Technology in the Asian Miracle and Debacle Debates

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Technology in the Asian Miracle and Debacle Debates

Applications of and Insights from the Field of Influence

Approach to Input-Output Analysis

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Technology in the Asian Miracle and Debacle Debates

Applications of and Insights from the Field of Influence
Approach to Input-Output Analysis

DISSERTATION

to obtain the degree of Doctor at Maastricht University,
on the authority of the Rector Magnificus,
Prof. Dr. Rianne M. Letschert in accordance with the
decision of the Board of Deans,
to be defended in public
on Thursday, 3 October 2019, at 14:00 hours

by

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SUMMARY

This study is about the role of technology in the Asian miracle and debacle episodes and dwells on several debates in economics. The basic contribution of the study is the application of the field of influence approach to input-output analysis in explaining economic growth and economic fluctuations. In the study, this was conducted in the case of three East Asian economies affected by the 1997 Asian crisis –the Philippines, Malaysia and Thailand.

The study is comprised of three parts. In Part One, a survey of growth theories that focus on technological change as the engine or driver of growth is provided in Chapter 2. These growth theories are the neoclassical or Solow growth, endogenous or new growth, Schumpeterian and evolutionary growth models. The basic difference between the Solow and endogenous models is the treatment of technological change as being determined outside the system (manna from heaven) in the former and being endogenized in the latter which means nations have to build their technological capability to grow. The third model on Schumpeterian and evolutionary models looks at the time path of technological changes as waves of technological advancements that revolutionize the economy.

Chapter 3 in the first part dwells on the accumulation versus assimilation debate in the case of the Asian miracle story, triggered by a World Bank report that deem to have found common ground in East Asian economies leapfrogging the industrialization process. Following Solowian growth accounting, the debate shows that depending on methodologies and assumptions of the various researchers, the growth of the Asian economies are either driven by additional capital and labor inputs (accumulation) or learning of new technologies (assimilation), both of which propose convincing arguments that do not result to any finality.

Part Two of the study focuses on another debate as to the causes of economic fluctuations in Chapter 4 where the leading causes in the literature pointing to monetary versus real or technological shocks as detonators of crisis in the growth momentum. While most episodes of economic crisis are driven by monetary impulses, real business cycle (RBC) theory looks at technological shocks as alternative explanation to why economies fluctuate with resulting effects on productivity. The chapter also connects the occurrence of cyclicalities in industries to the Forrester or bullwhip effect which shows the sensitivity of sectors across the supply chain to business cycles, with upstream or supplier industries most affected due to demand uncertainty and problems associated with forecasting demand and the need to supply buffer stocks to satisfy this demand downstream. The RBC theory was also linked to the notion of general purpose technologies (GPTs) which are dominantly used and have the potential to generate wider propagation mechanisms throughout the economy. The debate also touches on the empirical approach used to explain economic fluctuations ranging from econometric analysis to simulation to computable general equilibrium modelling, where RBC empirics were confined to simply simulating actual shocks with available data.

In Chapter 5, the Asian debacle story of 1997 is explained with another debate centering on the causes of the collapse of many Asian economies. The literature centers on the structuralist/fundamentalist versus the contagion/panic positions. The former adheres to the view that many of these Asian crisis economies suffered from major macroeconomic weaknesses such as balance of payments deficits, short term external debt accumulation, banking troubles beset with property bubbles and corporate governance problems. The opposite view believes in a pure

contagion occurring from asymmetric information yet economic fundamentals were sound. While both sides to the debate indicate business cycles as arising from monetary impulses in substance, there was no role ascribed to real shocks in attempting to explain the causes of the Asian crisis consonant with real business cycle theory.

Part Three of the dissertation is the kernel of the study as it applies input output analysis, specifically the relatively new field of influence approach to explain both economic growth and economic crisis in the case of three Asian economies – the Philippines, Malaysia and Thailand. Chapter 6 introduces the reader to the basics of input-output analysis which is the major methodological framework as well as the field of influence approach comprising equations that simply show that the matrix of technical coefficients for a given year should equal the sum of three parts: a) the matrix of technical coefficients of a reference year arranged as a direct field of influence where the entire matrix is just the product of all elements rearranged into row and column vectors; b) the total product of the direct field of influence matrix multiplied by the sectoral changes in technical coefficients; and c) the synergetic effect of both parts above calculated by multiplying the direct field of influence matrix by the reciprocal of the ratio of the determinant of the original (reference or base year) inverse matrix of technical coefficients to the determinant of the matrix of changes in the technical coefficients between the base year and the year under study.

A key assumption of input-output analysis is that the inverse of technical coefficients are fixed and yet the inverse coefficients change over time. The authors of the approach assume that this change in coefficients represent technological change as given a fixed share of inputs equaling unity, sectors compete for shares of inputs when producing their outputs. Given a longer time series of input-output tables being studied, the change in coefficients depict as well waves of technological diffusion across industries. Given this interpretation, there will be cases where the change in coefficients would be negative indicating less use of resources to produce higher output levels. In this study, such cases could be interpreted as technological efficiency (i.e., producing more with less) provided that domestic production is not replaced with higher imports of inputs and technological regress if the case is otherwise. Relating the change in coefficients to economic crisis, the conceptual framework uses network theory where propagation of sector-specific shocks analogous to new technologies diffusing across sectors in the case of growth, spreads like a virus throughout the economic system through a network of sectoral interdependencies in the case of crisis. This propagation mechanism which is conceptually associated to real business cycle theory could moreover be linked to the bullwhip effect where upstream or supplying sectors are adversely affected by supply shocks and downstream or buying sectors by demand shocks.

The concluding Chapter 7 presents and analyzes the results of the three economies which started off as agriculture-based in the reference years with food manufacturing and textiles as major industries and trade as the primary service sector but branching off over the decades to low technology to medium technology industries as mining, metallic manufacturing, petroleum, chemicals, electrical machinery, transport equipment, utilities such as electricity and water supply, and knowledge intensive services as transport and communication services, banking, finance and real estate, and private services.

Relating the findings to the debate on the role of technology in economic growth, long wave theory points to the invention of the microchip in the 1960s which led to the introduction of the computer in the 1970s and the rise of the Internet in the 1990s as the general purpose technology

that propelled technological change in the three Asian economies which became assemblers of semiconductor devices and manufacturers of computer peripherals post-1970s onwards. The fast diffusion of the Internet brought about by the dot com bubble which began in mid-1990 led to massive expansion of electronic chips in terms of components (transistors) fitted into a single silicon chip. Moore's law predicted the doubling of devices fitted onto a chip every 18 months shortening the technology cycles and accelerating the decline in prices of electronic products. This led to the digital revolution in the second half of the 1990s that witnessed the rise of digital cameras, smart phones, high definition television, navigation devices, and practically every household and personal gadget that uses the microchip. The spread of the Internet also crossed over services in internet banking, online ticketing, web shops and call centers. The economic structure of the three Asian economies were indeed transformed by technological change judging from the sectors that experienced changes in their technical coefficients.

As for the Asian crisis debate, the results of the field of influence seem to support both the panic/contagion position and the fundamentalist/ structuralist position. In the former, the key sector analysis based on the change in linkage coefficients show that the three Asian economies have similar industries in agriculture, mining, trade, petroleum and utilities and the rise of machinery in subsequent decades, indicating some element of contagion in the presence of asymmetric information among investors when the first country (Thailand) collapsed. However, there are also differences in structure of other sectors which developed in the three economies in terms of low, high and medium technology intensity, value added contribution, and sectoral shares to GDP. What is missing is the application of RBC theory in interpreting the crisis.

Using two models of the network propagation mechanism of real business cycle theory, the economic crisis that befell these three economies in 1997 could be played out by a supply shock arising from the microchip revolution where the rapid miniaturization of the chip in the latter part of the 1990s could have affected orders for the new chips by buyer industries [like electrical and industrial machinery (appliances), non-electrical machinery, transport equipment, communications, and utilities] which could not be fulfilled by supplier industries [mining, metals, rubber and plastic, chemicals (solvents), electrical parts (transistors)] that produce the required stocks of inputs following the bullwhip effect. Moreover, the emergence of China as a favorite destination for foreign investments in the semiconductor industry became a game changer in the growth momentum of the three Asian economies that thrived on semiconductors as their top foreign exchange earner. The demand shock arising from the recession following the Japanese property bubble in early 1990 coupled with the drop in electronics prices affected the supplier industries in terms of tighter financing and shrinking capital flows from Japanese banks into Japanese corporations that purchased these chips from these Asian economies and squeezed profitability from falling prices for electronic parts and products that significantly contributed to the fall in export earnings for these countries.

The study ends with policy implications in targeting industries that are technology intensive in industrial policy and national innovation systems and in identifying national champions with the right balance among sectors that contribute most to growth and those that minimize vulnerabilities from sectoral or even global-specific shocks. Under the emerging supplier-oriented model of development where the value chain is spread out to as many regions and countries that offer cost advantages in sectors such as semiconductors, transport equipment, and textiles and wearing apparel, the movement from low to higher value added segments of this value chain is critical for countries to graduate from mere assemblers to producers of own brands surrounded by a robust local component supplier base. There are also policy implications

in statistical compilation as national accounting frameworks tend to ignore the importance of material usage and input intensities of sectors given sustainability and environmental concerns. There are also contributions to institution building efforts of international organizations and research institutes engaged in innovation studies on the role of technology in growth and economic cycles as well as technological capability building and technology management among developing countries. The study finally reflects on the various debates presented in the study concerning the role of technology in terms of theory and empirical analysis on growth and crisis episodes as one is just a reverse of the other. Such was the intention of real business cycle theory in reconciling the gap in theoretical explanations of growth and crisis which were also studied using different analytical tools. As shown in this study, the field of influence approach to input-output analysis shows promise in bridging this gap by using the change in technological coefficients to explain technology diffusion that drives growth while at the same time the propagation of shocks between and among buying and supplying industries during times of economic crisis.

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*The road goes ever on and on down from the
door where it began. Now far ahead the road
has gone and I must follow if I can. Pursuing it
with weary feet until it joins some larger way,
where many paths and errands meet —and
whither then I cannot say.*

J.R.R. Tolkien

Chapter 1

Introduction

The Task Ahead:

1.1 The Context

The Asian crisis is a crisis of growth. What began as currency devaluation in Thailand in July 1997 spread out as a financial panic to the other Asian economies of Indonesia, Malaysia, the Philippines, and later in October of that year to South Korea, Hong Kong, and to lesser extents in Singapore, Viet Nam and China. There was a dramatic downturn for many of these economies, which have grown so rapidly for so long. Pritchett (2000), in a landmark study of more than a hundred countries, stylized growth patterns into hills (countries that experienced steady growth), plateaus (rapid growth followed by stagnation), mountains (rapid growth followed by decline), cliffs (rapid growth followed by steep falls); plains (continuous stagnation); and valleys (steady declines). He concluded that analysis of episodes of growth acceleration or deceleration show more promise as a policy-relevant exercise in investigating determinants of long run growth. In this work, the growth episode of high-performing Asian economies were classified as hills. A major challenge for any researcher working on the Asian model of economic development is to explain what factors spawned the decades-long stellar economic performance of these economies, why the growth momentum in Asia collapsed for some time, what caused growth to deviate from its trajectory, and how to improve the predictability of this growth path.

These questions led the researcher to look to economic growth and business cycle theories for answers. Economic growth literature, after all, has focused on explaining the sources and measures of growth between countries and whether this growth will converge or diverge between countries or groups of countries. The neoclassical growth theory, also called the Solow-Swan model accorded technology as an important determinant of growth although it never fully explained how technology emerged except that it fell from the sky as “manna from heaven”. Subsequent growth theories that feature technology as the centrepiece of growth are the endogenous growth theories, Schumpeterian and evolutionary theories which explore alternative definitions of technological progress embodied in human capital, research and development, entrepreneurship and innovation systems.

The business cycle literature, on the other hand, is that branch of study in macroeconomic theory that deals with the trend of economic growth and the fluctuations around this growth trajectory. Business cycles as defined by Lucas (1977), are deviations of aggregate real output from trend and co-movements of deviations from trend of various economic aggregates with those of real output. Business cycles, however, have a short-term connotation that repeats over a protracted time frame, usually associated with political tenure i.e., of about four years, when inventory changes occur (known as the Kitchin cycle), or of about a decade when fixed investments undergo

changes (known as the Juglar cycle); or in the medium term, e.g., of about 20 years associated with demographic changes (called Kuznets cycle). Long wave theory in turn emphasises the long-term deviation from the growth trajectory lasting 50-60 years (called Kondratieff waves) with technology as a major force behind each wave. Nonetheless, the Asian crisis is an economic aberration that needs explaining from whatever theory of economic fluctuations exists. After all, the Asian crisis has been characterised as bearing a resemblance to the Great Depression as noted by Krugman (1999), a period in economic history when precisely interest in business cycle theory was rekindled. He resurrected the notion of what he calls a "return to depression economics" triggered by the economic collapse of Asia. Furthermore, Chevallier (2002) alluded to the Asian crisis the down wave of the last Kondratieff cycle and the prelude to the ascending wave of the fifth long wave.

The literature on business cycles, be it on short and medium cycles or the so-called long wave, attributes economic fluctuations to two dominant impulses or shocks. These are *monetary* phenomena that theoretically operate on the demand side and *real* phenomena that are supply-driven, mainly on account of *technology* or productivity shocks. According to Solomou (1998), the two leading impulses to business cycles are (i) *monetary* disturbances, including *exchange rate* shocks on the demand side as advocated by the rational expectations school associated with Lucas (1975, 1977) and Barro (1976); and (ii) *technology* shocks on the supply side as emphasised in what came to be known as the real business cycle (RBC) theory, based on the pioneering work of Kydland and Prescott (1982). The same dichotomy between monetary business cycle models and RBC models are found in Hartley, Hoover and Salyer (1998), and Cooley (1995). Brunner and Meltzer (1986) also confirm that since the coming out of Haberler's classic study of business cycle theory in 1958, there has never been a consensus among economists about the dominant cause of fluctuations in the economy with real and monetary explanations competing.

In the case of the recent Asian crisis, the second approach, i.e., the impact of technological shocks, has been ignored. This is evident in the fact that the two opposing views on fundamentals attributed to Krugman (1994, 1997) and Corsetti, Pesenti & Roubini (1998a, 1998b, 1998c, 1998d) versus contagion advocated by Sachs & Radelet (1998s, 1998b) and Rodrick (1997) as the culprits behind the Asian debacle show a strong proclivity towards the monetarist explanation. There is a formidable case for this, inasmuch as the tell-tale signs of the crisis admittedly, are predominantly monetary and financial in nature (e.g., exchange rate trends, movements of capital flows, and fragile banking structures). Thus, most economists would concede that the Asian crisis is indeed a financial or even a currency crisis. This study does not challenge this belief nor attempts to offer an alternative explanation. One wonders however, if there is also some credence to explanations of the RBC theory that attribute economic fluctuations to a real factor such as a technology shock and if indeed this could be applied in the context of the events in Asia.

1.2 The Research Problems

The research problems posed by the study is to investigate the role of technology in the Asian growth and crisis episodes by applying input-output analysis. First, behind the Asian growth miracle story is the *accumulation*¹ versus *assimilation*² debate over the real source of growth in

¹ The major proponents of the accumulation view are Young (1992, 1994a, 1994b), Kim and Lau (1994, 1996), Nehru and Dhareshwar (1994), Osaka (1994), Collins and Bosworth (1996), Park and Ryu (2003) and Hahn and Kim (2003). Timmer (1999) also studied productivity growth in selected Asian economies and found them to be low.

² The major advocates of the assimilation view are Pack and Page (1994a, 1994b), Kawai (1994), Lindauer and Roemer (1994), Marti (1996), Sarel (1996), Drysdale and Huang (1997), Klenow and Rodriguez-Clare (1997), Nadiri and Son (1998) and Hsieh (1999, 2000a).

Asia where the Solow growth accounting approach was applied by different researchers to test if growth was merely input-driven or technology-based. This paper attempts to contribute to the debate by exploring new developments in dynamic input-output analysis in a technique called the “field of influence” approach. Secondly, the Asian crisis episode of 1997 was also characterized by a *structuralist*³ versus *contagion*⁴ debate which are both predominantly macroeconomic and financial/monetary in substance where the former believes that economic fundamentals were weak and the latter that there was simply panic among creditors due to asymmetric information. This research contributes to the debate by using the same dynamic input-output analysis called the field of influence to explore the possibility and relevance of the role of technology in line with real business cycle theory, in augmenting explanations to the causes of the Asian crisis.

The study will focus on three out of the five most affected economies of the Asian crisis. These are the ASEAN⁵ member countries of Thailand, Malaysia, and the Philippines. The hypotheses I put forward are first, that using the field of influence approach, the role of technological change in growth when defined in terms of how inputs are bought from and sold to other industries or sectors in the economy could stimulate growth via multiplier effects in these sectors to the extent that unmet demand and unutilized productive capacities prevail in the economy. Second, in the Asian crisis episode, input-output analysis show how crisis can be propagated across industries and sectors following RBC theory via the same multiplier process but in reverse.

Based on the foregoing, this study is intended to:

- (i) *Explore if technology assimilation or input accumulation caused Asia's spectacular growth using dynamic input-output analysis called the field of influence*

Growth accounting exercises have proven to shed little light on the causes of the Asian miracle with the use of the standard neo-classical production function to isolate the Solow residual or total factor productivity (TFP). The accumulationists view the growth process as merely attributable to the increase in productive inputs, specifically capital, and also skilled and a more literate labour force. The assimilationists, however, believe that there was technological progress and learning that spurred this growth process. The empirics prove little with different TFP estimations for the same countries even for the same periods, but largely contingent really on the assumptions about output elasticities of capital and labour, and about the specifications of the production functions. An emerging approach is the use of field of influence approach in input-output analysis that examines the changes in the inverse of the technical coefficients over time.

- (ii) *Investigate how the occurrence of the Asian crisis could be explained by the use of input-output analysis showing propagation mechanisms of crisis, and thereby examine the relevance of real business cycle explanations*

While few economists would argue anymore that technology shocks are the only source of business cycles following the RBC's basic premise, it would still be interesting to know if technology shocks can explain some part of the fluctuations, considering that monetary and other observable shocks seem unable to explain a large portion of the cyclicity of output as noted by

³ The structuralist position are based on the works of Krugman (1997b, 1998b), and Corsetti, Pesenti and Roubini (1998a, 1998b, 1998c, 1998d)

⁴ The contagion position is attributed to Sachs and Radelet (1998a, 1998b) and Rodrik (1998)

⁵ Association of South East Asian Nations comprising the countries of Indonesia, Malaysia, Thailand, Philippines, Singapore, Brunei Darussalam, Cambodia, Laos, Viet Nam, and Myanmar

Cochrane (1994). In this case, the technology shock will have to be clearly defined as it could assume different forms in the various countries covered under this study. Given this, the study does not attempt to give a mono-explanation of the Asian crisis but will attempt to supplement existing explanations by quantifying the real productivity shocks in the inter-industry accounts of input-output that contributed to the slack in growth for the economies of Asia.

1.3 The Scope of the Research

The study will focus on Thailand, Malaysia, and the Philippines, which were three among the five Asian economies most severely affected by the crisis. Partly due to budgetary and time constraints, not all the crisis economies were covered. South Korea was not included in the study because of its totally different level of economic development, being among the dragon economies and now a member of the OECD. Indonesia, on the other hand, was excluded from the scope of the study due to budgetary constraints on the funding of this research in obtaining historical input-output statistics although this could be a future area of study along with the other Southeast Asian economies like China, Viet Nam, Singapore and Taiwan. The three ASEAN economies were selected for the project also on the basis of the availability of consistent historical data on input-output from the time these countries introduced input-output tables.

1.4 The Research Methodology

Measuring Technology and Economic Growth

Because of its mathematical simplicity, the empirics behind growth theory centered on Solowian growth accounting. This involved extracting the growth rates of capital and labor as well as the parameter A in the Cobb-Douglas macro production function which Solow identifies as technological progress. As will be shown in Part One of this study, the Asian miracle debate emerged from conflicting findings of growth accounting exercises done in East Asian economies with one camp claiming growth was merely input-driven (accumulation) and the other, that growth was technologically-driven (assimilation). Recently, a new methodology called production frontier or data envelopment analysis (DEA) surfaced from the works of Aigner & Chu (1968); Aigner, Knox Lovell & Schmidt (1977); Atkinson & Cornwell (1994a, 1994b); Coelli, Prasada Rao & Battese (1998); Fried, Lovell & Schmidt (1993); Färe, Grosskopf & Knox Lovell (1994); Charnes, Cooper, Lewin & Seiford (2001); Sengupta (1995, 2000); Thanassoulis (2001); and Cooper, Seiford & Tone (2000). Production frontier analysis or data envelopment analysis (DEA) involves the measurement of the relative efficiency of a set of decision-making units that are similar in their patterns of inputs and output processes⁶. Using data on input costs and revenues from the sale of output, the DEA model is specified for firms belonging to an industry to analyze their technical and allocative efficiency. Technical efficiency is a measure of the firm's success in producing the maximum possible output from a given set of inputs, while allocative efficiency measures the firm's success in choosing an optimal set of inputs with a given set of input and/or output prices. Thus, the idea behind the DEA approach is to measure shifts of the production frontier to the best practice or maximum possibility, as against movements along the production frontier⁷.

The approach, drawing heavily on linear or mathematical programming, has been applied mostly at the micro- and meso- levels from measuring profitability, cost and scale efficiencies in public

⁶ See Sengupta (2000) and Thanassoulis (2001)

⁷ See Fried, Knox Lovell & Schmidt (1993) and Färe, Grosskopf & Knox Lovell (1994)

sector organisations like schools and hospitals and prison systems to private operations such as international airlines, telephone companies, agricultural farms, and big league baseball⁸. However, new results and applications of this technique have been discovered in the areas of finance (e.g., risk aversion and efficiency, investment portfolio modelling), management (comparing performance of public versus privately owned firms in a given industry, strategic grouping, environmental and quality control), and economics (technology diffusion, growth theory, flexible manufacturing systems)⁹. The emergence of dynamic efficiency analysis as opposed to stochastic frontier analysis¹⁰ during the earlier evolution of this methodological approach, led to the latter stream of applications with the source of dynamics provided for by technological change embodied in inputs or disembodied in experience and skills, learning curve effects, and lags in adjusting stocks of inputs to desired levels¹¹. In the growth context, Sengupta (2000) further attributes dynamic efficiency to the issue of output growth over time and the extent to which it can be explained by growth of different inputs and their marginal contributions in line with Solowian growth dynamics.

Ten Raa and Mohnen (2000) were among the first to use data envelopment analysis (DEA) application in measuring TFP growth using dynamic input-output analysis. Using input-output tables from Canada for the years 1962 to 1991, the authors were able to decompose TFP into efficiency change and frontier productivity growth, from which they were able to further extract technical change and terms-of-trade effects. The use of DEA just like growth accounting also would hinge on assumptions about best practice countries as technological frontiers.

In this study, a new approach called the field-of influence methodology will be examined and applied to the three subject countries. The core assumption of input-output analysis which was introduced by Wassily Leontief in 1966 is the constancy of direct input coefficients. The theoretical notion of the field of influence approach was developed in the late 1980s by Sonis and Hewings (1988a, 1988b, 1992) as a way of representing technological change as a change in the input coefficients. The process of technological change is presented as sectors or industries competing for shares of inputs as a result of the diffusion of innovation in the economy. The field of influence approach to input-output analysis is more thoroughly described in Part Three of this research.

Measuring Technology and Economic Fluctuations (Business Cycles)

On the other hand, the methodologies used in measuring and interpreting economic fluctuations, based on a literature survey of business cycle empirics¹² could be classified into the following: (i) indicator approach, (ii) econometric approach; (iii) general equilibrium modelling, and (iv) case studies. The *indicator* approach¹³ involves the development of leading, coincident and lagging sets of data expressed in index form such as diffusion or composite indices. The central idea is to find a batch of statistical time series that (i) conform to the business cycle, and (ii) demonstrate consistency in timing patterns such as leading or coincident or lagging sets of variables. Coincident indicators are used to define the turning points of the cycle, the leading indicators to forecast these points, and the lagging indicators to confirm that a cycle did happen.

⁸ See Charnes, Cooper, Lewin and Seiford (2001)

⁹ See Sengupta (1995, 2000)

¹⁰ Refers to the introduction of noise, measurement errors and disturbances in production frontier analysis. See Kumbhakar & Knox Lovell (2000)

¹¹ See Sengupta (2000)

¹² See Bergstöm & Vredin (1994); Hartley, Hoover & Salyer (1998); Semmler (1994); Thygesen et al. (1991); Zarnowitz (1992).

¹³ See Klein (1990), Stock & Watson (1993), and Zarnowitz (1992).

The *econometric* approach involves model building or the specification of equations that describe the structure of an economy. Among the various econometric methods, those typically used in business cycle analysis are vector autoregression¹⁴, and time series decomposition that entail detrending, filtering, and spectral analysis techniques. Vector autoregression (VAR) specifies a system of equations in which each variable is a function of past values of all other variables as well as of its own past values, to determine Granger causality in the economic system and the adjustment path of specific shocks. The variance of the forecast error at various periods in VAR results could be decomposed into the contributions from different shocks. *Time series decomposition* is a statistical process of removing in a given time series a trend, cyclical, seasonal and irregular component, of which two methods of decomposing the series are filtering¹⁵ and spectral analysis¹⁶.

*General equilibrium modelling (GEM)*¹⁷ is basically a theoretical construct of a Walrasian economic system consisting of households and firms as rational agents that own endowments or resources and behave to maximise some function subject to a budget constraint. The model determines equilibrium set of prices that match demand and supply for each and for all markets. Recent developments in research on GEM incorporate features to address its strict assumptions and static properties that include modelling with heterogeneous agents, infinite horizons, overlapping generations, externalities, non-convexities, imperfect competition, and missing markets¹⁸. Most of the monetary and RBC models described above are general equilibrium models patterned after Solow's growth model.

Finally, the *case study method*¹⁹ examines historical evidence by relying on singular or multiple sources of evidence, with data constructed to support a prior development of a theoretical proposition.

In this study, input-output analysis will again be employed inspired by the pioneering work of Acemoglu et al. (2015) where the key idea is that the structure of connections or interlinkages (called networks) between sectors and industries have implications on the propagation of shocks within the economy. Upon closer look, the idea is very similar to the field of influence approach introduced above. This network approach to input-output analysis is thoroughly discussed in Part Three as well.

1.5 Relevance and Contributions of the Study

The research agenda of this study will contribute to the understanding of the relationship between monetary or financial flows, technological innovation and long-term economic fluctuations. The study is also an initial attempt to explore an auxiliary explanation to the Asian crisis from the RBC perspective using the propagation element of a shock. As the RBC theory has always been associated with and tested for the U.S. economy and other developed economies of Europe, it is

¹⁴ See Berstöm & Vredin (1994), and Hamilton (1994) for procedures involved in VAR analysis; and Bernanke (1986), Bayoumi & Eichengreen (1996), Cecchetti & Karras (1994), and Canova, Finn & Pagan (1994), Todd (1990), Kim (1993), and Jacobs (1998) for VAR applications in relation to business cycle analysis.

¹⁵ See Hamilton (1994) for statistical procedures involved in filtering and spectral analysis. Hassler et al. (1994) described three filtering methods commonly used in business cycle analysis and applied these techniques in a study of the Swedish business cycle.

¹⁶ See Woitek (1997) for application of spectral analysis to business cycle analysis.

¹⁷ See Ginsburgh & Keyzer (1997) for description of methodology involved in general equilibrium modelling.

¹⁸ See Cooper (1997) for RBC application that introduces heterogeneity and non-convexity.

¹⁹ See Yin (1994) for description of case study method.

also an introductory effort to investigate the relevance of RBC modelling in a developing country setting.

The most significant contribution of this study is the application of input-output analysis in a dynamic context to understand economic growth and crisis. The results of the study will be relevant in terms of contributing to the literature on the economics of technological change, in terms of creating implications for institutional and capability-building efforts in the area of technology in developing countries, and in enhancing the overall technological policy context in these developing countries.

Contributions to the Literature

The findings of this study and its empirical results will greatly enrich the understanding of five ongoing controversies surrounding the economics of technological change.

First, the study contributes to the *accumulation versus assimilation debate* on the causes of East Asia's growth. The standard growth accounting equation uses total factor productivity (TFP) or the Solow residual to proxy for technological progress as a source of economic growth. While the growth accounting approach has been subject to criticism due to the assumptions relating to the specification of the production function, recent techniques such as the field of influence approach, have shown promise. This technique will be tested in the case of the Asian countries to showcase changes in input coefficients over time as representing technological change.

Second, the study links to the debate on *real and monetary explanations of business cycles*. If technology is proven to have a bearing on the Asian crisis, it will enhance and support the growing interest in real business cycle (RBC) analysis, which because of methodological issues, has been questioned as to relevance in favour of monetary business cycle (MBC) theories. While the study believes that monetary factors did trigger the crisis, it would also want to explore the possible role that technology could have contributed to the crisis in line with RBC thinking using input-output analysis to show the dynamics of how shocks are propagated among sectors or industries. The use of real business cycle explanations to the Asian crisis has never been explored and is a novelty of this study.

Third, the study relates to the *fundamentals versus contagion debate* about the causes of the Asian crisis. The results of the field of influence approach especially from key sector analysis will confirm if the countries share structural characteristics which could imply contagion effects in the absence of information to creditors or if structural differences exists not in terms of macroeconomic fundamentals but in terms of micro/meso perspectives. The study, by exploring how productivity shocks are propagated in the countries affected by the Asian crisis, will supplement existing explanations by incorporating a supply-side perspective. This will enrich understanding of business cycle phenomenon, which is caused by a cluster or combination of factors that could include technology shocks in addition to monetary or financial shocks.

Fourth, research gaps in the field of the microeconomics as opposed to the macroeconomics of technological change have also been noted and the industry-level or meso approach used in the study could help strengthen this area. The study would also contribute significantly to the widening applications of empirical methodologies in analysing the role of technological change on growth and economic fluctuations. The resulting empirical findings from the study, based on the developing country perspective acquired from the selected study sample of three crisis

economies, may lend useful insights to applications of input-output analysis such as studying Schumpeterian waves of technology across sectors and the whole economy. Another possible area for future research is to conduct a similar analysis for the other crisis economies of South Korea and Indonesia, and to those Asian countries that were not as severely affected by the crisis such as Singapore, Taiwan, Viet Nam and China. With European countries such as Greece, Spain, Portugal, Italy and Ireland experiencing similar crisis episodes, the study can also be extended in these economies as a future area for research. This will be useful in extending generalisations and conclusions about the impact of technology on growth and business cycles using the input-output framework.

Contributions to Institutional and Capability-Building Efforts

The study can also contribute to capacity and institution building in the area of policy-related research on growth and economic cycle analysis not only in the Asian context but in general as well. Among the institutions dealing with analysis of economic fluctuations, the study will be particularly relevant to academic and research institutions such as the National Bureau of Economic Research (NBER), Institute of Developing Economies (IDE), United Nations University Institute for New Technologies and Maastricht Economic Research Institute of Technology (UNU-MERIT), and also the various government agencies in the countries covered by this study that undertake their own economic and business cycle forecasting. The results of the study will also be of some importance to international institutions that deal with technological change in the Asian region such as the Asian Development Bank (ADB) and the Asian Institute of Technology (AIT).

The NBER has studied business cycles since the 1950s for the United States, Great Britain, France and Germany. The NBER nonetheless had focused more on the study of business cycles in developed countries. The application of business cycle analysis in the context of developing Asian economies could be useful in supplementing the body of work already done. As noted earlier, most of the policy research on business cycles has focused on OECD economies. Lags have been evident in similar research in the context of developing economies. The value added of the research is in testing the propagation mechanism of shocks in the economic system.

The empirical results of the study can also be useful and relevant to the ADB, a multilateral bank that finances sustainable development in the region, where the Asian crisis prompted the creation of a regional monitoring unit within its Strategy and Policy Office. The failure of the Bank to predict the Asian crisis necessitated the restructuring in its organisational set-up with the installation of an Asia Recovery Information Centre (ARIC), where results of the study can serve as input in monitoring efforts. The Asian Institute of Technology (AIT), which is a school for technology created for Asian scientists, engineers and technology managers can also benefit from the results of the study, by way of serving as a basis for its technology management courses and as a topic for future seminar series.

Finally, the study will be relevant to academic and research institutions such as UNU-MERIT, which main research interests lie in technology capability building in developing countries, and technological-catching-up between developing and developed economies, and under whose PhD collaborative program this research was conducted. The software developed by the researcher using Excel on the field of influence approach to input-output analysis can be used to test how industries and sectors in an economy compete for inputs as a manifestation of technological change, and how a shock can be propagated economy-wide.

Contribution to Policy Formulation

The findings of the study can significantly contribute to policy-making at both national and international levels. At the national level, appropriate understanding of the factors that affect business or economic fluctuations can lead to the formulation of improved macroeconomic and industrial policy prescriptions. There is a role played by technological forces in affecting policies that influence national innovation systems and that would necessitate active involvement of science and technology, and research and development institutes in development planning. For monetary shocks, monetary and financial policies will be given direction especially as these affect technology capability building and R&D financing.

The results of the research signify the importance of structural reforms being undertaken in the national innovation systems of the countries involved. In the flourishing literature on the causes of the Asian crisis, one finds after all that elements of the national innovation systems were also responsible for abetting the incidence of crisis. For instance, the power structure of the *chaebol*, which is a commanding feature of the Korean national innovation system, has been cited in the literature to showcase how moral hazard and weak corporate governance triggered the crisis. Certain aspects of national innovation systems that could get affected are the national financial systems, structural competitiveness, industrial networking, foreign direct investments and the operations of multinationals, public policy and relationship with the private sector, work organisation and management systems, and the process of institutional learning. These policy implications of the Asian crisis on national innovation systems when adequately addressed would ensure that industrial policy would remain effective in influencing an economy's sustainability and overall development strategy.

1.6 The Plan of the Book

The body of the thesis comprises three major parts — *Part One* deals with the role of technology in growth and in the Asian miracle story in particular; *Part Two* with the role of technology in economic crisis and specifically in the Asian crisis episode; *Part Three* presents the input-output framework and the field of influence approach and network approach to explain growth and crisis, respectively and their applications in the three countries of Thailand, Malaysia and the Philippines and in deriving policy insights.

Part One surveys growth theories that focus on technological change as the driver of growth, chiefly neoclassical, endogenous and Schumpeterian-evolutionary approaches and also canvasses the empirical approaches to growth with a focus on the use of growth accounting in the Asian miracle debate. The Solowian growth accounting approach was the main methodology used in evaluating the role of technology in the the growth dynamics in the Asian economies.

Part Two initially renders a comprehensive survey of the theory of economic fluctuations, particularly of the two competing explanations for economic crisis— monetary and real business cycle (RBC) theories. It elaborates further on the empirics, their limitations and criticisms. The section digresses a bit on a business phenomenon called the bullwhip effect which affects supply chain activities that will be relevant in the network approach to crisis. Next, it provides a cursory look at the Asian crisis and the debate on the Asian crisis.

Part Three presents the input-output framework and its extensions to growth and crisis analysis using the field of influence approach. The results and findings of the empirical work are then

presented for the three subject economies of the study. The thesis ends with key general conclusions, policy implications, and remaining issues and areas for further research and improvement, on the role of technological change on economic growth and crisis.

REFERENCES

- Acemoglu, D., Akcigit, U. & Kerr, W. (2015). Networks and the Macroeconomy: An Empirical Exploration. *NBER Working Paper 21344*. Cambridge, MA, July.
- Aigner, D. & Chu, S. (1968). On Estimating the Industry Production Function. *American Economic Review* 58: 826-839.
- Aigner, D., Knox Lovell, C. & Schmidt, P. (1977). *Formulation and Estimation of Stochastic Frontier Production Function Models*. *Journal of Econometrics* 6:21-37.
- Atkinson, S. E. & Cornwell, C. (1994a). Estimation of Output and Input Technical Efficiency Using a Flexible Form and Panel Data. *International Economic Review* 35, 245-255.
- Atkinson, S. E. & Cornwell, C. (1994b). Parametric Estimation of Technical and Allocative Inefficiency with Panel Data. *International Economic Review* 35, 231-243.
- Barro, R. (1976). Rational expectations and the role of monetary policy. *Journal of Monetary Economics* 2(1), 1-32.
- Bayoumi, T. & Eichengreen, B. (1996). The Gold Standard and the International Monetary System. In T. Bayoumi, B. Eichengreen, & M. Taylor (Eds), *Modern Perspectives on the Gold Standard*, Cambridge.
- Bergstörm, V. & Anders, V. (Eds) (1994). *Measuring and Interpreting Business Cycles*. Oxford: Clarendon Press.
- Bernanke, B. (1986). Alternative Explanations of the Money-Income Correlation. In K. Brunner & A. Meltzer (Eds.) *Real Business Cycles, Real Exchange Rates and Actual Policies*, *Carnegie-Rochester Conference Series on Public Policy*. North Holland, Vol. 25.
- Boskin, M. J. & Lau, L.J. (1990). Post-War Economic Growth in the Group-of-Five Countries: A New Analysis. Center for International and Development Economics Research, *Stanford University Technical Paper No. 217*.
- Boskin, M. J. & Lau, L.J. (1992). International and Intertemporal Comparison of Productive Efficiency: An application of the meta-production function approach to the Group-of-Five (G-5) Countries. *Economic Studies Quarterly* 43: 298-312.
- Brunner, K. & Meltzer, A.H. (1986) (Eds) *Real Business Cycles, Real Exchange Rates and Actual Policies*, *Carnegie-Rochester Conference Series on Public Policy*. North Holland, Vol. 25.
- Canova, F., Finn, M. & Pagan, A.R. (1994). Evaluating a real business cycle model. Reprinted in Hartley, J., Hoover, K. & Salyer, K. (1998), *Real Business Cycles: A Reader*. London: Routledge, 431-61.
- Cecchetti, S.G. & Karras, G. (1994). Sources of Output Fluctuations during the Interwar Period: Further Evidence on the Causes of the Great Depression. *Review of Economics and Statistics*, 77, 80-102.

- Charnes, A., Cooper, W., Lewin, A. & Seiford, L. (2001). *Data Envelopment Analysis Theory, Methodology and Applications*. Boston: Kluwer Academic Publishers.
- Chevallier, F. (2002). *Greenspan's Taming of the Wave*. London: Kogan Page.
- Cochrane, J. (1994) Shocks. *Carnegie-Rochester Conference Series on Public Policy*, Spring, 41, 295-364.
- Coelli, T., Prasada Rao, D. & Battese, G. (1998). *An Introduction to Efficiency and Productivity Analysis*, Massachusetts: Kluwer.
- Collins, S. & Bosworth, B. (1996). Economic Growth in East Asia: Accumulation versus Assimilation, *Brookings Papers on Economic Activity*, 2, 135-191.
- Cooley, T. (1995). *Frontiers of Business Cycle Research*. New Jersey: Princeton.
- Cooper, R. (1997). Business Cycles: Theory, Evidence and Implications. *NBER Working Paper 5994*, Massachusetts: National Bureau of Economic Research, April.
- Cooper, W., Seiford, L. & Tone, K. (2000). *Data Envelopment Analysis A Comprehensive Text with Models, Applications, References and DEA-Solver Software*. Boston: Kluwer Academic Publishers.
- Corsetti, G., Pesenti, P. & Roubini, N. (1998a). *What caused the Asian currency and financial crisis? Part I: A macroeconomic overview*. Yale University, September.
- Corsetti, G., Pesenti, P. & Roubini, N. (1998b). *What caused the Asian currency and financial crisis? Part II: The policy debate*. Yale University, September.
- Corsetti, G., Pesenti, P. & Roubini, N. (1998c). Paper Tigers? A model of the Asian crisis. *NBER Working Paper 6783*, November.
- Corsetti, G., Pesenti, P. & Roubini, N. (1998d). *Fundamental determinants of the Asian crisis: a preliminary empirical assessment*, Fordham University, November.
- Dahlman, C., Ross-Larson, B. & Westphal, L. (1987), Managing Technological Development: Lessons from the Newly Industrializing Countries. *World Development*, Vol. 15, No. 6: 759-75.
- Drysdale, P. & Huang, Y. (1997). Technological Catch-up and Economic Growth in East Asia and the Pacific. *The Economic Record*, Volume 73, No. 222, September, pp.201-211.
- Färe, R., Grosskopf, S. & Knox Lovell, C. (1994). *Production Frontiers*. Cambridge, U.K.: Cambridge University Press.
- Fried, H., Knox Lovell, C. & Schmidt, S. (1993). *The Measurement of Productive Efficiency Techniques and Applications*. New York: Oxford University Press.
- Ginsburgh, V. & Keyzer, M. (1997). *The Structure of Applied General Equilibrium Models*. Cambridge: MIT Press.
- Haberler, G. (1958). *Prosperity and Depression: A Theoretical Analysis of Cyclical Movements*. United Nations, New York.

- Hahn, C. & Kim, J. (2003). Understanding East Asian Growth: Sources and Determinants in a Cross-Country Perspective. Paper presented at the *Global Development Network Annual Meeting* held in Bonn, Germany in December 1999 organized by the World Bank.
- Hamilton, J. (1994). *Time Series Analysis*. Princeton University Press.
- Hartley, J., Hoover, K. & Salyer, K. (1998). *Real Business Cycles: A Reader*. London: Routledge.
- Hsieh, C. (2000a). *What Explains the Industrial Revolution in Asia? Evidence from the Factor Markets*. New Jersey: Princeton University, October.
- Hsieh, C. (1999). Productivity Growth and Factor Prices in East Asia. *American Economic Review*, Volume 89, No. 2, pp. 133-138.
- Jacobs, J. (1998). *Econometric Business Cycle Research*. Netherlands: Kluwer Academic Publishers.
- Kawai, H. (1994). International Comparative Analysis of Economic Growth: Trade Liberalization and Productivity. *The Developing Economies*, Volume 32, No. 4, (December), pp. 373-397.
- Kim, J. & Lau, L. (1994). The Sources of Economic Growth in the East Asian Newly Industrializing Countries. *Journal of the Japanese and International Economies*, 8: 235-71.
- Kim, J. & Lau, L. (1996). The Sources of Asian Pacific Economic Growth. *Canadian Journal of Economics*, Volume 39 (April), S448-S454.
- Kim, J. (1993). *Essays on Liquidity and Money*. PhD dissertation, University of California Los Angeles.
- Klein, P. (Ed) (1990). Analyzing Modern Business Cycles. *Essays Honoring Geoffrey H. Moore*, New York: M.E. Sharpe, Inc.
- Klenow, P. & Rodriguez-Clare, A. (1997). The Neoclassical Revival in Growth Economics: Has It Gone Too Far? In B. Bernanke & J. Rotemberg (1997) (Eds.) *NBER Macroeconomics Annual*. Cambridge, MA: MIT Press, pp. 73-114.
- Krugman, P. (1994). The Myth of Asia's Miracle. *Foreign Affairs*, 73 (6), 62-78.
- Krugman, P. (1997). Asia's Miracle is Alive and Well? Wrong, It Never Existed. *Time Asia*, 150 (13), September 29.
- Krugman, P. (1999). *The Return of Depression Economics*. New York: W.W. Norton and Company.
- Kumbhakar, S. & Knox Lovell C.A. (2000). *Stochastic Frontier Analysis*. Cambridge, U.K.: Cambridge University Press.
- Kydland, F. & Prescott, E. (1982). Time to Build and Aggregate Fluctuations. *Econometrica*, 50 (6), November, 1345-70.
- Leontief, W. (1966). *Input-Output Economics*. New York: Oxford University Press.
- Lindauer, D. L. & Roemer, M. (1994). Legacies and Opportunities. In D.L. Lindauer and M. Roemer (Eds.) *Asia and Africa: Legacies and Opportunities in Development*. International Center for Economic Growth and the Harvard Institute for International Development.

- Lucas, R. (1975). An Equilibrium Model of the Business Cycle. *Journal of Political Economy*, 83 (6), 1113-44.
- Lucas, R. (1977). Understanding Business Cycles. In K. Brunner & A. Meltzer (Eds.) *Stabilization of the Domestic and International Economy*, *Carnegie-Rochester Conference Series in Public Policy*, Amsterdam: North Holland, 7-29.
- Marti, C. (1996). Is There An East Asian Miracle? *Union Bank of Switzerland Economic Research Working Paper*, Zurich: Switzerland.
- Nadiri, I. & Kim, S. (1996a). R&D, Production Structure and Productivity Growth: A Comparison of the US, Japanese and Korean Manufacturing Sectors. *NBER Working Paper 5506*, Cambridge, Massachusetts: National Bureau of Economic Research (March).
- Nadiri, I. & Kim, S. (1996b). International R&D Spillovers, Trade and Productivity in Major OECD Countries. *NBER Working paper 5801*, Cambridge, Massachusetts: National Bureau of Economic Research (March).
- Nadiri, I. & Son, W. (1998). Sources of Growth in East Asian Economies. In T. Fu, C. Huang & C.A. Knox Lovell (Eds.) (1999) *Economic Efficiency and Productivity Growth in the Asia-Pacific Region*. UK: Edward Elgar Publishing, Institute of Economics, Academia Sinica Taiwan, pp. 43-65.
- Nehru, V. & Dhareshwar, A. (1994). New Estimates of Total Factor Productivity Growth for Developing and Industrial Countries. *World Bank Policy Research Working Paper* No. 1313.
- Nelson, R. & Pack, H. (1995). *The Asian Miracle and Modern Economic Growth*. World Bank, October.
- Osaka, H. (1994). Productivity Growth Analysis for Selected Asian Countries. *Asia-Pacific Development Journal*, Volume 4, Issue 2, pp. 93-110.
- Pack, H. & Page, J. Jr. (1994a). Accumulation, exports and growth in the high performing Asian economies. *Carnegie-Rochester Conference Series on Public Policy*, Volume 40, pp. 199-236.
- Pack, H. & Page, J. Jr. (1994b). Reply to Young. *Carnegie-Rochester Conference Series on Public Policy*, Volume 40, pp. 251-257.
- Park, J. & Ryu, H. (2003). *Role of Increasing Returns in the East Asian Economic Growth*. Department of Economics, State University of New York, Buffalo.
- Prichett, L. (2000). Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains. *The World Bank Economic Review* No. 14, 1: 221-250.
- Rodrik, D. (1997). TFPG Controversies, Institutions and Economic Performance in East Asia. *NBER Working Paper 5914*, Massachusetts: National Bureau of Economic Research, February.
- Sachs, J. & Radelet, S. (1998a). *The Onset of the East Asian Financial Crisis*. First Draft, 10 February.
- Sachs, J. & Radelet, S. (1998b). *The East Asian Financial Crisis: Diagnosis, Remedies, Prospects*. Harvard Institute for International Development, 20 April.
- Sarel, M. (1996). Growth in East Asia: What We Can and What We Cannot Infer. *International Monetary Fund Economic Issues* 1 (September).
- Semmler, W. (Ed.) (1994). *Business Cycles: Theory and Empirical Methods*. Boston: Kluwer.

- Sengupta, J. (2000). *Dynamic and Stochastic Efficiency Analysis: Economics of Data Envelopment Analysis*. Singapore, World Scientific.
- Sengupta, J. (1995). *Dynamics of Data Envelopment Analysis: Theory of Systems Efficiency*. Massachusetts: Kluwer Academic Publishers.
- Solomou, S. (1998). *Economic Cycles: Long Cycles and Business Cycles Since 1870*. Manchester University Press.
- Sonis, M. & Hewings, G.J.D. (1988a). Superposition and decomposition principles in hierarchical social accounting and input-output analysis. In F. Harrigan & P.G. McGregor (1988), *Recent Advances in Regional Economic Modelling*. London: Pion, 46-65.
- Sonis, M. & Hewings, G.J.D. (1988b). Error and sensitivity input-output analysis: a new approach. In R. Miller, K. Polenske & A. Rose (Eds.) (1989), *Frontiers of Input-Output Analysis*. New York: Oxford University Press.
- Sonis, M. & Hewings, G.J.D. (1992). Coefficient change in input-output models: theory and applications. *Economic Systems Research*, 4: 2, 143-158.
- Stock, J. & Watson, M. (1993). *Business Cycles, Indicators, and Forecasting*. University of Chicago Press.
- ten Raa, T. & Mohnen, P. (2000). *Neoclassical Growth Accounting and Frontier Analysis: A Synthesis*. Center for Economic Research (CentER), Netherlands: Tilburg University.
- Thanassoulis, E. (2001). *Introduction to the Theory and Application of Data Envelopment Analysis*. Massachusetts: Kluwer Academic Publishers.
- Thygesen, N., Velupillai, K. & Zambelli, S. (Eds.) (1991). *Business Cycles: Theories, Evidence, and Analysis*. Proceedings of a conference held by the *International Economic Association*, Denmark.
- Timmer, M. (1999). *The Dynamics of Asian Manufacturing: a comparative perspective, 1963-1993*. Eindhoven: Technische Universiteit Eindhoven.
- Todd, R. (1990). *Vector Autoregression Evidence on Monetarism: Another Look at the Robustness Debate*. Federal Reserve Bank of Minneapolis.
- Woitek, U. (1997). *Business Cycles An International Comparison of Stylized Facts in a Historical Perspective*. Munich: Physica-Verlag.
- Yin, R. (1994). Case Study Research Design and Methods. *Applied Social Research Methods Series*, Volume 5, 2nd edition, California: SAGE Publications.
- Young, A. (1992). A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore. In O.J. Blanchard & S. Fischer (Eds.), *NBER Macroeconomics Annual 1992*. Cambridge:
- Young, A. (1994a). Lessons from the East Asian NICs: A Contrarian View. *European Economic Review* 38, 964-73.
- Young, A. (1994b). Accumulation, exports, and growth in the high performing Asian economies: a comment. *Carnegie-Rochester Conference Series on Public Policy*, Volume 40, pp. 237-250.
- Zarnowitz, V. (1992). Business Cycles Theory, History, Indicators, and Forecasting. *NBER Studies in Business Cycles*, Vol. 27, University of Chicago Press.

Part One

Explaining the Asian Miracle: The Role of Technology

Chapter Two of the study delves into the role of technological change in the economic growth process. It begins with a brief survey of the theories governing the role of technological change in economic growth as described in neoclassical, endogenous or new growth, and Schumpeterian and evolutionary schools. This survey is necessary since the debate on the Asian miracle story hinges on whether technology drove the growth momentum or was simply the result of the accumulation of inputs. This is shown in Chapter Three with a discussion of the empirics behind growth theories, centering on the growth accounting approach derived from the Solow or neoclassical growth theory. The use of this approach to analyse the phenomenal rise of East Asia before the crisis has led to the controversy between ‘accumulationists’ and ‘assimilationists’ in explaining Asia’s economic miracle. Some implications and conclusions from growth accounting exercises are given as a prelude for the need to test other approaches to show the role of technological change, one of which is input-output analysis that will be tackled in Part Three.

"This detailed accounting is an improvement on my first attempt, but it leads to roughly the same conclusion. Remember that I distinguished only three factors: straight labor, straight capital, and residual 'technical change.'"

Robert Solow

*Speech on accepting the Nobel Prize
December 8, 1987*

"The strategic stimulus to economic development in my analysis is innovation, defined as the commercial or industrial application of something new---a new product, process or method of production, a new market or source of supply, a new form of commercial, business or financial organization".

Joseph Schumpeter

The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle, p. 19

CHAPTER TWO

Survey of Technology in Growth Theories:

Manna from Heaven, the Black Box and the Dominant Species

2.1 Introduction

The following chapter presents a general survey of the role of technological change in the growth process as described in economic growth literature. The major agenda of these growth theories is to explain the long-term economic growth process and its determinants. Bretschger (1999) provides a comprehensive history of economic growth theories as seen from his illustration below (Figure 2.1). Whilst the literature on growth theories points to a number of theoretical constructs and models spanning the classical to neoclassical to Keynesian/post-Keynesian and new schools of economic thought, the focus of the exposition will be only on those theories where technology figured prominently or where the role of technology later evolved into a major determinant of growth. These are basically the neoclassical, endogenous or new growth, and Schumpeterian and evolutionary growth theories.

The issue of long-term economic progress has been at the forefront of economic theorizing since the classical tradition. Peet & Hartwick (1999) provides a quick overview of what classical economists have to say about economic growth. The classical school commences with Adam Smith's reaction to mercantilist philosophy that a nation had to accumulate gold in order to grow. For Smith (1776), economic growth depended on capital accumulation that in turn was influenced by 'virtues of frugality and self-command.' The 'wealth of nations', as his treatise was entitled, sprung from the principles of specialization and division of labour and under the guiding principle of the invisible hand, self-regulating markets without government interference turned selfish private interests into the common weal. David Ricardo (1817), on the other hand, was concerned more about the distribution of wealth between landowners, labourers and owners of capital although he shared Malthus' pessimistic view that there were limits to economic growth posed by population growth and the law of diminishing returns which led to a 'geometric increase of population' outracing an 'arithmetic progression in food supply'. The major contribution though of classical growth theories is the elaboration of two types of growth conflicts: a distributional conflict between wages and profits (i.e., a higher growth of the wage rate can only be obtained at the expense of a lower growth of the profit rate); and a productivity conflict between gains in labour productivity and capital acceleration rate (i.e., at full employment, a higher growth rate of labour productivity can only be acquired at the cost of a lower growth rate of capital productivity).

Figure 2.1

Schema of the History of Growth Theories

Source: Bretschger (1999), p. 9.

The Marxist theoretic notion of growth made a special contribution in terms of defining capital as embodying technology. The Marxist idea of growth also foreshadowed the endogenous growth theories in the sense that technological change resolved the distributional conflict between wages and profits through high innovation intensity and/or capital-using bias that compensate for the profit-depressing effects of capital-deepening growth. The core arguments of Marx revolved around the contradiction of capital-deepening growth where the capitalist class in order to survive must continually exploit the working class or else face declining profits as wage rates tend to rise. Marx conjectures that given the capitalist's drive for accumulation, the inherent tendency for mature industrial economies towards capital deepening will raise the capital-labour ratio and turn the distribution of income against the capitalist class. However, the tendency for profit rates, or the rate of return to capital to fall can be curtailed if accompanied by innovation intensity. The eventual atrophy of capitalism due to the inadequacy of innovation intensity to offset the declining profit rates eventually leads to a class struggle that is rooted in a historical context. Political unrest resulting from the militancy of the working class would consequently lead to the abandonment of the core feature of industrial capitalism – profit-seeking under a system of private capital ownership, and its eventual necessary replacement by state intervention or control.

Growth theorizing during the early half of the 20th century was relegated to backstage until Keynes (1936), at the time of the Great Depression made his scientific contributions that revolutionized macroeconomic thinking. Although Keynes was concerned mainly with the short run for 'in the long run we are all dead', his major contributions in terms of demand-side management, multiplier and investment accelerator analyses, and the possibility of equilibrium at less than full employment deserves special recognition in growth literature because Keynesian macroeconomics influenced greatly the first formal growth models of Harrod (1939) and Domar (1946). The Harrod-Domar model, in turn, was the building block of the neoclassical growth model of Solow-Swan.

Contemporaneously with Keynes came the radical thinking of Schumpeter (1912) about creative destruction and the role of innovations as a motor that drives the growth process. He argued that in the wake of competition and falling profits, daring spirits called entrepreneurs created technical innovations and these spurts of economic activity generated economic growth. While initially eliciting little attention, Schumpeterian notions paved for the emergence of three strands of research in the area of growth theory during the latter part of the 20th century. The first line of research relates to studies in industrial organization relating firm size, market concentration, and market structures to innovative activity to test the Schumpeterian hypothesis that market power and large firms stimulate innovations. Leading figures in this line of research are Nordhaus (1969), Scherer (1965, 1967a, 1967b); Schmookler (1959, 1966, 1972); Levin (1978), Loury (1979), Dasgupta and Stiglitz (1980a, 1980b), Kamien and Schwartz (1972a, 1972b, 1974, 1975, 1976, 1978, 1982); Baldwin and Scott (1987, 1989); Kleinknecht (1987), Cohen and Levin (1989) and Cohen, Levin & Mowery (1985, 1987).

The second strand of research stemming from Schumpeterian economics pertain to the knowledge factor as both an input and output in the production process with major contributions from Arrow (1962) about 'learning by doing'; Kennedy (1964) about knowledge as a productive input that influences capital and labour productivity; Shell (1966, 1967) about knowledge as a specific output from a separate research sector; Sheshinski (1967) about knowledge spillovers as a determinant of optimum capital accumulation; and Uzawa (1965) about human capital in the growth process. These 'knowledge' theories influenced much of new growth or endogenous growth theories, which were neoclassical in approach, and were natural extensions of the Solow growth equation.

The final thread of research direction consists of evolutionary growth theories after the pioneering work of Nelson & Winter (1982a) where the dynamics of the growth process are modelled based on natural sciences and where the endogeneity feature of technological innovation under the assumption of economic rationality is challenged by an opposing view of technological competition where Darwinian notions of 'survival of the fittest' and path dependency drive the evolutionary dynamics of the growth process.

The succeeding sections now turn into brief discussions of three lines of growth theories where growth is ascribed to technological change and technological know-how. These are the neoclassical growth theories of Solow and Swan, endogenous or new growth theories, and evolutionary growth theories. The discussions of the theories, particularly diagrams were sourced mainly from textbooks by Barro and Sala-i-martin (1995), Aghion and Howitt (1998), Jones (1998), Solow (2000), Bretschger (1999), Romer (2001), and publications by Sala-i-martin (1990a, 1990b) and Mattalia (2000).

2.2 The Neoclassical Growth Theory: *Manna from Heaven*

The neoclassical growth model, known as the Solow and Swan growth models, builds upon the Harrod-Domar model, which was the very first attempt at formalizing the modelling of the growth process. While Trevor Swan (1956) developed his model independently of Robert Solow (1956, 1957), the model has been known more as the Solow model probably because his work earned the 1987 Nobel Prize in economics and because Swan's approach was less mathematically explicit even though analytically similar.

The basic equation of the neoclassical growth theory is the Cobb-Douglas production function in microeconomics which Solow applied at the macrolevel. The Cobb-Douglas production function

is expressed as: $Y = AL^\alpha K^{1-\alpha}$ where Y is output, L is labor supply, K is capital stock and A is a parameter that Solow attributes to technological progress, the exponents α and $1-\alpha$ indicate the output elasticities of labor and capital, respectively.

This equation forms the basis of growth accounting. Transforming the equation into logarithmic differentials or growth rates yields the growth accounting formula:

$$\dot{Y} = \dot{A} + \alpha \dot{L} + (1 - \alpha) \dot{K}$$

where the dots over the variables represent growth rates. Thus, the three sources of growth in the neoclassical model are labor, capital and technology.

Figure 2.2
**Technology and the Production Function
of the Neoclassical Growth Model**

Source: Perkins, Radelet, Lindauer & Block (2013, pp. 108 and 110).

Figure 2.2 above shows the dynamics behind the neoclassical growth model. The production function without technological progress is given as the concave curve $y = A \cdot f(k)$ and is expressed in per worker terms. The sy curve is the savings function per worker and the capital-widening line, which is the ray from the origin, denotes the growth rates of population (η) and depreciation or obsolescence rate of capital (δ) which in the Harrod-Domar model is designated as the natural rate of growth. The intersection of the capital-widening line with the savings function defines the steady state and projecting this point to the production function will determine the output per worker at y_0 . As represented by the concavity of the production function, the growth trajectory slows down as diminishing returns set in where a fixed A parameter is combined with variable units of capital (and labor). As in the Harrod-Domar model, an increase of savings will shift the savings function upward ($s'y$) leading to an increase in capital per worker (called capital deepening) from k_0 to k_2 and output per worker (y_2) from y_0 . An increase in population and depreciation of capital will make the capital-widening line steeper $(\eta + \delta)k$ so that output per worker declines as more labor (population) compete for less capital, hence capital per worker declines to k_1 from k_0 and with it, output per worker (y_1).

Conversely, it is easy to imagine that a decrease in population or obsolescence rate of capital in turn makes the capital-widening line flatter, indicating the rise in capital per worker as population (labor) falls. Consequently, output per worker rises as capital per worker increases. To prevent the onset of the steady state and diminishing returns, the production function can shift upward ($y' = A' \cdot f(k)$) and hence, long run growth can only be sustained if the A parameter in the model

risers. This A parameter, sometimes referred to as total factor productivity or the Solow residual is what Solow defined as technological progress. It shifts the total production function upward as shown by the arrow, indicating higher output per worker at y^* .

The Assumptions of the Model

There are certain assumptions underlying the production function as specified by Solow and Swan. These assumptions define properties of the production function useful in the study of economic growth, as follows: (i) constant returns to scale, (ii) positive marginal products or returns, and (iii) diminishing marginal products or returns. First, the production function, exhibits *constant returns to scale*. This means that the same proportion as the increase in inputs raises output such that when inputs are doubled, for instance, output also grows twofold. The second and third conditions imply that there are positive but diminishing marginal returns to capital and labour. There is a fourth condition called the Inada condition (after Inada (1963)) which tells us that only positive outputs are important such that output goes to infinity when either capital or labour goes to infinity, and that either input is essential for production and their supply is boundless. The Inada conditions imply that the marginal product of capital (or labour) becomes very large for small quantities of capital (or labour) and becomes very small, as the amount of capital (or labour) is very large.

A second important assumption about the production function is the substitution of capital and labour in production so that the size of capital intensity $\frac{K}{L}$ varies depending on the prices of capital and labour. Thus, the production isoquant allows for substitutability of inputs. This is a distinct contribution of the Solow-Swan model since the Harrod-Domar model assumed an L-shaped isoquant where capital and labour is used in fixed proportions. Underlying the concavity of the production function in the Solow-Swan model is the neoclassical factor price adjustment mechanism where the marginal productivity or reward of the factor determined demand for that factor. Since factor demand equated to factor supply at equilibrium, this means that the market clearing prices are $F_K = r$ (rental rate of capital) and $F_L = w$ (wage rate). Thus, the manner by which a rational producer chooses between capital and labour depended on factor prices.

The Solow-Swan model also only addresses employment stability or the balance between warranted and natural rates of growth, and assumes macroeconomic stability since planned investments equals planned savings in contrast to the Harrod-Domar model which was faced with the knife-edge dilemma of balancing actual and warranted rates of growth. The macroeconomic adjustment process in Solow-Swan is also different from the Harrod-Domar model in the sense that the causality between savings and investments is reversed akin to Say's law where supply creates its own demand. In the Keynesian tradition of Harrod-Domar, investment is determined by financial conditions and savings. The principles of rationality and marginal productivity theory of distribution, the factor market clearing process and the entire dynamics of macroeconomic adjustment make the Solow-Swan model distinctly *neoclassical* and not Keynesian. Hence, the Solow-Swan model is often referred to as the neoclassical growth model.

The properties of the Cobb-Douglas production function facilitated its use by Solow in specifying his growth model. Moreover, the Cobb-Douglas production function satisfies the neoclassical assumptions of: (i) constant returns to scale since the sum of the exponents representing the output elasticities of capital and labour add up to unity; and (ii) the equi-marginal product principle where firms hire labour until the marginal product of labour equals the wage rate and use capital until the marginal product of capital equals the rental rate of capital.

Evaluation of the Neoclassical Growth Model

One of the important contributions of the neoclassical model to growth theory is its use of changing relative factor prices and productivities to change the proportions in which inputs are combined in the production process. Unlike the Harrod-Domar model where it is based from, there is the possibility of 'switching' production techniques. The possibility of factor substitution arising from changes in relative factor prices, however, implies elastic responses of employers to these changes and that forces of competition within the economy are sufficiently vibrant so that changes in relative scarcities are reflected in relative prices. However, capital need not necessarily be substituted for labour smoothly and in increasing ratios in the production function when wages rise. For one, the prices of capital itself may rise when wages rise because capital is itself made by labour. Another reason is the non-malleability of capital, meaning that once the actual investment in machinery is made, capital-labour ratios cannot be varied. This is known as the 'putty-clay' argument, that is to say that *ex ante*, capital is putty (flexible) but *ex post*, is hard-baked clay.

The most significant contribution of the Solow-Swan model to growth theory is the treatment of technological change as the engine of growth. However, the neoclassical model failed to explain where or how this technological change arises. Inasmuch as technical change in the Solow-Swan model is exogenously given, then this technology or knowledge must be available to any country implying that the *A* term in the production functions of countries would be similar. Thus, there will be a 'catching up' process by poorer countries that acquire these techniques and that learn how to use them. Following the neoclassical assumption of factor price adjustment, then capital-labour ratios and the marginal productivities of capital should equalize in all countries given access to this 'free' technology and given capital mobility. What ensues is the inflow of foreign investments to these poor countries with low capital-labour ratios since their marginal productivity of capital would be high. Thus, a process of convergence to the same per capita GDP among countries would occur where countries starting from an initial position of low per capita GDPs would grow faster to catch-up with industrial countries, assuming similar savings and investment rates, as well as population growth rates.

This *convergence hypothesis*, as it is called, of the Solow-Swan model has two versions – absolute convergence and conditional convergence. Barro and Sala-i-Martin (1995) differentiates the two types of convergence. *Absolute convergence* assumes that all countries will converge to the same steady-state capital-labour ratio, output per capita, consumption per capita, and the same growth rate given equal access to the same technology, similar population growth rates, and savings propensity but differing only in initial capital-labour ratios. *Conditional convergence*, on the other hand, argues that countries have different steady-state values so that if they possess the same technological possibilities and population growth rates but vary in their savings propensities and initial capital-labour ratios, then all the level variables of capital, output, and consumption will grow at the same rate even if the capital-labour ratios are different at steady-state. Thus, the basic idea in conditional convergence is that the farther an economy is from its own steady-state value, the faster it grows.

When validated with data, the absolute convergence hypothesis have not been confirmed except for the example of post-war Germany and Japan where parameters such as technological accessibility, savings rates, and population growth rates were similar to other industrialized countries except for initial capital-labour ratios which varied as capital stocks were wiped out during the war. Empirical testing by Baumol (1986) confirmed the convergence hypothesis based on his regression of growth since 1870 on productivity for sixteen countries covered by Maddison

(1982). De Long (1988), however, cautions on the proper interpretation of Baumol's findings inasmuch as the regression used an *ex post* sample of countries (called by Baumol as the 'convergence club') that are already rich and that have already successfully developed. Thus, convergence was *de facto* guaranteed in the regression so that only a regression run based on an *ex ante* sample of nations in 1870 that were likely to converge would be meaningful. Most empirical contributions on the convergence implications of the Solow-Swan model have shown that while the development path of the industrialized countries appears to be dominated by convergence, divergence has actually characterized global growth patterns when the sample of countries is enlarged to include developing economies. In short, there is absolute convergence among a homogeneous group of countries but likely conditional if heterogeneity across the sample of economies is allowed.

These empirical tests extended the convergence hypothesis by introducing technical change as a factor that could explain income convergence between countries. Abramovitz (1986) was the first to introduce the concept of '*catching up*', '*falling behind*' and '*forging ahead*' in relation to technological gaps between nations. He asserted that countries that were backward in their technological level carried a potential for rapid catching up since the acquisition of new machinery and equipment from abroad by developing countries enables them to exploit a backlog of technological developments and improvements that are less costly than developing the technology themselves. Thus, countries with lower levels of technological knowledge can attain higher growth rates than those industrial countries already operating close to their technological frontiers. Verspagen (1993) attempted to explain growth performance across countries in relation to technology gaps with postwar leader USA as measured by per capita income gaps (measured by logarithms of per capita income in the USA over the per capita income in the follower country). Per capita income was used as a technology-gap proxy variable that inversely relates to productivity. While countries close to the technological frontier (as measured by the performance of the USA) showed smaller variances in their growth rates than those farther away from the frontier, thereby indicating convergence, countries that faced the largest gaps have lagged further behind, implying divergence.

Newer analyses of the convergence-divergence controversy such as by Quah (1995) relate cross-country patterns of economic growth to the dynamics of income distribution. His paper provides a modelling framework for studying the dynamics behind convergence of growth among countries where results showed persistence and immobility among countries, with some evidence of coalitions (convergence clubs) of rich countries and poor countries being formed and distribution of incomes either polarizing into 'twin peaks' of rich and poor; or overtaking and diverging, where two economies initially on roughly equal footing separating over time as one becomes wealthier than the other. In this sense, '*catching-up*' assumes a different dimension in that follower countries do not converge with the richer countries but form new coalitions, as illustrated by the newly industrializing economies or high performing economies of East Asia. The growth convergence models assume that economic growth is a cumulative unidirectional process where nations race along a fixed trajectory, and catching up is just a matter of relative speed. However, the experience of new convergence clubs like that of the East Asian dragons and tigers, signifies that nations could catch up by trailing another direction, or racing in another track, or leapfrogging.

Finally, an evaluation of the model will not be complete without saying something about the scope for policy, which resulting from the exogeneity of technology assumption of the model appears to be limited. The Solow-Swan model gave credence to policy prescriptions of developmentalists to pursue 'big push' (Rosenstein-Rodan, 1943), 'balanced growth' (Nurkse,

1953) and ‘unbalanced growth’ (Hirschman, 1958) strategies that focused on the expansion of the industrial capital stock and the rate of savings as instruments to promote economic growth and higher per capita incomes.

2.3 Endogenous Growth or New Growth Theories: *Opening the Black Box*

The neoclassical growth model of Solow-Swan implied that without exogenous technological progress, an economy would reach steady state in the long run but with zero growth in income per capita. Policy-wise, the long-term level but not growth rate of income and output could be influenced by population growth or technological advance but these are determined elsewhere. The long-term values of income and output also depended on the savings rate, but not their growth rates. The exogenous treatment of technological change as ‘manna from heaven’ was a major chink in the armour of the neoclassical growth model. Nothing is known about the most significant variable — technological progress that affects long-run growth except that it is free for the taking. As the term ‘manna’ literally translates in the Biblical sense into ‘what is it?’, so is this question apt and relevant in the case of technology that Rosenberg (1983) referred to it as a black box. Moreover, there are no indications for government intervention and little scope for economic policy in the neoclassical growth model, not to mention that its empirical results relating to convergence by poor countries have not been consistent with the model’s predictions. While the Solow-Swan model inspired research in the 1960s on exogenous growth models, economists’ attention was deflected in the 1970s on other macroeconomic issues that dealt with inflation, unemployment and the oil shocks. The seminal work of Romer (1986), however, led to a resurgence of interest in growth theories, leading to a new generation of growth models that sought to explain the growth rate of the economy as an endogenous process resulting from the optimising behaviour of rational economic agents where technological change and macroeconomic policy are the ‘engines or drivers of growth.’ Thus, these became known as new growth or endogenous growth models.

Endogenizing growth in these models entails the easing of the diminishing marginal returns to capital assumption of the neoclassical model. Evidently, there would be no incentive to invest in a factor such as capital if its returns were diminishing as an economy accumulates more of it and only find that growth would vanish in the course of time. For growth rate in output to remain positive, the factor that is accumulated should therefore exhibit at least constant marginal returns. This is true in the case of capital but likewise for the other productive input labour although in the neoclassical model, labour was also assumed to grow exogenously. Later versions of endogenous models look at labour accumulation as determined by labour specialization (Kim & Mohtadi, 1992), fertility or family size choice (Barro & Becker, 1989), socio-economic stratification (Benabou, 1996), parental childcare choices (Kennedy & Welling, 1997), subsidized education (Zhang, 1997), wage inequality (Lloyd-Ellis, 1999), among others. Inasmuch as growth in the neoclassical model hinges on capital accumulation, the earlier focus of endogenous growth models was on keeping the marginal productivity of capital constant.

Van Meijl (1995) presents a useful taxonomy of endogenous growth models based on keeping the marginal returns to capital from falling. He uses the Cobb-Douglas production function:

$Y = AK^\beta L^\alpha$ as the starting point from where the marginal productivity of capital is derived as follows: $\frac{\partial Y}{\partial K} = \frac{\beta AL^\alpha}{K^{1-\beta}}$. Three possibilities for keeping constant the marginal returns to capital are then: (i) simply assuming constant returns to capital and labour is not productive, i.e. $\beta=1$ and $\alpha=0$, which was the model of Rebelo (1991) or that labour is not growing, as assumed by Romer (1986); (ii) keeping the productivity of capital positive by allowing increases in total factor

productivity as in Lucas (1988), Romer (1990), Aghion and Howitt (1998), Grossman and Helpman (1989, 1990a, 1990b, 1990c, 1991), among others; and (iii) keeping the growth rate of labour positive, as in the labour accumulation models mentioned above.

The typology of endogenous growth models above is similar to Paczkowski (2002) who cited three ways of incorporating endogeneity in the neoclassical model with the objective of generating non-zero growth in the long term. The modifications to the neoclassical model that would allow for this positive growth entail: (a) relaxing the Inada conditions such that the marginal product of capital does not become zero when capital becomes infinitely large; (b) letting labour productivity to change due to capital changes; and (c) reducing the costs of capital accumulation in the future by accumulating capital in the present. The AK model is an example of the first; learning by doing models a prototype of the second, while human capital and R&D models typify the third.

Mattalia (2000) classifies endogenous growth models as those with constant returns to scale and constant returns to capital as in the models of Barro (1990) and Rebelo (1991); and models with increasing returns to scale and constant returns to capital as in Romer (1986) and Lucas (1988). To achieve the objective of making growth endogenous to the system, he likewise describes three approaches: (i) introducing the endogenous accumulation of human capital; (ii) developing a theory of innovation that makes the rate of change of technological progress endogenous; and (iii) discarding the diminishing returns to capital assumption of the neoclassical model.

Another taxonomy of how endogeneity is achieved in new growth models is found in Verspagen (1990) who uses the competitive market-clearing assumption as his starting point. Since technological progress is assumed to be exogenous, it is freely accessible and hence, depicts characteristics of a public good, which means it is obtainable at zero costs. But the neoclassical model does not adequately and convincingly answer who produces and shoulders the cost of this new technology. Endogenous and new growth theory, following the Schumpeterian concept of appropriating innovation, settles the issue of the public good character of technology by introducing monopoly power and externalities or spillover effects as means of appropriating this new technology. Thus, we have endogenous models that involve externalities such as Romer (1986) and Lucas (1988), and those that involve a research sector producing innovation through monopoly power as in Romer (1990), Grossman & Helpman (1990a, 1990b, 1991), and Aghion & Howitt (1990, 1992).

While endogenous growth theories proliferated in the 1980s, initial attempts to salvage the neoclassical model by endogenizing technology commenced in the 1960s with the classic work of Arrow (1962) on learning by doing. The basic problem of sustaining growth in the Solow-Swan growth model with exogenous technology dealt with generating rewards to make the A factor grow even as K and L continue to be paid their marginal returns. Inasmuch as the neoclassical production function exhibits constant returns for K and L while keeping A constant, something in the neoclassical model should ensure that the three factors could be compensated for their marginal products under the Walrasian theory of competitive equilibrium. The solution Arrow found was in a phenomenon dubbed 'learning by doing' where the growth of A is an external effect of gaining experience to firms producing and acquiring new capital goods. Thus, even with no additional reward to the factor A and with both K and L receiving their marginal returns, increased savings propensity would affect the time path of A , thereby endogenizing its growth.

Table 2.1
Endogenization of Technology in New Growth Theories

Model	Sectors	Type of Innovation	Production of Innovation	Production Function Final Goods Sector	Externalities of Innovation
Rebelo (1991)	One consumer good	Not explicit	Not explicit	$Y = AK$	None
Romer (1986)	One consumer good	Process innovation through knowledge accumulation	Not explicit	$Y = AK^{\alpha+\beta}\chi^{1-\alpha}$	Knowledge spillovers (positive)
Lucas (1988) I	One consumer good	Human capital accumulation through 'saving'	$\frac{dH}{H} = I_H - d_H H$	$Y = AK^\alpha H^{1-\alpha}$	Productivity stimulus from average human capital (positive)
Lucas (1988) II	Two consumer goods	Human capital accumulation through learning by doing	$\frac{dH}{H} = B(1 - \mu)$	$Y = AK^\alpha H^{1-\alpha} \bar{h}^\beta$	Productivity stimulus from average human capital (positive)
Romer (1990)	Research, intermediate goods, consumer goods	Addition of new varieties of intermediate goods (Ethier production function)	$\frac{\Delta B}{B} = \zeta H - \frac{\beta r}{(\alpha + \beta)(1 - \alpha - \beta)}$	$Y = L^\alpha H_Y^\beta \int_0^\infty x_i^{1-\alpha-\beta} d_i$	Knowledge spillovers in R&D and intermediate goods
Aghion & Howitt (1992)	Research, intermediate goods, consumer goods	Stochastic (Poisson) improvements in blueprints for intermediate goods	$x = \lambda \phi(n, R)$	$Y = Ax^\alpha$	Intertemporal improvements (positive); Business-stealing effect (negative)
Grossman & Helpman (1990a,b,c and 1991)	Research, intermediate goods, consumer goods	Addition of new varieties of intermediate goods (Ethier production function)	$K_t = F(n_t, \tau_t)$	$Y_t = A_t L_{Y_t}^{1-\beta} \left[\int_0^n x_t(\omega)^\alpha d\omega \right]^{\frac{\beta}{\alpha}}$	Knowledge spillovers in R&D and intermediate goods (positive)

Source of basic data: Verspagen (1990), pp. 12-13.

Nordhaus (1969) and Shell (1973) developed the first growth models of allocating economic resources to inventive activity through monopoly rents (patents) on new inventions and innovations although increasing returns were not sufficient in both models to sustain long-term growth without additional push from population growth in the former model and without an augmenting exogenous source of technological progress in the latter model. Uzawa (1965) is also credited to have been the first to incorporate human capital into the neoclassical growth model, as representing the A term in the form of education but his model focused more on the optimality conditions for the growth path rather than how the factor A for human capital could grow under

increasing returns. Related to human capital is the contribution by Nelson & Phelps (1966) about the role of education in enhancing the capacity to innovate and adapting to new innovations, thereby accelerating the rate of technological diffusion in the economy. Their models predict that the number of potential scientists and engineers would be an increasing function of educational attainment in a country as measured by secondary school or higher education enrolment rates such that the marginal productivity of educational attainment is positively related to technological progress and that developing countries could catch up technologically with advanced countries through educational policies. Verspagen (1990) summarizes the endogenization of technological change in new growth theory in Table 2.1.

In the succeeding pages, discussion will focus only on the pioneering models of endogenous or new growth theory in the 1980s, as these serve as the foundations of subsequent endogenous theorizing. Discussion will be narrowed to endogenous growth models that deal with technology and knowledge. These involve models of the *AK* type, human capital accumulation, R&D or ideas-based growth models.

AK Models

The *AK* models are the simplest endogenous growth models that specify a production function, which is linear in only one input — capital. The production function takes the form: $Y = AK$, hence the name “*AK*” model, which Sala-i-martin (1990b) describes as the micro-foundation of all other endogenous growth models as they build upon it and become variations of this basic framework. Salvadori (2003b) notes that historically though, the determination of growth as an endogenous process in a one-sector model dates back to the Harrod-Domar model with the exception that the new growth models ala *AK* type derive the savings or consumption behaviour as part of an inter-temporal optimization problem rather than being imposed as in the Harrod-Domar setup. Capital here is defined not only as the physical type but broadened to include other forms like human capital, stock of knowledge, and financial capital to ensure that diminishing marginal returns that usually accompanies physical capital is ruled out. The simplest version of the model is attributed to Romer (1986) and Rebelo (1991).

Recalling from the Solow-Swan model that capital is accumulated when people save and invest some of the output produced instead of spending income for consumption, the following equation for the change in capital stock was obtained: $dK = sY - \delta K = sAK - \delta K$ (since $Y=AK$). Dividing both sides by K to express growth rates, yields $\frac{dK}{K} = sA - \delta$ where δ denotes the rate of depreciation of capital. This too will be equal to the growth rate of output taking the logarithms and derivatives of the production function so that $\frac{dY}{Y}$ is also equal to $sA - \delta$. Thus, for as long as the term $sA - \delta > 0$ or equivalently $sA > \delta$, income or output grows without bounds.

Human Capital Models

After initial contributions by Uzawa (1965), Lucas (1988) presented the first human capital approach to endogenous growth. Lucas turned to the formalism of human capital accumulation to explain individual decisions to acquire knowledge and its implications for productivity in keeping with the one factor — technology or knowledge — isolated by the neoclassical model as having the potential to account for cross-country disparities in incomes and growth rates. The engine of growth is provided by human capital, defined as decisions of individuals to acquire education, training and skills to improve productivity of both labour and physical capital, and to enhance the level of knowledge and technology in the economy. The basic idea behind the model is that people allocate their time between working and training just like in the physical capital

model where they trade off consumption today for income tomorrow. When deciding on educating themselves, people sacrifice part of their current income in the hope that the training or education would raise their future productivity, and possibly wages or earning capacity. The acquisition of skills by a worker not only raises his or her productivity but also the average level of skills of the economy as a whole.

Lucas (1988) presents two approaches in treating human capital as engine of growth. The first is to treat human capital as just another form of capital in the same production function as physical capital, hence, a one-sector model, as in the AK model. The other approach was to specify a separate production function that is relatively intensive in producing human capital (e.g., a university or school) so that a two-sector model in the same light as Uzawa's (1965) emerges, except that now there is a production sector that uses physical capital intensively and a human capital sector that uses human capital intensively, rather than a consumption goods and capital goods sector as Uzawa (1965) formulated.

In the one-sector model, a standard Cobb-Douglas production function is assumed with human capital H as an input defined as μ (time spent working or producing output) times the workforce L multiplied by the average level of human capital (e.g., average quality or skill of the labour force) designated as h . Thus, the production function is specified as: $Y = AK^\alpha H^{1-\alpha}$ where $H = \mu hL$. At equilibrium, this output is equal on the demand side to consumption and investments in both physical capital I_K and human capital I_H , thus yielding the budget constraint. Changes in the stocks of both types of capital are then given by: $\frac{dK}{K} = I_K - \delta_K K$, and $\frac{dH}{H} = I_H - \delta_H H$, where δ is the depreciation rate. Note that even human capital depreciates since older people devote less time to train or study further. Since human capital can also change through investments, it could also be reproducible or accumulated and all that is required to generate growth is to increase the incentive to invest in human capital such that its marginal return will not diminish.

For as long as the incentive to study does not decrease over time, this by itself warrants that human capital will be accumulated so as to generate endogenous growth. The steady state growth rate in this model requires then a constant ratio of K to H , so that both must be growing at the same rate in equilibrium. Aggregate production which is $Y = AK^\alpha (\mu hL)^{1-\alpha}$ when expressed in per worker terms or intensive form becomes: $y = Ak^\alpha (\mu h)^{1-\alpha}$.

Lucas (1988) further adds an externality in human capital to reflect that people become more productive when they work with learned people. So from the basic production function for the one sector model, a positive externality is added. The production function depends therefore not only on K and L but also on μ (fraction of time devoted to production) and $1-\mu$ (the fraction of time devoted to education), as well as on h (internal effect of human capital), and $\bar{h}$ (the spillover effect of human capital). The internal effect is basically the human capital each worker brings into the labour force (e.g., skills) whereas the external effect is taken to be average level of human capital that contributes to the productivity of all factors. It is external because individuals do not consider this in their decisions of allocating time for education. It is possible therefore for human capital to generate increasing returns because human capital becomes cheaper to accumulate as its stock grows since in the process of learning, one also learns to learn (learning-to-learn phenomenon); and second, because knowledge can be shared between or imparted among workers at no cost (i.e., without having one go to school him/herself), thus there are externalities to human capital accumulation. The production function is now revised to add this positive externality $\bar{h}$, such that $Y = AK^\alpha (\mu hL)^{1-\alpha} \bar{h}^\beta$ and returns to scale now is no longer constant but

increasing by β .

The main result of the human capital models is that the economy's growth rate depends on the imbalance between human and physical capital, (or for that matter between human capital and manual labour). Economic growth rate tends to rise when human capital is abundant relative to physical capital (or manual labour) and fall when human capital is relatively scarce. This is because the amount of the productivity of education or training increases the marginal product of labour and also raises the future wage rate so that this creates incentives for further training that in turn increases the growth rate of the economy.

R&D or Ideas-Based Models

This class of models emphasizes the endogenous development of knowledge or R&D as the engine of growth. The basic contributions could be classified as those that involve increases in variety of inputs or intermediate goods (Romer, 1990); those that improve product quality (Aghion and Howitt, 1992) and those that involve knowledge diffusion or technology transfer across borders and international trade (Grossman and Helpman, 1989, 1990a, 1990b, 1991).

Increasing Variety of Inputs/Intermediate Goods

In the Romer (1990) model, the main driver of growth is the research sector that produces blueprints for a variety of capital goods that are in turn produced and used to manufacture consumption goods. Again, diminishing returns is ruled out insofar as reproducible factors applied in the research sector are concerned. Skilled labour called human capital, which is distinguished from unskilled labour, is taken as the only input, with its productivity linear in the stock of existing blueprints. This implies that researchers could benefit from knowledge created by previous inventions. So knowledge in this sense is non-excludable or non-rival for researchers. In contrast, the design of blueprints for capital goods is excludable by means of patents. Thus, the fruits of R&D could be sold but the revenue per unit of skilled labour used in producing research must be high enough relative to the alternative use of skilled labour in actual production.

In contrast to Lucas, human capital in the Romer (1990) model is fixed and has an inelastic supply because it is embodied in a fixed-size population. In the model, $H_B = (1 - \mu)$ and $H_Y = \mu$, denoting human capital devoted to the research and production sectors, respectively. This implies that technological progress is dependent only on the number of scientists and engineers, as represented by H_B .

There are three sectors in the Romer (1990) model: research, intermediate and consumption goods; and four production inputs: physical capital, unskilled labour (L), human capital (H) and technology. The research sector is characterized by perfect competition and uses human capital H_B and the existing stock of blueprints or designs as inputs. The research sector also discovers or invents new blueprints or designs, which are accumulated according to the following production function: $\Delta B_t = \rho H_B B$ or substituting the value of H_B which is equal to $(1 - \mu)$ becomes $\Delta B_t = \rho(1 - \mu)B$. In this set-up, ρ is the research success or productivity parameter. It could be observed that this production function is similar to the equation for human capital accumulation except that knowledge or blueprints replace human capital in the notation. The fact that the production function is linear in B implies that technology in the form of blueprints could grow without bounds since the more resources are allocated to the research sector, the higher its productivity. There are increasing returns in the production of blueprints since each researcher has access to prior discoveries or the existing stock of designs but only with some time delay.

In an earlier Romer (1986) version, the Romer model assumes the AK type where the elasticity of factors exceed unity, implying increasing returns to scale since the elasticity parameters are now $\alpha + \beta > 1$. Thus, there are constant returns to capital but increasing returns to scale arising from a positive externality (i.e., external economies of scale). Knowledge creation or learning by doing is a side product of investment. The production function for the entire economy could simplistically be written as: $Y = AK^{\alpha+\beta}x^{1-\alpha}$ where x represents the product of the R&D sector (blueprints) that generate positive externalities arising from the production of knowledge or the accumulation of experience.

Improving Product Quality

The Aghion and Howitt (1992) model further enhances endogenous growth modelling by introducing the Schumpeterian notion of creative destruction under conditions of uncertainty. In their model, growth is generated by a random or stochastic sequence of quality-improving innovations resulting from uncertain research activities. In contrast to Romer's (1990) model of horizontal innovations, which occurred deterministically, the Aghion and Howitt's version deals with vertical innovations where new inventions render preceding technologies obsolete or vintage. In order to deal with the destruction of older embodied knowledge, a vintage capital framework is introduced that allows each successive innovation to subsume the knowledge embodied in its predecessor technology. While present in a nascent form in the Romer (1990) model, the idea of vintage capital then did not contain productivity parameters. With Aghion and Howitt, vintage capital is restricted to a one-at-a-time set-up but the model's ability to represent technological progress through the quality advantage of each succeeding vintage is also regarded as a major contribution to endogenous growth theorizing.

Specifying a Poisson distribution where innovations are drastically introduced at random intervals facilitates the treatment of uncertainty in the Aghion and Howitt model. Innovations occur randomly at the Poisson arrival rate of $\lambda\Phi(n,R)$ where λ indicates research productivity or success and n denotes the number of researchers while Φ represents constant returns production function. Thus, increasing the number of researchers would raise the probability of an innovation by λ . Yet despite the presence of uncertainty that complicates decision-making, economic agents are assumed to optimise their behaviour with perfect foresight and maximize their expected returns under risk neutrality.

The basic set-up of the model involves three sectors as in the Romer (1990) framework: research sector, intermediate goods sector, and final goods sector. It is assumed that every innovation introduces a new type of intermediate input x that is more productive in the production of the final good y . Thus, an innovation raises the productivity parameter A by a constant factor γ so that A is a function of the number of innovations τ according to: $A_\tau = A_0\gamma^\tau$, where $\gamma > 1$. A firm that succeeds at innovating monopolizes the intermediate goods sector when it patents the innovation until the next innovator that comes up with a new drastic technology replaces it. The monopoly therefore prevails until the next innovator firm renders the current technology obsolete, unless the incumbent firm continually innovates in order to continue monopolizing the intermediate goods sector.

Having characterized the basic model, Aghion and Howitt then proceed analysing and solving the decision problem faced by three sectors. The problem faced in the research sector concerns allocating skilled labour n to generate an innovation that could be sold to the intermediate goods sector. The expected profits from research follow the optimal hiring rule that the expected value of one unit of labour devoted to research must equal its marginal resource cost. An asset-arbitrage

process governs the value V_{t+1} in the equation: $rV_{t+1} = \pi_{t+1} - \lambda\Phi n_{t+1}V_{t+1}$ which goes to say that the expected profit on a patent of the $t+1$ th innovation in a unit time interval rV_{t+1} equals the profit stream π_{t+1} accumulated by the $t+1$ th intermediate goods monopolist minus the expected loss occurred when she loses out V_{t+1} to the next innovator. Thus, V_{t+1} is the net present value of an asset yielding profits of π_{t+1} until it disappears at a rate $\lambda\Phi n_{t+1}$, where n_{t+1} is the amount of labour allocated to R&D after the $t+1$ th innovation. Rearranging the expression to obtain the value of V_{t+1} results in:

$$V_{t+1} = \frac{(\pi_{t+1})}{(r + \lambda\Phi n_{t+1})}.$$

The denominator term represents the creative destruction effect where the duration of monopoly profits that will be enjoyed by the creator of a subsequent innovation are likely to be shorter the more research is expected to occur or arrive following the current innovation which depends on labour allocated to research — n_{t+1} . The higher this denominator, the lower will be V_{t+1} or the expected payoff of innovating so that the monopolist does not have an incentive to innovate further. This replacement effect is ascribed to other researchers having immediate access to the current technology such that the value of the incumbent innovator of making the next innovation ($V_{t+1} - V_t$) is smaller than V_{t+1} .

Diffusing Technology across Borders

The Grossman and Helpman (1989, 1990a, 1990b, 1990c, 1991) models are prototypes of endogenous growth models that involve trade and technology. The (1990a) model though provides the basic framework about open economy implications arising from the international transmission of knowledge or technology transfer when goods are traded. The (1991) model involves innovation by the North and imitation by the South whereas the other models basically are one-country small open economy models that draw implications on innovation and trade policy through comparative advantage in R&D. The set-up of these models, draws on the Romer (1990) model and the Aghion and Howitt's (1992) model of creative destruction except that the intermediate goods sector is characterized as oligopolistic rather than monopolistic so that some product differentiation is introduced, and that two countries, each engaging in the three activities of producing a final good, a continuum of differentiated intermediate goods, and R&D is specified in order to incorporate the effects of international trade on long-run growth. The production function for final goods output in each country, i , is denoted as Cobb-Douglas of the Ethier type:

$$Y_t = A_t L_Y^{1-\beta} \left[\int_0^n x_t(\omega)^\alpha d\omega \right]^{\beta/\alpha}; 0 < \alpha; \beta < 1,$$

where L_Y pertains to employment of primary factor labour in the final goods sector, x is the employment of labour in the intermediate goods sector (ω) comprised of n varieties, and A is a country-specific productivity parameter. This implies that increasing the varieties of intermediate goods, which uses human capital, raises total factor productivity in the economy.

The production of intermediate goods involves manufacturing of middle products and research, which generates blueprints that expand the variety or quality of these intermediate products. Research activity likewise generates a positive externality in that human capital expended on research enhances the stock of knowledge accumulated through past research efforts, that in turn is embodied in the number of varieties of intermediate goods already available.

Following Aghion & Howitt (1992), R&D is conducted by private profit-maximizing firms that appropriate benefits of new technological innovations through a stream of oligopoly rents from indefinite patent protection. Because the blueprints produced by research are not tradeable, all profits accrue to the country that develops new intermediate goods. Specialization emerges as a

firm develops new middle products that generate dynamic external economies of scale to final goods producing firms. This concept of specialization if applied to countries in this case exhibits Ricardian principles of comparative advantage that are the basis to trade. Thus, a country could possess a comparative advantage or disadvantage in manufacturing or research activities. Comparative advantage is measured by the ratio: $b = \frac{\alpha_{Ln_i}}{\alpha_{Lx_i}}$. The final goods production function

is expressed as: $Y = A_Y L_Y^{1-b} X^b n^{\frac{b(1-a)}{a}}$ where $X^b n$ is the total quantity of intermediate inputs used, implying also the total amount of labor embodied in the intermediate goods. At the steady state, total final goods output Y grows at the rate of $\frac{b(1-a)}{a}$, which is also the rate at which new varieties of intermediate goods are discovered in the economy.

Apart from the spillover effect of research having wider applicabilities in the local research community, hence, contributing to the general level of knowhow or stock of knowledge capital, the Grossman and Helpman (1990a) model introduces the notion of a foreign contribution to the stock of local knowledge capital when local residents interact with foreign agents from abroad. The number of contacts with the international research community is assumed to be a positive function of international trade. Thus, the extent of knowledge spillovers across borders is likely to increase with the volume of trade between two countries. The model shows that trade policy by way of expanding the level of trade via import and export subsidies or by way of contracting trade through import tariffs and export duties now matters for long run growth and the transition of the economy to steady state. Commodity trade flows serve as conduits for information flows.

The Grossman and Helpman (1991) model explores the issue a further step by distinguishing innovation from imitation. Whereas the former entails the invention of new products and processes, the latter shortens the length of time the innovator could enjoy the monopoly rents and therefore reduces incentives for further innovation and economic growth. The model segregates the world geographically with the North characterized as having a comparative advantage in R&D and the South as enjoying a factor cost advantage in manufacturing and imitating. Viewed as a model of patent races, the North then ascends the product quality ladder by allocating resources to R&D while the South likewise devotes resources to research aimed at reproducing technology embodied in the latest patent. After a Southern firm is able to imitate, the firm owning the latest patent in the North has an informational edge in discovering the next quality upgrade. The model endogenizes growth in the sense that decisions to invest in R&D in the North and imitation in the South are guided by potential profits and research costs. With Northern firms reaping monopoly rents temporarily by offering more superior products in the market than available and Southern firms grabbing the rents through lower manufacturing costs, the model behaves in the same manner as Aghion and Howitt's creative destruction as successful firms that innovate or imitate captures the entire market share from incumbent firms.

Evaluation of Endogenous Growth Models

The evaluation of endogenous growth models is succinctly put by Pack (1994) as having 'intellectual appeal' but suffering from 'empirical shortcomings'. The intellectual appeal of new or endogenous growth theory stems from its capacity to explain the forces that drive technological change and determine this within the system rather than accept that such change is exogenous as assumed by the neoclassical approach. This bestows realism or credence to growth theorizing.

A comparison of the old and new growth theories provided by Verspagen (1992), McCallum (1996) and Salvadori (2003a) elaborates on the theoretical achievements of new growth theories in comparison with old or neoclassical growth theories. The novelties in new growth theories

essentially relate to the introduction of scale effects and monopolistic market structures that have implications on sub or non-optimal solutions and greater scope for policy intervention. Externalities in the innovation process such as learning effects and knowledge spillovers lead to increasing returns to scale that creates a wedge between the equilibrium growth rate and the optimal growth rate. When one firm doubles its inputs, the presence of externalities raises the inputs of other firms as well so that aggregate output increases by more than proportionately. In the neoclassical model, the exogenous or actual growth rate of technological progress is itself optimal such that the endogenous process leads to an equilibrium path that is also optimal. In endogenous models, the equilibrium growth rates could be smaller or larger than the optimal. New growth theories therefore make a distinction between the competitive market solution, which ignores the externality spillovers of knowledge accumulation or innovation and the social planning solution, which generally incorporates externalities in decision-making leading to the optimal growth path.

Because monopolistic pricing through patenting and product differentiation are required to ensure appropriability of research output and to encourage innovations to continuously occur, the role of the competitive market becomes less central and the role of government by way of policy interventions becomes relevant. Thus, technological policy such as R&D subsidies would influence welfare.

A related issue to policy intervention and the growth path is the possibility of transitional dynamics in the growth process under new growth models. The simplest versions of the endogenous growth models such as the AK model showed that equilibrium in the economy was always on the balanced growth path. However, the introduction of a second type of capital stock as in the Lucas human capital model, or two sectors involving intermediate and consumer goods as in the R&D models, led to results where some transitional adjustment to the steady state became evident. This transitional dynamics involved speed with which the economy reaches or converges to its balanced or equilibrium growth path. Government policy is relevant in hastening the transition to the balanced growth path or in steering the economy to this path.

In this regard, the possibility of indeterminate equilibrium represents another theoretical contribution of new growth theory. The pioneering works of Benhabib & Farmer (1994), Benhabib & Perli (1994), and Boldrin & Rustichini (1994) proved the existence in the presence of increasing returns and externalities of indeterminate equilibria, i.e., a continuum of equilibrium paths associated with any given initial stock of capital that is consistent with its unique stationary state. In another research, Boldrin & Perisco (1993) and Boldrin, Nishimure, Shigoka & Kano (2001) studied the case of indeterminate equilibria that do not converge to any balanced growth path, therefore displaying chaotic behaviour. This discovery is important by providing the link with evolutionary theory of growth and technological change, which is characterized by such dynamic properties of chaos.

Notwithstanding its contribution of ascribing a role to macro policy to influence long-run growth, endogenous growth models have been criticized on both theoretical and empirical grounds. Theoretically, new growth theory suffers from scale effects that imply any variation in the size or scale of the economy would dramatically affect the long-run growth rate. Thus, doubling for instance, population size or labour devoted to research would also double the growth rate. The scale effects relate to the requirement of new growth theories that the producible or accumulable factors of production (basically capital) must exhibit constant returns to scale for growth to be generated by endogenous forces such as technological change.

A major criticism of endogenous growth theory lies in its empirical drawback. Pack (1994) states that most of the empirical studies generated by endogenous growth theory only serve to test the neoclassical growth theory rather than endogenous growth theory itself. Specifically, the empirics of endogenous growth theory have been directed ironically at confirming the convergence hypothesis implied by neoclassical growth theory.

While endogenous growth theories have undoubtedly enhanced our understanding of the analytics of growth and the roles of human capital accumulation, investments in R&D, international trade, and externalities and scale economies in the growth process, no conclusive judgment about the role of public policy intervention and the nature of such intervention in influencing the growth process itself has surfaced. To this end, the Schumpeterian and evolutionary growth theories have made an imprint.

2.4. Schumpeterian and Evolutionary Growth Theories: *The Dominant Species*

The neoclassical and early endogenous growth explanations of technological change and economic growth are grounded deeply in the theory of the firm and production theory in a competitive setting. Firms are viewed as facing choice sets about inputs to be procured and outputs to be produced with the objective of maximizing profits and reaching equilibrium when demand balances supply in all relevant markets. Growth in the system is just a time path traced by these maximizing firms reacting to changes in demand and factor supply conditions as well as technological advances. Schumpeter (1934) portrayed an alternative view of the growth process that places the real drivers of the system at its core — innovating entrepreneurs. What makes the Schumpeterian alternative distinct is that the competitive environment of firms is not oriented towards static equilibrium conditions but rather characterized as a dynamic and selective process. Schumpeter proposed the view that capitalism could not be treated as a stationary process but rather that of recurring structural changes called ‘gales of creative destruction’ followed by waves of expansion and growth. The innovating firm or entrepreneur activates economic growth by actively searching for new products, new methods, new markets, new supply sources, and new organizations in production processes. These innovations bring about changes in the economic structure, which are not exogenous, but come from within the system. The long-term perspective of economic growth is thus seen in qualitative changes, which are difficult to model formally or empirically, and the generation of economic diversity, which is the basic source of innovation.

The role of competition is characterized in Schumpeterian lenses as acquiring advantages through innovation or early adoption of a new technology. The innovation process is viewed in two versions — one of creative destruction (or Schumpeter Mark I technological regime) as described in his 1912 work, where small firms dislodged equally-small incumbent firms with their innovations, and one of creative accumulation (or Schumpeter Mark II technological regime) found in his 1942 work, where large established enterprises continuously appropriated non-transferrable or tacit knowledge to prevent spill-overs and maintain their market shares. In articulating his view of competition, Schumpeter also proposed a trade-off between static efficiency as measured by marginal-cost pricing and dynamic progressiveness. In other words, the price of rapid technological advance is a more monopolistic market structure dominated by large firms with considerable market power. The Schumpeterian hypothesis, coined by Kamien and Schwartz (1975), that greater market concentration was more conducive to innovative activity than the entrepreneurial Mark I regime was verified by empirical studies conducted by Nelson and Winter (1982b) and Winter (1984) where industries with high R&D intensities exhibited greater market concentration over time.

The Schumpeterian framework became the theoretical inspiration for the evolutionary theory of the firm attributed to Nelson & Winter (1982a). One of their early models (1977) was in fact a simulation model of Schumpeterian competition. Evidently, Schumpeterian economic thinking is evolutionary in spirit, as he himself has alluded to the term ‘evolution’ in describing structural change in the economic process.

‘Evolution is lopsided, discontinuous, disharmonious by nature...evolution is a disturbance of existing structures and more like a series of explosion than a gentle, though incessant transformation.’ (Schumpeter, 1939, vol. 1,s.102).

Economic development as an evolutionary process is a historical formation where ‘every concrete process of development finally rests upon preceding development...[and] creates the prerequisites for the following.’ (Schumpeter, 1934, p.64).

Andersen (1996) claims that the relationship between Schumpeter and evolutionary modelling is superficial based only on a few Schumpeterian catchphrases rather than a comprehensive analysis of Schumpeterian economics. Nevertheless, there is a common strand or core between evolutionary and Schumpeterian economic analyses in terms of defining innovations as the major determinant of long-run economic growth where economic knowledge are reproduced or remembered through practice, in characterizing regularities in the sequence of innovating and imitating and learning, and in portraying firms as bounded rational agents aiming for more realistic strategies given the uncertainty and complexity not to mention the costs of collecting information needed for decision-making.

Figure 2.3
Darwinian Mechanisms in Schumpeterian Theory

EVOLUTIONARY MECHANISMS (Darwin)	CULTURAL EVOLUTION (Boyd & Richerson)	ECONOMIC EVOLUTION (Schumpeter)
INFORMATION STORAGE Preservation of some stale characteristics	CULTURAL INHERITANCE	BUSINESS ROUTINES
ENDOGENOUS CHANGE Generation of new variations	GUIDED VARIATION Conscious change of cultural Traits, based on some adaptive standard	INNOVATION Conscious change in business routines, based on expected profits
SELECTIVE RETENTION Increase in frequency of some variations (e.g., natural selection, differential survival and reproduction)	BIASED TRANSMISSION Conscious selective imitation of cultural variants, based on some adaptive standard	LEARNING Conscious selective imitation of innovations, based on expected profits
	NATURAL SELECTION Differential survival and availability of models for cultural inheritance	NATURAL SELECTION Differential survival of firms, determined by realized profits

Source: Kelm (1997), p. 125.

The evolutionary approach also applies the Schumpeterian principle of heterogeneous firms so that innovation becomes an organizational phenomenon rather than that of an individual entrepreneur. The Schumpeterian principle of heterogeneous agents corresponds to diversity or variety among members of a species or population needed in biological evolution for natural

selection to operate. This is conveniently summarized in Figure 2.3 from Kelm (1997) who showed how Schumpeterian theory of economic evolution anticipated many features of evolutionary economics, containing relevant analysis of Darwinian mechanisms of guided variation, biased transmission and natural selection that interact in capitalist economies to generate productivity growth. Hodgson (1997) contended that while Schumpeter was an evolutionary economist, there is no legitimate basis for describing his approach as Darwinian as Schumpeter himself made no such attempt to apply Darwinian theory to economic evolution.

Nelson & Winter (1982a) nonetheless used the metaphor of biological evolution to construct their theory. The use of the analogy from biology, however, could be traced back much earlier from the works of Marshall (1890) and Veblen (1898) who both suggested that the concept of Darwinian evolution could be applied to economics. In his preface to *The Principles of Economics* is found Marshall's famous quotation that '*the Mecca of the economist lies in economic biology.*'

Saviotti and Metcalfe (1991b) tracks down the evolutionary approach to four research traditions. First is Schumpeterian economics where the generation of economic variety through radical innovations is central to economic development; and qualitative change, which could be gradual and discontinuous resulting in non-equilibrium conditions characterizing capitalist structures.

The second comes from the biological research tradition with the theory of evolution by Darwin who established a principle of natural selection governing species called the '*survival of the fittest*' that was popularised by Spencer (1851, 1890) whereby species that poorly adapt to their environment perish and well-adapted ones survive although only the genetic constituency is inherited by successive generations. Also related is the evolutionary principle of Lamarck who maintained that organisms develop variations in order to cope with their environments and pass these acquired characteristics or adaptations to the next generation.

The third strand of influence are contributed by non-equilibrium thermodynamics and systems theory that classifies systems as either open wherein matter, energy and information could be exchanged with the environment, and closed where such exchange is not possible. While the latter tend to move to an equilibrium state, the former has multiple stationary states depending on the strength and its reaction to external constraints. The behaviour of the system against some control parameter could lead to instability and also self-organization where new solutions or attractors appear that endows the system new properties and possible order. This self-organizing character of evolutionary systems has been modelled mostly by Silverberg (1988, 1987, 1984) and Silverberg, Dosi & Orsenigo (1988).

Finally, contributions to evolutionary thought arise from firm and organization theories developed by Simon (1955, 1957), Cyert and March (1963), Penrose (1959) and Coase (1937) that focus on the notions of imperfect knowledge, satisficing rather than optimising behaviour and organizational conflict and bargaining.

Kwaśnicki (1996) presents an extensive genesis of the evolutionary approach to economic thinking branching into three main contemporary economic traditions — the Austrian school, neo-Schumpeterian, and institutionalism. The Austrian school is associated with the works of Carl Menger, von Hayek, and von Mises where analysis of the time-consuming, disorganized yet competitive 'market process' driven by economic actors in disequilibrium as opposed to Walrasian concepts of equilibrium positions was introduced along with the emphasis on uncertainty and role of information in the economy. According to Kwaśnicki (1996), neo-Schumpeterians like Alchian, Penrose, Demsetz, Coase, Simon, Nelson & Winter revived the

Schumpeterian notion of the evolutionary character of the capitalist economy through a process of search and selection. Their contributions are discussed below. Finally, institutionalist thought spearheaded by Veblen and continued by Ayres and Clark stressed the vitality of historical, social and institutional factors in shaping economic laws. Kwaśnicki (1996) in Figure 2.4 summarizes the family tree of evolutionary economics.

Figure 2.4
Roots of Evolutionary Economics

Source: Kwaśnicki (1996).

A number of elaborate publications on the whole topic of evolutionary economics have mushroomed, notably those of Nelson & Winter (1982a), Nelson (1995), Saviotti and Metcalfe (1991a), Dosi and Nelson (1994), Andersen (1996), Hodgson (2002, 1998, 1993), Verspagen (2000) and Dopfer (2001). Nevertheless in these works, three basic principles have emerged as governing the evolutionary approach to technological change. These are: the *process of search and selection*, *hereditary mechanisms* by which characteristics are passed on to the next generation, and the *heterogeneity or variation* of the population.

In consonance with the proposition of Penrose (1952), the selection process requires some sustaining or heritable element that would ensure that maximizing agents got selected over time through competitive forces. This heritable gene is epitomized by either the firm's routines/decision rules that subsume knowledge and skills according to Nelson & Winter (1982b), knowhow according to Boulding (1981), or the pool of organizational competences according to McKelvey (1982). Nelson & Winter (1982a) defined the firm's routines to include "characteristics of firms that range from well-specified technology for producing things, through procedures for hiring and firing, ordering new inventory, or stepping up production of items in high demand, to policies regarding investment, research and development (R&D), or advertising, and business strategies about product diversification and overseas investment (p.14)." The firm's habits and routines became the organizational memory or repository of knowledge and skills that could be replicated by imitation, or labour mobility, or takeovers, thus assuming the economic analogue of the biological gene. Moreover, because new characteristics of routines when modified by a firm could also be inherited by imitating and subsidiary firms, technological change assumes Lamarckian evolutionary characteristics where acquired traits could also possibly be inherited.

A second key concept to the evolutionary approach is the element of a process of search and selection, which entails changes in the routines of the firm that represent the counterpart of mutation in the biological science. When firms reach their threshold level of profitability, then there is no change in existing routines and thus, no search takes place. Nelson & Winter (1982a) describes two selection processes of innovation or 'local or internal search', where the firm develops a new routine itself from scratch; and imitation or 'external search', where the firm adapts an already existing routine in use by other firms elsewhere. Moreover, firms only engage in search if their rate of return falls below an arbitrarily set value. Based on the idea by Simon (1955, 1957) of bounded rationality where firms try to obtain a satisfactory minimum rather than an optimum, the notion of a threshold level of profitability proves that firms are 'satisficing' and not 'maximizing' agents. It is only when profitability falls short of this aspiration level when firms feel threatened and begin investing in R&D to search for new techniques that would restore their profitability. However, how much a firm is willing to invest in search and the type of search depends on the nature of its search routines and its ability and willingness to finance these investments, which is a function in turn, of its profitability.

The outcome of the search by firms could also be uncertain. Whether the search would lead to a more efficient routine than the existing one is not entirely warranted. Matthews (1984) coined the term 'competitive selection' as the 'only systematic mechanism directing the course of economic change' given that the presence of asymmetric information and bounded rationality limit the scope for optimal behaviour under the evolutionary approach. Moreover, he characterizes the process of competitive selection, as opposed to natural selection, as stochastic or random, slow, and replete with externalities that are influenced or affected by institutions. Thus, institutions play a role in the development path taken by an economy.

In addition to competition, Saviotti and Metcalfe (1991b) and Boulding (1991) cite two other types of interaction between biological species where each species exerts an effect on the other. These are (i) commensalism or mutual cooperation where each species has an accelerating effect on the other; and (ii) predation, where the predator has a restraining effect on the prey and the prey, a sustaining effect on the predator. The former is often associated with complementary technologies (e.g., computer and peripherals such as printers) whereas the latter with substitute technologies (e.g., compact discs and vinyl records).

As a third evolutionary principle, the generation of variety or novelty in the economic field differs from the biological sphere in the sense that it is purposeful or deliberate as firms intentionally seek to differentiate themselves from competitors via product and process innovations. Metcalfe (1998) elaborates on the principle of Fisher (1930) who introduced via replicator equations the idea that variety drives change. The notion of economic diversity or variety or heterogeneity of the population is among the basic requirements or ingredients of the evolutionary approach of technological change. Silverberg (1997) and Andersen (2004, 2003a, 2003b) cite the Fisher principle as the mathematical foundation of evolutionary modelling as specified in the following formula attributed to Price (1970, 1972):

$$x_i = x_i \left(f_i(x) - \bar{f}(x) \right); i = 1, n \text{ with } \bar{f}(x) = \sum_{i=1}^n x_i f_i(x).$$

The equation describes the evolution of a population comprised of n competing varieties with their associated frequency-dependent fitnesses denoted by $f_i(x)$, where x is a vector of relative frequencies of varieties ($x_1, x_2, \dots, x_n$). The average fitness is given by $\bar{f}(x)$ which changes according to the relative population weights. Thus, varieties with above-average fitness will multiply in relative importance whereas those with below-average fitness become extinct. If the fitnesses are assumed to be constants, then varieties with highest fitness will dominate and extinguish all the other varieties such that the average fitness rises monotonically until

homogeneity is attained.

Such mathematical function known as a *Lyapunov* function shows that average fitness is dynamically maximized by the evolutionary process but only under constant fitness functions. When fitness functions are dependent on population shares and the variety's own weight, increasing or decreasing returns could cause multiple equilibria such that the average fitness is not necessarily maximized. The replicator equations thus only describe relative share dynamics so that an additional function for deriving population levels is required.

One such system was developed by Volterra (1926) to describe predator-prey relationships and independently by Lotka (1925) to represent a chemical reaction. Applied for instance to rabbits and foxes, suppose $R(t)$ is the population of prey rabbits and $F(t)$ the population of predator foxes at time t , then the Lotka-Volterra system, which Hofbauer and Sigmund (1988) proved as equivalent to replicator systems, is:

$$\frac{dR}{dt} = R(a - bF); \frac{dF}{dt} = F(cR - d)$$

where a is the natural birth rate of rabbits in the absence of predation, b is the death rate of rabbits due to predation, c is the natural death rate of foxes in the absence of food (rabbits), and d is the efficiency of replacing predated rabbits into foxes. The general form of the Lotka-Volterra equation as described by Silverberg (1997) and Grübler (1990) is thus:

$$\frac{dN_i}{dt} = a_i N_i - \frac{1}{g_i} \sum_{j=1}^n l_{ij} N_i N_j; i = 1, \dots, n$$

which basically expresses the growth of a species i expressed as a function of the number or density of that species N_i and its interaction with another species N_j measured by l_{ij} . Applied to firms, the functions could be market shares or profit rates or some measure of competitiveness such as price, quality, delivery delay, or advertising. In the Lotka-Volterra system, the predator and prey are usually taken as two competing technologies as illustrated in Thomas (1999) using the example of shuttle looms and shuttleless looms in textile technologies. Figure 2.5 below illustrates the phenomenon of variation and novelty in the case of technologies with dominant ones likened to surviving species and old ones the extinct species. The figure shows the example of horse-drawn carriages and cars in the left panel and in the right panel, energy sources such as steam, coal, water, natural gas, nuclear, etc.

Evolutionary theorizing also reveals four unique properties that distinguish it from other strands of research on growth and technology. These four properties stem from the fact that the multiplicity and uncertainty of outcomes makes it difficult to predict which technology will succeed or be selected. Brian Arthur (1989, 1988a, 1988b) names these properties as: (i) *existence of multiple equilibria*, (ii) *likelihood of inefficiency*, (iii) *path dependency*, and (iv) *possibility of 'lock-in' solutions*.

These properties are attributed to what he calls 'self-reinforcing mechanisms' such as increasing returns, indivisibilities, network externalities and learning by doing such that minute differences in initial conditions could determine long-run outcomes. He illustrates the case of the Sony Betamax and VHS technology to explain these properties.

Multiple equilibria means that two different asymptotic market shares for the competing technologies lead to indeterminate, and unpredictable solutions which are likewise not unique, hence chaotic. At the start, both Betamax and VHS prevalence in the market encourages video outlets to stock film titles in either format so it was difficult to say in advance which technology would dominate. Possible inefficiencies mean that an inferior (superior) technology

could in fact dominate (disappear from) the industry as in the case of the Betamax, which was believed to be technically superior in terms of sound and picture quality to the VHS but by ill-timing or bad luck did not gain enough foothold in the market.

Figure 2.5
Substitution of Old for New Technologies

Source: Nakicenovic (1988), pp. 185 and 201.

Lock-in effects refer to the case where the dominant technology creates a barrier for the other technology to re-enter the market again. Thus, the videocassette recorder (VCR) technology was locked into the VHS format and the Sony Betamax recorder became an extinct technology. Finally, *path-dependency* connotes that initial conditions or early history such as first-mover advantages or 'founder status' determines which technology would prevail. When VHS cassette producer first introduced the bulkier VHS tapes with extended two hour playing time in response to consumer need to pre-tape television programs, it took the lead and eventually captured the whole market. Another often-cited example of both 'lock-in' and 'path-dependent' technology is the QWERTY mechanical typewriter keyboard, which according to David (1985) was developed to slow down typing to prevent frequent jamming on mechanical typewriters. The QWERTY keyboard became the universal keyboard even in the age of microcomputer technology and precluded entry of more speed typing oriented keyboards such as the Dvorak Simplified Keyboard (DSK) and the ideal DHIATENSOR keyboard whose ten letters compose 70 percent of words in the English language.

Evolutionary Models of Technological Change

There are several micro and macroeconomic evolutionary models of technology but the pioneering work is attributed to Nelson & Winter (1982a) as discussed below.

Nelson-Winter Model

The Nelson-Winter evolutionary model was a collaborative work that generally integrated Simon's concepts of bounded rationality and satisficing behavior, Achian's and Friedman's natural selection process and Schumpeterian notions on innovation and competition. In contrast to the neoclassical world where a representative agent exists, individual heterogeneous firms comprise an evolutionary economy with nonlinear dynamic interactions in their search for

innovation, in the competitive selection process and in their capital and R&D investments.

Figure 2.6
The Structure of the Nelson Winter Model

Source: Andersen (1996), p. 104.

Because firms search for new routines or combinations of labour and capital coefficients, technological change over time could be biased so that disproportional changes in capital and labour coefficients may resemble substitutability between capital and labour when the model is simulated. Inasmuch as macroeconomic properties are derived or deduced from microeconomic behaviour of firms, the dynamics are therefore explored through simulation rather than analytical solutions.

One such simulation was conducted to study long run growth of the American economy using the same data set as Solow (1957) who as could be recalled from the first part of this chapter explained it by: $Q_t = A_t K_t^\alpha L_t^\beta$. Nelson & Winter (1982a) showed an endogenous movement of the A parameter based on the micro level: $Q_{jt} = A_{jt} K_{jt}$ and $Q_t = \sum_{j=1}^n Q_{jt}$ with the result that the evolutionary model reproduced Solow's growth data more realistically than Solow's own model. The mechanics of the Nelson-Winter model are best explained using the flowchart in Figure 2.6 developed for simulating the model. The steps in the model are described in the diagram based on Andersen (1996).

The basic idea of the Nelson & Winter model is that the state of the industry at a certain period inherits from the previous period the size of physical capital stock (K_{jt}) and the productivity of capital (A_{jt}) for each of the individual firms which is aggregated to yield the total output or supply of the industry. Each individual firm follows a full-capacity utilization rule so that actual output equates to the maximum output for each firm. The search process for new combinations of capital and labour coefficients assumes two different forms: local search or innovation and imitation. The former means that firms search for new techniques not yet available in industrial applications whereas the latter means that the firm looks for techniques presently employed by competitor firms but not yet used in its own production process. The probability that firms innovate or imitate depends on R&D funds that are determined as a ratio to the level of physical

capital.

The model is original in the sense that there are potential entrants to the industry by 'empty' firms with zero capital stock that are also active in the search process. There is a quarter of a chance these firms will enter the industry if production techniques they discover promise a rate of return higher than an arbitrarily set value. Selection of a change in routine or technology is based on comparing productivities obtained by using a previous technique and technique discovered from either imitative or innovative search. The technique yielding the highest productivity is chosen that then determines productivity of the next period $t+1$. Thus, the firm adopts a new technique only if its expected rate of return is higher than the firm's present rate of return from using the old technology.

The main selection force in the model is the rate of return on techniques. The willingness of a firm to invest in search depends not only on the character of its search routines but also on its ability and willingness to finance these investments. The ability to finance in turn is dependent on how profitable the firm is. A firm's capital stock shrinks if it makes losses, acting as another filtering force for firms that cannot keep pace with technological advances of competitors to withdraw from the industry. If firms are financially constrained to make investments out of retained profits, loans from banks are resorted to, calculated as proportional to profits so that bank's decision rules (institutions) play a role in the evolutionary process. The firm therefore has a financial constraint based on availability of internal (retained earnings) and external funds (loans). The investment decision of each firm is governed by an investment function that depends on the firm's market share, price elasticity of demand, firm's profit per unit of capital, and bank policy. Desired investment is determined by the actual mark-up of price over costs and the desired mark-up that is influenced by the firm's market share. The actual or maximum investment made by the firm depends on current profits plus loans from the banks calculated in proportion to profits. The changes in physical capital affect production in the next period.

The core assumptions of the model are essentially that: (a) firms are not perfectly informed so are at best satisficing rather than optimising results; (b) decision-making of firms are bound by routines or rules that are also influenced by institutions (.e.g, banks); (c) firms could to a certain degree imitate the routines of other firms, learn for themselves and have the capability to create new techniques; (d) the search and selection process are characterized by cumulativeness and path-dependence; (e) interactions between firms are typically conducted under disequilibrium conditions and uncertainty; (f) the processes of change are non-deterministic, open-ended and irreversible.

Evaluation of Schumpeterian and Evolutionary Models

Evolutionary economics has evidently made a distinction as a separate school of economic thinking on economic growth and technological change despite the overlap with business research and management studies. Many ideas though of evolutionary economics are similar to endogenous growth or new growth theory. Fagerberg (2003) specifically cites the mechanism of economic growth triggered by incremental learning and knowledge accumulation as in the human capital models, or by investments in R&D as in the ideas-based models. While the use of intellectual property rights or patenting system could make knowledge an excludable good to create incentives for further innovation via the accrual of monopoly rents, the spillover effects in terms of replenishing the societal pool of knowledge, or the average skills level of labour, also foments new innovation that drives growth in the system. What is strikingly different though is that while new growth theory assumes a representative and perfectly rational and fully informed

economic agent, the evolutionary approach draws upon heterogeneous agents who are boundedly rational responding to radically uncertain environments on an ad hoc or trial and error basis.

Verspagen (1990) draws similar parallelisms and contrasts between new and old neoclassical growth theories and the evolutionary model. The main parallel is in identifying endogenously determined technological change as the main source of economic growth. The new growth theories put greater emphasis on the specific nature of technological change and leads to more or less the same conclusions as evolutionary-inspired theories. The difference between them is in how the dynamics comes about. This is attributed to the fact that in endogenous and neoclassical thinking, firms are in a state of equilibrium and technological change bears a tendency to cause economic growth. In evolutionary theory, mutable off-equilibrium behaviour of firms triggers technological change. Nevertheless, a second parallelism is that there is the dual recognition that *“in reality, equilibrium does not exist, but a tendency towards it can be observed* (Verspagen, 1990, p. 42).” This arises from the Schumpeterian notion of economic growth as approaching a stationary state of equilibrium. For instance, he describes that a state reached in an out-of-equilibrium dynamic process might actually be an equilibrium but in a different sense as the neoclassical notion of equilibrium. Per Dosi, Pavitt and Soete (1990), *“evolutionary equilibrium is defined as a state in which the (net) benefits of imitating a new technique are equal to the (net) benefits of innovation* (p. 43).” The possibility of lock-in effects where an inferior technology becomes dominant even though a new technology might be more efficient could mean that a situation of equilibrium has been reached although not exactly a position an economy would like to settle.

Krugman (1996) brings this point further as to suggest that while *“evolution is a theory of gradual change, of myopic dynamics, in practice most evolutionary theory focuses on the presumed end result of such dynamics: an equilibrium in which individuals maximize their fitness given what other individuals do* (p. 6).... Evolutionary theorists, even though they have a framework that fundamentally tells them that you cannot safely assume maximization-and-equilibrium, make use of maximization and equilibrium as modelling devices – as useful fictions about the world that allow them to cut through the complexities. And evolutionists have found these fictions so useful that they dominate analysis in evolution almost as completely as the same fictions dominate [neoclassical] economic theory (p. 7).” The earliest evolutionist Spencer (1890), as cited in Krugman (1996) looked at evolution as a process of equilibrium and harmony, which he calls equilibration: *“the changes which evolution presents cannot end until equilibrium is reached, and that equilibrium must at least be reached* (s.524).” Day (1986) in his study of disequilibrium economic dynamics, suggests *“economic disequilibrium...requires the presence of market mechanisms that make possible its continued viability”* and that a *“complex dynamic theory of economic change...must... be based not only on conventional rationality and routinely adapting behaviour but on a superior faculty, which may perhaps best be called ‘creative intelligence.’”*

Also making for a difference in the treatment of technological change between neoclassical-endogenous and evolutionary strands is the description of the behaviour of firms as perfectly informed representative rational utility maximizers in neoclassical and endogenous growth theory in contrast to boundedly rational satisficing heterogeneous firms in the evolutionary approach and the characteristics of the growth path as one of equilibrium in the former and disequilibrium in the latter. In the evolutionary perspective, the concepts of technology diffusion and learning receive much attention since diffusion presupposes a state of disequilibrium with the number of firms applying the innovation growing and those using an old technology falling, and since firms that learn from the innovation of other firms are no longer then representative. Technology diffusion and learning also arise from the cumulative character and path-dependent nature of

technological change.

The third comparison between endogenous and evolutionary theories involves the case made by both for active technology policy intervention. The difference lies in the degree or extent of specificity, detail and comprehensiveness of the policy measures. In endogenous growth theory, policy intervention was justified because the presence of externalities implied that the market solution was not socially optimal. In the evolutionary approach, however, economic growth is seen as a historical process and as such interacts with and is influenced not only by economic forces but also by non-economic factors as well like culture, science, and institutions. Verspagen (2000) observes that for evolutionary economists, the distinction between economic and non-economic forces that explain technological change and economic growth gets blurred. Technology becomes embedded in a web of links that include economic, cultural, social, political, industrial spheres similar to the notions of technological paradigms by Dosi (1982), technological guideposts and innovation avenues by Sahal (1985) or technoeconomic paradigms by Perez (1983).

As such, the goal of policy intervention is no longer related to rectifying market failure, defined as anything that prevents optimal allocation, as in the neoclassical world but rather as Smith (1991) calls it “*shaping the potential technological trajectory, and providing access to it for firms*” (p.268). An evolutionary normative framework to him could be structured along the issues of: (a) instituting economic and social mechanisms that generate the innovation search process; (b) developing the selection mechanism, which by itself is tied up to fiscal and monetary policies, trade policies, procurement policies, industrial policies, and the like so that variation is continuously generated; and (c) strengthening the interaction between institutional structures and strategic behaviour of firms. Some policy instruments such as education and training in human capital models may be seen as alternatives to output maximization in new growth theories but are underlying preconditions for growth in the evolutionary perspective. This brings us to systems of innovation as central to technology policy in the evolutionary perspective. Introduced by Freeman (1987), Lundvall (1992) and Nelson (1993), the national systems of innovation is defined as the entire social system involved in the production, diffusion and use of knowledge in an economy.

Finally, the fourth parallelism between the two strands of thought on technological change and growth could be found in the rigor of abstraction and formalization. Both fields are model-driven although at the onset, evolutionary theory was more descriptive in nature. Silverberg (1997) described the arsenal of ‘numerical and artificial intelligence tools’ that have been developed over the two decades when evolutionary perspective propagated. Apart from computer simulation models, the use of replicator dynamic equations, Master equations or Markov processes, and Polya urn approaches in evolutionary modelling have been introduced. Added to this list are directed graphs and landscape mapping as employed by Silverberg & Lehnert (1994, 1996), Silverberg & Verspagen (1994a, 1994b, 1994c, 1995a, 1995b, 1995c), Vega-Redondo (1996), Kauffman, Lobo & Mcready (1998), and Kwaśnicki & Kwaśnicka (1992); and counterfactual history (see Foray and Cowan, 2002). Moreover, the applications of evolutionary theorizing and even modelling has been extended to game theory, financial markets, organizational change, and economic models that were not only endogenized but ‘evolutionized’ such as Pasinetti’s framework of structural economic dynamics by Andersen (1996) or the Aghion and Howitt model by Eicher & van’t Veld (2000). Evolutionary modelling suffered the same setbacks as endogenous growth modelling but managed to overcome them. For instance, we have witnessed how the early Nelson & Winter model simulated the Solow test of U.S. time series on economic growth to which Silverberg and Verspagen (1998) commented that “*a more positive*

approach...would require an evolutionary theory to provide fresh results of its own and not only benchmark itself against neoclassical results (p. 249)." Silverberg (1997) aptly describes this evolution of evolutionary economics as a science:

First, the toolbox of evolutionary modelling has now reached the stage of reasonable systematisation and consistency, so that a coherent dialog between the disparate approaches is being facilitated and the taint of ad hocery is beginning to recede. Second, evolutionary models are gradually moving out of the sandbox of being interesting curiosities or toy alternatives to mainstream theorizing. They are acquiring theoretical status in their own right and are also beginning to yield their first dividends in terms of empirically testable results.

In the end, the basic contribution of evolutionary perspective is what it has taught us and that is in the words of Krugman (1996): *"I believe that economics would be a more productive field if we learned something important from evolutionists: that models are metaphors...not literal truths... to be defended at all costs, ...and that we should use them, not the other way around."*

2.5 Conclusion

The main purpose of this chapter is to present the burgeoning literature on growth theory with technology as its driver as this provides the backdrop of the debate on the Asian miracle episode discussed in the next chapter. The introduction of technological change as a determinant of economic growth was the main contribution of Solow and Swan which was picked up later on by new or endogenous growth scholars. The evolutionary growth theory, in turn, which germinated with the Schumpeterian concept of the entrepreneur and innovation driving the growth process through a process of creative destruction became the basis of evolutionary growth theory that places technological change higher in the pedestal of growth determinants. The chapter, however, does not cover the wider field of the growth episode literature (see Pritchett, 2000) where determinants other than technology have created an even massive field of empirical research on determinants of long-run economic growth. Its inclusion would only add to an already lengthy chapter which although found in many textbooks is herein presented as a comprehensive survey for the unacquainted reader.

REFERENCES

- Abramovitz, M. (1986), Catching-up, forging Ahead, and falling behind. *Thinking about growth and other essays on economic growth and welfare*. New York: Cambridge University Press, 1989, 220-242.
- Aghion, P., & Howitt, P. (1998), *Endogenous growth theory*. Cambridge, Massachusetts: MIT Press.
- Aghion, P., & Howitt, P. (1990). A model of growth through creative destruction. *NBER Working Paper* 3223 (January).
- Aghion, P., & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, Volume 60, No. 2 (March), 323-351.
- Andersen, E.S. (2004). Evolutionary econometrics: From Joseph Schumpeter's failed econometrics to George Price's general evometrics and beyond. Paper presented for the *Third Workshop on the Economic Transformation of Europe*, Sophia-Antipolis, 29-30 January.

- Andersen, E.S. (2003a). The evolving fable of the trees: Population thinking and evolutionary economic analysis. Paper presented at the *DRUID Summer Conference 2003 on Creating, Sharing and Transferring Knowledge: The Role of Geography, Institutions and Organizations*. Copenhagen, June 12-14.
- Andersen, E.S. (2003b). *A note on Price's equation for evolutionary economics: Derivation, interpretations and simple applications*. Preliminary Note, Aalborg: DRUID.
- Andersen, E.S. (1996). *Evolutionary economics: Post-Schumpeterian contributions*. London: Pinter
- Arrow, K. (1962). The economic implications of learning by doing. *The Review of Economic Studies*, Volume 29, Issue 3 (June), 155-173.
- Baldwin, W.L., & Scott, J.T. (1987). Market structure and technological change. *Fundamentals of Pure and Applied Economics*, Volume 15. Routledge (March).
- Baldwin, W.L., & Scott, J.T. (1989). Market structure and technological innovation. In F.M. Scherer (ed.), *The Economics of Technical Change*. Harwood Academic Publishers.
- Barro, R.J. (1990). Government Spending in a Simple Model of Endogenous Growth. *Journal of Political Economy* 98, No. 5, Part 2 (October): S103-S125.
- Barro, R. J., & Becker, G.S. (1989). Fertility choice in a model of economic growth. *Econometrica*, Volume 57, No. 2 (March), 481-501.
- Barro, R.J., & Sala-i-Martin, X. (1995). *Economic growth*. Singapore: McGraw-Hill, Inc.
- Baumol, W. J. (1986). Productivity growth, convergence and welfare: What the long run data show. *American Economic Review*, 76, 1072-1085.
- Benabou, R. (1996). Heterogeneity, stratification, and growth: Macroeconomic implications of community structure and school finance. *The American Economic Review*, Volume 86, No. 3 (June), 584-609.
- Benhabib, J., & Farmer, R.E.A. (1994). Indeterminacy and increasing returns. *Journal of Economic Theory*, Volume 63, 19-41.
- Benhabib, J., & Perli, R. (1994). Uniqueness and indeterminacy: On the dynamics of endogenous growth. *Journal of Economic Theory*, Volume 63, 113-142.
- Boldrin, M., Nishimura, K., Shigoka, T., & Kano, M. (2001). Chaotic equilibrium dynamics in endogenous growth models. *Journal of Economic Theory*, Volume 96, 97-132.
- Boldrin, M., & Perisco, N. (1993). A chaotic map arising in the theory of endogenous growth. *Northwestern University Center for Mathematical Studies in Economics and Management Science Discussion Paper 1071*, November.
- Boldrin, M., & Rustichini, A. (1994). Growth and indeterminacy in dynamic models with externalities. *Econometrica*, Volume 62, 323-342.
- Boulding, K.E. (1981). Agricultural Economics in an Evolutionary Perspective. Mimeo. *Paper presented at the Annual Meeting of the American Agricultural Economics Association and the Southern Agricultural Economics Association*, Clemson University, South Carolina, 28 July 1981.

- Boulding, K. E. (1991). What is evolutionary economics? *Journal of Evolutionary Economics*, Volume 1, Issue 1, 9-17.
- Baldwin, W.L., & Scott, J.T. (1981). *Evolutionary economics*. London: SAGE.
- Bretschger, L. (1999), *Growth theory and sustainable development*. UK: Edward Elgar
- Brian, A.W. (1989). Competing technologies, increasing returns, and lock-in by historical events. *The Economic Journal*, Volume 99, No. 394 (March), 116-131.
- Brian, A.W (1988a). Self-reinforcing mechanisms in economics, in Anderson, P. W., Arrow, K.J., & Pines, D. (eds.) (1988). *The economy as an evolving complex system*, Proceedings of the *Evolutionary Paths of the Global Economy Workshop* held on September 1987 in Santa Fe, New Mexico. Massachusetts: Perseus Books, 9-31.
- Brian, A.W (1988b). Competing technologies: an overview. In G. Dosi, C. Freeman, R. Nelson, G. Silverberg & L. Soete (eds.) (1988). *Technical change and economic theory*. London: Pinter Publishers, 590-607.
- Coase, R. H. (1937). The nature of the firm. *Economica*, New Series, Volume 4, No. 16 (November), 386-405.
- Cohen, W. M., & Levin, R.C. (1989). Empirical studies of innovation and market structure. In R. Schmalensee & R.D. Willig (Eds.), *Handbook of Industrial Organization*, North Holland, Amsterdam.
- Cohen, W. M., Levin, R.C., & Mowery, D.C. (1985). R&D appropriability, opportunity, and market structure: New evidence on some Schumpeterian hypotheses. *The American Economic Review*, Volume 75, No. 2, Papers and Proceedings of the Ninety-seventh Annual Meeting of the American Economic Association, (May), 20-24.
- Cohen, W. M., Levin, R.C., & Mowery, D.C. (1987). Firm size and R&D intensity: A re-examination. *The Journal of Industrial Economics*, Volume 35, No. 4. The Empirical Renaissance in Industrial Economics (June), 543-565.
- Cyert R., & March, J. (1963). *A behavioural theory of the firm*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Dasgupta, P., & Stiglitz, J. (1980a). Uncertainty, industrial structure, and the speed of R&D. *The Bell Journal of Economics*, Vol. 11, No. 1 (Spring), 1-28.
- Dasgupta, P., & Stiglitz, J. (1980b). Industrial structure and the nature of innovative activity. *The Economic Journal*, Vol. 90, No. 358 (June), 266-293.
- David, P. (1985). Clio and the economics of QWERTY. *American Economic Review*, 75, 332-337.
- Day, R. H. (1986). Disequilibrium economic dynamics: A post-Schumpeterian contribution. In R.H. Day & G. Eliasson (1986) (Eds.). *The Dynamics of Market Economies*. Netherlands: Elsevier Science Publishers B.V., 51-70.
- De Long, J.B. (1988), Productivity growth, convergence, and welfare: Comment. *The American Economic Review*, Vol. 78, No. 5, December.
- Domar, E. D. (1946). Capital expansion, rate of growth, and employment. *Econometrica*, 14 (2), 137-147.

- Dopfer, K. (ed.) (2001). *Evolutionary economics: Program and scope*. Boston: Kluwer Academic Publishers.
- Dosi, G. (1982). Technological paradigms and technological trajectories. *Research Policy*, Volume 11, Issue 3 (June), 147-162.
- Dosi, G., & Nelson, R. (1994). An introduction to evolutionary theories in economics. *Journal of Evolutionary Economics*, Volume 4, Issue 3, 153-172.
- Dosi, G., Pavitt, K., & Soete, L. (1990). *The Economics of Technological Change and International Trade*. Edward Elgar.
- Eicher, T., & van't Veld, K. (2000). *Search in research: An evolutionary approach to technical change and growth*, Working Paper, University of Washington (October).
- Fagerberg, J. (2003). Schumpeter and the revival of evolutionary economics: An appraisal of the literature. *Journal of Evolutionary Economics*, Volume 13, No. 2 (April), 125-159.
- Fisher, R.A. (1930). *The genetical theory of natural selection*. Oxford: Clarendon Press.
- Foray, D., & Cowan, R. (2002). Evolutionary economics and the counterfactual threat: On the nature and role of counterfactual history as an empirical tool in economics. *Journal of Evolutionary Economics*, Volume 12, Issue 5, 539-562.
- Freeman, C. (1987). *Technology policy and economic performance*. London: Pinter.
- Grossman, G., & Helpman, E. (1991). Quality ladders in the theory of growth. *The Review of Economic Studies*, Volume 58, No. 1 (January), 43-61.
- Grossman, G., & Helpman, E. (1990a). Trade, knowledge spillovers, and growth. *NBER Working Paper* No. 3485, (October).
- Grossman, G., & Helpman, E. (1990b). Comparative advantage and long-run growth. *The American Economic Review*, Volume 80, No. 4 (September), 796-815.
- Grossman, G., & Helpman, E. (1990c). Trade, innovation, and growth. *The American Economic Review*, Volume 80, No. 2, Papers and Proceedings of the Hundred and Second Annual Meeting of the American Economic Association (May), 86-91.
- Grossman, G., & Helpman, E. (1989). Growth and welfare in a small open economy. *NBER Working Paper* No. 2970 (July).
- Harrod, R. (1939). An essay in dynamic theory. *Economic Journal*, 49 (193), 14-33.
- Hirschman, A. (1958). *The strategy of economic development*. New Haven, Connecticut: Yale University Press.
- Hodgson, G. (2002). Evolutionary theories of the firm. *The IEBM Handbook of Economics*, Thomson, 515-521.
- Hodgson, G. (1998). Evolutionary and competence-based theories of the firm. *Journal of Economic Studies*, Volume 25, No. 1, 25-56.
- Hodgson, G. (1997). The evolutionary and non-Darwinian economics of Joseph Schumpeter. *Journal of Evolutionary Economics*, Volume 7, Issue 2, 131-145.

- Hodgson, G. (1993). *Economics and evolution: Bringing back life into economics*. Ann Arbor, Michigan: University of Michigan Press.
- Hofbauer, J., & Sigmund, K. (1988). *The theory of evolution and dynamical systems*. Cambridge: Cambridge University Press.
- Inada, K. (1963). On a two-sector model of economic growth: Comments and a generalization. *Review of Economic Studies*, 30 (2), 119-127.
- Jones, C. (1998). *Introduction to economic growth*. New York: W.W. Norton and Company.
- Kamien, M., & Schwartz, N. (1972a). Timing of innovation under rivalry. *Econometrica*, Volume 40, No. 1 (January), 43-60.
- Kamien, M., & Schwartz, N. (1972b). Market structure, rivals' response, and the firm's rate of product improvement. *The Journal of Industrial Economics*, Volume 20, No. 2 (April), 159-172.
- Kamien, M., & Schwartz, N. (1974). Patent life and R&D rivalry. *The American Economic Review*, Volume 64, No. 1 (March), 183-187.
- Kamien, M., & Schwartz, N. (1975). Market structure and innovation: A survey. *Journal of Economic Literature*, Volume 13, No. 1 (March), 1-37.
- Kamien, M., & Schwartz, N. (1976). On the degree of rivalry for maximum innovative activity. *The Quarterly Journal of Economics*, Volume 90, No. 2 (May), 245-260.
- Kamien, M., & Schwartz, N. (1978). Potential rivalry, monopoly profits and the pace of inventive activity. *The Review of Economic Studies*, Volume 45, No. 3 (October), 547-557.
- Kamien, M., & Schwartz, N. (1982). *Market structure and innovation*. Cambridge: Cambridge University Press.
- Kauffman, S., Lobo, J., & Macready, W. (1998). Optimal search on a technology landscape. *Research in Economics*, Working Paper No. 10-091, Santa Fe Institute.
- Kelm, M. (1997). Schumpeter's theory of economic evolution: A Darwinian interpretation. *Journal of Evolutionary Economics*, Volume 7, Issue 2, 97-130.
- Kennedy, C. (1964). Induced bias in innovation and the theory of distribution. *The Economic Journal*, Volume 74, Issue 295 (September), 541-547.
- Kennedy, P., & Welling, L. (1997). Production externalities and the efficiency of parental child care choices. *The Canadian Journal of Economics*, Volume 30, No. 42 (November), 822-834.
- Keynes, J. M. (1936). *The general theory of employment, interest and money*. London: Macmillan Company.
- Kim, S., & Mohtadi, H. (1992). Labour specialization and endogenous growth. *The American Economic Review*, Volume 82, No. 2 (May), 404-408.
- Kleinknecht, A. (1987). Measuring R&D in small firms: How much are we missing? *The Journal of Industrial Economics*, Volume 36, No. 2 (December), 253-256.
- Krugman, P. (1996). What economists can learn from evolutionary theorists and vice-versa? In J. Groenewegen & J. Vromen (Eds.) (2000). *Institutions and the evolution of capitalism*. Cheltenham, U.K. and Lyme, U.S.: Edward Elgar.

- Kwaśnicki, W. (1996). *Roots of evolutionary economics*. Maastricht Economic Research Institute on Innovation and Technology, Working Paper (September).
- Kwaśnicki, W., & Kwaśnicka, H. (1992). Market, innovation, competition: An evolutionary model of industrial dynamics. *Journal of Economic Behaviour and Organization*, Volume 19, Issue 3 (December), 343-368.
- Levin, R. (1978). Technical change, barriers to entry, and market structure. *Economica*, New Series, Volume 45, Issue 180 (November), 347-361.
- Lloyd-Ellis, H. (1999). Endogenous technological change and wage inequality. *The American Economic Review*, Volume 89, No. 1 (March), 47-77.
- Lotka, A.J. (1925). *Elements of physical biology*. Baltimore: Williams & Wilkins, Reprinted in 1956: *Elements of mathematical biology*. New York: Dover Publications, Inc.
- Loury, G. (1979). Market structure and innovation. *The Quarterly Journal of Economics*, Vol. 93, No. 3 (August), 395-410.
- Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, Volume 22, 3-42.
- Lundvall, B.-A. (ed.) (1992). *National systems of innovation: Towards a theory of innovation and interactive learning*. London: Pinter.
- Maddison, A. (1982). *Phases of capitalist development*. New York: Oxford University Press.
- Marshall, A. (1890). *Principles of economics*. First Edition (September). Library of Economics and Liberty. Retrieved from <http://www.econlib.org/library/Marshall/marP.html> on 12 December 2015.
- Matallia, C. (2000). *Neoclassical growth model and new endogenous growth model: A survey*. Turin, Italy: University of Turin, April.
- Matthews, R. (1984). Darwinism and economic change. *Oxford Economic Papers*, New Series, Volume 36 (November), 91-117.
- McCallum, B. (1996). Neoclassical vs. endogenous growth analysis: An overview. *NBER Working Paper* No. 5844 (November).
- McKelvey, B. (1982). *Organizational systematics: Taxonomy, evolution, classification*. University of California Press.
- Metcalf, J.S. (1998). *Evolutionary economics and creative destruction*. The Graz Schumpeter Lectures 1, Routledge.
- Nakicenovic, N. (1988). Dynamics and replacement of U.S. transport infrastructures. In J. Ausubel & R. Herman (Eds.) (1988). *Cities and their vital systems: Infrastructure, past, present, and future*. Washington, D.C.: National Academy Press, 175-220.
- Nelson, R. (1993). *National innovation systems: A comparative analysis*. New York: Oxford University Press.
- Nelson, R., & Phelps, E. (1966). Investments in humans, technological diffusion, and economic growth. *The American Economic Review*, Vol. 56, No. 1/2 (March), 69-75.

- Nelson, R., & Winter, S. (1982a). *An evolutionary theory of economic change*. Cambridge: Massachusetts: Belknap Press of Harvard University Press.
- Nelson, R., & Winter, S. (1982b). The Schumpeterian tradeoff revisited. *The American Economic Review*, Volume 72, No. 1 (March), 114-132.
- Nelson, R., & Winter, S. (1977). Simulation of Schumpeterian competition. *The American Economic Review*, Volume 67, No. 1 (February), 271-276
- Nelson, R. (1995). Recent evolutionary theorizing about economic change. *Journal of Economic Literature*, Volume 33, No. 1 (March), 48-90.
- Nordhaus, W. (1969). An economic theory of technological change. *The American Economic Review*, Volume 59, Issue 2, Papers and Proceedings of the Eighty-first Annual Meeting of the American Economic Association (May), 18-28.
- Nurkse, R. (1953). *Problems of capital development in underdeveloped countries*. New York: Oxford University Press.
- Pack, H. (1994). Endogenous growth theory: Intellectual appeal and empirical shortcomings. *The Journal of Economic Perspectives*, Volume 8, No. 1 (Winter), 55-72.
- Paczkowski, W. (2002). *Endogenous growth models*. Lecture Notes. New Jersey: Rutgers University.
- Peet, R., & Hartwick, E. (1999). *Theories of development*. New York: Guilford Press.
- Penrose, E. (1959). *The theory of the growth of the firm*. New York: John Wiley.
- Penrose, E (1952). Biological analogies in the theory of the firm. *The American Economic Review*, Volume 42, No. 5 (December), 804-819.
- Perez, C. (1983). Structural change and assimilation of new technologies in the economic and social systems. *Futures*, Volume 15, No. 5 (October), 357-375.
- Perkins, D., Radelet, S., Lindauer, D. & Block, S. (2013). *Economics of Development*, 7th edition. W.W. Norton & Company: London.
- Price, G. (1972). Fisher's "fundamental theorem" made clear. *Annals of Human Genetics*, Volume 36, 129-140.
- Price, G. (1970). Selection and covariance. *Nature*, Volume 227, 520-521.
- Prichett, L. (2000). Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains. *The World Bank Economic Review No. 14*, 1: 221-250.
- Quah, D. (1995). Empirics for Economic Growth and Convergence. *Centre for Economic Performance Discussion Paper No. 253*. London School of Economics.
- Rebelo, S. (1991). Long-run policy analysis and long-run growth. *The Journal of Political Economy*, Volume 99, No. 3 (June), 500-521.
- Ricardo, D. (1817). *On the principles of political economy and taxation*. Reprint: Cambridge 1951: Cambridge University Press.

- Romer, D. (2001). *Advanced macroeconomics*, 2nd ed., New York: McGraw-Hill, 5-46.
- Romer, P. (1986). Increasing returns and long run growth. *The Journal of Political Economy*, Volume 94, No. 5 (October), 1002-1037.
- Romer, P. (1990). Endogenous technological change. *The Journal of Political Economy*, Volume 98, No.5, Part 2: The Problem of Development: A Conference of the Institute for the Study of Free Enterprise Systems (October), S71-S102.
- Rosenberg, N. (1983). *Inside the black box: Technology and economics*. Cambridge University Press.
- Rosenstein-Rodan, P. (1943). Problems of industrialization of Eastern and Southeastern Europe. *Economic Journal* (June-September). Reprinted in A.N. Agarwala & S.P. Singh (Eds.) *The Economics of Underdevelopment*, New York: Oxford University Press, 1963.
- Sahal, D. (1985). Technological guideposts and innovation avenues. *Research Policy*, Volume 14, Issue 2 (April), 61-82.
- Sala-i-martin, X. (1990a) Lecture notes on economic growth (I): Introduction to the literature and neoclassical models. *NBER Working Paper* 3563 (December).
- Sala-i-martin, X. (1990b). Lecture notes on economic growth (II): Five prototype models of endogenous growth. *NBER Working Paper* 3564 (December).
- Salvadori, N. (ed.) (2003a). *Old and new growth theories: An assessment*. Cheltenham, UK: Edward Elgar.
- Salvadori, N. (2003b). *The theory of economic growth: A 'classical' perspective*. Cheltenham, UK: Edward Elgar.
- Saviotti P., & Metcalfe, J.S. (1991a). *Evolutionary theories of economic and technological change*. Switzerland: Harwood Academic Publishers.
- Saviotti P., & Metcalfe, J.S. (1991b). Present developments and trends in evolutionary economics. In P. Saviotti & J. S. Metcalfe (1991a). *Evolutionary theories of economic and technological change*. Switzerland: Harwood Academic Publishers, 1-30.
- Scherer, F.M. (1965). Firm size, market structure, opportunity, and the output of patented inventions. *The American Economic Review*, Volume 55, Issue 5 (December), 1097-1125.
- Scherer, F.M. (1967a). Research and development resource allocation under rivalry. *The Quarterly Journal of Economics*, Volume 81, Issue 3 (August), 359-394.
- Scherer, F.M. (1967b). Market structure and the employment of scientists and engineers. *The American Economic Review*, Volume 57, 524-531.
- Schmookler, J. (1959). Bigness, fewness, and research. *The Journal of Political Economy*, Volume 67, Issue 6 (December), 628-632.
- Schmookler, J. (1966). *Invention and economic growth*. Cambridge, Massachusetts: Harvard University Press.
- Schmookler, J. (1972). *Patents, invention and economic growth: Data and selected essays*. Cambridge, Massachusetts: Harvard University Press.

- Schumpeter, J. A. (1939). *Business cycles: a theoretical historical and statistical analysis of the capitalist process* (2 vol.). New York: McGraw-Hill.
- Schumpeter, J. A. (1934). The theory of economic development. *Harvard University Studies* 46. Translated by Redvers Opie.
- Schumpeter, J. A. (1942). *Capitalism, socialism and democracy*. New York: Harper and Brothers.
- Schumpeter, J. A. _ (1912). *The theory of economic development*. Oxford: Oxford University Press.
- Shell, K. (1973). Inventive activity, industrial organization, and economic activity. In J. Mirlees & N. Stern (Eds). *Models of economic growth*. London: Macmillan.
- Shell, K. (1967). A model of inventive economic activity and capital accumulation. In K. Shell (Ed.). *Essays on the theory of optimal economic growth*. Cambridge Massachusetts: MIT Press.
- Shell, K. (1966). Toward a theory of inventive activity and capital accumulation. *The American Economic Review*, Volume 56, Issue 1/2 (March), 62-68.
- Sheshinski, E. (1967). Optimal accumulation with learning by doing. In K. Shell (Ed.). *Essays on the theory of optimal economic growth*. Cambridge, Massachusetts: MIT Press.
- Silverberg, G. (1997). Evolutionary modelling in economics: Recent history and immediate prospects. MERIT: University of Maastricht. Paper for the *Workshop on Evolutionary Economics as a Scientific Research Programme*, Stockholm, May 26-27.
- Silverberg, G. (1988). Modelling economic dynamics and technical change: mathematical approaches to self-organisation and evolution. In G. Dosi, C. Freeman, R. Nelson, G. Silverberg & L. Soete (Eds.) (1988). *Technical Change and Economic Theory*. London: Pinter Publishers, 531-559.
- Silverberg, G. (1987). Technical progress, capital accumulation, and effective demand: A self-organization model. In D. Batten, J. Casti & B. Johansson (Eds.) (1987). *Economic evolution and structural adjustment*. Berlin: Springer-Verlag, 116-144.
- Silverberg, G. (1984). Embodied technical progress in a dynamic economic model: The self-organisation paradigm. In R.M. Goodwin, M. Krüger & A.Vercelli (Eds.) (1984). *Nonlinear models of fluctuating growth. Lecture Notes in Economics and Mathematical Systems No. 228*, Springer-Verlag, 192-208.
- Silverberg, G., Dosi, G., & Orsenigo, L. (1988). Innovation, diversity and diffusion: A self-organisation model. *The Economic Journal*, Volume 98 (December), 1032-1054.
- Silverberg, G., & Lehnert, D. (1996). Evolutionary chaos: Growth fluctuations in a Schumpeterian model of creative destruction. In W. Barnett, A. Kirman & M. Salmon (Eds.). *Nonlinear dynamics and economics: Proceedings of the tenth international symposium in economic theory and econometrics*. Cambridge: Cambridge University Press, 45-74.
- Silverberg, G., & Lehnert, D. (1994). Growth fluctuations in an evolutionary model of creative destruction. In G. Silverberg & L. Soete (1994) (Eds.). *The economics of growth and technical change: Technologies, nations, agents*. Edward Elgar, Aldershot, 74-108.
- Silverberg, G., & Verspagen, B. (1998). Economic growth and economic evolution: A modelling perspective. In F. Schweitzer & G. Silverberg (Eds.) (1998). *Evolution and self-organization in economics, Selbstorganisation-Jahrbuch für Komplexität in den Natur-Sozial and Geisteswissenschaften*, Bd. 9, Berlin: Duncker & Humblot, 239-264.

- Silverberg, G., & Verspagen, B. (1995a). Evolutionary theorizing on economic growth. In K. Dopfer (2004). *The Evolutionary Foundations of Economics*. Cambridge University Press (September).
- Silverberg, G., & Verspagen, B. (1995b). From the artificial to the endogenous: Modelling evolutionary adaptation and economic growth. *International Institute for Applied Systems Analysis (IIASA) Working Paper* WP-95-08.
- Silverberg, G., & Verspagen, B. (1995c). An evolutionary model of long term cyclical variations of catching up and falling behind. *International Institute for Applied Systems Analysis (IIASA) Working Paper* WP-95-09.
- Silverberg, G., & Verspagen, B. (1994a). Learning, innovation and economic growth: A long-run model of industrial dynamics. *Industrial dynamics and corporate change*, Volume 3, No. 1, 199-223.
- Silverberg, G., & Verspagen, B. (1994b). Collective learning, innovation and growth in a boundedly rational, evolutionary world. *Journal of Evolutionary Economics*, Volume 4, Issue 3, 207-226.
- Silverberg, G., & Verspagen, B. (1994c). Economic dynamics and behavioural adaptation: An application to an evolutionary endogenous growth model. *International Institute for Applied Systems Analysis (IIASA) Working Paper* WP-94-84.
- Simon, H. (1957). *Models of man*. New York: John Wiley and Sons, Inc.
- Simon, H. (1955). A behavioural model of rational choice. *The Quarterly Journal of Economics*, Volume 69, No. 1 (February), 99-118.
- Smith, A. (1776). *An inquiry into the nature and the causes of the wealth of nations*, Reprint: New York 1937: Random House.
- Smith, K. (1991). Innovation policy in an evolutionary context. In P. Saviotti & J.S. Metcalfe (1991a). *Evolutionary theories of economic and technological change*. Switzerland: Harwood Academic Publishers, 256-275.
- Solow, R. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, vol. 70, 65-94.
- Solow, R. (1957). Technical progress and the aggregate production function. *Review of Economics and Statistics*, vol. 39, 312-320.
- Solow, R. (2000). *Growth theory: An exposition*, New York: Oxford University Press.
- Spencer, H. (1890). *First principles*, 5th edition. London: Williams & Norgate.
- Spencer, H. (1851). *Social statics*. London: Chapman.
- Swan, T. (1956). Economic growth and capital accumulation. *Economic Record* 32: 344-361.
- Thomas, H. (1999). *Bionomic Analysis of Predatory Exclusion of Technologies*. Quarterly Report (August), University of Auburn.
- Uzawa, H. (1965). Optimum technical change in an aggregative model of economic growth. *International Economic Review*, Volume 6, Issue 1 (January), 18-31.
- Van Meijl, H. (1995). *Endogenous technological change: The case of information technology*. PhD dissertation. University of Maastricht.

- Veblen, T. (1898). Why is economics not an evolutionary science? *Quarterly Journal of Economics*, Volume 12, No. 4 (July), 373-397.
- Vega-Redondo, F. (1994). Technological change and path dependence: A co-evolutionary model on a directed graph. *Journal of Evolutionary Economics*, Volume 4, Issue No. 1, 59-80.
- Verspagen, B. (2000). *Economic growth and technological change: An evolutionary interpretation*. Draft paper, Eindhoven Centre for Innovation Studies (ECIS) and MERIT.
- Verspagen, B. (1993). *Uneven growth between interdependent economies: An evolutionary view on technology gaps, trade and growth*. Aldershot: Avery.
- Verspagen, B. (1992). Endogenous innovation in neo-classical growth models: A survey. *Journal of Macroeconomics*, Volume 14, No. 4, 631-662.
- Verspagen, B. (1990). 'New' neoclassical growth models and their relation to evolutionary theories of economic growth: an interpretative survey of some recent literature,' *MERIT Research Memorandum* 90-007 (June).
- Volterra, V. (1926). *Variazioni e fluttuazioni del numero d'individui in specie animali conviventi*. Mem. R. Accademia Nazionale dei Lincei, Serie VI, vol. 2.
- Winter, S. (1984). Schumpeterian competition in alternative technological regimes. *Journal of Economic Behaviour and Organization*, Volume 5, Issues 3-4 (September-December), 287-320.
- Zhang, J. (1997). Fertility, growth and public investments in children. *The Canadian Journal of Economics*, Volume 30, No. 4a (November), 835-843.

The high-performing Asian economies were more successful than other lower middle-income countries in raising investment levels and in developing human capital, and these factors were important contributors to their growth. These fundamental factors were supplemented by rapid growth of total factor productivity deriving mainly from the movement toward international best practice. In these "productivity-driven" economies, unusually high rates of technical efficiency change were combined with high rates of growth based on factor accumulation, leading to extremely rapid growth in per capita income.

Howard Pack and John M. Page, Jr.

'Accumulation, exports, and growth in the high performing Asian economies.'
Carnegie-Rochester Conference Series on Public Policy 40 (1994), p. 229.

In essence, I have remained true to Pack and Page's methodology, merely substituting changes in participation rates and capital stocks for the population growth and investment variables they use. On the basis of the analysis above, I find it hard to conclude that "the sources of growth in the HPAEs (were) significantly different from those in other developing countries." Factor accumulation leads to growth, and the HPAEs appear to have experienced unusually rapid rates of factor accumulation.

Alwyn Young

'Accumulation, exports, and growth in the high performing Asian economies: A comment'
Carnegie-Rochester Conference Series on Public Policy 40 (1994), p. 244

Chapter THREE

Measuring Total Factor Productivity in Asia Using the Growth Accounting Approach: The Accumulation versus Assimilation Debate

3.1 Introduction

In growth models, the main sources of growth have been identified as factor accumulation (through capital investment and employment growth) and productivity growth. Productivity growth in turn has two aspects: an *improvement in efficiency* with which factors and inputs are used and *technological change* which arises from new ideas, new machinery or new ways of organizing production. The empirical methods popularly used by economists to measure growth and decompose it into its main sources are data envelopment analysis using econometric and mathematical programming techniques and traditional growth accounting.

Data Envelopment Analysis

Production frontier analysis or data envelopment analysis (DEA) as described by Sengupta (2000) and Thanassoulis (2001), involves the measurement of the relative efficiency of a set of decision-making units that are similar in their patterns of inputs and output processes. Using data on input costs and revenues from the sale of output, the DEA model is specified for firms belonging to an industry to analyse their technical and allocative efficiency. Technical efficiency is a measure of the firm's success in producing the maximum possible output from a given set of inputs, while allocative efficiency measures the firm's success in choosing an optimal set of inputs with a given set of input and/or output prices. Thus, the idea behind the DEA approach is to measure shifts of the production frontier to the best practice or maximum possibility, as against movements along

the production frontier, following the works of Aigner & Chu (1968), Aigner, Knox Lovell & Schmidt (1977), Atkinson & Cornwell (1994a, 1994b), Coelli, Rao & Battese (1997), Fried, Lovell & Schmidt (1993), Färe, Grosskopf & Knox Lovell (1994), Charnes, Cooper, Lewin & Seiford (2001), Sengupta (1995, 2000), Thanassoulis (2001), and Cooper, Seiford & Tone (2000).

Efficiency is defined as the ratio of outputs to inputs but comparisons become problematic when different activity or output levels are supported by multiple resources or inputs as Farrell (1957) noted. Thus, DEA analysis calculates the relative efficiency as developed by Farrell & Fieldhouse (1962) which is the weighted sum of outputs divided by the weighted sum of inputs:

$$\text{Efficiency of unit or activity } j = \frac{u_1 y_{1j} + u_2 y_{2j} + \dots}{v_1 x_{1j} + v_2 x_{2j} + \dots} \quad \text{where } u_i \text{ and } v_i \text{ are weights given to output } i \text{ and input } i, \text{ respectively, and } y_{ij} \text{ and } x_{ij} \text{ are the amounts of output } i \text{ from unit } j \text{ and amounts of input } i \text{ to unit } j, \text{ respectively.}$$

The weighted average of efficient units is thus constructed as a hypothetical efficient unit or frontier that acts as a comparator for inefficient units. This is shown in Figure 3.1 where an efficiency frontier consisting of 'best practice' units is derived as an envelope below which are inefficient units. The distance of each unit from the frontier defines an efficiency measure or target with a reference set of efficient units closest to the frontier are compared.

Figure 3.1
Deriving the Data Envelope

Source: <http://www.cmte.utoronto.ca/dea.shtml>

The approach, drawing heavily on linear or mathematical programming, has been applied mostly at the micro—and meso—levels from measuring profitability, cost and scale efficiencies in public sector organisations like schools and hospitals and prison systems to private operations such as international airlines, telephone companies, agricultural farms, and big league baseball²⁰. However, new results and applications of this technique have been discovered in the areas of finance (e.g., risk aversion and efficiency, investment portfolio modelling), management (comparing performance of public versus privately owned firms in a given industry, strategic grouping, environmental and quality control), and economics (technology diffusion, growth

²⁰ See Charnes, Cooper, Lewin and Seiford (2001)

theory, flexible manufacturing systems)²¹. The emergence of dynamic efficiency analysis as opposed to stochastic frontier analysis²² during the earlier evolution of this methodological approach, led to the latter stream of applications with the source of dynamics provided for by technological change embodied in inputs or disembodied in experience and skills, learning curve effects, and lags in adjusting stocks of inputs to desired levels²³. In the growth context, Sengupta (2000) further attributes dynamic efficiency to the issue of output growth over time and the extent to which it can be explained by growth of different inputs and their marginal contributions in line with neoclassical growth dynamics.

Ten Raa and Mohnen (2000) were among the first to use DEA application in measuring TFP growth using dynamic input-output analysis. Using input-output tables from Canada for the years 1962 to 1991, the authors were able to decompose TFP into efficiency change and frontier productivity growth, from which they were able to further extract technical change and terms-of-trade effects. In the context of Asian economies, DEA analysis was used by Knox Lovell & Tang (1997) on Hong Kong and Singapore; Mathur (2006) on South and East Asian economies²⁴; Nadiri & Son (1999) on South Korea, Japan, Taiwan, Singapore, Malaysia and Thailand; and Timmer & Los (2002) on South Korea, Taiwan, Indonesia, Philippines, Japan, and Sri Lanka.

Traditional Growth Accounting

Growth empirics as applied to the Asian economies have nevertheless converged on the use of growth accounting following the neoclassical growth model. This is most likely because of its mathematical straightforwardness. However, this has been the subject of controversy — the so-called total factor productivity debate. This debate focuses on growth driven by accumulation of factors such as labor and fixed capital, and growth driven by productivity improvements arising from technological advances. The productivity debate is significant for purposes of this thesis as the theoretical and empirical frameworks used to explain both growth theory and business cycles are commonly grounded on the role of technology. As will be discussed in *Part Three* both the Asian miracle and crisis episodes will use the same framework of input-output analysis.

This chapter presents the economic debate surrounding the East Asian miracle triggered by Krugman (1994) who used Young's (1992) results in declaring that the miracle story was actually a myth and comparing Asian growth with that of the Soviet Union, where diminishing returns were imminent to occur. The first part discusses the growth accounting approach, which next to the convergence hypothesis was another legacy left by the Solow-Swan or neoclassical growth model. There are two opposing sides to the productivity debate surrounding Asian growth. One group, known as the *accumulationists* maintains that growth in the Asian region was primarily input-driven. The opposing camp, called the *assimilationists* claims that the growth of East Asia was mainly attributable to learning, acquiring, and mastering imported technology. Both parties use the growth accounting approach to support their claims. An overview and summary of the empirical results, assumptions, and conclusions of the *accumulationist* and the *assimilationist* factions follow in the next two succeeding sections.

Finally, an evaluation and assessment of the growth accounting approach as it relates to the Asian miracle is presented, questioning the utility of this approach so that brakes should be

²¹ See Sengupta (1995, 2000)

²² Refers to the introduction of noise, measurement errors and disturbances in production frontier analysis. See Kunbhakar and Knox Lovell (2000)

²³ See Sengupta (2000)

²⁴ Mathur (2006) compared South Asian economies of Bangladesh, India, Pakistan, Nepal, Sri Lanka) and East Asian economies of Malaysia, China, Indonesia, Japan, Philippines, Singapore, Thailand and Hong Kong.

slammed on its further burgeoning yet conflicting outcomes, or whether it continues to provide a consistent framework for measuring and understanding the sources of growth in an economy.

3.2 Growth Accounting: *Measuring our Ignorance*

Growth accounting is a strand of economic research that emerged out of the national income measurement tradition and later became associated with Solow's growth model. In basic macroeconomics, national income accounts could be measured in three equivalent ways: the expenditure approach, the value-added approach and the income approach. The first approach determines national income using the Keynesian concepts of aggregating demand components whereas the value added approach determines total economic output or gross domestic product by summing up all the gross value added of different economic sectors, hence a supply-side approach. The last approach, which is the income approach adds up all payments made to inputs or factors of production, and is the basis of total factor productivity measurement that later became associated with growth accounting.

Basically total output in the economy is just the accumulation of quantities produced and sold at a given period q_t multiplied by the corresponding prices p_t , much the same way as total sales or total revenues are calculated, hence national income or total output or total sales of an economy for a given time is $p_t q_t$. Thus, in the income approach, factor payments for the quantity of inputs used by producers — labour (L_t) and capital (K_t), multiplied by their corresponding prices, wage rate (w_t) and the rental rate of capital (r_t) yield total GDP, as follows:

$$p_t q_t = w_t L_t + r_t K_t.$$

Inasmuch as current prices are used in this accounting, any increase in output or income could be just a result of rising prices or inflation, which could be misleading as an indicator of growth. Thus, a parallel accounting is done that keeps prices constant as of a certain base year (p_o) to more accurately reflect economic growth. This approach, however, becomes problematic since it assumes equality of the value of output at constant prices with the sum of the value of inputs at constant prices in any given year and rules out the possibility that in the succeeding year, it is possible to produce more output with the same quantity of inputs. In other words, growth could also be attributed not just to an increase in the quantity of inputs but also to factor productivities. A scaling factor S that assumes a value of 1 in the base year is therefore introduced to take account of changes in the productivity of capital and/or labour over time, as follows:

$$p_o q_t = \frac{s_t}{s_o} w_o L_t + r_o K_t.$$

Dividing both sides of the expression by $w_o L_t + r_o K_t$ shows then that the scaling factor is nothing else but the ratio of output per unit of total factor input, which is factor productivity. Hulten (2000) and Griliches (1996) ascribe the notion of this index of output-over-input to Copeland (1937) and Copeland and Martin (1938). Since prices in the base period are equal to 1, the entire equation could be rearranged to yield:

$$\frac{s_t}{s_o} = \frac{\frac{q_t}{q_o}}{\frac{w_o L_t + r_o K_t}{w_o L_o + r_o K_o}}.$$

Upon closer examination, this immediately reveals one of the basic problems of growth accounting – the index number bias, which entails weighting issues. In this case, the formula becomes equivalent to the Laspeyres index where weights (quantities of capital and labour) as of the base year are used, and therefore are fixed or constant. The weights could nevertheless be adjusted or re-weighted frequently by a procedure known as chain indexing.

The second strand of research tied up with growth accounting involves the production function approach that is related to the Solow growth model. The starting point of Solow's approach is

the production function with technological change or a shift parameter defined in the Hicksian sense assuming constant returns to scale:

$$Y_t = A_t F(K_t L_t)$$

Taking the growth rates or alternatively the logarithmic differential of the production function yields:

$$\frac{\dot{Y}_t}{Y_t} = \left(\frac{\partial Y}{\partial K} \times \frac{K_t}{Y_t} \times \frac{\dot{K}_t}{K_t} \right) + \left(\frac{\partial Y}{\partial L} \times \frac{L_t}{Y_t} \times \frac{\dot{L}_t}{L_t} \right) + \frac{\dot{A}_t}{A_t}.$$

This equation shows that the growth rate of real output on the left-hand expression could be decomposed into the growth rates of capital and labour weighted by their respective output elasticities, and the growth rate of the Hicksian term, which in the Solow growth equation is identified as technological change. The first two addends on the right hand expression measure the movements along the production function while the Hicksian parameter $\frac{\dot{A}_t}{A_t}$ measures the shift of the production function. The output elasticities, in turn, which are the marginal productivities of capital and labour are not directly observed but assuming that each input is paid the value of its marginal product, then relative prices for capital (r) and labour (w) could be substituted for the corresponding marginal productivities, i.e.:

$$\frac{\partial Y}{\partial K} = \frac{r_t}{p_t}, \quad \frac{\partial Y}{\partial L} = \frac{w_t}{p_t}.$$

Doing so converts the unobservable output elasticities into observable income shares of capital and labour (s_K) and (s_L), respectively) such that the growth function becomes:

$$\frac{\dot{Y}_t}{Y_t} = \left(s_{K_t} \times \frac{\dot{K}_t}{K_t} \right) + \left(s_{L_t} \times \frac{\dot{L}_t}{L_t} \right) + \frac{\dot{A}_t}{A_t}.$$

This is called the Divisia index where the weights used in calculating the weighted sum of growth rates are the factor shares to total income. When the average factor shares between two time periods are taken as weights, the Tornqvist index is reckoned instead. Rearranging the terms so that the Hicksian parameter appears on the left hand side obtains:

$$\epsilon_t = \frac{\dot{A}_t}{A_t} = \frac{\dot{Y}_t}{Y_t} - \left(s_{K_t} \times \frac{\dot{K}_t}{K_t} \right) - \left(s_{L_t} \times \frac{\dot{L}_t}{L_t} \right)$$

where ϵ_t , which is equal to the growth rate of the Hicksian A term, is the Solow residual, or the residual growth rate of output that is not explained by the growth of inputs. Because it is a residual, Abramovitz (1956) referred to it as the ‘measure of our ignorance’ since the Solow residual includes all other factors besides input accumulation that could not account for growth. These could be technical change and organizational innovation, as the Solow residual is mistakenly identified with, but also other factors such as measurement errors (e.g., capital stock measurement), omitted variables (e.g., cultural, political and other determinants of growth), aggregation bias (e.g., summing up firm level data to macro level indicators) and model misspecification (e.g., Cobb-Douglas constant returns to scale production function). Abramovitz (1993) concludes:

What was this Residual, this total factor productivity growth, that seemed to hog the whole show? Technological progress was, of course, a part of the Residual, and the Residual's large value fitted in nicely with a common intuition that such progress was an important source of labor productivity growth. There was, therefore, an early tendency to identify that large primitive Residual with the advance of technology. ... I had seen at once, however, and my paper had pointed out, that the Residual in its early primitive form was a cover for many sources of growth besides technological advance, and some were clearly significant matters. So the Residual was really a grab bag. ... With all that in mind, I called that Big Residual "some sort of measure of ignorance", and thereby, all unwitting, coined a phrase that seemed to have a great deal of resonance.

The above equation for deriving the Solow residual is known as standard primal growth accounting. Hsieh (1998) using Barro's (1998) notes on growth accounting, derived a dual approach by using the national income tradition where output is equal to factor incomes:

$$Y = rK + wL.$$

Getting the time derivatives and dividing by Y yields the following:

$$\frac{\dot{Y}_t}{Y_t} = s_K \left(\frac{\dot{r}_t}{r_t} + \frac{\dot{K}_t}{K_t} \right) + s_L \left(\frac{\dot{w}_t}{w_t} + \frac{\dot{L}_t}{L_t} \right).$$

Here the terms $s_K = r \frac{K}{Y}$ and $s_L = w \frac{L}{Y}$ are the factor income shares. Transposing the terms involving factor quantities on the left hand side and those involving prices on the right hand side leads to:

$$\frac{\dot{Y}_t}{Y_t} - s_K \left(\frac{\dot{K}_t}{K_t} \right) - s_L \left(\frac{\dot{L}_t}{L_t} \right) = s_K \left(\frac{\dot{r}_t}{r_t} \right) + s_L \left(\frac{\dot{w}_t}{w_t} \right).$$

The left hand expression is the Solow residual based on standard primal growth accounting, as encountered earlier, which is the growth rate of output after subtracting the share-weighted growth of factor quantities. The right hand side, in turn, is the dual measure of the Solow residual that is obtained as a share-weighted growth in factor prices. Thus, Hsieh (1998) proved that the primal and dual estimates are equivalent on condition that output equals factor incomes so that no assumptions were made about the form of the production function, nor the relationship between factor prices and social marginal products nor the bias of technological change (e.g., returns to scale). The equivalence between the primal and dual estimates of the Solow residual indicate that biased estimates of the former due for instance to the inaccurate measurement of the capital stock would yield biased estimates of the latter. Moreover, in cases where output is given by:

$$Y = rK + wL + \pi,$$

where the presence of profits (π) indicates market power of firms, then additional factors other than capital and labour were taken into account in the growth accounting exercise so that π just represents the returns to these additional factors.

The growth accounting framework has equipped economists with a quaint methodology to measure or calculate the sources of growth in an economy. The productivity debate is not exclusive insofar as the Asian miracle is concerned but is in fact, as noted by Hulten (2000), a long-standing controversy in growth theory. He typifies Marxian and neoclassical theories as attributing growth to productivity gains driven by technological advances and organisation of production (i.e., assimilation), while new growth theory and the neoclassical theory of capital and investments, as assigning greater weights to incremental investments in fixed and human capital, in explaining growth (i.e., accumulation).

As far as the productivity debate concerns Asia, Chen (1997), Felipe (1999, 1997) and Chris Rodrigo (2001) provide detailed and comprehensive surveys of total factor productivity studies on the East Asian economies. The *accumulation* versus *assimilation* debate is borrowed from Nelson and Pack (1995, 1999) who coined the terms to describe the two different interpretations of the Asian growth story. According to them, the 'accumulationists' and 'assimilationists' differ in the following dimensions: engine of growth, the nature of technology, the effect of human capital accumulation, determinants of firm decisions, the role of entrepreneurship, inducement structure, reasons for strong export performance, and the ex-post elasticity of substitution. These differences are summarized in Table 3.1 and explained in the subsequent descriptions of each view.

3.3 The Accumulation View: *Growing by Perspiration*

Economists who support the accumulation view attribute the lion's share of increased per capita incomes in Asia as originating from increases in physical and human capital per worker. Their emphasis is on explaining how investments enable the Asian economies to move 'along their production functions'. This implies that if other countries marshalled the same investment effort, growth and development would ensue. Accumulationists tend to believe that much of technological knowledge is codified and what matters for growth is to simply acquire these blueprints. The technological possibilities and alternatives are available to firms and the fact that the Asian countries were able to fend off diminishing returns reflects the extensiveness of the technological frontier already in use in other countries that have been made available to them as the high elasticities of substitution also show. This set of technological possibilities are defined in terms of parameters of a conventional production function and ignores the process of search and learning and mastery of technology that the assimilationists would instead focus on.

Table 3.1
**Comparison of Two Contesting Paradigms
on the Productivity Debate in Asia**

<i>Dimension</i>	<i>Accumulation View</i>	<i>Assimilation View</i>
Engine of Growth	Investments in physical and human capital	Human capital and innovation and entrepreneurship
Nature of Technology	Codified in blueprints	Tacit and cumulative
Effect of human capital accumulation	Increased quality and effectiveness of labour	Increased ability to search, learn and innovate
Technology alternatives	Embodied, available and accessible	Need to be searched, acquired and learned
Determinants of firm decisions	Market incentives and constraints and the external environment	Firm's search and learning ability and daring
Role of entrepreneurship	Automatic result of massive investments	Key to overcoming uncertainty
Inducement structure	Getting prices right for efficient allocation	Successful entrepreneurship
Reasons for strong export performance	Change in comparative advantage arising from changes in input accumulation	Government incentives to push exports and learning to compete in world markets
Ex-post elasticity of substitution	High	Low

Source: Author's compilation.

The accumulationists also perceive the increase in educational levels in the high-performing Asian economies as just a shift to a more capital-intensive form of production, i.e., a rise in human capital that raises the quality or effectiveness of labour. There is also a passive role for entrepreneurship except that this was an automatic result of the massive investments in physical and human capital. Entrepreneurs or owners of firms react to the incentives and constraints offered to the firm and choose the most profitable set of actions. Finally, the accumulation view sees the surge of manufactured exports in the Asian economies as comparative advantage in motion. Comparative advantage merely shifted to sectors or industries that intensively used the rapidly rising stocks of physical and human capital inputs.

The accumulation view is associated with the work on productivity growth in East and Southeast Asia conducted by Young (1992, 1994a, 1994b, 1995); Kim and Lau (1994); Nehru and Dhareshwar (1994) and Collins and Bosworth (1997). Their findings typify the view that development in the miracle economies was characterized more by 'hard work rather than by smart work.' Using growth accounting, their findings revealed that the main source of East Asian growth was capital accumulation, with total factor productivity growth calculated at zero to even negative for some countries in the last two to three decades prior to the Asian crisis. An earlier work though in the survey of TFP studies by Elias (1993) intended to highlight the role of total factor productivity in economic growth. He estimated the contribution shares of TFP growth to GDP growth in 96 countries covering the period 1950-1987. The results of his study for the Asian NIEs in Table 3.2, while depicting significant average TFP growth compared to other developing countries (except for Hong Kong) showed larger contributions of capital accumulation to GDP growth compared to TFP's contribution.

Table 3.2
Empirical Results of Elias (1993) for the Asian NIEs

Country	GDP Growth	Labor	Capital	Labor Contribution	Capital Contribution	TFP	TFP Share
Indonesia	5.1	2.0	6.9	1.22	2.74	1.17	22.8
Philippines	4.7	2.5	4.0	1.5	1.59	1.59	33.9
Thailand	6.5	2.7	8.6	1.63	3.44	1.43	22.0
Malaysia	5.7	3.3	7.1	1.96	2.84	0.92	16.1
Korea	7.8	3.0	8.0	1.79	3.19	2.85	36.4
Singapore	8.1	3.6	12.4	2.53	3.73	1.81	22.5
Hong Kong	8.7	3.6	10.0	2.49	2.99	3.18	36.8

Source of data: Elias (1993), pp. 22-25.

Later on or contemporaneously, other economists who wanted to confirm the Young, Kim & Lau and Bosworth studies eventually came up with findings that also support the input or endowment-driven view such as those of Osaka (1994), Park & Ryu (2003) and Hahn & Kim (2003). A comparison of the assumptions and empirical results of the key 'accumulationists' are presented in Table 3.3.

Other Accumulationists

There are other analyses done supporting the accumulation view but more specifically focused on the sources of growth in individual countries or pairs of countries. These studies are listed in Table 3.4 and their findings show that TFP growth in these countries have been low and in some cases even negative, and that the contribution of TFP growth to overall growth has been second, if not third, to growth of capital or labor inputs. Hence, economic growth in these countries, as concluded by these studies, is more input-driven or endowment-driven rather than productivity-driven.

Table 3.3
Comparison of Growth Accounting Empirics of the 'Accumulationists'

	<i>Young (1992, 1994a, 1994b)</i>	<i>Kim & Lau (1994, 1996)</i>	<i>Nehru & Dhareshwar (1994)</i>	<i>Osaka (1994)</i>	<i>Collins & Bosworth (1997)</i>	<i>Park & Ryu (2003)</i>	<i>Hahn & Kim (2003)</i>
ASSUMPTIONS							
• Production function	Trans-logarithmic	Trans-logarithmic Meta-production function approach	Various models (Cobb-Douglas, CES and translog) with physical capital, labor and human capital	Trans-logarithmic (with physical capital and employment)	Cobb-Douglas (with physical capital per worker and education per worker)	Cobb-Douglas and homothetic variable returns to scale on meta-production function approach	Cobb-Douglas (with physical capital, labor and human capital)
• Returns to scale	Imposed (constant)	Estimated (Diminishing)	Imposed (constant)	Imposed (constant)	Imposed (constant)	Estimated (Increasing and constant compared)	Imposed (constant)
• Elasticity of substitution	Any value	Any value	Unity	Any value	Unity	Any value	Unity
• Perfect competition	Imposed	Estimated (rejected)	No assumptions made	Imposed	Imposed	No assumptions made	Imposed
• Technical progress	Imposed (Hicks neutral)	Estimated (Capital-augmenting	Imposed (Hicks neutral)	Imposed (Hicks neutral)	Imposed (Hicks neutral)	Factor-augmenting (Both capital and labour)	Imposed (Hicks-neutral)
• Technology	Common across countries	Common across countries and firms in terms of efficient-equivalent inputs	Common across countries	Common across countries	Common across countries	Common across countries	Common across countries
METHODOLOGY							
• Measurement of physical capital	Perpetual inventory method with geometric depreciation based on a formula: the initial capital stock is taken assuming growth rate of	Derived as accumulation of gross fixed capital formation in non-residential assets (equipment and structure) in 1980 prices but no depreciation assumed	Not explained	Perpetual inventory method, 5% assumed rate of depreciation, initial capital stock 1959 data World Bank database "STARS"	Perpetual inventory method, geometric depreciation rate of 4%, initial capital stock 1950 data World	Physical capital stock constructed using real gross fixed investments based on perpetual inventory method and initial capital	Same as in Nehru and Dhareshwar (1994)

	investment in the first 5 years of the investment series				Bank database	stocks based on Boskin and Lau (2002)	
• Sample countries	Gang of Four (South Korea, Singapore, Hong Kong and Taiwan)	Group of 5 industrialized countries (France, West Germany, Japan, UK and USA) and the four NICs (Hong Kong, Singapore, South Korea and Taiwan)	Selected OECD, African, Middle Eastern, South Asian, European, American. Among East Asian economies included were: Myanmar, China, Indonesia, South Korea, Malaysia, Philippines and Thailand	South Korea, Thailand and the Philippines	Indonesia, South Korea, Malaysia, Philippines, Singapore, Thailand and Taiwan	G-5 countries (USA, Japan, West Germany, France and UK) and four NIEs (Hong Kong, Taiwan, Singapore and South Korea)	Indonesia, Japan, South Korea, Malaysia, Philippines, Singapore, Thailand and Taiwan and regions (East Asia, Latin America, Middle East, South Asia and Sub-Saharan Africa)
• Estimation period	1960-1985	Various starting dates for countries (as early as 1953 for Taiwan to 1990 for other countries)	1960-1990	1960-1993 broken into 3 subperiods: 1960-70, 1971-80, 1981-93	1960-1994 broken into 4 subperiods: 1960-73, 1973-94, 1973-84, 1984-94	Same as Kim & Lau's (1994) study but extended to 1995	1960-1990
• Approach	Econometric	Econometric	Econometric and error correction model	Growth accounting and econometric (co-integration test)	Growth accounting	Econometric	Growth accounting and econometric regressions
EMPIRICAL FINDINGS							
• Level of capital shares (α)	Average of 0.37 for Hong Kong, 0.60 for Singapore, 0.19 for South Korea and Taiwan	0.44 to 0.67 input shares do not add up to unity because of diminishing returns to scale	0.5 when human capital is not included and below 0.4 when human capital is included	Very high ranging averaging 0.59, 0.63 and 0.72 for 3 sample countries	0.35 for the entire sample	Variable	0.35 for entire sample, and 0.4 when human capital is included as an input
• Total Factor Productivity growth	Negligible, ranging from -0.3% to 2.3%	Close to zero	Negligible	Negligible	Low but rising in the latter period 1984-1994	Negligible because of scale effects	Low and not remarkably higher than other developing regions
• Contribution of TFP growth to total output growth	Not discussed but implicitly low	Low ranging from zero for all Asian NICs under first estimate; 14%-35% under second estimate and -6% to 27% for conventional estimate	Low because of high human capital contribution	Negative	Low throughout all subperiods but high in 1984-1994 (except for the Philippines)	Negligible under increasing returns to scale	Low

Source: Author's compilation.

Table 3.4
TFP studies on individual East Asian economies
leaning towards the accumulation view

THE ACCUMULATIONISTS				
Country	Author	Period	Method	Average TFP growth (%)
Japan	<ul style="list-style-type: none"> ▪ Norsworthy & Malmquist (1983) ▪ Jorgenson et al. (1987) ▪ Morrison (1990) ▪ Inoue (1995) ▪ Wolff (1996) ▪ Nakajima et al. (2004) 	1965-1978	Translog function with gross output	0.91 to 1.64
		1960-1979	Translog quantities index	0.83
		1960-1981	Generalized Leontief cost function	0.99
		1961-1993	Not explained	-0.7 to 4.1
		1950-1989	Growth accounting	0.11 to 4.92
		1960-2000	Growth accounting	-0.16 to 5.903
South Korea	<ul style="list-style-type: none"> ▪ Pyo & Kwon (1991) ▪ Pyo et al. (1993) ▪ Kang & Kwon (1993) ▪ Kwak (1994) ▪ Park & Kwon (1995) ▪ Pyo (1995) ▪ Kim (2000) ▪ Kim (2000) ▪ Yuhn & Kwon (2000) ▪ Lee (2004) ▪ Lee (2004) ▪ Timmer (1999b) 	1960-1989	Growth accounting	1.65
		1970-1990	Growth Accounting	1.31
		1963-1983	Growth accounting with cost function	0.16 to 3.43
		1970-1988	Growth accounting	1.51
		1973-1983	Generalized Leontief cost function	-1.6
		1970-1992	Growth accounting	1.09
		1966-1988	Traditional approach	1.9
		1966-1988	Modified approach	0.5
		1962-1981	Growth accounting with cost function	1.52
		1972-1999	Traditional approach	1.94
		1972-1999	Modified approach	0.3 to 1.3
		1963-1993	Tornqvist TFP index (indexed to USA=100)	23 to 45.5
Taiwan	<ul style="list-style-type: none"> ▪ Liang (1995) ▪ Chuang (1996) ▪ DGBAS (2000) ▪ Timmer (1999b) 	1973-1987	Growth accounting	0.12 to 1.41
		1975-1990	Econometric	1.9
		1978-1998	Tornqvist TFP index	1.9
		1963-1993	Tornqvist TFP index (indexed to USA=100)	36.8 to 40.8
Singapore	<ul style="list-style-type: none"> ▪ Tsao (1985) ▪ Rao & Lee (1995) ▪ Wong & Gan (1994) ▪ Toh & Low (1996) ▪ Bloch & Tang (2000) ▪ Thangavelu (2004) ▪ Wu & Ping (2002) 	1970-1979	Growth accounting	0.08
		1976-1994	Growth accounting	-0.4 to 3.2
		1981-1990	Growth accounting	1.6
		1970-1992	Growth accounting	1.37
		1975-1994	Generalized Leontief cost function (sectoral)	-8.8 to 2.5
		1970-1998	Growth accounting	-2.46 to 2.74
Hong Kong	<ul style="list-style-type: none"> ▪ Kwong et al. (2000) ▪ Imai (2001) ▪ Voon & Chen (2003) ▪ Kee (2005) 	1984-1993	Growth accounting	-1.53
		1981-1997	Growth accounting	0.2 to 2.4
		1966-1996	Growth accounting	0.39
		1984-1997	Econometric	-1.75
Malaysia	<ul style="list-style-type: none"> ▪ Gan & Robinson (1993) ▪ Zarina & Shariman (1994) ▪ Okamoto (1994) ▪ Ab. Wahab (1996) ▪ Ab. Wahab (2004) ▪ Choong & Tham (1995) ▪ Tham (1995) ▪ Tham (1998) ▪ Gan & Soon (1998) ▪ Menon (1998) ▪ Oguchi et al. (2002) 	1975-1991	Econometric	Low
		1978-1992	Growth accounting	Negative
		1981-1990	Growth accounting	-1.9 to 0.3
		1990-1997	Growth accounting	1.3
		1981-2001	Growth accounting	0.64
		1986-1990	Growth accounting	1.08
		1986-1991	Econometric	0.3
		1986-1993	Econometric	0.1
		1974-1995	Growth accounting	1.6
		1988-1992	Growth accounting	0.205
Thailand	<ul style="list-style-type: none"> ▪ Wiboonchutikula (1982) ▪ Brimble (1987) ▪ Limskul (1988) ▪ Urata & Yokota (1994) ▪ Kraipornsak (1995) ▪ Chandrachai et al. (2004) 	1963-1976	Growth accounting	Declining
		1973-1983	Econometric	Negative to 7.62
		1960-1986	Econometric	Negative
		1976-1988	Growth accounting	0.7 to 1.8
		1971-1996	Econometric	-1.25 to 1.6
		1977-1999	Growth accounting	1.27
Indonesia	<ul style="list-style-type: none"> ▪ Osada (1994) ▪ Aswicahyono (2000) ▪ Sigit (2004) ▪ Timmer (1999b) 	1985-1990	Growth accounting	-2.7
		1975-1993	Growth accounting	0.49
		1980-2000	Growth accounting	-0.80
		1963-1993	Tornqvist TFP index (indexed to USA=100)	17.8 to 20.0

Philippines	■ Williamson & Sicat (1968)	1957-1968	Growth accounting	1.0
	■ Williamson (1969)	1947-1965	Growth accounting	1.367 to 1.489
	■ Patalinghug (1980, 1984)	1956-1970	Growth accounting	-5.0
	■ Sanchez (1983)	1957-1978	Growth accounting	-0.15
	■ Hooley (1985)	1957-1980	Growth accounting	-0.26
	■ Kajiwara (1994)	1984-1988	Econometric	-0.6
	■ Austria & Martin (1995)	1950-1987	Econometric	-2.54 to 6.28
	■ Cororaton et al. (1996)	1957-1992	Sectoral growth accounting	-6.17 to 7.41
	■ Austria (1998)	1960-1996	Growth accounting	-0.116
	■ Lim (1998)	1975-1997	Econometric	-0.9
	■ Cororaton & Caparas (1999)	1980-1996	Growth accounting, translog index, econometric	-0.097 to 0.052
	■ Cororaton & Abdula (1999)	1958-1991	Growth accounting	0.0294
	■ Yamagata (2000)	1956-1980	Growth accounting	-3.6
	■ Cororaton & Cuenca (2001)	1981-1998	Translog index	-0.00359
	■ De Silva (2001)	1971-1998	Growth accounting	-0.8
	■ Cororaton (2002, 2004)	1967-2000	Growth accounting	-0.24

Sources of Basic Data: Sun (2005), Felipe (1997), Park (2002), Said et al. (2003) and added compilations of this author.

3.4 The Assimilation View: *Growing by Inspiration*

The assimilation view emphasizes the role of entrepreneurship, innovation and learning, and the mastery of new technologies in the spectacular growth of the East Asian economies, with investments in physical and human capital only as necessary but not sufficient conditions. This is because using these new technologies acquired in the 1970s and 1980s that were not available to them in the 1950s and 1960s required the learning and development of new skills and organizational improvements as well as marketing abilities to become competent in new markets.

The ‘assimilationists’ believe that much of technological knowledge is tacit and not codified in blueprints as ‘accumulationists’ think so that learning by doing and acquiring mastery over these technologies mattered. As for rising educational levels, the ‘assimilationists’ perceive this as a necessary adjunct to the development of successful entrepreneurship with the build-up of a cadre of engineers and scientists and managers that have a comparative advantage in searching for new opportunities and learning new mechanisms. The role of entrepreneurship is focal in the assimilation view because new ventures carry with it uncertain profitability that requires daring of firms and their decision-makers. Finally, in terms of the export surge in the Asian economies, the assimilationists while not denying the workings of comparative advantage, credit this to innovation and learning that firms had to muster with government’s support to enable them to effectively compete in international markets. Table 3.5 compares the assumptions and key results of the assimilationists.

Other ‘Assimilationists’

Other economists and scholars calculated TFP at the macro level but focused more narrowly on individual countries and their findings support the assimilation view. These studies are listed in Table 3.6.

Table 3.5
Comparison of Growth Accounting Empirics of the 'Assimilationists'

	<i>Pack & Page</i> (1994a, 1994b)	<i>Kawai</i> (1994)	<i>Lindauer & Roemer</i> (1994)	<i>Marti</i> (1996)	<i>Sarel</i> (1996)	<i>Drysdale & Huang</i> (1997)	<i>Klenow & Rodriguez-Clare</i> (1997)	<i>Nadiri & Son</i> (1998)	<i>Hsieh</i> (1999, 2000a)
ASSUMPTIONS									
• Production function/	Cobb-Douglas ¹	Non-parametric (No assumption about production function)	Cobb-Douglas (implied)	Trans-logarithmic	Cobb-Douglas	Trans-logarithmic ²	Cobb-Douglas with human capital	Trans-logarithmic	None. Used national income dual estimates (e.g., returns to capital and labor or factor incomes)
• Returns to scale	Imposed (constant)	None	Constant (implied)	Imposed (constant)	Imposed (constant)	Not mentioned	Imposed (constant)	Imposed (constant)	Not applicable
• Elasticity of substitution	Any value	None	Unity (implied)	Any value	Unity	Not mentioned	Unity	Unity	Not applicable
• Perfect competition	Implied	None	Implied	Imposed	Estimated (rejected)	Not mentioned	Implied	Imposed	Implied
• Technical progress	Imposed (Hicks neutral)	None	Not discussed	Imposed (Hicks neutral)	Imposed (Hicks-neutral)	Not mentioned	Imposed (Hicks-neutral)	Disembodied	No assumption
• Technology	Access to best practice common to all countries. Technical efficiency change is constant and does not vary across countries	US technology taken as best practice and is accessible to all countries	Not discussed	Common across countries	Common across countries	Not mentioned	Common across countries	Common across countries	No assumption
METHODOLOGY									
• Measurement of physical capital	Average share of investment in GDP from Summers and Heston database (1988) and also	Calculated but not discussed	Used investment to GDP ratio to proxy share of capital and an assumed	Perpetual inventory method with geometric depreciation	Used historical data on investment flows for 1960-1992	Used average shares of gross domestic investment to GDP over the	Used Summers and Heston database on investments	To derive capital stock series, investment data disaggre-	Perpetual inventory method with geometric depreciation rate. Computed for 5 types of capital and their

¹Methodology and assumptions based on Nishimizu and Page (1982)

²Methodology and assumptions based on Dowrick (1992)

Table 3.6
TFP studies on individual East Asian economies
leaning towards the assimilation view

THE ASSIMILATIONISTS				
Country	Author	Period	Method	Average TFP growth (%)
Japan	■ Prasad (1997)	1971-1993	Not explained	2.8
	■ Nakajima et al. (1998)	1998	Index number approach	3.73
	■ Sato (2002)	1979-1997	Not explained	2.2 to 2.5
South Korea	■ Kim (1979)	1966-1975	Growth accounting	2.6
	■ Kim & Park (1985)	1963-1982	Growth Accounting	2.72
	■ Kwon (1986)	1961-1980	Growth accounting with cost function	2.95
	■ Christensen & Cummings (1981)	1960-1973	Growth accounting	4.1
	■ Kim, Yoo & Hwang (1984)	1967-1979	Growth accounting	5.5
	■ Kim & Park (1988)	1966-1983	Growth accounting	7.03
	■ Moon, Jo, Whang & Kim (1991)	1971-1989	Growth accounting	3.66
	■ Kim & Hong (1997)	1963-1995	Growth accounting	3.63
	■ Lee (1988)	1966-1983	Growth accounting	6.15
	■ Dollar & Sokoloff (1988)	1963-1979	Growth accounting	6.1
	■ Pilat (1995)	1967-1987	Growth accounting	4.3
	■ Van (2004)	1983-1998	Growth accounting (capital intensive sectors)	7.5 to 14.0
	■ Okuda (1997)	1967-1989	Growth accounting	3.2
	■ Hwang (1998)	1970-1993	Growth accounting (augmented Solow model)	2.06 to 2.46
	■ Kwack (2000)	1971-1993	Growth accounting	3.0
	■ Lee (2001)	1971-1996	Growth accounting	2.0
Taiwan	■ Okuda (1994)	1978-1991	Growth accounting	2.6
	■ Dessus, Shea & Shi (1995)	1951-1990	Growth accounting	3.16
	■ Dessus (1997)	1971-1990	Econometric	2.3
	■ Chang (1997)	1961-1996	Growth accounting	3.7
	■ Lin, Wang & Chu (1998)	1952-1996	Growth accounting	3.12
	■ Liang & Jorgenson (1999)	1961-1993	Growth accounting	2.46
	■ Hu & Chan (1999)	1979-1996	Growth accounting	3.1
	■ Sun (2004a, 2004b)	1951-1999	Multilateral TFP Index	2.52 to 2.68
	■ Chow & Lin (2002)	1981-1991	Growth accounting	3.24
	■ Aw et al. (2001)	1961-1980	Growth accounting	2.03
	■ Liang (2003)	1980-1999	Growth accounting	2.37
	■ Fu (2004)	1965-1999	Growth accounting	2.28
Singapore	■ Leung (1997)	1983-1993	Growth accounting	2.8
	■ Elaine-Seow & Lall (1996)	1981-1990	Translog cost function	6.19
	■ Koh, Rahman & Tan (2002)	1975-1998	Growth accounting	2.7
Hong Kong	■ Lin & Wong (1997)	1975-1990	Error correction model	5.4
Malaysia	■ Thomas & Wang (1992)	1960-1987	Econometric	2.0
	■ Maisom, Ariff & Aini (1994)	1975-1989	Growth accounting	4.1 to 13.5
	■ Rahmah & Idris (2000)	1982-1994	Growth accounting (sectoral)	0.769 to 11.24
	■ Zulaifah & Maisom (2001)	1985-1995	Growth accounting	4.3
Thailand	■ Sakonpan (1997)	1979-1991	Growth accounting	3.29
	■ Tinakorn & Sussangkarn (1998)	1970-1996	Growth accounting	2.11
Indonesia	■ Abimanyu (1995)	1975-1995	Growth accounting	3.0
	■ Timmer (1999a)	1975-1993	Growth accounting	2.7
	■ Aswicahyono & Hill (2002)	1984-1993	Growth accounting	2.1
	■ Widiyanto (2004)	1970-1997	Econometric	3.6
Philippines	■ Hooley (1968)	1948-1961	Growth accounting	2.0

Source: Author's compilation.

There are other economists and scholars who have contested the accumulation view but without necessarily conducting growth accounting exercises. They resorted to comparing TFP trends of the Asian economies with that of the Western industrialized countries or providing micro-evidence that there was indeed technological learning and mastery in the case of the East Asian economies either through case studies or growth accounting at the plant or firm-level.

Hsiao and Hsiao (1998) used Young's results and compared them with Jorgenson (1995) who did the growth accounting exercise for OECD countries. Their findings showed that the TFP growth rates of the Asian newly industrializing countries (NICs) except Singapore for the period 1966-1990 were comparable to if not higher than that achieved by the USA, Canada, the United

Kingdom and the Netherlands for the period 1960-1973. Using the same time frame, the long-run TFP contributions to the GDP growth rates of these Asian NICs, particularly Hong Kong and Taiwan, were close to the USA's. On this basis, the authors contested Krugman's assertion that growth in Asia was primarily input-driven for the reason that even among the industrialized countries, there is no clear and cut rule as to what the appropriate value of TFP and its contribution to growth should be. They also countered Krugman's proposition that growth in East Asia would likely set in motion diminishing returns à la the Soviet Union since the East Asian economies have relied on strategies that would delay the occurrence of diminishing returns. These are investments in education, expansion of domestic R&D and promotion of open trade. Technology, they observed, was in fact transferred through importing and exporting as well as through inward foreign direct investments.

Baily and Zitzewitz (1998) conducted an industry-level growth accounting exercise for Korea in selected manufacturing and services sectors covering the period 1970-1995 using a Cobb-Douglas production function with factor shares reflected by the shares of labour cost and gross return to capital to total value-added. They investigated productivity in the automotive, food processing, semi-conductor, and steel industries among the manufacturing sector; and general merchandise retailing, construction, telecommunications and banking among the services sector. Their results were mixed with a couple of industries found to have achieved best-practice technology. These are the integrated steel mills, telecommunications and semi-conductor industries where best-practice engineering and technical knowledge were acquired and where best-practice technology embodied in capital goods have been successfully transferred. However, there were also cases of over-investments such as in the automotive, food confectionery and banking sectors so that these sectors were characterized by low productivity and low returns.

Hallward-Driemeier et al. (2002) attempted to investigate productivity patterns at the firm level for five East Asian countries—Indonesia, Korea, Malaysia, Philippines and Thailand. They used comprehensive data from approximately 2,700 manufacturing establishments during the 1996-1998 period using manufacturing survey data where instruments and sampling procedures were standardized for comparison using World Bank expertise (e.g., under its Regional Program for Enterprise Development (RPED) surveys). The profile of the firms show quite a good representation of export-oriented (54 percent) and non-exporter firms (46 percent); foreign-owned (24 percent) and domestically-owned firms (76 percent); small (less than 50 workers—31 percent), medium-sized (50 to 149 employees—30 percent) and large firms (more than 150 employees—39 percent); and scope of manufacturing industries covering food (18 percent), textiles (16 percent), garments (17 percent), construction materials (3 percent), chemicals (20 percent), machinery (5 percent), electronics (15 percent) and automotive parts (7 percent). TFP was defined as an unobserved plant-specific effect that could be measured econometrically using a basic Cobb-Douglas production function as the difference between actual and predicted output.

The authors used the logarithmic form of the production function in carrying out four basic specifications out of which different estimates of output elasticities were obtained to calculate TFP. One specification used output (computed as total sales plus the change in inventories as the dependent variable and explanatory variables comprising total assets, total employment, material inputs and energy, and dummies for sectors and years). The second specification used gross value added less value of raw materials and energy costs as dependent variable regressed on total assets and total employment. The third and fourth specifications use alternative approaches to correct for simultaneity biases. The simultaneity bias arises from the fact that firm productivity affects input decisions, which in turn affect productivity, and this is shown by the high correlation between the

input coefficients and TFP. The authors ran several multivariate regressions across firms within each country, with the log of TFP determined by dummies representing sector, year, firm size, location, extent of foreign investments, extent of exports and time the firm exported relative to establishment, and other firm characteristics. The results showed that firms with foreign ownership and firms that export, especially among the early industrializers of East Asia such as Korea, Malaysia and Thailand, have higher TFP and that the productivity gap is larger for the least developed economies of Indonesia and the Philippines.

Finally, case studies of technological capability building, learning and mastery of foreign technology either through imitation or innovation are provided by Enos and Park (1988), Westphal (1990), Hobday (1994a, 1994b, 1995a, 1995b, 1996a, 1996b, 1996c, 1996d, 1996e, 1997, 1998, 2000), Kim & Dahlman (1992), Dahlman & Westphal (1981), Dahlman & Sercovich (1984), Dahlman, Ross-Larson & Westphal (1987), Dahlman & Sananikone (1990), Kim (1997), Lee & Lim (1998), Kim & Nelson (2000), and Pack (2001). These case studies document evidences of leapfrogging and in most instances, the painstaking and cumulative process of technological learning and acquisition that firms in the East Asian economies went through in ascending the technology ladder. The build-up of technological capability in areas of electronics, automotive, steel, shipbuilding, and consumer appliance industries only serve to confirm that technological assimilation did take place.

The work done by these scholars also serve to support the observations of Stiglitz (1998) who remarked that: ‘.... Any visitor to the cities and factories in East Asia comes away impressed by the enormous technological progress in the last decades. The Young, Kim, Lau, et al. results are simply not very robust.... East Asia has seen impressive productivity growth in recent decades.’

3.5 Issues and Implications for Growth Empirics: *The ‘Last’ of the Residual?*

Felipe (1997, 2006), Chen (1997, 1977), and Chris Rodrigo (1998, 2001) provide a thorough discussion of the various issues involved in growth accounting. These issues generally relate to conceptual or theoretical and empirical problems concerning the measurement and meaning of productivity measures, as well as their policy inferences or implications.

Theoretical and Conceptual Issues

The theoretical or conceptual issues relate to the interpretation of the residual as technological progress, the idea of an aggregative production function and the embodiment of technological advance in capital goods. The residual can generally be defined as the determinant of growth not explained for by factors or inputs used in production. To equate the residual to technological progress ignores other determinants to growth that could have played a role such as social capital, the policy regime and other political, social, cultural and non-economic forces that could influence economic growth and hence are technically covered by the residual. Thus, the residual cannot be entirely interpreted as total factor productivity. Prescott (1998) observed that differences in TFP account for large international income and productivity gaps between countries, invoking the need for a theory of TFP. Such theory according to him ‘*must account for differences in TFP other than those arising from growth in the stock of technical knowledge*’. This is because TFP could not be assumed to encompass entirely technological progress.

A second theoretical issue involves what is known as the aggregation problem. The aggregate production function, the bulwark of the neoclassical growth model, simply does not exist at the

macro-level. One cannot just add up the production functions of firms to build up the aggregate production function and even if one could, the economic sense is baseless. This is because the aggregate production function expresses the technological relationships of the macro-economy; to be precise it measures the maximum or optimal output producible given the input or factor bundles. Summing up micro production functions presents a conceptual dilemma since the production function of a multinational automotive manufacturing corporation and the production function of an agricultural enterprise and the production function of an ICT service firm cannot just be added up because these are heterogeneous entities, e.g., ‘adding up apples and oranges’, unless some formula exists that converts heterogeneous quantities into a homogeneous whole. In fact this aggregation problem appears equally with two or a thousand firms but becomes more pressing the greater the number of firms, as they will differ in multiple ways that would prevent aggregation.

Linking the two theoretical issues, Felipe and McCombie (2003) and Felipe (2000) contend that growth accounting results from the specification of an aggregate production function using aggregate output and input data from the national income accounts are tenuous. The income identity relating value-added output to the sum of the wage bill and overall profits just happens to be written in a form that resembles the production function. Because growth accounting data come from an accounting identity, this will always yield a good statistical fit to the data that coincidentally displays the properties of a neoclassical aggregate production function. The parameters resulting from such estimation however does not capture a technological relationship that an aggregate production function is supposed to represent. At best, it just shows how national income is divided between labour income and capital income and not the technological relationship between output and inputs. Because of the difficulty of differentiating between the accounting identity and the production function, any econometric estimation of the aggregate production function becomes a dubious exercise. Any production function could be shown to be a particular method of rewriting the national income accounting identity using different assumptions about factor shares. Thus, deriving total factor productivity as the residual of the growth in value-added output less the respective growth rates of capital and labour inputs from such an accounting identity and to interpret it as technological progress could be misleading.

In a survey of the aggregation debate by Felipe & Fisher (2003), the authors argued that even if the aggregate production function is proven to exist mathematically as Fisher (1968) did, the conditions are very stringent such that no real world economy could fulfil them²⁵. Nevertheless, Fisher (1969) proved that the empirical fit on aggregate output data to aggregate input data tend to be high, especially in the Cobb-Douglas case where elasticities approximate factor shares so that economists tend to use the aggregate production function as a tool (called the instrumental argument) without realizing the invalidity of the concept at the theoretical level. In the end, Felipe and Fisher (2001) made the case that “*one does not need an aggregate production function to study growth unless one insists that the only possible conception of growth is the neoclassical model.*” In the same vein, Sargent and Rodriguez (2001) argued that ‘*any attempt to measure TFP involves an implicit assumption about the underlying model of growth*’²⁶ and that simply estimating TFP growth is not sufficient but requires more fundamental understanding of the growth models. They concluded that in the neoclassical growth model without any quality adjustments made for capital, measured TFP growth reflected both disembodied and embodied technological change so that TFP became meaningful to measure long-run trends in productivity. However, when capital is adjusted

²⁵ For instance, one such condition is that all micro production units are identical except for the capital efficiency coefficient (translated into a partial differentiation equation which is the same function for all firms). Another condition is that for a labour aggregate to exist requires the absence of specialization in employment or in the case of an output aggregate, the absence of specialization in production.

²⁶ Sargent & Rodriguez (2001), p. 13.

for quality changes, TFP measures only disembodied technical change and additional data would be required to construct a measure of embodied technology. In new growth models, in turn, where physical capital drives the growth process, capital intensity and accumulation would be more relevant in examining the growth process rather than TFP growth.

Following from the points above, technological progress viewed in many of the growth accounting studies is of the exogenous, disembodied or Hicks-neutral type except for the Kim & Lau (1994) study that hypothesized the factor-augmenting type of technological change. The idea of embodiment suggests that capital is the instrument or channel by which technological change is introduced in the production process. The purchase of a new piece of machinery represents by itself technological progress as it involves a different production method. Splitting up the purchase of machinery as capital accumulation and efficiency of its use as technological progress would be difficult to achieve in growth accounting exercises. This also implies that new technical knowledge must be embodied in new capital goods so that recent acquisitions to the capital stock should carry more weight than earlier vintages. Pack (2001) quantified embodiment effects of technology using a Cobb-Douglas production specification by Nelson (1964) as follows:

$$Q^* = A^* + bK^* + (b\lambda_k - b\lambda_k\Delta\alpha) + (1 - b)L^*$$

where α is the average age of the equipment, $\Delta\alpha = 1 - (K^* + d)\alpha_{t-1}$ is the rate of change of the average age of equipment, λ_k is the rate of increase of productivity of new vintages, d is the depreciation rate, and b is the output elasticity of capital. The term $(b\lambda_k - b\lambda_k\Delta\alpha)$ captures the potential impact of technology embodied in imported capital equipment. Applying this equation for data on Taiwan for the period 1960-1990, Pack (2001) estimated the embodiment effect to be about 1.2 percent per year. However, in most growth accounting exercises, the extent to which most of technological progress is still embodied in capital goods implies that low TFP residuals are not surprising as technological progress is already captured by the capital stock data. The burden then falls on explaining high residuals and what constitutes them if technological progress is already counted under capital goods.

Empirical Issues

The empirical issues in growth accounting logically follow from the dependence of TFP calculations on assumptions about the dubiously existing aggregate production function. These assumptions relate basically to perfectly competitive markets where factor prices approximate marginal products of inputs and where output elasticities equal their respective factor shares. In developing countries, factor markets are imperfect due to minimum wage legislations, public sector employment and wage policies, social security systems, and regulations covering job security and tenure, so that the so-called competitive assumption fails to hold or at best comes close to being approximated. If markets are not competitive or approximately close to being one, then factor prices cannot be used to represent marginal products of the inputs and therefore, weighing growth rates of the contributing inputs by their factor shares in national income accounts to account for total growth becomes disputable. The neoclassical production function is Cobb-Douglas, which imposes the elasticity of substitution between capital and labour to equal unity, hence, displaying constant returns to scale. Since TFP is obtained as a residual, an assumed elasticity of substitution that is too high would underestimate TFP growth. This sensitivity is illustrated by Rodrik (1997) who using the Collins & Bosworth (1996) study, imputed the TFP growth rates implied by differing assumptions about factor substitution, as shown in Table 3.7. Clearly, the lower the assumption on elasticity of substitution, the higher TFP growth rates tend to

be, and vice versa.

This problem exists even if the production function is not the Cobb-Douglas case. Citing Young's (1995) approach using a translog production function that does not restrict the elasticity of substitution to unity, Rodrik (1997) shows that averaging the end-period factor shares between periods t and $t - 1$ could exhibit a high capital share despite capital deepening. As the capital-labour ratio rises, the marginal productivity of capital should tend to fall but is upheld by either high substitutability between capital and labour or by labour-saving technological change. But then again because technological progress is assumed to be Hicks-neutral, much of output growth is attributed to capital accumulation rather than to TFP growth in Young's study.

Table 3.7
**TFP Growth Rates Implied by Different Output Elasticity
of Substitution Assumptions by Rodrik (1997)**

Elasticity of Substitution	Implied TFP growth after:			Implied Capital Share after:		
	10 years	20 years	30 years	10 years	20 years	30 years
1	1.03	1.03	1.03	0.35	0.35	0.35
0.8	1.28	1.51	1.73	0.31	0.28	0.24
0.5	1.93	2.53	2.89	0.21	0.12	0.06
0.3	2.68	3.17	3.27	0.10	0.02	0.00

Source: Rodrik (1997), p. 33.

This is known as the identification problem — that is a case of two underlying production functions that could satisfy identical data sets. Growth accounting exercises could not distinguish between two interpretations of the growth decomposition borne by time series data: one coming from a production function with unitary elasticity of substitution between inputs and Hicks-neutral technological change and another arising from a production function with less-than-unitary elasticity of substitution and with factor-augmenting technological change. Under the first interpretation, a steeper production function with high elasticity of substitution would attribute overall growth more to capital accumulation and less to technological progress. On the other hand, under the second interpretation, a production function with lower elasticity of substitution implies that less of output growth is attributable to increasing capital intensity and more to improvements in technology.

The measurement problem results from the fact that as the capital-labor ratio increases, the returns to new investment will tend to diminish but this decline in profits is mitigated by either improvements in technological change or the high substitutability of capital for labor, e.g., input usage, otherwise known as efficiency change. The imposed constancy of capital share is therefore implied by an assumed high elasticity of substitution, which in the case of the Cobb Douglas production function is equal to unity. In case where the elasticity of substitution is below unity, capital share could still be prevented from declining in the capital-labor ratio because of high labor saving technological progress. Because it is unlikely to separate factor-augmenting technological change from the shape of the production function and its elasticity of substitution as proven by Diamond, McFadden & Rodriquez's (1972,1978) 'Impossibility theorem', labor-saving technological change may be wrongly attributed to an assumed elasticity of substitution that is too high resulting in an underestimation of TFP growth. This is illustrated in Figure 3.2 where the dashed lines represent equal capital shares at points A_0 and B on the lower and upper production functions. The assimilationists would argue that the elasticity of substitution would be low in the early phase of rapid development of the Asian NIEs as these economies were not yet familiar in

operating in high capital-intensity sectors, produce new variety of goods and even enter new markets. But because the same capital-labor ratio is associated with point B as in point A_0 , then the movement from A_0 to A_1 will give the contribution of capital accumulation and the upward movement from A_1 to B must be attributed to technological progress.

The measurement approach to productivity growth adopted by the accumulationists as shown by Young (1998b) is to deem technical progress to occur at the starting-period of analysis akin to a Laspeyres-like measure of productivity growth contrary to the end-period assumption of the occurrence of technical change, which is like a Paasche-like measure of productivity growth. Thus, Young suggested that instead of assuming technical change to be the movement from points A_1 to B in Figure 3.2, it could also be a movement from points A_0 to B_0 and the contribution of capital accumulation as the movement from B_0 to B_1 as in Figure 3.3.

Source: Young (1998b), p.1.

For the contention of the assimilationists to be consistent with data presented by the accumulationists, Young (1998b) suggested that the production functions in the two preceding figures be rotated as in Figure 3.4 such that capital share is the slope to both functions, hence constant capital share. Thus employing standard growth accounting TFP growth would be negligible for the accumulationists but positive for the assimilationists as indicated by the northward arrows. The latter would contend that the Asian economies grew because of end-period technological progress in the face of capital accumulation in previous periods while the former would argue that capital-augmenting technical change was negative at the beginning but the economies kept on growing because of capital accumulation.

Related to the assumption on elasticity of substitution, Sun (2004a) alleges that the findings of the accumulationists have been biased due to the miscalculation of factor shares, thus producing lower estimates of TFP growth in the East Asian economies. Theoretically, GDP comprises the payments to capital and labour inputs assuming perfect competition and constant returns to scale.

Figure 3.4
The Identification Problem

Source: Young (1998b), p. 5.

However, Sun (2004a, 2004b) proposed the removal of net indirect taxes and imperfect competition profits and capital depreciation from GDP to obtain the true labour and capital shares. He showed the effects on TFP of modified estimation of labour and capital shares using three approaches. The first is the conventional approach, which ignores the effects on net indirect taxes and imperfect competition profits; the second is Young's approach of simply deducting net indirect taxes from value-added but the balance operating surplus continue to be treated as part of capital share; and third is the modified factor shares approach where both net indirect and imperfect competition profits are removed from value-added to obtain the correct factor shares. The results of this exercise was done for the basic sectors of Taiwan from 1980-1999 but only the economy-wide results are shown in Table 3.8 to illustrate the sensitivity of TFP estimates on assumed factor shares. In general, the data reveals that TFP growth is understated when net indirect taxes and imperfect competition profits are ignored.

Senhadji (1999) likewise illustrates the sensitivity of growth accounting results to the assumed share of physical capital to real output, α . His extensive study covering panel estimation of 88 countries for the period 1960-1994 was patterned after Hall and Jones (1998) with the novelty of econometrically determining rather than assuming the value of α , relaxing the assumption of identical technology across regions, and focusing on levels rather than growth rates of TFP since cointegration literature stressed the superiority of level equations over first-difference equations in nonstationary time series. The results of Senhadji (1999), which are presented on a regional basis showed that the highest performer was Asia, which is a toss-up between South Asia and East Asia depending on the value of α . For high values ranging from 0.4 to 0.6, South Asia was the highest performer and for lower values of α such as 0.2, the East Asian countries ranked at the top of the productivity chart. The contribution of TFP to output growth hinges therefore on the share of physical capital to output growth. The higher is α , the lower is the contribution of TFP. In the East Asian countries, the fact that high rates of physical capital accumulation combined with high share of physical capital in real output left little room for growth in productivity. In the empirical panel estimates of α using seven different econometric methods covering pooled regression, generalized

least squares and seemingly unrelated regressions with and without human capital in the Cobb-Douglas production specification, the mean value of α for East Asia was above 0.4, corroborating the view that growth in the region was driven by capital accumulation.

Table 3.8
**Sun's (2004a) Sensitivity of TFP to
Factor Shares in Taiwan, 1980-1999**
(Average annual growth rates)

Period	Output	Capital	Labour	SL1	SL2	SL3	TFPG1	TFPG2	TFPG3
1980-85	0.067	0.095	0.023	0.609	0.682	0.787	0.016	0.021	0.029
1985-90	0.087	0.066	0.029	0.629	0.677	0.778	0.044	0.046	0.050
1990-95	0.071	0.088	0.024	0.712	0.712	0.817	0.025	0.029	0.035
1995-99	0.057	0.077	0.013	0.659	0.659	0.756	0.020	0.022	0.028
1980-99	0.072	0.082	0.023	0.684	0.684	0.786	0.027	0.030	0.036

Source: Sun (2004a), p. 16.

Sensitivity of growth accounting estimates to the assumption of constant returns to scale has also been tested. Park and Ryu (2003) explored the role of increasing returns in the economic growth of the Gang of Four and the G-5 countries. Using a homothetic variable returns-to-scale functional specification of the meta-production function, their approach allowed the separate identification of technological progress and returns to scale. They found that when scale effects are isolated from non-scale factors, the decomposition of the sources of growth in East Asia are significantly different from that of the constant returns to scale procedure. The results showed that the role of technological progress tended to be overestimated under the assumption of constant returns to scale and tended to decline when scale effects are taken into account. These are shown on Table 3.9.

Table 3.9
**Park and Ryu's (2003) Sensitivity of
Growth Accounting to Scale Effects (in percent)**

	Scale Effects	Total Non-Scale Contribution	Decomposition of Non-Scale Contribution			TFP	Physical Capital	Labour
			TFP	Physical Capital	Labour			
USA (1948-98)	5.8	94.2	49.3	23.6	21.2	55.4	23.0	21.6
Japan (1953-98)	8.2	91.8	51.2	35.9	4.63	60.4	34.9	4.76
Germany (1954-95)	5.8	94.2	50.0	46.8	-2.64	56.9	45.8	-2.72
UK (1956-98)	5.0	95.0	66.4	29.7	-1.20	72.4	28.8	-1.21
France (1953-98)	6.2	93.8	55.5	33.9	4.44	62.6	32.8	4.52
Hong Kong (1966-95)	10.1	89.9	36.4	33.9	20.0	45.7	33.7	20.6
S. Korea (1960-95)	11.6	88.4	18.9	45.9	23.6	26.8	47.2	26.0
Singapore (1964-95)	14.5	85.5	18.2	31.4	35.9	27.2	32.9	40.0
Taiwan (1953-95)	15.2	84.8	20.5	41.4	12.9	42.9	42.8	14.3

Source: Adapted from Park and Ryu (2003), pp. 19-21.

The other empirical issues follow from the aggregation problem, involving basically the measurement of capital stock that is resonant of the Cambridge Capital controversies. This debate sparked by Joan Robinson (1953-1954, 1955-1956, 1971) questions the physical unit by which capital is measured since capital could be defined in financial and technical realms. Thus unlike labour and land that could well be measured in physical quantities such as headcount of workers or acres of land, capital is measured in value terms given the heterogeneous notion of capital. Capital, in short, does not have a natural unit and its measurement would require knowledge about relative values of individual capital goods as well as the given rate of profits since the value of

capital changes when profits and wage rates change. In this regard, the methodology for measuring capital stock and the associated assumptions on depreciation rates will be very crucial in the growth accounting exercise. The stock of capital is usually estimated using the perpetual inventory method, which is just the sum of all past available investment flows given an initial period and an assumed depreciation rate. Thus, results of growth accounting are also sensitive to changes in the depreciation rate and the beginning period of capital accumulation, i.e., to the time dimension studied.

The problem of using value instead of physical units extends not only to capital aggregation but also to the rest of the variables in the production function equation. At the aggregate level, total physical output as measured in national income accounts is expressed as value-added and deflating this by a price index does not lead to a volume of output but to a measure of aggregate output with constant prices as of some arbitrarily chosen base year. Thus, the quality and reliability of deflators used in the indices matter. Moreover, firms produce gross output and not value added, which is obtained by subtracting intermediate inputs from gross output. Therefore, empirically there is no measure of aggregate output as a physical quantity either just as none exists for capital inputs.

Related to time dimension, Baier et al. (2002) concluded that growth analysis spanning less than 40 years are prone to reach erroneous conclusions and proved that analysis based on data using the last 20 years, i.e., 1980 to 1999, showed different conclusions than one based on the last 40 years, i.e. 1960 to 1999. Their study examined the relative importance of growth of physical and human capital and TFP using organized datasets of 145 countries spanning more than 100 years for at least 24 of the countries covered. The relevance of time dimension on growth accounting results are confirmed by Liang (1995) who concluded in his study that the accumulation theory explaining NIE growth is valid over a long period (1961-1993) but invalid if the time studied is 1982-1993.

Finally, Dowling & Summers (1997) tested the sensitivity of TFP estimates to a variety of factors such as assumed capital shares, sampling period used, dataset used and within-country variation since countries with the lowest overall TFP growth have the greatest variation over time. The authors regressed TFP growth estimates on four groups of dummy variables, a country dummy which assumes the value of 1 if the observation comes from that country; a dummy for three subsample periods (1961-75, 1976-85, 1986-95); a dummy for the data set used (e.g., the King-Levine (1994) capital stock data with Summers-Heston output data measured in international prices and the Nehru-Dhareshwar (1993) capital stock data with World Bank output data measured in national currencies); and a dummy for various values of capital shares. They found that the TFP estimates were sensitive to all four factors: individual country variation, the sample period used, the assumed values of capital shares; and the output data used. The individual country dummies resulted in estimates of the average TFP growth using international prices and a base capital share of 30 percent over the entire 1961-1995 sample period and yielded a range of about 2.8 percentage points per year in TFP growth rates across countries. The subsample dummies showed that TFP growth in the two earlier periods were lower for the entire sample with a statistically significant drop of nearly half a percentage point for the 1976-1985 period and a full percentage point increase over the full sample in TFP growth in the latter sub-period 1986-1995. For the dummy on capital shares, using a 40% capital share relative to a base case of 30% resulted in a drop of 0.72 percentage points in annual TFP growth for a given country and 0.36 percentage points if the capital share is 35%. Finally, there is a significant difference in TFP estimates as measured by the

two data sets with national currency estimates yielding more than 0.25 percentage points lower TFP estimates compared to those measured in international prices.

Policy Inferences

The issue with respect to policy implications arising from growth accounting could be summed up in terms of what is called the interpretation problem and the attribution problem. Since growth accounting is nothing more than an accounting exercise, no causal behavioural relationship could be established between factor input growth or factor productivity to output growth. The association of the residual with technological progress blurs even more the distinction between the decomposition of growth and the explanation for growth. There is still no agreement on what the computed productivity parameters actually measure and how they are to be interpreted, much more what the sources of their fluctuations and growth denote. Sudit and Finger (1981), on the other hand, cite the lack of policy analysis resulting from growth accounting since we cannot explain the residual, which measures what we do not know about growth. Thus according to them, *'public exhortations for deliberate efforts to improve the rate of growth in aggregate productivity suffer from an underlying contradiction in logic (as) we simply cannot hope to affect consciously something that is defined to measure our lack of knowledge.'* Thus, the role of policies that promote growth in TFP seems to be without strong basis.

The attribution problem, in turn, questions the whole rationale for decomposing growth since in the real world, only actual combinations of inputs and output are observed in a dynamic process rather than the production function itself. Thus, it is meaningless to distinguish between shifts in the production function and movements along it. According to Felipe (1997), the neoclassical growth model upon which growth accounting exercises are grounded assumes the smooth substitution among inputs in the production isoquant implying that a one percent increase in overall output could be achieved by either a one percent increase in the capital stock, or a one percent increase in employment, or a one percent increase in factor productivity. This premise, however, does not hold when inputs are complementary and interdependent, in which case growth becomes super-additive or synergetic so that the overall growth is greater than the sum of individual growth rates of its components. Nelson (1981) best summarizes the attribution problem as follows:

Consider the sources of a well-made cake. It is possible to list a number of inputs — flour, sugar, milk, etc. It is even possible to analyze the effects upon the cake of having a little bit more or less of one ingredient, holding the other ingredients constant. But it makes no sense to try to divide the credit for a good cake to various inputs (Nelson, 1981, p. 1054.)

3.6 Conclusion

The productivity debate surrounding East Asian growth has led to a sceptical view about the usefulness of growth accounting or econometric estimation of production functions in explaining the sources of growth in an economy. The attribution problem calls into question the validity of the exercise when factors exhibit complementarities and shows intrinsic discrepancies and the relevance of policy inferences resulting from decomposing overall growth. More important is the issue of the Solow residual as a measure of factor productivity where technological progress is largely viewed as exogenous, disembodied and of the non-factor augmenting or Hicks-neutral type. An important part of technological progress is of course embodied in inputs, and it is difficult to disentangle disembodied technological change from those embodied in inputs, especially capital

or machinery, indicating that some portion of TFP has already been factored out or counted in capital's share. This prompted Felipe (1999, 2000) to state that the "*Solow residualization of the East Asian economies is an activity...subject to significant diminishing returns.*"

The rate of TFP is thus not a sufficient statistic upon which conclusions could be drawn and policy statements about growth and its prediction could be made. Chen (1997) suggested that there is also a fixation of analysis on TFP and the neglect of labour productivity growth as an indicator of productive efficiency and technological advance. Rodrik (1997) opines that labour-augmenting technology may be misattributed due to the assumed high elasticity of substitution between capital and labour implicit in the Cobb-Douglas production function. There is also the question of the theoretical basis of an aggregate production function and the empirical coincidence of deriving such aggregate production functions from national income accounting identities. The aggregate production function is grounded upon neoclassical theory and its restrictive assumptions, and together with the new endogenous growth models, are viewed as ignoring how countries create and assimilate technology. Thus, growth empirics in explaining the East Asian case has to look at other paradigms such as the evolutionary theory of technological change or even non-linear models of technology. Finally, there are sources of errors in the measurement of physical capital such as capital composition or what constitutes capital and judgments about capacity utilization and depreciation. Finally, Timmer (1999b) summarizes the disagreement between accumulationists and assimilationists as based on whether capital intensification can be considered as technological change as it involves exploration of global production possibilities that are novel to countries such as the East Asian economies putting them into practice. Studies on catch-up processes of developing countries, he affirms should be conducted at a more detailed industry level given that growth accounting studies focus on aggregative comparisons of growth rates.

Despite all its flaws and shortcomings, growth accounting continues to be used by economic growth analysts because of its simplicity and convenience. Even though it has turned out to be a war of numbers, the productivity debate in East Asia has focused attention of economic analysts about the importance of productivity in the growth process. Already, many East Asian economies have imposed targets on their TFP growth rates and have looked at enhancing technological progress or shifts in their production functions, if not improving at least technological efficiency, which is an important component of TFP. In the meantime, new approaches have to be developed and tried that could better explain technological change which could be an alternative to growth accounting and econometric estimation of production functions. Such novel methodologies should be able to incorporate alternatives to the neoclassical paradigm and to flexibly deal with its restrictive assumptions. In this study, the use of the field of influence approach to input-output analysis holds promise.

REFERENCES

- Ab. Wahab, M. (2004). National Report on Malaysia. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 210-232.
- Ab. Wahab, M. (1996). *Total Factor Productivity Measurement: Experience of Malaysia*. Paper presented at the *Asian Productivity Organization (APO) Symposium on Productivity Measurement: Sector Specific*. Tokyo, Japan: Asian Productivity Organization.
- Abramovitz, M. (1993). The Search for the Sources of Growth: Areas of Ignorance, Old and New. *The Journal of Economic History*, Volume 53, Issue 2 (June), 217-243.

- Abramovitz, M. (1956). Resource and Output Trends in the United States since 1870. *The American Economic Review*, Volume 46, Issue 2 (May), 5-23.
- Abimanyu, A. (1995). The Indonesian economy and total factor productivity. *Singapore Economic Review*, Volume 40, Issue 1, 25-40.
- Aigner, D. & Chu, S. (1968). On Estimating the Industry Production Function. *American Economic Review* 58: 826-839.
- Aigner, D., Knox Lovell, C. & Schmidt, P. (1977). *Formulation and Estimation of Stochastic Frontier Production Function Models*. *Journal of Econometrics* 6:21-37.
- Aswicahyono, H. (2000). *Total Factor Productivity in Indonesia Manufacturing, 1975-1993*. PhD Dissertation, Australian National University, Canberra.
- Aswicahyono, H. & Hill, H. (2002). Perspiration versus Inspiration in Asian Industrialization: Indonesia before the Crisis. *The Journal of Development Studies*, Vol. 38, No. 3, February 2002, 138-163.
- Austria, M. & Martin, W. (1995). Macroeconomic Instability and Growth in the Philippines, 1950-87: A dynamic Approach. *Singapore Economic Review*, Vol. 1, No. 1, 65-82.
- Austria, M. (2000). Philippine Productivity Performance in the 1990s: An Assessment. *Philippine Institute of Development Studies (PIDS) Discussion Paper Series* No. 2000-23.
- Austria, M. (1998). Productivity Growth in the Philippines after the Industrial Reforms. *Philippine Institute of Development Studies (PIDS) Discussion Paper Series* No. 98-26.
- Aw, B.Y., Chen, X. & Roberts, M. (2001). Firm-level evidence on productivity differentials and turnover in Taiwanese manufacturing. *Journal of Development Economics*, Vol. 66, No. 1, 51-86.
- Baier, S., Dwyer Jr., G. & Tamura, R. (2002). How important are Capital and Total Factor Productivity for Economic Growth? *Federal Reserve Bank of Atlanta Working Paper 2002-2a* (April).
- Baily, M.N. & Zitzewitz, E. (1998). Extending the East Asian Miracle: Microeconomic Evidence from Korea. *Brookings Papers on Economic Activity. Microeconomics*, Vol. 1998, 249-321.
- Barro, R. (1998). Notes on Growth Accounting. *NBER Working Paper* No. 6654 (July).
- Bloch, H. & Tang, S. (2000). Estimating Technical Change, Economies of Scale, and Degree of Competition for Manufacturing Industries in Singapore. *Singapore Economic Review*, Vol. 45, No. 1, 33-58.
- Bloch, H. & Tang, S. (1999). Technical change and total factor productivity growth: a study of Singapore's manufacturing industries. *Applied Economics Letters*, Vol. 6, No. 10, 697-701.
- Boskin, M. & Lau, L. (2002). *Capital-technology complementarity and postwar economic growth*. Working Paper Department of Economics, Stanford University.
- Brimble, P. (1987). *Total factor productivity growth at the firm level in Thailand: A challenge for the future*. Bangkok: Faculty of Economics, Thammasat University (unpublished).
- Chandrachai, A., Bangorn, T. & Chockpisansin, K. (2004). National Report on Thailand. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 297-321.

- Chang, W-P. Productivity gains from factor reallocation: A case study of the Taiwan experience. *Industry of Free China*, Vol. 87, No. 3, 75-91.
- Charnes, A., Cooper, W., Lewin, A. & Seiford, L. (2001). *Data Envelopment Analysis Theory, Methodology and Applications*. Boston: Kluwer Academic Publishers.
- Chen, E. (1997). The Total Factor Productivity Debate: Determinants of Economic Growth in East Asia. *Asian Pacific Economic Literature*, Volume 11, No. 1 (May), 18-39.
- Chen, E. (1977). Factor Inputs, Total factor Productivity, and Economic Growth: The Asian Case. *The Developing Economies*, Volume 15, No. 2 (June), 121-143.
- Choong, P. & Siew-Yean, T. (1995). Total Factor Productivity in the Malaysian Manufacturing Sector: Some Preliminary Results. *Jurnal Ekonomi Malaysia*, Vol. 29, 9-35.
- Chow, G. & Lin, A. (2002). Accounting for Economic Growth in Taiwan and Mainland China: A Comparative Analysis. *Journal of Comparative Economics*, Vol. 30, No. 3, 507-530.
- Chris Rodrigo, G. (1998). *Can TFP analyses of East Asian economic growth yield reasonable estimates of technological change?* Monograph. Institute of Public Policy, George Mason University (September 15).
- Chris Rodrigo, G. (2001). *Technology, Economic Growth and Crises in East Asia*. Cheltenham, UK: Edward Elgar Publishing, Inc.
- Christensen, L. & Cummings, D. (1981). Real product, real factor input, and productivity in the Republic of Korea, 1960-1973. *Journal of Development Economics*, Volume 8, Issue 3, June, 285-302.
- Chuang, Y.-C. (1996). Identifying the sources of growth in Taiwan's manufacturing industry. *Journal of Development Studies*, Vol. 32, No. 3, 445-463.
- Coelli, T., Prasada Rao, D. & Battese, G. (1998). *An Introduction to Efficiency and Productivity Analysis*, Massachusetts: Kluwer.
- Collins, S. & Bosworth, B. (1996). Economic Growth in East Asia: Accumulation versus Assimilation. *Brookings Papers on Economic Activity*, Volume 1996, No. 2, 135-203.
- Cooper, W., Seiford, L. & Tone, K. (2000). *Data Envelopment Analysis A Comprehensive Text with Models, Applications, References and DEA-Solver Software*. Boston: Kluwer Academic Publishers.
- Copeland, M.A. (1937). Concepts of national income. *Studies in Income and Wealth*. Vol. 1, 3-63. New York: National Bureau of Economic Research.
- Copeland, M.A & Martin, E.M. (1938). The correction of wealth and income estimates for price changes. *Studies in Income and Wealth*. Vol. 2: 85-135. New York: National Bureau of Economic Research.
- Cororaton, C. (2004). National Report on the Philippines. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 255-279.
- Cororaton, C. (2002). Total Factor Productivity in the Philippines. *Philippine Institute for Development Studies (PIDS) Discussion Paper Series* No. 2002-01 (March).

- Cororaton, C., & Abdula, R. (1999). Productivity of Philippine Manufacturing. *Philippine Institute for Development Studies (PIDS) Discussion Paper Series* No. 99-21 (August).
- Cororaton, C. & Cuenca, J. (2001). Estimates of Total Factor Productivity in the Philippines. *Philippine Institute for Development Studies (PIDS) Discussion Paper Series* No. 2001-02 (January).
- Cororaton, C., Endriga, B., Ornedo, D. & Chua, C. (1996). Total Factor Productivity of Philippine Manufacturing Industries. *Philippine Institute for Development Studies (PIDS) Development Research News*, Volume 14, No.1 (January-February), pp. 1, 6-9, 12-16.
- Cororaton, C. & Caparas, T. (1999). Total Factor Productivity: Estimates for the Philippine Economy. *Philippine Institute for Development Studies (PIDS) Discussion Paper Series* No. 99-06 (March)
- Cororaton, C. & Zingapan, S. (1999). Recent TFP Policy Agenda for the Philippines. *Philippine Institute for Development Studies (PIDS) Discussion Paper Series* No. 99-07 (March).
- Dahlman, C. & Westphal, L. (1981). The Meaning of Technological Mastery in Relation to Transfer of Technology. *The Annals of the American Academy of Political and Social Science*, Volume 458 (November), 12-26.
- Dahlman, C., Ross-Larson, B. & Westphal, L. (1987). Managing Technological Development: Lessons from the Newly Industrializing Countries, *World Development*, Volume 15, No. 6, 759-775.
- Dahlman, C. & Sananikone, O. (1990). *Technology Strategy in the Economy of Taiwan: Exploiting Foreign Linkages and Investing in Local Capability*. Industry and Energy Department, Policy Planning and Research. Washington, D.C.: World Bank.
- Dahlman, C. & Sercovich, F. (1984). Local Development and Exports of Technology: The Comparative Advantages of Argentina, Brazil, India, the Republic of Korea and Mexico. *World Bank Staff Working Paper* No. 667, Washington, D.C.: World Bank.
- Dalum, G. & Villumsen, G. (1996). Are OECD Export Specialisation Patterns 'Sticky'. *Danish Research Unit for Industrial Dynamics (DRUID) Working Paper* No. 96-3.
- De Long, B. (1988). Productivity Growth, Convergence, and Welfare: Comment. *The American Economic Review*, Vol. 78, No. 5, December.
- Denison, E. (1967). Sources of Postwar Growth in Nine Western Countries. *The American Economic Review*, Volume 57, No. 2 (May), 325-332.
- De Silva, M.A.A.T. (2001). *Measuring Total Factor Productivity: Survey Report*. Tokyo: Asian Productivity Organization.
- Dessus, S. (1997). Total Factor Productivity and Outward Orientation in Taiwan: What is the Nature of the Relationship? Paper presented at the *International Conference on Dynamics, Economic Growth and International Trade II*, Hong Kong, July 22-23.
- Dessus, S., Shea, J. & Shi, M. (1995). Total factor productivity and growth in Taiwan area, 1950-1990. *Academia Sinica Institute of Economics Discussion Paper* No. 9504, 1-46.
- Diamond, P., McFadden, D. & Rodriguez, M. (1978). Measurement of Elasticity of Factor Substitution and Bias of Technical Change. In M. Fuss and D. McFadden (Eds.). *Production Economics: A Dual Approach to Theory and Applications*, Vol. 2. New York: North-Holland.

- Diamond, P., McFadden, D. & Rodriguez, M. (1972). Identification of the Elasticity of Substitution and the Bias of Technical Change. In D. McFadden (Ed.). *An Econometric Approach to Production Theory*. Amsterdam: North-Holland.
- Directorate-General of Budget, Accounting and Statistics (DGBAS) (2000). *The Trends in Multifactor Productivity, Taiwan Area, Republic of China*, Taipei, Taiwan.
- Dollar, D. & Sokoloff, K. (1988). Patterns of Productivity Growth in South Korean Manufacturing Industries, 1963-1979. *UCLA Working Paper No. 481*.
- Dowling, M. & Summers, P. (1997). Total Factor Productivity and Economic Growth—Issues for Asia. *The University of Melbourne Department of Economics Research Paper No. 594*, October.
- Dowrick, S. (1992). Technological Catch Up and Diverging Incomes: Patterns of Economic Growth 1960-88. *The Economic Journal*, Vol. 102, No. 412 (May), 600-610.
- Drysdale, P. & Huang, Y. (1997). Technological Catch-up and Economic Growth in East Asia and the Pacific. *The Economic Record*, Volume 73, No. 222, September, 201-211.
- Dutta, M. (1998). The New Industrial Revolution in Asian Economies: Has It Reached Its Ceiling? — Some Remarks. *Research in Asian Economic Studies*, Volume 8, 43-50.
- Easterly, W. (1995). The Mystery of Growth: Shocks, Policies, and Surprises in Old and New theories of Economic Growth. *Singapore Economic Review*, Volume 40, No.1, 3-24
- Elaine-Seow, L. H. & Lall, A. (1996). Technical Change in Manufacturing Industries in Singapore: 1980-91. In C. Soon Beng & J. D. Kendall (Eds.). *Regional Issues in Economics*, Vol. II. Singapore: Nanyang Business School, Nanyang Technological University.
- Elias, V. (1993). The Role of Total Factor Productivity in Economic Growth'. *Estudios de Economia*, Vol. 20, No. 1 (Special issue). University of Chile.
- Enos, J. L. & Park, W-H. (1988). *The Adoption and Diffusion of Imported Technology: The Case of Korea*, London: Croom Helm.
- Färe, R., Grosskopf, S. & Knox Lovell, C. (1994). *Production Frontiers*. Cambridge, U.K.: Cambridge University Press.
- Farrell, M.J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society Series A (General)*, Vol. 120, No. 3: 253-281.
- Feenstra, R., Markusen, J. & Zeile, W. (1992). Accounting for Growth with New Inputs: Theory and Evidence. *The American Economic Review*, Volume 82, No. 2 (May), 415-421.
- Felipe, J. (2006). A decade of debate about the sources of growth in East Asia. How much do we know about why some countries grow faster than others? *Estudios de Economia Aplicada*. Vol. 24-1: 181-220/
- Felipe, J. (2000). On the Myth and Mystery of Singapore's "Zero TFP". *Asian Economic Journal*, Volume 14, Issue 2 (June), 187-209.
- Felipe, J. (1997). Total Factor productivity Growth in East Asia: A Critical Survey, *Asian Development Bank EDRC Report Series No. 65*. Manila: Asian Development Bank.

- Felipe, J. & Fisher, F. (2003). Aggregation in Production Functions: What Applied Economists should Know. *Metroeconomica*. Vol. 54, Issue 2-3, May: 208-262.
- Felipe, J. & McCombie, J.S.L (2003). Some methodological problems with the neoclassical analysis of the East Asian miracle. *Cambridge Journal of Economics*, Volume 27, 695-721.
- Felipe, J. & McCombie, J.S.L (2001). Biased Technical Change, Growth Accounting, and the Conundrum of the East Asian Miracle. *Journal of Comparative Economics*, Volume 29, pp. 542-564.
- Firdausy, C.M., Aswicahyono, H. & Tarmidi, L. (2000). *Sources of Indonesian Economic Growth*. Global Development Network. Retrieved on July 2008 from <http://www.gdnet.org/>
- Fisher, F.M. (1968). Embodied Technology and the Existence of Labour and Output Aggregates. *Econometrica*, 37: 553-577.
- Fisher, F.M. (1968). The Existence of Aggregate Production Functions. *Review of Economic Studies*, 35: 417-428.
- Fried, H., Knox Lovell, C. & Schmidt, S. (1993). *The Measurement of Productive Efficiency Techniques and Applications*. New York: Oxford University Press.
- Fu, T. (2004). National Report on China. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 33-51.
- Gan, W.B. & Robinson, E. (1993). Aggregate Supply and Wage Price Mechanism: Some Implications for Inflation Stabilization in Malaysia. Paper presented at the *HIID-ISIS Seminar*, Kuala Lumpur, Malaysia.
- Gan, W.B. & Soon, L.Y. (1998). Input versus Productivity-Driven Growth: Implications for the Malaysian Economy. In L.Y.Soon & N. Shyamala (Eds) *The Seventh Malaysia Plan: Productivity for Sustainable Development*. Kuala Lumpur: University Malaya Press.
- Greenwood, J. & Jovanovic, B. (1998). Accounting for Growth. *NBER Working Paper* No. 6647 (July).
- Griliches, Z. (1996). The Discovery of the Residual: A Historical Note. *Journal of Economic Literature*, Volume 34, No. 3 (September), 1324-1330.
- Hahn, C. & Kim, J. (2003). Understanding East Asian Growth: Sources and Determinants in a Cross-Country Perspective. Paper presented at the *Global Development Network annual meeting* held in Bonn, Germany in December 1999 organized by the World Bank.
- Hall, R. & Jones, C. (1998). Why Do Some Countries Produce So Much More Output per Worker than Others? *The Quarterly Journal of Economics*, Vol. 114, No. 1 (February), 83-116.
- Hallward-Driemeier, M., Iarossi, G. & Sokoloff, K. (2002). Exports and Manufacturing Productivity in East Asia: A Comparative Analysis with Firm-Level Data. *NBER Working Paper 8894*. Cambridge, Massachusetts: National Bureau of Economic Research.
- Hanson, J., Dasgupta, D. & Hulu, E. (1995). The Rise in Total Factor Productivity during Deregulation: Indonesia 1985-1992. *Seminar on Building on Success: Maximizing the Gains from Deregulation*, April 26-28, 1995, Jakarta.
- Harberger, A. (1998). Reflections on Economic Growth in Asia and the Pacific. *Research in Asian Economic Studies*, Volume 8, JAI Press, 13-41.

- Hayami, Y. (1969). Sources of Agricultural Productivity Gap among Selected Countries. *The American Journal of Agricultural Economics*, Volume 51, 564-575.
- Hayami, Y. & Ruttan, V. (1970). Agricultural Productivity Differences among Countries. *The American Economic Review*, Volume 60, 895-911.
- Hayami, Y. & Ruttan, V. (1985). *Agricultural Development: International Perspective*, Revised edition, Baltimore and London: The Johns Hopkins University Press.
- Hobday, M. (2000). East versus Southeast Asian innovation systems: comparing OEM- and TNC-led growth in electronics. In L. Kim & R. Nelson (Eds). *Technology, Learning and Innovation: Experiences of Newly Industrializing Economies*. Cambridge, U.K.: Cambridge University Press, 129-169.
- Hobday, M. (1998): Understanding Innovation in Electronics in Malaysia. In K.S.Jomo, G. Felker & R. Rasiah (Eds.) (1999). *Industrial Technology Development in Malaysia: Industry and Firm Studies*, London: Routledge, 76-105.
- Hobday, M. (1997): Latecomer Catch-up Strategies in Electronics: Samsung of South Korea and ACER of Taiwan. *Asia Pacific Business Review*, Vol. 4, Nos. 2-3, 48-83.
- Hobday, M. (1996a). Innovation in South Asia: Lessons for Europe? *Management Decision*, Vol. 34, No. 9, 71-81.
- Hobday, M. (1996b). Korea: Facing the Challenge of Restructuring. In H. Rush, M. Hobday, J. Bessant, E. Arnold & R. Murray (Eds) *Technology Institutes: Strategies for Best Practice*, London: Thompson.
- Hobday, M. (1996c). Taiwan: Incubating High Technology Industries. In H. Rush, M. Hobday, J. Bessant, E. Arnold & R. Murray (Eds) *Technology Institutes: Strategies for Best Practice*, London: Thompson.
- Hobday, M. (1996d). Singapore: Encouraging Foreign Transnationals to Take Root. In H. Rush, M. Hobday, J. Bessant, E. Arnold & R. Murray (Eds) *Technology Institutes: Strategies for Best Practice*, London: Thompson.
- Hobday, M. (1996e). Hong Kong: Improving Productivity and Overcoming Market Failures. In H. Rush, M. Hobday, J. Bessant, E. Arnold & R. Murray (Eds.). *Technology Institutes: Strategies for Best Practice*, London: Thompson.
- Hobday, M. (1995a). *Innovation in East Asia: The Challenge to Japan*. Aldershot, U.K.: Edward Elgar.
- Hobday, M. (1995b). East Asian Latecomer Firms: Learning the Technology of Electronics. *World Development*, Volume. 23, No. 7.
- Hobday, M. (1994a). Export-led Technology Development in the Four Dragons: the Case of Electronics. *Development and Change*, Vol. 25, No. 2 (April), 333-361.
- Hobday, M. (1994b). Technological Learning in Singapore: a Test Case of Leapfrogging. *Journal of Development Studies*, Vol. 30, No. 4, 831-858.
- Hooley, R. (1985). *Productivity Growth in Philippine Manufacturing: Retrospect and Future Prospects*. Philippine Institute for Development Studies.

- Hooley, R (1968). Long-Term Growth of the Philippine Economy. *The Philippine Economic Journal*. First Semester.
- Hsieh, C. (2000a). *What Explains the Industrial Revolution in East Asia? Evidence from the Factor Markets*. Working Paper, Princeton University (October).
- Hsieh, C. (2000b). *Measuring Biased Technology*. Working Paper, Princeton University.
- Hsieh, C. (1999). Productivity Growth and Factor Prices in East Asia. *The American Economic Review*, Volume 89, No. 2, 133-138.
- Hsieh, C. (1998). *Notes on Growth Accounting: A Comment*. Working Paper. Princeton University (August).
- Hsiao, F. & Hsiao, M. (1998). Miracle or Myth of Asian NIC's Growth: The Irony of Numbers. *Research in Asian Economic Studies*, Volume 8, 51-68.
- Hu, S.C. & Chan, V. (1999). The determinants of total factor productivity in Taiwan. *Industry of Free China*, Vol. 89, No. 9, 1-50.
- Hulten, C. (2000). Total Factor Productivity: A Short Biography. *NBER Working Paper* No. 7471 (January).
- Hwang, I. (1998) Long-run determinant of Korean economic growth: empirical evidence from manufacturing. *Applied Economics*, Vol. 30, No. 3, 391-405.
- Ikemoto, Y. (1986). Technical Progress and Level of Technology in Asian Countries, 1970-80: A Translog Index Approach. *The Developing Economies*, Volume 24, No. 4 (December), 368-390.
- Imai, H. (2001). Structural transformation and economic growth in Hong Kong: another look at Young's Hong Kong thesis. *Journal of Comparative Economics*, Vol. 29, No. 2, 366-382.
- Inoue, K. (1995). The Growth Experience of Japan—what lessons to Draw? In P. Anderson, J. Dwyer & D. Gruen (Eds.). *Productivity and Growth*. Economic Group, Reserve Bank of Australia.
- Ito, T. & Rose, A.K. (Eds.) (2004). *Growth and Productivity in East Asia*. NBER. Chicago: University of Chicago Press.
- Jorgenson, D.W. (1995). *Productivity*. Vol. 2. Cambridge, MA: MIT Press.
- Jorgenson, D.W. & Griliches, Z. (1967). The Explanation of Productivity Change. *The Review of Economic Studies*, Volume 34, No. 3 (July), 249-283.
- Jorgenson, D.W., Kuroda, M. & Nishimizu, M. (1987). Japan-U.S. industry-level productivity comparisons, 1960-79. *Journal of the Japanese and International Economy*, Vol. 1, No. 1, 1-30.
- Kajiwar, H. (1994). The Effects of Trade and Foreign Investment Liberalization Policy on Productivity in the Philippines. *The Developing Economies*, Vol. 32, No. 4 (December), 492-508.
- Kang, J.M. & Kwon, J.K. (1993). The role of returns to scale and capacity utilization in productivity changes: the case of Korean manufacturing. *International Economic Journal*, Vol. 7, No. 1, 95-109.

- Kawai, H. (1994). International Comparative Analysis of Economic Growth: Trade Liberalization and Productivity. *The Developing Economies*, Volume 32, No. 4, (December), 373-397.
- Kee, H. L. (2005). Productivity or Endowments? Sectoral Evidence for Hong Kong's Aggregate Growth. *Asian Economic Journal*, Vol. 19, No. 1, 51-81.
- Kim, E. (2000). Trade liberalization and productivity growth in Korean manufacturing industries: price protection, market power, and scale efficiency. *Journal of Development Economics*, Vol. 62, No. 1, 55-83.
- Kim, Chuk-Kyo (1979). *Productivity Analysis for Korean Manufacturing, 1966-75*. Korea. Development Institute.
- Kim, Chu-Kyo, Yoo, Ji-Sung & Hwang, Kyu-Ho (1984). *Productivity Analysis for Korea, Taiwan and Japan*. Economic Research Institute. Hanyang University.
- Kim, Jong-Il & Lau, L. (1994). The Sources of Economic Growth of the East Asian Newly Industrialized Countries. *Journal of the Japanese and International Economies*, Volume 8, 235-71.
- Kim, Jong-Il & Lau, L. (1996). The Sources of Asian Pacific Economic Growth. *Canadian Journal of Economics*, Volume 39 (April), S448-S454.
- Kim, Kwang-Suk & Park, J-K. (1985). *Sources of Economic Growth in Korea: 1963-1982*. Seoul: Korea Development Institute.
- Kim, Kwang-Suk & Seung-Rok Park (1988). *Productivity Growth and its Determinants in Korean Manufacturing*, Korean Institute for Industrial Economics and Trade.
- Kim, Kwang Suk & Sung Duk Hong (1997). *Accounting for Rapid Economic Growth in Korea, 1963-1995*. Seoul: Korea Development Institute.
- Kim, L. (1997). *Imitation to Innovation: The Dynamics of Korea's Technological Learning*. Boston: Harvard Business School Press.
- Kim, L. (1998). Crisis Construction and Organizational Learning: Capability Building in Catching-up at Hyundai Motor. *Organization Science* 9 (4), 506-521.
- Kim, L. & Dahlman, C. (1992). Technology policy ofr industrialization: An integrative framework and Korea's experience. *Research Policy*, 1992, Vol. 21, 5: 437-452.
- Kim, L. & Nelson, R. (Eds) (2000). *Technology, Learning and Innovation: Experiences of Newly Industrializing Economies*. New York: Cambridge University Press.
- King, R. & Levine, R. (1994). Capital Fundamentalism, Economic Development and Economic Growth. *Carnegie-Rochester Conference Series on Public Policy*, Vol. 40, 259-292.
- Klenow, P. & Rodriguez-Clare, A. (1997). The Neoclassical Revival in Growth Economics: Has It Gone Too Far? In B. S. Bernanke & J. J. Rotemberg (1997) (Eds.) *NBER Macroeconomics Annual*, Cambridge, MA: MIT Press, 73-114.

- Knox Lovell, C.A. & Tang, Yih Pin (1997). An Alternative Tale of Two Cities. In T. Fu, C. Huang & C.A. Knox Lovell (Eds.) (1999). *Economic Efficiency and Productivity Growth in the Asia-Pacific Region*. Institute of Economics, Academia Sinica, Taiwan. Edward Elgar.
- Koh, Soo-Wei, Rahman, S. & Randolph Tan, G.K. (2002). Growth and Productivity in Singapore Manufacturing Industries: 1975-1998. *Asian Economic Journal*, Vol. 16, No. 3, 247-266.
- Kraipornsak, P. (1995). *Source of economic growth in Thailand: 1970-1989*. PhD dissertation. Australian National University.
- Krugman, P. (1997a). Asia's Miracle is Alive and Well? Wrong, It Never Existed. *Time Asia*, 150 (13), September 29.
- Krugman, P. (1994). The Myth of Asia's Miracle. *Foreign Affairs*, 73 (6), 62-78.
- Kwack, Sung Yeung (2000). Total factor productivity growth and the sources of growth in Korean manufacturing industries, 1971-1993. *The Journal of the Korean Economy*, Vol. 1, No. 2, 229-265.
- Kwak, H. (1994). Changing Trade Policy and its Impact on TFP in the Republic of Korea. *The Developing Economies*, Vol. 32, No. 4 (December), 398-422.
- Kwon, J.K. (1986). Capacity utilization, economies of scale and technical change in the growth of total factor productivity: an explanation of South Korean manufacturing growth. *Journal of Development Economics*, Vol. 24, No. 1, 75-89.
- Kwong, K., Lau, L. & Tzong-Biau Lin (2000). The impact of relocation on the total factor productivity of Hong Kong manufacturing. *Pacific Economic Review*, Vol. 5, No. 2, 171-199.
- Lee, B. (2004). National report on Republic of Korea. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 186-209.
- Lee, K. (2001). Growth of total factor productivity in Korea: 1971-96. Asian Productivity Organization, (Ed.) *Measuring Total Factor Productivity-Survey Report*. Tokyo.
- Lee, K. & Lim, C. (1998). Technological Regimes, Catching-up and Leapfrogging: Findings from Korea Industries. *Research Policy*, Vol. 30, No. 3, 459-483.
- Lee, S. (1988). *Effects and Targets of Government-Led Industrial Policy in Korea*. Federation of Korean Industries.
- Leung, H.M. (1997). Total factor productivity growth in Singapore's manufacturing industries. *Applied Economics Letters*, Vol. 4, No. 8, 525-528.
- Liang, C. (2003). *Industrial Structure Changes and the Measurement of Total factor Productivity: The Krugman-Kim-Lau-Young Hypothesis Revisited*. Institute of Economics, Academia Sinica.
- Liang, C (1995). Productivity growth in Asian NIE: a case study of the Republic of China, 1961-1993. *APO Productivity Journal*, Tokyo, Japan: Asian Productivity Organization (Winter).
- Liang, C. & Jorgenson, D.W. (1999). Productivity growth in Taiwan's manufacturing industry, 1961-1993. In T. Fu, C. J. Huang & C.A. Knox Lovell (Eds.) (1999). *Economic Efficiency and Productivity Growth in the Asia-Pacific Region*. Cheltenham, U.K.: Edward Elgar, 265-284.

- Lim, J. (1998). *Annual Macroeconomic Model with Social Sector Block*. National Economic and Development Authority.
- Limskul, K. (1995). Sources of Economic Growth and Development in Thailand. *Singapore Economic Review*, Vol. 40, No. 1.
- Limskul, K. (1988). *Economic development and structural change in Thailand*. PhD. dissertation, Faculty of Economics, Nagoya University, Japan.
- Lin, A-L., Wang, S-W. Chiu, S-G. (1998). *Total factor productivity and competitiveness of Taiwan economy*. Technical Report, Chun-Hua Institute for Economic Research.
- Lin, C-W. & Wong, K. (1997). Economic Growth and International Trade: The Case of Hong Kong. Paper presented at the *International Conference on Dynamics, Economic Growth and International Trade* held in Hong Kong in July 1997.
- Lindauer, D. L. & Roemer, M. (1994). Legacies and Opportunities. In D.L. Lindauer & M. Roemer (Eds.) *Asia and Africa: Legacies and Opportunities in Development*. International Center for Economic Growth and the Harvard Institute for International Development.
- Maddison, A. (1982). *Phases of Capitalist Development*, Oxford: Oxford University Press.
- Maisom, A., Ariff H. & Nor Aini, A. (1994). Productivity and Efficiency in the Malaysian Manufacturing Sector: A Time Series Analysis. In M. Semudram & M. Yap (Eds.). *Proceedings of the First Malaysian Econometric Conference*, Kuala Lumpur: Malaysian Institute for Economic Research.
- Marti, C. (1996). Is There An East Asian Miracle? *Union Bank of Switzerland Economic Research Working Paper*, Zurich: Switzerland.
- Mathur, S.K. (2006). Growth Accounting for Some Developed, Developing and Newly Industrailized Countries: from 1966 to 2000: A Data Envelopment Analysis. *Journal of European Economy*, Vol. 4, No. 4, December 2005. Ternopil Economic University.
- Menon, J. (1998). Total Factor Productivity Growth in Foreign and Domestic Firms in Malaysian Manufacturing. *Journal of Asian Economics*, Vol. 9, No. 2, 251-280.
- Moon, Hee-Wha, Jo, Byung-Tahk, Whang, Ihn-Ho, and Kim, Kyung-Buhm (1991). *Total Factor Productivity in Korea: An Analysis of 27 Manufacturing Industries*. Seoul: Korea Productivity Center.
- Morrison, C.J. (1990). Decisions of firms and productivity growth with fixed input constraints: an empirical comparison of U.S. and Japanese manufacturing. In Hulten, C.R. (Ed.). *Productivity Growth in Japan and the United States*. Chicago and London: University of Chicago Press.
- Nadiri M. Ishaq (1970). Some Approaches to the Theory and Measurement of Total Factor Productivity: A Survey. *The Journal of Economic Literature*, Volume 8, No. 4 (December), 1137-1177.
- Nadiri, I. & Kim, S. (1996a). R&D, Production Structure and Productivity Growth: A Comparison of the US, Japanese and Korean Manufacturing Sectors. *NBER Working Paper 5506*, Cambridge, Massachusetts: National Bureau of Economic Research (March).
- Nadiri, I. & Kim, (1996b). International R&D Spillovers, Trade and Productivity in Major OECD Countries. *NBER Working paper 5801*, Cambridge, Massachusetts: National Bureau of Economic Research (March).

- Nadiri, I. & Son, W. (1998). Sources of Growth in East Asian Economies. In Tsu Tan Fu, Cliff J. Huang and C.A. Knox Lovell (Eds.) (1999). *Economic Efficiency and Productivity Growth in the Asia-Pacific Region*. UK: Edward Elgar Publishing, Institute of Economics, Academia Sinica Taiwan, 43-65.
- Nakajima, T., Nakamura, M. & Yoshioka, K. (1998). An index number method for estimating scale economies and technical progress using time-series of cross-section data: sources of total factor productivity growth for Japanese manufacturing, 1964-1988'. *Japanese Economic Review*, Vol. 49, No. 3, 310-334.
- Nakajima, T., Nomura, K. & Matsuura, T. (2004). National Report on Japan. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 168-183.
- Nehru, V. & Dhareshwar, A. (1994). New Estimates of Total Factor Productivity Growth for Developing and Industrial Countries. *World Bank Policy Research Working Paper* No. 1313.
- Nehru, V. & Dhareshwar, A. (1993). A New Database on Physical Capital Stock: Sources, Methodology and Results. *Rivista de Analisis Economico*, Vol. 8, No. 1, 37-59.
- Nelson, R. (1964). Aggregate Production Functions and Medium-Range Growth Projections. *The American Economic Review*, Vol. 54, No. 5: 575-606.
- Nelson, R. (1981). Research on Productivity Growth and Productivity Differences: Dead Ends and New Departures. *Journal of Economic Literature*, Volume 19, No. 3 (September), 1029-1064.
- Nelson, R. & Pack, H. (1995). *The Asian Miracle and Modern Growth Theory*, unpublished paper, Columbia University and Pennsylvania University, September.
- Nishimizu, M. & Page, J.M. (1982). Total Factor Productivity Growth, Technological Progress and Technical Efficiency Change: Dimensions of Productivity Change in Yugoslavia, 1965-78. *The Economic Journal*, Vol. 92, No. 368 (December), 920-936.
- Nordhaus, William D. (2001). Alternative Methods for Measuring Productivity Growth. *NBER Working Paper* No. 8095 (January).
- Norsworthy, J.R. & Malmquist, D.H. (1983). Input measurement and productivity growth in Japanese and U.S. manufacturing. *The American Economic Review*, vol. 73, No. 5, 947-967.
- Oguchi, N. (2004). Integrated Report. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 3-29.
- Oguchi, N., Nor Aini M.A., Bakar, Z., Abidin, R.Z., & Shafii, M. (2002). Productivity of Foreign and Domestic Firms in the Malaysian Manufacturing Industry. *Asian Economic Journal*, Vol. 16, No.3, 215-228.
- Okamoto, Y. (1994). Impact of Trade and FDI Liberalization Policies on the Malaysian Economy. *The Developing Economies*, Vol. 32, No. 460-478.
- Okuda S. (1997). Industrialization policies of Korea and Taiwan and their effects on manufacturing productivity. *Developing Economies*, Vol. 35, No. 4, 358-381.
- Okuda S. (1994). Taiwan's Trade and FDI Policies and Their Effect on Productivity Growth. *Developing Economies*, Vol. 32, No. 4 (December), 423-443.

- Osada, Hiroshi (1994). Trade Liberalization and FDI Incentives in Indonesia: The Impact on Industrial Productivity. *The Developing Economies*, Vol. 32, No. 4 (December), 471-491.
- Osaka, H. (1994). Productivity Growth Analysis for Selected Asian Countries. *Asia-Pacific Development Journal*, Volume 4, Issue 2, 93-110.
- Owyong, D. & Rao, B. (1998). Total Factor Productivity Growth in the Singapore Economy: Some Econometric Estimates. *Singapore Economic Review*, Vol. 43, No. 1, 74-81.
- Pack, H. (2001). The Role of Acquisition of Foreign Technology in Taiwanese Growth. *Industrial and Corporate Change*, Volume 10, No.3, 713-734.
- Pack, H. & Page, J. Jr. (1994a). Accumulation, exports and growth in the high performing Asian economies. *Carnegie-Rochester Conference Series on Public Policy*, Volume 40, 199-236.
- Pack, H. & Page, J. Jr. (1994b). Reply to Young. *Carnegie-Rochester Conference Series on Public Policy*, Volume 40, 251-257.
- Park, J. & Ryu, H. (2003). *Role of Increasing Returns in the East Asian Economic Growth*. Department of Economics, State University of New York, Buffalo.
- Park, S. & Kwon, J. (1995). Rapid economic growth with increasing returns to scale and little or no productivity growth. *Review of Economics and Statistics*, Vo. 77, No. 2, 332-351.
- Park, S. (2002). A review of total factor productivity studies in Korea and a discussion of limits to national and corporate technology strategies. *International Journal of Technology Management*, Vol. 22, No. 5-6, 524-538.
- Patalinghug, E. (1980). Sectoral Output, Input and Productivity. *The Philippine Review of Economics and Business*, Vol. 17, No. 3 & 4, 23-54.
- Patalinghug, E. (1984). Labor Quality and Growth Accounting: The Philippines. *The Philippine Review of Economics and Business*, Vol. 21, No. 3 & 4, 201-208.
- Pavitt, K.L.R. & Soete, L. (1982). International Differences in Economic Growth and the International Location of Innovation. In H. Giersch (Ed.). *Emerging Technologies: The Consequences of Economic Growth, Structural Change and Employment*, Tubingen, Mohr, 105-133.
- Pilat, D. (1995). Comparative productivity of Korean manufacturing, 1967-1987. *Journal of Development Economics*, Vol. 46, No. 1, 123-144.
- Prasad, E. (1997). Sectoral shifts and structural change in the Japanese economy: evidence and interpretation. *Japan and the World Economy*, Vol. 9, No. 3, 293-313.
- Prescott, E. (1998). Needed: A Theory of Total Factor Productivity. *International Economic Review*, Volume 39, No. 3 (August), 525-551.
- Prichett, L. (2000). Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains. *The World Bank Economic Review No. 14*, 1: 221-250.
- Pyo, H. (1995). *Measurement of Value-Added Productivity*. Hyundai Economic Institute.
- Pyo, H., & Kwon, H-Y. (1991). Estimation of real factor input and factor productivity in Korean private sector. *Korean Economic Journal*, Vol. 30, 147-194.

- Pyo, H., Kong, B., Kwon, H. & Kim, E. (1993). *An Analysis of the Causes of Growth and Productivity by Industry for the Republic of Korea, 1970-1990*. Seoul: Korean Economic Research Institute.
- Quah, D. (1995). Empirics for Economic Growth and Convergence, London School of Economics, *Centre for Economic Performance Discussion Paper* No. 253.
- Rahmah, I. & Idris, J. (2000). Sources of Labor Productivity in Large Scale Industries in Malaysia. *Jurnal Ekonomi Malaysia*, Vol. 34, 59-75.
- Rao, V.V.B. & Lee, C. (1995). Sources of growth in the Singaporean economy and its manufacturing and service sectors. *Singapore Economic Review*, Vol. 40, No. 1, 83-115.
- Robertson, P. (1998). Growth accounting, growth theory and the East Asian miracle. *University of New South Wales Discussion Paper* 98/11.
- Robinson, J. (1971). The Measure of Capital: The End of the Controversy. *The Economic Journal*, Vol. 81, No. 323 (September), 597-602.
- Robinson, J. (1955-1956). The Production and the Theory of Capital: A Reply. *Review of Economic Studies*, Volume 23, No. 2, p. 247.
- Robinson, J. (1953-1954). The Production Function and the Theory of Capital. *Review of Economic Studies*, Vol. 21, No. 2, 81-106.
- Rodrik, D. (1997). TFPG Controversies, Institutions, and Economic Performance in East Asia. *NBER Working Paper* No. 5914 (February).
- Said, F., Said, S.M., Azhar harun & Ibrahim, A. (2003). Sources of Growth Studies in Malaysia: Methodology and Results. Faculty of Economics and Administration (FEA) *Working Paper* No. 2003-10 (September), University of Malaya.
- Sakonpan, N. (1997). *The analysis of total factor productivity growth of industries in Thailand*, Masteral thesis. Bangkok: Faculty of Economics, Chulalongkorn University.
- Sanchez, A. (1983). *Philippine Capital Stock Measurement and Total Factor Productivity Analysis*. PhD dissertation. University of the Philippines, Manila.
- Sarel, M. (1997). Growth and Productivity in ASEAN Countries. *IMF Working Paper* 97/97.
- Sarel, M. (1996). Growth in East Asia: What We Can and What We Cannot Infer. International Monetary Fund *Economic Issues* 1 (September).
- Sargent, T. & Rodriguez, E. (2001). Labor or Total Factor Productivity: Do We Need to Choose? *Department of Finance Working Paper 2001-04*, Economic Studies and Policy Analysis Division, Economic and Fiscal Policy Branch, Department of Finance, Ottawa, Canada.
- Sato, K. (2002). From fast to last: the Japanese economy in the 1990s. *Journal of Asian Economics*, Vol. 13, No. 2, 213-235.
- Sengupta, J. (2000). *Dynamic and Stochastic Efficiency Analysis: Economics of Data Envelopment Analysis*. Singapore, World Scientific.
- Sengupta, J. (1995). *Dynamics of Data Envelopment Analysis: Theory of Systems Efficiency*. Massachusetts: Kluwer Academic Publishers.

- Senhadji, A. (1999). Sources of Economic Growth: An Extensive Growth Accounting Exercise. *IMF Working Paper* WP/99/77, June. Washington, D.C.: International Monetary Fund.
- Sigit, H. (2004). National Report on Indonesia. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 98-133.
- Singh, N. & Trieu, H. (1996). *Total Factor Productivity Growth in Japan, South Korea and Taiwan*. University of California Santa Cruz.
- Solow, R. (1956). A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*, Vol. 70, 65-94.
- Solow, R. (1957). Technical Progress and the Aggregate Production Function, *Review of Economics and Statistics*, vol. 39, 312-320.
- Solow, R. (1970). *Growth Theory: An Exposition*, New York: Oxford University Press.
- Stiglitz, J. (1998). Sound Finance and Sustainable Development in Asia. *Keynote Address to the Asia Development Forum*. Manila: Philippines, 12 March.
- Sudit, E. & Finger, N. (1981). Methodological Issues in Aggregate Productivity Analysis. In Ali Dogramaci and Nabil R. Adam (Eds.) *Aggregate and Industry-Level Productivity Analyses*, Martinus Nijhoff Publishing, 7-30.
- Sun, C. (2004a). Market Imperfection and Productivity Growth—Alternative Estimates for Taiwan. *Journal of Productivity Analysis*, Vol. 22, 5-27.
- Sun, C. (2004b). *Total Factor Productivity Growth and Market Imperfection in Taiwan's Manufacturing Industries*. Taiwan: Department of Economics, National Chung Cheng University.
- Sun, C. (2005). Productivity Growth in East Asian Manufacturing: A Fading Miracle or Measurement Problem? *Journal of International Development*, Volume 17, 1-19.
- Tcha, M. (2004). Changing Patterns in Production and Trade in Korea: Findings and Implication. Korea Development Institute. Paper prepared for the 33rd KDI Anniversary Conference on Industrial Dynamism and Competitiveness in the East Asian Economies. Seoul.
- Tee, K. & Peter, W. (1995). Introduction. *Singapore Economic Review*, Volume 40, No. 1, 1-2.
- ten Raa, T. & Mohnen, P. (2000). *Neoclassical Growth Accounting and Frontier Analysis: A Synthesis*. Center for Economic Research (CentER), Netherlands: Tilburg University
- Tham, S. (1998). Productivity and Competitiveness of Malaysian Manufacturing Sector. In Soon, L.Y. & N. Shyamala (Eds.) *The Seventh Malaysia Plan: Productivity for Sustainable Development*. Kuala Lumpur: University Malaya Press.
- Tham, S. (1995). Productivity, Growth and Development in Malaysia. *Singapore Economic Review*, Vol. 40, No. 1, 41-63.
- Thanassoulis, E. (2001). *Introduction to the Theory and Application of Data Envelopment Analysis*. Massachusetts: Kluwer Academic Publishers.
- Thangavelu, S.M. (2004). National Report on Singapore. *Total Factor Productivity Growth Survey Report 2001/2002*. Tokyo: Asian Productivity Organization, 280-296.

- Thangavelu, S.M. & Rao, B. (1999), TFP Growth in the Electronics Industry of Singapore. Singapore Economic Review, Vol.. 44, No. 2, 56-68.
- Thomas, V. & Wang, Y. (1993). *Government Policy and Productivity Growth: Is East Asia an Exception?* Washington, D.C.: World Bank.
- Timmer, M. (1999a). Indonesia's Ascent on the Technology Ladder: Capital Stock and Total Factor Productivity in Indonesian Manufacturing, 1975-95. *Bulletin of Indonesian Economic Studies*, Vol. 35, No. 1 (April), 75-97.
- Timmer, M. (1999b). *The Dynamics of Asian Manufacturing: a comparative perspective*. Eindhoven: Technische Universiteit Eindhoven.
- Timmer, M. & Los, B. (2002). Localized Innovation and Productivity Growth in Asia: An Intertemporal DEA Approach. *Journal in Productivity Analysis*, 23: 47-64. Springer Science + Business Media, Inc.
- Tinakorn, P. & Sussangkarn, C. (1998). *Total Factor Productivity Growth in Thailand: 1980-1995*. Bangkok: Thailand Development Research Institution.
- Toh, M. & Low, L. (1996). Differential Total Factor Productivity in the Four Dragons: The Singapore Case. *Journal of International Trade and Economic Development*, Volume 5, Issue 2, 161-181.
- Tsao, Y. (1985). Growth without Productivity: Singapore Manufacturing in the 1970s. *Journal of Development Economics*, Volume 19, Issues 1-2, September –October, 25-38.
- Urata, S. & Yokota, K. (1994). Trade Liberalization and Productivity Growth in Thailand. *The Developing Economies*, Vol. 32, No. 4 (December), 444-459.
- Van, P. H. (2004). *One Industry at a Time: Evidence of Induced Technical Gains in the East Asian Countries*. Department of Economics, University of Missouri, Columbia.
- Verspagen, B. (1993). *Uneven Growth between Interdependent Economies: An Evolutionary View on Technology Gaps, Trade and Growth*, Aldershot: Avery.
- Verspagen, B. (1991). Competitiveness and Growth Rate Differentials: A Multi-Sector Evolutionary Model, *Maastricht Economic Research Institute on Innovation and Technology Paper* 91007.
- Voon, J. P. & Chen, E. (2003). Contributions of capital stock quality improvement to economic growth: the case of Hong Kong. *Journal of Asian Economics*, Vol. 14, 631-644.
- Westphal, L. (1990). Industrial Policy in an Export-Propelled Economy: Lessons from South Korea's Experience. *The Journal of Economic Perspectives*, Vol. 4, No. 3, 41-59.
- Westphal, L.E., Kim, L. & Dahlman, C. (1985). Reflections on the Republic of Korea's Acquisition of Technological Capability. In N. Rosenberg & C. Frischak (Eds.). *International Transfer of Technology: Concepts, Measures and Comparisons*. New York: Praeger, 167-221.
- Wiboonchutikula, P. (1982). *Total factor productivity growth of the manufacturing industries in Thailand, 1963-1976*. Ph.D. dissertation. University of Minnesota.
- Widiyanto, I. (2004). *Essays on Growth, Productivity and the Oil Industry in Indonesia*. PhD Dissertation. Canada: Dalhousie University.

- Williamson, J. & Sicut, G. (1968). Technical Change and the Resource Allocation in Philippine Manufacturing, 1957-1965. *Institute of Economic Development and Research Discussion Paper* No. 68-21.
- Williamson, J. (1969). Dimensions of Postwar Philippine Economic Progress. *Quarterly Journal of Economics*, Vol. 83, No. 1, pp. 93-109.
- Wilson, P. (1995). Sources of Economic Growth and Development in ASEAN: Closing and Summing Up. *Singapore Economic Review*, Vol. 40, No. 2.
- Wolff, E.N. (1996). The Productivity Slowdown: The Culprit at Last? Follow-up on Hulten and Wolff. *The American Economic Review*, Vol. 86, No. 5 (December), 1239-52.
- Wong, F. & Gan, W. (1994). Total factor productivity growth in the Singapore manufacturing industries during the 1980's. *Journal of Asian Economics*, Volume 5, Issue 2, Summer, 177-196.
- Wu, F. & Ping, T. (2002). Total Factor productivity with Singaporean Characteristics: Adjusting for Impact of Housing Investment and Foreign Workers. *Economic Survey of Singapore* Third Quarter, 45-55.
- Yamagata, T. (2000). Procyclical Productivity and Returns-to-Scale in Philippine Manufacturing. *Asian Economic Journal*, Vol. 14, No. 4, 389-414.
- Young, A. (1998a). Alternative Estimates of Productivity Growth in the NICs: A Comment on the Findings of Chang-Tai Hsieh. *NBER Working Paper* 6657, July.
- Young, A. (1998b). *Paasche vs. Laspeyres: The Elasticity of Substitution and Bias in Measures of TFP Growth*, manuscript, 1998.
- Young, A. (1995). The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience. *Quarterly Journal of Economics*, 110 (3), 641-80.
- Young, A. (1994a). Lessons from the East Asian NICs: A Contrarian View. *European Economic Review*, 38, 964-73.
- Young, A. (1994b). Accumulation, exports, and growth in the high performing Asian economies: A comment. *Carnegie-Rochester Conference Series on Public Policy*, Volume 40, 237-250.
- Young, A. (1992). A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore. In O.J. Blanchard & S. Fischer (Eds.). *NBER Macroeconomics Annual* 1992, Cambridge: MIT Press.
- Yuhn, K. & Kwon, J.K. (2000). Economic growth and productivity: A case study of South Korea. *Applied Economics*, Vol. 32, No. 1, 13-23.
- Zarina, Z.A. & Shariman, A. (1994). Growth, Inflation and Potential Output. *Central Bank Discussion Paper* 33, Kuala Lumpur, Malaysia.
- Zulaifah, O. & Maisom, A. (2001). Pattern of Total Factor Productivity Growth in Malaysian Manufacturing Industries, 1985-1995. In S.Y.Tai & R. Alias (Eds.). *Selected Readings on Economic Analysis of Industries and Natural Resources*. Serdang: University Putra Malaysia.

Part Two

Explaining the Asian Crisis: The Role of Technology

Part Two provides a survey of the theoretical and empirical debate on business cycles and applies this in the Asian context. Chapter Four surveys the theoretical landscape on the causes of economic fluctuations. It provides an overview of theories on business cycles that have evolved in the history of economic thought, describing business cycle theories in general and also the concept of long waves. The exposition then focuses on two dominant and competing explanations on economic fluctuations that have surfaced in the literature — the monetarist versus real business cycle (RBC) schools of thought. The section zeroes on RBC theories, its empirical framework, strengths and limitations in explaining economic fluctuations, and discusses also its relevance in the continuing evolution of RBC thinking into endogenous and new growth theories that attempt to achieve the same objective — the further refinement and understanding of macroeconomic dynamics. This is followed by a discussion of empirical approaches that have been used to illustrate RBC. Chapter Five discusses the debate on the structural or fundamentalist versus the contagion or panic views of the Asian crisis, including as well other explanations that have been offered such as political and social factors. It ends with the acknowledgment that the debate is mostly monetarist rather than RBC in view and sets the tone on the use of input-output analysis to incorporate or capture RBC elements in the empirics which will be expounded in part Three.

The general result...is that the fluctuations are due to disturbances in the available stock of money – the term money being taken to cover every species of purchasing power available for immediate use, both legal tender money and credit money....The special importance of money in trade fluctuations is to be attributed to the fact that all branches of commerce and industry are equally dependent...on the use of money. Whether the economic influences connected with the use of money are great or small they will at any rate be far-reaching.

Ralph George Hawtrey

Good and Bad Trade (1913), pp. 3-4.

The finding that when uncertainty in the rate of technological change is incorporated into the growth model, it displays the business cycle phenomena was both dramatic and unprecedented.....Economic fluctuations are optimal responses to uncertainty in the rate of technological change.

Edward C. Prescott

Theory Ahead of Business Cycle Measurement (1986), pp.9-10.

Chapter FOUR

The Literature on Business Cycle Theories: Monetary and Technology Shocks: Yin and Yang of Economic Fluctuations

4.1 Introduction

The literature on business cycles distinguishes between short and long economic fluctuations. The short run cycles are known as Kitchin and Juglar cycles lasting 40 months and 9-10 years, respectively. Two long cycle perspectives that have been developed are the Kondratieff waves lasting 50 years and the Kuznets swings of 20 years. The causal frameworks for business cycles of short duration are categorized into the propagation and impulse perspectives based on Frisch's (1933) terminology, distinguishing between impulses or triggers that begin a business cycle, and propagation mechanisms that perpetuate a cycle. Based on Adelman (1960), the propagation theory explains cycles as endogenously determined within the economic system via certain parameters of the multiplier-accelerator mechanism that generates these cycles repeatedly within the system. The impulse theory, in turn, attributes cycles to exogenous shocks on the economy that could be demand-driven or supply-determined. Thus, we have endogenous models of business cycles and stochastic models that deal with exogenous shocks.

Sato and Aiba (1992) provide a survey of traditional business cycle theories, where two types of theories are described. The first are theories of Hicks, Samuelson, Kalecki, Kaldor and Harrod, who consider the business cycle to be caused by demand-side factors. These theories are all based on Keynesian principles of effective demand and multiplier-accelerator mechanisms. The second type are the supply-side theories of Schumpeter and von Hayek that focus on the role of technology in generating business cycles. Schumpeter's theory will be presented at a later section while von Hayek who believed that technical substitution was caused by monetary factors during the early part of his career later viewed real wages as causing technical substitution. For Hayek, technical change meant technical substitution given an existing technology whereas Schumpeter viewed technical change as the introduction of new techniques or innovations. Arnold (2002) ascribes business cycle theories to five macroeconomic schools of thought: Keynesianism, monetarism, new classical economics, real business cycle theory and New Keynesian economics, highlighting their differences and commonalities.

According to Solomou (1998), the two leading impulses to business cycles are (i) monetary phenomenon, including exchange rate shocks on the demand side as advocated in the rational expectations school associated with Lucas (1972, 1975) and Barro (1976); and (ii) technology shocks on the supply side as emphasized in what came to be known as the real business cycle theory, based on the pioneering work of Kydland and Prescott (1982). Brunner and Meltzer (1986) also confirm that since the disclosure of the classic study of business cycle theory by Haberler (1958), there has never been a consensus among economists about the dominant cause of fluctuations in the economy with real and monetary explanations competing.

The same dichotomy between monetary business cycle models and real or technological business cycle models are found in Hartley, Hoover and Salyer (1998), and Cooley (1995). Dow (1998) accounted for short-term output fluctuations as driven by demand, and in this sense is Keynesian, as against supply disturbances which have theoretical foundations from the new classical macroeconomics and its successor the real business cycle (RBC) theory. For purposes of definition then, a real business cycle shock or technology shock shall refer to a shock that shifts the production function whereas a demand-side shock are shocks to the economy resulting from government monetary (including fiscal policies) to influence the state of aggregate demand in the economy.

There are other demand side shocks that might prevail, such as changes in consumer tastes (fashion), export volumes and terms of trade; and other supply side shocks such as weather disturbances that affect agricultural output, but the case for these shocks, save for export volumes and terms of trade shocks are less compelling so these will not be addressed. As for export volumes and terms of trade, exchange rate shocks which capture both are subsumed under monetary shocks.

4.2 Monetary Business Cycles: *Money is the Root of All Evil*

The pure monetary approach to the business cycle is associated with Hawtrey (1913) and Hawtrey & Pigou (1929) who proposed that all changes in the level of economic activity resulted from variations in the flow of funds. When money supply grows, prices rise, profits increase and real output expands. When money supply contracts, prices fall, profits decline or losses are incurred, business failures rise, and unemployment increases and real output drops. The main factor affecting money supply is the credit mechanism because it is the ease or tightness of credit that causes fluctuations in the money supply.

Another monetary cycle theory is the monetary overinvestment phenomenon attributed to Hayek (1933). In his theory, processes initiated within the monetary system cause distortions in the production process. The economy is made up of two sectors, consumption and investment goods, the balance between which defines equilibrium for the economy. This stability condition may be destabilized by changes in the money supply that affect the relationship between savings and investments. If savings out of current income precede investments, then decreased consumption merely accommodates a proportional increase in investment spending, leaving prices and total employment unchanged even as productive resources are shifted from the production of consumer to investment goods. On the other hand, if investments precede savings, the expansion of credit produces an imbalance between the two sectors, with production of investment goods expanding while consumption goods growing at a constant rate. Whether the economy is at full employment or not will define the turning points of the business cycle.

In modern business cycle analysis, two theories predominate about how monetary flows affect the business cycle. In one case, business cycles based on monetary shocks are explained as the reaction

of workers and producers to expectational errors induced by monetary policy. The theoretical notion is that random monetary shocks create 'noise' in the system, which confuses rational agents as to their choices over work and leisure and over consumption and investment. These agents' expectational errors were the impulses that drove the economy away from the Solovian steady state. Lucas (1975), who advocated this theory, believes that agents became confused in separating relative from absolute or aggregate price changes as a result of monetary shocks such as changes in the growth rate of money supply or in the velocity of circulation.

The second theory, with intellectual precedents from Keynes himself, explains monetary shocks as having real effects because of wage rigidities, where workers and firms enter into contracts that fix nominal wages in advance; or price rigidities, where prices do not change because of costs associated with it such as menu costs, risks and imperfect information, and uncertainty with respect to competitor's reactions to price changes.

As far as propagation is concerned, the channels by which a monetary shock could affect economic activity continually is through (i) a reduction in the money supply caused by, say a financial panic that causes the public to reduce its currency-to-deposit ratio and the banks to likewise contract their deposit-to-reserve ratios to strengthen liquidity positions; (ii) a reduction in money velocity due to an increase in the demand for money (or inducement to hoard money) on account of liquidity and solvency problems of the financial system; and (iii) a reduction in real output brought about by a debt-deflation process that leads to bankruptcies in the corporate sector (see Bordo, 1992). This is known as the monetarist approach to financial crisis, associated with Friedman and Schwartz (1963) and Cagan (1965), where banking panics were shown to aggravate the effects of a monetary shock.

Alternatively, Minsky (1977), Kindleberger (1978), Kaufman (1986) and Friedman (1986) regard financial crisis as a necessary consequence of the excesses of the previous boom and is thus, an essential part of the upper turning point of the business cycle. Their views are variations of Irving Fisher's (1933) theory that the business cycle is caused by over-indebtedness and deflation. Some exogenous event such as an invention with pervasive effects or a bumper harvest or an end of a war would provide new profitable opportunities for investment in key sectors of the economy that increases output and prices. Rising prices and the spectre of increased profits encourage greater investments and speculation for capital gain. The whole process, if financed primarily by bank loans, increases deposits and money supply, further contributing to the rise in prices. This expansion continues until a general state of over-indebtedness is reached when liquid assets of borrowers become insufficient to pay off their liabilities. Creditors will demand debtors to liquidate their assets, as the latter are unable to pay or to refinance their positions. If such 'distress selling' becomes widespread, a crisis begins and possibly a depression unless averted by monetary intervention. As bank deposits decline, deflation sets in, and with falling prices, profits are reduced, possibly leading to bankruptcies. Real economic activity falls with the decline in output and employment until widespread bankruptcy eliminates the state of over-indebtedness and reflationary monetary policy is pursued that should trigger a recovery and begin the cycle anew. Recently, Paul Krugman (1998) resurrects this approach via what he calls a "hangover theory."

A parallel development of thought characterizes the literature on long economic cycles that came to be known as the long wave debate. Long cycles focus on the cyclical evolution of economic growth with periods of high economic growth alternating with downswinging phases of slow economic growth. This is analogous to Prichett's (2000) growth episodes where growth patterns of countries are characterized by instability and volatility. The first explanations of long wave

stressed monetary factors as a key determinant. Korpinen (1985) traces the monetary model of long cycles to Kondratieff himself who was “one of the first to integrate monetary and real factors into a general long-cycle hypothesis” and to whom discovery of long waves is credited. According to Tinbergen (1981), the first explanations of long waves were based on monetary theory centering on parallel movements of prices and the stock of monetary gold, which is exogenous depending on gold discoveries, although this explanation is no longer relevant after the abandonment of the gold standard. Subsequently, the advocates of monetary explanations of long waves switched their attention to the role of monetary policy such as the substantial contraction of money supply (Friedman & Schwartz, 1963) or the rise in the cost of intermediation (Bernanke, 1983) in explaining financial crisis such as the Great Depression.

The transmission mechanism of monetary policy on the behaviour of aggregate output and generation of business cycles likewise follows a rich evolution of thought. From the classical model of Modigliani & Miller’s (1958) theory of investment where capital markets are perfect and where a firm’s financial policy and capital structure are irrelevant for monetary policy transmission, Jorgensen (1963, 1971) argued that a firm’s financial variables such as cash flow, net worth or profits should be excluded in investment equations. Firms formulate investment decisions by maximizing their market value in a neoclassical world of perfect capital markets. This implies that monetary policy affects only the asset side of a firm’s balance sheet through traditional interest rate or user cost of capital effects, inasmuch as the liability side comprised of loans and equity are perfect substitutes (i.e., firms are not financially constrained). This is known as the money view of monetary policy.

An alternative view of monetary transmission is the credit view as described in Bernanke & Blinder (1988) and Bernanke & Gertler (1995), premised on capital market imperfections which are characterized by asymmetric information, agency costs, and missing markets. Under the credit view, there were two channels of monetary transmission — the bank lending channel and the balance sheet channel. According to the bank lending channel, a monetary policy shock such as a money supply contraction led banks to cut back on their supply of loans which are used to finance investments. Bank-dependent firms therefore face higher funding costs. The balance sheet channel, on the other hand, shows that monetary policy, unlike the money view, affects a firm’s financial structure, i.e., the liability side of its balance sheet because of the existence of a wedge between external (loans) and internal (equity) funding. Hence, loans and equity are imperfect substitutes and the cost of obtaining one vis-à-vis the other will matter for the firm’s investment decision. Kaplan and Zingales (1997) proved that an increase in the wedge between internal and external funding made a firm more financially constrained. Bernanke & Blinder (1992) in turn, combines both money and credit views through the Federal Funds rate which could be a reliable indicator of future movements of real macroeconomic variables and changes in monetary policy actions that works partly through credit (bank loans) and partly through money (bank deposits).

Asymmetric information led a firm to sub-optimally invest as portrayed by two models in the literature. The first model, attributed to Stiglitz & Weiss (1981) provided an analysis of credit rationing in the loan market where underinvestment occurred when the lending rate exceeds some reservation rate of a borrower with the lowest risk. The alternative model by De Meza & Webb (1987) showed overinvestment by firms because asymmetric information caused them to finance even the marginal projects where expected returns were below the opportunity costs. Myers & Majluf (1984) applied the ideas of Stiglitz-Weiss to address the problem of equity finance and showed that firms finance investments internally first then with debt. Because of the under-pricing

of equity resulting from asymmetric information, a firm underinvests even if a project's discounted future stream of profits is positive. Such prioritization has been known as the 'pecking-order' or 'finance hierarchy' theory. This idea that investments are only sensitive to internal funds when there are financial constraints led to models that measure internal sources of financing to classify firms by the extent of their financial constraint. Hubbard, Kashyap & Whited (1995) used cash flow as a criteria for financial constraint; Fazzari, Hubbard & Petersen (1988, 1993) used dividend pay-out ratios; Chirinko & Schaller (1995) used age of firms; Gertler & Gilchrist (1994) used firm size; while membership or aggrupation with a conglomerate or networks within conglomerates were used by Fohlin (1998); Hoshi, Kashyap & Scharfstein (1991); Van Ees & Garretsen (1994); Siregar (1995); and Hermes & Lensink (1998). Finally, Greenwald & Stiglitz (1993) developed a simple model of business cycles resulting from financial market imperfections, such as those generated by asymmetric information.

4.3 Real Business Cycles: *The Dark Side of Technology*

The alternative theory posed by the real business cycle school is that technology shocks provide the impulse to business cycles, i.e., technological change would have real effects. It was Karl Marx (1867) in his *Das Kapital* who first observed the phenomenon of technological unemployment creating a reserve army of the unemployed as a stage in his law of motion of capitalism as firms appropriated more profits to investment in machinery and equipment. This capital accumulation process not only displaces labor which is the source of value creation but induces a fall in profits that causes widespread bankruptcies.

Hansen & Prescott (1993) described real business cycle theory as determining statistical properties of macroeconomic fluctuations induced by technology shocks. A technological shock leads firms to invest in new capital in order to raise future output, but this process entails a considerable gestation lag in the tradition of the Kaleckian model of the business cycle according to Asada (1994). It is this 'time to build' in the terminology of Kyland & Prescott (1982), that contributes to the persistence of fluctuations. In contrast to the monetarist propagation of economic fluctuations, technology shocks in the real business cycle school are shown to be propagated by the introduction of a time-to-build feature in investment and by allowing leisure to be a durable good (see Altug, 1989). Aiyagari (1994) cautions that the RBC approach though misses quantitatively important sources of fluctuations other than those arising from the determinants.

Campbell (1997) provided new evidence that shocks to embodied technological change are a significant source of economic fluctuations in the U.S. economy. Using a vintage capital model where technological progress is embodied in new factories, he found that a persistent improvement to embodied technology induced obsolete plants to cease production and cause exits to rise, and hence output to fall. As entering factories embodying the new technology later become operational, both output and productivity begin to rise. Thus, the entry rate co-varied positively with current output and total factor productivity growth (e.g., was pro-cyclical) while the exit rate was positively correlated to future productivity and output growth, hence, was countercyclical.

In a more recent work, Helpman & Rangel (1998), examined how a new technology could trigger a recession even when it raises output in the long term through their effects on the labour market. In their model, the two main determinants of whether a boom or cycle occurs as a result of new technology are experience and learning acquired by working with a new technology and knowledge that is acquired via education and training. Output declines with the arrival of a new technology when an inexperienced worker is more productive with the old technology so that a

recession becomes unavoidable. Recessions could also be triggered when experienced workers with an old technology switch (called the switching effect) from the old to the new sector, causing productivity to rise faster as experience is gained in the new sector. There is likewise an entry effect of schooling requirement needed to operate a new technology: a technology-skill complementarity exists whenever the schooling requirement is larger for the new technology and conversely, a technology-skill substitutability when it is larger for the old technology. In the case of the former, a negative entry effect is induced as workers employed in the old sector who choose to switch to the new technology will have to upgrade their skills via schooling, thus not producing during their training period and hence, resulting in output decline. In the case of the latter, there is a positive entry effect into the labour force as students leave schools earlier than expected with the arrival of the new technology but output in the short-run does not increase because of a negative switching effect.

If a technological shock would impact on the growth of an economy, the caveat here is that the technology must be characterized as one of pervasiveness in that it is used in a wide and expanding range of sectors and industries in the economy. Breshanan and Trajtenberg (1995) call this technology a general-purpose technology (GPT). In addition to pervasiveness or diverse applicability across sectors, a GPT must possess generality of purpose or wide variety of uses. A third necessary but not sufficient condition is scope for further improvement in a GPT so that its application in a wide variety of uses entails an evolution of sorts in incremental improvements to the original technology. A fourth defining feature is technological complementarities that refer to changes or reorganizations in some other technology systems that cooperate with the main technology. Lipsey, Bekar & Carlaw (1998) introduced another type of complementarity that is of the Hicksian type. This refers to changes in the demand for other inputs in response to a reduction in the price of one particular input as a result of technological change.

Aghion & Howitt (1998) adapted their original 1992 model to general-purpose technologies to show a dynamics that produces business cycles. The arrival of a GPT induces firms to invest in the development of an intermediate input during which labour is drawn from manufacturing into R&D, causing real output to drop since R&D is undervalued in the national accounts. In the first phase, a distinction was further made between skilled and unskilled labour, where the former is used more intensively in the implementation of the new GPT that produces a productivity slowdown and differences in relative wages between the two types of labour. The introduction of the new GPT will also cause some costly search in the labour market that results in frictional unemployment. Moreover, capital obsolescence associated with the wave of secondary innovations would induce a decline in output. Once the input has been developed the economy moves to a second phase where output grows as the new technology is implemented and all firms of the final output use the intermediate input along with the GPT.

Helpman & Trajtenberg (1998) developed a GPT-based growth model to demonstrate the macroeconomic effects of a GPT in the sense of generating cycles with the arrival of a GPT. Borrowing from Kydland & Prescott's 'time to build' terminology, Helpman & Trajtenberg discuss the growth dynamics of this model in terms of a 'time to sow and a time to reap'. In the first phase of a cycle when a GPT is introduced, there is a slump in output growth and productivity, stagnation in real wages and decline in profit shares, as the old GPT is used to manufacture final output and R&D is invested in developing components for the new GPT. The benefits from the more advanced GPT in terms of higher output, real wages and profits are realized only in the second phase after enough complementary inputs have been developed for the new GPT. Because

the GPTs are continually introduced over time intervals, the framework generates long run cycles associated with each new and improved generation of GPTs.

The theory on long cycles shifted radically with Schumpeter's introduction of the role of innovations and technical change as the key determinant of long waves. Schumpeter (1939) hypothesized that major technological innovations tended to swarm or to cluster during periods of recession under a process called *creative destruction* where old products and processes are discarded and new ones discovered, causing the growth of leading sectors that drive the expansionary half or upswing of the business cycle. Related to this, is the notion by Mensch (1979) that major innovations tended to occur during recessionary periods when investors are more willing to invest in high-risk long-term ventures compared to periods of prosperity. Mandel (1981) argued that while bunching of innovations did occur during depressive phases of the long wave, they do not themselves cause the transition to the expansionary phase. Rather, exogenous system shocks of various sorts were needed to propel the system out of the depressive phase.

Empirical support for the existence of long waves were provided by Van Duijn (1979, 1983) and Kleinknecht (1984) although other tests done by Lewis, Van Ewijk, and Beenstock as noted by Solomou (1998) found evidence on the contrary. Nevertheless, in the evolution of long wave theories, contemporary researchers have followed Schumpeter's path of seeking explanations outside the monetary sphere. Van Duijn (1983) and Delbeke (1984), for instance, provide a convenient typology or classification of these new theories according to (i) the role of capital (Mandel and Forrester); (ii) the role of labour (Freeman); and (iii) the role of raw materials and foodstuffs (Rostow) as crucial explanatory variables. But these, in the final reckoning, just split the production function to the various inputs as determinants of growth and its deviation from a steady path.

Freeman (1987) and Perez (2009) introduced the concept of techno-economic paradigms which are technological revolutions that define these long waves. Both authors along with Soete (1987) identify one of these technological revolutions which are akin to general purpose technologies to information and communication technologies.

4.4 The Bullwhip Effect

The *bullwhip effect* is an occurrence also known as whiplash effect, or whipsaw effect although bullwhip is the most used term according to Ertek & Eryilmaz (2008) which refers to information distortion in the supply chain (shown in Figure 4.1) that causes higher variances in order quantities and inventory levels in upstream stages compared to downstream stages. Due to brisk competition in the global business environment, firms attempt to increase productivity and reduce problems in their supply chain systems instead of coordinating the state of the whole chain based on global information.

Forrester (1961) was the first to recognize the phenomenon using industrial dynamics to depict the amplification in orders and sales that is why it is sometimes called the Forrester effect. In the 1960s, the phenomenon was tested at the Massachusetts Institute of Technology (MIT) in an experiment called the beer distribution game (Sternan, 1989). According to Lee, Padmanabhan & Whang (1997), the bullwhip effect refers to a trend where orders to the supplier are likely to be more volatile than sales to the buyer leading to inaccurate demand which amplifies from the customer to the manufacturer, with heavy cost implications in terms of excess raw materials inventory due to unplanned purchases of supplies, excessive manufacturing costs arising from excessive production, inefficient plant utilization and overtime, excessive warehousing and storage

costs, and extra transportation costs due to inefficient scheduling at higher shipping rates. The outcome is that the supplier and manufacturer are the most affected by business cycles as they end up with excess inventories during times of recession or shortages during times of boom.

Figure 4.1
Information Flows along Supply Chain

Source: Adapted from Metters (1997).

The Forrester or bullwhip effect occurs when demand is based on recent orders, new supply is unlimited with a reliable delivery time, costs involved in placing the orders are minimal, and the purchasing costs stay fixed for a while. Firms must forecast demand to correctly position resources and stocks because clients' orders are hardly consistent. Firms always carry extra stock for safety because orders are usually estimates. Raw material suppliers are likewise aware of the need for safety stock. Normally, when demand decreases, orders are reduced leading to a reduction in stock. Conversely, an increase in demand will lead to an increase in orders thereby requiring replenishment of stocks. The outcome is that variations increase as activities shift up the supply chain from the customer to the manufacturer / raw material supplier with the end result that the last participant upstream ends up with unsold and unneeded buffer stocks. Since the oscillating demand magnifies as one moves upstream in the supply chain, the irregularities in the orders resemble a cracking whip as shown in Figure 4.3, hence the bullwhip effect.

Figure 4.2
The Bullwhip Effect

Source: Adapted from https://en.wikipedia.org/wiki/Bullwhip_effect.

A number of researches have been conducted tracing the causes of the bullwhip effect, as in Lee et al. (1997), Chen, Drezner, Ryan & Simchi-Levi (2000), Ertek & Eryilmaz (2008), Khan & Ekta (2016), Geary, Disney & Towill (2003), Alizadeh (2012) and Moll (2013). The causes of the bullwhip effect are categorized into operational and behavioural reasons (Tuma-Doh, 2014). Operational causes include (a) demand processing that relies on forecast errors, (b) lead time inconsistency, (c) batch ordering; d) quantity reductions, (e) trade publicity and buying in excess of demand, (f) expected shortages arising from product distribution rule of suppliers, shortage gaming (customers ordering more than they need), lean and Just In Time (JIN) style of managing inventories and chase production strategies. Behavioural causes include; (a) mismanagement of base-stock policies, (b) misunderstanding of information that requires action, and (c) nervous orders as a response to unrealized demand.

Recent studies by Chen et al. (2000); Lee et al. (1997); Metters (1997); Cachon, Randall & Schmidt (2007); Disney & Towill (2003), Croson & Donohue (2006); Chatfield, Kim, Harrison & Hayya (2009); Cantor & Katok (2012); Tanweer, Li, Duan & Song (2014); Li (2013); Parra, Mula & Campuzano-Bolarin (2012); Moll (2013); Alizadeh (2012); Buchmeister, Friscic & Palcic (2014); Warburton (2004), McCullen & Towill (2002) and Oliva & Gonçalves (2005) focused on quantifying the bullwhip effect applying different methods and modelling techniques and searching for optimal solutions for the phenomenon.

Lee et al. (2004), Ertek & Eryilmaz (2008), Wang & Disney (2015), Khan & Ekta (2016), and Alizadeh (2012) focus four major operational reasons for the bullwhip effect. The first of these is *order batching* which refers to supply chain managers not placing orders as soon as demand is made but allowing the orders to build up based on their order rules. A company orders large quantity of goods in one month and does not order for five weeks or more after to take advantage of supplier discounts or lower transportation cost. The effect of batch ordering is that the manufacturer will notice a large order followed by no orders for a long time and then another large order and so on such that future demand forecasts are based on orders instead of sales.

The second reason is *price fluctuations due to sales promotion* where supply chain actors like distributors and retailers offer refunds, price reductions, vouchers, that lead to price variability. Consequently, customers purchase larger quantities than they actually need and stop purchases until stocks of the product are exhausted. The customer's purchasing sequences does not reveal its consumption pattern.

A third reason is *demand signal processing and non-zero lead times* where supply chain participants use the demand information from their own narrow clientele to generate their own forecast, e.g., the raw materials supplier bases demand on manufacturer's orders, manufacturer's orders are based on retailer orders, and so on. If the supplier makes his forecast based on the retailers' demand, the fluctuation in the suppliers' demand will be higher than the retailers' demand. As a result, demand distortion spreads up the supply chain. Prolonged lead time intensifies the situation since the longer the lead time, the safety inventory kept becomes higher. Thus, the variability becomes higher when the resupply period for items along the supply chain is longer.

The fourth reason is *shortage gaming and rationing* which involves supply chain actors allocating the supply of the product to satisfy their client's orders during times of shortages so that customers would order more quantities than they usually need if availability of stocks are unlimited.

4.5 A Survey of Methodologies in Business Cycle Analysis

In the literature on business cycle empirics, the traditional emphasis of methodology focused on explaining the co-movements of aggregate time series such as output, employment, prices, income, trade and the supposed exogenous shocks used to explain the cycle as money supply or the Solow residual as a proxy for technology. Still it was believed that the central fact that needed explaining is the decline and subsequent recovery or what is known as the turning points of the cycle rather than the co-movements of a time series of indicators (see Hartley, Hoover and Salyer, 1998). The methodologies used in measuring and interpreting business cycles could be classified into: cyclical indicator approach, econometric approach comprising vector autoregression and time series decomposition using filtering techniques and spectral analysis, general equilibrium modelling, and historical case studies. These approaches are discussed below.

The Indicator Approach

The best known technique for examining the co-movements of a time series and the turning points of the business cycle is the indicator approach. This involves the development of leading, coincident and lagging sets of data expressed in index form such as diffusion or composite indices. The central idea behind this approach is to find a batch of statistical time series that (i) conform to the business cycle, and (ii) demonstrate consistency in timing patterns such as leading or coincident or lagging sets of variables. Once such exercise is completed, it is simply a matter of using coincident indicators to define the turning points of the cycle, the leading indicators to forecast these points, and the lagging indicators to confirm that a cycle did happen. Because of its apparent simplicity, this approach is often disparagingly referred to as 'measuring without theory.' Popkin (1990), however, argued that the indicators are not without theoretical content although it seems that their selection is not directly structured to reflect theory.

The National Bureau of Economic Research (NBER) has used the indicator approach in a number of comprehensive studies of long time series (since the 1950s) for the United States, Great Britain, France and Germany. The NBER nonetheless had focused more on the study of business cycles in developed countries, as could be gleaned from such historical compilations of NBER's work on business cycle analysis done by Klein (1990), Zarnowitz (1985, 1992), and Stock & Watson (1993). Scanty work has been done on business cycles in Asia but Osada & Hiratsuka (1991) prepared one path-breaking study. Their study was essentially a survey of the cyclical indicator methodology in relation to a project called Short-term Economic Prediction in Asia (SEPIA) for the Institute of Developing Economies (IDE) in Tokyo. In this project, diffusion indices were constructed from circa 1970s to mid-1980s for seven Asian economies, five of which happen to be the crisis economies²⁷. Extension of this series up until the time of the crisis might be a good starting point for this study. The suggested approach is to expand the indicators used in the index to include technology indicators, as many of the monetary indicators are already covered. It is expected a priori that inclusion of technology indicators should be relevant as leading indices to warrant that a technology shock could have triggered the Asian crisis.

The Econometric Approach

Another widely used approach for analyzing business cycles is the econometric approach. This involves model building or the specification of equations that describe the structure of an economy.

²⁷ The other two countries are Singapore and India.

Among the various econometric methods, those typically used in business cycle analysis are vector autoregression, and detrending, filtering, and spectral analysis.

a) Vector Autoregression

Vector autoregression or VAR involves the specification of a system of equations in which each variable is a function of past values of all other variables as well as of its own past values. This econometric technique is used to analyze Granger causality in the economic system and the adjustment path of specific shocks. A variable x is said to 'Granger-cause' another variable y if past values of x explain the current value of y . Bergstrom & Vredin (1994) illustrate the procedures involved in VAR analysis as applied to business cycle empirics. Based on their description, underlying a VAR model is a structural model expressed by $x_t = \beta(0)x_t + \beta(L)x_t + \varphi_t$ where x is a vector of n observable variables, φ is a vector of stochastic impulses or shocks driving the model, $\beta(0)$ is a coefficient matrix of contemporaneous relations, and $\beta(L)$ is a matrix of lag polynomials defined by $\beta(L) = \sum_{j=1}^p \beta_j L_j$, with L as the lag operator (i.e., $L_j x_t = x_{t-j}$).

The VAR approach is different from conventional econometric models in that (i) all variables are treated symmetrically, implying they are all endogenous, except for the stochastic shocks which are exogenous; and (ii) the system of equations is emphasized rather than individual equations so that one could not identify specific equations such as supply or demand equations. The VAR model is thus characterized in terms of 'impulse response functions' that trace the effects on each variable of shocks to the system. If the aim of the structural model is to disentangle the impacts of distinct shocks, then the model is identified in such a way that the shocks are uncorrelated, i.e., that $E(\varphi\varphi')$ is diagonal.

The VAR reduced form model corresponding to the structural model is: $\pi(L)x_t = \varepsilon_t$ where ε is the vector of residuals in the VAR model, and $\pi(L)$ is a matrix of lag polynomials. It is thus straightforward to use estimates of this reduced form VAR model to evaluate how impulses ε are propagated through the model. The results from vector autoregressions could be presented by decomposing the variance of the forecast error at various periods into the contributions from different shocks.

This decomposition provides a measure of the importance of each shock, which in turn depends on the variance of the shocks and the propagation mechanism of the model. Bernanke (1986), to investigate the correlation between money and income using a credit shock and a real business cycle shock, used a VAR approach to the study of business cycles. Bayoumi & Eichengreen (1996) also used a VAR model to decompose supply and demand shocks for the USA, Britain, Sweden, Denmark and Australia, and concluded that both shocks were comparably important during the period 1919-1938. Similarly, Cecchetti & Karras (1994) used the same approach to show that while demand shocks predominated before 1931, supply-side shocks became more prevalent after the Great Depression. Canova, Finn & Pagan (1994) used a restricted VAR model to evaluate the real business cycle framework.

b) Time Series Decomposition, Filtering and Spectral Analysis

Decomposing a time series is a statistical process of removing in a given time series, y , a trend component, a cyclical component, a seasonal component and an irregular component also called

noise. When annual data is used as is the case with business cycle analysis, the seasonal component could be dropped, so schematically, the decomposition of the time series is expressed as:

$$y = \text{trend} + \text{cycle} + \text{noise}.$$

Filtering a time series is one method of decomposing a series into these elements by measuring co-movements of macroeconomic variables in the time and frequency domains.

The time domain method measures co-movements by comparing cross-correlation coefficients between different variables and an index of the cycle, typically the GDP at various leads and lags. Hassler, Lundvik, Perrson & Soderlind (1994) defined a decision rule that when a variable is procyclical (countercyclical), it should show a predominantly positive (negative) and statistically significant correlation coefficient. Otherwise, the variable is acyclical. If the correlation coefficients display (do not display) a pronounced peak, then the variable depicts cyclical (non-cyclical) behavior. If such a peak is attained when the variable is lagged (led) relative to GDP, then the variable is referred to as leading (lagging) the reference variable.

The frequency domain, in turn, measures the co-movement of two variables x and y through a statistic called coherence: $C^{xy}(\omega)$, which is defined as the absolute value of a frequency-specific correlation coefficient. Its squared value is similar to the measure of R^2 in regression analysis, where it yields the proportion of variance in either x or y that could be explained by regressing one variable linearly against the other at frequency ω . Thus, coherence assumes a value between 0 and 1, where a high value of coherence between a given variable and GDP at a certain business cycle frequency, is taken to signal cyclical co-movement. Coherence, however, does not say anything about the sign of the relation between two variables, and unlike the time domain method, does not reflect lead-lag relationships. One frequency domain statistic that does this is the phase statistic of x with respect to y at frequency ω , given as $P^{xy}(\omega)$. It measures the lead of x over y in terms of the length of the cycle corresponding to ω , and assumes a value between $-\pi$ and $+\pi$ where a full cycle is equal to 2π . A positive (negative) value denotes that x is leading (lagging) y while a value of the phase close to either $-\pi$ and $+\pi$ is taken to mean that the variable is countercyclical, a value close to zero implies it is pro-cyclical.

Filtering refers to extracting the cyclical components of a given time series. Hassler, Lundvik, Perrson & Soderlind (1994) described three filtering methods commonly used by business cycle analysts and applied these techniques in a study of the Swedish business cycle. First is the band-pass filter where cyclical components of a given series are removed except those appearing within a chosen frequency band, called the pass band. For example, if a business cycle is perceived as a cyclical co-movement around a trend lasting 5 years, a pass band between 3 and 8 years is set so that in decomposing y in the decomposition equation introduced above, components with the lowest frequency would correspond to cycles lasting 8 years and more, and are therefore classified as trend of y while those with very high frequencies would correspond to 3 years or less, and are then classified as noise.

The second filtering technique is the Whittaker-Henderson filter or HP filter after Hodrick & Prescott (1980) who applied it in economic modelling. This involves decomposing a given time series into its trend and cyclical components by finding a solution to an optimization problem, where the trend component's smoothness is traded off against its ability to track the series. Given a series $x_t = y_t + g_t$ with y as the cyclical component and g the trend component, the HP filter minimizes:

$$\sum y_t^2 + \lambda \sum [(g_t - g_{t-1}) + (g_{t-1} - g_{t-2})]^2$$

where λ is the smoothness coefficient.

The third filtering technique is the first-difference filter which is simply $y_t = x_t - x_{t-1}$, which corresponds to growth rates for series expressed in logarithms.

A fourth type of filter, which is gaining ground in application, is the Kalman filter. Solomou (1998) described this approach as modelling a time series as:

$$\begin{aligned} y_t &= \mu_t + \psi_t + \varepsilon_t \\ \mu_t &= \mu_{t-1} + \beta_{t-1} + \zeta_{t-1} \\ \beta_t &= \beta_{t-1} + v_t \\ \psi_t &= [(1 - \rho \cos \lambda L)\omega_t + (\rho \sin \lambda L)\omega_t^*]/1 - 2\rho \cos \lambda L + \rho^2 L^2 \end{aligned}$$

where μ_t is the trend component of y_t ; ζ_t allows the trend to shift up and down; v_t are the shocks to the slope β_t ; ψ_t represents cyclical regularities in y_t ; L is the lag operator; ω_t are the shocks to the cyclical component; ε_t accounts for short term erratic movements and measurement errors in y_t . The parameters $\varepsilon_t, \zeta_t, v_t$ and ω_t are assumed to be mutually independent, with ω_t^* arising by construction under the constraint that $\sigma(\omega) = \sigma(\omega)^*$; λ is the frequency of the cycle and ρ is the damping factor.

Woitek (1997) illustrates the use of spectral analysis in a study of business cycles in Germany. Spectral analysis focuses on the cyclical properties of a time series by transforming the covariance function from the time domain to the frequency domain. In applying spectral analysis to a given time series, a necessary condition is stationarity of the series, which means that its mean and variance do not change over time. But most economic time series data are not stationary, following more or less a trend. Thus, before a spectrum of a series is computed, the nature of non-stationarity needs to be examined. Statistical tests used to check for stationarity of a time series include co-integration and augmented Dickey-Fuller tests. Then the series is transformed in a way so as to achieve stationarity. This transformation is called a Fourier transformation, and the result is called a spectrum. A Fourier transform of a stationary time series y expresses the series as a sum of cyclical components at different frequencies ω . The resulting spectrum of the series $S^y(\omega)$ decomposes the variance of the series by frequency so that one could interpret the spectrum as a density function where the area under $S^y(\omega)$ (called the spectral mass) between any two frequencies, ω_1 and ω_2 gives the proportion of y due to cyclical components in the frequency band (ω_1, ω_2) . In a paper by Watson (1993), spectral analysis was also used to decompose the power of the real business cycle model to match movements in output at different frequencies or time horizons.

General Equilibrium Modelling

The third approach to business cycle measurement is general equilibrium modelling. It is basically a theoretical construct of a Walrasian economic system consisting of households and firms. Each household owns endowments or resources from the sale of which, at given prices, it derives an income that determines a set of consumption bundles, from which the household chooses the most preferred one, the one that maximizes her utility given her budget constraint. Each firm is also characterized by a set of production possibilities, from which it chooses a production bundle that would maximize its profits, at given prices. An equilibrium set of prices, which the model determines, is that which matches demand and supply for each market and finally for all markets.

The equilibrium solution from the model has to be unique and stable. For uniqueness to hold, a tight assumption about the price adjustment mechanism with respect to the excess demand functions of other goods is made. This is called the property of gross substitution, which states that when the price of one good rises (falls), the excess demand for all other goods will rise (fall). The uniqueness of equilibrium is a necessary condition to compare equilibrium before and after some parameter change. The stability of equilibrium relates to the price adjustment process or what is known as the Walrasian *tatonnement* process. Equilibrium is globally stable if the price adjustment process always converges to the equilibrium. For an excess demand function z , a price adjustment process is globally convergent if it converges for any starting point to the equilibrium. Meanwhile, the price adjustment process is universally convergent for a given starting point if it converges from this starting point for every excess demand function. If the adjustment process reaches both global and universal convergence, implying that it converges from any starting point for every excess demand function, then there is effective convergence.

At the theoretical level, most general equilibrium models are generally abstract and complex while at the empirical or computational level, the models are much more simplified. The introduction of concepts and theorems at the theoretical level culminated in Debreu's (1959) *Theory of Value*, which provided a systematic account of the conditions, required for an economy to reach general equilibrium.

At the empirical level, Shoven and Whalley (1972) advanced the development of applied general equilibrium models. In the empirical testing of these models, values are assigned to the parameters rather than estimated, a process known as calibration. General equilibrium models are superior over macroeconometric models in that they have a firm microeconomic basis that allows every relation in the model to be tracked down to some behavioral or consistency rule. However, in spite of their theoretical soundness and elegance, their major drawback is the difficulty in numerically specifying the model.

A major application of applied general equilibrium models is to investigate welfare distribution under Pareto efficiency and optimality conditions. Hofkes (1991) cites the major weaknesses of general equilibrium modelling, namely its strict assumption of convexities in the production and consumption possibilities set, the static properties and absence of dynamics in the models, and the implied system of quantity rationing as an equilibrating mechanism since prices could be inflexible in the real world.

Recent developments in research on general equilibrium modelling described in Ginsburgh & Keyzer (1997) incorporate features to address these issues that include modelling with heterogeneous agents, infinite horizons, overlapping generations, externalities, non-convexities, imperfect competition, and missing markets. For instance, Cooper (1997) developed an RBC model that introduced heterogeneity and non-convexity.

Most of the business cycle models modify the equilibrium growth model such as Solow's growth model, to explain cyclical variances of a set of economic time series from a steady state path. Such approach was used in testing for the effects of monetary disturbances on the growth process by Lucas (1977, 1981, 1987), Barro (1981, 1989), and Christiano (1994); and in testing for how financial market imperfections affect business cycles by Diamond & Dybvig (1983), Bernanke & Gertler (1989), Greenwald & Stiglitz (1993), Cooley & Hansen (1995), Cooper & Corbae (1997), Bernanke, Gertler & Gilchrist (1998).

Real business cycle models, in turn, are formulated using stylized facts of long-run growth theory, particularly Solow's growth model that is an example of a general equilibrium model. Kydland & Prescott's (1982) seminal real business cycle model was in fact patterned after the Lucas monetary growth model but adapted by removing the monetary sector and introducing the Solow total factor productivity residual to identify and measure the size of technology shocks. Disciples of Kydland and Prescott likewise used the general equilibrium approach to model real business cycle phenomenon as in the works of Long & Plosser (1983), Hansen (1985), King, Plosser & Rebelo (1988), Altug (1989), Cooley & Hansen (1989), McCallum (1989), Eichenbaum (1991), Christiano & Eichenbaum (1992), Hansen & Wright (1992), Bresnahan & Trajtenberg (1995), Aulin (1996), Campbell (1997), Helpman & Rangel (1998), Goolsbee (1998), Helpman & Trajtenberg (1998), Aghion & Howitt (1998), and Harris (1998).

It should be noted that all the above methodologies are based on the exogenous approach to modelling business cycles. Slutsky (1927), Frisch (1933), and Tinbergen (1939) founded the belief that economic fluctuations were driven by exogenous random or stochastic shocks to an inherently stable economy. In the absence of these external shocks, the economy would converge to a stable equilibrium path and no persistent economic fluctuations would occur.

Extensions of the general equilibrium approach entail endogenous business cycle modelling, where the focus is on the interaction of the consumption multiplier with the investment accelerator as a cause of business cycles. Modelling business cycles endogenously started in the 1940s to 1950s by such renowned economists as Samuelson (1939), Kaldor (1940), Metzler (1941), Hicks (1950), and Goodwin (1951), with the view to search non-linear economic mechanisms that could explain observed economic fluctuations. De Vilder (1995) accounts that the exogenous approach was favored because of difficulties in analyzing non-linear endogenous models, regularities in the cycles generated by endogenous models compared with actual observations, and inconsistency of endogenous models with rational behavior as behavioral rules were not based from utility or profit maximization. Benhabib (1992) compiles together general equilibrium models of the business cycle that exhibit endogenous fluctuations and deterministic chaos. Thygesen, Velupillai, & Zambelli (1991) also collected two non-equilibrium macrodynamic models of economic fluctuations, one by Laffargue & Malgrange (1991), and another by Lorenz (1991). Semmler (1994) devoted a chapter to deal with non-linearities in the business cycle with contributions from Potter (1994), Mitnik and Niu (1994), Sayers (1994), Mizrahi (1994), and Rothman (1994). Inasmuch as this study is focused on technology and monetary factors as exogenous impulses that drive economic cyclical behaviour, these endogenous and chaotic models will not be discussed.

Historical Case Studies

A fourth approach to analyzing business cycle phenomenon is to examine historical evidence. One of the intriguing questions that have confronted business cycle analysts is whether business cycles are all alike. Some contend this to be true while others believe that each cycle has its own idiosyncrasy that warrants historical accounts of individual cycles. Dow (1998) who used this approach in his study of British recessions described it as trying to interrogate history rather than to narrate the past in order to understand why things happened as they did. When events are followed closely, one acquires an impression about the main channels of causation from a chronology or order of events, and from what affected parties say about what happened to them. While he admits that the use of such methods '*do not permit conclusions that could claim anything close to certainty*', it is possible to '*construct what seems to be a plausible and complete*

explanation, though...disputable.' He further admits that the explanation may be incomplete, speculative and insecure but the spirit of the study is not to '*strain unnaturally at complete answers but to see virtue in remaining sceptical.*' There are two advantages of historical case studies that he cites. One is permission to detail and another is confrontation with historical reality that fertilizes productive theorizing. Quantitative or empirical analysis are guaranteed to produce results but are an indirect route to truth because its starting point is theoretically inspired hypothesis from which variations are experimented upon to see which fits best stylized reality. By contrast, the explanations offered by historical accounts are generated directly from facts that could yield explanations that are even superior to existing theories. Friedman & Schwartz (1963) also employed the historical case study approach in explaining the causes of the Great Depression. Commenting on the inability of statistical association to determine causality²⁸, they remarked:

'A great merit of the examination of a wide range of qualitative evidence, so essential to monetary history, is that it provides a basis for discriminating between the possible explanations of the observed statistical covariation. We can go beyond the numbers alone and, on at least some occasions, discern the antecedent circumstances whence arose the particular movements that become so anonymous when we feed the statistics into the computer.'

4.6 Conclusion

As this study not only looks at growth episodes but fluctuations or crises as well, the survey of business cycle theories and empirics is crucial to contextualize the debate on the Asian crisis presented in the next chapter. The study aims to look into the possibility of real causes to the collapse of the Asian economies in 1997 following real business cycle theory, which in the literature survey was found to be the competing cause of crisis compared to monetary explanations. The real business cycle theory itself also bifurcates into impulse versus propagation branches of explaining shocks. Related to propagation is the bullwhip effect which investigates the cyclical sensitivity of actors in the supply chain which is relevant in the understanding of the supply-oriented model of development presented in the last chapter. Finally, the survey on the empirical techniques also reveal the popular application of econometric approaches such as vector auto-regression and time series decomposition in addition to general equilibrium modelling in business cycle empirics, setting the stage for the novelty of applying input-output techniques to the analysis of economic crisis which is the centerpiece of this study.

REFERENCES

- Adelman, I. (1960). Business Cycles – Endogenous or Stochastic, *Economic Journal*, 70, 783-796.
- Aghion, P. & Howitt, P. (1998). On the Macroeconomic Effects of Major Technological Change. In E. Helpman (Ed.) (1998), *General Purpose Technologies and Economic Growth*, Cambridge: MIT, 121-44.
- Aiyagari, S. R. (1994). On the Contribution of Technology Shocks to Business Cycles. *Federal Reserve Bank of Minneapolis Quarterly Review*, Winter, 22-34.
- Alizadeh, P. (2012). The Role of Forecasting Parameters in Reducing Bullwhip Effect. *Advances in Production Engineering and Management* 7 (3): 177-186.

²⁸ See Dow (1998), footnote on p.4.

- Altug, Sumru (1989). Time-to-build and aggregate fluctuations: Some new evidence. *International Economic Review* 30 (4), 889-920.
- Arnold, L. (2002). *Business Cycle Theory*. New York: Oxford University Press.
- Asada, T. (1994). Monetary Factors and Gestation Lag in a Kaleckian Model of the Business Cycle. In W. Semmler, (Ed.) (1994), *Business Cycles: Theory and Empirical Methods*, Boston: Kluwer. 289-310.
- Aulin, A. (1996). Causal and Stochastic Elements in Business Cycles. *Lecture Notes in Economics and Mathematical Systems*, Berlin, Springer.
- Barro, R. (1976). Rational expectations and the role of monetary policy. *Journal of Monetary Economics* 2(1), 1-32.
- Barro, R. (1981). *Money Expectations, and Business Cycles*. New York.
- Barro, R. (1989). *Modern Business Cycle Theory*, Cambridge, Harvard University Press.
- Bayoumi, T. & Eichengreen, B. (1996). The Gold Standard and the International Monetary System. In T. Bayoumi, T. B. Eichengreen & M. Taylor (Eds.), *Modern Perspectives on the Gold Standard*, Cambridge.
- Benhabib, J. (Ed.) (1992). *Cycles and Chaos in Economic Equilibrium*, Princeton University Press.
- Bernanke, B. (1983). Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression. *American Economic Review*, 73 (3), 257-76.
- Bernanke, B. (1986). Alternative Explanations of the Money-Income Correlation. In K. Brunner & A. H. Meltzer (Eds.) (1986) *Real Business Cycles, Real Exchange Rates and Actual Policies. Carnegie-Rochester Conference Series on Public Policy*, North Holland, Vol. 25, Autumn.
- Bernanke, B. & Blinder, A. (1988). Credit, Money and Aggregate Demand. *The American Economic Review Papers and Proceedings* 78 (2), May, 435-39.
- Bernanke, B. & Blinder, A. (1992). Federal Funds Rate and the Channels of Monetary Policy Transmission. *The American Economic Review* 82 (4), 901-21.
- Bernanke, B. & Gertler, M. (1989). Agency Costs, Net Worth, and Business Fluctuations. *American Economic Review* 79 (1), 14-31.
- Bernanke, B. & Gertler, M. (1995). Inside the Black Box: The Credit Channel of Monetary Policy Transmission. *Journal of Economic Perspectives* 9 (4), 27-48.
- Bernanke, B., Gertler, M. & Gilchrist, S. (1998). The Financial Accelerator in a Quantitative Business Cycle Framework. *NBER Working Paper 6455*, Cambridge, March.
- Bergstö, V. & Vredin, A. (Eds.) (1994). *Measuring and Interpreting Business Cycles*. Oxford: Clarendon Press.
- Bordo, M. (Ed.) (1992). *Financial Crisis*. Volumes I and II, England: Elgar.
- Bresnahan, T. & Trajtenberg, M. (1995). General Purpose Technologies 'Engines of Growth? *Journal of Econometrics* 65, 83-108.

- Brunner, K. & Meltzer, A. (Eds.) (1986). Real Business Cycles, Real Exchange Rates and Actual Policies, *Carnegie-Rochester Conference Series on Public Policy*, North Holland, Vol. 25, Autumn.
- Buchmeister, B., Friscic, D. & Palcic, I. (2014). Bullwhip Effect Study in a Constrained Supply Chain. *Procedia Engineering* 69: 63-71.
- Cachon, G., Randall T. & Schmidt, G. (2007). In Search of the Bullwhip Effect. *Manufacturing & Service Operations Management* 9 (4), 457-479, © 2007 INFORMS
- Cagan, P. (1965). *Determinants and Effects of Changes in the Stock of Money, 1875-1960*. New York: Columbia.
- Campbell, J. (1997). Entry, Exit, Embodied Technology, and Business Cycles. *NBER Working Paper* 5955, Cambridge.
- Canova, F., Finn, M. & Pagan, A. (1994). Evaluating a real business cycle model. In C. Hargreaves (Ed.) *Nonstationary Time Series Analysis and Cointegration*. Oxford University Press.
- Cantor, D & Katok, E. (2012). The Bullwhip Effect and Order Smoothing in a Laboratory Beergame. *Transportation Research Part E* 48: 781-794.
- Cecchetti, S. & Karras, G. (1994). Sources of Output Fluctuations During the Interwar Period: Further Evidence on the Causes of the Great Depression. *Review of Economics and Statistics*, 77, 80-102.
- Chatfield, D., Kim, J., Harrison, T. & Hayya, J. (2009). The Bullwhip Effect – Impact of Stochastic Lead Time, Information Quality, and Information Sharing: A Simulation Study. *Production and Operations Management*, 13 (4): 340-353.
- Chen, F., Drezner, Z., Ryan, J. & Simchi-Levi, D. (2000). Quantifying the Bullwhip Effect in a Simple Supply Chain: The Impact of Forecasting, Lead Times, and Information. *Management Science* 46 (3): 436-443.
- Chirinko, R.S. & Schaller, H. (1995). Why does liquidity matter in investment equations? *Journal of Money, Credit and Banking*, 27: 527-48.
- Christiano, L. (1994). Modelling the Liquidity Effect of a Money Shock. In R. Fiorito (Ed.) (1994), *Inventory, Business Cycles and Monetary Transmission*. Berlin: Springer-Verlag, 61-124.
- Christiano, L. & Eichenbaum, M. (1992). Current real business cycle theories and aggregate labor market fluctuations. *American Economic Review* 82 (3), June, 430-50.
- Cooley, T. (1995). *Frontiers of Business Cycle Research*. New Jersey: Princeton.
- Cooley, T. & Hansen, G. (1989). The inflation tax in a real business cycle model. *American Economic Review* 79 (4), September, 733-48.
- Cooley, T. & Hansen, G. (1995). Money and the business cycle. In T. Cooley (Ed.) (1995), *Frontiers of Business Cycle Research*. New Jersey: Princeton.
- Cooper, R. (1997). Business Cycles: Theory, Evidence and Implications. *NBER Working Paper* 5994, Cambridge, April.

- Cooper, R. & Corbae, D. (1997). Financial Fragility and the Great Depression. *NBER Working Paper 6094*, July.
- Croson, R. & Donohue, K. (2006). Behavioural Causes of the Bullwhip Effect and the Observed Value of Inventory Information. *Management Science* 52 (3): iv-472.
- De Meza, D. & Webb, D. (1987). Too much investment in problems of asymmetric information. *Quarterly Journal of Economics*, 102: 179-222.
- De Vilder, R. (1995). *Endogenous Business Cycles*. Amsterdam: Thesis Publishers.
- Debreu, G. (1959). *Theory of Value: An Axiomatic Analysis of Economic Equilibrium*. Yale University Press.
- Delbeke, J. (1984). Recent Long-Wave Theories: A Critical Survey. In C. Freeman (Ed.) *Long Waves in the World Economy*, London: Frances Pinter.
- Diamond, D. & Dybvig, O. (1983). Bank runs, deposit insurance and liquidity. *American Economic Review*, 55: 1126-50.
- Disney, S. & Towill, D. (2003). The effect of vendor managed inventory (VMI) dynamics on the Bullwhip Effect in supply chains. *International Journal of Production Economics* 85 (2): 199-215.
- Dow, C. (1998). *Major Recessions: Britain and the World, 1920-1995*. Oxford.
- Eichenbaum, M. (1991). Real business cycle theory: Wisdom or whimsy? *Journal of Economic Dynamics and Control* 15 (4), October, 607-26.
- Ertek, G. & Eryilmaz, E. (2008). *The bullwhip effect in supply chain: Reflections after a decade*. CELS 2008. Sweden: Jönköping.
- Fazzari, S., Hubbard, R. & Petersen, B. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, 141-95.
- Fazzari, S., Hubbard, R. & Petersen, B. (1993). Working capital and fixed investment: new evidence on financing constraints. *RAND Journal of Economics* 24, 328-41.
- Fiorito, R. (Ed.) (1994). *Inventory, Business Cycles and Monetary Transmission*. Berlin: Springer-Verlag.
- Fisher, I. (1933). The Debt-Deflation Theory of Great Depressions. *Econometrica*, I, 337-57.
- Fohlin, C. (1998). Relationship banking, liquidity, and investment in the German industrialization. *Journal of Finance*, 1737-58.
- Forrester, J.W. (1961). *Industrial Dynamics*. MIT Press.
- Freeman, C. & Soete, L. (1987). *Technical Change and Full Employment*. Oxford: Basil Blackwell.
- Freeman, C. (1987). Information Technology and Change in Techno-Economic Paradigm. In Freeman, C. & Soete, L. (1987), *Technical Change and Full Employment*. Oxford: Basil Blackwell, 49-69.
- Friedman, B. (1986). Increasing Indebtedness and Financial Instability in the United States. *Debt, Financial Stability and Public Policy*, Federal Reserve Bank of Kansas City.

- Friedman, M. & Schwartz, A. (1963). The Great Contraction, 1929-33. A Monetary History of the United States 1867-1960, Princeton. Reprinted in M. Bordo (Ed.), *Financial Crisis*, Volumes I, England: Elgar, 152-225.
- Frisch, R. (1933). Propagation Problems and Impulse Response Problems in Dynamic Economics. *Economic Essays in Honour of Gustav Cassel*, October 20, 1933, London: George Allen and Unwin.
- Geary, S., Disney, S & Towill, D. (2003). Bullwhip in Supply Chains – Past, Present and Future. *Proceedings from the 17th International Conference on Production Research*. Virginia, USA, 3-7 August 2003.
- Gertler, M. & Gilchrist, S. (1994). Monetary Policy, Business Cycles, and the Behavior of Small Manufacturing Firms. *The Quarterly Journal of Economics* 109 (2), 309-40.
- Ginsburgh, V. & Keyzer, M. (1997). *The Structure of Applied General Equilibrium Models*. Cambridge: MIT Press.
- Goodwin, R.M. (1951). The non-linear accelerator and the persistence of business cycles. *Econometrica* 16, 1-17.
- Goolsbee, A. (1998). The Business Cycle, Financial Performance, and the Retirement of Capital Goods. *NBER Working Paper 6392*, Cambridge, February.
- Greenwald, B. & Stiglitz, J. (1993). Financial Market Imperfections and Business Cycles. *Quarterly Journal of Economics*, February, 77-114.
- Haberler, G. (1958). *Prosperity and Depression: A Theoretical Analysis of Cyclical Movements*. United Nations, New York.
- Hansen, G. (1985). Indivisible labor and the business cycle. *Journal of Monetary Economics* 16 (3), November, 309-28.
- Hansen, G. & Prescott, E. (1993). Did technology shocks cause the 1990-1991 recession? *American Economic Review* 83 (2), May, 280-86.
- Hansen, G. & Wright, R. (1992). The labor market in real business cycle theory. *Federal Reserve Bank of Minneapolis Quarterly Review*, Spring, 2-12.
- Hartley, J., Hoover, K., & Salyer, K. (1998). *Real Business Cycles: A Reader*. London: Routledge.
- Harris, R. (1998). The Internet as a GPT: Factor Market Implications. In E. Helpman (Ed.), *General Purpose Technologies and Economic Growth*, Cambridge: MIT, 145-66.
- Hassler, J., Lundvik, P., Perrson, T. & Soderlind, P. (1994). The Swedish Business Cycle Stylized Facts over 130 Years. In V. Bergström & A. Vredin (Eds.), *Measuring and Interpreting Business Cycles*, Oxford: Clarendon Press.
- Hawtrey, R.G. (1913). *Good and Bad Trade: An Inquiry into the Causes of Trade Fluctuations*. London: Constable & Co. Ltd.
- Hawtrey, R.G. & Pigou, A.C. (1929). The Monetary Theory of the Trade Cycle. *The Economic Journal*, 39: 156: 636-643. Wiley on behalf of Royal Economic Society.

- Hayek, P.A. (1933). *Monetary Theory and the Trade Cycle*, London.
- Helpman, E. (Ed.) (1998). *General Purpose Technologies and Economic Growth*. Cambridge: MIT.
- Helpman, E. & Trajtenberg, M. (1998). A Time to Sow and a Time to Reap: Growth Based on General Purpose Technologies. In E. Helpman (Ed.), *General Purpose Technologies and Economic Growth*, Cambridge: MIT, 55-83.
- Helpman, E. & Rangel, A. (1998). Adjusting to New Technology: Experience and Training. *NBER Working Paper 6551*, Cambridge.
- Hermes, N. & Lensink, R. (1998). Regulatory change and the allocation of finance: the role of business conglomerates in Chile, 1983-1992. In V. Murinde, J. Doukas, & C. Wihlborg (Eds.) *Financial Sector Reform and Privatization in Transition Economies*, North Holland, 217-39.
- Hicks, J.R. (1950). *A Contribution to the Theory of the Trade Cycle*. Clarendon Press.
- Hodrick, R. J. and E. C. Prescott (1980), Postwar U.S. business cycles: an empirical investigation. *Discussion Paper No. 451, Carnegie Mellon University*. Published in updated form as Hodrick and Prescott (1997).
- Hodrick, R.J. & Prescott, E.C. (1997). Post-war U.S. Business Cycles: an empirical investigation. *Journal of Credit, Money and Banking*, 29: 1 (February), 1-16.
- Hofkes, M. (1991). *Modelling and Computation of General Equilibrium*. Amsterdam: Thesis Publishers.
- Hoshi, T., Kashyap, A., & Scharfstein, D. (1991). Corporate structure, liquidity, and investment: evidence from Japanese industrial groups. *Quarterly Journal of Economics*, 106, 33-60.
- Hubbard, R.G., Kashyap, A. & Whited, T. (1995). Internal finance and firm investment. *Journal of Money, Credit, and Banking*, 27, 683-701.
- Jorgensen, D.W. (1963). Capital theory and investment behaviour. *The American Economic Review*, 53, 247-59.
- Jorgensen, D.W. (1971). Econometric studies of investment behaviour. *Journal of Economic Literature*, 9, 1111-47.
- Kaldor, N. (1940). A Model of the Trade Cycle. *Economic Journal* 50, 78-92.
- Kaplan, S.N. & Zingales, L. (1997). Do investment cash flow sensitivities provide useful measures of financing constraints? *Quarterly Journal of Economics*, 112, 169-215.
- Kaufman, H. (1986). Debt: The Threat to Economic and Financial Stability. *Debt, Financial Stability and Public Policy*, Federal Reserve Bank of Kansas City.
- Khan, S & Ekta (2016). Bullwhip Effect in Supply Chain. *Journal of Management, Information Technology and Engineering* 2 (1):15-18, June 2016.
- Kindleberger, C. (1978). *Manias, Panics, and Crashes: A History of Financial Crises*. New York: Basic.
- King, R., Plosser, C. & Rebelo, S. (1988). Production, growth and business cycles: The basic neoclassical model. *Journal of Monetary Economics* 21 (2), March, 152-232.

- Klein, P. (Ed.) (1990) *Analyzing Modern Business Cycles. Essays Honoring Geoffrey H. Moore*, New York: M.E. Sharpe, Inc.
- Kleinknecht, A. (1984). *Innovation Patterns in Crisis and Prosperity: Schumpeter's Long Cycle Reconsidered*, Amsterdam, Vrije University.
- Korpinen, P. (1985). A Monetary Model of Long Cycles. In T. Vasko (Ed.), *The Long Wave Debate*, Austria: Springer-Verlag.
- Krugman, P. (1998). *The Hangover Theory: Are Recessions the Inevitable Payback for Good Times*. Slate: The Dismal Science.
- Kydland, F. & Prescott, E. (1982). 'Time to Build and Aggregate Fluctuations. *Econometrica*, 50 (6), November, 1345-70.
- Laffargue, J.P. & Malgrange, P. (1991). Rationality and Cycles in the Multiplier-Accelerator Model. In N. Thygesen, K. Velupillai, & S. Zambelli, S. (Eds) *Business Cycles: Theories, Evidence, and Analysis*, Proceedings of a conference by International Economic Association, Denmark, 157-182.
- Lee, H., Padmanabhan, V. & Whang, S. (1997). Information Distortion in a Supply Chain: The Bullwhip Effect. *Management Science*, 43 (4): 546-558.
- Li, C. (2013). Controlling the bullwhip effect in a supply chain system with constrained information flows. *Applied Mathematical Modelling* 37, 1897-1909.
- Lipsey, R., Bekar, C., & Carlaw, K. (1998). What Requires Explanation? In E. Helpman (Ed.), *General Purpose Technologies and Economic Growth*. Cambridge: MIT, 15-54.
- Long, J.B. & Plosser, C. (1983). Real business cycles. *Journal of Political Economy*, 91, 39-69.
- Lorenz, H. (1991). Strange Attractors and Endogenous Business Cycles. In N. Thygesen, K. Velupillai, & S. Zambelli (Eds.). *Business Cycles: Theories, Evidence, and Analysis*, Proceedings of a conference held by the International Economic Association, Denmark, 200-204.
- Lucas, R. (1972). Expectation and the neutrality of money. *Journal of Economic Theory* 4, 103-24.
- Lucas, R. (1975). An Equilibrium Model of the Business Cycle. *Journal of Political Economy*, 83 (6), 1113-44.
- Lucas, R. (1977). Understanding Business Cycles. In K. Brunner & A. Meltzer (Eds.), *Stabilization of the Domestic and International Economy, Carnegie-Rochester Conference Series in Public Policy*. Amsterdam: North Holland, 7-29.
- Lucas, R. (1981). *Studies in Business Cycle Theory*. Oxford: Basil Blackwell.
- Lucas, R. (1987). *Models of Business Cycles*. Yrjo Jahnsson Lectures, Basil Blackwell.
- Mandel, E. (1981). Explaining Long Waves of Capitalist Development. *Futures*, August, 332-38.
- Marx, Karl (1867). *Capital: A Critique of Political Economy*. First English Edition in 1887. Translated by Moore, S. & Aveluing, E. (2016), Wentworth Press.

- Mccallum, B. (1989). Real Business Cycle Models. In R. Barro (Ed.), *Modern Business Cycle Theory*. Cambridge, Harvard University Press, 16-50.
- McCullen, P. & Towill, D. (2002). Diagnosis and reduction of bullwhip in supply chains. *Supply Chain Management: An International Journal* 7(3): 164-179.
- Mensch, G. (1979). *The Technological Stalemate*. Harvard University Press.
- Metters, R. (1997). Quantifying the bullwhip effect in supply chains. *Journal of Operations Management* 15, 89-100.
- Metzler, L.A. (1941). The nature and stability of inventory cycles. *Review of Economic Statistics* 29, 1-15.
- Minsky, H. (1977). A Theory of System Fragility. In E. Altman & A. Sametz (Eds.), *Financial Crises: Institutions and Markets in a Fragile Environment*, New York: Wiley. Reprinted in M. Bordo (Ed.), *Financial Crisis*, Volumes I, England: Elgar, 45-59.
- Mittnik, S. & Niu, Z. (1994). Asymmetries in Business Cycles: Econometric Techniques and Empirical Evidence. In Semmler, W. (Ed.) (1994). *Business Cycles: Theory and Empirical Methods*. Boston: Kluwer; 331-350.
- Mizrach, B. (1994). Using U-Statistics to Detect Business Cycle Nonlinearities. In Semmler, W. (Ed.) (1994). *Business Cycles: Theory and Empirical Methods*. Boston: Kluwer; 369-388.
- Modigliani, F. & Miller, M. (1958). The cost of capital, corporate finance, and the theory of investment. *American Economic Review*, 48, 178-97.
- Moll, J. (2013). *The Bullwhip Effect: Analysis of the Causes and Remedies*. Vrije University Amsterdam.
- Myers, S.C. & S. Majluf (1984). Corporate financing decisions when firms have investment information that investors do not. *Journal of Financial Economics*, 13, 187-220.
- Oliva, R. & Gonçalves, P. (2005). Behavioural causes of demand amplification in supply chains: 'satisficing' policies with limited information cues. *Proceedings of the International System Dynamics Conference*, Boston: MA, USA, July 2005.
- Osada, H. & Hiratsuka, D. (Eds.) (1991). Business Cycles in Asia. *Institute of Developing Economies Occasional Papers Series 26*, Tokyo.
- Parra, J., Mula, J. & Campuzano-Bolarin, F. (2012). *A formulation for measuring the bullwhip effect within spreadsheets*. Sixth International Conference on Industrial Engineering and Industrial Management. Vigo: Spain, July 18-20.
- Perez, C. (2009). Technological Revolutions and Techno-economic Paradigms. *Working Papers on Technology Governance and Economic Dynamics* No. 20. Tallinn University of Technology.
- Popkin, J. (1990). Why Some of the Leading Indicators Lead? In P. Klein (Ed.), *Analyzing Modern Business Cycles Essays Honoring Geoffrey H. Moore*. New York: M.E. Sharpe, Inc.
- Potter, S. (1994). Asymmetric Economic Propagation Mechanisms. In Semmler, W. (Ed.) (1994). *Business Cycles: Theory and Empirical Methods*. Boston: Kluwer; 313-330.

- Prescott, E. (1986). Theory Ahead of Business Cycle Measurement. *Federal Reserve Bank of Minneapolis Quarterly Review*, Vol. 10, No. 4, 9-22.
- Prichett, L. (2000). Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains. *The World Bank Economic Review* No. 14, 1: 221-250.
- Rothman, P. (1994). The Time Reversibility Test with Application to Financial Data. In Semmler, W. (Ed.) (1994). *Business Cycles: Theory and Empirical Methods*. Boston: Kluwer; 389-403.
- Samuelson, P. (1939). Interactions between the multiplier analysis and the principle of acceleration. *Review of Economic Statistics* 21, 75-78.
- Sato, Y. & Aiba, Y. (1992). Critical Survey of the Theories of the Business Cycles. In N. Okishio (Ed.), *Business Cycles*. Dynamische Wirtschaftstheorie Bd. 12, Frankfurt am Main: Peter Lang.
- Sayers, C. (1994). Testing for Chaos and Non-Linearities in Macroeconomic Time Series. In Semmler, W. (Ed.) (1994). *Business Cycles: Theory and Empirical Methods*. Boston: Kluwer; 351-368.
- Schumpeter, J. (1939). *Business Cycles* (2 volumes), Mc-Graw-Hill.
- Semmler, W. (Ed.) (1994). *Business Cycles: Theory and Empirical Methods*. Boston: Kluwer.
- Shoven, J.B. & J. Whalley (1972). A General Equilibrium Calculation of the Effects of Differential Taxation from Capital in the U.S. *Journal of Public Economics*, 1, 281-321.
- Siregar, M.G. (1995). *Indonesia's financial liberalization: an empirical analysis of 1981-1988 panel data*, Institute of Southeast Asian Studies.
- Slutzky, E. (1927). The summation of random causes as the source of cyclical processes. *Econometrica*, 5, 105-146.
- Soete, L. (1987). The Newly Emerging Information Technology Sector. In C. Freeman & L. Soete, *Technical Change and Full Employment*. Oxford: Basil Blackwell, 189-220.
- Solomou, S. (1998). *Economic Cycles: Long Cycles and Business Cycles since 1870*. Manchester University Press.
- Sterman, J. (1989). Modelling Managerial Behaviour: Misperceptions of Feedback in a Dynamic Decision Making Experiment. *Management Science* 35(3): 321-339.
- Stiglitz, J. & Weiss, A. (1981). Credit rationing in markets with imperfect information. *American Economic Review*, 71, 393-410.
- Stock, J. & Watson, M. (1993). *Business Cycles, Indicators, and Forecasting*, University of Chicago Press.
- Tanweer, A., Li, Y., Duan, G. & Song, J. (2014). An Optimization Model for Mitigating Bullwhip-Effect in a Two-Echelon Supply Chain. *Procedia – Social and Behavioral Sciences* 138: 289-297.
- Thygesen, N., Velupillai, K. & Zambelli, S. (Eds.) (1991). *Business Cycles: Theories, Evidence, and Analysis*, Proceedings of a conference held by the International Economic Association, Denmark.

- Tinbergen, J. (1939). *Statistical Testing of Business Cycle Theories*, 2 volumes, Geneva: League of Nations.
- Tinbergen, J. (1981). Kondratieff Cycles and so-called Long Waves: The Early Research. *Futures*, IPC Business Press.
- Tuma-Doh, L. (2014). *The Impact of the Bullwhip Effect on Dotula Services Sarl Supply Chain*. Maastricht School of Management.
- Van Duijn, J. (1979). Fluctuations in Innovations over Time. In C. Freeman (Ed.) *Long Waves in the World Economy*. London: Frances Pinter, 1984.
- Van Duijn, J. (1983). *The Long Wave in Economic Life*. London: George Allen and Unwin.
- Van Ees, H.& Garretsen, J.H. (1994). Does liquidity matter for business investment? Some evidence from the Netherlands. *Journal of Macroeconomics*, 16: 613-27.
- Wang, X. & Disney, S. (2016). The Bullwhip Effect: Progress, Trends and Directions. *European Journal of Operational Research* 250 (3): 691-701.
- Warburton, R. (2004). An Analytical Investigation of the Bullwhip Effect. *Production and Operations Management* 13(2), Summer: 150-160.
- Watson, M. (1993). Measures of Fit for Calibrated Models. *Journal of Political Economy*. Vol. 101, No. 6 (December): 1011-1041.
- Woitek, U. (1997). *Business Cycles: An International Comparison of Stylized Facts in a Historical Perspective*, Munich: Physica-Verlag.
- Zarnowitz, V. (1985). Recent Work on Business Cycles in Historical Perspective: A Review of Theories and Evidence. *Journal of Economic Literature*, XXIII, 523-80.
- Zarnowitz, V. (1992). Business Cycles Theory, History, Indicators, and Forecasting. *NBER Studies in Business Cycles Vol. 27*, University of Chicago Press.

“The Asian crisis can be understood as a crisis of success caused by a boom of international lending followed by a sudden withdrawal of funds...[where] large-scale foreign capital inflows into financial systems ...became vulnerable to panic.

Jeffrey Sachs and Steve Radelet
*The Onset of the East Asian
 Financial Crisis*
 10 February 1998

“...it simply wasn’t true that the Asian crisis was a pure panic. There were serious flaws in the economies...”

Paul Krugman
Will Asia Bounce Back?
Speech for Credit Suisse
 First Boston, Hong Kong, March 1998

Chapter FIVE

The Debate on the Causes of the Asian Crisis: Fundamentalist versus Contagionist Views

The following chapter describes the competing explanations for the occurrence of the Asian crisis. The first section surveys the literature on the Asian crisis. It begins with a description of why the Asian crisis is distinct compared to others that have occurred in economic history such as the Mexican, Brazilian and Russian crises. Then it discusses the debate on the causes of the Asian debacle involving *structural or fundamental* versus *contagion or panic* views about why the Asian crisis occurred, including as well other explanations that have been suggested such as political and social causes. The differing views about the triggers of the crisis will also be explained. Then a description of the remedies by the international financial community, under the direction of the International Monetary Fund will be discussed, including a critique of its rescue package. The chapter ends with a status report on the recovery or otherwise of the economies hardest hit by the crisis and a description of their growth prospects.

5.1 A Crisis unlike Any Other: *Neither Tequila nor Vodka*

According to Pritchett (2000), the growth experience of most countries, particularly developing ones, are not characterized by a single time trend but by instability in growth rates over time which are identifiable in episodes. Bluhm, de Crombrughe & Szirmai (2013) confirm that most growth performances are volatile and marked by switching between different growth paths. Since the Great Depression of the 1930s, the world economy has been assailed by a number of economic and financial crises including the Latin American debt crises of the 1980s and the Mexican, Brazilian and Russian crises of the 1990s. Unlike any other financial crises that have transpired during the entire spectrum of economic history, the recent Asian crisis appears unique in a number of ways. First, the crisis had befallen the most dynamic and rapidly growing economies in the world, these economies having been looked up to, at least before the crisis, as paragons of development and as miracle stories. In 1993, the World Bank published a report called “The East Asian Miracle” to account for the spectacular growth of the so- called high-performing Asian economies (or HPAEs) that included Japan; the tiger economies comprising South Korea, Taiwan, Singapore and Hong Kong; and the newly-industrializing cub economies of Thailand, Malaysia and Indonesia. In that report, the essence of the Asian economic success was summed up into rapid growth with equity, which was achieved through selective government policy intervention,

institution-building, rapid accumulation of physical and human capital, and efficient allocation and productivity change. The occurrence of the Asian crisis has posed questions about whether the miracle was just a mirage (see Krugman, 1994, 1997a) and whether these economies were just 'paper tigers'²⁹. The crisis has, in fact, raised doubts about the real causes of Asia's growth. A brewing controversy among today's economists' focuses on the *accumulation* versus the *assimilation* views behind the Asian miracle, a topic exhaustively covered in Chapter 3.

A second reason why the Asian crisis is distinctive stems from the fact that economists and analysts have never really been clear as to the major causes or determinants of the crisis, precipitating a new controversy on the explanation of the crisis itself. One extreme view holds that weak macroeconomic fundamentals and deficient economic policies triggered the debacle. The other extreme view believes that macroeconomic fundamentals in the affected economies were essentially sound, and that the downturn of Asia was spawned by the panic of domestic and international investors and the faulty policy response of the international financial community in restoring confidence in the financial system. A confluence of these two extreme explanations spawned the crisis, and yet others believe that cultural values and political governance are also determinants to why the crisis occurred.

Thirdly, the Asian crisis is exceptional because it was not predicted or at least not anticipated in the magnitude that it had assumed although some economists warned about some meltdown in growth in the region even before the crisis happened. Krugman (1994) for instance believed this happening on account of diminishing returns emanating from the accumulationist's view of Asia's success story supported by Young's (1992, 1994a, 1994b, 1995) growth accounting findings discussed in the preceding chapter. Bello & Rosenfeld (1990) even much earlier than Krugman thought that a structural squeeze and internal political crisis threatened the NIC³⁰ export-oriented industrialization process. Even empirical tests of the predictability of the crisis given the benefits of hindsight data and state-of-the-art early warning modelling techniques produced weak results as Furman & Stiglitz (1998), Hardy & Pazarbaşıoğlu (1998), Berg & Pattillo (1998), and Fratzcher (2002)³¹ confirmed.

One of the reasons why in the words of Godement (1999) 'the dog did not bark' to warn the market of the impending crisis was because many of the signals that are taken to be the usual suspects of economic problems showed little evidence of deterioration. The crisis was thus not preceded by typical macroeconomic disturbances. In the most heavily-affected or crisis economies, huge capital inflows financed investment-led rather than consumption-led growth; inflation rates were contained within single-digit levels; fiscal surpluses were achieved; and international reserve positions were robust despite widening current account imbalances. One inconspicuous signal, though, that triggered panic was the rise in short-term indebtedness at levels that exceeded that of international reserves. Advocates of the contagion view, nevertheless, would not consider this as a significant problem for as long as creditors are willing to rollover these short-term loans and work out a sustainable payback mechanism.

The Asian crisis is described as a currency crisis as it involved dramatic devaluations of the exchange rates of most Asian countries that were pegged to the U.S. dollar. This distinguishes it

²⁹ See Corsetti, Pesenti & Roubini (1998c). *Paper Tigers? A Model of the Asian Crisis*, September 1998. The authors borrowed the expression *paper tigers* from Mao-tse-tung, referring to a person or country that appears outwardly powerful but is actually weak or ineffective.

³⁰ NIC means newly industrializing country and NIE is newly industrializing economy.

³¹ In the case of Fratzscher (2002), only when contagion is included in his model in addition to country-specific economic fundamentals, is the predictive ability improved and the degree of severity of the crisis could also be forecasted.

from the debt crisis of the 1980s, which also turned into a regional economic crisis when most of the Latin American countries declared a moratorium on their external debt payments. Since erupting in 1997, a lot of economic scholars have devoted analysis into the causes of currency crisis and contagion effects to seemingly bystander countries.

The literature dichotomises between first-generation models and second-generation models of currency crisis. Pesenti & Tille (2000), Esquivel & Larrain (1998), Eichengreen, Rose & Wyplosz (1996) and Masson (1999) exhaustively describe the characteristics of both first and second-generation models. First-generation models pioneered by Krugman (1979) are the inevitable result of unsustainable policies or macroeconomic fundamental imbalances, which draws on Salant & Henderson's (1978) speculative attack model in analysing a balance of payments crisis, and developed further by Flood & Garber (1984), Connolly & Taylor (1984), Calvo (1987), Edwards (1989), and Krugman & Rotemberg (1990).

In Krugman's model, expansionary monetary or fiscal policies work inconsistently with a fixed exchange rate commitment. The crisis is triggered by excessive money creation or expansion of domestic credits, typically propelled by a fiscal imbalance. With government assumed to have no access to capital markets, it is compelled to monetize its deficitary spending. Eventually, the growth of money supply exceeds the demand for domestic currency so that those who have accumulated excess liquidity would prefer now to trade domestic currency for foreign currency (or foreign-denominated instruments) or domestic interest-bearing assets, which depresses yields and sparks a sell-out of domestic in favour of foreign-denominated securities. In either case, pressure is exerted on the exchange rate. In case of capital mobility, interest rate parity condition leads to capital outflows. A gradual run on international reserves ensues because of the central bank's commitment to defend the exchange rate. The depletion of foreign reserves causes the economy's currency to become susceptible to a speculative attack, which triggers a collapse of the fixed exchange rate regime as the monetary authorities are left with little choice but to devalue the currency. In first generation models, policy is deemed to be exogenous.

The second-generation models, as introduced by Obstfeld (1986) and expanded later by Calvo (1995), Cole & Kehoe (1996), Sachs, Tornell & Velasco (1996), Drazen (1998) and Masson (1998) emphasize the interaction between agent's expectations and actual policy outcomes that could lead to self-fulfilling crises. Such models also endogenise policy as policymaker's actions are assumed to represent optimal responses to macroeconomic shocks. For instance, when despite a commitment by the monetary authorities to defend the exchange rate, extraordinary circumstances (such as a cyclical downturn or a fall in the country's terms of trade) warrants a floating of the currency. This then causes investors who expect a likely devaluation to charge high-risk premiums on their claims, raising the nation's cost of borrowing and debt servicing, which crowds out domestic credits and curtails output. The costs of maintaining the peg also becomes too high for the monetary authorities who then decide to devalue the currency, hence fulfilling the investors' original expectations. For investors who do not expect devaluation, borrowing costs will then stay low in the absence of additional risk premium, so that the exchange rate peg could be maintained, validating the original expectations of no devaluation.

Second-generation models are therefore prone to the possibility of several outcomes or multiple policy equilibria or 'sunspots'. Thus, in second-generation models, the behaviour of economic agents have reinforcing effects in determining the movement of the economy from one equilibrium position to another. The role of economic fundamentals in second-generation models also varies from one where a key role is played to one where fundamentals do not matter. Where fundamentals

are a determinant, the occurrence of a crisis becomes dependent on a range or threshold level of crucial macroeconomic variables. Where the position of fundamentals does not affect the occurrence of the crisis, then the crisis becomes the result of pure speculation based on asymmetric information, leading to herd or bandwagon behaviour and possible contagion effects. Market sentiment in the guise of sudden and arbitrary shifts in expectations rather than economic fundamentals influences the eruption of crisis. The banking and financial sectors become culpable and the transmission of crisis to other countries, i.e., contagion, becomes imminent.

Against this backdrop, there are categorically two extreme views on the causes of the Asian crisis that emerged in the literature. These are the *structuralist or fundamentalist* view, and the *contagion or financial panic* view. Many economists, though, believe that a mixture of these two extreme explanations caused the crisis. Thus, fundamental imbalances emphasized by first-generation models make an economy vulnerable to shifts in investor sentiment, triggering a crisis that carries self-reinforcing mechanisms of self-fulfilling prophecies as featured in second-generation models. Table 5.1 shows a matrix, following Ziesemer (1998), of the differing views on the causes of the crisis, and the position taken by key economic scholars insofar as leaning towards these two extreme views. Other views that consider political and social elements also came out thereafter as alternative explanations. These diverse views are described in a later section.

5.2 The Fundamentalist Explanation: *Crumbling House of Cards*

The structuralist or fundamentals-driven view, which is attributed to Krugman (1997b, 1998b), and Corsetti, Pesenti & Roubini (1998a, 1998b, 1998c, 1998d), maintains that weak macroeconomic fundamentals and poor economic policies triggered the crisis. According to the structuralists or fundamentalists, this deterioration in economic fundamentals was apparent in the significant real appreciation of currencies³², in exchange rate misalignments that led to vicious circles of competitive devaluations³³, in large and growing current account deficit positions that were financed primarily by short-term borrowings³⁴, in excessive investments in risky and low-profitability projects³⁵, and in the fiscal implications (i.e., prospective deficits) of the moral hazard effects of implicit or explicit government bail-out guarantees to financial institutions³⁶. These structural defects make the East Asian economies vulnerable to crisis akin to a stack-up of unsteady cards that is prone to crumble.

It may be argued that while the gravity of structural problems in these economies is debatable, there is some element of external vulnerability evident in their growing current account imbalances (i.e., the five crisis economies are inside the inner circle in Figure 5.1 indicating negative current account-to-GDP ratios), rising indebtedness (Figure 5.2) and increased volatile capital flows (Figure 5.3) notably portfolio investments (Figure 5.4) relative to the other Asian economies who were spared or were less affected such as Taiwan, Hong Kong, Viet Nam, Singapore or China.

³² See Grenville (1998). The Asian Economic Crisis, *Reserve Bank of Australia Bulletin*, April.

³³ See Liu, Noland, Robinson, & Wang (1998). Asia Competitive Devaluations, *Institute for International Economics (IIE) Working Paper 98-2*, 17 January; and Corsetti, Pesenti, Roubini, & Tille, *Competitive Devaluations: A Welfare-Based Approach*, Revised Draft, December 1998.

³⁴ See Ostry (1997). Current Account Imbalances in ASEAN Countries: Are They a Problem?, *IMF Working Paper 97/51*, April.

³⁵ See Hill (1998). *The Asian Financial Crisis*, University of Washington, Retrieved from <http://weber.u.washington.edu/~chill/updates/AsianCrisis.html>.

³⁶ See Burnside, Eichenbaum, & Rebelo (1998). Prospective Deficits and the Asian Currency Crisis, *NBER Working Paper 6758*, October.

Table 5. 1
Matrix of Economists' Views on Causes of the Asian Crisis

EXPLANATORY FACTOR (BY IMPORTANCE)	Fundamentals-View					Contagion View				
	KRUGMAN ¹	CORSETTI, PESENTI, ROUBINI ²	FISCHER ³	WESTPHAL ⁴	SUMMERS ⁵	STIGLITZ ⁶	GREENSPAN ⁷	DORNBUSCH ⁸	BERGSTEN ⁹	SACHS & RADELET ¹⁰
Micro & Institutional Fundamentals	High	High	High	High	Low	High	High	High	Low	Low
Domestic Macro Fundamentals	High	High	Low	Low	High	Low	Low	Low	Low	Low
International Fundamentals	High	High	High	High	High	Low	High	High	Low	Low
Moral Hazard	High	High	Low	Low	Low	High	High	Low	Low	Low
Currency Overvaluation/ Competitive Devaluations	High	High	High	High	High	High	High	High	High	High
International Stock Markets/ Foreign Banks & Creditors	High	Low	Low	Low	Low	Low	High	High	Low	High
Speculative attacks	Low	Low	Low	Low	Low	High	High	High	High	High

¹ See Krugman (1997b, 1998b, 1998d)

² See Corsetti, Pesenti, & Roubini (1998a, 1998b, 1998, 1998d)

³ See Fischer (1998a, 1998b)

⁴ See Westphal (1998)

⁵ See Summers (1998)

⁶ See Stiglitz (1998a, 1998b)

⁷ See Greenspan (1997, 1998a, 1998b)

⁸ See Dornbusch (1998)

⁹ See Bergsten (1998)

¹⁰ Sachs & Radelet (1998a, 1998b)

Source of Basic Data: Ziesemer (1998) and author's addition.

However, external creditors seemed impervious to these signals, as the habitual indicators of impending crisis did not appear to warrant concern. The heavily affected economies of South Korea, Thailand, Indonesia, Malaysia and the Philippines, the so-called crisis economies, all showed respectable real GDP growth rates of 5-8 percent in the last five years up to the crisis year 1997 (Figure 5.5), moderate inflation rates that were maintained at single-digit levels (Figure 5.6), healthy fiscal positions that even registered surpluses (Figure 5.7), strong savings and investments accumulation (Figure 5.8), and large international reserves (Figure 5.9) even as their current account positions showed deteriorating movements.

Even monetary policy as shown by the annual growth of real money supply did not seem to be unusually accommodative even as domestic loans outstanding have been rising (Figure 5.10) although real interest rates were generally positively high (Figure 5.11). What worried many investors and creditors was the implied bankruptcy of some crisis economies as their short-term debts began to exceed their international reserves (Figure 5.12), which has also been falling below the normative three months import cover (Figure 5.9). Alba et al. (1998) documented the build-up of vulnerabilities in East Asia mainly on account of deficient domestic financial intermediation systems, weak corporate governance, and inadequate government policy responses to large capital inflows.

The Asian crisis is fundamentally different because it is a capital account crisis as opposed to the conventional current account crisis plaguing developing or emerging economies. In a current account crisis, profligate government budget deficits coupled with excessive money creation usually lead to higher domestic absorption that produces a current account deficit combined with inflation. These current account deficits are normally financed by capital inflows, which the economy could not attract because of weak macroeconomic fundamentals. Thus, the only recourse is to finance them by depleting international reserves that leads eventually to currency devaluation and finally the need to seek emergency assistance from the IMF. On the contrary, a capital account crisis as Yoshitomi and ADBI Staff (2003) describes, arises from massive capital inflows from abroad attracted by sound macroeconomic fundamentals of the recipient country and high interest rates.

As these economies opened up their financial sectors and liberalized their capital accounts, e.g., investment rules and foreign debt ceilings, massive inflows of liquidity flooded the markets so that capital account surpluses led to balance of payments surpluses. With fixed or managed exchange rates, these balance of payments excesses replenished international reserves causing money supply and credit to expand, and therefore raising domestic absorption that spilled into current account spending. Thus, in a capital account crisis, excessive credit creation brought by massive infusions of foreign capital caused the increase in domestic absorption whereas in a current account crisis, extravagant government spending is the trigger.

The other facet of the fundamentals-driven view of the crisis focuses on the over borrowing and over lending phenomena by domestic and foreign banks and investors because of moral hazard. Yoshitomi & Ohno (1999) and Pereira da Silva & Yoshitomi (2001) discuss the various mechanisms whereby moral hazard could be invoked. These situations, as summarized in Table 5.2 range from government orchestrated bail-outs arising from bankruptcy rules, prudential guidelines, deposit insurance schemes, government guarantees on private loans, cronyism or too big to fail argument, fixed exchange rates, and existence of lender of last resort facilities by the local central bank and by the IMF in the case of international lending. The presence of moral

Figure 5.1
Current Account Balance-to-GDP Ratio: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.2
Total Debt-to-GDP Ratio: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.3
Capital Flows-to-GDP Ratio: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.4
Amounts of Foreign Direct Investments and Portfolio Investments: 1990-1997 (in Million U.S. Dollars)

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.5
Real GDP Growth: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.6
Annual Inflation Rates (Consumer Prices): 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.7
Fiscal Balance-to-GDP Ratio: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.8
Gross Domestic Savings-to-Gross Domestic Capital Formation Ratio: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.9

International Reserves-to-Total Debt & Import Cover in Months: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.10

Annual Growth Rate of Real M2 and Loans Outstanding

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.11
Real Interest Rates (Long-Term Deposits): 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.12
Short-Term Debt-to-International Reserves Ratio: 1990-1997

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Table 5.2
Cases of Moral Hazard

<i>Effect on: Caused By:</i>	Domestic Lenders	International Lenders	Borrowers (Investors, Banks, Corporations)
Local Bankruptcy Regulation			Borrowers borrow in excess if local bankruptcy legislation is unclear, soft on debtors and/or not enforced
Local Prudential Financial Regulations	Banks extend credit in excess if prudential guidelines are loose, soft on capital adequacy ratios and/or not enforced	Same problem in country of origin of inflows (emission country)	
Local Government Deposit Insurance Scheme	Banks extend credit in excess if part of the cost of their liabilities (deposits) is covered by a deposit insurance scheme or a guarantee	Usually, only foreign banks that were fully-licensed and locally registered ones were covered by the local deposit insurance scheme	
Local Government Formal Guarantee on Private Loans	Banks extend credit in excess if part of the cost of their liabilities is covered by a guarantee offered by the government	This type of formal guarantee is usually not contemplated for foreigners. Only public loans can benefit from these mechanisms.	
Local Government Informal Guarantee on Private Loans ("Cronyism")	There is a sense that informally part of the bank's liabilities is covered by a "political economy" guarantee or 'too-big-to-fail' argument	Foreigners complained against this 'informal guarantee' to locally vested interests and labelled it 'cronyism'. They tried to circumvent it or use it to their own advantage.	Borrowers would also benefit from 'cronyism' and in order to create a 'too-big-to-fail' argument, they would take excessive borrowing risks.
Local Central Bank Implicit Guarantee against Systemic Collapse of the Local Financial System	Banks extend credit in excess if the central bank is perceived to follow a policy of rescuing banks if the problem is large and systemic		
Local Central Bank Liquidity Assistance to Specific Financial Institutions or to Specific 'Large' Borrowers (Debt Rescheduling, etc.)	Same as above if the problem is small and temporary (in liquidity crisis) but mixed with 'cronyism', while rules for liquidity assistance are not transparent		Borrowers would take excessive risks if central bank is perceived coming to their rescue when they are well -connected and they are 'too-big-to-fail'

Local Government Commitment to a Fixed Exchange Rate		Foreign banks extend credit in foreign currency to local borrowers based on their perception of a central bank's or government's fixed and stable exchange rate regime	Borrowers (local banks and corporations) would not hedge their exposure to foreign liabilities
Foreign Government Guarantee		Foreign banks extend credit in excess to emerging markets if there is a formal or informal guarantee by their own government	
Foreign (Home Country for Lenders) Private Guarantee on Loans		Foreign banks extend credit in excess if there is a formal or informal guarantee by a large private company of their own country	Local investors participate in riskier operations when part of their liabilities is guaranteed by a large foreign private company
Foreign (Home Country) or International Prudential Regulations		Foreign banks extend credit to local borrowers in excess if prudential guidelines in home country regarding foreign exposure are loose, soft and/or not enforced	
Foreign (Home) Central Bank Implicit Guarantee or Existence of International lender of Last Resort (e.g., IMF)		Foreign banks extend credit in excess if there is a formal or informal guarantee by an international lender of last resort	

Source: Pereira da Silva & Yoshitomo (2001), pp. 4-5.

hazard caused excessive risk taking and further a mismatch of maturity and currency, as banks and firms unwisely borrowed short-term (i.e., maturing within a year) in dollars and invested long-term in locally-denominated assets such as real estate or activities such as manufacturing, believing that exchange rates would remain stable and that short-term loans would be rolled over. In the case of foreign banks, newly found freedoms to compete in the domestic banking sector as a result of financial and capital account liberalization led to intense competition and in the bid to aggressively expand market shares ended up financing riskier endeavours and inflating their balance sheets with potential non-performing assets.

Another view by Fischer & Reisen (1992) and McKinnon & Pill (1998) attributed over borrowing and over lending by foreign banks and investors to the ability of the East Asian countries to successfully managed the 'unholy trinity' of free capital mobility, exchange rate stability and monetary autonomy. As the policy stances seemed credible and stable, the international financial markets increased their investments and lending in anticipation of prospective growth. Finally, Mishkin (1996), Calvo (1998) and Chinn & Kletzer (2000) suggest that the commitment to keep a fixed exchange rate regime provided an implicit guarantee of foreign loans by sovereign governments and constituted an incentive for irresponsible external lending. In any event, given the double mismatch, the bursting of the financial bubble deflated the real value of assets while currency devaluations raised the liabilities' side of domestic balance sheets leading to a shake-up of investor confidence and a massive capital flight. The Asian crisis, as it was, became a liquidity crisis of the private sector.

Kim, Kose & Plummer (2001) investigated the extent of symmetric problems in domestic economic fundamentals shared by the Asian crisis economies by looking at the business cycle co-movements of key macroeconomic aggregates. Their hypothesis was that if the economies' business cycles were significantly synchronized, then the spread of the Asian crisis could be explained largely by economic fundamentals while a low correlation implied otherwise. Results of their cross-country correlation analysis among the five Asian crisis economies indicated strong contemporaneous cross-country correlations of the major macro variables such as output, consumption, investment, and price levels.

In terms of output fluctuations, Korea's business cycle differed from the other four countries, which are ASEAN³⁷ members, indicating its higher stage of development, while Indonesia as well was less similar from Malaysia, Thailand and the Philippines, especially with respect to consumption and investment patterns. The latter three countries share the same export and manufacturing structures, as well as exchange rate regimes, lending credence and justification to why this study was limited to the three economies. The cross-correlations for government consumption and money stock were also low and close to zero, suggesting that monetary and fiscal policies among the countries do not exhibit a common cyclicity.

The authors Kim et al. (2001) cited above also tested for cointegration among macro variables for these countries to examine long-run co-movements as cross-country correlations of de-trended data capture only short-term relationships. The results showed strong cointegration of macro aggregates for pairs of countries, notably Indonesia and Korea, and Indonesia and Malaysia.

Their study likewise tested for common external shocks that could have triggered similar cyclical fluctuations of the crisis economies given their high degree of openness. The authors tested the

³⁷ The Association of Southeast Asian Nations (ASEAN) comprises the countries of Singapore, Thailand, Indonesia, Malaysia, the Philippines, Brunei Darussalam, Viet Nam, Cambodia, Lao PDR, and Myanmar.

devaluation of the Chinese renminbi in 1994, changes in the movements of the yen-U.S. dollar rate in the mid-1990s and the increase in world oil prices in 1996 as possible triggers of the Asian crisis. Confirming earlier studies, their results showed that the movements of the Japanese yen against the dollar and the oil price shocks contributed to the weakening of domestic fundamentals of the crisis countries while the devaluation of the Chinese currency actually provided a stimulus to growth. It has been argued that China was the first domino that triggered the crisis when it devalued its currency in 1994, leading to its strong export performance in 1994-1995 and curtailing the export growth of the other Asian countries that have pegged to the U.S. dollar. A study by Fernald, Edison & Loungani (1998) proved otherwise, disputing the belief that China was the first trigger and is therefore consistent with the renminbi devaluation not being a significant common external shock as observed by Kim, Kose & Plummer (2001).

Another study conducted by Pereira da Silva & Yoshitomi (2001) explored the significance of moral hazard in explaining the Asian crisis. Moral hazard, as discussed earlier, was identified by Krugman (1998a, 1998b) as a key determinant of the crisis by way of encouraging excessive risk-taking behaviour by borrowers and lenders, depositors and investors, banks and corporations thus creating huge financial bubbles in the crisis economies. The authors developed two stylised stories of over investments or over lending in Asia.

The first is consistent with Krugman's characterised moral hazard story where implicit guarantees by governments through 'crony capitalism' or other sort of bail-out listed in Table 5.2, lowers the cost of funds of financial intermediaries and pushes their investments to a point exceeding the 'normal' level where marginal product of capital stock equals the marginal cost of new investments sans guarantee or insurance. While the Krugman story does not distinguish between local and international lending, the authors alluded to Chinn & Kletzer (2000) where the commitment to a fixed or a pegged exchange rate regime created the incentive for irresponsible external borrowing; and to McKinnon & Pill (1998) and Fischer & Reisen (1992) where perceptions of policy credibility, stability and anticipation of further growth in East Asian success in managing the trilemma of free capital mobility with exchange rate stability and some degree of monetary autonomy provided the insurance to foreign banks to increase their investments and inflate their balance sheets with potential non-performing assets.

The alternative story is that of simple herd behaviour, where unregulated competition between banks in emerging deregulated financial markets led to a scramble for market share to acquire full bank licenses, by increasing loans and exposure, inevitably ending up financing riskier ventures and feeding on the credit bubble. In this alternative stylised version, there is no implicit guarantee or moral hazard that distorts the costs of financial intermediation, but rather a willingness to accept initial higher risks as a form of entry cost to reap the rewards of presence in a fast-growing market.

Pereira da Silva & Yoshitomi (2001) narrowed the empirical testing of both stylised facts to Japanese lending to East Asia since Japanese bank loans accounted for 50 percent to 70 percent of East Asian countries' external debt. This is further justified by the acceleration of Japanese lending during the 1990-1996 period where in East Asia alone, an estimated stock of \$25 billion of excess loans were made compared to other international lending of Japanese banks, and where the growth of Japanese loans surpassed that of the Japanese domestic market, and Japanese direct foreign investments abroad, indicating some possibility of a foreign credit bubble.

The empirical estimation involves the econometric specification of a moral hazard story through a supply-driven equation where Japanese lending to an individual East Asian country as a ratio of total Japanese bank loans is determined by relative (Japan vis-à-vis the recipient country's) risk factors such as the expected net relative yen yield on the loan; a relative market risk denoted by the difference between the sovereign borrowing rate (proxied by the government bond rate) and that of regular customers (represented by the prime lending rate); and a variable for other business opportunities such as the local market stock index vis-à-vis the stock market in Japan referenced as the date of its peak period.

The alternative specification without moral hazard regresses the same dependent variable, which are Japanese loans to an individual East Asian country as a ratio of total Japanese bank loans on demand-driven determinants such as Japanese FDI and credit to the private sector relative to the same variable in Japan. Their results showed that the supply-side specification were less robust than the demand-side equation suggesting a weak case for moral hazard.

Finally, Husted & MacDonald (1999) examined the extent of misalignment of currencies central to the Asian crisis. Based on the theoretical framework of the monetary approach to exchange rate determination, they produced estimates using panel data sets of equilibrium exchange rates for a number of Asian currencies and found these estimates to be generally consistent with the theoretical model. Very little evidence of currency misalignment was found to exist in 1996 or before the crisis erupted, implying that the cause of the Asian collapse could not be blamed on badly driven fundamentals.

5.3 The Contagionist Explanation: *Tumbling Dominoes*

On the other hand, the contagion view, ascribed to Sachs & Radelet (1998a, 1998b) and Rodrik (1998), holds that the crisis was caused by financial panic of investors provoked by a creditor grab race, and the inadequate policy response and lack of coordination among creditors and the international financial community, particularly the International Monetary Fund (IMF) in quelling the panic. The contagion position believes that macroeconomic fundamentals in the affected economies were essentially sound and that the crisis simply reflected the bad equilibrium resulting from the sudden withdrawal of confidence that should have been reflected instead in a simple deflation of asset values.

Sachs (1998) further portrays the crisis as undergoing a three-staged process as follows: first, an overvaluation of the exchange rate resulting from an internal or external shock; second, a resolute defence of the exchange rate by the central bank at the expense of draining international reserves; and third, a panicked outflow by foreign creditors holding short-term claims signalled by the depletion of reserves combined with devaluation. His typology of financial crisis is grouped into five categories.

First is macroeconomic or policy-induced crisis, such as a balance of payments crisis, which results from government adherence to an inconsistent set of macroeconomic policies. The second category is financial panic where the country is subject to a Diamond-Dybvig³⁸ type of a bank run that leaves the economy with an acute shortage of international liquidity and where creditors race to withdraw ahead of the others. Third is a bubble burst along the Blanchard-Watson³⁹ type of

³⁸ See Diamond & Dybvig (1983). Bank Runs, Deposit Insurance, and Liquidity. *Journal of Political Economy*, 91 (3), June, 401-19.

³⁹ See Blanchard & Watson (1982). Bubbles, Rational Expectations and Financial Markets. *NBER Working Paper* No. 945.

speculation where rational behaviour dictates prices of an asset to deviate from its fundamental value as time proceeds until a point when the bubble bursts and asset prices drop to an extent lower than the pre-bubble level because of overproduction or excess inventory of the asset being speculated on. Fourth is the moral hazard crisis where excessive and over-risky investments by banks and financial institutions are financed by loans, which had implicit or explicit bailout guarantees from the government or international financial institutions. The fifth type is disorderly workouts, which is a grab for assets in the event of a liquidity problem since there is no domestic or international bankruptcy system that reorganizes claims. According to Sachs & Radelet (1998a), *“the Asian crisis can be understood as a crisis of success caused by a boom of international lending followed by a sudden withdrawal of funds...[where] large-scale foreign capital inflows into financial systems became vulnerable to panic.”*

There are several transmission channels by which contagion can occur. Hernandez & Valdes (2001), Gregorio & Valdes (2001), and Pritsker (2000) distinguish between trade channels, neighborhood channels, and financial channels. Transmission through the trade channel occurs directly when the devaluation of one country's currency increases that country's price competitiveness and decreases demand for goods of another trading partner country. This occurs also indirectly when one country's devaluation of its currency builds a competitive price advantage over other countries competing for the same export markets, pressuring them to also devalue their currencies. Thus, the trade transmission mechanism affects the economic fundamentals of other countries through terms of trade and income effects.

Contagion is transmitted through the financial channel when international investors are compelled to re-evaluate their exposures to countries in a particular region when one country in such grouping is hit by a crisis. The transmission through financial markets can be direct if international investors who have significant direct investments and foreign loans to the crisis economies suddenly withdraw the capital inflows to adjust their investment positions in order to meet capital-adequacy ratios, or margin calls, or settle liquidity problems.

In the case of East Asia, a number of Japanese and Korean banks have raised their direct investments and lending to the East Asian crisis economies such that the increase in bankruptcies and bank runs coupled with currency depreciation caused severe liquidity strains on these Korean and Japanese investors. Another example is when the devaluation of the Thai baht caused stock prices in Malaysia to drop because of the losses Malaysian corporations investing in Thailand incur with the baht depreciation. The financial transmission is said to be indirect when bonds of countries are treated as complementary assets such that fund managers applying rules of thumb pull resources out from other countries to rebalance or readjust their portfolios. Thus, the same Japanese and Korean banks withdraw similar investments in other countries whose economic fundamentals are sound and are not directly affected by the crisis in order to compensate for their losses in the crisis economies.

Finally, the third case of pure contagion involves a sudden shift or reversal in market perception towards risk so that a country-specific shock gets replicated in other fundamentally sound economies because of this change in market sentiment. Wade (2002) calls it a Gestalt shift, borrowing the term from cognitive psychology where the renowned drawing of Rubin's 'vase or

faces⁴⁰ causes an instantaneous refocusing in visual perception from one image to another. Applied to the Asian case, one-moment speculators and investors view the Asian miracle, the next they see 'Asian cronyism and state capitalism'.

Among the theories related to pure contagion, Kim, Kose & Plummer (2002) describe: a) *herd behaviour* — where information asymmetry causes uninformed investors to follow the leader who withdraws its investments in a crisis economy, considering this as information that they should do likewise; b) *information cascade* — where an investor withdraws an investment in markets similar to the crisis economy instead of individually assessing their fundamentals (or what Hernandez & Valdes (2001) term the neighborhood channel because of macroeconomic similarities among crisis countries and other countries in the region); c) *demonstration effect*—where investors re-assess their exposures to other countries when a crisis hits one economy because of incomplete information so investors treat countries that look alike as equal; and d) *wake-up call*—where an investor realizes other structural defects in another economy brought about by a crisis in one country because of an information spillover against countries in a similar situation such as weaknesses in the banking and financial sectors of Korea brought about by speculative attacks on the Thai baht.

Empirical evidence of each these transmission channels have mixed results. For the trade transmission channel, Glick & Rose (1998) proved that currency crisis spreads because of trade linkages. Using a regression framework specified as: $Crisis_i = \phi Trade_i + \lambda M_i + \varepsilon_i$ where $Crisis_i$ is an indicator variable defined as unity if a country i was attacked in a given crisis episode and zero otherwise; M_i is a set of macroeconomic control regressors (e.g., annual growth rate of domestic credit, government budget as percent of GDP, growth rate of real GDP, ratio of M2 to international reserves, domestic CPI inflation, and extent of currency undervaluation in the real exchange rate index) and λ is the corresponding vector of coefficients; ε is a normally distributed error term representing omitted influences that make possible a currency crisis; and $Trade_i$ is a measure of trade linkage comprising mutual bilateral exports between the first victim country and other countries (trade shares were also used). A binary probit equation across countries was estimated with $\phi = 0$ as their null hypothesis, which was contradicted and interpreted as evidence of trade contagion.

Kochhar, Loungani & Stone (1998) confirmed that trade linkages was an important source of contagion in the Asian economies given that the countries exported to the same destinations, and exported similar products. Thus, the devaluation of one currency adversely affected competitiveness of other countries, putting downward pressure on their currencies as well. The authors showed that the bulk of exports to the United States alone by the Asian crisis economies were concentrated in two product clusters, semi-conductors and apparel, footwear and household goods, where export competition intensified in the former and weakened in the latter.

On the contrary, the empirical evidence provided by Kim, Kose & Plummer (2001) showed that the trade transmission channel was weak since testing for direction of trade and composition of trade revealed marked differences between the crisis economies. Intra-trade among the five

countries comprised only 10 percent of their total trade on average. While the five major trading partners of the five countries consisted of the USA, Japan, Hong Kong, Singapore and China, their relative importance varied. Exports for the American market was largest for the Philippines at 35 percent but only about 15 percent for the rest. Export shares with Japan dominated Indonesian trade, while exports for Hong Kong and Singapore were substantial for Malaysia. Exports for China was significant for Korea at 10 percent but not for the ASEAN-4 with less than 5 percent. Even the composition of exports seems to belie that contagion could have been spread via the trade channel. Korean and Malaysian exports were mostly machinery equipment at more than 50 percent, contrasting with less than 10 percent for Indonesia. Agricultural exports were significant for Thailand at close to 20 percent compared to less than 2 percent for Korea. Mineral fuels comprised 25 percent of Indonesian exports but barely 1 percent for the Philippines. Thus, these findings confirm that the trade channel could not fully explain the Asian contagion.

The empirical results for contagion transmitted through financial channels were mixed. A study by Baig & Goldfajn (1998) tested for the evidence of contagion in the exchange rates, interest rates, equity and sovereign debt markets of the Asian-5 crisis economies. Applying vector auto regression (VAR) on three and a half years of daily data from 1995-1998 and studying the correlation between the countries' respective foreign exchange, interest rate, equity and sovereign debt markets, they made a case for contagion when the correlations among the markets increase significantly during the crisis episode compared to tranquil periods. Their results reflected discernible patterns of contagion in the foreign debt and currency markets. The degree of correlation in the equity or stock markets were mixed though between and among the countries but not as significant as during tranquil times. Finally, the correlation among interest rates indicated no discernible conclusion except that interest rates reflected policy stances rather than market-determined levels.

Van Rijckeghem & Weder (1999, 2000), Caramazza, Ricci & Salgado (1999) and Kaminsky & Reinhart (1999) also proved that spill-overs through bank lending rather than trade linkages explained contagion in the Mexican, Asian, and Russian crises episodes through a common bank lender effect. This pertains to the country that lent the most to the first country in crisis, or what they term the 'ground zero' country of each of the episodes. The common bank lenders in these cases are the United States for the Mexican crisis, Japan for the Asian crisis, and Germany for the Russian crisis.

5.4 Socio-political Explanations: *Virtues Turned into Vices*

The socio-political explanations for the Asian financial crisis are the same factors that have been cited earlier for Asia's miraculous growth. These are basically the style of governance and the uniqueness of Asian cultural values that now have been denounced by its critics as the very virtues turned into vices that spawned the Asian crisis.

Wrage (1998) uses the Asian financial crisis as proof that the so-called Asian authoritarian advantage did not inspire sustainable and rapid growth, and moreover, could have caused the crisis itself. Authoritarian rule clouded good decision-making since there was no public accountability and government officials being shielded from public scrutiny were more inclined to "*hide shortfalls, conceal failures, favour industries in which they or their family have an interest, and divert public monies to sectors, corporations, or individuals they prefer.*" The principles of accountability and transparency were replaced by 'habits of confidence' that entailed '*window-dressing, secrecy and protection offered to a privileged elite, false and contrived impressions made*

in collaboration with a controlled press, juggling of accounts, and sweetheart deals to friends and family members of the ruling class'. These allegations were supported by claims that national accounts and statistics were padded, banks and corporations with government representation were quietly shored up by government with printed money from the central bank and other secret subsidies, and inside information on cash-strapped finance companies were shared with influential brokers and cronies. The events of the Asian financial crisis portray authoritarian regimes to be the hardest hit and the slowest to recover so that these recent events in Asia will finally 'put to rest talk about the "authoritarian advantage".'

The second factor relates to the same Asian values touted to have caused the miracle as also blamed for the occurrence of the Asian crisis. The Asian hallmarks of family ties and communalism when viewed in hindsight bred paternalism, cronyism, and nepotism. Similarly, relationships of trust and social harmony (meaning "not rocking the boat") engendered loss of transparency and accountability, conformity and blind tolerance of corrupt practices. Reciprocal gift giving evolved into an intricate and hidden system of bribery. Bhattacharya (2003) succinctly and nicely puts the degeneration of Asian values: *"The much praised attachment to family has become nepotism; the stress on personal relationships instead of formal legality has degenerated into cronyism; the emphasis on consensus has become corrupt politics; conservatism and respect for authority have turned into inflexibility and inability to innovate; educational achievements turn out to be rote learning and uncritical kowtowing to authority figures."*

Tay (2000) recounts that Lee Kuan Yew argued that it was good Asian values that supported the Asian miracle and bad Asian values that fabricated the Asian crisis; the latter involving *"feudalist traditions of exacting dues from subjects, high living among rulers in the midst of abject poverty among the people; unquestioning obedience, favouritism and nepotism to one's friends and kin; the power of those in authority to grant or withhold favours, rights, and privileges; corruption, squeeze, extravagant gifts, bribery."* Further, she cites an Indonesian official to have stated that institutionalised power structures embodying bad Asian values like crony capitalism, corruption, secrecy or non-transparency and non-accountability have displaced the role of values as a basis for social cohesion. To many critics of Asian values as a factor of economic success, the Asian crisis has *"sounded the death knell of the Asian values debate"* (Milner, 1999); *"punctured the idea of Asian exceptionalism"* (Fukuyama, 1999); and *"exploded the Asian values myth"* (Lau, 1998).

By way of rebuttal, the Asian advocates like Lee Kuan Yew and Mahathir have proclaimed that Asian values will help these countries recover just as they were responsible for economic growth. According to Milner (1999), Lee Kuan Yew argued that these bad Asian values could not have caused the meltdown *"because nepotism, favouritism and corruption have been endemic"* since the miracle and some countries like Singapore and Hong Kong were not as badly affected. Mahathir, in turn, blames jealous Western capitalism and not Asian values that triggered the crisis and speculates on a Western conspiracy, in reference to George Soros, to *"shake up the economies of the Asian miracle nations"* because these *"racists are not happy to see us prosper."*

Bluhm, de Crombrughe & Szirmai (2013) found evidence that weak quality of institutions precede crisis and strong institutions shorten the duration of crisis. It is the prevailing structures and quality of institutions that drive the duration of declines during slumps and these institutions create the political and economic incentive, resolve the coordination failures and define the set of feasible counterpolicies. Acemoglu et al. (2003) likewise argue that weak institutional environments raise vulnerability to crisis and could prolong crisis duration.

The socio-political explanations to the Asian crisis are congruent with what Röpke & Minhui (1998) render as a Schumpeterian construction of the Asian Depression. In their study, the authors present two alternative views of explaining both the Asian miracle and crisis stories. One view is the mainstream view, which in our parlance is the neoclassical view, where the focus of analysis is based on the logic of the production function (hence, growth accounting) and allocative efficiency, where a crisis merely reflects distortions in the resource allocation system. The other view, which is the Schumpeterian view believes that fluctuations are inherently built into the capitalistic development and where innovation is the key to economic prosperity. Viewed in the Schumpeterian lens as gleaned from Chapter 2, innovations swarm during times of recession and depression, driving the next boom or expansion phase. However, innovation depends on a lot of factors, among which are the quality of institutions, governance, cultural values, psyche of investors, policy interventions, among other determinants. In Schumpeterian economics, the confluence of this variety of determinants matter for growth and fluctuations, not just the logic of inputs.

5.5 Remedies to the Crisis: *Is the Doctor Killing the Patients?*

The occurrence of the Asian crisis has put to test the effectiveness and relevance of the International Monetary Fund (IMF) as an institutional rescuer in times of economic crisis, and much more questioned the ability of Bretton Woods institutions as governing bodies in the world economic order. Having been itself criticized as a possible trigger of the Asian crisis by way of providing moral hazard to international and sovereign investors and lenders, the IMF has historically provided support or assistance to countries suffering from a balance of payments, debt or financial crisis. The IMF did provide assistance to the Asian crisis economies but not without eliciting immense criticism as fuelling further the fire rather than dousing it. The criticism centers on the irrelevance or inappropriateness of IMF solutions, which are focused mainly on current account problems rather than difficulties arising from capital account liberalization which most of the Asian crisis economies successfully undertook as part of the conditionalities of previous loans and in the interest of joining the globalization bandwagon. Table 5.3 summarizes the conditionalities imposed by the IMF on the crisis economies that knocked on its doors for assistance. Among the crisis economies, only Malaysia opted to work out its problems without IMF assistance while the Philippines had already an ongoing arrangement at the time the crisis commenced. A common theme that emerged is the IMF classic prescriptions of monetary and fiscal austerity programs that are felt to be more relevant for current account as opposed to capital account crises, and for public sector rather than private sector liquidity problems.

The role of the IMF in the Asian crisis is exhaustively chronicled and discussed in Lane, Ghosh, Hamann, Phillips, Schulze-Ghattas & Tsikata (1999); Boorman, Lane, Schulze-Ghattas, Bulir, Ghosh, Hamann, Mourmouras, & Phillips (2000); Bullard, Bello & Malhotra (1998); Zhang (1998); Griffith-Jones & Pfaffensteller (1998); Nellor (1998); and IMF Staff (2000). Their descriptions of the IMF packages point to a consensus of a three-pronged approach by the IMF in stabilizing the crisis economies consonant with what Mussa & Savastano (1999) call as the core components of the IMF approach to economic stabilization. This approach consisted of: (i) securing sustainable external financing, (ii) adoption of macroeconomic policy adjustments, specifically demand-restraining measures; and (iii) implementing structural reforms.

Table 5.3
IMF Conditionalities Imposed on the Asian Crisis Economies

THE CONDITIONALITIES OF THE 1997-98 AND 1998-99 ECONOMIC CRISIS						
Country	Amount	Conditionality				Structural Reforms
		Fiscal	Financial	Monetary/ Exchange Rate/ Trade Reforms	Management of Capital Flows (FDI and External Debt)	
Thailand	\$17.2 billion	<ul style="list-style-type: none">■ Fiscal measures including an increase in the VAT rate from 7% to 10%. These measures are equivalent to 3% of GDP to correct public sector deficit to a surplus of 1% of GDP in 1997/98 to support the necessary improvement in the current account, and pay for the cost of financial restructuring■ Adjusting the fiscal targets from a public sector surplus of 1% of GDP to negative 2% of GDP in response to weakened economic activity, and to finance higher social spending	<ul style="list-style-type: none">■ Financial sector restructuring including identification and closure of 56 out of 58 Thai finance companies, intervention in the weakest banks, and recapitalization of the banking system■ Establishment of a timetable for implementing financial sector restructuring, including strategies for pre-emptive recapitalization and strengthening of the financial system	<ul style="list-style-type: none">■ New framework for monetary and exchange rate policy including a managed float for the Thai bath	<ul style="list-style-type: none">■ Initiatives to attract foreign capital	<ul style="list-style-type: none">■ Structural initiatives to increase efficiency, deepen the role of the private sector, and reinforce the Thai economy's outward orientation through civil service reform, privatisation.■ Acceleration of plans to protect the weaker sectors of society and strengthening the social safety net
Korea	\$57 billion	<ul style="list-style-type: none">■ Fiscal measures equivalent to 2% of GDP to make room for the costs of financial sector restructuring. These measures include widening of the tax base: corporate, income and VAT.■ Targeting a fiscal deficit of 1% of GDP for 1998 to	<ul style="list-style-type: none">■ Comprehensive financial sector restructuring introducing a clear and firm exit policy for financial institutions, strong market and supervisory discipline, and central bank independence.	<ul style="list-style-type: none">■ Trade liberalization measures: setting a timetable in line with WTO commitments to eliminate trade-related subsidies, restrictive import licensing and import diversification program, and streamlining	<ul style="list-style-type: none">■ Capital account liberalization measures to open up Korean money, equity and bond markets to capital inflows and to liberalize foreign direct investments	<ul style="list-style-type: none">■ Dismantling of non-transparent and inefficient ties between govt, banks and firms.■ Accounting, auditing and disclosure standards to be made more stringent. <p>Corporate financial</p>

		<p>accommodate impact of weaker economic activity and allow for higher expenditure on social safety net.</p>	<p>Suspension of operations of 9 insolvent merchant banks; government capital injections for 2 large distressed commercial banks and submission of plans by all commercial banks with inadequate capital for recapitalization.</p> <ul style="list-style-type: none"> ▪ Publication and dissemination of key economic and financial data. ▪ Accelerating implementation of the comprehensive restructuring plan for the financial sector, including establishing a high-level team to negotiate with foreign creditors and reduce recourse of Korean banks to the central bank. ▪ Increasing range and amounts of financial instruments available to foreign investors, increasing access of Korean companies to foreign capital markets, and liberalizing the corporate financing market. 	<p>and improving transparency of import certification procedures</p> <ul style="list-style-type: none"> ▪ Further monetary tightening and abolition of daily exchange rate band ▪ Speeding up trade liberalization measures, including liberalization of financial services as agreed with OECD binding under the WTO. 	<ul style="list-style-type: none"> ▪ Speeding up liberalization of capital and money markets including lifting of all capital account restrictions on foreign investors' access to the Korean bond market by 3 Dec. 1997 	<p>statements to be prepared on a consolidated basis and certified by external auditors. System of cross-guarantees within conglomerates to be changed.</p> <ul style="list-style-type: none"> ▪ Introducing measures to improve corporate transparency, including strengthening the oversight functions of corporate board of directors, increasing accountability to shareholders, and introducing outside directors and external audit committees.
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Indonesia	\$43 billion	<ul style="list-style-type: none"> ■ Fiscal measures equivalent to 1% of GDP in 1997/98 and 2% in 1998/99 to yield a public sector surplus of 1% of GDP in both periods, to facilitate external adjustment and provide resources to pay for financial restructuring. The fiscal measures include cutting back from major state enterprise infrastructure projects, removing government subsidies, eliminating VAT exemptions, and adjusting administered prices, including prices of petroleum products and electricity. ■ Adjustment to 1998/99 budget that would result in a public sector deficit of about 1% of GDP to absorb impact of economic slowdown. ■ Cancellation of 12 infrastructure projects and revoking or discontinuing privileges for the airline projects and the National Car Project 	<ul style="list-style-type: none"> ■ Financial sector restructuring, including closing unviable institutions, merging state banks and establishing a timetable for dealing with remaining weak institutions and improving the institutional, legal and regulatory framework of the financial system. ■ Establishment of the Indonesian Bank Restructuring Agency (IBRA) and a government guarantee on bank deposits and credits ■ Accelerated bank restructuring with IBRA to continue with closing or take-over of unviable or weak financial institutions. It was also empowered to issue bonds to finance the restoration of financial viability to qualified institutions, removal of existing restrictions on foreign ownership of banks, and enactment of new bankruptcy law. 	<ul style="list-style-type: none"> ■ Stabilizing the rupiah by adopting a tight monetary policy of high interest rates and a flexible exchange rate regime. ■ A strong monetary policy to stop the rupiah from sliding further. 	<ul style="list-style-type: none"> ■ Liberalization of foreign trade and investments ■ More far-reaching bank and corporate sector restructuring including announcement of a framework for creditors and debtors to work on external debt problems of Indonesian corporations on a voluntary case-by-case basis. ■ Accelerated arrangement to develop a framework with foreign creditors to restore trade financing and to resolve the issue of corporate debt and interbank credit. 	<ul style="list-style-type: none"> ■ Dismantling of domestic monopolies and expanding privatisation programs ■ Limiting the monopoly of the national marketing board (BULOG) to rice, deregulating domestic trade in agricultural produce and eliminating restrictive marketing arrangements ■ Measures to alleviate the suffering from the drought to ensure adequate food supplies are available at reasonable prices. ■ Comprehensive agenda of structural reforms to increase competition and efficiency in the economy, reinforcing commitments made in January 1998 including privatisation of a further 6 major state enterprises and identification of 7 new enterprises for privatisation in 1998/99. ■ Strengthening the social safety net through support for small and
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						medium-sized enterprises and through public works
Philippines	\$1 billion	<ul style="list-style-type: none"> Consolidated public sector position will be limited to a deficit of 0.9% of GNP in 1998, to balance in 1999 and to a surplus of 0.9% of GNP in 2003. Cut discretionary expenditures by 25% without compromising programs aimed at social protection and poverty alleviation. Strengthen tax administration by focusing on large taxpayers and installing a comprehensive audit plan to enhance taxpayer compliance. A large taxpayer unit will be established and made fully operational at the Bureau of Internal Revenue (BIR) headquarters to supervise all aspects of large taxpayers' compliance including the conduct of audits. These measures among others should increase tax revenue to GNP ratio (tax effort) to about 1.8 percentage points over the medium-term. Improve customs administration by curtailing sharply the scope of duty- 	<ul style="list-style-type: none"> Improve prudential and supervisory systems Enhance banks' capacity to withstand shocks by raising their capital and encourage consolidation and mergers within the industry. Tightening of provisioning requirements and strengthening regulatory oversight to reduce bank risks. Levelling playing field between different types of instruments to reduce disincentives to peso intermediation. Dealing expeditiously with any problem banks while safeguarding the soundness of the banking system. 	<ul style="list-style-type: none"> The central bank will adjust interest rates if the peso comes under renewed pressure. The statutory reserve requirement will be reduced from 13% to 10% with simultaneous increase in the liquidity reserve requirement from 4% to 7% during the program. To improve functioning of the foreign exchange market and to increase flexibility of the exchange rate, the volatility band established by the Bankers' Association of the Philippines (BAP) will be reviewed by the central bank in consultation with the BAP with a view to phasing it out not later than end-1998. Measures will be taken that trading outside the band will not be stopped for more than an hour. Outstanding contracts under the non-deliverable forward (NDF) facility will be unwound gradually over the next 18 months 	<ul style="list-style-type: none"> Reduce short-term debt and encourage better maturity structure of debt flows as well as higher non-debt creating flows Measures to diminish disincentives to peso intermediation. Subject foreign currency deposits made by residents to a 7.5% tax on income, 15% liquid-asset cover requirement to be raised to 30% by mid-1998 Quantitative ceilings on new official external borrowing. Create attractive environment and liberal regime for investment. Further simplification and liberalization of investment requirements will be implemented during the program period. 	<ul style="list-style-type: none"> Privatization efforts will focus on disposing of remaining items that are strategically vital to industrial development such as the National Power Corporation, the PNOC Energy Development Corporation and the Food Terminal. Deregulate the oil sector with prices of domestic petroleum products remaining regulated for a specified period except for socially-sensitive products, which will remain regulated until July 1998.

		free shopping facilities that have proven to be leakages to the system.		<p>and no new contracts (except roll-overs) or similar schemes will be undertaken by the central bank.</p> <ul style="list-style-type: none"> ▪ The central bank will channel all its spot foreign exchange transactions (except those with the government) through the Philippine Dealing System ▪ Continue trade liberalization with reductions in nominal tariff rate to 11.2% in 1998, 10.2% in 1999 and 9.1 % in 2000. The maximum tariff rate applying to some agricultural imports will be reduced to 65% in 1999. In the context of WTO, undertake measures to review restriction on rice imports by 2004. 	<p>Retail trade sector will be liberalized, particularly to investments in medium and large-scale firms.</p> <p>Investment houses will be opened further to foreign investments with the raising of the foreign equity participation from 49% to 60% voting shares.</p>	
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Source: Bullard, Bello & Malhotra (1998) and Zhang (1998).

Financing Component: The Tourniquet

Capital account requirements dominated the financing needs of the Asian crisis economies, premised specifically on the assumed rollover of short-term foreign obligations. The huge size of these short-term foreign debts required that creditors extended their positions and inducing them to do so necessitated the availability of official financing to make the IMF program work and hinting that unilaterally withdrawing their money out would compromise their long-term interests. The very large official financing packages were intended to restore market confidence and curb the further exodus of capital flows. The amount of financing provided for in these packages as shown in Table 5.4 were said to have few precedents (the Mexican bailout for example) and were augmented by substantial bilateral and other multilateral support from the World Bank and the Asian Development Bank, most of which exceeded IMF funding and some of which were disbursed in conjunction with IMF disbursements that were in turn dependent on compliance with IMF conditionalities.

Table 5.4
**Official Financing Packages under the IMF Assistance to
the Asian Crisis Economies**

Country	Official Sources	Original Package ¹ (in billion US dollars)	In Percent of IMF Quota	In Percent of Annual GDP
Thailand	Multilateral	6.7	505	5
	Of which:			
	IMF	4.0		3
	ADB and IBRD	2.7		2
	Bilateral	10.5		7
	Total	17.2		12
Indonesia	Multilateral	18.1	490	9
	Of which:			
	IMF ²	10.1		5
	ADB and IBRD	8.0		4
	Bilateral	18.0		9
	Total	36.1		18
Korea	Multilateral	35.3	1,938	8
	Of which:			
	IMF	21.1		5
	ADB and IBRD	14.2		3
	Bilateral	23.1		5
	Total	58.4		13

¹The figures refer to the financing packages announced at the time when the standby arrangements were approved: 20 August 1997 for Thailand; 5 November 1997 for Indonesia and 4 December 1997 for Korea. The duration of arrangements were: 34 months for Thailand, and 36 months for Indonesia and Korea.

²Excludes subsequent augmentations.

Source of Data: Lane et al (1999), p. 21 and Boorman et al. (2000), p. 28.

A major criticism against the IMF-led assistance package is the moral hazard argument that financial support from the IMF dampens incentives for countries to take preventive action to avoid future crisis and encourages imprudent risk-taking among borrowers and lenders that makes a crisis more likely. Jeanne & Zettelmeyer (2004) developed a model of international lending where

they show that the IMF cannot cause moral hazard under the assumptions that the IMF lends at actuarially fair interest rates and debtor governments maximize the welfare of their taxpayers. This follows the ‘Mussa theorem’, after Mussa (1999, 2002) who argued that for as long as these assumptions are met, the expectation then of IMF bailouts increases the welfare of recipient countries at no cost to the rest of the world. Thus, there is no trade-off between insurance and incentives, and any changes in policy effort, capital flows or borrowing costs in response to IMF crisis lending will be efficient. Jeanne & Zettelmeyer (2004) proposed that it is when these assumptions are violated that moral hazard from IMF lending arises.

On the side of debtor governments, Dreher & Vaubel (2002) empirically verified using panel data for 106 countries from 1971-1997 that recipient countries tended to be more accommodative policy-wise with higher monetary expansion and higher budget deficits the more it could still borrow from the IMF and the higher the interest rate subsidy of the IMF loan. Nonetheless, the extent of Fund-induced moral hazard is outweighed by the fact that IMF support is not a cash reward but a loan that has to be repaid by the member country with interest. Thus, investors are bailed out not by the IMF but by the member country’s own prospective savings flows and earnings flows from exports, as reflected in the anticipated improvement of its external accounts.

On the side of investors, it is generally perceived that Fund financial support, even when exceptionally large as in the case of the Asian crisis, pale in comparison to what would be required to imply a full and credible guarantee. As shown in Table 5.4, the amounts disbursed in the first semester of the program fell far too short of the amounts needed to redeem the short-term debt maturing during the same period. Moreover, private capital continued to leave even after the IMF packages were announced, indicating that other factors such as policy content, program implementation and ownership, and political commitment were essential to placate the market. While these enfeeble the case for moral hazard in IMF lending, Dell’Ariccia et al. (2000) proved otherwise by showing that in the case of the Russian default crisis in 1998 and its non-bailout by the IMF which signalled the slowdown in perceived probability of future crisis lending by the IMF to emerging markets, there was an increase in sovereign bond spreads after the Russian crisis. The spreads’ sensitivity in reflecting fundamentals heightened and dispersion across countries widened, indicating the presence of moral hazard effects.

There are more studies, in contrast, that dispute the moral hazard argument of IMF lending. Lane & Phillips (2000) showed that announcements of the availability of IMF support did not affect indicators of market expectations, such as interest rate spreads in Asia, which measure perceived risks although Lee & Shin (2005) confirmed that the case for moral hazard might be stronger for countries politically connected to the IMF.

Evrensel & Kutan (2004a, 2004b), using daily sovereign bond market spreads and stock market returns of Korea and Indonesia, believed that even as creditor moral hazard were associated with IMF-related news about program negotiations and approvals, their effects on spreads was short-lived. Nunnenkamp (1999) proved that IMF lending has not shaped bank behaviour significantly given the low correlations between cross-country distributions of bank and IMF loans, and given that IMF lending has been marginal compared to private capital flows. Willett (1999) likewise argued that if moral hazard in IMF support was true, then the large size of the Mexican bailout should have triggered the large capital flows to the Asian economies, which was not borne by data on increased holdings of sovereign debt into Asia.

Similarly, Kamin (2002) used evidence on country access to international capital markets to illustrate that access by emerging markets after the exceptional Mexican bailout by the IMF in 1995 did not increase nor was there any difference between access by geopolitically important countries and those of smaller non-systemically important ones. Finally, Noy (2004) demonstrated that using an events-study approach on significant and unexpected IMF news, the Mexican rescue in 1995 and the Russian non-bailout in 1998 had no impact on the way international investors subsequently behaved.

The other crucial issues with respect to the financing packages related to the Asian crisis bailout was the apparent necessity of frontloading the money rather than the usual IMF practice of phasing this down in successive tranches conditional upon the progress of the program, as observed by Lane & Schulze-Ghattas (1999). Such phasing while ensuring that program implementation proceeds on track is viewed as incongruous with a capital account crisis since monetary authorities do not have the money up front to settle maturing short-term obligations, much more to counter capital flight. Some critics say the bailout package was underfunded but this too seems to be inconsistent with the moral hazard argument.

For one, the IMF too had resource constraints and too large a bailout would indeed create moral hazard. Second, the IMF package was complemented by contributions from other multilateral and bilateral sources and assurances and indications from major private creditor banks, although the 'second lines of defence' in the cases of Indonesia and Korea by some bilateral creditors were only committed but never disbursed according to Lane & Schulze-Ghattas (1999). It was also hoped that the official financing package would elicit automatic private market response of rolling over short-term debts falling due so that the official financing package would not really be exhausted or used in full. Thus, again the bailout was supposed to be catalytic of the return of capital flows which is a 'Catch-22' dilemma —the IMF committing smaller amounts to prevent moral hazard and hoping that this would create moral hazard by inspiring private capital flows in line with its objective of helping countries improve their access to international capital markets.

Mody & Saravia (2003) challenged this catalytic role of IMF funding by showing that IMF-supported programs do not uniformly provide a positive 'seal of good housekeeping' and that market reaction is guided more by perceptions of reform credibility and commitment. By defining an IMF program to be successful when there is no shortfall in actual compared to projected net private capital flows, Benelli (2003) likewise showed that the catalytic effects of IMF lending was weak since success was negatively correlated with the size of IMF financial assistance but positively associated with policy adjustment. In the same vein, Cottarelli & Giannini (2002) concluded that catalytic financing from the IMF is dependent upon transmission channels of program design, information, commitment, screening and insurance. However, catalytic IMF financing is less reliable to manage capital account crises when its dependability on these channels becomes weaker.

The other issue with respect to financing involves the untried alternative of arranging a concerted involvement of the private sector at the outset in the workout process. This bail-in of private creditors involving standstills, rollovers and capital controls while reducing the external adjustment required and the amount of official financing needed is a palliative to the moral hazard problem as it imposes losses on imprudent lenders although it could also cause short-term investors anticipating such measures to run off more hastily while the chance exists, and could also increase the risk of contagion as investors become more nervous.

Nonetheless, the experience with the Asian crisis has led to an exploration of mechanisms that invoke greater private sector participation in the preclusion and resolution of crisis. Such mechanisms include establishing credit lines by private lenders for activation in the event of crisis, introducing call options into short-term loans that allows lengthening of maturities under specific conditions, incorporating sharing and qualified majority clauses in bond contracts that allow for restructuring when crisis occurs, and imposing Chilean-style minimum deposit requirements on short-term external debts. The effectiveness though of these mechanisms in resolving crisis is yet to be tested. The case for collective action clauses, for instance, have been argued by Eichengreen & Portes (1995), Eichengreen (1999) and Kletzer (2003) showing its efficient outcomes for sovereign debt renegotiation compared to unanimity rules.

Macroeconomic Policy Component: The Pill

The second component of macroeconomic policy adjustment in the Asian bailout is even more contentious. This comprises demand-restraining measures that seek to restore and preserve equilibrium between aggregate demand and output in the recipient country. Expenditure-reducing measures, according to Mussa & Savastano (1999) are the best-known ingredient of IMF-supported programs and are regarded as the cornerstone of traditional IMF packages. These measures to reduce domestic absorption normally envisage a tightening of fiscal and monetary policies by amounts deemed essential to bring aggregate demand in line with prospective output and available external financing, hence to achieve a sustainable current account. The measures sometimes involve expenditure-switching measures that contemplate changes in the level or rate of exchange rate adjustment needed to bring about external balance.

In the case of the Asian crisis, monetary policy needed to be constricted in order to arrest the collapse of exchange rates, foil capital flight, and prevent currency depreciation from leading into a spiral of inflation and continuing depreciation. This monetary stance, however, had to be cautiously balanced, as in a tightrope act with its downside effect of weakening economic activity and output stability. There was no intention in any of the crisis countries, however, to use monetary policy to attain a fixed target for the exchange rate.

A more radical alternative was to establish a currency board, especially in Indonesia but the severity of the banking crisis, and the need for legal and institutional reforms in the financial system coupled with a looming political uncertainty led to its ultimate rejection by the Fund. Instead, the policy as cited by Lane & Schulze-Ghattas (1999) with respect to the exchange rate was to 'lean against the wind' by avoiding further bouts of rapid depreciation. As international reserves were also short in supply, monetary policy thus emphasized the use of interest rate and credit policy, rather than direct foreign exchange intervention, to restore currency stability. However, the timely availability of data on monetary and credit aggregates and the uncertainty of the money-demand function during crisis limited their operational use for policy control and militated against monetary targeting so the conduct of monetary policy fell largely on interest rates. While the nominal interest rate became the instrument of monetary policy tightening, Ghosh & Phillips (1999) stated that formal performance criteria such as ceilings on net domestic assets (NDA) in the cases of Korea and Thailand and on base money for Indonesia, and floors on the net international reserves (NIR) of all three countries were imposed to provide indications of whether program and policy implementation were on track.

Boorman et al. (2000) described implementation of the monetary program as undermining credibility and market confidence. This was due to the hesitancy of the monetary authorities of the

crisis economies at the early stages of the program to raise interest rates sufficiently to counter speculative attacks on their currencies. There was also a stop-go tendency to restrict then ease monetary policy with the first sign of stabilization. The initial reluctance of these countries could be attributed to the controversy over the relationship between interest rates and exchange rates. The traditional economic view posits that high interest rates would raise the returns on domestic investments that an investor would obtain thereby reducing capital flows, containing speculation, and leading to an appreciation of exchange rates. Conversely, a more revisionist argument attributed to Radelet & Sachs (1998), Feldstein (1998) and Furman & Stiglitz (1998) believes that an increase in interest rates under the unique condition of financial panic would lead to a financial implosion — raising default probabilities, widespread bankruptcies, larger country risk premiums, intensified capital outflows, and hence a further currency weakening.

This is consistent with an earlier work by Frankel & Rose (1995) who found that the empirical relationship between interest rates and exchange rates is tenuous in the short-run. According to Ghosh & Phillips (1999), the limited range of short-term local currency-denominated financial instruments, which narrowed the scope to attract foreign investors into purchasing domestic currency assets, also hampered the transmission mechanism for interest rates to influence the exchange rate in the case of the Asian crisis economies.

Nonetheless, the empirical evidence on the relationship between monetary policy and the exchange rate support the traditional view as numerous studies validate. Goldfajn & Gupta (2003) analysing a large dataset of 80 countries from 1980 to 1998 proved that tight monetary policy could increase the probability of reversing a post-crisis currency undervaluation through a nominal exchange rate appreciation rather than higher inflation. By measuring exchange market pressure defined as the sum of exchange rate depreciation and reserve outflows, Tanner (2001) equated this to the difference between the domestic component of base money and money demand. He found that contractionary monetary policy helped reduce this exchange market pressure in his study of Brazil, Chile, Mexico, Indonesia, Korea, and Thailand. However, his monetary policy stance was measured by the growth in domestic credits rather than interest rates where difficulty exists in extracting its policy-related from market-determined component.

Developing an exchange rate model, Basurto & Ghosh (2000) discovered little evidence on the perverse effect of tight monetary policy on exchange rates. Even allowing for a time-varying risk premium in their model, there was no evidence either that real interest rates contributed to higher risk premiums. Dekle, Hsiao & Wang (2001) in their study of Korean weekly pre-and post-crisis data on interest rates and exchange rates, also confirmed that the lead-lag relationship between both variables indicated that when interest rates were raised, the nominal exchange rate appreciated according to what traditional theory predicts. Lastly, Goldfajn & Baig (1998) using a higher frequency of daily data also detected a negative relationship between nominal exchange rates and nominal interest rates in their study of the crisis economies. Based on the behaviour of real interest rates, which was negative in most of the crisis economies and even below their pre-crisis levels in early 1998, they could only conclude that monetary policy was not overly tight although they observed the usual trade-off between inflation and output when interest rates were raised, suggesting a softer monetary stance to combat an ensuing recession.

A related controversial issue with the monetary stance of IMF bailouts in Asia, according to Ghosh & Phillips (1999), is that credit crunches were created in the crisis economies. The perception is that the curtailed availability of external financing was exacerbated by excessively tight domestic credit conditions leading to an unsatisfied excess demand for credit and possibly quantity

rationing. Consequently, a major economic slowdown in the crisis economies arose. In the wake of widespread bankruptcies and creditor preoccupation with credit and default risks as well as prudential regulations, possibly many domestic borrowers such as small and medium enterprises who had previous access to credit found themselves suddenly unable to access local financing, or were crowded out by the increasing share of credit going to large companies. The scenario is pronounced in Korea where large corporations called *chaebols* and local banks are closely knitted.

While such sectoral credit reallocation is hardly captured by aggregate credit data, empirical studies on the presence of credit crunches in Asia have been conducted but with results contradicting the presence of a credit crunch. Ghosh & Ghosh (1999) estimated credit demand and credit supply functions in the crisis economies using a disequilibrium model and found evidence of a binding supply constraint only at the beginning of the crisis and more of real credit demand nose-diving as the crisis unfolded. This is supported by Dollar & Hallward-Driemeier (2000) who surveyed more than a thousand manufacturing firms in Thailand in the last quarter of 1997 through the first quarter of 1998. In their rankings of the causes of output decline, the lack of credit access was ranked last among factors causing the depressed activity, next only to exchange rate impact on input costs, lack of domestic and foreign demand, and the high cost of capital as the respective top three responses.

In a related study, Claessens, Djankov & Ferri (1999) investigated the impact of exchange rate and interest rate shocks on the liquidity and solvency of a sample of firms in the crisis economies. They defined a firm to be illiquid if gross earnings fell short of debt service and insolvent if total liabilities at the new exchange rate and interest rate exceeded their pre-crisis or end-1996 equity. Their results indicated a minimal effect of interest rate shocks with only 15 to 25 percent of the sample firms in each of the countries driven into illiquidity and even a smaller 2 to 5 percent driven into insolvency. The study failed to capture though the fact that the interest rate shocks may have compounded the liquidity and solvency problems of the firms. Interestingly, a little more than one-third of the firms in the crisis economies were solvent but illiquid suggesting that credit flows should have been promptly and adequately pumped into these firms.

The fiscal policy component of the IMF package was not spared from criticism either. Based on Lane & Tsikata (1999), the general perception was that the IMF was applying a standard prescription of fiscal austerity to an exceptional situation considering that the Asian crisis did not originate from extravagant government spending but from the poor economic decisions of private investors and creditors. The rationale for fiscal policy was to contribute to the current account adjustment between the public and private sectors implied by the huge capital outflows and by restoring confidence, to influence the total amount of the external financing gap. The fiscal deficit was also intended to be financed domestically so as to avoid crowding out financing to the private sector. A third aim of the fiscal program was to incorporate the costs of bank and financial sector restructuring required in the crisis economies in a non-inflationary manner. These carrying costs for bank restructuring cover compensation to the central banks for supporting failed banks, recapitalization of ailing financial institutions, payments to depositors under insurance guarantee schemes, acquisition of bad loans and non-performing assets from commercial and merchant banks, issuance of government-guaranteed bonds, swaps of government assets for restructuring agency's claims on banks, and operational costs of restructuring institutions such as the Indonesian Bank Restructuring Agency and Thailand's Financial Institutions Development Fund. Provisions for bank restructuring were estimated at 3 percent of GDP for Thailand, 1.5 percent of GDP for Indonesia (later raised to 2 percent of GDP) and 0.75 percent of GDP for Korea to reach over 2 percent of GDP in the medium-term.

Lane & Tsikata (1999) further recount that the initial programs envisaged minor current account adjustments and hence smaller fiscal corrections to achieve this except for Thailand where the current account imbalance was larger. The projected fiscal positions for the fiscal calendar 1997-1998 were correspondingly an improvement of 1 percent of GDP for Thailand, an improvement of 0.2 percent of GDP for Korea, and a deficit of 0.9 percent of GDP in fiscal year 1997-1998 for Indonesia, which was to improve to a surplus of 0.2 percent of GDP in the next fiscal year 1998-1999. These fiscal targets in the IMF package were based on projections about economic activity and assumptions about fiscal measures to be adopted by the governments, which turned out to be too optimistic. The severity of the ensuing economic recession adversely affected the fiscal positions of the crisis economies, as automatic stabilizers were limited in effectiveness given the low sensitivity of government expenditures to business cycles, and the narrow progressivity of the income tax system.

The exchange rate deterioration had negative repercussions as well on fiscal balances according to Lane & Tsikata (1999): first given its impact on corporate taxable incomes, which dropped on account of the rise in the currency cost of foreign debt servicing; and second, given its effect on imported basic goods, which led to higher prices translating into greater public subsidies to preclude starvation. These led to the urgency for some fiscal easing, resulting to slippages in the fiscal program. In the end, the IMF relented in allowing some fiscal expansion with a focus on social safety nets. Because of mistaken assumptions and projections, the bigger question was whether fiscal policy should have been supportive of economic activity at the very outset. Kopits (2000) suggested the use of fiscal policy rules, such as the ones adopted in emerging markets of Argentina, Brazil and Peru as a tool for crisis prevention. These fiscal policy rules involve balanced-budget constraints and expenditure limits, debt ceilings, transparency reporting and accounting procedures and a scorecard on progress in implementing structural reforms in areas such as banking, social security, intergovernmental fiscal relations, and taxation as a way of signaling mechanism for crisis prevention. Perhaps, such direction of fiscal policy reforms could have been introduced in the Asian crisis economies.

Structural Reform Component: The Therapy

The structural reform content of the IMF rescue package elicited the most controversy considering that structural reforms have never been made the centerpiece of an IMF program. Hamann & Schulze-Ghattas (1999) listed these structural reforms as involving measures to address deficiencies in the financial, corporate, and government sectors, and to bolster social safety nets. In the financial sector, the reforms included measures to stop bank runs, protect the payments system, limit accumulating losses; and deal with non-performing assets. It also included shutdowns of insolvent banks and financial institutions; recapitalization of viable ones, and reinforcing prudential regulatory reforms with the view to tighten loan classification, loss provisioning, and capital adequacy standards. In the corporate sector, the reforms involved the dismantling of non-transparent linkages between government, firms and banks; adoption of accounting, auditing and disclosure standards for firms with respect to cross-guarantees within conglomerates and preparation of consolidated financial statements; review of bankruptcy legislation, and establishment of out-of-court judicial systems for orderly debt workouts. Reforms in the government sector included the abolition of state-owned monopolies and cartels, intensification of privatization of state-owned enterprises; reinforcing competition laws; and strengthening of data dissemination particularly, economic and financial data.

In addition to financial and corporate restructuring, the structural reforms based on Hamann & Schulze-Ghattas (1999) included measures to speed up current and capital account liberalization where the former involved reduction in tariffs, gradual elimination of non-tariff barriers, and removal of export and import subsidies, import licensing and import diversification. Capital account liberalization involved relaxing investment laws and regulations, removal of restrictions on long-term foreign debt on corporations, and raising the limits on ownership stakes of foreign investors, which were viewed as paradoxical considering that excessive exposure to capital flows was one of the reasons why the crisis occurred in the first place.

Finally, social sector policies, the need for which became pressing as the economic recession deepened during the crisis, were introduced to mitigate the impact of inflation and unemployment on the poorer segments of society. The social sector reforms ranged from increasing income transfers such as unemployment insurance and reforming restrictions in the labour market, to allowing existing subsidies for basic goods and services such as foodstuff, energy and transportation, to self-employment initiatives and training programs, to increasing access by the poor to basic health care and education services.

5.6 Post Crisis Status of the Problem Economies: *Recovery and Relapse*

Within two years after the crisis erupted in 1997, the five crisis economies of Indonesia, South Korea, Malaysia, Thailand and the Philippines managed to rebound significantly at speeds faster than expected. South Korea, alone, which was the fastest to recover, turned around from a real GDP growth rate of -6.9 percent in 1998 to 9.5 percent in 1999 although this slowed down to 8.5 percent in 2000, which is still slightly above the pre-crisis average of 8.4 percent covering the period 1986-1996. Malaysia, despite defying the standard IMF prescriptions, rebounded to a real GDP growth of 6.1 percent in 1999 and further to 8.9 percent in 2000, which is approximately near its pre-crisis 1986-1996 average real growth of 9.1 percent. Thailand reversed its 10.5 percent decline in real output in 1998 to a modest 4.4 percent in 1999, further rising to 4.8 percent in 2000 and 6.9 percent in 2003, although still below the pre-crisis ten-year average of 9.5 percent. The Philippines, in turn, grew by 3.5 percent in real terms in 1999 and 4.4 percent in 2000 from negative 0.6 percent in 1998. Its performance after a slight expansion of only 1.8 percent in 2001 at respective real growth rates of 4.3 percent, 4.7 percent and 6.1 percent in 2002, 2003 and 2004 exceeded the pre-crisis 10-year average of 3.7 percent. Finally, Indonesia, which suffered the most decline in real output of 13.1 percent in 1998 recovered to slightly less than 1 percent growth in 1999 to 4.9 percent in 2003 and 5.1 percent in 2004 but still way below the pre-crisis average of 7.0 percent growth recorded from 1986-1996. Figure 5.13 shows the adjustment path of real GDP growth in the East Asian crisis economies after the crisis.

Park & Lee (2002) subscribe this phenomenal rebound to the expansionary macroeconomic policies, exchange rate depreciation and favourable global environment. Their analysis, which is based on a compilation of the range of worldwide currency crisis episodes over the period 1970 to 1995, covering a cross-country data set, revealed the usual V-pattern of adjustment. This V-shaped pattern shows a dramatic drop in GDP growth rates with the outbreak of a crisis, which then recovers to pre-crisis levels within two to three years. The authors compared the adjustment trends of countries that followed an IMF-supported adjustment program with those that did not. The regression results showed that IMF financial assistance did not have an independent impact in the recovery process.

Figure 5.13
**Post-Crisis Recovery: Real GDP Growth
 of the Crisis Economies**

Source of Basic Data: ADB Key Indicators of Developing Asian and Pacific Countries (2005) and Asian Development Outlook (2005).

This adjustment path confirms the V-pattern cited in the works of Gupta, Mishra & Sahay (2001), Park & Lee (2002) and Hong & Tornell (2005). Generally, a V-type adjustment path exhibits real GDP growth rates falling below the average from three to five years prior to the crisis, increasing slightly during the crisis year and recovering quickly to the non-crisis level within three years after. The average real GDP growth rate is normally about 2 percent above the crisis-year level and the actual growth rates tend to exceed the pre-crisis or tranquil period average, eventually tapering off to the pre-crisis level within five years after the crisis period.

Figure 5.14
Real Effective Exchange Rates in the Crisis Economies

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries and Asian Development Outlook (2005).

While the above studies examined the long-run impact on the *growth* rate of output, another study by Cerra & Saxena (2005) looked at the extent to which the *level* of output has recovered from the Asian crisis. The authors, building on the theoretical models of Hamilton (1989) and Friedman (1993), expanded the empirical methodology of Kim and Murray (2002) by applying a regime-switching common factor model that decomposes recessions into permanent and temporary components using state variables in a multivariate analysis covering output, investment and consumption. In Hamilton's (1989) model, a negative state results in a permanent output loss since the regime switch between positive and negative growth states occurs in the permanent component while in Friedman's (1993) model, the regime switching occurs in the temporary component so that output is just 'plucked' below trend during a recession.

Cerra & Saxena (2005) applied the regime-switching model to decompose recessions in six Asian countries (i.e., Hong Kong, Indonesia, Korea, Malaysia, Philippines and Singapore) and concluded that while growth recovered reasonably quickly after the crisis, there was evidence of permanent losses in the levels of output of the six Asian countries studied, thus behaving according to Hamilton's model. The policy implications vary since a permanent loss a la Hamilton is associated with a downward shift of potential output whereas a temporary loss a la Friedman denotes a deterioration of the output gap. The source of the losses dictates the appropriate policy response, which in this case involves macroeconomic and structural policies that reduce distortions and stimulate potential output.

Park & Lee (2002) identified the large real exchange rate depreciation and expansionary monetary and fiscal policies as macroeconomic policies that contributed to the speedy recovery of the crisis economies. Figure 5.14 shows the level of the real effective exchange rates in the five crisis economies with the rate of depreciation averaging about 29 percent in 1998 compared to a real appreciation averaging 7 percent in 1996. The rate of depreciation in 1998 ranged from a high of 52 percent in Indonesia to a low of 19 percent in Thailand. The depreciation rates were sustained to about 2.5 percent per year from 2001 to 2003. An issue related to exchange rate policy after the crisis is whether the Asian crisis economies have reverted back to their pre-crisis exchange rate policies making them vulnerable to a repetition of events that unfolded in 1997.

Calvo & Reinhart (2002) believe that the currencies of the crisis economies were not adjusting as much just like the pre-crisis years because of the 'fear of floating', thus maintaining 'soft pegs'. McKinnon (2001, 1999) acknowledges the return to formal or informal dollar pegging by the crisis economies because of the 'original sin' hypothesis where domestic currency could not be used to borrow abroad nor borrow long-term even in the domestic market, leading to currency (e.g., projects that generate income in pesos are financed with dollars) and maturity mismatches (e.g., long-term projects are financed by short-term loans). By computing an index of monthly changes in 'exchange market pressure'⁴¹, the empirical results of Hernandez & Montiel (2001), on the contrary, showed a general movement towards greater exchange rate flexibility in the post-crisis period for most of the crisis economies, with the exception of Malaysia, which openly fixed its U.S. dollar exchange rate in the face of re-erecting capital controls.

None of the countries though moved to the extreme of pursuing a clean float of the exchange rate, preferring to stay in the 'hollow middle' of managing floats to stabilize high-frequency exchange rate movements. Finally, Baig (2001) through country-by-country regression analyses and

⁴¹ This is a weighted average of monthly per cent changes in the exchange rate, stock of international reserves and domestic interest rates.

hypothesis tests of coefficient stability proved that exchange rate volatility remained high in the post-crisis period compared to the pre-crisis period and that the East Asian currencies are not increasingly being pegged to the dollar contrary to McKinnon's findings.

Nonetheless, the substantive depreciation of currencies in the crisis economies supported a rise in net exports beginning 1998 as shown in Figure 5.15. The real exchange rate depreciation had a bigger impact on those East Asian economies given their higher level of openness to trade and export-orientation. Net exports in real terms grew fastest in Thailand and Korea in 1998 and in Indonesia in 1999 after depreciating a year or two earlier given their level of openness measured as the average export plus import share to GDP ratios of 88 percent, 51 percent and 52 percent, respectively for the pre-crisis years 1990-1996. Moreover, even as Malaysia had the most open economy with an average total trade to GDP ratio of 173 percent, its net exports did not improve as much as it opted to fix its exchange rate to the dollar contrary to IMF conditionality.

Figure 5.15
Real Net Export Growth Rate of the Crisis Economies

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Finally, the Philippines with an 83 percent total trade to GDP ratio showed a modest improvement in net exports as its currency, as shown in Figure 5.14 depreciated the least in real terms. A study by Duttagupta & Spilimbergo (2000) observed that export volumes in the East Asian countries had a delayed response to the large exchange rate depreciations. Focusing on specific exports such as chemicals, manufactures, machinery, vehicle, clothing and semi-conductors in six Asian economies of Hong Kong, Indonesia, Malaysia, Thailand, Korea and Singapore, they constructed a new monthly data set of price and quantity of these exports and conducted a demand-supply analysis using a vector cointegration estimation procedure. Testing the following plausible reasons for the non-response of exports — e.g., short-run price inelasticity of exports indicating a J-curve

effect; a credit crunch to the private exporters because of high interest rates; an exogenous shift in world demand; and competitive devaluations, the authors found evidence of the latter.

The demand for East Asian exports were indeed sensitive to prices and to nominal exchange rate changes so that a nominal depreciation depresses the U.S. dollar-denominated export price and increases the demand for the depreciating country's exports. However, this positive demand effect of the initial depreciation is neutralized when another exporting competitor country's currency depreciates, inducing an overall effect of declining export prices with modest increases in export volumes. These effects have been found to occur within four to six months, thus confirming that trade was an important channel of transmission of contagion during the crisis.

Figure 5.16
Growth of Money Supply (M2) in the Crisis Economies
Annual percent growth

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

The Park & Lee (2002) study also attributed the quicker rate of recovery of the crisis economies to accommodative monetary and fiscal policies. Figures 5.16 and 5.17 illustrate the respective growth rates of real money supply and government spending in the crisis economies. South Korea initiated the expansionary monetary policy stance in 1998 with real M2 rising by close to 20 percent as the rest of the crisis economies siphoned off money supply from the system. Malaysia, the Philippines and to a lesser extent Thailand followed suit in 1999 with real M2 growing by about 15 percent, 10 percent and 5 percent, respectively. The expansionary stance is corroborated by Goldfajn & Baig (1998) and Ghosh & Ghosh (1999) whose studies respectively found no evidence of overly tight monetary policies in the Asian countries right after the crisis and the need for softer monetary policy to combat recession given the tradeoff between inflation and output; and no evidence of a credit crunch as rising real interest rates and weakened economic activity lowered credit demand rather than constraining the supply of credit in the crisis economies.

In terms of fiscal policy, all countries started to ease in 1999 with more pronounced increases in real government spending in Indonesia (about 20 percent) and South Korea (about 15 percent). Malaysia though pursued expansionary fiscal policy through 2001 whereas all the rest used it as a countercyclical tool because of the weakening of the economies, but more importantly to provide

social safety nets as a result of massive lay-offs and social dislocations brought about by the crisis and to incorporate the costs of financial system restructuring.

Figure 5.17
**Growth of Real Government Expenditures
in the Crisis Economies**

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Figure 5.18
**Growth in Real Gross Domestic Capital Formation
in the Crisis Economies**

Source of Basic Data: Asian Development Bank (2005) Key Indicators of Developing Asian and Pacific Countries.

Reminiscent of the debate on the Keynesian and Friedman solutions to the Great Depression, the impact of the expansionary monetary and fiscal measures on the recovery process contrasted with the initial IMF prescription of tight monetary and fiscal austerity programs. Radelet & Sachs (1999), Nunnenkamp (1998), Hutson & Kearney (1999), Berg (1999), Dawson (2002), De

Gregorio, Eichengreen, Ito, & Wyplosz (1999), Bullard, Bello & Malhotra (1998), Eichengreen (2000), Corbett & Vines (1999), Harvie (2000), among others, criticized these IMF solutions as harsh, unnecessary and contributory to the further deepening of the crisis, given that its nature is liquidity-based. The monetary policy for those crisis economies that followed an IMF program necessitated interest rate increases to attract back capital flows and preclude exchange rates from sliding further. Thus, gross domestic capital formation dipped during the first two to three years of the IMF program. Once the governments were able to arrest speculation and restore stability in the currency markets, the monetary authorities were able to adjust interest rates gradually leading to an upsurge in investment demand beginning 1999 for Korea and the Philippines and subsequently for Indonesia, Malaysia, and Thailand in the year thereafter as shown in Figure 5.18, after which they reverted back to the pre-crisis trend. Park & Lee (2002) attribute one final determinant of the Asian crisis recovery process to the favorable external or global environment.

Figure 5.19
**Annual Real GDP Growth Rates of Leading OECD Countries
1980-2000**

Source: OECD Economic Outlook No. 77, Statistical Annex Tables Retrieved from http://www.oecd.org/document/61/0,2340,en_2825_32066506_2483901_1_1_1_1,00.html on June 2008.

For one as shown in Figure 5.19, the world's principal economies led by the USA, posted strong growth exceeding 4 percent in real terms from 1997 to 1999, owing to the surge in ICT productivity. This was relatively higher than the 1980-1990 average of 3.3 percent. The U.S. growth was followed by the European Union with 3.1 percent average growth in real terms for three consecutive years after the Asian crisis erupted, higher than the 1980-1990 average of 2.4 percent. Even Canada and Australia posted respective average real output growth of 4.9 percent and 4.3 percent in the 1998-2000 period comparing favorably with the corresponding 1980-1990 mean performance of 2.8 percent and 3.2 percent. Japan, recovered though much later in 2000 posting a real growth of more than 2 percent, as it was among industrialized countries, the most affected by the Asian crisis, having lent heavily to the crisis economies.

Figure 5.20
World Oil Prices: 1970-2005

Source: Energy Information Administration, Retrieved from <http://www.eia.doe.gov/emeu/cabs/chron.html> on June 2008.

Secondly, oil prices, as shown in Figure 5.20, plummeted in 1997 to 1999 as Iraq began exporting oil under several United Nations Resolutions (No. 1153, 1158, 1266) (see <https://www.un.org/Depts/oip/background/scrsindex.html>) and the OPEC boosted its production quota by 2.5 million barrels per day to 27.5 million barrels per day, making it the largest annual increase since 1988. Based on Mabro (1998) and Baffes, Ayhan Kose, Ohnsorge, & Stocker (2015), the increase in oil supply coincided with low demand for oil from the Asian countries due to the crisis and also increased inventories on account of two unusually warm winters. The ensuing drop in oil prices supported the recovery process in the Asian crisis economies and in the rest of the global economy.

5.7 Conclusion

This chapter reviewed the debate on the causes of the Asian crisis episode of 1997 with two competing explanations emerging — one of structural or fundamental macroeconomic frailties and the other simply a panic or contagion effect from creditors under the spectre of asymmetric information. The Asian debacle story confirms the stylized fact that the growth process is non-linear and is prone to moments of instability and shifts in growth patterns. The key take-away of the chapter lies in revealing the dearth of real (technological) explanations to the crisis as espoused by real business cycle theory reviewed in Chapter 4. Both fundamentalist and contagionist positions to the causes of the Asian crisis are monetarist in nature judging from the rise in short-term credits compared to existing foreign reserves, banking sector inefficiencies and corporate governance weaknesses which led to substantial capital outflows, creditor collection race, and in the end massive exchange rate depreciations. The involvement of the International Monetary Fund by way of providing bail-out money and introducing conditionalities befitting a current account crisis rather than a capital account crisis which affected the stricken countries was also questioned. This study will attempt to supplement the existing explanations for the crisis that befell these Asian

economies by incorporating the technological perspective following real business cycle theory using input-output analysis in the succeeding chapters.

REFERENCES

- Acemoglu, D., S. Johnson, J. A. Robinson, and Y. Thaicharoen (2003). Institutional causes, macroeconomic symptoms: volatility, crises and growth. *Journal of Monetary Economics* 50 (1), 49 – 123
- Ahluwalia, P. (2000). Discriminating Contagion: An Alternative Explanation of Contagious Currency Crises in Emerging Markets. *IMF Working Paper* WP/00/14, February. Washington, D.C.: International Monetary Fund.
- Alba, P., Bhattacharya, A., Claessens, S., Ghosh, S. & Hernandez, L. (1998). *Volatility and Contagion in a Financially-Integrated World: Lessons from East Asia's Recent Experience*, Paper presented at PAFTAD, Thailand, 20-22 May.
- Arndt, H.W. and Hal Hill, (Eds.) (1999). *Southeast Asia's Economic Crisis: Origins, Lessons and the Way Forward*. Singapore: Institute of Southeast Asian Studies.
- Asian Development Bank (2005). *Asian Development Outlook 2005*. Manila: Asian Development Bank (April).
- Asian Development Bank (2005). *Key Indicators of Developing Asian and Pacific Countries*. Manila: Asian Development Bank.
- Aziz, J., Caramazza, F., & Salgado, R. (2000). Currency Crises: In Search of Common Elements. *IMF Working Paper* WP/00/67, March. Washington, D.C.: International Monetary Fund.
- Bae, K., G. Andrew Karolyi, G., & Stulz, R. (2000). A New Approach to Measuring Financial Contagion. *NBER Working Paper* 7913, (September). Cambridge, MA: National Bureau of Economic Research.
- Baffes, J., Ayhan Kose, M., Ohnsorge, F. & Stocker M. (2015). The Great Plunge in Oil Prices: Causes, Consequences and Policy Responses. *World Bank Group Policy Research Note* PRN/15/01, March. Development Economics World Bank Group
- Baig, T. (2001). Characterizing Exchange Rate Regimes in Post-Crisis East Asia. *IMF Working Paper* WP/01/152, October. Washington, D.C.: International Monetary Fund.
- Baig, T. & Goldfajn, I. (1998). Financial Market Contagion in the Asian Crisis. *IMF Working Paper* 98/155, November. Washington, D.C.: International Monetary Fund.
- Basu, R. (2002). Financial Contagion and Investor “Learning”: An Empirical Investigation. *IMF Working Paper* WP/02/218, December. Washington, D.C.: International Monetary Fund.
- Basurto, G. & Ghosh, A. (2000). The Interest Rate-Exchange Rate Nexus in the Asian Crisis Countries. *IMF Working Paper* WP/00/19, February. Washington, D.C.: International Monetary Fund.
- Bello, W. & Rosenfeld, S. (1990). *Dragons in Distress: Asia's Miracle Economies in Crisis*. San Francisco, CA: Institute for Food and Development Policy.

- Benelli, R. (2003). Do IMF-Supported Programs Boost Private Capital Inflows? The Role of Program Size and Policy Adjustment. *IMF Working Paper* WP/03/231 (November). Washington, D.C.: International Monetary Fund.
- Bernanke, B. (1983). Nonmonetary Effects of the Financial Crisis in the Propagation of the Great Depression. *American Economic Review*, 73 (3), 257-76.
- Berg, A. (1999). The Asia Crisis: Causes, Policy Responses, and Outcomes. *IMF Working Paper* WP/99/138. October. Washington, D.C.: International Monetary Fund
- Berg, A. & Pattillo, C. (1998). Are Currency Crises Predictable? A Test. *IMF Working Paper* WP/98/154, November. Washington, D.C.: International Monetary Fund.
- Bergsten, C. F. (1998). Why the Asian Monetary Crisis? *EDI Forum*, World Bank, Vol.2, No. 4, Spring.
- Bhattacharya, P. (2003). Changing Asian Values. (April 5). Boloji.com webpage. Back to the Future Channel. Retrieved 09-10-2007 from <http://www.boloji.com/analysis/bttf/041g.htm>, 25 August 2005.
- Bikhchandani, S. & Sharma, S. (2000). Herd Behavior in Financial Markets: A Review. *IMF Working Paper* WP/00/48, March. Washington, D.C.: International Monetary Fund.
- Blanchard, O. & Watson, M. (1982). Bubbles, Rational Expectations and Financial Markets. *NBER Working Paper* No. 945.
- Bluhm, R., de Crombrughe, D & Szirmai, A. (2013). Do Weak Institutions Prolong Crisis? On the Identification, Characteristics and Duration of Declines During Economic Slumps. *CESifo Working Paper* No. 4594.
- Boorman, J., Lane, T., Schulze-Ghattas, M., Bulir, A., Ghosh, A., Hamann, J., Mourmouras, A. & Phillips, S. (2000). Managing Financial Crises: The Experience of East Asia. *IMF Working Paper* WP/00/107, June. Washington, D.C.: International Monetary Fund.
- Bordo, M. (2000). Are Financial Crises Becoming Increasingly More Contagious? What is the Historical Evidence on Contagion? *NBER Working Paper* 7900, September, Cambridge, MA: National Bureau of Economic Research.
- Bosworth, B. & Collins, S. (2000). From Boom to Crisis and Back Again: What Have We Learned? *ADB Institute Working Paper* 7, February. Tokyo, Japan: Asian Development Bank Institute.
- Broner, F., Gaston Gelos, R. & Reinhart, C. (2004). When in Peril, Retrench: testing the Portfolio Channel of Contagion. *NBER Working Paper* No. 10941, December. Cambridge, MA: National Bureau of Economic Research.
- Bullard, N., Bello, W. & Malhotra, K. (1998). *Taming the Tigers: The IMF and the Asian Crisis*. CIDSE. Retrieved from www.cidse.org/pubs/tamingtigers.html on 25 August 2005.
- Burnside, C., Eichenbaum, M. & Rebelo, S. (1998), Prospective Deficits and the Asian Currency Crisis. *NBER Working Paper* 6758, October.
- Calvo, G. (1998). *Balance of Payments Crises in Emerging Markets: Large Capital Inflows and Sovereign Governments*. Paper presented at the National Bureau of Economic Research Conference on Currency Crises, Cambridge, Massachusetts, February 6-7, 1998.

- Calvo, G. (1995). *Varieties of Capital Market Crises*. Mimeo. University of Maryland. Retrieved from <https://core.ac.uk/download/pdf/6441988.pdf> on October 2010.
- Calvo, G. (1987). Balance of Payments Crises in a Cash-in-Advance Economy. *Journal of Money, Credit and Banking*, Vol. 19, No. 1 (February): 19-32.
- Calvo, G. & Reinhart, C. (2002). Fear of Floating. *The Quarterly Journal of Economics*. Vol. CXVII, Issue 2, May, pp. 379-408.
- Caramazza, F., Ricci, L. & Salgado, R. (2000). Trade and Financial Contagion in Currency Crises. *IMF Working Paper WP/00/?* (January).
- Cecchetti, S.G. & Karras, G. (1994). Sources of Output Fluctuations during the Interwar Period: Further Evidence on the Causes of the Great Depression. *Review of Economics and Statistics*, 77, 80-102.
- Cerra, V. & Saxena, S.C. (2005). Did Output Recover from the Asian Crisis? *IMF Staff Papers*, Vol. 52, No. 1, Washington, D.C.: International Monetary Fund.
- Chinn, M. & Kletzer, K. (2000). International Capital Inflows, Domestic Financial Intermediation and Financial Crises under Imperfect Information. *NBER Working Paper No. 7902* (September).
- Claessens, S., Djankov, S. & Ferri, G. (1999). Corporate Distress in East Asia: Assessing the Impact of Interest and Exchange Rates Shocks. *Emerging Markets Quarterly*, Vol. 3, No. 2.
- Claessens, S., Djankov, S. & Klingebiel, D. (1999). Financial Restructuring in East Asia: Halfway There? *World Bank Financial Sector Discussion Paper No. 3*. Washington, D.C.: The World Bank.
- Claessens, S., Djankov, S. & Lang, L.H.P. (2000). East Asian Corporations Heroes or Villains? *World Bank Discussion Paper No. 409*, Washington, D.C.: The World Bank.
- Claessens, S., Djankov, S. & Xu, L.C. (2000). Corporate Performance in the East Asian Financial Crisis. *World Bank Research Observer*, Vol. 15, No. 1, pp. 23-46. Washington, D.C.: The World Bank.
- Clark, P. & Huang, H. (2001). International Financial Contagion and the IMF: A Theoretical Framework'. *IMF Working Paper WP/01/137*, September. Washington, D.C.: International Monetary Fund.
- Cole, H. & Kehoe, T. (1996). A Self-Fulfilling Model of Mexico's 1994-1995 Debt Crisis. *Federal Bank of Minneapolis Research Department Staff Report 210* (April).
- Collins, S. & Bosworth, B. (1996). Economic Growth in East Asia: Accumulation versus Assimilation. *Brookings Papers on Economic Activity*, 2, 135-191.
- Connolly, M. & Taylor, D. (1984). The Exact Timing of the Collapse of an Exchange Rate Regime and its Impact on the Relative Price of Traded Goods. *Journal of Money, Credit and Banking*, Vol. 16, No. 2, (May): 194-207.
- Cooper, R. & Corbae, D. (1997). Financial Fragility and the Great Depression. *NBER Working Paper 6094*, July.
- Corbett, J & Vines, D. (1999). The Asian crisis: lessons from the collapse of financial systems, exchange rates and macroeconomic policy. In P. Agenor, M. Miller, D. Vines & A. Weber (1999). *The Asian Financial Crisis: Causes, Contagion and Consequences*. Center for Economic Policy Research, World Bank Institute. Cambridge University Press: 67-111.

- Corsetti, G., Pesenti, P. & Roubini, N. (1998a). *What caused the Asian currency and financial crisis? Part I: A macroeconomic overview*. Yale University, September.
- Corsetti, G., Pesenti, P. & Roubini, N. (1998b). *What caused the Asian currency and financial crisis? Part II: The policy debate*. Yale University, September.
- Corsetti, G., Pesenti, P. & Roubini, N. (1998c). Paper Tigers? A model of the Asian crisis. *NBER Working Paper* 6783, November.
- Corsetti, G., Pesenti, P. & Roubini, N. (1998d). *Fundamental determinants of the Asian crisis: a preliminary empirical assessment*. Fordham University, November.
- Corsetti, G., Pesenti, P., Roubini, N. & Tille, C. (1998). *Competitive devaluations: a welfare-based approach*. Duke University, December.
- Cottarelli, C. & Giannini, C. (2002). Bedfellows, Hostages or Perfect Strangers? Global Capital Markets and the Catalytic Effect of IMF Crisis Lending. *IMF Working Paper* WP/02/193 (November). Washington, D.C.: International Monetary Fund.
- Crafts, N. (1998). East Asian Growth Before and After the Crisis. *IMF Working Paper* WP/98/137, September. Washington, D.C.: International Monetary Fund.
- Dawson, T. (2002). The IMF's Role in Asia: Part of the Problem or Part of the Solution? Speech prepared for the Institute of Policy Studies and Singapore Management University Forum, Singapore: 10 July. Retrieved from <https://www.imf.org/en/News/Articles/2015/09/28/04/53/sp071002> on 06-2018.
- De Gregorio, J., Eichengreen, B., Ito, T. & Wyplosz, C. (1999). An Independent and Accountable IMF. *Geneva Reports on the World Economy* 1, 10 September. International Center for Monetary and Banking Studies and Center for Economic Policy Research. Retrieved from https://cepr.org/sites/default/files/geneva_reports/GenevaP130.pdf on 06-2018.
- De Gregorio, J. & Valdes, R. (2000). *Crisis Transmission: Evidence from the Debt, Tequila and Asian Flu Crises*. Draft March. WIDER/World Bank Research Project.
- Delhaise, P. F. (1998). *Asia in Crisis: The Implosion of the Banking and Finance Systems*. Singapore: John Wiley and Sons (Asia) Pte Ltd.
- Dell'Ariccia, G., Schnabel, I., & Zettelmeyer, J. (2002). Moral Hazard and International Crisis Lending: A Test. *IMF Working Papers* WP/02/181 (October), Washington, D.C.: International Monetary Fund.
- Dekle, R., Hsiao, C. & Wang, S. (2001). Do High Interest Rates Appreciate Exchange Rates During Crisis?: The Korean Evidence. *Oxford Bulletin of Economics and Statistics*, 63, 3, 0305-9049.
- De Meza, D. & Webb, D.C. (1987). Too much investment in problems of asymmetric information. *Quarterly Journal of Economics*, 102: 179-222.
- Desai, P. (2003). *Financial Crisis, Contagion, and Containment*. Princeton, New Jersey: Princeton University Press.
- Diamond, D. and Dybvig, O.H. (1983), Bank runs, deposit insurance and liquidity. *Journal of Political Economy*, 91 (3), June, 401-19.
- Disyatat, P. (2001). Currency Crises and the Real Economy: The Role of Banks. *IMF Working Paper* WP/01/49, May. Washington, D.C.: International Monetary Fund.
- Dollar, D. & Hallward-Driemeier, M. (2000). Crisis, Adjustment and Reform in Thailand's Industrial Firms. *The World Bank Research Observer*, Vol. 15, No. 1, February.

- Dooley, M. P. (1997). A Model of Crises in Emerging Markets. *NBER Working Paper* No. 6300, December, Cambridge, MA: National Bureau of Economic Research.
- Dornbusch, R. (1998). *Asian Crisis Themes*, MIT, February.
- Dornbusch, R., Park, Y.C., & Claessens, S. (2000), Contagion: Understanding How It Spreads. *World Bank Research Observer*, Vol. 15, No. 2, pp. 177-197, Washington, D.C.: The World Bank.
- Drazen, A. (1998). Political Contagion in Currency Crisis. Paper prepared for an *NBER conference on Currency Crises*, Cambridge MA, February 6-7, 1998. Retrieved from http://econserver.umd.edu/~drazen/Hard_To_Find_Papers/ciewp39.pdf on September 2010.
- Dreher, A.D. & Vaubel, R. (2002). Does the IMF cause moral hazard and political business cycles? *Institut für Volkswirtschaftslehre und Statistik* No. 598-01, Mannheim, Germany: Universität Mannheim.
- Duttagupta, R. & Spilimbergo, A. (2000). What Happened to Asian Exports During the Crisis? *IMF Working Paper* WP/00/200, December. Washington, D.C.: International Monetary Fund.
- Edwards, S. (2004). *Capital Controls, Sudden Stops and Current Account Reversals*. Paper presented at the National Bureau of Economic Research Conference on International Borrowing, Santa Barbara, California, Dec. 16-18, 2004.
- Edwards, S. (1989). Exchange Rate Misalignment in Developing Countries. *The World Bank Research Observer*, Vol. 4, Issue 1 (January): 3-21.
- Edwards, S. & Susmel, R. (2001). Volatility Dependence and Contagion in Emerging Equity Markets. *NBER Working Paper* No. 8506, October. Cambridge, MA: National Bureau of Economic Research.
- Eichengreen, B. (1999). *Toward a New International Financial Architecture: A Practical Post-Asia Agenda*. Washington, D.C.: Institute for International Economics.
- Eichengreen, B. (2000). The International Monetary Fund in the Wake of the Asian Crisis. In Noble, G. & Ravenhill, J. (2000). *The Asian Financial Crisis and the Architecture of Global Finance*. Cambridge University P170-191.ress, pp.
- Eichengreen, B. & Portes, R. (1995). *Crisis? What Crisis? Orderly Workouts for Sovereign Debtors*. London: Centre for Economic Policy Research.
- Eichengreen, B., Rose, A.K. & Wyplosz, C. (1996). Contagious Currency Crisis. *NBER Working Paper* No. 5681, July. Cambridge, MA: National Bureau of Economic Research.
- Enoch, C., Baldwin, B., Frecaut, O. & Kovanen, A. (2001). Indonesia: Anatomy of a Banking Crisis Two Years of Living Dangerously 1997-99. *IMF Working Paper* WP/01/52, May. Washington, D.C.: International Monetary Fund.
- Esquivel, G. & Larrain, F. B. (1998). Explaining Currency Crises. *Harvard Institute for International Development (HIID) Development Discussion Paper* No. 666, November, Harvard University.
- Evrensel, A.Y. & Kutun, A.M. (2004a). Testing Creditor Moral Hazard in Sovereign Bond Markets: A Unified Theoretical Approach and Empirical Evidence. *William Davidson Institute Working Paper Series* 2004-665, William Davidson Institute at the University of Michigan Business School.

- Evrensel, A.Y. & Kutan, A.M. (2004b). Creditor Moral Hazard in Equity Markets: A Theoretical Framework and Evidence from Indonesia and Korea. *William Davidson Institute Working Paper Series* 2004-659. William Davidson Institute at the University of Michigan Business School.
- Feldstein, M. (1998). Refocusing the IMF. *Foreign Affairs*. March/April 1998: 20-33.
- Fernald, J., Edison, H. & Loungani, P. (1998). Was China the First Domino? Assessing Links between China and the Rest of Emerging Asia. *Board of Governors of the Federal Reserve System International Finance Discussion Paper* No. 604, March.
- Ffrench-Davis, R. (Ed.) (2001). *Financial Crises in "Successful" Emerging Economies*. United Nations Economic Commission for Latin America and the Caribbean. Washington, D.C.: Brookings Institution Press.
- Fischer, B. & Reisen, H. (1992). Towards Capital Account Convertibility. *OECD Development Center Policy Brief* No. 4, Paris.
- Fischer, S. (1998a). *The Asian Crisis: A View from the IMF*. Address at the Midwinter Conference of the Bankers' Association of Foreign Trade, Washington, D.C., 22 January.
- Fischer, S. (1998b). *The IMF and the Asian Crisis*. Forum Funds Lecture at UCLA, California, 20 March.
- Flood, R. & Garber, P. (1984). Collapsing Exchange-Rate Regimes —Some Linear Examples. *Journal of International Economics*, Vol. 17, Issues 1-2, August, pp. 1-13.
- Flood, R., Garber, P., & Kramer, C. (1995). Collapsing Exchange Rate Regimes: Another Linear Example. *NBER Working Paper* 5318, October. Cambridge, MA: National Bureau of Economic Research.
- Flood, R. & Marion, N. (2001). A Model of Joint Distribution of Banking and Exchange –Rate Crises. *IMF Working Paper* WP/01/213, December. Washington, D.C.: International Monetary Fund.
- Flood, R. & Marion, N. (1998). Self-Fulfilling Risk Predictions: An Application to Speculative Attacks. *IMF Working Paper* WP/98/124, August. Washington, D.C.: International Monetary Fund.
- Forbes, K. & Rigobon, R. (2000). *No Contagion, only Interdependence: Measuring Stock Market Co-movements*. Draft February. MIT-Sloan School of Management and National Bureau of Economic Research.
- Frankel, J. & Rose, A. (1995). A Survey of Empirical Research on Nominal Exchange Rates. *NBER Working Paper* No. 4865 (September).
- Frankel, J. & Schmukler, S. (1998). Crisis, Contagion and Country Funds: Effects on East Asia and Latin America. In R. Glick (Ed.) (1998), *Managing Capital Flows and Exchange Rates*, Cambridge University Press.
- Fratzscher, M. (2002). On Currency Crises and Contagion. *European Central Bank Working Paper* No. 139, April. Germany: European Central Bank.
- Friedman, M. (1993). The "Plucking Model" of Business Fluctuations Revisited. *Economic Inquiry*, Vol. 31, April, pp.171-177.
- Fukuyama, F. (1999). *Asian Values in the Wake of the Asian Crisis*. Paper presented at the Conference on Democracy, Market Economy and Development, Seoul, Korea: 25-27 February.

- Furman, J. & Stiglitz, J. (1998). Economic Crises: Evidence and Insights from East Asia. *Brookings Papers on Economic Activity* No. 2, pp. 1-135. The Brookings Institution.
- Garran, R. (1998). *Tigers Tamed: The End of the Asian Miracle*. Honolulu, Hawaii: University of Hawaii Press.
- Ghosh, S. & Ghosh, A. (1999). East Asia in the Aftermath: Was There a Crunch? *IMF Working Paper* WP/99/38, March. Washington, D.C.: International Monetary Fund.
- Ghosh, A. & Phillips, S. (1999). Monetary and Exchange Rate Policies. In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment. *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 35-55.
- Glick, R. & Rose, A. (1998). Contagion and Trade: Why are Currency Crises Regional? *Pacific Basin Working Paper Series* No. PB98-03, Center for Pacific Basin Monetary and Economic Studies, Federal Reserve Bank of San Francisco.
- Godement, F. (1999). *The Downsizing of Asia*. London: Routledge.
- Goldfajn, I. & Baig, T. (1998). Monetary Policy in the Aftermath of Currency Crises: The Case of Asia. *IMF Working Paper* WP/98/170, December, Washington, D.C.: International Monetary Fund.
- Goldfajn, I. & Gupta, P. (2003). Does Monetary Policy Stabilize the Exchange Rate following a Currency Crisis? *IMF Staff Papers*, January 2003, Vol. 50, Issue 1: 90-114.
- Goldstein, I. & Pauzner, A. (2001). *Contagion of Self-Fulfilling Financial Crises Due to Diversification of Investment Portfolios*. Draft 5 June, Princeton University.
- Goldstein, M. (1998). The Asian Financial Crises: Causes, Cures and Systemic Implications. *Policy Analysis in International Economics* No. 55. Institute of International Economics. Washington, D.C.
- Gough, L. (1998). *Asia Meltdown: The End of the Miracle?* Oxford, U.K: Capstone Publishing Limited.
- Greenspan, A. (1997). *Remarks before the Committee on Banking and Financial Services*, U.S. House of Representatives, 13 November.
- Greenspan, A. (1998a). *Remarks before the Committee on Banking and Financial Services*, U.S. House of Representatives, 30 January.
- Greenspan, A. (1998b). *Remarks before the Annual Financial Markets Conference of the Federal Reserve Bank of Atlanta*, Miami Beach, 27 February.
- Gregorio, de J. & Valdes, R. (2001). Crisis Transmission: Evidence from the Debt, Tequila, and Asian Flu Crises. In S. Claessens, K.J. Forbes (Eds.). *International Financial Contagion*. Springer, Boston, MA.
- Grenville, S.A. (1998). The Asian Economic Crisis. *Reserve Bank of Australia Bulletin*, April.
- Griffith-Jones, S. & Pfaffen-zeller, S. (1998). *A Survey of the East Asian Currency Crisis: the Debate on its Causes and Possible Solutions*. Draft, Institute of Development Studies, 18 June.
- Gupta, P., Mishra, D., & Sahay, R. (2003). Output Response to Currency Crises. *IMF Working Paper* WP/03/230, November. Washington, D.C.: International Monetary Fund.

- Harvie, C. (2000). The Korean Financial Crisis: Is Bail-out a Solution? In T. Van Hoa & C. Harvie (Eds.). *The Causes and Impact of the Asian Financial Crisis*. Macmillan Press Ltd.:58-94.
- Jackson, K (Ed.) (1999). *Asian Contagion: The Causes and Consequences of a Financial Crisis*. Boulder, Colorado: Westview Press.
- Haggard, S. (2000). *The Political Economy of the Asian Financial Crisis*. Washington, D.C.: Institute for International Economics, August.
- Hamann, J. (1999). Background to the Crisis. In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment. *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 9-17.
- Hamann, J. & Schulze-Ghattas, M. (1999). Structural Reforms. . In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment. *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 67-76.
- Hamilton, J. (1989). A New Approach to the Economic Analysis of Nonstationary Time Series and the Business Cycle. *Econometrica*, Vol. 57, No. 2, March, pp. 357-384.
- Hardy, D. & Pazarbaşıoğlu, C. (1998). Leading Indicators of Banking Crises: Was Asia Different? *IMF Working Paper WP/98/91*, June. Washington, D.C.: International Monetary Fund.
- Henderson, C. (2000). *Asian Dawn*. New York: McGraw-Hill.
- Henderson, C. (1998). *Asia Falling*. New York: McGraw-Hill.
- Henke, H. & Boxill, I. (Eds.) (2000).The End of the Asian Model? *Advances in Organization Studies*, Volume 2. Amsterdam, Netherlands: John Benjamins Publishing Company.
- Herman, B. & Sharma, K. (Eds.) (1998). *International Finance and Developing Countries in a Year of Crisis*. Tokyo, Japan: United Nations University.
- Hernandez, L. & Montiel, P. (2001). Post-Crisis Exchange Rate Policy in Five Asian Countries: Filling in the "Hollow Middle"? *IMF Working Paper WP/01/170*, November. Washington, D.C.: International Monetary Fund.
- Hernandez, L. & Valdes, R. (2001). What Drives Contagion: Trade, Neighborhood, or Financial Links? *IMF Working Paper WP/-1/29* (March). Washington, D.C.: International Monetary Fund.
- Hernandez, L., Mellado, P., & Valdes, R. (2001). Determinants of Private Capital Flows in the 1970s and 1990s: Is There Evidence of Contagion? *IMF Working Paper WP/01/64*, May. Washington, D.C.: International Monetary Fund.
- Hill, C. (1998). *The Asian Financial Crisis*, University of Washington. Retrieved from <http://weber.u.washington.edu/~chill/updates/AsianCrisis.html>, 25 August 2005
- Hong, K. & Tornell, A. (2005). Recovery from a currency crisis: some stylized facts. *Journal of Development Economics*, Vol. 76, pp. 71-96.
- Huang, H. & Xu, C. (2000). Financial Institutions, Financial Contagion, and Financial Crises. *IMF Working Paper WP/00/92*, May. Washington, D.C.: International Monetary Fund.

- Husted, S. & MacDonald, R. (1999). The Asian currency crash: were badly driven fundamentals to blame? *Journal of Asian Economics*, Vol. 10, pp. 537-550.
- Hutson, E. & Kearney, C. (1999). The Asian Financial Crisis and the Role of the IMF. *Journal of the Asia Pacific Economy* 4, 393-412.
- IMF Staff (2000). *Recovery from the Asian Crisis and the Role of the IMF*. Washington, D.C.: International Monetary Fund, June.
- Jackson, K. (Ed.) (1999). *Asian Contagion: The Causes and Consequences of a Financial Crisis*. Boulder, Colorado: Westview Press.
- Jeanne, O. & Zettelmeyer, J. (2004). The Mussa Theorem (and other Results on IMF-Induced Moral Hazard). *IMF Working Paper* WP/04/192 (October). Washington, D.C.: International Monetary Fund.
- Jomo, K.S., (Ed.) (1998). *Tigers in Trouble: Financial Governance, Liberalisation and Crises in East Asia*. London, U.K.: Zed Books Ltd.
- Kahler, M. (Ed.) (1998). *Capital Flows and Financial Crises*. Ithaca, New York: Cornell University Press.
- Kamin, S. (2002). Identifying the role of moral hazard in international financial markets. *International Finance Discussion Papers* No. 736, Board of Governors of the Federal Reserve System.
- Kaminsky, G., Reinhart, C. & Vegh, C. (2004). When It Rains, It Pours: Pro-cyclical Capital Flows and Macroeconomic Policies. *NBER Working Paper* 10780, September, Cambridge, MA: National Bureau of Economic Research.
- Kaminsky, G., Reinhart, C. & Vegh, C. (2003). The Unholy Trinity of Financial Contagion. *NBER Working Paper* No. 10061, October. Cambridge, MA: National Bureau of Economic Research.
- Kaminsky, G., & Reinhart, C. (1999). The Twin Crises: The Causes of Banking and Balance-of-Payments Problems. *The American Economic Review*, Vol. 89, No. 3, June, pp. 473-500.
- Kaminsky, G., & Schmukler, S. (1999). What Triggers Market Jitters? A Chronicle of the Asian Crisis. *Journal of International Money and Finance* 18 (1999), 537-560.
- Karacaovah, B. (1999). *Determinants of Contagious Currency and Financial Crises: The Case of Asia 1997*. Department of Economics, Istanbul Bilgi University, Turkey.
- Kim, C. & Murray, C. (2002). Permanent and Transitory Components of Recessions. *Empirical Economics*, 27 (2), 163-183.
- Kim, S.H., Kose, M.A. & Plummer, M. (2001). Understanding the Asian Contagion. *Asian Economic Journal*, 15 (2), 111-138.
- Kindleberger, C. (1978), *Manias, Panics, and Crashes: A History of Financial Crises*, New York: Basic.
- Kletzer, K. (2003). Sovereign Bond Restructuring: Collective Action Clauses and Official Crisis Intervention. *IMF Working Paper* WP/03/134 (June). Washington, D.C.: International Monetary Fund.
- Kochar, K., Loungani, P. & Stone, M. (1998). The East Asian Crisis: Macroeconomic Developments and Policy Lessons. *IMF Working Paper* WP/98/128 (August).

- Kopits, G. (2000). How Can Fiscal Policy Help Avert Currency Crises? *IMF Working Paper* WP/00/185, November. Washington, D.C.: International Monetary Fund.
- Kotler, P. & Kartajaya, H. (2000). *Repositioning Asia from Bubble to Sustainable Economy*. Andersen Consulting. Singapore: John Wiley and Sons (Asia) Pte Ltd.
- Krugman, P. (1998a). *The Hangover Theory: Are Recessions the Inevitable Payback for Good Times*. Slate: The Dismal Science.
- Krugman, P. (1998b). *Fire-sale FDI*. Retrieved from <http://web.mit.edu/krugman> 25 August 2005.
- Krugman, P. (1998c). *Will Asia Bounce Back?* Speech for Credit Suisse First Boston, Hong Kong, March.
- Krugman, P. (1998d). *Asia: What Went Wrong?* Fortune, 2 March.
- Krugman, P. (1997a). *Asia's Miracle is Alive and Well? Wrong, It Never Existed*. Time Asia, 150 (13), September 29.
- Krugman, P. (1997b). *What happened to Asia?* MIT.
- Krugman, P. (1994). The Myth of Asia's Miracle. *Foreign Affairs*, 73 (6), 62-78.
- Krugman, P. (1979). A Model of Balance-of-Payments Crises. *Journal of Money, Credit and Banking*, Vol. 11, pp.311-325.
- Krugman, P. & Rotemberg, J. (1990). Target Zones with Limited Reserves. *NBER Working Paper* 3418, August. Cambridge, MA: National Bureau of Economic Research.
- Kumar, M. & Persaud, A. (2001). Pure Contagion and Investors' Shifting Risk Appetite: Analytical Issues and Empirical Evidence. *IMF Working Paper* WP/01/134, September. Washington, D.C.: International Monetary Fund.
- Lane, T. (1999). Program Design. In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment. *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 18-19.
- Lane, T. (1999). Taking Stock. In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment. *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 77-80.
- Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). 'IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment', *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund
- Lane, T. & Schulze-Ghattas, M. (1999). Program Financing and Market Reactions. In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment. *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 20-26.
- Lane, T. & Phillips, S. (2000). Does IMF Financing Result in Moral Hazard? *IMF Working Paper* WP/00/168, October, Washington, D.C.: International Monetary Fund.

- Lane, T. & Phillips, S. (1999). Macroeconomic Environment. In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). 'IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment', *IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 27-34.
- Lane, T. & Tsikata, T. (1999). Fiscal Policy. In Lane, T., Ghosh, A., Hamann, J., Phillips, S., Schulze-Ghattas, M. & Tsikata, T. (1999). *IMF-Supported Programs in Indonesia, Korea and Thailand: A Preliminary Assessment. IMF Occasional Paper No. 178*, Washington, D.C.: International Monetary Fund, pp. 56-66.
- Lau, D. (1998). "Asian values" myth explodes. *Indian Express* (January 22). Bombay: Indian Express Newspapers (Bombay) Ltd. Retrieved from <http://www.expressindia.com/fe/daily/19980122/02255484.html> 25 August 2005.
- Lee, E. (1998). *The Asian Financial Crisis: The Challenge for Social Policy*. Geneva: International Labour Office.
- Lee, J. & Shin, K. (2005). IMF Bailouts and Moral Hazard. International Finance No. 0501005, *Economics Working Paper Archive at Washington University in St. Louis* at <http://econwpa.wustl.edu/>.
- Liu, L., Noland, M., Robinson, S. & Wang, Z. (1998). Asia Competitive Devaluations. *Institute for International Economics (IIE) Working Paper* 98-2, 17 January.
- Mabro, R. (1998). The Oil Price Crisis of 1998. *Oxford Institute for Energy Studies* SP 10.
- Masson, P. (1999). Multiple Equilibria, Contagion, and the Emerging Market Crises. *IMF Working Paper* WP/99/164, November. Washington, D.C.: International Monetary Fund.
- Masson, P. (1998). 'Contagion: Monsoonal Effects, Spillovers, and Jumps between Multiple Equilibria. *IMF Working Paper* WP/98/142, September. Washington, D.C.: International Monetary Fund.
- McKibbin, W. (1998). The Crisis in Asia: An Empirical Assessment. *Brookings Discussion Papers in International Economics* No. 136, April, Washington, D.C.: The Brookings Institution.
- McKinnon, R. (2001). After the Crisis, the East Asian Dollar Standard Resurrected: An Interpretation of High-Frequency Exchange Rate Pegging. In Stiglitz, J. & Yusuf, S. (Eds.) (2001), *Rethinking the East Asian Miracle*. A Publication of the World Bank. New York: Oxford University Press, pp. 197-246.
- McKinnon, R. (1999). 'The East Asian Dollar Standard, Life after Death? *Stanford University Working Paper* No. 99-017.
- McKinnon, R. & Pill, H. (1998). International Overborrowing: A Decomposition of Credit and Currency Risks. *U.S.- Japan Management Studies Center Working Paper Series*, Vol. 98, Issue 1.
- McKinnon, R. & Pill, H. (1997). Credible Economic Liberalizations and Overborrowing. *The American Economic Review*, Vol. 87, No. 2, pp. 189-193. Papers and Proceedings of the Hundred and Fourth Annual Meeting of the American Economic Association, May.
- McLeod, R. & Garnaut, R. (Eds.) (1998). *East Asia in Crisis from being a miracle to needing one?* London: Routledge.
- Milesi-Ferretti, G. M. & Razin, A. (1998). Current Account Reversals and Currency Crises: Empirical Regularities. *IMF Working Paper* WP/98/89, June. Washington, D.C.: International Monetary Fund.

- Milner, A. (1999). *What's happened to Asian Values?* Australia: Australian National University Faculty of Asian Studies, Retrieved from <http://www.anu.edu.au/asianstudies/values.html> on 25 August 2005.
- Mishkin, F. (1996). Understanding Financial Crises: A Developing Country Perspective. *NBER Working Paper No. 5600* (May).
- Mody, A. & Saravia, D. (2003). Catalyzing Private Capital Flows: Do IMF-Supported Programs Work as Commitment Devices? *IMF Working Paper* WP/03/100. Washington, D.C.: International Monetary Fund.
- Montes, M. (1999). *The Currency Crisis in Southeast Asia*. Singapore: Institute of Southeast Asian Studies.
- Mussa, M. (2002). Reflections on Moral Hazard and Private Sector Involvement in the Resolution of Emerging Market Financial Crises. Retrieved from <http://www.bankofengland.co.uk/financialstability/conferences/conf0207/mussa.pdf>, 25 August 2005.
- Mussa, M. (1999). Reforming the International Financial Architecture: Limiting Moral Hazard and Containing Real Hazard. Downloaded from <http://www.rba.gov.au/PublicationsAndResearch/Conferences/1999/Mussa.pdf>, 25 August 2005.
- Mussa, M. & Savastano, M. (1999). The IMF Approach to Economic Stabilization. *IMF Working Paper* WP/99/104, July, Washington, D.C.: International Monetary Fund.
- Nellor, D. (1998). The Role of the International Monetary Fund. In Mcleod, R. & Garnaut, R. (Eds.) (1998). *East Asia in Crisis from being a miracle to needing one?* London: Routledge, pp. 245-265.
- Noble, G. & Ravenhill, J. (Eds.) (2000). *The Asian Financial Crisis and the Architecture of Global Finance*. Cambridge, U.K.: Cambridge University Press.
- Noland, M., Liu, L., Robinson, S. & Wang, Z. (1998). Global Economic Effects of the Asian Currency Devaluations. *Policy Analysis in International Economics* No. 56, Institute of International Economics. Washington, D.C.
- Noy, I. (2004). Do IMF Bailouts Result in Moral Hazard? An Events-Study Approach. *University of Hawaii at Manoa Department of Economics Working Papers* 200402.
- Nunnenkamp, P. (1998). Dealing with the Asian Crisis: IMF Conditionality and Implications in Asia and Beyond. *Intereconomics*. March/April 1998, pp. 64-72.
- Nunnenkamp, P. (1999). The Moral Hazard of IMF Lending: Making a Fuss about a Minor Problem? *Kiel Discussion Paper* No. 332, Kiel, Germany: Kiel Institute of World Economics.
- Obstfeld, M. (1986). Speculative Attack and the External Constraint in a Maximizing Model of the Balance of Payments. *The Canadian Journal of Economics*, Vol. 19, No. 1 (February): 1-22.
- Ostry, J. (1997). Current Account Imbalances in ASEAN Countries: Are They a Problem? *IMF Working Paper* 97/51, April 1997.
- Park, Y. & Lee, J. (2002). Financial Crisis and Recovery: Patterns of Adjustment in East Asia, 1996-99. *ADB Institute Research Paper* 45, Tokyo: Asian Development Bank (ADB) Institute.

- Park, Y. & Song, C. (2000). Financial Contagion in the East Asian Crisis – With Special Reference to the Republic of Korea. *Paper submitted to the NBER Project on Exchange Rate Crises in Emerging Market Countries*, 1 February, 2000, Royal Sonesta Hotel, Cambridge, MA.
- Pempel, T.J. (Ed.) (1999). *The Politics of the Asian Economic Crisis*. Ithaca, New York: Cornell University Press.
- Pereira da Silva, L. & Yoshitomi, M. (2001). Can “Moral Hazard” Explain the Asian Crisis? *ADB Institute Research Paper 29*, Tokyo: Asian Development Bank (ADB) Institute.
- Perry, G. & Lederman, D. (1998). *Financial Vulnerability, Spillover Effects, and Contagion: Lessons from the Asian Crises for Latin America*. Washington, D.C.: The World Bank.
- Pesenti, P. & Tille, C. (2000). The Economics of Currency Crises and Contagion: An Introduction. *Federal Reserve Bank of New York (FRBNY) Economic Policy Review*, September.
- Pollack, J. & Kim, H. (Eds.) (1995). *East Asia’s Potential for Instability and Crisis*. Center for Asia-Pacific Policy and the Sejong Institute. Santa Monica, California: RAND.
- Prichett, L. (2000). Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains. *The World Bank Economic Review No. 14*, 1: 221-250.
- Pritsker, M. (2000). *The Channels for Financial Contagion*, Draft August. UNU-WIDER Contagion Project.
- Radelet, S. & Sachs, J. (1999). *What Have We Learned So Far, from the Asian Financial Crisis?* US Agency for International Development (US-AID). Consulting Assistance on Economic Reform (CAER) II Project. Retrieved from <https://sites.hks.harvard.edu/cid/archive/hiid/papers/aea122.pdf> on 06-2015.
- Rodrik, D. (1998). *Who Needs Capital Account Convertibility?* Harvard University.
- Rodrik, D. (1997). TFP Growth Controversies, Institutions, and Economic Performance in East Asia, *NBER Working Paper 5914*, February.
- Röpke, J. & Minhui O. (1998). *The Asian Depression: A Schumpeterian Construction*. University of Marburg.
- Sachs, J. (1998). *Creditor Panics: Causes and Remedies*. Prepared for CATO Conference on Money in the New Millennium, 22 October.
- Sachs, J. & Radelet, S. (1998a). *The Onset of the East Asian Financial Crisis*, First Draft, 10 February.
- Sachs, J. & Radelet, S. (1998b). *The East Asian Financial Crisis: Diagnosis, Remedies, Prospects*. Harvard Institute for International Development, 20 April.
- Sachs, J., Tornell, A. & Velasco, A. (1996). Financial Crises in Emerging Markets: The Lessons from 1995. *NBER Working Paper No. 5576*, May. Cambridge, MA: National Bureau of Economic Research.
- Salant, S. & Henderson, D.W. (1978). Market Anticipations of Government Policies and the Price of Gold. *Journal of Political Economy*, 86, No. 4 (August): 627-648.
- Stiglitz, J. (1998a), Bad Private-Sector Decisions. *Wall Street Journal*, 4 February.

- Stiglitz, J. (1998b), 'The Asian Crisis and the Future Role of the International Architecture', World Bank, September.
- Stiglitz, J. & Yusuf, S. (Eds.) (2001). *Rethinking the East Asian Miracle*. A Publication of the World Bank. New York: Oxford University Press.
- Summers, L. (1998), *Opportunities Out of Crises: Lessons from Asia*. Office of Public Affairs, Treasury News, 19 March.
- Tanner, E. (2001). Exchange Market Pressure and Monetary Policy. *IMF Staff Papers*, Vo. 47, No. 3.
- Tay, A. (2000). "Asian Values" and the Rule of Law. Jura Gentium Centre for Philosophy of International Law and Global Politics. Retrieved from <http://dex1.tsd.unifi.it/jg/en/index.htm?surveys/rol/tay.htm>. 25 August 2005.
- Van Hoa, T. & Harvie, C. (2000). *The Causes and Impact of the Asian Financial Crisis*. London: Macmillan Press.
- Van Rijckeghem, C. & Weder, B. (2000). Spillovers through Banking Centers: A Panel Data Analysis. *IMF Working Paper* WP/00/88, May. Washington, D.C.: International Monetary Fund.
- Van Rijckeghem, C. & Weder, B. (1999). Sources of Contagion: Finance or Trade? *IMF Working Paper* WP/99/146, October. Washington, D.C.: International Monetary Fund.
- Wade, R. (2002). 'Gestalt Shift' From 'Miracle' to 'Cronyism' in the Asian Crisis. *Development Studies Institute Working Paper* No. 02-25, London School of Economics and Political Science.
- Wade, R. & Veneroso, F. (1998). The Asian Crisis: The High Debt Model vs. the Wall Street-Treasury-IMF Complex. *New Left Review*, March-April, pp. 3-23.
- Westphal, L. (1998). *The East Asian Economies: What Happened?* Swarthmore College, 5 June.
- Willet, T. (1999). Did the Mexican Bailout Really Cause the Asian Crisis? *Claremont Policy Briefs*, Issue No. 99-01, The Claremont Institute for Economic Policy Studies, The Commons Institute for International Economic Studies, and the Lowe Institute of Political Economy.
- Willet, T., Budiman, A., Denzau, A., Jo, G., Ramos, C. & Thomas, J. (2004). *The Falsification of Four Popular Hypotheses about the Asian Crisis*. Oxford: Blackwell Publishing Ltd.
- Woo, W. T., Sachs, J. & Schwab, K. (Eds.) (2000). *The Asian Financial Crisis: Lessons for a Resilient Asia*. London, England: The MIT Press.
- Wrage, S. (1998). Examining the "Authoritarian Advantage" in Southeast Asian Development in the Wake of the Asian Economic Failures. *Columbia International Affairs Online (CIAO) Working Papers*. Retrieved from www.ciaonet.org, March 2005.
- Yoshitomi, M. & ADBI Staff (2003). *Post-Crisis Development Paradigms in Asia*. Asian Development Bank Institute (ADBI). Tokyo, Japan.
- Yoshitomi, M. & Ohno, K. (1999). Capital Account Crisis and Credit Contraction: The New Nature of Crisis Requires New Policy Responses. *ADBI Research Paper Series No. 2*. Asian Development Bank Institute (ADBI), Tokyo.
- Young, A. (1995). The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience. *Quarterly Journal of Economics*, 110 (3), 641-80.

- Young, A. (1994a). Lessons from the East Asian NICs: A Contrarian View. *European Economic Review*, 38, 964-73.
- Young, A. (1994b). Accumulation, exports, and growth in the high performing Asian economies: A comment. *Carnegie-Rochester Conference Series on Public Policy, Volume 40*, 237-250.
- Young, A. (1992). A Tale of Two Cities: Factor Accumulation and Technical Change in Hong Kong and Singapore. In O.J. Blanchard & S. Fischer (Eds.). *NBER Macroeconomics Annual 1992*, Cambridge: MIT Press.
- Zhang, P. (Ed.) (1998). *IMF and the Asian Financial Crisis*. Singapore: World Scientific Asian Economic Profiles.
- Zhang, Z. (2001). Speculative Attacks in the Asian Crisis. *IMF Working Paper* WP/01/189, November. Washington, D.C.: International Monetary Fund.
- Zhuang, J. & Malcolm Dowling, J. (2002). Causes of the 1997 Asian Financial Crisis: What Can an Early Warning System Model Tell Us? *ADB Economics and Research Department (ERD) Working Paper Series* No. 26, Manila: Asian Development Bank.
- Ziesemer, T. (1998). *The Structure of the Asian Debt Crisis in Theoretical and Historical Perspective*, MERIT, April.

Part Three

Applying Input-Output Analysis to Investigate the Role of Technology in the Asian Miracle and Crisis Episodes

In Part Three, the study investigates the role of technology in the Asian miracle and crisis episodes by using input-output analytical techniques. Chapter Six starts with a detailed description of the input-output analytical framework in general. This is followed by an elaboration of the field of influence approach which is used to shed light on the role of technology in growth. This technique differs from the traditional macroeconomic growth accounting methodology as it explores growth at a more detailed meso or industry level and looks at the structure of the macroeconomy based on sectoral interdependencies. The chapter continues with explaining the use of input-output analysis to explain business crisis through what is known as the network model that is mostly similar to the field of influence approach. Then in Chapter Seven, these empirical techniques are tested in the case of three of the Asian crisis economies of Malaysia, the Philippines and Thailand, applying the methodology of the field of influence approach, and presenting the results of this approach on the input-output data of the three subject economies. The final Chapter Eight analyses the insights gleaned from the application of the field of influence approach and relates these insights to their implications on the debates presented in parts One and Two about the role of technology in both growth and crisis episodes in the East Asian sample countries and concludes with the valorization of the study in terms of contributions to economic theory and empirics, policy ramifications and scope for further research.

Neoclassical economists consider I-O analysis a futile exercise in central planning. The relationship between the delivery of a bill of final goods and its requirements in terms of gross output and factor inputs is considered mechanical, with no or little attention paid to the role of the price mechanism in the choice of techniques.

Wassily Leontief

The Structure of the American Economy
(1941)

True, I-O analysis is used to relate prices to factor costs, but here too the analysis is considered mechanical as I-O coefficients are assumed to be fixed. Conversely, I-O economists consider neoclassical economics a futile exercise in marginal analysis that fails to grasp the underlying structure of the economy. Firms supply up to the point that marginal revenue equals marginal cost and set the price accordingly. But does not marginal cost depend on all prices in the system, including the one of the product under consideration? And if the answer is yes, should not we take into account the inter-industry relations, that is, apply I-O analysis?

Thijs ten Raa

Structural Economics (2004)

Chapter 6

Investigating Technology's Role in Growth and Crisis Episodes: The Input-Output Approach

In the previous chapters, we encountered the role of technology in the Asian miracle and crisis debates. As far as the growth story is concerned, the use of Solovian growth accounting approach to explain the miraculous growth of the Asian high-performing economies has led to two opposing views, conclusions of which are dependent on the assumptions used in the macroeconomic production function. As far as the crisis episode is involved, the debate focused a lot on macroeconomic linkages that revolve around monetary business cycle theories, ignoring possible explanations arising from real business cycle theory.

This chapter will elucidate on the use of structural economics with its main tool input-output analysis, to augment or supplement existing sides of both growth and debacle debates as applied to Asia. First, a primer on input-output analysis will be discussed in 6.1. This will be followed by an explanation of the field of influence approach in explaining growth in 6.2 and the use of the same approach in explaining crisis in 6.3.

Structural economics is plainly an approach to economic analysis that takes into account an economy's underlying structural features. Structural economics is described by ten Raa (2004) as an accounting framework for studying the fundamental features of an economy which are its technology, endowments and patterns of consumption. Duchin (1998) goes further by defining structural economics as describing and explaining important features of technological, social and environmental changes and their interactions within an economic system. She also defines it as a framework for empirically describing and analysing quantitatively the changes that have transpired from one state to another. In her book, the need for structural economics is invoked since neoclassical economics assume competitive selection through efficient outcomes as the driving force for economic change at the firm level; and grounds this microeconomic theory as foundation for macroeconomic relationships. Structural economics questions this approach by

replacing convenient but overly restrictive formal assumptions of neoclassical economics with assumptions that allow for a more open-ended inquiry. While the mathematical framework of neoclassical economics yield numerical solutions that substantially simplifies the complex world, it constrains analysis by building in assumptions that habitually become unquestioned and taken for granted thereby discouraging lines of investigation for which it may not be suitable. Ten Raa (2004) considers neoclassical and structural economics as two sides of the same coin. According to him, whereas neoclassical economics focuses on the price system unable to prescribe output levels especially when constant returns to scale prevails in production, structural economics concentrates more on quantity relations between output levels of economic sectors while still accounting for cost or price components in a mechanistic way that is independent of output levels.

6.1 A Primer on Input-Output Analysis

Input-Output Tables

What follows are the basics of input-output analysis as this is the fundamental approach to examining the role of technology in growth and business cycles which is the topic of this research. At the core of structural economics is input-output (from here on I-O) analysis which is its main theoretical and quantitative technique. I-O analysis is the analytical model developed in the 1930s by Leontief which looks at the interdependence of industries in an economy, hence, it is sometimes referred to as interindustry analysis. As Leontief (1936) defines, I-O analysis is a “method of systematically quantifying the mutual relationships among various sectors of a complex economic system’ (p.19). I-O tables are generally constructed from observed data for a specific geographic region which can either be a city, a state, a country or even groups of countries. An I-O table describes the flow of goods and services between all the individual sectors of a national or even a regional economy over a given period of time, usually a year. In the I-O tables, one can find the activity of an industry that both produce goods (as outputs) and consume goods from other industries as inputs to produce its own output. Thus, I-O analysis is concerned with the flow of products from one economic sector to another as a producer to each of the sectors including itself and as a consumer to itself and other sectors. There are three main tables involved in I-O analysis: a transactions table, a table of technical coefficients and a table of interdependence coefficients.

The basic table of the I-O system is the transactions table in which are entered in value terms the various economic flows within an economy during a particular year. The economy is normally divided into a number of sectors based on some national or international statistical classification. As shown on Table 6.1, the shaded rows show the outputs produced by each sector of the economy and the shaded columns show the inputs purchased by a particular industry or sector to produce its output. The interindustry exchange of goods make up the core of the I-O transactions table. The additional unshaded rows include value-added to account for other inputs used in production such as labour, operating profits, depreciation of capital, indirect business taxes, and imports of inputs. Thus, these additional rows correspond to the industrial origin approach to calculate GDP. The additional unshaded columns, in turn, show the final demand to record sales of each sector to final markets such as households, firms, governments and buyers abroad, e.g., exports, which correspond to the expenditure approach to calculate GDP. Hence, the national accounts and I-O tables are interlinked and reconciled.

Table 6.1
Input-Output Transactions Table

		PRODUCERS AS CONSUMERS								FINAL DEMAND			
		Agric.	Mining	Const.	Manuf.	Trade	Transp.	Services	Other	Personal Consumption Expenditures	Gross Private Domestic Investment	Govt. Purchases of Goods & Services	Net Exports of Goods & Services
PRODUCERS	Agriculture												
	Mining												
	Construction												
	Manufacturing												
	Trade												
	Transportation												
	Services												
	Other Industry												
VALUE ADDED	Employees	Employee compensation								GROSS DOMESTIC PRODUCT			
	Business Owners and Capital	Profit-type income and capital consumption allowances											
	Government	Indirect business taxes											

Source: Miller and Blair (2009), p. 3.

The mathematical structure of this I-O table can be represented as a system of n linear equations with n unknowns that can easily be written in matrix notation. This is shown in Table 6.2. The distribution of output between sectors or industries of an economy are illustrated in the I-O table where columns show intermediate and final demand for goods and services and rows, the input and cost structure of these same economic sectors or industries.

Table 6.2
Basic Input-Output Table as a Matrix

Basic Input-Output Table as a Matrix						
	Intermediate Demand (z_j)	Final Demand (Y_i)				Total Output (X_i)
		Domestic			Export	
		Personal Consumption	Gross Domestic Capital Formation	Government		
	Sectors ($j=1,2,3...n$)					
Sectors ($i=1,2,3...n$)	<div><div><div><div>z_{11}</div><div>z_{21}</div><div>$\vdots$</div><div>z_{i1}</div></div><div><div>z_{1j}</div><div>z_{ij}</div></div></div><div>Quadrant 1 ($n \times n$)</div></div>	<div>Quadrant 2 ($n \times m$)</div>				<div>X_1 X_2 X_3 $\vdots$ X_n</div>
Imports (M_j)						
Value Added (V_j)	Quadrant 3 ($p \times n$)	Quadrant 4 ($p \times m$)				
Total Inputs (X_i)	$X_1X_2X_3....X_n$					

Source: This author based on O'Connor & Henry (1975), p. 11.

Within rows, horizontal movements show the value of total production X of the i^{th} industry which is the sum of the intermediate demand (z_{ij}) and final demand (Y_i), hence what each sector or industry sells to other industries as output and what it sells as final output to consumers, firms, government and the rest of the world, yielding total output X_i . This is expressed as:

$$X_i = \sum z_{ij} + Y_i.$$

Within columns, vertical movements show the total input X of the j^{th} industry which is the sum of the intermediate demand (z_{ij}), imports of inputs (M_j) and value added (V_j) that yield total inputs X_j . In other words, it shows what each industry buys as intermediate inputs from other industries plus other primary inputs like labour and capital (value added) that result in total inputs used to produce the final output. In mathematical notation, this is expressed as:

$$X_j = \sum z_{ij} + M_j + V_j.$$

Based on O'Connor and Henry (1975), there are four discernible quadrants in the inner part of the I-O transactions table. Vertically, there are two parts representing flows of goods or services among sectors in the process of their current production found on the left (called the intermediate demand or interindustry quadrant) and the sales of the outputs of each producing sector to the final disposing sectors found on the right (called the final demand quadrant). Each of these quadrants are further subdivided horizontally into two sections at the lower part—the primary inputs to industries quadrant which are not part of the current output of the producing sectors found on the lower left corner; and the primary inputs for direct consumption quadrant containing primary inputs that are sold directly to the final demand sectors found on the lower right corner. As shown in Table 6.2 as well, the interindustry quadrant contains the same amount of rows and columns and is always a square matrix whereas the other quadrants do not have this feature and the number of columns and rows in these quadrants do not typically match.

A complete I-O system usually includes an integrated set of MAKE and USE tables or matrices in addition to symmetric commodity by commodity or industry by industry tables. The MAKE and USE tables is a transitional stage towards the construction of symmetric I-O tables.

Table 6.3
Industry by Commodity MAKE Table

	Commodities								Total Industry
	Nat. Res.	Const.	Manuf.	Transp.	Util.	Inform.	Fin. Ser.	Other Ser.	Output
Industries
Natural Resources									
Construction									
Manufacturing									
Transportation									
Utilities									
Information									
Financial Services									
Other Services									
Total Commodity Output									

Source: Miller & Blair (2009), p. 138.

The MAKE matrix is an industry by commodity matrix showing the commodity values produced per industry. It provides industry production of commodities. Industries are listed along the rows while commodities along the columns. A column of the MAKE matrix corresponds to a commodity while rows show the production of that commodity by different industries, hence revealing the product mix of an industry which comprises both primary and secondary products. In a square matrix (i.e., equal number of rows and columns) the values of the primary product produced by an industry appears along the diagonal of the matrix (i.e., the cell where the row number of an industry intersects its column number). The secondary products are shown as off-diagonal entries. The MAKE matrix thus discloses the value of production by each industry of the commodity that is named at the head of the columns. The row totals in a MAKE matrix indicate industry output whereas the column totals contain the commodity output, where both need not necessarily equal on account of secondary production. This is because columns show different types of industries that produce both primary and secondary products. An industry by commodity MAKE table is shown in Table 6.3.

The USE matrix presents data on how goods and services are used or consumed in each sector, and also shows the cost structures of industries. The USE matrix consists of the intermediate use quadrant showing the inter-industry accounts, the final use quadrant and the value-added components quadrant. The commodity by industry intermediate use quadrant represents intermediate consumption by industries contained in the columns, of commodities that are written on the rows. The final demand quadrant shows consumption of these commodities by final users. The primary inputs to industries quadrant shows employee compensation (wages and salaries) representing payments or returns to labour for their value added contribution, operating surplus or profits and depreciation, and rent representing respective returns to capital and land for their value addition as well as taxes less subsidies on production. In the USE matrix, row totals yield total commodity output regardless of which industry produced it; column totals indicate total industry output regardless of what commodities were produced. Table 6.4 shows an example of a commodity by industry USE table.

Table 6.4
Commodity by Industry USE Table

	Industries									Final Demand				Total Commodity Output
	Nat. Res.	Const.	Manuf.	Transp.	Util.	Inform.	Fin. Ser.	Other Ser.	Pers.	Cons.	Invest.	Net Exports	Govt.	Output
Commodities	<div>Interindustry Transactions</div>													
Natural Resources														
Construction														
Manufacturing														
Transportation														
Utilities														
Information														
Financial Services	<div>Gross Domestic Product</div>													
Other Services														
Value Added														
Employee Compensation														
Indirect Business Tax														
Other Value Added														
Total Industry Output														

Source: Miller & Blair (2009), p. 136.

Thus, the column totals of the MAKE matrix correspond or are equal to the row totals of the USE matrix, showing commodity outputs. Conversely, row totals of the MAKE matrix correspond to or equate to the column totals of the USE matrix, showing the industry outputs. This is shown in Table 6.5 where both tables are consolidated.

A symmetric I-O table, in turn, uses the same classifications in both rows and columns. This could either be a commodity by commodity or an industry by industry table. The symmetric tables are constructed from the MAKE and USE matrices. The transformation into symmetric matrices involves the transfer of secondary products in the MAKE matrix such that these additional activities are removed from industries where they are produced and are treated as activities for industries for which they are principal products; and transfer of inputs in the USE matrix associated with secondary outputs of an industry where they take place to the industry where they characteristically or principally belong. The transformation of outputs and associated inputs are based on two types of technology criteria. The *industry technology* criteria assumes that products whether primary or secondary have the same input structure. The *commodity technology* criteria assumes that a product has the same input structure whichever industry it is produced. While the latter makes more economic sense, symmetric tables are derived using the industry technology assumption since negative technical coefficients which is unacceptable may arise if the commodity technology criteria is used.

Table 6.5
Consolidated MAKE and USE Tables

		Commodities								Industries								Total Final Demand	Total Output
		Nat. Res.	Const.	Manuf.	Transp.	Util.	Inform.	Fin. Ser.	Other Ser.	Nat. Res.	Const.	Manuf.	Transp.	Util.	Inform.	Fin. Ser.	Other Ser.		
Commodities	Natural Resources	Use Matrix																Final Demand	Total Commodity Output
	Construction																		
	Manufacturing																		
	Transportation																		
	Utilities																		
	Information																		
	Financial Services																		
	Other Services																		
Industries	Natural Resources	Make Matrix																	Total Industry Output
	Construction																		
	Manufacturing																		
	Transportation																		
	Utilities																		
	Information																		
	Financial Services																		
	Other Services																		
Total Value Added		Value Added								GDP									
Total Output		Total Commodity Output								Total Industry Output									Total Output

Source: Miller & Blair (2009), p. 139.

While MAKE and USE tables can be useful for several analytical purposes, the symmetric I-O table provide the basic framework used for economic modelling even though stronger accounting constraints are imposed by these tables since row and column totals must match for each commodity or each industry.

Table of Technical Coefficients

Next to the transactions table which is the statistical foundation of the I-O framework, the technical coefficients table or matrix is calculated. The technical coefficients table depicted in

Table 6.6 is the unit cost structure of production and is derived by dividing every item in quadrants 1 and 3 by the column totals (i.e., total inputs) where each entry is recorded. In other words, we get the ratio of each intermediate input of industry i to total inputs used in industry j including the ratio of each primary input (e.g., capital and labor) used in industry j . When read column-wise, each entry shows the coefficient value of intermediate and primary inputs required in producing one unit of output in that sector or industry.

Table 6.6
Calculating Technical Coefficients from the Transactions Table

Inputs	Intermediate Demand			Total Final Demand	Total Output (X_i)
	1	2	3		
Agriculture 1	z_{11}	z_{12}	z_{13}	Y_1	X_1
Industry 2	z_{21}	z_{22}	z_{23}	Y_2	X_2
Services 3	z_{31}	z_{32}	z_{33}	Y_3	X_3
All primary inputs	V_1	V_2	V_3		
Total inputs (X_j)	X_1	X_2	X_3		

Source: This author based on O'Connor & Henry (1975), p. 24.

Assuming a simple I-O table shown below comprising three sectors Agriculture, Industry and Services, the various flows among the three sectors can be represented as a system of linear equations which extends the vertical column view as follows:

$$X_1 = z_{11} + z_{12} + z_{13} + Y_1$$

$$X_2 = z_{21} + z_{22} + z_{23} + Y_2$$

$$X_3 = z_{31} + z_{32} + z_{33} + Y_3$$

The input coefficients measures how much inputs an industry directly requires from other industries to produce a currency's worth of output. From the I-O table, it is derived by dividing each column of z_{ij} 's by the total input of industry j (X_j) found in that column, i.e., in mathematical form: $a_{ij} = \frac{z_{ij}}{X_j}$.⁴² By transposition, it follows that the product of the input coefficient and the total input yields the inter-sectoral flows, i.e., $z_{ij} = a_{ij}X_j$.

The output coefficients, in turn, measures the amount of an industry's output demanded by other industries rather than final consumers. It is calculated by dividing each row of z_{ij} s by the total output (X_i) of industry i found in the corresponding row. This is discussed further below under the supply-driven input-output model of Ghosh. Mathematically, it is written as: $\vec{a}_{ij} = \frac{z_{ij}}{X_i}$.

In symbolic form, the technical coefficient (input) matrix, which is alternatively known as the A matrix can be written as:

$$\begin{bmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{bmatrix}$$

The system of linear equations can thus be rewritten by incorporating the input coefficients as:

⁴² According to Miller & Blair (2009) early presentations used A_i and $\vec{A}$ to distinguish between demand-side and supply-side coefficients and make explicit the two points of view of dividing all elements of intermediate demand Z by the associated column total of the sector for demand-driven models and dividing all elements of intermediate demand Z by the associated row total of the sector for supply-driven models. Traditional demand side coefficients are now simply denoted by A .

$$\begin{aligned}
X_1 &= a_{11}X_1 + a_{12}X_2 + a_{13}X_3 + Y_1 \\
X_2 &= a_{21}X_1 + a_{22}X_2 + a_{23}X_3 + Y_2 \\
X_3 &= a_{31}X_1 + a_{32}X_2 + a_{33}X_3 + Y_3
\end{aligned}$$

Leontief Inverse Matrix and the Table of Interdependence Coefficients

From the equations above, a regrouping of all X's on one side to yield Y on the right side yields the following system of equations:

$$\begin{aligned}
(1 - a_{11})X_1 - a_{12}X_2 - a_{13}X_3 &= Y_1 \\
-a_{21}X_1 - (1 - a_{22})X_2 - a_{23}X_3 &= Y_2 \\
-a_{31}X_1 - a_{32}X_2 - (1 - a_{33})X_3 &= Y_3
\end{aligned}$$

In matrix notation, the system of equations if extended to more sectors can be written as:

$$\begin{bmatrix} (1 - a_{11}) & \cdots & -a_{1j} \\ -a_{21} & (1 - a_{22}) & -a_{2j} \\ \vdots & \ddots & \vdots \\ -a_{i1} & \cdots & (1 - a_{ij}) \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_j \end{bmatrix} = \begin{bmatrix} Y_1 \\ Y_2 \\ \vdots \\ Y_j \end{bmatrix}$$

This whole system can be expressed in abbreviated matrix form as: $(I - A)X = Y$ where the columns of X's and Y's are called vectors and written as X and Y respectively, I is the identity matrix and A is the matrix of technology coefficients.

The inverse matrix basically links the intermediate production to final demand as it shows both direct and indirect production required per currency unit increase of final demand for that industry's output. Thus, if the values of final demand Y are given, the problem boils down to determining the vector of outputs X to meet the final demand. The effect of an increase in demand for a certain product produced by an industry requires not only direct intermediate inputs but sets into motion a chain of production where each intermediate input produced by an industry also generates other inputs produced by other industries. The inverse matrix illustrates the sum of these chained interactions.

Returning to the abbreviated matrix of $(I - A)X = Y$, transferring $(I - A)$ on the right side involves taking the inverse of the $(I - A)$ matrix since division is not possible in matrix operations. In other words, algebraically what we are doing is: $X = Y/(I - A)$. Thus, solving for vector X given vector Y using matrix inversion will yield:

$$X = (I - A)^{-1}Y = LY$$

where $(I - A)^{-1}$ is known as the Leontief inverse of matrix $(I - A)$, or for simplicity the L matrix. Matrix inversion involves taking the reciprocal of the determinant of the identity matrix (a matrix where the diagonals are all equal to one and the off-diagonal entries are all zeroes) minus the original matrix. There are techniques to do this such as the Gaussian elimination method⁴³ or by using determinants⁴⁴.

⁴³ The Gaussian elimination method is equivalent to solving a system of equations with x, y and z unknowns simultaneously. The original entries of a matrix are manipulated by multiplying, adding, or subtracting entries in a row such that the end result of the coefficients yields the identity matrix for the whole system of equations.

⁴⁴ A cofactor matrix involves taking the determinant of each entry in the matrix. A determinant is derived by blocking off all elements of a column and row where one entry belongs to and then multiplying the diagonal elements of the unblocked entries in

The interdependence coefficients are obtained by inverting the $(I-A)$ matrix of coefficients. Each element of the Leontief inverse matrix (L_{ij}) show the weights of Y on sectoral outputs, i.e. how much direct and indirect effects of a unit increase in value of final demand will generate on every sector. A change in final demand for the products of one sector causes a chain reaction as it will not only cause a change in the output of the industry concerned but of other industries as well that are related or linked to it. The table of technical coefficients show only the direct or first order effects of changes in final demand on a sector or industry. The interdependence coefficients show second and higher order or indirect effects of the change in final demand on a particular sector. For this reason, the output required for any sector will exceed the final demand.

To illustrate this, if final demand for the product of sector 1 increases and there are no changes in other sectors in our sample 3×3 matrix, then the first order effects will just be the sum of all row entries as shown in the following matrix or in abbreviated format: $AY = X^{(1)}$

$$\begin{array}{ccc} & A & Y & X^{(1)} \\ \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} & \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} & = & \begin{bmatrix} a_{11} \\ a_{21} \\ a_{31} \end{bmatrix} \end{array}$$

The increases in output generated by the first order effects denoted by the vector $X^{(1)}$ will require further inputs to produce the increments in output which in turn increases outputs further. The second order effects are similarly generated as: $AX^{(1)} = X^{(2)} = A^2Y$ or written in full format:

$$\begin{array}{ccc} & A & X^{(1)} & X^{(2)} \\ \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} & \begin{bmatrix} a_{11} \\ a_{21} \\ a_{31} \end{bmatrix} & = & \begin{bmatrix} (a_{11} \times a_{11}) + (a_{12} \times a_{21}) + (a_{13} \times a_{31}) \\ (a_{21} \times a_{11}) + (a_{22} \times a_{21}) + (a_{23} \times a_{31}) \\ (a_{31} \times a_{11}) + (a_{32} \times a_{21}) + (a_{33} \times a_{31}) \end{bmatrix} \end{array}$$

Each order is derived by multiplying the preceding order by the matrix of technical coefficients and the total effect of all successive rounds will just be the sum of all order effects. Thus, the following system of equations are obtained.

$$\begin{aligned} X^{(1)} &= AY \\ X^{(2)} &= AX^{(1)} = A^2Y \\ X^{(3)} &= AX^{(2)} = A^3Y \\ X^{(n)} &= AX^{(n-1)} = A^nY \end{aligned}$$

The total of the effects of all rounds on sectoral output denoted as X^n is arrived at additively as:

$$X^n = X^{(1)} + X^{(2)} + X^{(3)} + \dots + X^{(n)}$$

and by substitution:

$$X^n = Y + AY + A^2Y + A^3Y + \dots + A^nY$$

the submatrix (called the minor) and deducting the cross diagonal elements. For example, given a matrix $A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$,

and the determinant of entry a_{22} is to be taken, the entire second row and entire second column is blocked since the entry is positioned along this row and column. The minor (M) or unblocked entries are then $\begin{bmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{bmatrix}$. The determinant of a_{22} is then the product of the diagonal $a_{11} \times a_{33}$ minus the product of the cross diagonal entries $a_{13} \times a_{31}$. The determinant is denoted in matrix operations by two bars as in: $\begin{vmatrix} a_{11} & a_{13} \\ a_{31} & a_{33} \end{vmatrix}$. When all the determinants of each entry are derived, the appropriate sign is given to the entry following the rule $(-1)^{i+j} \times M_{ij}$ such that odd-numbered sum of column and row numbers receive a negative sign and even-numbered sum of column and row numbers take a positive value. When the appropriate signs are given to the matrix of determinants of each entry, this is known as the co-factor matrix. Each determinant of the co-factor matrix are then divided by the reciprocal of the determinant of the whole matrix, i.e., $\frac{1}{\det A}$, and then the resulting entries are transposed. The determinant of the whole matrix is just the sum of all the entries of the original matrix multiplied by the determinant of each entry in the matrix. Matrix inversion by using determinants can be expressed as: $A^{-1} = \frac{1}{|A|} (A^c)^T$, where A^c is the co-factor matrix of A and T denotes transposition of the matrix (transposition involves rearranging row entries into columns).

or bringing Y out:

$$X^n = (1 + A + A^2 + A^3 + \dots + A^n)Y$$

As n increases, the expression above will approximate the Leontief inverse of $(I-A)$ matrix as successive round effects except for the initial round will always be less than previous rounds. O'Connor & Henry (1975) cites this as another approximate method of matrix inversion called *expansion of powers* method which are suitable only for matrices where the sum of elements in each column is equal to or less than unity and at least one column total is below one.

Whether the interdependence coefficients could be interpreted as multipliers, however, has been controversial. Ten Raa (2010, p. 26) states that “...*(F)inal demand has a multiplier effect on output....By definition, the demand-pull multiplier effects is the output increase per unit of final demand increase....The jth column of the Leontief inverse gives the demand-pull multipliers of commodity j.*”

Davar (2013, p.9) cautions that Leontief never meant for the inverse matrix coefficients to be interpreted as multipliers. “*The interpretation of the inverse matrix coefficients of Leontief as multipliers, however, is based on the substitution of the cause (national income) by the effect (national product), which is erroneous. Therefore, the genuine meaning of the inverse coefficients...is tantamount to a requirement, and not to a multiplication. Hence, the requirement indicates the required quantity of national income to satisfy one unit of final use (individual and public consumption, investment, export).*”

Table 6.7
**Interdependence Coefficients for Intermediate Sectors
and Technical Coefficients for Primary Inputs**

Sector	Sector 1	Sector 2	Sector 3
Interdependence Coefficients (Leontief inverses)			
Sector 1	l_{11}	l_{12}	l_{13}
Sector 2	l_{12}	l_{22}	l_{23}
Sector 3	l_{13}	l_{32}	l_{33}
Technical Coefficients			
Primary Inputs	V_{11}	V_{12}	V_{13}

Source of Table Format: O'Connor & Henry (1975), p.43. Note the l_{ijs} denote the Leontief inverses of the A matrix comprised of technical coefficients (a_{ijs}).

Table 6.8
Calculation of Partial Income Multipliers

Sector	Technical Coefficient of Primary Inputs	Interdependence Coefficients			Income Arising		
		Sector 1	Sector 2	Sector 3	Sector 1	Sector 2	Sector 3
Sector 1	V_{11}	l_{11}	l_{12}	l_{13}	$V_{11} \times l_{11}$	$V_{11} \times l_{12}$	$V_{11} \times l_{13}$
Sector 2	V_{12}	l_{12}	l_{22}	l_{23}	$V_{12} \times l_{12}$	$V_{12} \times l_{22}$	$V_{12} \times l_{23}$
Sector 3	V_{13}	l_{13}	l_{32}	l_{33}	$V_{13} \times l_{13}$	$V_{13} \times l_{32}$	$V_{13} \times l_{33}$
Partial Multipliers					$\Sigma = m1$	$\Sigma = m2$	$\Sigma = m3$

Source of Table Format: O'Connor & Henry (1975), p.43.

For multipliers to be calculated in the Keynesian sense, a partial multiplier can be derived by multiplying the row of technical coefficients of primary inputs (value-added) of each sector or

industry by the column of interdependence coefficients of the respective industry. In this sense, the results will show the benefit to the whole economy in terms of rise in income attributable to a unit increase in final demand. This is shown in Table 6.8 given the interdependence and technical coefficients of Table 6.7.

If primary inputs are identified or broken down in the input-output tables into components such as value-added from labour (wages and salaries), capital (operating surplus), imports, etc., other multipliers can also be calculated such as employment multipliers, capital multipliers, and import multipliers.

Input-Output Supply Driven Model of Ghosh

Ghosh (1958) suggested an alternative input-output model that is supply-driven or output-oriented in that it measures how much increase of an industry's output is needed to cope with a unit increase in final demand for other industries' products. Miller & Blair (2009) explain that while the Leontief demand-driven model related sectoral gross outputs to the amount of final product (final demand), it could be interpreted as "a unit of product *leaving* the interindustry system at the end of the process" (p. 543). Ghosh, on the other hand, related sectoral gross production to the primary inputs – i.e., "a unit of value *entering* the interindustry system at the beginning of the process" (p.543).

The Ghoshian approach is operationalized by basically rotating or transposing the vertical column view of Leontief (L) to a horizontal row perspective. Thus, instead of dividing each column of intermediate demand (z_{ij}) by the gross output of the industry associated with that column to derive input coefficients (i.e., $a_{ij} = \frac{z_{ij}}{x_j}$) the Ghoshian approach divides each row of intermediate demand (z_{ij}) by the gross output of the sector associated with that row to yield output coefficients (i.e., $\bar{a}_{ij} = \frac{z_{ij}}{x_i}$). A new matrix B is derived showing the direct output coefficients as shown below:

$$B = \begin{bmatrix} b_{11} & \cdots & b_{1n} \\ \vdots & \ddots & \vdots \\ b_{n1} & \cdots & b_{nn} \end{bmatrix} = \begin{bmatrix} z_{11}/x_1 & \cdots & z_{1n}/x_1 \\ \vdots & \ddots & \vdots \\ z_{n1}/x_n & \cdots & z_{nn}/x_n \end{bmatrix} = \begin{bmatrix} 1/x_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & 1/x_n \end{bmatrix} \begin{bmatrix} z_{11} & \cdots & z_{1n} \\ \vdots & \ddots & \vdots \\ z_{n1} & \cdots & z_{nn} \end{bmatrix} = (I - A)^{-1}Z = LZ$$

The Ghoshian output inverse matrix is given by $G = (I - B)^{-1}$ with elements g_{ij} measuring the total value of production arising in sector j per unit of primary input in sector i .

Based on this equation, the supply-driven model can be derived as: $X_j = \Sigma \bar{a}_{ij} X_i + V_j$. In matrix notation, this is expressed as: $X_j = \bar{A}X + V_j$. The Ghoshian inverse is thus derived as: $X' = (I - \bar{A})^{-1}V$ where V is the vector of value-added and $(I - \bar{A})^{-1}$ is the output Leontief inverse from the horizontal row view. The prime symbol (') attached to X denotes the transpose of the matrix.

Miller & Blair (2009) call the resulting supply-side coefficients *allocation coefficients* as opposed to *technical coefficients* in Leontief's demand-driven model. The introduction of the supply driven model by Ghosh has led to a controversy over the economic implausibility of a model that allocates output in response to primary inputs or value-added without changes in output further translating to corresponding changes in value-added. This implausibility argument was introduced by Oosterhaven (1996). Conversely, Dietzenbacher (1997) vindicates the Ghosh

model as formally being equivalent to the standard Leontief model if it is interpreted as a price model. Several authors notably Davar (2005), De Mesnard (2001) and Park (n.d.) disagree with the price model reinterpretation whereas Guerra & Sancho (2010); Manresa & Sancho (2012) and Reyes & Mendoza (2012) compared both Leontief demand-driven and Ghoshian supply-driven models and conclude that the models are still compatible. The supply-driven model of Ghosh becomes relevant in explaining the notion of forward linkages in input-output analysis.

Forward and Backward Linkages

The inverse matrix of input coefficients enables the use of input-output analysis to measure the indirect effects of sectors or industries. These indirect effects are called backward and forward linkages. The concept of linkage effects were pioneered by Rasmussen (1957), and Chenery & Watanabe (1958), applied by Hirschman (1958) in development planning and adaptations were introduced by Yotopoulos & Nugent (1973), Laumas (1976), Riedel (1976), Jones (1976), and Schulz (1977). More recently, input-output analysts such as Cella (1984), Clements (1990), Heimler (1991), Sonis, Guilhoto, Hewings & Martins (1995), and Dietzenbacher (1997) have further refined linkage analysis measures.

Backward linkages measure the interdependency of a particular industry on other industries from which it purchases inputs. It is calculated as the column sums of the direct input coefficient matrix A , i.e., $BL(d)_j = \sum_{i=1}^n a_{ij}$. Inasmuch as the coefficients in A measure direct effects only, it is called the direct backward linkage (BL(d)). Viewed in terms of the basic transactions table as initially proposed by Chenery & Watanabe (1958), direct backward linkage is the value of intermediate inputs for industry j ($\sum_{i=1}^n z_{ij}$) as a proportion of the total value of industry j 's output (x_j). If BL(d)1 to BL(d)n are added up, the direct backward linkage $b(d) = t'A$, or the transpose of the i rows multiplied by the technical coefficients or A matrix are obtained. Rasmussen (1957) proposed a total backward linkage measure to capture both direct and indirect linkages by using the column sums of the Leontief inverse or total requirements matrix $(I - A)^{-1}$ or L matrix. The total backward linkage effect ($BL(t)_j$) is thus calculated as: $BL(t)_j = \sum_{i=1}^n l_{ij}$ where l_{ij} are the elements of the Leontief inverse of technical coefficients. Analogously, the corresponding row vector of total backward linkages for each industry is: $b(t) = t'L$.

Forward linkages, on the other hand, measure the interdependency of one particular industry on other industries to which its output is sold. When an industry i raises its supplies to other industries, then more of industry i 's output will be used by other industries as inputs in their production activity. Analogous to the formula explained in the backward linkage effect, the earlier versions of the direct forward linkage effects are based on the row sums of the technical coefficient or A matrix (A_i) and the total forward linkage effects based on the row sums of the Leontief inverse or L matrix (L_i). However, Miller & Blair (2009, p.558) state that this measure was treated sceptically because “they are generated by a particular stimulus – a simultaneous increase of one unit in the gross outputs of every sector in the case of A_i and an increase of one unit in the final demands of every sector in the case of L_i ”. Andreosso-O’Callaghan & Guoqiang (2000, p.4) conclude that the “Rasmussen’s measures of forward linkage (the row sums of the Leontief inverse) do not provide a measure of forward linkages symmetrical to that provided by the column sum for backward linkages”. It was therefore proposed by Augustinovics (1970), Beyers (1976) and Jones (1976) that in terms of transactions, the row sums of the allocation coefficients of the Ghosh supply driven model would be more appropriate as forward linkage

measures. The direct forward linkages are therefore given by: $FL(d)_i = \sum_{j=1}^n b_{ij}$ and the total forward linkages by $FL(t)_i = \sum_{j=1}^n g_{ij}$.

In both forward and backward linkages, Harrigan & McGilvray (1988) raised the issue of whether on-diagonal elements representing self-sector transactions in the technical coefficients or Leontief inverse matrices should be included or removed from the summations. Miller & Blair (2009) rule that to the extent that internal linkages within the same industry form part of Hirschman's concept of derived demand, then they should be included. Otherwise, they should be excluded if one is purely interested in an industry's dependence on another or with the rest of the economy.

Kula (2008) provides a summary of linkage analysis based on both the Leontief demand-driven model and Ghoshian supply driven model. Using Chenery and Watanabe (1958) formula (CW for short), the backward linkage is the column sums of the input coefficient matrix A and is expressed as: $BL^{CW}_j = \sum_{i=1}^n \frac{x_{ij}}{x_j} = \sum_{i=1}^n a_{ij}$ while the forward linkage is the row sums of the output coefficient matrix B and is expressed as: $FL^{CW}_i = \sum_{j=1}^n \frac{x_{ij}}{x_i} = \sum_{j=1}^n b_{ij}$. In both cases, the direct input and output coefficients are used so that the resulting indices are called *direct* backward and forward linkages.

Using the Rasmussen-Hirschman method (RH), the Leontief inverse is used to measure inter-sectoral linkages with the backward linkage based on the column sums of the inverse matrix: $BL^{RH}_j = \sum_{i=1}^n l_{ij}$ which reflects effects of an increase in final demand, while forward linkage is also defined as the row sums of the Leontief inverse matrix: $FL^{RH}_i = \sum_{j=1}^n l_{ij}$, which measures the magnitude of output increase in an industry *i* if the final demand in each other industry were to increase by one unit. Miller & Blair (2009) summarize the linkage measures in matrix expressions in Table 6.9. Since the input-output tables of the sample countries of this study are based on the Leontief inverse, the Ghoshian way of calculating the direct forward linkage was not used.

Table 6.9
Linkage Measures

	<i>BL</i>	<i>FL</i>	<i>BL</i>	<i>FL</i>
Direct	$i'A$	Bi	$ni'A/i'Ai$	$nB_i/i'B_i$
Total	$i'L$	Gi	$ni'L/i'Li$	$nG_i/i'Gi$

Legend: A – technical coefficient matrix; L – Leontief inverse matrix; B – output coefficient matrix; G – Ghoshian output inverse matrix; n – number of industries or sectors; i' – transpose of industry *i*.

Source: Miller & Blair (2009), p. 559.

To allow for inter-industry comparison, a normalization procedure for the results for both linkages is often executed by using a simple or weighted mean of all *direct* backward or forward linkages, as the case may be. Using a simple average in the case of backward linkage, sector *j*'s direct backward linkage is divided by the mean of the backward linkages of all sectors:

$$\overline{BL}(d)_j = \frac{BL(d)_j}{\frac{\sum_{j=1}^n BL(d)_j}{n}} = \frac{\sum_{i=1}^n a_{ij}}{(1/n) \sum_{i=1}^n a_{ij} \sum_{j=1}^n a_{ij}}$$

where the bar over BL indicates a normalized measure. Similarly, sector *i*'s direct forward linkage is divided by the forward linkages of all sectors:

$$\overline{FL}(d)_i = \frac{FL(d)_i}{\frac{\sum_{i=1}^n FL(d)_i}{n}} = \frac{\sum_{j=1}^n b_{ij}}{(1/n) \sum_{i=1}^n b_{ij} \sum_{j=1}^n b_{ij}}$$

For total linkages, the Leontief inverse or L matrix is used.

For total backward linkage effects, a Power of Dispersion Index is calculated as:

$$\frac{\text{Each sum of column in inverse matrix coefficient table}}{\text{Mean value of entire vertical sum in the inverse matrix coefficient table}} = \frac{l_{*j}}{\bar{B}}$$

where $l_{*j} = \sum_{i=1}^n l_{ij}$ and $\bar{B} = \frac{1}{n} \sum_{i=1}^n l_{ij} \sum_{j=1}^n l_{ij}$. This ratio indicates the relative magnitude of production repercussions in terms of which industry's final demand could wield the greatest output effect on entire industries.

For total forward linkages, an Index of Sensitivity of Dispersion is calculated as:

$$\frac{\text{Each sum of row in inverse matrix coefficient table}}{\text{Mean value of entire horizontal sum in the inverse matrix coefficient table}} = \frac{l_{i*}}{\bar{B}}$$

where $l_{i*} = \sum_{j=1}^n l_{ij}$ and $\bar{B} = \frac{1}{n} \sum_{i=1}^n l_{ij} \sum_{j=1}^n l_{ij}$. This ratio indicates the relative influence of one unit of final demand for a row sector that can exert the greatest production repercussion on entire industries.

The average value of the backward and forward linkages is unity⁴⁵. Sectors with strong or above average linkages have indices greater than one whereas those with weaker linkages have indices below one. Based on the generated results of backward and forward linkages, Miller & Blair (2009) offer a four-way classification as shown in Table 6.10.

Table 6.10
Classification of Backward and Forward Linkage Results

		Direct or Total Forward Linkage	
		Low (<1)	High (>1)
Direct or Total Backward Linkage	Low (<1)	(I) Generally independent	(II) Dependent on inter-industry demand
	High (>1)	(III) Dependent on inter-industry supply	(IV) Generally dependent

Source: Miller & Blair (2009, p.560).

In the upper left quadrant where both linkage measures are less than one, industries are not strongly connected to other sectors while the lower right quadrant where both linkage measures exceed unity are industries that have very strong connections to other industries. In the lower left quadrant lie industries that are dependent on inter-industry supply since only the backward linkage exceeds unity. Finally, the upper right corner contain industries that are dependent on inter-industry demand with only the forward linkage exceeding the value of one.

Weighted averages have also been suggested instead of using simple arithmetic mean and was originally suggested by Laumas (1976). The direct input coefficients are weighted according to the importance of each sector in final demand, and output coefficients in turn are weighted according to the importance of each sector to total value-added or total primary inputs. Based on the relative

⁴⁵ Since $[\bar{b}(d)]i \left(\frac{1}{n}\right) = [ni'A/t'Ai][i/n] = 1$.

importance of each industry in terms of final demand or primary inputs, indices of overall inter-sectoral interdependence are calculated by Andreosso-O'Callaghan et al. (2000) as:

$$TOL = \sum_{j=1}^n \alpha_j BL_j \text{ and } TOL = \sum_{i=1}^n \beta_i FL_i$$

where TOL represent the index of overall inter-sectoral interdependence for the Chenery-Watanabe and Rasmussen methods, α is the share of sector j in final demand and β is the share of sector i in primary inputs.

Main Assumptions of Input-Output Methodology

The United Nations Statistical Office (1973) list two basic assumptions of input-output systems. These are the homogeneity and proportionality assumptions. The homogeneity assumption connotes that “each sector produces a single output with a single input structure and that there is no automatic substitution of outputs of different sectors” (p.20). The proportionality assumption conveys that “the inputs into each sector are a linear function only of the level of output of that sector, i.e., that the amount of each kind of output absorbed by a particular sector varies in direct proportion to that sector's total output” (p.20). O'Connor & Henry (1975) added a third assumption of additivity which means that “the total effect of carrying out production in several sectors is the sum of the separate effects” (p.62).

O'Connor & Henry (1975) further explain the homogeneity assumption as a) requiring all commodities of a single sector to be either perfect substitutes or be produced in strictly fixed proportions; b) grouping commodities having similar input structures; and c) ensuring that products belonging to different sectors or industries are not substitutes of each other. This implies that a similar product or close substitute cannot belong to two or more different sectors or industries. Every industry thus produces only one homogeneous commodity. The proportionality assumption in turn implies that input coefficients will only change if techniques of production changes. Thus, in a statistical unit that produces a mix of commodities (e.g., violating the homogeneity assumption), a change in the proportions in which these commodities are produced would result in a change in the input coefficients even though techniques of production in any of the commodities remain the same. This is because the tabulated input coefficient would be the weighted average of the input coefficients of each commodity produced in the sector and would thus vary if the output proportions comprising the weights change. In a sector where products are classified under conditions that neither assumption is fulfilled, inputs will not remain in proportion to output recorded in the base year as output levels of constituent products change over time. O'Connor & Henry (1975) rule that in case a conflict arises between homogeneity and proportionality, the latter takes precedence. A major implication of these two basic assumptions is that the technical coefficients in the A matrix are fixed such that a given state of technology is given.

The consistency of production technology levels are signified by fixed input coefficients which means that input ratios of raw materials and other intermediate inputs required to produce goods and services stay the same between the year to be analysed and the base year the I-O table was compiled. Fixed input coefficients, in essence, reflect production technologies adopted in the base year so that changes in production technologies in succeeding years would naturally alter the coefficients. As noted by Tanaka (2011), using a Cobb-Douglas production function, fixed input coefficients imply that the isoquants are L-shaped and the elasticity of substitution is zero.

The stability of input coefficients also show that the production scales used by various establishments and enterprises allocated to the corresponding industrial sectors are assumed not to undergo changes from the base year. In other, words, there are constant returns to scale such that an x percentage change in output of a sector requires an x percentage change in all of the inputs. Economies of scale are therefore ruled out. Even if similar products are produced, different production scales from that of the base year will lead to different input coefficients.

Factors affecting the input coefficients are relative factor prices and product mixes so that changes in both would also lead to revised input coefficients. Since individual transactions in the basic I-O table are valued at prices in the base year the table was compiled, changes in relative prices of goods and services will also alter the input coefficients even if technological structures remain the same. As the United Nations Statistical Office (1973, p.20) explains, the coefficients in the pure theory of input-output should be regarded as physical quantities of inputs used in producing a given physical quantity of another good. Input-output tables, however, are prepared in monetary values since *“commodities are too heterogeneous to permit a purely, physical measure, and some such as services are simply not measureable in physical terms”*. Thus, intra-year comparison of input-output tables require transactions to be valued at constant prices so that the coefficients which are in value terms would be interpreted as being in physical terms.

Ghosh (1958) further notes that in the Leontief demand-driven model, two implicit assumptions are the existence of competitive markets and non-scarce resource allocation functions and also the presence of a large unused capacity in the short run. This prompted Ghosh to develop an alternative input-output supply-driven model under a monopolistic market or centrally planned economy where one resource is scarce leading to production combinations that are not optimal but are feasible with respect to a welfare function. Thus production combinations are forced on industries through a rationing system of allocation. Input ratios therefore are conditioned by the assigned quotas by central authorities and any change in the assigned quotas would alter the ratios. The Ghoshian supply-driven model departs from the Leontief demand-driven model's assumptions by adding two new conditions which are that: a) fixed allocation coefficients not affected by final demand changes as they depend on centrally-imposed rations and that b) idle capacity exists for all industrial sectors except for the targeted industries with scarce resource.

Because transactions in I-O tables are expressed in monetary values, the difference between the producers' and purchasers' prices consisting of marketing costs, transport, wholesale and retail mark-ups, insurance and warehousing costs and indirect taxes less subsidies are shown as either inputs from the appropriate industries or as a single row in the primary inputs portion as trade and transport margins if transactions are valued at producers' prices. Otherwise, if valued at purchasers' prices, the row totals of each sector will already include the trade and transport margins so that the row and column totals of valuation under purchaser's prices will be higher than those valued at producers' prices. The trade and transport margins of inputs will not appear separately. For this reason, valuation at producers' prices is normally favoured. Imports are also normally treated as a primary input row due to the difficulty of distinguishing between competitive and non-competitive imports. The former is a close substitute for domestically produced goods while the latter means there is no domestic substitute. If imports are treated as non-competitive, their entry as primary input would perfectly show a breakdown of domestic and imported inputs used in production. To the extent imports could be identified as competitive, their values are then entered in the final demand column with negative signs after total final demand.

Applications of Input-Output Analysis

The input-output system has been widely used in economic analysis with new ideas and applications discussed at proceedings of World input-output conferences that are organized every three years. Most applications of I-O analysis are conducted in development planning. Eleish (1963) enumerates several particular applications of input-output analysis in planning such as calculation of production targets, sectoral analysis, regional analysis, calculating foreign currency requirements of development projects, testing the effects of an import substitution policy (or agricultural or industrial policy), modelling choice of investments, national budgeting, calculating requirements of an investment program, and evaluating management of public sector entities.

One of the popular applications of input-output analysis is *structural decomposition analysis* (SDA) which is defined by Rose and Miernyk (1989) as a method of identifying major changes in an economy using comparative static changes in major sets of parameters. It is basically a method of determining structural changes in an economy using input-output tables, normally between two years. Miller and Blair (2009) describes SDA as a process of disaggregating the total amount of change in the economic structure into contributions made by each component. In the context of I-O analysis, the total change in gross output of an economy between two periods (hence, between I-O tables of a country for a base year and another comparator year) is broken down into parts that are associated with changes in technology as shown by changes in the Leontief inverse and changes in final demand. While the precursor of SDA was Leontief himself who analysed changes in US input-output tables in his 1941 and 1953 papers, it was the studies of Chenery & Watanabe (1958), Chenery (1960), Chenery, Shishido & Watanabe (1962), and later extended by Syrquin (1976, 1988) and Chenery & Syrquin (1975, 1980, 1989) that applied SDA in dissecting sources of economic growth in sectors or industries that made an imprint in its use in development economics.

According to Liu & Saal (2001), input-output method is widely used in the analysis of structural changes in the economy for a number of reasons, one being that the table itself provides the most important economic transactions as shown by direct input coefficients that is not generally available in national statistics of many countries, particularly developing nations. Second, I-O analysis enables the analyst to incorporate both direct and indirect sectoral interrelations in the study as measured by the interdependent coefficients or the Leontief inverse.

A third reason is that structural changes can be decomposed into different components such as final demand, export expansion, import substitution and technological change. Moreover, one could get around the static nature of the method by comparing two or more snapshots of the economy at different moments to enable analysis of changes over time in technical coefficients and sectoral mix. While its use has been mostly for historical analysis, recent works by Casler, Afriasabi & McCauley (1991) and Rose & Chen (1991) explored its use in forecasting. As SDA enables the analyst to also examine responses to price changes given value-based I-O tables, decomposing changes of output prices and quantities over time become problematic when considering the indirect effects arising from interindustry relations.

Studies on the applications of the dual I-O system of prices to account for output price changes observed over time or in a single or inter-country comparison have been conducted by Karasz (1992) and Fujikawa, Izumi and Milana (1995a, 1995b) and Dietzenbacher (1997). Milana (2001) notes that changes in output prices or quantities using SDA are conducted in terms of differences rather than ratios and attributes this to the problem of the index number approach in incorporating indirect and induced effects in the analysis of price or quantity changes in a value-based input-

output table. It is usually assumed that input-output ratios remain fixed in physical terms when relative input prices vary following Leontief (1936, 1941). Alternatively, it is sometimes assumed that input-output value shares, valued at current prices, remain constant as relative inputs change following the works of Klein (1952-1953, 1956) and Morishima (1956, 1957).

Another reason for the widespread use of SDA is its comprehensive accounting of all inputs in production and with the increasing popularity of environmental and natural resource management issues, the applications of SDA were extended to look at causes of pollution and resource depletion that are more readily traced to intermediate sectors. SDA thus found broad applications in examining sources of change in international trade [as in Kanemitsu & Ohnishi (1989) and Chen & Wu (1995)]; technological change [as in Sterner (1985), Oosterhaven & van der Linden (1994)]; energy use [as in Office of Technology Assessment (1990), Lin & Polenske (1995)]; workforce requirements [as in Wolff (1985) and Han (1995)]; services [as in Barker (1990)] and development planning [as in Siegel, Alwang & Johnson (1995, 1996)].

With the ability of SDA to distinguish direct and indirect components of sectoral changes, the techniques of input-output analysis found application in growth accounting. The idea is that the indirect effects of one industry on productivity changes occurring in other industries are accounted for by looking at supplied intermediate inputs. Hulten (1978) differentiated productivity change that originated in a sector and the impact of that productivity change on that sector that come from other sectors through supply and use of intermediate inputs, the combined effects of which are called the effective rate of technological or productivity change. The rate of growth in economic productivity has been a fundamental source of economic growth; and its measurement according to Jorgenson & Griliches (1967) has been an active area for analysis in recent years.

Measures of productivity found expression in input-output analysis as in Baumol & Wolff (1984), Wolff (1985, 1994, 1997), ten Raa (2004, 2005) and ten Raa & Mohnen (2004), where the concept of total factor productivity defined as the growth in total output not attributable to the growth in inputs was explored. Input-output framework was also extended to the modelling of economic equilibrium where econometric analysis is applied to specify elasticities. This involves relaxing the assumption of fixed technical coefficients by estimating technical coefficients econometrically as a function of relative prices of inputs based on historical price data.

The econometric estimation is also built around computable general equilibrium (CGE) models using input-output technical coefficients or a social accounting matrix (SAM) where coefficients of interindustry, factor inputs and final demand are econometrically specified. The basic input-output model translated into a CGE model defines a competitive equilibrium with zero profits earned by productive units and where the price of the good is at least equal to the average cost of producing that good and the factor used to produce it is constrained by its availability, in addition to industry production bound to be non-negative. The CGE model as described by Miller & Blair (2009: 681-682) becomes then a primal and dual linear programming problem where the value of total final demand (or gross domestic product) is maximized subject to the technical coefficients and supply availability of value-added factors yielding a solution where the maximized value of final demand equals the minimized cost of value-added factors.

Introduced by Jensen, West & Hewings (1988) is the concept of fundamental economic structure (FES) which uses regression techniques to identify patterns of relations between macroeconomic aggregates and economic transactions in regional input-output tables for entries in the input-output table that reveal consistency at predictable levels over a range of sectors classified as fundamental

to the economy as a whole. This has implications in updating input-output data where more resources are committed to acquire data for the more unpredictable region-specific sectors (e.g., mining) called the non-fundamental economic structure (NFES). Thakur (2008) and Jiang, Dietzenbacher & Los (2007) estimated the FES using the regional I-O tables of big economies like India and China, respectively.

The applications of input-output analysis has in recent years delved into relaxing the static or fixed technological coefficients assumption of the I-O tables using the concept of field of influence approach and network approach. These approaches will be used in this study to explain the role of technology in growth and crisis episodes via its diffusion or propagation among sectors in the interindustry flows contained in input-output tables.

6.2 Technological Change and Input-Output Analysis: The Field-of-Influence Approach

The main methodology to be used in this paper is the field-of-influence approach developed by Hewings, Sonis & Jensen (1988). The most important assumption in Leontief's input-output theory was that direct input coefficients were constant or fixed. In Sonis & Hewings (2007), the authors surveyed the literature on the treatment of coefficient change in input-output models as error analysis and sensitivity analysis. According to them, the literature citing the works of Evans (1954), Simonovits (1975), Lahiri & Satchell (1986), emphasized the effect of error or changes in individual coefficients on the elements of the Leontief inverse matrix. Interpreting change in input structures as error analysis was pioneered by Theil (1957, 1972) where he suggested that change could be decomposed into additive components. In West (1982), error analysis was approached in a relative sense with coefficient change affecting the multipliers of the corresponding inverse matrix. Jackson (1986), in turn developed probability density functions for each coefficient and showed how this could limit input-output modelling.

Insofar as sensitivity analysis is concerned, earlier works have focused on the concept of inverse important coefficients. Bullard & Sebal (1977, 1988) have been cited as applying a theorem developed by Sherman & Morrison (1949, 1950) showing that only a small number of input coefficients in the American input-output model were analytically significant in energy terms. Jensen & West (1980) similarly concluded that omission of a large percentage of entries in the input-output table would have little effect on results from using input-output models for impact analysis. Sensitivity analysis implications of inputs coefficient changes were extended by Morrison & Thurman (1980) and Hewings & Romanos (1981) to question the 'censal' mentality that entries in input-output models need to be estimated with similar degrees of accuracy. West (1982) observed that the size and location of the coefficient within the input-output table was the major determinant of an individual coefficient's importance. Combining sensitivity analysis with statistical estimation, it was Jackson & West's (1989) conclusion that a more 'rational' approach to treating coefficient change that prompted the development of the field-of-influence approach.

Since changes in input coefficients in the input-output framework can be attributed to various factors such as price changes, technological change, substitution of products, changes in scale, Sonis & Hewings (1988a, 1988b) conceptualized the field-of-influence approach as a "*general way of representing the gradient of change of all coefficients in the Leontief inverse associated with a change of all coefficients in the direct coefficients matrix.*"

The field-of-influence approach unlike error and sensitivity analysis measures the overall changes in economic relationships between industries caused by changes in technological coefficients. In Hewings, Sonis & Jensen (1988), the authors explain the field-of-influence approach as a

technique to measure the effects of technological change, specifically in relation to an initial innovation. The authors acknowledged the presence of two dominant logistic relationships in the theory of innovation diffusion – the first one being new products or processes undergoing slow growth then rapid spread, decelerating growth and subsequent decline; and the second one being the competition between new and old products for production space (i.e., competing products from two or more firms or competing processes) and consumption space (i.e., consumer preferences regarding which products to adopt) that determines which old or new products would dominate the market. They thus define technological change as a process of competition for inputs resulting from innovation diffusion or spread. The competitive process which can be modelled as a Markov or general logistic process can be translated to changes in coefficients and hence to changes in the field of influence so that innovation changes are mapped into changes in the economy's structure of industries. This is illustrated in Figure 6.1.

In Sonis & Hewings (2007), the notion of a Schumpeterian wave in a leading sector was conceptually used as a process of direct inputs adjustment using a column in the input-output table as a frequency vector that uses inputs from all other sectors. This adjustment process was described as competition for shares of direct inputs by sectors under a relative share competitive environment.

Figure 6.1
Innovation and the Inter-Industry System

Source: Hewings, Sonis & Jensen (1988, p.33).

The Schumpeterian sigmoid or S-shaped wave are modelled in Sonis & Hewings (2007, pp. 13-17) as a logistic function using the technological coefficients matrix of a given lead sector in the input-output table. The logistic is normally applied to population growth where initial stages show

exponential progression which peters out as a saturation or maturity stage is reached. Given the set of technological coefficients of sector j_1 , the following logistic differential equations are derived:

$$a_{ij_1}(t+1) = N_0 \frac{(a_{ij_1}(t) - N_i)e^{u_i}}{\sum_{s=1}^{n+1} (a_{sj_1}(t) - N_s)e^{u_s}} + N_i$$

$$N_0 + \sum_{s=1}^{n+1} N_s = 1; 0 \leq N_0, N_s \leq 1$$

where $u_i, i = 1, 2, \dots, n+1$ are temporal marginal uses of inputs from sectors i , and $N_1, N_2, \dots, N_{n+1}, 0 \leq N_s \leq 1$ are the widths of the minimal use of inputs from all sectors also defined as technological niches for each input in sector j_1 . The total width of possible changes in inputs outside of all technological niches are represented then by $N_0 = 1 - \sum_{s=1}^{n+1} N_s$. Sonis (1983, 1986) showed the solution to this system of differential equations as:

$$a_{ij_1}(t) = N_0 \frac{(a_{ij_1}(0) - N_i)e^{u_i t}}{\sum_{s=1}^{n+1} (a_{sj_1}(0) - N_s)e^{u_s t}} + N_i,$$

where the vector $r = \begin{pmatrix} N_0 + N_1 \\ N_2 \\ \vdots \\ N_{n+1} \end{pmatrix}$ is the stabilization attractor state.

Figure 6.2
Schumpeterian Waves in the Field of Influence

Source: Sonis & Hewings (2007), p.14.

Applying the Schumpeterian wave to illustrate the dynamics behind coefficient change in the Leontief inverse matrix, $B(t) = (I - A(t))^{-1}$, Sonis & Hewings (2007, 2009) introduced the matrix of changes $E(t) = (e_{ij}(t)) = A(t) - A(0)$ with A being the matrix of direct input coefficients. In Sonis & Hewings (2007), the economy is described as transforming from initial state at time 0 following the logistic differential equation:

$$\begin{aligned}
Q(E(t)) &= 1 - \sum_{i=1}^n b_{j_1 i}(0) e_{i j_1}(t) = 1 - \sum_{i=1}^n b_{j_1 i}(0) a_{i j_1}(t) + \sum_{i=1}^n b_{j_1 i}(0) a_{i j_1}(0) \\
&= 1 + \sum_{i=1}^n b_{j_1 i}(0) a_{i j_1}(0) - \sum_{i=1}^n b_{j_1 i}(0) \left[N_1 + N_0 \frac{(a_{i j_1}(0) - N_i) e^{u_i t}}{\sum_{s=1}^{n+1} (a_{s j_1}(0) - N_s) e^{u_s t}} \right], \text{ and} \\
B(t) &= B(0) + \frac{1}{Q(E(t))} \left\{ \sum_{s=1}^n F(j_s, s)(a_{s j_1}(t) - a_{s j_1}(0)) \right\} \text{ or} \\
b_{ij}(E(t)) &= b_{ij_1}(0) \frac{\sum_{s=1}^n b_{sj}(0) \left(N_s + N_0 \frac{(a_{s j_1}(0) - N_s) e^{u_s t}}{\sum_{r=1}^{n+1} (a_{r j_1}(0) - N_r) e^{u_r t}} - a_{s j_1}(0) \right)}{Q(E(t))}.
\end{aligned}$$

What happens in the redistribution of inputs arising from this Schumpeterian competition is that the share $a_{i j_1}(t)$ with the most efficient use (or maximum temporal marginal use or ‘utility’) monotonically increases from its niche width of N_1 to the new level $N_1 + N_0$ and the share $a_{n+1 j_1}(t)$ of the most inefficient input monotonically decreases from its preservation niche level of N_{n+1} to N_n . Because the share of the input ranges between N_i and $N_0 + N_i$, (i.e., $N_i \leq a_{i j_1}(t) \leq N_0 + N_i$) the portion N_i which is always included measures the extent of captivity of direct inputs from sector i which could take on the value of zero indicating its replacement by other inputs or its transfer for use in other sectors. The dynamics of the input shares in a sector display wave-like characteristics as shown in Figure 6.2 with monotonic increases to their maximum levels followed by asymptotic decreases to their preservation niche levels.

The Basic Equations of the Field-of-Influence Approach

The field-of-influence approach uses the decomposition analysis of the influence of changes in the input coefficients and in the components of final demand on output levels proposed in the work of Feldman, McClain & Parker (1987). Defining x_0 and x_t as the gross output vectors; B_0 and B_t the Leontief inverses of matrix A of direct input coefficients, and f_0 and f_t the vectors of final demand over time periods 0 and t , then their changes are expressed as:

$$\begin{aligned}
\Delta x &= x_t - x_0 \\
\Delta B &= B_t - B_0 \\
\Delta f &= f_t - f_0
\end{aligned}$$

The changes in gross output is then represented as: $\Delta x = x_t - x_0 = B_t f_t - B_0 f_0$. This can be further decomposed into: $\Delta x = (B_0 + \Delta B)(f_0 + \Delta f) - B_0 f_0 = B_0 \Delta f + \Delta B f_0 + \Delta B \Delta f$. The Feldman et al. (1987) approach to decomposition proposed a split of Δx into two components:

$$\frac{1}{2} [B_t(f_t - f_0) + B_0(f_t - f_0)] \text{ and } \frac{1}{2} [(B_t - B_0)f_0 + (B_t - B_0)f_t]$$

where the former represents the gross output changes attributed to changes in final demand and the latter the changes in output attributed to changes in input coefficients. These two contributions to changes in output can be expressed as: $B_0 \Delta f + \frac{1}{2} \Delta B \Delta f$ and $\Delta B f_0 + \frac{1}{2} \Delta B \Delta f$. The presence of the term $\Delta B \Delta f$ in both expressions depicts the problem of assigning the effects of changes in final demand and changes in coefficient change which the Feldman et al. approach conveniently assigned equally (50 percent) to each component. The field-of-influence approach improves on the Feldman et al. technique by decomposing ΔB and Δf and adding a synergetic interaction of the two effects. Thus, the change in gross output is presented as: $\Delta x_i = \Delta x_i^f + \Delta x_i^B + \Delta x_i^{Bf}$, where the superscripts refer to changes associated in final demand (f), changes in input coefficients or technology (B), and their synergetic effect (Bf).

The field-of-influence approach begins by defining $A = (a_{ij})$ which is the $n \times n$ matrix of direct input coefficients of the I-O table; $E = (e_{ij})$ which is a matrix of incremental changes e in the direct input coefficients (i.e., matrix of direct input coefficients in the current year less matrix of direct input coefficients in the base or reference year) ; $B_0 = (I - A)^{-1} = (b_{ij})$ ⁴⁶ and $B_t = B(E) = (I - A - E)^{-1}$ which are the respective Leontief inverse matrices before and after the coefficient changes; and $\det B$ and $\det B(E)$ which are the determinants of the corresponding inverses. The basic formula of the field of influence approach was derived from an earlier work of Sherman & Morrison (1950) where change in the direct input coefficient occurred in only one sector to determine inverse-important input coefficients. The Sherman-Morrison formula for the Leontief inverse assumes the form:

$$B(E) = B + \frac{1}{1 - b_{j_1 i_1} e} F \begin{pmatrix} j_1 \\ i_1 \end{pmatrix} e$$

where j 's are rows and i 's are columns, and e 's are the corresponding changes in technical coefficients; and where the field of influence is notated as:

$$F \begin{pmatrix} j_1 \\ i_1 \end{pmatrix} = \begin{pmatrix} b_{1i_1} \\ b_{2i_1} \\ \vdots \\ b_{ni_1} \end{pmatrix} (b_{j_1 1}, b_{j_1 2}, \dots, b_{j_1 n}) = (b_{ii_1} b_{i_1 j})$$

This is simply a reorganized version of an $n \times n$ block matrix of the Leontief inverse of technical coefficients of the reference or base year with blocks comprising the fields of influence of the first order called the span where:

$$\left\{ F \begin{pmatrix} j_1 \\ i_1 \end{pmatrix} \right\} = \begin{Bmatrix} F(1; 1) & F(2; 1) & \dots & F(n; 1) \\ F(1; 2) & F(2; 2) & \dots & F(n; 2) \\ \vdots & \vdots & \ddots & \vdots \\ F(1; n) & F(2; n) & \dots & F(n; n) \end{Bmatrix}$$

$$= \left\{ \begin{array}{ccc} \left[\begin{pmatrix} b_{11} \\ b_{21} \\ \vdots \\ b_{n1} \end{pmatrix} (b_{11} \quad b_{12} \quad \dots \quad b_{1n}) \right] & \left[\begin{pmatrix} b_{21} \\ b_{22} \\ \vdots \\ b_{n2} \end{pmatrix} (b_{21} \quad b_{22} \quad \dots \quad b_{2n}) \right] & \dots \quad \left[\begin{pmatrix} b_{11} \\ b_{21} \\ \vdots \\ b_{n1} \end{pmatrix} (b_{n1} \quad b_{n2} \quad \dots \quad b_{nn}) \right] \\ \left[\begin{pmatrix} b_{12} \\ b_{22} \\ \vdots \\ b_{n2} \end{pmatrix} (b_{11} \quad b_{12} \quad \dots \quad b_{1n}) \right] & \left[\begin{pmatrix} b_{12} \\ b_{22} \\ \vdots \\ b_{n2} \end{pmatrix} (b_{21} \quad b_{22} \quad \dots \quad b_{2n}) \right] & \dots \quad \left[\begin{pmatrix} b_{12} \\ b_{22} \\ \vdots \\ b_{n2} \end{pmatrix} (b_{n1} \quad b_{n2} \quad \dots \quad b_{nn}) \right] \\ \vdots & \vdots & \ddots & \vdots \\ \left[\begin{pmatrix} b_{1n} \\ b_{2n} \\ \vdots \\ b_{nn} \end{pmatrix} (b_{11} \quad b_{12} \quad \dots \quad b_{1n}) \right] & \left[\begin{pmatrix} b_{1n} \\ b_{2n} \\ \vdots \\ b_{nn} \end{pmatrix} (b_{21} \quad b_{22} \quad \dots \quad b_{2n}) \right] & \dots \quad \left[\begin{pmatrix} b_{1n} \\ b_{2n} \\ \vdots \\ b_{nn} \end{pmatrix} (b_{n1} \quad b_{n2} \quad \dots \quad b_{nn}) \right] \end{array} \right\}$$

⁴⁶ Note that in the theoretical discussion of input-output in Chapter 6.1, the elements of the Leontief inverse matrix were notated as $L = (I - A)^{-1} = l_{ij}$ but in the field of influence approach, the Leontief inverse is notated as the B matrix comprised of elements b_{ij} .

$$= \begin{bmatrix} \begin{pmatrix} b_{11} \\ b_{21} \\ \vdots \\ b_{n1} \end{pmatrix} \\ \begin{pmatrix} b_{12} \\ b_{22} \\ \vdots \\ b_{n2} \end{pmatrix} \\ \vdots \\ \begin{pmatrix} b_{1n} \\ b_{2n} \\ \vdots \\ b_{nn} \end{pmatrix} \end{bmatrix} [(b_{11} \ b_{12} \ \dots \ b_{1n}) \ (b_{21} \ b_{22} \ \dots \ b_{2n}) \ \dots \ (b_{n1} \ b_{n2} \ \dots \ b_{nn})]$$

Following this formulation, Sonis & Hewings (1992, 2007, 2009) and Sonis, Hewings & Guo (1996) developed the following general field-of-influence equation:

$$B_t = B(E) = B_0 + \frac{1}{Q(E)} \left[\sum_{k=1}^n \sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} 'F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} e_{j_1 i_1} \dots e_{j_k i_k} \right]$$

where $F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix}$ is the matrix of intensity (i.e., product of the row and column multipliers of the direct field of influence, $e_{j_1 i_1} \dots e_{j_k i_k}$ are the respective incremental changes and $Q(E)$ is the ratio of the determinants of the Leontief inverses pre-and post-changes in the coefficients which is defined as the polynomial of the incremental changes e_{ij} that has the formula:

$$Q(E) = \frac{\det B_0}{\det B_t} = 1 - \sum_{j_1 i_1} b_{j_1 i_1} e_{i_1 j_1} + \sum_{k=2}^n (-1)^k \sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} B_{or} \begin{pmatrix} j_1 & \dots & j_k \\ i_1 & \dots & i_k \end{pmatrix} e_{i_1 j_1} \dots e_{i_k j_k}$$

where $B_{or} \begin{pmatrix} j_1 & \dots & j_k \\ i_1 & \dots & i_k \end{pmatrix}$ in the right hand term is a determinant of order k that contains the Leontief inverse B_0 from the ordered array of columns $i_1, i_2 \dots i_k$ and rows $j_1, j_2 \dots j_n$. In this formula, the negative of the determinant of the Leontief inverse matrix is multiplied by the elements of the Leontief inverse matrix of the initial year, i.e., $-\det B \times B$.

To take account of the second order fields of influence as noted in Sonis and Hewings (n.d.) $-\det B \times B$ is multiplied by the matrix of changes in technical coefficients (i.e., E matrix). The authors illustrated this in a sample 2 x 2 matrix where:

$$B(E) = B + \frac{1}{Q(E)} [F(1,1)e_{11} + F(1,2)e_{12} + F(2,1)e_{21} + F(2,2)e_{22} - \det B B \begin{bmatrix} e_{11} & e_{12} \\ e_{21} & e_{22} \end{bmatrix}].$$

Through direct calculation, this expands to:

$$\begin{pmatrix} b_{11}(E) & b_{12}(E) \\ b_{21}(E) & b_{22}(E) \end{pmatrix} = \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix} + \frac{1}{Q(E)} \left[\begin{pmatrix} b_{11}b_{11} & b_{11}b_{12} \\ b_{21}b_{11} & b_{21}b_{12} \end{pmatrix} e_{11} + \begin{pmatrix} b_{11}b_{21} & b_{11}b_{22} \\ b_{21}b_{21} & b_{21}b_{22} \end{pmatrix} e_{12} + \begin{pmatrix} b_{11}b_{21} & b_{12}b_{12} \\ b_{11}b_{22} & b_{21}b_{22} \end{pmatrix} e_{21} + \begin{pmatrix} b_{12}b_{21} & b_{12}b_{22} \\ b_{21}b_{22} & b_{22}b_{22} \end{pmatrix} e_{22} \right. \\ \left. - \det B \begin{pmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \end{pmatrix} \begin{bmatrix} e_{11} & e_{12} \\ e_{21} & e_{22} \end{bmatrix} \right] = \frac{1}{Q(E)} \begin{pmatrix} 1 - a_{22} - e_{22} & a_{12} + e_{12} \\ a_{21} + e_{21} & 1 - a_{11} - e_{11} \end{pmatrix}$$

In Sonis, Hewings & Guo (1996), the connection to decomposition of changes in gross output by the given field-of-influence formula stated above is provided as:

$$\Delta x = B_0 \Delta f + \frac{1}{Q(E)} \sum_{k=1}^n \left[\sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} 'F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} f_0 e_{j_1 i_1} \dots e_{j_k i_k} \right] + \frac{1}{Q(E)} \sum_{k=1}^n \left[\sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} 'F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} \Delta f e_{j_1 i_1} \dots e_{j_k i_k} \right].$$

The first term $B_0\Delta f$ represents changes in gross output resulting from changes in final demand weighted by the Leontief inverse before the change in direct input coefficients; the second term represents the contributions of each individual field of influence to changes in gross output weighted by final demand f_0 before the change in direct input coefficients; and the third term measures the changes in gross output ascribed to the synergetic interaction of all individual fields of influence weighted by changes in final demand. This decomposition is divided into self-induced or own-generated changes in gross output arising from the sector itself due to changes in final demand or technological change; and other-generated changes in gross output arising from another sector in the inter-industry accounts.

Adding the first and second terms to yield $B_t\Delta f$, one derives the portion of changes in gross output attributed to changes in final demand weighted by the Leontief inverse after the change in direct input coefficients such that the expression above can be rewritten as:

$$\Delta x = B_t\Delta f + \frac{1}{Q(E)} \sum_{k=1}^n \left[\sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} f_0 e_{j_1 i_1} \dots e_{j_k i_k} \right].$$

Hence, in essence, the matrix notations simply state that the new Leontief inverse $B(E)$ also referred to as the perturbed inverse matrix should be equal to the sum of two matrices which are the old Leontief inverse B (that of the initial year) and the field of influence $F(i_1; j_1)$ multiplied by the rational fraction function of e which are the respective changes in the direct input coefficients, as follows: $B(E) = B + \frac{e}{1 - b_{j_1, i_1} e} F(i_1; j_1)$. This decomposition of changes in gross

output can be simplified as: $\Delta x_i = \Delta x_i^f + \Delta x_i^B + \Delta x_i^{Bf}$, where the superscripts represent changes arising from final demand (f), changes in technology, i.e., intermediate inputs (B) and their synergetic action (Bf). Expressed as relative changes assuming that Δx_i is not equal to zero, the relative shares of these changes to the total change in gross output are further represented by the following equations: $p_i = \frac{\Delta x_i^f}{\Delta x_i}$; $q_i = \frac{\Delta x_i^B}{\Delta x_i}$; $r_i = \frac{\Delta x_i^{Bf}}{\Delta x_i}$ where the relative shares of these components add up to unity, $p_i + q_i + r_i = 1$.

Figure 6.3
Hexagram of Changes in Gross Output

Source: Sonis, Hewings & Guo (1996), p. 20.

The authors used this simplification to facilitate the use of a graphical tool with Barycentric coordinates⁴⁷ to trace the evolution of changes in gross output between two time periods corresponding to different combinations of signs of the components p , q and r . This is shown in a hexagram in Figure 6.3 where three axes representing Δp , Δq , Δr with the same origin bisect each other at a 60 degree angle dividing the surface into six sectors representing the different signs possible among the three components tabulated in Table 6.11.

Interpretation of the Change in Interdependence Coefficients

Sonis & Hewings (1996, 1988a, 1988b, 2007, 2009); Hewings, Sonis & Jensen (1988); and Sonis, Hewings & Guo (1996) explain the change in technical coefficients as a direct input adjustment process where firms compete for shares of these direct inputs resulting from innovation diffusion. As explained in the earlier section of Chapter 6.2 on Schumpeterian waves, this competition operates in both production and consumption spheres between new and old products displaying characteristics of the logistic curve where a period of slow growth is followed by rapid and then decelerating growth and consequent decline. In the production sphere, firms will compete for inputs or processes to produce these new products whereas in the consumption sphere, consumers apply their preferences in adopting these new products/processes and discarding old ones. These changes in coefficients can then be induced by changes in prices, structural change or innovation diffusion and adoption.

Table 6.11
Six Types of Qualitative Changes

Classification	Sign Δp_i	Sign Δq_i	Sign Δr_i	Qualitative description of changes
1	+	+	-	Growth in influence of final demand and technology; decline in synergetic effect
2	+	-	-	Growth in influence of final demand; decline in technology and synergetic effect
3	+	-	+	Growth in influence of final demand and interaction; decline in technology
4	-	-	+	Growth in synergetic effect; decline in final demand and technology
5	-	+	+	Growth in technology and synergetic effect; decline in final demand
6	-	+	-	Growth in technology; decline in final demand and synergetic influence

Source: Sonis, Hewings & Guo (1996), p.21.

What the authors failed to mention is that this technological diffusion process arises only when there is excess demand or unutilized capacity⁴⁸ in the sectors where technology spreads as there should be absorptive capacity to meet the unfulfilled demand so that multiplier effects needed for growth will operate; otherwise the absence of these conditions could only lead to inflation or

⁴⁷ Barycentric coordinates are triples of numbers corresponding to masses placed at the vertices of a reference triangle such that a point P is determined by these vertices which is the geometric center of the three masses. See <http://mathworld.wolfram.com/BarycentricCoordinates.html>.

⁴⁸ See Main Assumptions of Input-Output Methodology under 6.1 where advocates of Ghosh added these assumptions to the Leontief assumptions (p.204).

deflation. In the case of unmet demand, growth occurs since technological progress lowers supply constraints and induces production increases and a decrease in costs and prices. In the case of undercapacity, technological advancement can reduce average costs to produce when new technology is cost effective or cost-reducing in which case growth does not occur but only leads to a reduction in commodity prices. Newly introduced technology introduces sunk costs which necessitate full production, but this increase in production is desirable only up to a point where unsatisfied demand is still positive as deflation can set in once production surpasses this point leading to excess supply and abnormal fall in prices.

While the case for positive changes in coefficients are implicit in the competition for input shares, the authors do not discount the fact that the change in inverse coefficients could be zero or negative. Hewings, Sonis & Jensen (1988) state the “*possible existence of the competitive exclusion of inputs which leads to the existence of a few zero inputs in the final equilibrium distribution* (p.29).” Sonis & Hewings (1988b) suggested using “*the rank-size ordering of the elements of [the field of influence], f_{ij} from the largest positive to the negative elements* (p.237)” to ascertain the qualitative structure of the field of influence. Then in Sonis & Hewings (1996), they mention “*the positive and negative parts of the intensity*” of the field of influence.

The authors, however, implied that negative changes in the inverse coefficients, which connotes less purchases and sales of inputs among industries in producing output could only mean a decline in technology or technological regress. Feller (1972) distinguishes between the terms technological change and technical change which are often used interchangeably. Technological change, according to him, “*involves the creation of a new set (called technology) of production alternatives* (p.155)” whereas technical change is defined as “*a change in production method out of the existing set of alternatives* (p. 155).” This is graphically illustrated using a standard envelope isoquant where any observed movement between two points along this envelope given a change in factor prices could reflect either modification of an existing technique (technical change) or adoption of a new technique (technological change) provided that the latter was initially available to the firm when it was deciding on its choices. In the modification case, the firm will be buying additional inputs to an installed technique of production even though inefficient because it entails smaller capital outlays whereas in the adoption case, the firm will be dismantling an existing technique and replacing it with a new one which may be costly but more efficient. The adoption case of technological change is illustrated with “*an inward shift in the production isoquant* (p. 160).” This implies producing the same or greater amount of output with fewer input combinations, in other words, “producing more with less”.

Baptist & Hepburn (2013) decry the exclusion of materials, energy and other intermediate inputs in growth modelling due to the omission by economists of natural and environmental resources in specifying production functions in deference to capital and labour as more significant determinants of output. This omission of intermediate inputs could lead to biased estimates of productivity. The authors introduced the term material efficiency (which in this study will be called technical efficiency) as “*the provision of more goods and services with fewer materials* (p. 3)” or intermediate inputs. In contrast to engineers and physical scientists who could identify material inputs (as steel and iron ore), economists, however, have aggregated materials together with other intermediate inputs due to the difficulty of segregating raw from other processed inputs. In their study, the authors used intermediate inputs as the unit of analysis to show that sectors that are less intensive in using intermediate inputs registered higher productivity, and vice-versa. This result was reached using firm-level panel data of more than 400 manufacturing industries in the National Bureau of Economic Research (NBER) dataset, using four econometric techniques specifying

capital, labour and intermediate coefficients of an aggregate production function. Thus, producing more with less inputs which is technical efficiency could lead to growth.

Sonis, Hewings, Guilhoto & Martins (1995) acknowledged that the field of influence methodology is “*not limited to changes induced by technological change, improvements in efficiency or changes in product lines* (p.241)”, indicating the difference between technological change and technical efficiency. Apart from these forces, the authors also caution about the possibility of changes in an economy’s competitive position. This means that a reduction in input intensity could also be at the expense of trade dependency as purchases made in the domestic economy are supplanted by more imports. Thus, it would be necessary to cross check negative changes in technical coefficients (i.e., less inter-industry purchases and sales in the national economy) with the trends in import coefficients. How imports are treated in the inverse matrix of technical coefficients must therefore be further scrutinized.

The Ministry of Internal Affairs and Communications Japan (2016) describes the three ways by which inverse matrix coefficients account for imported inputs. These are: (a) $(I - A)^{-1}$ or the competitive import type where imports are excluded from intermediate inputs and deducted from final demand; (b) $[I - (I - \dot{M})A]^{-1}$ which is another variant of competitive import type where the imported input ratio is assumed constant in all sectors, whether for intermediate or final demand and $\dot{M}$ is a diagonal matrix containing the import coefficients and (c) $(I - A^d)^{-1}$ or non-competitive import type where input ratios of imports vary by sector. In the case of the sample countries of the study, the Philippines and Thailand follow the first type whereas Malaysia follows the third method of calculation.

In summary, a negative change in the technical coefficients could signal technical efficiency as long as this is not replaced by increasing trade dependency (higher imports of inputs). Otherwise, the possibility of a decline in technological capability or technological regress is possible and could be an impulse for crisis.

Intensity of Direct Field-of-Influence, Global Intensity Matrix, the Multiplier Product Matrix and Backward and Forward Linkages

To link the field of influence approach with key sector analysis of backward and forward linkages, Sonis and Hewings (2009) introduced the concept of the intensity of the direct field of influence. This intensity of the field of influence is linked to the concept of multiplier product matrix which is derived from the matrix A of direct input coefficients in the input-output table and matrix B which is the associated Leontief inverse matrix. This Leontief inverse matrix will be comprised of $B_{i\cdot}$ for column multipliers and $B_{\cdot j}$ for row multipliers defined as:

$$B_{i\cdot} = \sum_{j=1}^n b_{ij}, B_{\cdot j} = \sum_{i=1}^n b_{ij}.$$

In matrix format as depicted in Sonis & Hewings (1999), the row vector (M_c) comprising column multipliers can be expressed as:

$$M_c(B) = [B_{\cdot 1} \ B_{\cdot 2} \ \dots \ B_{\cdot n}]$$

and the column vector comprising row multipliers (M_r) as:

$$M_r(B) = \begin{bmatrix} B_{1\cdot} \\ B_{2\cdot} \\ \vdots \\ B_{n\cdot} \end{bmatrix}.$$

The intensity of the direct field of influence is calculated as the sum of all elements of the field of influence notated as $f_{ij}(i_1, j_1)$ equal to the sum of the products of the column and row multipliers:

$$IntF(i_1; j_1) = \sum_{ij} f_{ij}(i_1; j_1) = B_{i\bullet} B_{\bullet j} .$$

The field of influence is a mathematical technique used by Sonis & Hewings where row and column multipliers of the Leontief inverse are arranged as a column vector and a row vector, respectively and their products are taken to yield the intensity of the direct field of influence. The multiplier product matrix M is calculated by weighing the field of influence by the volume V of the Leontief inverse matrix. This volume using the field of influence is the *global intensity* as it is the sum of the all the row multipliers and column multipliers expressed in Sonis & Hewings (2009, p. 91) as:

$$V = \sum_{i=1}^n \sum_{j=1}^n b_{ij} = \sum_i B_{i\bullet} = \sum_j B_{\bullet j} .$$

Thus, the input-output multiplier product matrix M is notated under the global intensity matrix as:

$$M = \frac{1}{V} \begin{bmatrix} B_{1\bullet} \\ B_{2\bullet} \\ \vdots \\ B_{n\bullet} \end{bmatrix} \times [B_{\bullet 1} \ B_{\bullet 2} \ \dots \ B_{\bullet n}] .$$

The components of the multiplier product matrix m_{ij} is expressed as:

$$M = (m_{ij}) = \frac{B_{\bullet i} B_{\bullet j}}{V}$$

which simply states that the product of the column vector of row multipliers and the row vector of column multipliers yields the multiplier product matrix which the authors interpret as a matrix of first order intensities of the fields of influence of individual changes in the direct input coefficients. Thus, using the first order intensities of the direct field of influence (i.e., product of the column and row vectors of corresponding row and column multipliers of the Leontief inverse of the initial year), the global intensity matrix whose entries are the intensity $F(i_1, j_1)$ can be expressed as the multiplier product matrix where the intensity per sector is weighted by the total or global intensity (volume) of the direct field of influence matrix based on Sonis & Hewings (2009):

$$M = \frac{1}{V} [IntF(i_1; j_1)]$$

For purposes of illustration, the intensities of the first order fields of influence are thus incorporated into the multiplier product matrix using a sample of a 2 x 2 matrix as follows:

$$M = \frac{1}{V} \begin{bmatrix} (b_{11} + b_{21})(b_{11} + b_{12}) & (b_{12} + b_{22})(b_{11} + b_{12}) \\ (b_{11} + b_{21})(b_{21} + b_{22}) & (b_{12} + b_{22})(b_{21} + b_{22}) \end{bmatrix}$$

where V is the global intensity is: $V = b_{11} + b_{12} + b_{21} + b_{22}$.

The multiplier product matrix M that is derived from the products of the corresponding column and row multipliers of the Leontief inverse is next used to conduct key sector analysis of backward and forward linkages which Sonis & Hewings (2009) propose. Using Rasmussen (1957) and Hirschman's (1958) concepts of backward and forward linkages, sectors can be identified that have linkage structures that create an above average impact on the rest of the economy due to an expansion of that sector or in response to a change in other sectors of the system. The backward linkage or power of dispersion is calculated as: $BL_j = \frac{nB_{\bullet j}}{V}$, where $B_{\bullet j}$ is the row vector of column multipliers of sector j; and the forward linkage or sensitivity of dispersion is calculated as: $FL_i = \frac{nB_{i\bullet}}{V}$; $B_{i\bullet}$ being the column vector of row multipliers of sector i.

The sum of all backward linkages and the sum of all forward linkages add up to n , and the average linkage should add up to unity. When the backward linkage exceeds the average linkage, i.e., $BL_j > 1$, the corresponding column multiplier of a sector $B_{\bullet j}$ is higher than the average column multiplier indicating that a unit increase in final demand in sector j will trigger an above average increase in the economy. On the other hand, when the forward linkage exceeds the average linkage, i.e., $FL_i > 1$, the corresponding row multiplier of a sector $B_{i \bullet}$ is higher than the average row multiplier, implying that a unit increase in all sectors' final demand (including sector i) would cause an above average increase in sector i . A key sector is defined as one where both backward and forward linkages exceed the value of 1.

These backward and forward linkage indices could be ranked in descending order, results of which according to Sonis & Hewings (2009) categorizes industries or sectors into four groups as follows: (i) a key sector if $BL_i > 1$ and $FL_i > 1$; (ii) a backward linkage oriented sector if $BL_i > 1$ and $FL_i < 1$; (iii) a forward linkage oriented sector if $BL_i < 1$ and $FL_i > 1$; and (iv) a weak linkages oriented sector if $BL_i < 1$ and $FL_i < 1$. This typology is depicted in Figure 6.4 using the case of the Chinese economy as a sample in Sonis & Hewings (1999). The rank size ordering or hierarchy of the backward and forward linkage indices reflect the rank size ordering of the column and row multipliers.

Figure 6.4
Key Sector Classification using Backward and Forward Linkages

Source: Sonis & Hewings (1999, p.62).

Inasmuch as the column and row multipliers for the multiplier product matrix are the same as those of the Leontief inverse matrix, the structure of the multiplier product matrix is basically connected to the cross-structure properties of backward and forward linkages of the sectors. The cross structure properties imply proportionality which means that if ranked in descending order, the elements of the row containing the largest row multipliers should be larger than the corresponding elements of all other rows, and the elements of the column containing the largest column multiplier should be larger than the corresponding elements of all other columns. If the largest column multiplier and the largest row multiplier are located in the coordinates (i_0, j_0) in the multiplier product matrix M , then the element located in i_0, j_0 would define the center of the largest cross within the M matrix. This is shown in Figure 6.5.

Figure 6.5
Cross Structure of Multiplier Product Matrix

Source: Sonis & Hewings (2009, p. 83).

Figure 6.6
Economic Landscape using Rank Size Hierarchy of Backward and Forward Linkages

Source: Sonis & Hewings (n.d., p.65).

The ranking may also be interpreted as the strength of backward and forward linkage effects with respect to the first order field of influence, i.e., the center of the largest cross of the direct field of influence will coincide with the location of change in direct coefficient e . Thus, the largest components of the direct field of influence (e.g., $f(i_1; j_1)$ in the diagram) will be located in the i_1 th row and j_1 th column impacting most the forward linkages of sector i_1 and the backward linkages of sector j_1 . Excluding this cross from M would reveal the second largest cross and so on. When reorganizing the locations of rows and columns of M in such a way that the centers of the

corresponding crosses ranked by size appear on the main diagonal, a descending economic landscape is portrayed as shown on Figure 6.6.

The most significant property of the economic landscape is that the elements of the multiplier product matrix represent the intensities of the first order fields of influence of changes, i.e., the components of the gradients of changes in direct input coefficients. This gradient is a measure of the inverse importance of direct inputs explained in Sonis & Hewings (1999) where inverse important inputs refer to those inputs, changes of which lead to the most sizeable impact on the economy.

Second Order Intensity Matrix N, Residual, Symmetric and Antisymmetric Matrices

It should be noted that while traditional key sector analysis calculate backward and forward linkages from the input-output tables per year, this traditional approach based on Rasmussen (1957) and Hirschman (1958) looks at changes in the Leontief inverse caused by changes in individual direct inputs and ignores the details of intra/intersectoral interdependencies. Sonis & Hewings (2009) propose a new framework for key sector analysis using the multiplier product matrix to calculate forward and backward linkages as this approach can further be processed into scaling effects of intersectoral linkages and synergetic interactions between different sectors associated with rounds of spending derived from the power series expansion of the Leontief inverse matrix. This implies that a second order intensity matrix N could be computed from the multiplier product matrix using the intensities of the second order fields of influence. The sum of the second order intensities are equal to $\pm \det B(b_{11} + b_{12} + b_{21} + b_{22}) = \pm V \det B$ since the sum of the row and column multipliers of the Leontief inverse yield the total volume V. The equation for the N matrix could be derived as follows using a sample 2x2 matrix:

$$N = \frac{1}{V^2} \begin{bmatrix} -V \det B & V \det B \\ V \det B & -V \det B \end{bmatrix}$$

The Leontief inverse matrix could thus be decomposed into the following satisfying the minimum information property⁴⁹ which was proven in Sonis & Hewings (2009, pp. 90-93):

$$B = M - N = \frac{1}{V} \begin{bmatrix} (b_{11} + b_{21})(b_{11} + b_{12}) & (b_{12} + b_{22})(b_{11} + b_{12}) \\ (b_{11} + b_{21})(b_{21} + b_{22}) & (b_{12} + b_{22})(b_{21} + b_{22}) \end{bmatrix} - \frac{1}{V} \begin{bmatrix} -\det B & \det B \\ \det B & -\det B \end{bmatrix}.$$

This matrix of synergetic interaction N includes scaling effects of intrasectoral linkages and is obtained based on the equation above by using the reciprocal of the global intensity of the multiplier product matrix, i.e., $\frac{1}{V}$ and multiplying this by the second order effects of the direct field of influence. The scaling effects indicate the self-influence of sectors that are reflected in the diagonal components of the Leontief inverse which contain the largest coefficients. Sonis & Hewings (2009, n.d.) further introduce a residual matrix R from the N matrix that reflects bilateral balances and imbalances through push-pull backward and forward linkages. The residual matrix is obtained by the formula: $R = -D - N$ where D represents the diagonal components of the N matrix. Thus, the Leontief inverse can be decomposed into: $B = M + D + R$, where B is the Leontief inverse matrix, M is the multiplier product matrix, D is the diagonal of the N matrix and

⁴⁹ In statistical inference, the minimum information principle is related to the dynamics of entropy where the non-zero probability of a new information or event affecting a given probability distribution is calibrated. It is a standard by which data derived by relevant methods can easily be verified, analysed and interpreted by the wider scientific community. This minimum information property according to Sonis & Hewings (2009) is equal to the solution to the minimization problem: $\min \ln f N = \sum_{ij} \frac{B_{\bullet i} B_{\bullet j}}{V^2} \ln \frac{B_{\bullet i} B_{\bullet j}}{V^2}$ which yields the equation above where $B = M - N$.

R is the residual matrix with zero as diagonal elements and usually positive numbers as off-diagonal elements.

The residual matrix R contains symmetric (S) and anti-symmetric (S_a) components, hence $R = S + S_a$ to represent the respective sectoral balances and imbalances between the various sectors when the technical coefficients change that causes the multiplier product matrix M to deviate from a homogeneous distribution of backward and forward linkages. The authors denote the symmetric part of R as an S matrix which is obtained by taking one-half of the sum of the R matrix and its transpose R^T , i.e., $(S = \frac{1}{2}(R + R^T))$. The anti-symmetric part known as the S_a matrix, in turn, is obtained by taking one-half of the difference between the R matrix and its transpose R^T , i.e. $S_a = \frac{1}{2}((R - R^T))$. The sum of the column and row elements of the anti-symmetric matrix add up to zero. Furthermore, the sum of the column and row elements of both the N matrix and the S matrix must also be identical according to the authors.

In conclusion, the total linkages for key sector analysis obtained from the multiplier product matrix is simply the direct field of influence multiplied by respective change in inverse coefficients of each sector weighted by the volume (intensity) or total sum of columns and rows. If the second order or synergetic effects are weighted similarly by the total volume used in the multiplier product matrix, the N matrix is derived which shows scaling effects of self-influence sectors. This N matrix in turn can further be manipulated to derive sectoral compensatory balances needed to keep the same distribution as the multiplier product matrix which is known as the residual matrix. This decomposition is not obtainable under the traditional static key sector analysis using the actual multipliers of the given Leontief inverse matrices of each year as opposed to using the field of influence approach which shows further dynamics behind changes in technical coefficients.

6.3 Business Cycles (Crisis) and Input-Output Analysis: The Network Concept using Field of Influence Approach

The input-output framework can also be used to explain the propagation of business cycle shocks on the rest of the economy. This follows the real business cycle (RBC) theories introduced by Kydland & Prescott (1982) as discussed in Chapter 4. The use of input-output approach to explain aggregate fluctuations was explored in the past decade by Carvalho (2008); Acemoglu, Carvalho, Ozdaglar & Tahbaz-Salehi (2012); Roson & Sartori (2014); Alatraste Contreras & Fagiolo (2014); Acemoglu, Akcigit & Kerr (2015); and Baqaee (2015) who all built on the multi-sectoral framework developed by Long & Plosser (1983).

The propagation mechanism of RBC theories measures how shocks are amplified and propagated throughout the macro-economy. The application of input-output analysis to measure the propagation mechanism is explained using the network perspective of production linkages. In Acemoglu, Akcigit & Kerr (2015), the transmission channel of shocks are typified as demand-side shocks propagating upstream to the input-supplying industries and supply-side shocks propagating downstream to customer-based industries. This is nothing else but the backward (upstream) and forward (downstream) linkages in the input-output framework, with some application as well of the bullwhip or Forrester effect also discussed in Chapter 4.

The network characteristics of industries are required since any perturbation affecting a single microeconomic unit would have minimal impact when aggregated. Shocks affecting n number of independent microeconomic units as argued by Lucas (1977) would generate fluctuations with

standard deviations that scales with a factor of $1/\sqrt{n}$. This implies that microeconomic shocks average out and would exert negligible effects at the aggregate level. This is because aggregate output converges around its mean at a rapid rate such that aggregate fluctuations would magnify proportionally by the scaling factor. Thus as n becomes larger, i.e., the economy becomes more disaggregated, the fluctuations at the macro level would average out. However, this ignores the possibility of interconnectedness between firms and industries, which can also amplify propagation of idiosyncratic shocks economy-wide. As more and more units are linked as found in input-output relationships, a shock could propagate throughout the economic system with sizeable aggregate volatility. This was proven by Gabaix (2011) who concluded with his granular theory that the distribution of firms or sectors in the economy are statistically typically fat-tailed, meaning that shocks affecting larger firms or sectors cannot be balanced out by those hitting smaller firms, so that distinctive shocks to large sub-units can lead to significant aggregate fluctuations. His paper showed that when firm size is power-law distributed would break down the conditions of the central limit theorem and aggregate volatility decays by $1/\ln N$ rather than by $1/\sqrt{n}$.

Figure 6.7

Symmetric Inter-sectoral Relationships

Source: Acemoglu, Carvalho, Ozdaglar & Tahbaz-Salehi (2012), p.1979.

The inapplicability of the law of large numbers in the case of shocks hitting sectors that are important suppliers to other sectors so as to generate significant aggregate fluctuations were also explored by Acemoglu, Carvalho, Ozdaglar & Tahbaz-Salehi (2012) who argued for the presence of certain network characteristics. In their paper, they concluded that sizeable aggregate fluctuations can be obtained from sector-specific shocks only if there is asymmetry in sectoral roles as direct or indirect suppliers to others. Symmetrical relationships are pictured in Figure 6.7, where the image in panel (a) shows non-inter-acting sectors and the one on panel (b) shows a star relationship where a sector is equally dependent on the outputs of all other sectors. In both cases, the so-called diversification argument of Lucas where microeconomic shocks wash out would be applicable.

On the other hand, the authors show that aggregate output concentrates around its mean at a slower rate of decay under two cases. The first case is that of first order interconnections where shocks to a sector that is a top-heavy supplier to an unevenly large number of other sectors can propagate shocks directly to those sectors as shown in panel (a) of Figure 6.8. The second case refers to higher-order interconnections where low productivity in a sector create a decrease in production not only of immediate downstream sectors but a cascading effect on sectors that are

related to each other or are clustered around a common supplier, as shown in panel (b). These were proven by the authors through a series of mathematical theorems and corollaries.

Figure 6.8
Asymmetric Inter-sectoral Relationships

Source: Acemoglu, Carvalho, Ozdaglar & Tahbaz-Salehi (2012), pp.1979-1980.

A second condition the authors imposed on the irrelevance of the law of large numbers on aggregate fluctuations is the sparseness or thinness of the input-output matrix itself. This is demonstrated by considering balanced inter-sectoral networks where aggregate volatility would tend to decay at the rate $\sqrt{n}$, as shown by the ring in panel (a) and the binary tree in panel (b) of Figure 6.9, showing behaviour on aggregate fluctuations no different from those depicted in symmetric interconnectedness shown earlier. Scantiness of the I-O matrix does not affect the nature of aggregate fluctuations.

Figure 6.9
Balanced Inter-sectoral Relationships

Source: Acemoglu, Carvalho, Ozdaglar & Tahbaz-Salehi (2012), p. 1996.

For second-order interconnections, the authors also proved that two economies with corresponding inter-sectoral connections depicted in Figure 6.10 may have identical degree sequences in number of sectors n but would display different levels of network-originated aggregate fluctuations that would be higher in panel (a) where high degree sectors share a common supplier compared to panel (b) where high degree sectors do not share a common supplier.

Figure 6.10
**Networked Relationships with Identical Degrees
 but Varying Effects on Aggregate Fluctuations**

Source: Acemoglu, Carvalho, Ozdaglar & Tahbaz-Salehi (2012), p. 1992.

To test their theory empirically, Acemoglu et al. (2012) used a static version of Long & Plosser's (1983) multi-sector model where they assumed each commodity in the economy was produced competitively and were either finally consumed or used as inputs by other sectors for production. The sectors further utilized Cobb-Douglas technologies with constant returns to scale with output of sector i denoted by x_i notated as $x_i = z_i^a l_i^a \prod_{j=1}^n x_{ij}^{(1-\alpha)\omega_{ij}}$. In this expression, l_i is the amount of labour hired by the sector, $\alpha \in (0,1)$ represent the share of labour, x_{ij} is the amount of commodity j used in the production of sector i , and z_i is the distinctive productivity shock to sector i . In the model, the exponent ω_{ij} corresponding to the entries of input-output tables will be zero if sector i does not use commodity j and will be positive otherwise. Also, the productivity shocks z_{ij} which are independent across sectors are denoted by a distribution called F_i which is equivalent to $\varepsilon_i \equiv \log(z_i)$.

The concept of inter-sectoral network of the economy and input-output matrix are used interchangeably as representing the structure of inter-sectoral exchanges. The authors proceed by defining the degree of sector i as $d_i \equiv \sum_{j=1}^n \omega_{ji}$ which depicts the share of sector i 's output in the input supply of the entire economy normalized by a constant $1 - \alpha$. Finally, they define a vector v as cited by Carvalho (2008) called the influence vector as $v \equiv \frac{(1-\alpha)}{n} [I - \alpha W]^{-1} \mathbf{1}$, where the expression in brackets is the Leontief inverse.

The logarithm of real value added of the economy is then expressed as: $y \equiv \log(GDP) = v' \varepsilon$ which tells that the growth rate of real aggregate output depends on logarithms of sectoral shocks with coefficients determined by the elements of the influence vector. The authors also presented a reduced form model expressed as: $\tilde{y} = \tilde{W} \tilde{y} + \tilde{\varepsilon}$ where $\tilde{y}$ is a vector of output levels or value-added of n sectors, $\tilde{W}$ is the input-output matrix and $\tilde{\varepsilon}$ is a vector of idiosyncratic sectoral shocks. Applying the model to the US economy over the 1972-2002 period, the authors discovered a significantly slower rate of decay than what power law suggests as they expanded from 84 sectors to 483 sectors of the US input-output accounts. Their results implied that the structure of inter-sectoral network represented by input-output linkages in terms of importance of different sectors as direct or indirect suppliers in the entire economy and the presence of high degree sectors sharing common suppliers produced slower rates of decay in aggregate volatility arising from idiosyncratic sectoral shocks. Using input-output tables from 2001-2002 until 2012-2013, the same results as the USA were revealed for Australia in a similar study conducted by Anufriev, Goryacheva & Panchenko (2016) following Acemoglu et al.'s (2012) model although the aggregate volatility in

Australia's hub industries were smaller in comparison.

Another study conducted by Acemoglu, Akcigit & Kerr (2015) posited a more specific pattern of economic transition in the network economy where demand-side shocks propagate upstream to supplier sectors and supply-side shocks propagate downstream to buyer industries consonant with the Forrester or bullwhip effect discussed in Chapter 4. The study investigated four types of industry-level shocks that propagate through the input-output linkages using again US input-output data covering 392 industries. The four types of shocks were demand-side shocks which are variations in exogenous component of industry imports from China and changes in federal spending; and two supply-side shocks which are total factor productivity shocks and variation in knowledge and ideas coming from foreign patents. The results found statistical significance in the propagation mechanism through input-output network and confirmed their theory as the two demand-side shocks showed upstream dominating downstream propagation and the two supply-side effects showing stronger downstream and minimal to no upstream propagation. This simply shows that in the case of supply-side shocks, the forward linkage indices will be higher while for demand-side effects, the backward linkage indices should be larger.

Related studies by Alatraste Contreras (2014) and Alatraste Contreras & Fagiolo (2014) further investigate how the network structure of sectoral interdependencies shapes the propagation of exogenous shocks in what they describe as diffusion models. There are three diffusion models that explain how shocks are transmitted from one sector to an adjoining one along the production chain.

The first model is a standard one where shocks are demand-driven which do not alter during the diffusion process the production and technological relationships between sectors in the input-output table. This means that the impact on sectoral production keeps the magnitudes of inter-sectoral linkages and sectoral production fixed, i.e., the Leontief inverse coefficients remain constant. In this model according to Alatraste Contreras (2014), production is defined as: $x = z + D$ where x is the $n \times 1$ column vector of output, z is the inter-sectoral flow or intermediate demand matrix, and D is the $n \times 1$ column vector of final demand. Elements of the intermediate demand matrix are denoted by z_{ij} showing the inputs sold by sector i to sector j for its production requirements. Alternatively the production equation can be expressed as: $x = xA + D$ where A is a matrix of technical coefficients, i.e. $A = [a_{ij}] = z_{ij}/x_j$. Solving for x in the alternative equation yields $x = (I - A)^{-1}D = LD$, where L is the Leontief inverse $L = (I - A)^{-1}$. The impact of sector i on aggregate output will be the change in production of sectors needed to offset the change in final demand of sector i , which is calculated as: $\Delta x = x^1 - x^0 = L(D^1 - D^0)$ or $L\Delta D = L * f$

where f is a column vector containing entries of sector i receiving a shock, i.e. $f = \begin{pmatrix} 0 \\ \vdots \\ f_i \\ \vdots \\ 0 \end{pmatrix}$. The

number of sectors with Δx that are non-zero ($\Delta x \neq 0$) indicates the avalanche or cascade size triggered by introducing a shock on final demand.

In a second diffusion model, the magnitudes of change in input-output transactions during the propagation of the shock and in this case final demand is fixed. When a negative shock of size $0 < f < 1$ hits sector i , this provokes firms in the sector to modify their supplying and buying behaviours leading to a change in inter-sectoral linkages in the input-output table that affects all other industries or sectors that buy or sell to the sector hit by the shock. The weights of interindustry linkages of sector i with its input buyers and suppliers are respectively revised as:

$w_{ij}^* = (1 - f)w_{ij}, 0 < f < 1$ and $w_{ji}^* = (1 - f)w_{ji}, 0 < f < 1$. A shock will spread to a neighbouring sector j if the total decline of either the incoming or outgoing link weights of sector j exceeds a capacity threshold c of the node or sectoral capacity x_j .

Defining j as the set of suppliers and buyers to sector i which receives the initial shock, the shock will propagate to j following the condition:

$$\left(\sum_{k \in N(j)} w_{jk} - \sum_{k \in N(j)} w_{jk}^* \right) + \left(\sum_{k \in N(j)} w_{kj} - \sum_{k \in N(j)} w_{kj}^* \right) > c * x_j, 0 < c < 1,$$

where $k \in N(j)$ pertains to some sector k in the set of input suppliers and buyers of sector j , i.e., neighbourhood of j . As sector j gets hit by the shock, its supply and demand of inputs falls and mimics the same condition befalling sector i with the same equations as before but this time the weights are replaced by w_{jk}^* and w_{kj}^* . From sector j 's perspective, the shock will spread to sector k following the condition: $\sum_{k \in N(j)} f w_{jk} + \sum_{k \in N(j)} f w_{kj} > c * x_j$. Transposing f , the general condition for a shock to spread to other sectors is expressed as: $\sum_{k \in N(j)} (w_{jk} + w_{kj}) > \left(\frac{c}{f}\right) * x_j$.

The first and second terms inside the brackets are called the node in-strength and out-strength. The f and c parameters assume values between zero and unity and are identical for all sectors in the economy. The spreading mechanism is determined by the ratio $\frac{c}{f}$ which is defined as the *resilience* of the system. Thus, the sectors affected by the original sector will also modify their buying and selling behaviour until the reaction chain the authors call 'cascade' or avalanche ceases when no further sectors are hit by the shock. Production is then updated and size of the cascade effect is measured by counting the sectors eventually hit after the initial shock to sector i . The last equation simply indicates that the shock will propagate to neighbouring sectors if the sector hit by the shock is strongly connected and the node strengths are small to absorb the shock.

The third diffusion model is similar to the second except that in the second model, the magnitude of economic transactions decrease by f after a sector gets hit by a shock but during diffusion, only the input-output matrix changes but does not affect the inverse coefficients. As a sector is hit by a shock, new weights of the input-output matrix ensues as its rows and columns become updated during the diffusion process causing a new set of technological coefficients matrix. Thus the change in the inverse coefficients can be viewed as a dynamic reaction to production updating during shock propagation.

This third model is similar to the second in that final demand is assumed fixed and the conditions for the shock to spread are met. In the third model, a stage t of the propagation process is defined where weights (z) of the inter-sectoral linkages of the input-output matrix are indexed by t and with a shock, the flow of inputs revise the weights as follows:

$$z_{ij}(t+1) = z_{ij}(t) * (1 - f), 0 < f < 1 \text{ for sector } i\text{'s input buyers and}$$

$$z_{ji}(t+1) = z_{ji}(t) * (1 - f), 0 < f < 1 \text{ for its input suppliers,}$$

where the $z(t+1)$'s indicate the new magnitudes of supply and demand for this sector's output and input.

The decrease in input flows will revise the technological coefficients a_{ij} according to:

$$a_{ij}(t+1) = \frac{z_{ij}(t+1)}{x_j(t)} \text{ and } a_{ji}(t+1) = \frac{z_{ji}(t+1)}{x_i(t)}.$$

The updated production level after the shock becomes:

$$x(t+1) = (1 - A(t+1))^{-1}D = L(t+1)D,$$

where $x(t+1)$ is the new output vector, $A(t+1) = \frac{z_{ij}(t+1)}{x_j(t)}$ is the new technological coefficients matrix, $L(t+1)$ is the new Leontief inverse, and D is the final demand vector which is assumed fixed. As in the second model, the condition for shock hitting sector i to propagate to sector j and its neighbouring sectors will be: $\sum_{k \in N(j)} (w_{jk}(t) + w_{kj}(t)) > \left(\frac{c}{f}\right) * x_j(t+1)$.

The results of the models when applied to the European Union countries in the case of Alatrisme Contreras & Fagiolo (2014) and the case of France in the case of Alatrisme Contreras (2014) confirmed their theory on the propagation spread described in the three models. In the first model, the cascading process was homogeneous in size distribution in the sampled countries as the linear and fixed inter-sectoral linkages in the input-output data brought about the same diffusion to a shock that is evenly spread throughout the input-output structure characterized by a fixed requirements matrix. In the EU countries, the avalanches were triggered by similar primary sectors independent of the size of the shock. In the second model, the avalanche size distribution depends on the resilience parameters $\frac{c}{f}$. When c exceeds f , i.e., a capacity threshold too high and the shock is small, the avalanche size is zero. However, for lower system resilience, i.e., f exceeds c , the size of the shock is greater than the capacity of the sector to absorb it so that the avalanche size distributions are heterogeneous with wider cascade effects. In the third diffusion model, the results showed even larger avalanche sizes as these are reinforced by feedback effects as fewer inputs are supplied to other sectors making them vulnerable. These results are illustrated in Figure 6.11.

Figure 6.11

Avalanche Size Distributions of Three Diffusion Models

Source: Alatrisme Contreras (2014), pp. 9, 11-12.

Among these network models, it is the last diffusion model of Alatrisme Contreras (2014) and Alatrisme Contreras & Fagiolo (2014) which is the most identical conceptually to the *field of influence approach* as it considers the change in technical coefficients. Even Hewings, Sonis and Jensen (1988) acknowledged that the field of influence approach satisfy the criteria of “*stability, periodicity and turbulence in actual input-output dynamics* (pp. 11-12).” In this case, stability referred to the existence of an equilibrium distribution to which input distributions approached.

Periodicity pertains to the appearance of stability in one or few sectors. Turbulence or chaos, in turn, is the property related to crisis as it implies that small agitations in the input distribution would have different results in the long run and that strange attractors in one or a few sectors are possible in the change of inputs.

In Sonis & Hewings (1999, p. 60), the authors confirm that changes in the field of influence as represented by the multiplier product matrix represent “*paths of propagation of influence in this integrated system...revealed through the identification of feedback loops.*” Zaman, Surugiu & Surugiu (2010, p.488) described the matrix of technical coefficients as showing “*increasing interdependencies (that) could be considered as growth engine, but also as vulnerability factor for declining or disturbance registered in some sectors of activity.*” In the latter study analysing the input-output structure of the Romanian economy, the authors simply used matrix operations such as triangulation and calculating differences between the coefficients of the transactions matrix and the Leontief inverse to measure propagation effects without the use of econometric models.

Thus, in the case, of crisis, the change in technical coefficients is explained as a process of propagation of shocks that requires production upgrading as sectors adjust their purchases and supplies of inputs to each other. As in the network theory of input-output framework, the nodes are the sectors and the edges are the inter-sectoral purchases and sales of inputs and outputs. The concept of sector-specific idiosyncratic shocks is identical to the multiplier product matrix, and capacity to absorb these shocks are analogous to the intensity or volume V of the field of influence. The node in-strength and out-strengths are similar to the backward and forward linkages and the ability to propagate shocks or resilience are analogous to the N matrix and its respective symmetric and anti-symmetric components that measure sectoral distortions arising from self-influence of economic sectors.

In a separate study by Dietzenbacher, Romero Luna & Bosma (2005), the economic distance or average propagation lengths measured as the average number of steps an exogenous shock takes to affect the value of production in another sector, regardless of whether the linkages are backward or forward was proposed in addition to just the size of the sectoral linkages. The suggested methodology uses the Ghoshian matrix and thus for purposes of this study will not be applied.

In this study, the field of influence approach will also be used to explain the propagation of shocks or crisis to the economic system following the third diffusion model of Alatríste Contreras (2014) and Alatríste Contreras & Fagiolo (2014) and combining it with the Acemoglu, Akcigit & Kerr (2015) study using the backward and forward linkages to show strength of downstream and upstream propagation by the size of the change in coefficients. Some matrix operations as conducted by Zaman et al. (2010) and Sonis, Guilhoto, Hewings & Martins (1995) such as the use of variances to measure extent or spread of propagation will also be used on the field of influence results. The self-influence of shocks from sectors in turn will be shown through the decomposition of the Leontief inverse into the N , R and S matrices as discussed earlier.

6.4 Conclusion

The main contribution of this study is the application of the field of influence approach to input-output analysis. The chapter introduces the reader to some basics of input-output analysis to make the impression that unlike growth accounting discussed in Chapters 2 and 3, input-output analysis burrows deeper into the structure of an economy at the industry level by looking at interdependences or linkage effects of sectors and how growth and even crisis spreads throughout

the economic system. The field of influence approach was also discussed in detail to relay the concept of technological change, which is captured in the model as the change in technical coefficients inasmuch as the input-output framework itself is based on the assumption that these technical coefficients are fixed. The framework interprets these changes in technical coefficients between input-output tables of different time periods or years as technological change arising from competition for shares of inputs by various industries or sectors under the pretext of unfulfilled demand and excess capacity that absorbs the newly produced commodities. Another value added of the study apart from the use of field of influence technique to illustrate technology diffusion is its application as well to crisis propagation under a similar nexus of buyer-supplier relationships between and among industries but this time in reverse. This process of technology diffusion in growth episodes or propagation of shocks in times of crisis can be seen from the magnitude of the change in coefficients from self-influence sectors with scaling effects transmitted to adjacent buying or supplying sectors, leading to sectoral distortions that are in turn balanced by push-pull effects from compensating sectors. Finally, while the reader could have been referred to any textbook about the basics of input-output analysis, the author saves her/him the trouble of skimming through tomes of input-output references by condensing the fundamentals of the input-output framework in this chapter.

REFERENCES

- Acemoglu, D., Akcigit, U. & Kerr, W. (2015). Networks and the Macroeconomy: An Empirical Exploration. NBER Working Paper 21344. Cambridge, MA, July.
- Acemoglu, D., Carvalho, V.M., Ozdaglar, A. & Tahbaz-Salehi, A. (2012). The Network Origins of Aggregate Fluctuations. *Econometrica*. 80 (5), September.
- Alatríste Contreras, M.G. (2014). *The Impact of Final Demand and Technology Shocks in the French Economy*. Paper presented at the 22nd International Input-Output Conference, July 14-18, 2014, Lisbon, Portugal.
- Alatríste Contreras, M.G. & Fagiolo, G. (2014). Propagation of Economic Shocks in Input-Output Networks: A Cross-Country Analysis. *Physical Review E*, vol. 90, issue 6, pages 062812. Downloaded from <https://arxiv.org/abs/1401.4704v2> on 15 May 2017.
- Andreosso-O'Callaghan, B. & Guoqiang, Y. (2000). Intersectoral linkages and key sectors in China 1987–1997 — an application of input-output linkage analysis. *Papers of the 13th International Conference on Input-Output Techniques*.
- Anufriev, M., Goryacheva, E & Panchenko, V (2016). *The Network View on Input-Output Analysis for Australia*. Working paper University of Technology Sydney, Australia and University of New South Wales, Australia.
- Augustinovics, M. (1970). Methods of International and Intertemporal Comparisons of Structures. In Carter, A.B. & Brody, A. (Eds), *Contributions to Input-output Analysis*. Amsterdam, North-Holland P.C., Vol. I.
- Baptist, S. & Hepburn, C. (2013). Intermediate inputs and economic productivity. *Phil Trans R Soc A* 371: 20110565. Downloaded from <http://rsta.royalsocietypublishing.org/> on 11 July 2018.
- Baqaei, D.R. (2015). *Cascading Failures in Production Networks*. London School of Economics.

- Barker, T. (1990). Sources of structural change for the UK service industries, 1979-1984. *Economic Systems Research* 2:173-183.
- Baumol, W.J. & Wolff, E.N. (1984). On Inter-industry Differences in Absolute Productivity, *Journal of Political Economy*, 92, 1017-1034.
- Beyers, W. (1976). Empirical Evaluation of Key Sectors: Some Further Evidence. *Environment and Planning A*, 17, 73-99.
- Bullard, C.W. & Sebald, A.V. (1977). Effects of parametric uncertainty and technological change in input-output models. *Review of Economics and Statistics*, 59: 75-81.
- Bullard, C.W. & Sebald, A.V. (1988). Monte Carlo Sensitivity Analysis of Input-Output Models. *The Review of Economics and Statistics*, Vol. 70, No. 4 (November): 708-712.
- Carvalho, V.M. (2008). From micro to macro via production networks. *Cambridge-Institute for New Economic Thinking (INET) Working Paper Series No. 2014/18*, and *Cambridge Working Paper in Economics No. 1467*. University of Cambridge.
- Casler, S., Afroasabi, A. & McCauley, M. (1991). Decomposing change in energy input-output coefficients, *Resources and Energy*, 13: 95-109.
- Cella, G. (1984). The Input-output measurement of Interindustry Linkages. *Oxford Bulletin of Economics and Statistics*, 46 (1), pp.73-84
- Chen, C.Y. & Wu, R.H. (1995). Effects of restructuring of international trade on changing energy use patterns and CO2 emissions in Taiwan: 1981-1991. *Proceedings of the 18th IAEE International Conference*, 351-360.
- Chenery, H. B. (1960). Patterns of Industrial Growth. *The American Economic Review*, Vol. 50, No. 4 (September): 624-654.
- Chenery, H.B., Shishido, S. & Watanabe, T. (1962). The Pattern of Japanese Growth, 1914-1954. *Econometrica*, Vol. 30, No. 1 (January): 98-139.
- Chenery, H.B. & Syrquin, M. (1975). *Patterns of Development, 1950-1970*. Oxford University Press.
- Chenery, H.B. & Syrquin, M. (1980). A Comparative Analysis of Industrial Growth. In R.C.O. Matthews (Ed.). *Economic Growth and Resources*. International Economic Association Series. Palgrave Macmillan, London.
- Chenery, H.B. & Syrquin, M. (1989). Patterns of Development, 1950 to 1983. *World Bank Discussion Papers No. 41*.
- Chenery, H.B. & Watanabe, T. (1958). International Comparisons of the Structure of Productions. *Econometrica*, 4, 487-521.
- Clements, B.J. (1990). On the Decomposition and Normalisation of Interindustry Linkages. *Economics Letters*, 33, 337-40.
- Davar, E. (2005). Input-output system models: Leontief versus Ghosh. *Paper presented at the 15th International Input-Output Conference*, Beijing: China, 27 June – 1 July.
- De Mesnard, L. (2001). *About the reinterpretation of the Ghosh model as a price model*. Laboratoire d'Economie et de Gestion (LED), University of Burgundy.

- Dietzenbacher, E. (1997). In vindication of the Ghosh model: A reinterpretation as a price model. *Journal of Regional Science*, 37 (4), 629-51.
- Dietzenbacher, E., Romero Luna I, & Bosma, N (2005). Using Average Propagation Lengths to identify Production Chains in the Andalusian Economy. *Estudios de Economía Aplicada*. Vol. 23-2; 405-422.
- Dietzenbacher, E., and van der Linden, J. (1997). Sectoral and Spatial Linkages in the EC Production Structure. *Journal of Regional Science*, 37 (2), 235-57.
- Duchin, F. (1998). *Structural Economics: Measuring Change in Technology, Lifestyles and the Environment*. Washington, D.C.: Island Press.
- Eleish, G.E. (1963). Uses of input-output model in development planning in underdeveloped countries. *The Review of Income and Wealth*, 1963 (1), 286-317.
- Evans, W.D. (1954). The effect of structural matrix errors on interindustry relations estimates. *Econometrica*, 22:461-480.
- Feldman, S.J., McClain, D. & Palmer, K. (1987). Sources of structural change in the United States 1963-1978: an input-output perspective. *Review of Economics and Statistics*, 69, 503-510.
- Feller, I. (1972). Production Isoquants and the Analysis of Technological and Technical Change. *The Quarterly Journal of Economics*, 86 (1): 154-161. Retrieved from <http://www.jstor.org/stable/1880504> on 22 May 2018.
- Fujikawa, K., Izumi, H. & Milana, C. (1995a). Multilateral Comparison of Cost Structures in the Input-Output Tables of Japan, the US and West Germany. *Economic Systems Research*, Vol. 7, Issue 3: 321-342.
- Fujikawa, K., Izumi, H. & Milana, C. (1995b). A comparison of cost structures in Japan and the US using input-output tables. *Journal of Applied Input-Output Analysis*, 2: 1-23.
- Gabaix, X. (2011). The granular origin of aggregate fluctuations. *Econometrica*, 79(3): 773-72.
- Ghosh, A. (1958). Input-output approach to an allocation system. *Economica*, 25, 58-64.
- Guerra, A-I & Sancho, F. (2010). A comparison of input-output models: Ghosh reduces to Leontief (but 'closing' Ghosh makes it more plausible. *Barcelona Economics Working Paper Series* No. 450.
- Han, X. (1995). Structural change and labour requirement of the Japanese economy. *Economic Systems Research*, 7: 47-65.
- Harrigan, F.J. & McGilvray, J. (1988). The Measurement of Interindustry Linkages. *Ricerche Economiche*, 42, 325-343.
- Heimler, A. (1991). Linkage and Vertical Integration in the Chinese Economy. *Review of Economics and Statistics*, 73, 261-267.
- Hewings, G.J.D., Sonis, M. & Jensen R.C. (1988). Fields of influence of technological change in input-output models. *Papers of the Regional Science Association*, Vol. 64: 25-36.
- Hewings, G.J.D. & Romanos, M.C. (1981). Simulating less-developed regional economies under conditions of limited information. *Geographical Analysis*, 13: 373-390.

- Hirschman, A.O. (1958). *The Strategy of Economic Development*. New York: Yale University Press.
- Hulten, C. (1978). Growth Accounting with Intermediate Inputs. *The Review of Economic Studies*, Vol. 45, No. 3 (October): 511-518.
- Jackson, R.W. (1986). The Full-Distribution Approach to Aggregate Representation in the Input-Output Modeling Framework. *Journal of Regional Science*, Vol. 26, Issue 3 (August): 515-531.
- Jackson, R.W. & West, G.R. (1989). Perspectives on probabilistic input-output analysis in Miller, R., Polenske, K. & Rose, A. (eds.) *Frontiers of input-output analysis*. London: Oxford University Press.
- Jiang, X., Dietzenbacher, E & Los, B. (2007). Using Fundamental Economic Structures to estimate Chinese regional input-output tables. *Working Paper for the 16th International Input-Output Conference*, Turkey, July 2-6.
- Jensen, R.C. & West, G.R. (1980). The effect of relative coefficient size in input-output multipliers. *Environment and Planning, A* 12: 659-670.
- Jensen, R.C., West, G.R. & Hewings, G.J.D. (1988). The Study of Regional Economic Structure using Input-Output Tables, *Regional Studies*, 22:3, 209-220.
- Jorgenson, D.W. & Griliches, Z. (1967). The Explanation of Productivity Change. *Review of Economic Studies*, 34, 249-283.
- Jones, L.P. (1976). The Measurement of Hirschmanian Linkages. *Quarterly Journal of Economics*, 90, 323-333.
- Kanemitsu, H. & Ohnishi, H. (1989). An input-output analysis of technological change in the Japanese economy: 1970-1980, in Miller, R. et al. (eds.) *Frontiers of Input-Output Analysis*, Oxford University Press; New York.
- Karasz, P. (1992). Influence of Interindustrial Relationships on Prices in Czechoslovakia. *Economic Systems Research*, 4:377-384.
- Klein, L. R. (1952-53). On the interpretation of Professor Leontief's system. *Review of Economic Studies*, 20: 131-36.
- Klein, L. R. (1956). The Interpretation of Leontief's System: A Reply, *Review of Economic Studies*, 24:69-70.
- Kula, M. (2008). Supply-use and input-output tables, backward and forward linkages in the Turkish economy. *Paper presented at the 16th Inform World Conference in Northern Cyprus*, 01-05 September 2008.
- Kydland, F. & Prescott, E. (1982). Time to Build and Aggregate Fluctuations. *Econometrica*, 50 (6), November, 1345-70.
- Lahiri, S. & Satchell, S. (1986). Properties of the expected value of the Leontief inverse: some further results. *Mathematical Social Science*, 11: 69-82.
- Laumas, P.S. (1976). The Weighting Problem in Testing the Linkage Hypothesis. *Quarterly Journal of Economics*, XC, 319-22.

- Leontief, W. (1936). Quantitative Input-Output Relations in the Economics System of the United States. *Review of Economics and Statistics*, 18:105-25.
- Leontief, W. (1941). *Structure of the American Economy*. New York: Oxford University Press.
- Leontief, W. (1953). *Studies in the Structure of the American Economy*. New York: Oxford University Press.
- Lin, X. & Polenske, K.R. (1995). Input-output anatomy of China's energy use changes in the 1980s. *Economic Systems Research*, 7: 67-83.
- Liu, A. & Saal, D. (2001). Structural change in apartheid-era South Africa, 197-1993, *Economic Systems Research*, 13: 235-237.
- Long, J.B. & Plosser, C. (1983). Real business cycles. *Journal of Political Economy*, 91, 39-69.
- Lucas, R.E. (1977). Understanding Business Cycles. *Carnegie-Rochester Conference Series on Public Policy*, 5, 7-29.
- Manresa, A. & Sancho, F. (2012). Leontief versus Ghosh: two faces of the same coin. *Xarxa de Referencia en Economia Aplicada (XREAP) 2012-18. Barcelona, Spain*.
- Milana, C. (2001). The Input-Output Structural Decomposition Analysis of "Flexible" Production Systems. In M.L. Lahr & E. Dietzenbacher (Eds.) *Input-Output Analysis: Frontiers and Extensions, Essays in honor of Ronald E. Miller*. London: Macmillan Press.
- Miller, R. & Blair, P. (2009). *Input-Output Analysis Foundations and Extensions*, 2nd ed. United Kingdom: Cambridge University Press.
- Ministry of Internal Affairs and Communications Japan (2016). Chapter IV. Coefficients for Input-Output Analysis and Computation Methods in *Explanatory Notes to 2011 Input-Output Tables for Japan*: 79-102. Downloaded from www.soumu.go.jp/main_content/000327480.pdf on 20 May 2018.
- Morishima, M. (1956). A comment on Dr. Klein's interpretation of Leontief's system, *Review of Economic Studies*, 24: 65-68.
- Morishima, M. (1957). Dr. Klein's interpretation of Leontief's system: A Rejoinder, *Review of Economic Studies*, 25: 59-61.
- Morrison, W.I. & Thurman, R.G. (1980). A Lagrangian multiplier approach to the solution of a special constrained matrix problem. *Journal of Regional Science*, 20: 279-292.
- O'Connor & Henry (1975). Input-output analysis and its applications. *Griffin's Statistical Monographs & Courses No. 36*. Series Editor: Stuart, Alan. London: Charles Griffin & Co. Ltd.
- Office of Technology Assessment (1990). *Energy Use and the Economy*. Washington, DC: USGPO.
- Oosterhaven, J. (1996). Leontief versus Ghoshian price and quantity models. *Southern Economic Journal*, 62 (3), 750-59.
- Oosterhaven, J. & van der Linden, J.A. (1994). *European technology, trade and income changes for 1975-1985: an intercountry input-output decomposition*. *Economic Systems Research*, 9: 393-411.

- Park, JY (n.d.). *The supply-driven input-output model: A reinterpretation and extension*. Los Angeles, CA: University of Southern California. Retrieved on 16 December 2016 from www.bcf.usc.edu/~pgordon/pdf/200703supply.pdf.
- Rasmussen, P.N. (1957). *Studies in Inter-sectoral Relations*. Amsterdam: North-Holland.
- Reyes, F.A. & Mendoza, M.A.M. (2012). *The demand-driven and the supply-sided input-output models: Notes for the debate*. Universidad Nacional Autonoma de Mexico. Retrieved 5 January 2017 from economix.fr/pdf/workshops/2012_pioneers/aroche-marquez.pdf
- Riedel, J. (1976). A Balanced-Growth Version of the Linkage Hypothesis: A Comment. *Quarterly Journal of Economics*, XC, 319-22.
- Rose, A. & Chen, C.Y. (1991) Modeling the responsiveness of energy use to changing economic conditions, in Fesharaki, F. & Dorian, J. (eds.) *Energy Developments in the 1990s*, pp. 31-51.
- Rose, A. & Miernyk, W. (1989). Input-output analysis: the first fifty years. *Economic Systems Research*, 1, 229-271.
- Roson, R. & Sartori, M. (2014). Input-output linkages and the propagation of domestic productivity shocks: assessing alternative theories with stochastic simulation. *School of International Studies (SIS) Working Paper No. 2014-7*, November. Italy: University of Trento.
- Schultz, S. (1977). Approaches to Identifying Key Sectors Empirically by Means of Input-output Analysis. *Journal of Development Studies*, 14 (1), October, 77-96.
- Sherman, J. & Morrison, W.J. (1949). Adjustment of an inverse matrix corresponding to changes in the elements of a given column or a given row of the original matrix. *Annals of Mathematical Statistics*, 20: 621.
- Sherman, J. & Morrison, W.J. (1950). Adjustment of an inverse matrix corresponding to a change in an element of a given matrix. *Annals of Mathematical Statistics*, 21: 124-127.
- Siegel, P., Alwang, J. & Johnson, T. (1995). A Structural Decomposition of Regional Economic Instability: A Conceptual Framework. *Journal of Regional Science*, Vol. 35, Issue 3 (August): 457-40.
- Siegel, P., Alwang, J. & Johnson, T. (1996). Decomposing sources of regional growth with an input-output model: a framework for analysis. *International Regional Science Review*, 18: 331-353.
- Simonovits, A. (1975) A Note on the underestimation and overestimation of the Leontief inverse. *Econometrica*, 43: 493-498.
- Sonis, M. & Hewings, G.J.D. (1988a). Superposition and decomposition principles in hierarchical social accounting and input-output analysis in Harrigan, F. & McGregor, P.G. (1988). *Recent Advances in Regional Economic Modelling*. London: Pion, 46-65.
- Sonis, M. & Hewings, G.J.D. (1988b). Error and sensitivity input-output analysis: a new approach. In Miller, R., Polenske, K. & Rose, A. (Eds.) (1989), *Frontiers of Input-Output Analysis*. New York: Oxford University Press, 232-244.
- Sonis, M. & Hewings, G.J.D. (1992). Coefficient change in input-output models: theory and applications. *Economic Systems Research*, 4: 2, 143-158.

- Sonis, M. & Hewings, G.J.D. (1996). *Theoretical and applied dynamic input-output analysis: a new synthesis*. European Regional Science Association 36th European Congress, ETH Zurich, Switzerland, 29-30 August.
- Sonis, M. & Hewings, G.J.D. (1999). Economic landscapes: Multiplier product matrix analysis for multiregional input-output systems. *Hitotsubashi Journal of Economics* 40 (1): 59-74.
- Sonis, M. & Hewings, G.J.D. (2007). *Coefficient change and innovation spread in input-output models*. TD. Mestrado em Economia Aplicada, FEA/UFJF 004/2007.
- Sonis, M. & Hewings, G.J.D. (n.d.). *Analytical Formalization of the Concepts of Fields of Influence*. Draft of Chapter 3 replaced by New developments in input-output analysis: Fields of influence of changes, the temporal Leontief inverse and the reconsideration of classical key sector analysis in Sonis, M. & Hewings, G.J.D. (eds.) (2009).
- Sonis, M. & Hewings, G.J.D. (2009). New developments in input-output analysis: Fields of influence of changes, the temporal Leontief inverse and the reconsideration of classical key sector analysis in Sonis, M. & Hewings, G.J.D. (eds.) (2009). *Tool Kits in Regional Science*. Advances in Spatial Science. Springer-Verlag Berlin Heidelberg, 69-117.
- Sonis, M., Hewings, G.J.D. & Guo, J. (1996). Sources of structural change in input-output systems: a field of influence approach. *Economic Systems Research*, 8: 1, 15-32.
- Sonis, M., Guilhoto, J.J.M., Hewings, G.J.D., and Martins, E.B. (1995) " Linkages, key sectors, and structural change: Some new perspectives," *The Developing Economies*, XXXIII-3, September, 233-270.
- Sterner, T. (1985). Structural change and technology choice: energy use in Mexican manufacturing industry, 1970-1981. *Energy Economics*, 9: 77-86.
- Syrquin, M. (1976). Sources of industrial growth and change: an alternative measure. Paper presented to the *European Meeting of the Econometric Society*, Helsinki, Finland.
- Syrquin, M. (1988). Patterns of Structural Change. In H. Chenery & T.N. Srinivasan (Eds.). *Handbook of Development Economics*, Vol. 1; 203-273.
- Tanaka, F.J.M. (2011). Applications of Leontief's input-output analysis in our economy. Retrieved from reposit.sun.ac.jp/dspace/bitstream/10561/874/1/v45n1p29_tanaka.pdf on 15 December 2016.
- ten Raa, T. (2004). A Neoclassical Analysis of Total Factor Productivity, in Dietzenbacher, E. & Lahr, M.L. (Eds.). *Wassily Leontief and Input-Output Economics*. Cambridge, UK, Cambridge University Press, 151-165.
- ten Raa, T. (2005). *The Economics of Input-Output Analysis*. Cambridge, UK: Cambridge University Press.
- ten Raa (2004). *Structural Economics*. Routledge: London.
- ten Raa, T. & Mohnen, P. (2004). Neoclassical growth accounting and frontier analysis: a synthesis in ten Raa (2004). *Structural Economics*, Routledge: London, 228-246.
- Thakur, S. (2008). Identification of Regional Fundamental Economic Structure of India. *United Nations University-World Institute for Development Economics Research (UNU-WIDER) Research Paper No. 2008/59*.

- Theil, H. (1957). Linear aggregation in input-output analysis. *Econometrica*, 25: 111-122.
- Theil, H. (1972). *Statistical Decomposition Analysis*. Amsterdam: North Holland.
- United Nations Statistical Office (1973). Input-Output Tables and Analysis. *Studies in Methods* Series F, No. 14. New York: Department of Economic and Social Affairs, Statistical Office.
- West, G.R. (1982). Sensitivity and key sector analysis in input-output models. *Australian Economic Papers*, 21:365-378.
- Wolff, E.N. (1985). Industrial Composition, Interindustry Effects and the U.S. Productivity Slowdown, *Review of Economics and Statistics*, 67, 268-277.
- Wolff, E.N. (1994). Productivity Measurement within an Input-Output Framework, *Regional Science and Urban Economics*, 24, 75-92.
- Wolff, E.N. (1997). Spillovers, Linkages and Technical Change, *Economic Systems Research*, 9, 9-23.
- Yotopoulos, P.A. & Nugent, J.B (1973). A Balanced-Growth Version of the Linkage Hypothesis: A Test. *Quarterly Journal of Economics*, LXXXVII (2), May, 157-71.
- Zaman, G., Surugiu, M. & Surugiu, C. (2010). *Time-Stability of the Coefficients: An Input-Output Analysis on Romania Case*. Analele Stiintifice ale Universitatii Alexandru Ioan Cuza din Iasi – Stiinte Economice, Alexandru Ioan Cuza University, Faculty of Economics and Business Administration: 57:483-503 (November).

Technological change, particularly in association with a new innovation, provides a special case of coefficient change....(T)he field of influence will be used to provide a way of measuring the effects of technological change.

Hewings, G., Sonis, M. & Jensen, R.
Field of Influence of Technological Change in Input-Output Models (1988)

A shock to a single firm (or sector) could have a much larger impact on the macroeconomy if it reduces the output of not only this firm (or sector) but also of others that are connected to it through a network of input-output linkages.

Acemoglu, D., Akcigit, U. & Kerr, W.
Networks and the Macroeconomy: An Empirical Exploration (2015)

Chapter 7

Applications of the Field of Influence Approach on the Sample Countries

7.1 Field of Influence Methodology

The subject of this study is on the three Asian economies of Malaysia, Thailand and the Philippines, which are also among the focus countries of the Asian growth and crisis episodes. The input-output tables of these countries were used and the characteristics of each country's input-output data in terms of available years and number of sectors or size are summarized in Table 7.1.

Table 7.1
Input-Output Tables of Subject Countries

Malaysia Year (Size)	Thailand Year (Size)	Philippines Year (Size)
1978 (60)	1975 (16; 26; 58; 180)	1961 (12; 29; 50)
1983 (60)	1980 (16; 26; 58; 180)	1965 (97)
1987 (60)	1985 (16; 26; 58; 180)	1969 (120)
1991 (27; 92)	1990 (16; 26; 58; 180)	1974 (60; 120)
2000 (94)	1995 (16; 26; 58; 180)	1979 (24; 65)
2005 (120)	1998 (16; 26; 58; 180)	1985 (11; 59)
	2000 (16; 26; 58; 180)	1988 (60)
	2005 (16; 26; 58; 180)	1994 (11; 59)
		2000 (60)
		2006 (11; 60; 70; 120; 240)

Source: Department of Statistics, Malaysia (1978, 1983, 1987, 1991, 2000, 2005); Office of the Prime Minister, Thailand (1975, 1980, 1985, 1990, 1995, 1998, 2000, 2005), National Economic Council (1961) and National Economic Development Authority, Philippines (1965, 1969, 1974, 1979, 1985, 1988, 1994, 2000, 2006).

From the table, one can already glean that the availability period and size of sectors per year vary in each of the countries. Moreover, in the case of Thailand, the statistical tables are not in matrix format but are simply arranged as respective data for row 1 and column 1 as shown in Table 7.2, so there was a need to re-write the table in matrix format. To keep the research manageable, particularly in terms of matrix calculations, the size per country was collapsed to 26 sectors for Thailand and Malaysia and 29 sectors for the Philippines using the industrial classifications applied by the respective statistical offices in preparing the national accounts; and one year per

decade was taken as sample.

Per country, the input-output tables for the following years were used in the calculations: Malaysia – 1978, 1983, 1991, 2000 and 2005; Thailand – 1975, 1985, 1995, 2000, 2005; and Philippines – 1969, 1979, 1988, 1994, 2000 and 2006. The years chosen for each country were as close as possible which means that even though input-output tables were available for the Philippines as early as 1961, the year 1969 for 1960s was taken as the initial year so that the subsequent year which is 1979 is as close as possible to the years available for Malaysia (1978) and Thailand (1975) when these two countries initially began compiling input-output tables. It should be noted that while Malaysia compiled input-output statistics in 1960 and subsequently in 1965 and 1970, the initial tables were only for Kuala Lumpur and all three years were never published.

Each of the input-output tables of the chosen years were then deflated to yield figures at constant prices using the respective GDP deflators of each sector available from the national accounts. If a breakdown exists per sector, then the corresponding deflators for that sector were used and if not available for a particular year such as for Malaysia which began showing GDP by industrial origin only in 1991, the overall GDP deflator rather than the sectoral deflator was used.

Table 7.2
Sample Input-Output Table of Thailand

ROW	COL	PURCHASER	WHOLESALE	RETAIL	TRANSPORT	PRODUCER	IMPORT	DOMESTIC
001	001	5914873	138409	112306	72211	5591947	24046	5567901
002	001	545	19	17	163	346	0	346
003	001	6988035	363628	314592	189719	6120096	28042	6092054
004	001	320124	52435	28833	14061	224795	6913	217882
005	001	332754	19562	40480	8568	264144	5499	258645
006	001	4329	299	315	88	3627	20	3607
007	001	5387137	482227	481267	146044	4277599	1727410	2550189
008	001	105780	15067	9054	7099	74560	83	74477
009	001	1158264	25979	36057	9476	1086752	96077	990675
010	001	12680	728	1065	264	10623	1774	8849

Source: National Economic and Social Development Board, Thailand

The basic transactions tables in the input-output of the representative years were keyed in Excel, converted in constant prices by deflating by the respective GDP deflators of each sector, then the matrix of technical coefficients were calculated, the identity matrices were keyed in, from which the I–A matrices were computed, followed by the inverse of the I–A matrices to yield the Leontief inverses of the direct coefficients matrices, i.e., $(I-A)^{-1}$. The same procedure was done for the succeeding chosen year. The differences in the technical coefficients between the current year and the initial or base year yielded the E matrix.

Given time constraints to learn a software program to calculate the field of influence and given the magnitude of the calculations (e.g., a 30 sector matrix will translate into a 900 x 900 matrix using the Sonis & Hewing formulation), this researcher developed a Microsoft Excel program where the equations for the field of influence approach were keyed into the appropriate Excel cells. Any reference to a numerical value was also entered in terms of their position in the Excel cells with alphabets for columns and numbers for rows, e.g., A1 or ZZ100. Thus, once these formulas were typed, any change in the numbers of the original matrix automatically calculated all the values required for analysis. This in itself is a tedious process as each cell has to be double-

checked for the correct mathematical formulation or equation in addition to each keyed entry into the transactions table in terms of column and row positions.

At the beginning of the study, the field of influence methodology was tested using a small sample of 3 x 3 sectors to verify if indeed the equations of the field of influence approach yielded the correct values using the data and whether the mathematical properties outlined by the authors were fulfilled. Once the small trial on a 3 x 3 matrix proved correct in terms of values generated using the formula, the matrix was then expanded to the respective sizes of sectors for each of the years in each of the countries sampled in the study,

What follows is the sample 3 x 3 matrix done for the Philippines data for 1969 (initial year) and 1979 (year when technical coefficients changed) representing the sectors Agriculture, Industry and Services. The tables were all created by this author using basic input-output data from the Philippines for 1969 and 1979 which is published by the National Economic and Development Authority.

The first step involved aggregating the entire matrix into a 3 x 3 size by collapsing all related industries or sectors into the three major sectoral groupings. The values were then deflated using the GDP sectoral deflators yielding the following transactions table at constant prices (Table 7.3):

Table 7.3
Input-Output Table of the Philippines
3x3, 1969 vs 1979 at Constant Prices

1969 3 x 3 Constant		1	2	3	1979 3 x 3 Constant		1	2	3
Agriculture, fishing & forestry	1	186354	1345793	70778	Agriculture, fishing & forestry	1	321239	2652715	69291
Industry	2	213484	2333729	679966	Industry	2	876034	7426635	1266962
Services	3	185305	981101	1133952	Services	3	318905	2100827	1377289
Total Intermediate		585143	4660623	1884697	Total Intermediate		1516178	12180177	2713542
Other value added		3226207	3170663	5220067	Other Value Added		5214601	8007079	8124468
Total Inputs		3811349	7831285	7104764	Total Inputs		6730779	20187256	10838010

From the basic transactions table at constant prices, the matrix of technical or direct input coefficients was generated as the ratio of each element in the rows of the matrix to the total inputs per column, results of which are shown in the following A matrices (Table 7.4). The shares add up to unity.

Table 7.4
Matrix of Technical Coefficients of the Philippines
3x3, 1969 vs 1979

A=	1969	Matrix of Technical Coefficients			A=	1979	Matrix of Technical Coefficients		
		1	2	3			1	2	3
Agriculture, fishing & forestry	1	0.048894441	0.17185	0.009962	Agriculture, fishing & forestry	1	0.04773	0.1314054	0.0063933
Industry	2	0.056012711	0.298	0.095706	Industry	2	0.13015	0.3678873	0.1168999
Services	3	0.048619199	0.12528	0.159604	Services	3	0.04738	0.104067	0.1270795
Total Intermediate Inputs		0.153526351	0.59513	0.265272	Total Intermediate Inputs		0.22526	0.6033597	0.2503728
Other Value Added		0.846473649	0.40487	0.734728	Other Value Added		0.77474	0.3966403	0.7496272
Total Inputs		1	1	1	Total Inputs		1	1	1

Then the identity matrix was written from which the A matrices above were subtracted to yield the I-A matrix as shown below (Table 7.5).

Table 7.5
I-A Matrix of the Philippines
3x3, 1969 vs 1979

Agriculture, fishing & forestry		1	0	0	Agriculture, fishing & forestry		1	0	0
Industry		0	1	0	Industry		0	1	0
Services		0	0	1	Services		0	0	1
	1969 I-A					1979 I-A			
Agriculture, fishing & forestry		0.951105559	-0.17185	-0.00996	Agriculture, fishing & forestry		0.95227	-0.1314054	-0.006393
Industry		-0.056012711	0.702	-0.09571	Industry		-0.1302	0.6321127	-0.1169
Services		-0.048619199	-0.12528	0.840396	Services		-0.0474	-0.104067	0.8729205

The inverse of the I-A matrix was calculated using MINVERSE function in Excel which gives the Leontief inverse of direct input coefficients. The determinants of the inverse matrices were also calculated using the MDETERM function of Excel (Table 7.6).

Table 7.6
(I-A)⁻¹ Matrix (Leontief Inverse) and
Determinant of the Leontief Inverse of the Philippines
3x3, 1969 vs 1979

	B=	1969 I-A ⁻¹					B(E)=	1979 I-A ⁻¹			
Agriculture, fishing & forestry		1.069499825	0.26955	0.043375	Agriculture, fishing & forestry		1.08373	0.2317033	0.0389665		
Industry		0.095716375	1.47818	0.169472	Industry		0.2393	1.6688237	0.2252384		
Services		0.076142174	0.23595	1.217689	Services		0.08735	0.2115285	1.174547		
	DET	1.850451247					DET	2.00832			

The next procedure is to calculate the E matrix which is the change in the direct input coefficients for the current year (1979) and the initial year (1969) taken as the difference between the two years. Its determinant was also calculated using the MDETERM function in Excel (Table 7.7).

Table 7.7
Matrix of Changes in Technical Coefficients (E) and
Determinant of the E Matrix of the Philippines
3x3, 1969 vs 1979

Change in Technical Coefficients (1979-1969) - E matrix				
Agriculture, fishing & forestry		-0.001167526	-0.04044	-0.00357
Industry		0.074140699	0.06989	0.021194
Services		-0.001239136	-0.02121	-0.03252
	DET (E)	-8.903E-05		
	Q(E)	detB/det B(E)	=	0.921393
	1/Q(E)		=	1.085313

The field of influence is then constructed below using the formulation based on Sonis & Hewings (1992, 2007, 2009) and Sonis, Hewings & Guo (1996):

$$F(i_1; j_1) = [f_{ij}(i_1; j_1)] = \begin{pmatrix} b_{1i_1} \\ b_{2i_1} \\ \vdots \\ b_{ni_1} \end{pmatrix} (b_{j_1 1} \quad b_{j_1 2} \quad \dots \quad b_{j_1 n})$$

b11									
b12									
b13									
b21									
b22	b11	b12	b13	b21	b22	b23	b31	b32	b33
b23									
b31									
b32									
b33									
1.0695									
0.26955									
0.04338									
0.09572	1.0694998	0.2695526	0.04337503	0.09572	1.47818	0.1694721	0.07614	0.2359498	1.21768886
1.47818									
0.16947									
0.07614									
0.23595									
1.21769									

Multiplication of these matrices yields the intensities (F) of the direct field of influence shown below in (Table 7.8):

Table 7.8
Intensities of the Direct Field of Influence of the Philippines
3x3, 1969 vs 1979

	b11	b12	b13	b21	b22	b23	b31	b32	b33
b11	1.14383	0.2882864	0.0463896	0.10236865	1.58091	0.18125	0.081434	0.25235	1.30231803
b12	0.28829	0.0726586	0.0116918	0.02580059	0.39845	0.04568	0.0205243	0.0636	0.32823115
b13	0.04639	0.0116918	0.0018814	0.0041517	0.06412	0.00735	0.0033027	0.01023	0.05281729
b21	0.10237	0.0258006	0.0041517	0.00916162	0.14149	0.01622	0.0072881	0.02258	0.11655276
b22	1.58091	0.3984468	0.064116	0.14148588	2.18501	0.25051	0.1125517	0.34878	1.79996137
b23	0.18125	0.0456816	0.0073509	0.01622125	0.25051	0.02872	0.012904	0.03999	0.20636425
b31	0.08143	0.0205243	0.0033027	0.00728805	0.11255	0.0129	0.0057976	0.01797	0.09271748
b32	0.25235	0.0636009	0.0102343	0.02258426	0.34878	0.03999	0.0179657	0.05567	0.28731344
b33	1.30232	0.3282311	0.0528173	0.11655276	1.79996	0.20636	0.0927175	0.28731	1.48276617

The matrices as shown by like-colours represent the matrix pertinent to a sector to which each corresponding entry in the E matrix (change in coefficient) has to be multiplied to get the first order intensities or effects per sector as shown below:

b11b11	b11b12	b11b13			1.14383	0.28829	0.0463896			-0.00133545	-0.0003366	-5.4161E-05
b21b11	b21b12	b21b13	(e11)	=	0.10237	0.0258	0.0041517	-0.0012	=	-0.00011952	-3.012E-05	-4.8472E-06
b31b11	b31b12	b31b13			0.08143	0.02052	0.0033027			-9.5076E-05	-2.396E-05	-3.856E-06
b11b21	b11b22	b11b23			0.10237	1.58091	0.1812503			-0.00414008	-0.0639365	-0.00733028
b21b21	b21b22	b21b23	(e12)	=	0.00916	0.14149	0.0162213	-0.0404	=	-0.00037052	-0.0057221	-0.00065603
b31b21	b31b22	b31b23			0.00729	0.11255	0.012904			-0.00029475	-0.0045519	-0.00052187
b11b31	b11b32	b11b33			0.08143	0.25235	1.302318			-0.00029062	-0.0009006	-0.00464772
b21b31	b21b32	b21b33	(e13)	=	0.00729	0.02258	0.1165528	-0.0036	=	-2.601E-05	-8.06E-05	-0.00041595
b31b31	b31b32	b31b33			0.0058	0.01797	0.0927175			-2.0691E-05	-6.412E-05	-0.00033089
b12b11	b12b12	b12b13			0.28829	0.07266	0.0116918			0.02137376	0.00538696	0.00086684
b22b11	b22b12	b22b13	(e21)	=	1.58091	0.39845	0.064116	0.07414	=	0.11720989	0.02954112	0.00475361
b32b11	b32b12	b32b13			0.25235	0.0636	0.0102343			0.01870928	0.00471541	0.00075878
b12b21	b12b22	b12b23			0.0258	0.39845	0.0456816			0.00180311	0.02784607	0.00319253
b22b21	b22b22	b22b23	(e22)	=	0.14149	2.18501	0.2505099	0.06989	=	0.00988796	0.15270292	0.01750728
b32b21	b32b22	b32b23			0.02258	0.34878	0.0399869			0.00157834	0.02437475	0.00279455
b12b31	b12b32	b12b33			0.02052	0.0636	0.3282311			0.000435	0.00134797	0.00695662
b22b31	b22b32	b22b33	(e23)	=	0.11255	0.34878	1.7999614	0.02119	=	0.00238545	0.00739205	0.03814885
b32b31	b32b32	b32b33			0.01797	0.05567	0.2873134			0.00038077	0.00117993	0.00060894
b13b11	b13b12	b13b13			0.04639	0.01169	0.0018814			-5.7483E-05	-1.449E-05	-2.3313E-06
b23b11	b23b12	b23b13	(e31)	=	0.18125	0.04568	0.0073509	-0.0012	=	-0.00022459	-5.661E-05	-9.1087E-06
b33b11	b33b12	b33b13			1.30232	0.32823	0.0528173			-0.00161375	-0.0004067	-6.5448E-05
b13b21	b13b22	b13b23			0.00415	0.06412	0.0073509			-8.8069E-05	-0.0013601	-0.00015593
b23b21	b23b22	b23b23	(e32)	=	0.01622	0.25051	0.0287208	-0.0212	=	-0.0003441	-0.005314	-0.00060925
b33b21	b33b22	b33b23			0.11655	1.79996	0.2063642			-0.0024724	-0.0381821	-0.00437754
b13b31	b13b32	b13b33			0.0033	0.01023	0.0528173			-0.00010742	-0.0003329	-0.00171788
b23b31	b23b32	b23b33	(e33)	=	0.0129	0.03999	0.2063642	-0.0325	=	-0.0004197	-0.0013006	-0.00671199
b33b31	b33b32	b33b33			0.09272	0.28731	1.4827662			-0.00301563	-0.0093449	-0.04822689

The resulting products when multiplying the change in the technical coefficients (e's) by the product of the corresponding direct field of influence column and row entries are summed up to yield the second term (which is enclosed in brackets) in the field of influence equation of Sonis & Hewing (1992, 2007, 2009) shown again below:

$$B_t = B(E) = B_0 + \frac{1}{Q(E)} \left[\sum_{k=1}^n \sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} 'F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} e_{j_1 i_1} \dots e_{j_k i_k} \right].$$

This result as tabulated in Table 7.9 shows the change in intensities arising from the change in coefficients and the sum per sector yields the first order or first round effects of the change in coefficients, signifying technological change as sectors compete for inputs given their fixed shares according to Sonis & Hewings (1996, 1988a, 1988b, 2007, 2009); Hewings, Sonis & Jensen (1988); and Sonis, Hewings & Guo (1996).

Table 7.9
**Change in Intensities (First Order Effects) of
the Direct Field of Influence of the Philippines
3x3, 1969 vs 1979**

	0.01759275	-0.0323001	-0.00289231
Σ	0.12797886	0.1771321	0.05200256
	0.01315609	-0.0223035	-0.04388378

It should be noted that a third term in the equation above is the product of $\frac{1}{Q(E)}$ and the second term in the brackets, i.e., $\sum_{k=1}^n \sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} 'F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} e_{j_1 i_1} \dots e_{j_k i_k}$. As $Q(E)$ is defined as the ratio of the determinants of the Leontief inverse of the initial year to the Leontief inverse of the next or succeeding year (i.e., $\frac{\det B}{\det B(e)}$), where $B(e)$ is the Leontief inverse when technical coefficients changed (also known as the perturbed matrix), the determinants of each individual year were first calculated. Referring to the Leontief inverse matrices of technical coefficients for 1969 and 1979 shown earlier, the determinants were calculated respectively at 1.850451 for 1969 and 2.00832 for 1979 (see Table 7.6). The ratio of these two determinants is $Q(E)$ which amounts to $\frac{1.850451}{2.00832} = 0.921393$. The reciprocal of this ratio $\frac{1}{Q(E)}$ appears in the field of equation formula as the term preceding the items in brackets, and this amounts to 1.085313, i.e., $\frac{1}{0.921393} = 1.085313$ in Table 7.7.

For second order effects as explained in Sonis & Hewings (n.d.), the Leontief inverse of the initial year is then multiplied by the negative of its determinant to yield the following (Table 7.10):

Table 7.10
**Product of Leontief Inverse of Initial Year and Negative
of its Determinant for the Philippines
3x3, 1969 vs 1979**

1.06949982	0.26955256	0.04337503	(-det B)		-1.97905728	-0.49879386	-0.08026
0.09571637	1.47817839	0.16947207	-1.85045125	=	-0.17711848	-2.73529705	-0.3136
0.07614217	0.2359498	1.21768886			-0.14089738	-0.4366136	-2.25327

Finally, the model tells us that the Leontief inverse of the new or successive year $B(E)$ should be

equal to the sum of two matrices – the old or initial year's Leontief inverse B_0 and the field of influence $F(i_1, j_1)$ multiplied on the rational fraction of e (change in technical coefficients where i is the row vector and j the column vector of the Leontief inverse of the initial year:

$$B(E) = B_0 + \frac{e}{1 - b_{j_1 i_1} e} F(i_1, j_1)$$

This leads to the following result on Table 7.11:

Table 7.11
Results of the Field of Influence Equations for the Philippines
3x3, 1969 vs 1979

1979 (I-A)-1					1969 (I-A)-1				
	1.08373	0.2317033	0.0389665			1.0695	0.2695526	0.04338	
	0.2393	1.6688237	0.2252384	=		0.09572	1.4781784	0.16947	
	0.08735	0.2115285	1.174547			0.07614	0.2359498	1.21769	
(from Table 7.7)					(from Table 7.10)				
	(1/Q(E))	0.01759275	-0.03230014	-0.00289231		-1.97905728	-0.49879386	-0.08026	DET(E)
+	1.08531279	0.12797886	0.1771321	0.052002563	+	-0.17711848	-2.73529705	-0.3136	-8.903E-05
		0.01315609	-0.02230353	-0.04388378		-0.14089738	-0.4366136	-2.25327	

Solving the products of the second and third terms above and adding the result to the Leontief inverse of the initial year yields:

1979 (I-A)-1					1969 (I-A)-1										
	1.08373	0.2317033	0.0389665			1.0695	0.2695526	0.04338					0.01928486	-0.0350076	-0.00313131
	0.2393	1.6688237	0.2252384	=		0.09572	1.4781784	0.16947	+				0.1389142	0.19250804	0.05646935
	0.08735	0.2115285	1.174547			0.07614	0.2359498	1.21769					0.01429208	-0.0241641	-0.04740991

With some rounding error due to the number of digits (in the billions) of the input-output entries, the equation balances.

1.0837261	0.2317033	0.0389665			1.0887847	0.2345450	0.0402437		
0.2392958	1.6688237	0.2252384	=		0.2346306	1.6706864	0.2259414		
0.0873502	0.2115285	1.1745470			0.0904343	0.2117857	1.1702790		

The final step involves the calculation of the intensity of the direct field of influence, the multiplier product matrix and the backward and forward linkages. The intensity or volume V is given as:

$$V = \sum_{i=1}^n \sum_{j=1}^n b_{ij} \text{ which under the } 3 \times 3 \text{ matrix is simply:}$$

V	=	b11+b12+b13+b21+b22+b23+b31+b32+b33
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The multiplier product matrix in turn, is given in Sonis & Hewings (1999) as:

$$M = \frac{1}{V} \begin{bmatrix} B_1 \\ B_2 \\ \vdots \\ B_n \end{bmatrix} \times [B_1 \ B_2 \ \dots \ B_n].$$

M	=	1/V	$(b_{11}+b_{21}+b_{31})/(b_{11}+b_{12}+b_{13})$	$(b_{12}+b_{22}+b_{32})/(b_{11}+b_{12}+b_{13})$	$(b_{13}+b_{23}+b_{33})/(b_{11}+b_{12}+b_{13})$
			$(b_{11}+b_{21}+b_{31})/(b_{21}+b_{22}+b_{23})$	$(b_{12}+b_{22}+b_{32})/(b_{21}+b_{22}+b_{23})$	$(b_{13}+b_{23}+b_{33})/(b_{21}+b_{22}+b_{23})$
			$(b_{11}+b_{21}+b_{31})/(b_{31}+b_{32}+b_{33})$	$(b_{12}+b_{22}+b_{32})/(b_{31}+b_{32}+b_{33})$	$(b_{13}+b_{23}+b_{33})/(b_{31}+b_{32}+b_{33})$

Using the data for 1969, we have:

B=	1969	I-A-1		
Agriculture, fishing & forestry		1.0695	0.2695526	0.043375
Industry		0.09572	1.4781784	0.1694721
Services		0.07614	0.2359498	1.2176889

and arranging terms:

b11	b12	b13	b21	b22	b23	b31	b32	b33
1.0695	0.26955	0.043375	0.0957164	1.47817839	0.16947	0.07614	0.2359498	1.21769

from which V is calculated as simply the sum of the elements in the row above and 1/V as its reciprocal:

V	=	4.65558
1/V	=	0.2148

The multiplier product matrix (M) is then derived as shown on Table 7.12

Table 7.12
Multiplier Product Matrix for the Philippines
3x3, 1969

CNC, 1989											
			1.2413584	1.3824274		1.98368	1.38243		1.43054	1.38242741	
	M	=	0.2148	1.2413584	1.7433668		1.98368	1.74337		1.43054	1.74336683
				1.2413584	1.5297808		1.98368	1.52978		1.43054	1.52978084
							1.7160878	2.7422946	1.97761211		
			M	=	0.2148		2.164143	3.4582832	2.49394894		
							1.8990062	3.0345968	2.18840649		

The product of the matrix above is shown below and adding the row entries yields the total forward linkages and the column entries the total backward linkages (Table 7.13):

Table 7.13
Total Forward and Backward Linkages for the Philippines
based on Field of Influence Operations
3x3, 1969

						Total	Average	FL
			0.36861	0.5890346	0.4247836	1.38242741	1.55186	0.89082
	M	=	0.46485	0.7428262	0.5356908	1.74336683	1.55186	1.12341
			0.4079	0.65182	0.4700615	1.52978084	1.55186	0.98577
		Total	1.24136	1.9836807	1.430536	4.65557508		
		Average	1.55186	1.5518584	1.5518584			
		BL	0.79992	1.2782615	0.9218212			

The same process is repeated for the data for 1979.

1979	I-A-1		
	1.08878468	0.234545	0.04024372
	0.23463058	1.67068643	0.225941415
	0.09043426	0.21178568	1.170278959

where terms are arranged to yield V and I/V:

b11	b12	b13	b21	b22	b23	b31	b32	b33
1.08878468	0.234545	0.04024372	0.23463058	1.67068643	0.225941415	0.090434258	0.211786	1.170278959

V	=	4.96733072
1/V	=	0.20131537

The corresponding multiplier product matrix for 1979 is then:

M	=	1.41384952	1.363573399		2.117017108	1.363573399		1.436464094	1.363573399
	0.20131537	1.41384952	2.131258424		2.117017108	2.131258424		1.436464094	2.131258424
		1.41384952	1.472498898		2.117017108	1.472498898		1.436464094	1.472498898

yielding the following results

M	=	1.92788759	2.886708214	1.958724228
	0.20131537	3.0132787	4.511910545	3.061476202
		2.08189186	3.11730536	2.115191797

and the resulting backward and forward linkages for 1979 as follows (Table 7.14):

Table 7.14
**Total Forward and Backward Linkages for the Philippines based
on Field of Influence Operations
3x3, 1979**

					Total	Average	FL
M	=	0.3881134	0.581138719	0.394321284	1.363573399	1.655776907	0.823525
		0.6066193	0.908316921	0.616322201	2.131258424	1.655776907	1.287165
		0.41911682	0.627561468	0.42582061	1.472498898	1.655776907	0.88931
	Total	1.41384952	2.117017108	1.436464094	4.967330721		
	Average	1.65577691	1.655776907	1.655776907			
	BL	0.8538889	1.278564219	0.867546883			

The decomposition of the Leontief inverse, in turn, starts with calculating the multiplier product matrix as shown above followed by the second order intensity matrix N (synergetic effects) of the field of influence and weighting it by 1/V used in the multiplier product matrix. Since the equation is given as $B = M - N$, the N matrix could be calculated as $N = M - B$ (Table 7.15) which was also used by the authors in their application on China. As explained in Chapter 6 (pp. 216-217), this was discussed in Sonis & Hewings (n.d., 2009) who stated that the formula could be verified directly. This verification is done below⁵⁰.

⁵⁰ For example, given inverse matrix $\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and the multiplier product matrix equation as stated in Sonis & Hewings (n.d, 2009):

Table 7.15
Deriving the N matrix for the Philippines, 3x3, 1969

-0.70089	0.319482	0.381409
0.369133	-0.73535	0.366219
0.331757	0.41587	-0.74763

The diagonals of the N matrix are then taken as shown on Table 7.16. The diagonals show which sectors have the highest self-influence in terms of affecting the biggest change on the whole economy.

Table 7.16
Diagonals of the N Matrix for the Philippines, 3x3, 1969

-0.70089	0	0
0	-0.73535	0
0	0	-0.747627

From the diagonals, the residual matrix is calculated using the formula $R = -D - N$ such that the diagonals of the R matrix must contain zeroes according to Sonis & Hewings (2019).

Table 7.17
Residual Matrix for the Philippines, 3x3, 1969

			sum
0	0.319482	0.381409	0.700891
0.369133	0	0.366219	0.735352
-0.331757	0.41587	0	0.084113
0.037376	0.735352	0.747628	1.520356

The transpose of the residual matrix is then computed on Table 7.18 using TRANSPOSE function in Excel.

Table 7.18
Transpose of the Residual Matrix for the Philippines, 3x3, 1969

0	0.369133	-0.331757
0.319482	0	0.41587
0.381409	0.366219	0

Finally to decompose, the residual matrix into its symmetric and anti-symmetric parts, the sum of the R matrix and its transpose and the difference of the R matrix and its transpose are calculated as shown in Table 7.19 and 7.20, respectively. The residual matrix and its transpose are added and multiplied by one half to yield the symmetric matrix. The difference of the residual matrix and its transpose, on the other hand, will obtain the anti-symmetric matrix. Two properties of these matrices as discussed in Chapter 6 are: i) the sum total of all column and row elements of the symmetric matrix and the residual matrix must be equal; and ii) the sum total of all column and

$$M = \frac{1}{V} \begin{bmatrix} (b_{11} + b_{21})(b_{11} + b_{12}) & (b_{12} + b_{22})(b_{11} + b_{12}) \\ (b_{11} + b_{21})(b_{21} + b_{22}) & (b_{12} + b_{22})(b_{21} + b_{22}) \end{bmatrix} \text{ and } N = \frac{1}{V} \begin{bmatrix} -\det B & \det B \\ \det B & -\det B \end{bmatrix}. \text{ Substituting values,}$$

$$\text{we derive: } M = \frac{1}{3} \begin{bmatrix} (1+0)(1+1) & (1+1)(1+1) \\ (1+0)(0+1) & (1+1)(0+1) \end{bmatrix} = \frac{1}{3} \begin{bmatrix} 2 & 4 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 2/3 & 4/3 \\ 1/3 & 2/3 \end{bmatrix} \text{ and for N given the determinant as}$$

$$\det B = (b_{11} \times b_{22}) - (b_{12} \times b_{21}) = 1 - 0 = 1; \text{ and } V = b_{11} + b_{12} + b_{21} + b_{22} = 1 + 0 + 1 + 1 = 3, \text{ we}$$

$$\text{obtain: } N = \frac{1}{3} \begin{bmatrix} -1 & 1 \\ 1 & -1 \end{bmatrix} = \begin{bmatrix} -1/3 & 1/3 \\ 1/3 & -1/3 \end{bmatrix}. \text{ Since } B = M - N, \text{ we get } \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 2/3 & 4/3 \\ 1/3 & 2/3 \end{bmatrix} - \begin{bmatrix} -1/3 & 1/3 \\ 1/3 & -1/3 \end{bmatrix}, \text{ which}$$

balances. Thus, by transposition, N can also be derived as $M - B = N$.

row elements of the anti-symmetric matrix must be zero, as the column totals of each row and the row totals of each column are exactly the same but opposite in signs.

Table 7.19
**Residual Matrix Operations with Transpose
for the Philippines, 3x3, 1969**

<i>R matrix + R Transpose</i>			<i>R matrix – R Transpose</i>		
0	0.688615	0.049652	0	-0.04965	0.713166
0.688615	0	0.782089	0.049651	0	-0.049651
0.049652	0.782089	0	-0.713166	0.049651	0

Multiplying both matrices above by one-half will yield the symmetric and anti-symmetric matrices of the residual matrix (Table 7.20). These matrices represent the push-pull effects of backward and forward linkages among sectors representing sectoral distortions arising from the shock or change from a given sector. According to Sonis & Hewings (2009), the total of all column and row elements of the anti-symmetrical matrix must be zero while the total of all column and row elements of the symmetric matrix and the residual matrix must be identical. These properties are fulfilled as indicated by the highlighted sum totals in Table 7.20 compared to total of Table 7.17 for symmetric and Table 7.20 compared to total of Table 7.18 for anti-symmetric.

Table 7.20
**Symmetric and Anti-Symmetric Components
of the Residual Matrix
for the Philippines, 3x3, 1969**

Symmetric Residual					Anti-symmetric Residual				
				Sum					Sum
	0	0.344308	0.024826	0.3691335		0	-0.02483	0.356583	0.3317575
	0.3443075	0	0.3910445	0.735352		0.0248255	0	-0.0248255	0
						-0.356583	0.024826	0	-0.3317575
Sum	0.024826	0.391045	0	1.520356	Sum	-0.3317575	0	0.3317575	0

It should be noted that the N matrices of succeeding years can also be derived using the same formula: $N = M - B$. However, the multiplier product matrix is now the product of the first order intensities and the E matrix containing the change in technical coefficients and the volume is the sum total of all rows and columns of this product. Subtracting B(E) or Bn which represents the matrix of inverse coefficients of the succeeding years from this multiplier product matrix will yield the N matrices of the years following the base or reference year. The corresponding diagonal, residual, symmetric and anti-symmetric matrices using the formula can thus be easily calculated.

As mentioned before, the equations were programmed in Excel and replicated for all input-output tables for each sample year of the three countries covered in this study. The results and findings of the calculations for the years covering the subject countries are discussed in the next sections.

7.2 Applications on Growth

For purposes of comparative analysis, the following framework will be applied on the field of influence matrices of the Philippines first, followed by Malaysia and then Thailand. First, for each country, a description of the economic developments by sector will be discussed. The main source of these economic descriptions was <http://www.encyclopedia.com>.

The inverse coefficients of the initial year of the input-output table used as base or initial year is then presented from which further analysis of the direct field of influence is calculated. This is the first term (B_0) in the equation:

$$B_t = B(E) = B_0 + \frac{1}{Q(E)} \left[\sum_{k=1}^n \sum_{\substack{i_r \neq i_s \\ j_r \neq j_s}} {}^t F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} e_{j_1 i_1} \dots e_{j_k i_k} \right].$$

The discussion proceeds to show the intensity of the direct field of influence. The direct field of influence is just a re-arranged version of the Leontief inverse matrix of technical coefficients of the initial or base year of each country where both columns and rows of the entire Leontief inverse are arranged into a column vector of row multipliers and row vector of column multipliers, respectively and multiplied to yield the intensity of the direct field of influence F . The products contained as elements of this F matrix which should be equal on the row or column sides because of the commutative property of multiplication yields the intensity of linkages in the initial year chosen for each country as represented in the term on the bracket in the equation above. This implies that if input coefficients are fixed, the same intensities should prevail in succeeding years of the input-output table. The intensity of the direct field of influence measures the degree of interdependency of a sector to both buying and selling sectors during the initial year.

Then the changes in the inverse coefficients over succeeding sample years representing the E matrix ($e_{j i s}$) will be mapped on the surface of the direct field of influence of the initial year. If technical coefficients are fixed as assumed in input-output analysis, the surface map of successive years should be identical to the initial year's. The maps will show that this will not be the case because technical coefficients will change for many sectors, if not all, in succeeding years.

The second term of the field of influence equation – the term inside the brackets will then be discussed which denotes the changes in technical coefficients ($e_{j i s}$) for each of the sample years multiplied on the direct field of influence of the initial year and summed up for all sectors. This product of the direct field of influence and the corresponding changes in technical coefficients (i.e., elements of the E matrix) comprise the first order intensities or first round effects of the field of influence approach, measuring the change in linkage intensities from the initial year resulting from the changes in technical coefficients of the succeeding years. In the field of influence framework the first order intensities represent technological change as sectors compete for inputs given an innovation, and hence the span of linkage intensities measure the extent of diffusion of technology as shown in Sonis & Hewings (1996, 1988a, 1988b, 2007, 2009); Hewings, Sonis & Jensen (1988); and Sonis, Hewings & Guo (1996).

The third term of the field of influence equation shows the synergetic effects of both a change in final demand shown by the initial year inverse matrix and the self-generated sectoral change arising from technological change as interpreted by the creators of the approach. The second round impact after the sectoral change (i.e., change in technical coefficients) affects final demand and starts a new round of inter-industry sales and purchases of intermediate inputs. This is calculated by multiplying the reciprocal of the ratio of the determinants of the Leontief inverse matrix of the initial year to the Leontief inverse of the next year, i.e., $\left(\frac{1}{Q(e)}\right)$ by the results of the first order effects. Alternatively, the same results are arrived at by multiplying the negative of the determinant of the Leontief inverse of the initial year to the entire Leontief inverse matrix of that same year and multiplying this by the E matrix or matrix of changes in technical coefficients.

Then, the analysis proceeds with generating the change in linkage intensities (backward, forward and total) by sector arising from the field of influence above and weighting each element by the column and row totals called volume or global intensity. As discussed in Chapter 6, the field of influence approach yields the individual changes in each sector's technical coefficients from which a revised set of linkage intensities are calculated resulting from multiplying the direct field of influence by the respective sectoral changes in technical coefficients weighted by the sum total (or volume) for all sectors. The multiplier product matrix is also calculated which is just the direct field of influence divided by the total volume. From here, the backward, forward and total linkages for each year ranked in descending order reveal the key sectors of the economy driven by growth in technological change which is mapped into an economic landscape as discussed in Chapter 6. To calculate backward and forward linkages, the criteria used by Rasmussen (1957) and Hirschman (1958) as acknowledged by Sonis & Hewings (2009) is applied.

7.2.1 Results for the Philippines

The main reference for the following description of the Philippines originated from <https://www.encyclopedia.com/places/asia/philippines-political-geography/philippines>.

From a predominantly agricultural producer of subsistence crops like palay (unhusked rice) and corn and exporter of commercial crops like coconut and copra in the 1950s to 1960s, the Philippine economy transformed into a major producer of manufactured exports in the next decades with electronics and telecommunications comprising three quarters of total export revenues by the start of the new millennium. Its growth momentum, however, compared to its Asian tiger neighbours was hampered by political instability in the 1970s with the declaration of martial law which reached a climax in 1986 with the overthrow of a 20-year dictatorship under Ferdinand Marcos in a people power revolt. At the start of the 1990s, a triple blow of natural disasters such as an earthquake, volcanic eruption and super typhoons hit the economy which suffered in the mid-1990s from an even more devastating typhoon followed by the Asian financial crisis of 1997 and a global recession at the onset of 2001 following the dot com bubble.

Following Indonesia, the Philippines ranked second in mining prospectivity and resources, owning the world's biggest source of chromite and huge deposits of gold, silver, copper and nickel. The production of limestone, marble, sand and gravel dominated its industrial mining sector along with the production of phosphate, bentonite, feldspar, lime, perlite, pyrite, silica sand and sulphur. The Mining Act of 1995 enhanced the exploitation of mineral resources by providing incentives to international companies, allowing exploration permits for a maximum of four years through production sharing, co-production, joint ventures and financial/technical assistance.

The industrial sector which accounts for about a third of the country's real output is led by textiles, pharmaceuticals, chemicals, wood products, food processing, energy (electricity), electrical machinery, electronics assembly, and petroleum refining along with significant production of transport equipment, non-metallic minerals, fabricated metal, beverages, paper and paper products, leather products, printing and publishing, and furniture and fixtures. In 1981, the Marcos government launched an ambitious implementation of 11 industrial projects covering a copper smelter, aluminium smelter, phosphate fertilizer plant, diesel engine manufacturing, cement, coco-chemicals complex, petrochemical complex, an integrated pulp and paper mill, heavy engineering, integrated steel mill, and the production of *alcogas* (a mixture of alcohol and gas). In the late 1990s, the export value of electronics overtook food products and textiles as the new Aquino and later Ramos governments shifted industrial policy from an agricultural-based economy to high

value-added manufactured exports anchored on the assembly of computer chips and peripherals and information technology products. Computer chip assemblers and component manufacturers such as Intel, Philips, Acer, Toshiba, Hitachi, and Fujitsu set up operations in the Philippines.

In terms of the energy sector, the Philippines is the world's second largest producer of geothermal energy. With modest oil reserves amounting to about 152 million barrels as of the early 2000s, the country discovered significant natural gas reserves of about 3.6 trillion cubic ft. in the mid-2000s, leading the government to replace oil-fired power plants with natural gas. The country has also recoverable coal reserves although its share to the energy mix has declined significantly on account of the discovery of natural gas reserves. A substantial portion of the economy's electricity generating capacity still comes from fossil fuels with hydropower and geothermal sources filling in the gap.

The archipelagic geography of the country requires the set-up of regional centers with the proliferation of small retail shops in its domestic trading sector. Distribution centers, trading firms and retail establishments are located in the major metropolitan hub in Makati City where commercial banks and financial institutions are also situated.

The transactions tables and Leontief inverse matrices of technical coefficients for 1969, 1979, 1988, 1994, 2000 and 2006 for the Philippines are shown in Appendices 1 and 2, respectively. The direct field of influence for the base year 1969 is shown in Appendix 3. The field of influence for the same years multiplied by the change in technical coefficients representing self-induced changes or first order effects in the sectoral inverse coefficients are shown in Appendix 4.

The first term of the field of influence approach is the Leontief inverse of the base year, which is simply rearranged into column and row vectors to facilitate further calculations needed in the basic equation or formulation. For the Philippines, the initial year for the study chosen was 1969 which is the third year input-output tables were available after it was first compiled in the Philippines in 1961.

Taking 1969 I-O tables as representative of the 1960s decade and initial year for the Philippines, the sectors exceeding the sectoral averages of the technical coefficients and hence, most affected by a change in final demand as shown in Table 7.21 and depicted in Figure 7.1 are: 1) ferrous metals; 2) chemicals; 3) wholesale and retail trade; 4) agriculture, fishery and forestry; 5) paper and paper products; 6) other services; 7) non-ferrous metals; 8) petroleum products; 9) textile products; 10) food manufacturing; 11) mining; and 12) transport equipment. Industries affected the least by a change in final demand in 1969 were: communication, furniture and fixtures, tobacco, beverages, printing, non-electrical machinery; footwear and wearing apparel; construction, rubber, and wood.

Table 7.22 presents the intensities of the direct field of influence resulting from summing up per sector the products of multiplying the column and row vectors containing the respective row

Table 7.21
Inverse of Technical Coefficients in 1969
Philippines

	Column Totals	Row Totals	Sum	Rank
Agriculture, fishing & forestry	1.245167048	3.314862339	4.560029388	4
Mining	1.588190017	2.241771696	3.829961713	11
Food manufactures	2.077404985	1.88945155	3.966856535	10
Beverages	1.78468601	1.091930626	2.876616636	26
Tobacco products	1.607263153	1.204353887	2.81161704	27
Textile products	2.102849091	1.959176102	4.062025194	9
Footwear & wearing apparel	2.122891649	1.019446347	3.142337996	23
Wood products	1.886751393	1.413704481	3.300455874	20
Furniture & fixtures	1.758465806	1.026562299	2.785028104	28
Paper & paper products	2.058993237	2.30122247	4.360215707	6
Printed materials	1.887967877	1.207374525	3.095342402	25
Leather & leather products	1.967175101	1.399002287	3.366177388	18
Rubber products	1.897490593	1.328985259	3.226475853	21
Chemicals	2.039976831	2.946914757	4.986891588	2
Petroleum products	1.99536901	2.098762149	4.09413116	8
Non-metallic products	1.996929671	1.392808544	3.389738215	16
Ferrous metal products	2.206613221	2.984539509	5.19115273	1
Non-ferrous metal products	2.244448973	2.055901026	4.300349999	7
Non-electrical machinery	2.006824224	1.113303345	3.120127569	24
Electrical machinery	2.01143195	1.37632222	3.38775417	17
Transport equipment	2.006668704	1.676165026	3.68283373	12
Miscellaneous manufactures	1.8522277	1.502104675	3.354332375	19
Construction	1.993477203	1.180053842	3.173531045	22
Wholesale & retail trade	1.393031663	3.575375983	4.968407646	3
Transport services	1.565237095	1.912366878	3.477603973	14
Communication	1.380295108	1.172117654	2.552412762	29
Electricity, gas & water	1.783684803	1.626351535	3.410036338	15
Banking, insurance & real estate	1.311396382	2.361050004	3.672446386	13
Other services	1.493237048	2.894164531	4.387401579	5
Average	1.83676364	1.83676364	3.673527279	

Note: This table tabulates the column and row totals of the inverse of the technological coefficients given in the Leontief inverse matrix of the initial year.

Figure 7.1
Sum of Inverse Coefficients Philippines, 1969

multipliers and column multipliers of the Leontief inverse of the initial year. The top industries that were intensive in linkages or sectoral interdependencies in 1969 were: 1) ferrous metal; 2) chemicals; 3) wholesale and retail trade; 4) agriculture, fishery and forestry; 5) other services; 6) paper and paper products; 7) non-ferrous metals; 8) petroleum products; 9) textiles; and 10) food manufacturing. The least intensive sectors in terms of interdependencies were: 1) communication;

2) furniture and fixtures; 3) tobacco; 4) beverages; 5) printing; 6) non-electrical machinery; 7) footwear; 8) construction; 9) rubber; and 10) wood products. The intensities of the direct field of influence as expected are similar to the inverse-important sectors based on the results of the inverse of technical coefficients as the field of influence contain the same entries as the Leontief inverse matrix.

Table 7.22
Intensities of the Direct Field of Influence, 1969
Philippines

Sectors	Column Totals	Row Totals	Average	Rank
Agriculture, fishing & forestry	66.335122	176.5699	121.4525	4
Mining	84.642816	119.4105	102.0267	11
Food manufactures	110.66786	100.6455	105.6567	10
Beverages	95.043109	58.16254	76.60282	26
Tobacco products	85.599094	64.15129	74.87519	27
Textile products	112.03928	104.3578	108.1985	9
Footwear	113.09365	54.30198	83.69781	23
Wood products	100.53451	75.30259	87.91855	20
Furniture & fixtures	93.674753	54.68096	74.17785	28
Paper & paper products	109.71986	122.5773	116.1486	5
Printed materials	100.58038	64.3102	82.44529	25
Leather & leather products	104.81401	74.51946	89.66674	18
Rubber products	101.0652	71.53904	86.30212	21
Chemicals	108.67745	156.9708	132.8241	2
Petroleum products	107.41141	111.7956	109.6035	8
Non-metallic products	105.40926	74.18954	89.7994	17
Ferrous metal products	117.54924	158.9749	138.2621	1
Non-ferrous metal products	119.57076	109.5143	114.5425	7
Non-electrical machinery	106.91285	59.30174	83.1073	24
Electrical machinery	107.14235	73.31138	90.22687	16
Transport equipment	106.91589	89.28285	98.09937	12
Miscellaneous manufactures	98.582904	80.01133	89.29711	19
Construction	106.10831	62.85692	84.48261	22
Wholesale & retail trade	74.200833	190.4465	132.3237	3
Transport services	83.442371	101.8189	92.63064	14
Communication	73.528785	62.43419	67.98149	29
Electricity, gas & water	95.164378	86.62948	90.89693	15
Banking, insurance & real estate	69.789061	125.764	97.77655	13
Other services	79.541053	153.925	116.733	6
Total (Global) Intensity=Volume	2837.7565	2837.757	2837.757	

Note: This table comes from the product of the column vectors and row vectors of the direct field of influence (Leontief inverse matrix) of the initial year summed up for all sectors to yield intensities of interdependency of that sector with other sectors.

Compared to the base year, Figure 7.2 shows a surface map of the inverse coefficients in the base year 1969 and how it has changed over the years. The surface map for 1969 show the biggest inverse coefficients along the main diagonal which is one of the properties of the field of influence approach. The changes in technical coefficients varied among sectors during the sample periods after the initial year 1969. Sectors that consistently showed increments in the inverse coefficients were petroleum in 1979, 1994, 2000 and 2006; textiles in 1988, 1994, 2000 and 2006; furniture and fixtures in 1979, 2000 and 2006; electrical machinery in 1994, 2000 and 2006; non-electrical machinery in 1994 and 2000; mining in 1994 and 2006; and wholesale and retail trade in 1979 and 2006. Decrements in the inverse of the technical coefficients were consistently observed for other services and construction for all the sample years after 1969; food manufacturing for 1988, 1994, 2000 and 2006; non-ferrous metals for 1979, 1988, 1994 and 2000; transport equipment for 1979, 1988 and 2006; and chemicals for 1988, 1994, and 2000.

Figure 7.2
**Surface Map of the 1969 Field of Influence and Changes
 in Technical Coefficients (E) over the Sample Years for the Philippines**

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles 7 Footwear & wearing apparel 8 Wood products 9 Furniture & fixtures 10 Paper & products 11 Printed materials 12 Leather & leather products 13 Rubber products 14 Chemicals 15 Petroleum products 16 Non-metallic products 17 Ferrous metallic products 18 Non-ferrous metallic products 19 Non-electrical machinery 20 Electrical machinery 21 Transport equipment 22 Miscellaneous manufactures 23 Construction 24 Wholesale & retail trade 25 Transport services 26 Communication 27 Electricity, gas & water 28 Banking, insurance & real estate 29 Other services

Since the imports are recorded in the Philippines on the final demand side and imported intermediate inputs and raw materials are lumped with imports of finished goods, it cannot be determined if these decrements in inverse coefficients could be interpreted as technical efficiency or whether there was a rise in import dependency unless a breakdown of imported intermediate inputs by industry can be obtained.

Figure 7.3
**Surface Map of the Change in Linkage Intensities (First Order Effects)
over the Sample Years for the Philippines**

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles 7 Footwear & wearing apparel 8 Wood products 9 Furniture & fixtures 10 Paper & products 11 Printed materials 12 Leather & leather products 13 Rubber products 14 Chemicals 15 Petroleum products 16 Non-metallic products 17 Ferrous metallic products 18 Non-ferrous metallic products 19 Non-electrical machinery 20 Electrical machinery 21 Transport equipment 22 Miscellaneous manufactures 23 Construction 24 Wholesale & retail trade 25 Transport services 26 Communication 27 Electricity, gas & water 28 Banking, insurance & real estate 29 Other services

Multiplying the changes in technical coefficients of each year by the direct field of influence and summing up the products for each sector yields the first order or self-generated effects of changes in linkage intensities in each sector compared to the initial year. These changes in first round linkage intensities over the years are depicted in Figure 7.3 based on calculations in Appendix 4.

Changes in linkage intensities in the field of influence surface were pronounced in 1979 through 2006 for exactly the same sectors discussed in the change in technical coefficients above. In 1979, four sectors registered negative changes in first order linkage intensities – construction, transport equipment, textiles, and other services. Sectors that deepened their interdependency with other sectors were led by petroleum, ferrous metals, mining, chemicals, wholesale and retail trade, tobacco, furniture and fixtures, food manufacturing paper, and electricity, gas and water.

In 1988, all sectors with the exception of footwear and wearing apparel registered decrements in their linkage intensities notably ferrous and non-ferrous metals, chemicals, trade, agriculture, paper, other services, transport equipment, banking, and food manufacturing. In 1994, only other services recorded a decline in linkage intensity whereas all sectors experienced more sectoral interdependency especially petroleum, mining, paper, transport equipment, textiles, electricity, transport services, electrical and non-electrical machinery, and ferrous metals.

In 2000, half of the sectors reduced their linkage intensities led by agriculture; other services; food manufactures; construction; ferrous metals; paper products; non-ferrous metals; tobacco; rubber; non-metallic products; banking, insurance & real estate; chemicals; beverages; wood products; and printing. Those that became more linkage intensive were: electrical machinery, footwear, leather, non-electrical machinery, textiles, trade, petroleum, and electricity. Finally, in 2006, other services and transport equipment showed negative changes in their linkage intensities while sectors that became more linkage intensive were trade, petroleum, mining, electrical machinery, textiles, chemicals, paper, non-electrical machinery, wood, and furniture.

The third term in the field of influence formula measures the synergetic (or second round intensities) of the changes of inverse coefficients on the field of influence representing first round intensities multiplied by $\frac{1}{Q(E)}$ or the reciprocal of the ratio of the determinant of the inverse matrix in the initial year to the determinant of the succeeding year.

The synergetic effects for the Philippines are summarized in Table 7.23 based on calculations shown in Appendix 6 where the following sectors showed greater than average second round intensities triggered by the change in technical coefficients over the sample years: 1) petroleum products; 2) mining; 3) paper and paper products; 4) textile products; 5) electricity, gas and water; 6) ferrous metal products; 7) transport services; 8) transport equipment; 9) wholesale and retail trade; 10) electrical machinery; and 11) non-electrical machinery. Sectors with lower synergetic effects were other services; footwear and wearing apparel; miscellaneous manufactures; food manufacturing; banking, insurance and real estate; construction; non-ferrous metals; communication; beverages; and furniture and fixtures.

It should be noted that the synergetic effects were largest in 1994 or three years before the crisis, indicating the rapid diffusion of innovation during the decade of the 1990s of information technology to be discussed in the last chapter. This is shown in the radar or cobweb map in Figure 7.4.

The change in linkage effects resulting from the field of influence operations over the sample

period are shown in Table 7.25 using 1969 as the initial period for the field of influence calculations. The linkage intensity is the sum of the field of influence multiplied by the respective changes in technical coefficients for each sector's inter-industry matrix divided by the total volume of intensities. Thus, the relative shares of each sector to the total or global intensity is measured. Figure 7.5 depicts a visual representation of the weighted changes in total linkage intensities among the sectors from the reference year 1969. They show the impact of sectors whose change in coefficients create the largest volume of change in the entire economic system in terms of shares to total intensity. The change in inverse coefficients under the field of influence formula yields the forward, backward and total linkage intensities based on the Sonis & Hewings (2009) framework as shown in Appendix 7.

Table 7.23
Ranking of Sectors based on Synergetic Effects (Second Round)
of Changes in Inverse Coefficients from 1969
Philippines, 1979-2006

Sector	2006	2000	1994	1988	1979	1969	Average 1979-2006	Rank
Agriculture, fishing & forestry	2.6385	2.5079	5.5111	-0.4120	0.4419	4.5600	2.1375	18
Mining	12.5806	-1.0973	35.2865	-0.2391	1.7925	3.8300	9.6647	2
Food manufactures	0.2821	1.6751	0.5975	-0.3029	0.9294	3.9669	0.6363	26
Beverages	2.5548	0.7539	3.5780	-0.1264	0.3654	2.8766	1.4251	21
Tobacco products	2.4577	1.1007	8.8896	-0.1095	1.0912	2.8116	2.6860	13
Textile products	6.7907	-2.4689	22.6845	-0.1523	-0.1559	4.0620	5.3396	4
Footwear	1.6308	-10.9124	8.4549	0.1994	0.2042	3.1423	-0.0846	28
Wood products	3.8833	0.7029	6.6839	-0.1733	0.7417	3.3005	2.3677	16
Furniture & fixtures	3.8200	-1.1499	5.6338	-0.0745	0.9572	2.7850	1.8373	20
Paper & paper products	4.8744	1.1738	28.9448	-0.4113	0.9290	4.3602	7.1021	3
Printed materials	2.8784	0.3606	8.6052	-0.1500	0.3681	3.0953	2.4125	14
Leather & leather products	1.9615	-2.6722	10.2796	-0.2295	0.5391	3.3662	1.9757	19
Rubber products	2.1570	1.0735	8.3563	-0.1711	0.5724	3.2265	2.3976	15
Chemicals	5.5372	0.7611	7.9201	-0.4794	1.7739	4.9869	3.1026	12
Petroleum products	15.6239	-1.4901	49.8195	-0.2326	2.9289	4.0941	13.3299	1
Non-metallic products	3.3490	0.8417	7.8003	-0.2102	0.0030	3.3897	2.3568	17
Ferrous metal products	1.6307	1.1947	17.8012	-0.5516	2.2972	5.1912	4.4744	6
Non-ferrous metal products	3.6548	1.1053	1.5501	-0.4540	0.1988	4.3003	1.2110	23
Non-electrical machinery	3.9500	-2.7145	14.6718	-0.2343	0.4413	3.1201	3.2229	11
Electrical machinery	10.4420	-12.1915	18.3126	-0.0934	0.5523	3.3878	3.4044	10
Transport equipment	-1.0368	-0.0196	23.6566	-0.3430	-0.4187	3.6828	4.3677	8
Miscellaneous manufactures	1.8835	-1.3228	2.2038	-0.2362	0.3664	3.3543	0.5789	27
Construction	0.2356	1.5307	2.4652	-0.2142	-0.0460	3.1735	0.7943	24
Wholesale & retail trade	16.4065	-2.0962	6.5274	-0.4724	1.4560	4.9684	4.3643	9
Transport services	2.0977	-0.0357	19.8656	-0.1829	0.5077	3.4776	4.4505	7
Communication	3.4734	-2.5121	5.7838	-0.0488	0.0921	2.5524	1.3577	22
Electricity, gas & water	2.6197	-1.1668	22.5104	-0.1560	0.7937	3.4100	4.9202	5
Banking, insurance & real estate	2.5730	0.7992	0.7463	-0.3093	0.0601	3.6724	0.7739	25
Other services	-2.6272	1.9323	-4.0470	-0.3881	-0.6092	4.3874	-1.1478	29
Average	4.0801	-0.8392	12.1067	-0.2400	0.6612	3.6735	3.1538	

Note: Data from this table were obtained from the product of multiplying the direct field of influence matrix by the change in technical coefficients per sector and the reciprocal of the ratio of determinant of the Leontief inverse matrix of the initial year to the determinant of the Leontief inverse matrix of the succeeding year, i.e. $\frac{1}{Q(E)}$. Synergetic effects are second round effects of the change in technological coefficients on the direct field of influence arising from a change in final demand which triggers a successive round of buying and selling of inputs and outputs by sectors.

Figure 7.4
**Synergetic Effects of Changes in Inverse Coefficients
 for the Philippines 1979-2006**

A decade after the base year 1969, higher linkage intensities shifted to the following industries: 1) petroleum products; 2) ferrous metals; 3) mining; 4) chemicals; 5) wholesale and retail trade; 6) tobacco products; 7) furniture and fixtures; 8) food manufactures; 9) paper and paper products; and 10) electricity, gas and water. Thus, in the 1970s, the following industries retained their standings within the top 10 sectors in terms of linkage intensity: ferrous metals, chemicals, wholesale and retail trade, petroleum products, paper and paper products, and food manufacturing. There was a significant jump in petroleum products while linkage intensity in the mining sector, tobacco, and furniture and fixtures replaced the inverse importance of textiles, non-ferrous metals and agriculture, fishery and forestry among the leading industries. Sectors with weakest linkage intensities were other services; transport equipment; textiles; construction; non-metallic products; banking, insurance and real estate; communication; non-ferrous metals; footwear and wearing apparel; and beverages.

Looking at the 1980s using 1988 data, the top ten industries in terms of the change in linkage intensities weighted by the total volume or global intensity from the 1960s were: 1) ferrous metals; 2) chemicals; 3) wholesale and retail trade; 4) non-ferrous metals; 5) agriculture, fishery and forestry; 6) paper and paper products; 7) other services; 8) transport equipment; 9) banking, insurance and real estate; and 10) food manufactures.

Table 7.24
Linkage Intensities from the Field of Influence Approach Philippines, 1969-2006

Sectors	1969				1979				1988				1994				2000				2006			
	BL	FL	TL	Rank	Δ BL	Δ FL	Δ TL	Rank	Δ BL	Δ FL	Δ TL	Rank	Δ BL	Δ FL	Δ TL	Rank	Δ BL	Δ FL	Δ TL	Rank	Δ BL	Δ FL	Δ TL	Rank
Agriculture, fishing & forestry	1.2452	3.3149	4.56	4	0.0298	0.0163	0.0461	16	0.0091	0.1093	0.1184	5	0.0225	0.0089	0.0314	22	-0.019	-0.187	-0.206	29	0.0264	0.0182	0.0446	15
Mining	1.5882	2.2418	3.83	11	-0.013	0.1998	0.187	3	0.0255	0.0432	0.0687	11	0.0255	0.1755	0.201	2	-0.068	0.1585	0.0902	12	0.0134	0.1992	0.2126	3
Food manufactures	2.0774	1.8995	3.9669	10	0.0117	0.0852	0.0969	8	0.0449	0.0421	0.087	10	0.0101	-0.007	0.0034	28	-0.096	-0.041	-0.138	27	0.0179	-0.013	0.0048	26
Beverages	1.7847	1.0919	2.8766	26	0.0421	-0.004	0.0381	20	0.0326	0.0038	0.0363	24	0.0244	-0.004	0.0204	23	-0.061	-0.001	-0.062	17	0.0344	0.0088	0.0432	18
Tobacco products	1.6073	1.2044	2.8116	27	0.0787	0.0351	0.1138	6	0.0241	0.0074	0.0315	25	0.0416	0.009	0.0506	12	-0.067	-0.024	-0.09	22	0.0497	-0.008	0.0415	19
Textile products	2.1028	1.9592	4.062	9	0.0077	-0.024	-0.016	27	0.0704	-0.027	0.0438	22	0.0372	0.092	0.1292	5	-0.169	0.3715	0.2029	6	0.0205	0.0943	0.1148	5
Footwear & wearing apparel	2.1229	1.0194	3.1423	23	0.0153	0.006	0.0213	21	-0.056	-0.002	-0.057	29	0.0345	0.0137	0.0482	14	0.8396	0.0572	0.8968	2	0.0278	-2E-04	0.0276	24
Wood products	1.8868	1.4137	3.3005	20	0.0401	0.0373	0.0774	11	0.0363	0.0135	0.0498	19	0.0285	0.0096	0.0381	18	-0.086	0.0287	-0.058	16	0.0361	0.0296	0.0656	9
Furniture & fixtures	1.7585	1.0266	2.785	28	0.1005	-7E-04	0.0998	7	0.0206	0.0008	0.0214	27	0.0316	0.0005	0.0321	21	0.0795	0.015	0.0945	11	0.0524	0.0122	0.0646	10
Paper & paper products	2.059	2.3012	4.3602	6	0.0531	0.0438	0.0969	9	0.0572	0.061	0.1182	6	0.053	0.1118	0.1649	3	-0.073	-0.024	-0.096	24	0.0497	0.0327	0.0824	7
Printed materials	1.888	1.2074	3.0953	25	0.0535	-0.015	0.0384	18	0.0325	0.0106	0.0431	23	0.0546	-0.006	0.049	13	-0.017	-0.012	-0.03	15	0.0471	0.0015	0.0487	14
Leather & leather products	1.9672	1.399	3.3662	18	0.0477	0.0086	0.0562	14	0.0538	0.0122	0.066	15	0.0357	0.0228	0.0586	11	0.1306	0.089	0.2196	4	0.0466	-0.013	0.0332	22
Rubber products	1.8975	1.329	3.2265	21	0.0666	-0.007	0.0597	12	0.0367	0.0125	0.0492	20	0.0364	0.0112	0.0476	15	-0.078	-0.01	-0.088	21	0.0325	0.0039	0.0365	20
Chemicals	2.04	2.9469	4.9869	2	0.0359	0.1491	0.185	4	0.0509	0.0869	0.1378	2	0.0199	0.0252	0.0451	16	-0.088	0.0258	-0.063	18	0.0385	0.0551	0.0936	6
Petroleum products	1.9954	2.0988	4.0941	8	-7E-04	0.3062	0.3055	1	0.045	0.0218	0.0668	14	0.0424	0.2414	0.2838	1	-0.063	0.1851	0.1225	8	0.0322	0.2319	0.2641	2
Non-metallic products	1.9969	1.3928	3.3897	16	0.0202	-0.02	0.0003	25	0.0449	0.0155	0.0604	17	0.0421	0.0024	0.0444	17	-0.057	-0.013	-0.069	20	0.0426	0.014	0.0566	13
Ferrous metal products	2.2066	2.9845	5.1912	1	0.0714	0.1683	0.2396	2	0.0577	0.1008	0.1585	1	0.0454	0.056	0.1014	9	-0.068	-0.03	-0.098	25	0.0567	-0.029	0.0276	25
Non-ferrous metal products	2.2444	2.0559	4.3003	7	0.0497	-0.029	0.0207	22	0.0739	0.0566	0.1305	4	0.0347	-0.026	0.0088	26	-0.116	0.0252	-0.091	23	0.0436	0.0181	0.0618	11
Non-electrical machinery	2.0068	1.1133	3.1201	24	0.0428	0.0032	0.046	17	0.0634	0.0039	0.0673	13	0.0437	0.0399	0.0836	10	0.1612	0.0619	0.2231	3	0.0569	0.0099	0.0668	8
Electrical machinery	2.0114	1.3763	3.3878	17	0.057	0.0006	0.0576	13	0.0284	-0.002	0.0268	26	0.0534	0.0509	0.1043	8	0.6528	0.3491	1.0019	1	0.065	0.1115	0.1765	4
Transport equipment	2.0067	1.6762	3.6828	12	-0.004	-0.039	-0.044	28	0.0619	0.0367	0.0986	8	0.0778	0.057	0.1348	4	0.0472	-0.046	0.0016	14	0.0492	-0.067	-0.018	28
Miscellaneous manufactures	1.8521	1.5021	3.3543	19	0.0687	-0.03	0.0382	19	0.038	0.0299	0.0679	12	0.0276	-0.015	0.0126	25	0.1217	-0.013	0.1087	9	0.0483	-0.016	0.0318	23
Construction	1.9935	1.1801	3.1735	22	0.0059	-0.011	-0.005	26	0.0553	0.0063	0.0616	16	0.0078	0.0063	0.014	24	-0.11	-0.016	-0.126	26	0.0134	-0.009	0.004	27
Wholesale & retail trade	1.393	3.5754	4.9684	3	-0.018	0.1699	0.1519	5	0.0165	0.1193	0.1358	3	0.0206	0.0166	0.0372	19	-0.005	0.1776	0.1723	7	0.0147	0.2626	0.2773	1
Transport services	1.5652	1.9124	3.4776	14	0.043	0.01	0.053	15	0.0149	0.0376	0.0526	18	0.0615	0.0517	0.1132	7	0.0341	-0.031	0.0029	13	0.0423	-0.007	0.0355	21
Communication	1.3803	1.1721	2.5524	29	0.0045	0.0051	0.0096	23	0.0076	0.0064	0.014	28	0.0151	0.0179	0.0329	20	0.1785	0.0279	0.2064	5	0.0231	0.0356	0.0587	12
Electricity, gas & water	1.7837	1.6264	3.41	15	0.0699	0.0129	0.0828	10	0.0274	0.0174	0.0448	21	0.0455	0.0827	0.1282	6	0.0158	0.0801	0.0959	10	-0.006	0.0501	0.0443	16
Banking, insurance & real estate	1.3114	2.3611	3.6724	13	-0.01	0.0162	0.0063	24	0.0123	0.0766	0.0889	9	0.0044	-1E-04	0.0043	27	-0.008	-0.058	-0.066	19	0.0148	0.0287	0.0435	17
Other services	1.4932	2.8942	4.3874	5	0.03	-0.094	-0.064	29	0.014	0.0976	0.1115	7	0.0227	-0.046	-0.023	29	-0.013	-0.146	-0.159	28	0.0101	-0.054	-0.044	29

Note: Table was created from the intensity of the direct field of influence for the initial year (Table 7.21) and for succeeding years, the result of multiplying the change in technological coefficients (i.e., e_{ijts}) and the direct field of influence summed up row-wise and column-wise and weighted by the total (called volume).

Figure 7.5
**Change in Linkage Intensities from Field of Influence Approach
 Philippines, 1969-2006**

After two decades, seven of the industries' dominance within the 10 leading sectors did not change except for some of the rankings, i.e., ferrous metals; chemicals; wholesale and retail trade; agriculture, fishery and forestry; paper and paper products; non-ferrous metals; and other services. In the 1980s, transport equipment and banking, insurance and real estate jumped to the rankings among the top ten linkage intensive sectors. The industries which ranked least in global intensity were: footwear and wearing apparel; communication; furniture and fixtures; electrical machinery; tobacco, beverages, printing, textiles; electricity, gas and water; and rubber products.

In the 1990s represented by 1994, the changes in linkage effects from 1969 depicted the following rankings among the top 10 dominant sectors in linkage intensity: 1) petroleum products; 2) mining; 3) paper and paper products; 4) transport equipment; 5) textiles; 6) electricity, gas and water; 7) transport services; 8) electrical machinery; 9) ferrous metals; and 10) non-electrical machinery. Five sectors entered the rankings compared to the 1960s, namely: mining, transport equipment; transport services; electrical and non-electrical machinery. The remaining five sectors that retained their linkage importance just changed their rankings. These were ferrous metals; paper products; textiles; electricity, gas and water; and petroleum products.

Table 7.25
**Ranking of Sectors based on Average Changes in
 Linkage Intensity Coefficients from 1969
 Philippines, 1979-2006**

	2006	2000	1994	1988	1979	Average	Rank
Agriculture, fishing & forestry	0.0446	-0.206	0.0314	0.1184	0.0461	0.00688	27
Mining	0.2126	0.0902	0.201	0.0687	0.187	0.1519	5
Food manufactures	0.0048	-0.138	0.0034	0.087	0.0969	0.0109	26
Beverages	0.0432	-0.062	0.0204	0.0363	0.0381	0.01521	25
Tobacco products	0.0415	-0.09	0.0506	0.0315	0.1138	0.0294	20
Textile products	0.1148	0.2029	0.1292	0.0438	-0.016	0.09488	7
Footwear & wearing apparel	0.0276	0.8968	0.0482	-0.057	0.0213	0.1873	3
Wood products	0.0656	-0.058	0.0381	0.0498	0.0774	0.03463	18
Furniture & fixtures	0.0646	0.0945	0.0321	0.0214	0.0998	0.06248	14
Paper & paper products	0.0824	-0.096	0.1649	0.1182	0.0969	0.07319	12
Printed materials	0.0487	-0.03	0.049	0.0431	0.0384	0.02991	19
Leather & leather products	0.0332	0.2196	0.0586	0.066	0.0562	0.0867	8
Rubber products	0.0365	-0.088	0.0476	0.0492	0.0597	0.02095	22
Chemicals	0.0936	-0.063	0.0451	0.1378	0.185	0.0798	10
Petroleum products	0.2641	0.1225	0.2838	0.0668	0.3055	0.20854	2
Non-metallic products	0.0566	-0.069	0.0444	0.0604	0.0003	0.01852	23
Ferrous metal products	0.0276	-0.098	0.1014	0.1585	0.2396	0.08579	9
Non-ferrous metal products	0.0618	-0.091	0.0088	0.1305	0.0207	0.0262	21
Non-electrical machinery	0.0668	0.2231	0.0836	0.0673	0.046	0.09736	6
Electrical machinery	0.1765	1.0019	0.1043	0.0268	0.0576	0.27343	1
Transport equipment	-0.018	0.0016	0.1348	0.0986	-0.044	0.03475	17
Miscellaneous manufactures	0.0318	0.1087	0.0126	0.0679	0.0382	0.05184	15
Construction	0.004	-0.126	0.014	0.0616	-0.005	-0.0102	28
Wholesale & retail trade	0.2773	0.1723	0.0372	0.1358	0.1519	0.15488	4
Transport services	0.0355	0.0029	0.1132	0.0526	0.053	0.05142	16
Communication	0.0587	0.2064	0.0329	0.014	0.0096	0.06435	13
Electricity, gas & water	0.0443	0.0959	0.1282	0.0448	0.0828	0.0792	11
Banking, insurance & real estate	0.0435	-0.066	0.0043	0.0889	0.0063	0.01544	24
Other services	-0.044	-0.159	-0.023	0.1115	-0.064	-0.03565	29

Note: Data on Table 7.24 (change in total linkages ΔTL column) were averaged for all sample years and the sectors were ranked from highest to lowest.

The sectors lagging in linkage intensity were other services; food manufacturing; banking and finance; non-ferrous metals; miscellaneous manufactures; construction; beverages; agriculture; furniture and fixtures; and communication.

In 2000, the top ten industries of the Philippines as illustrated by their linkage intensity were: 1) electrical machinery; 2) footwear and wearing apparel; 3) non-electrical machinery; 4) leather and leather products; 5) communication; 6) textiles; 7) wholesale and retail trade; 8) petroleum products; 9) miscellaneous manufactures; and 10) electricity, gas and water. The sectors lagging in linkage intensity were other services; food manufacturing; banking and finance; non-ferrous metals; miscellaneous manufactures; construction; beverages; agriculture; furniture and fixtures; and communication.

In 2000, the top ten industries of the Philippines as illustrated by their linkage intensity were: 1) electrical machinery; 2) footwear and wearing apparel; 3) non-electrical machinery; 4) leather and leather products; 5) communication; 6) textiles; 7) wholesale and retail trade; 8) petroleum products; 9) miscellaneous manufactures; and 10) electricity, gas and water.

Table 7.26
Total Linkages for the Philippines Using Field of Influence Results, 1969-2006

Sectors	1969			1979			1988			1994			2000			2006			AVERAGE					
	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	FL	TL	Rank	
Agriculture, fishing & forestry	1,245,637	3,314,862	4,560,029	4	1,274,998	3,331,123	4,606,122	4	1,254,236	3,424,196	4,678,432	4	1,267,624	3,332,8	4,591,423	4	1,271,599	3,330,8	4,604,028	4	1,256,633	3,309,128	4,565,761	4
Mining	1,588,19	2,241,772	3,829,962	11	1,575,394	2,441,54	4,016,934	11	1,613,667	2,859,002	3,898,669	11	1,613,685	2,417,286	4,039,711	10	1,601,637	2,440,73	4,042,61	10	1,585,407	2,371,14	3,955,647	11
Food manufactures	2,077,405	1,889,452	3,966,857	10	2,089,125	1,974,68	4,063,805	9	2,122,33	1,931,57	4,053,9	10	2,087,459	1,882,801	3,970,026	11	2,095,285	1,876,34	3,971,625	11	2,075,46	1,904,08	3,975,94	10
Beverages	1,784,686	1,091,931	2,871,617	26	1,826,752	1,087,982	2,914,734	27	1,817,762	1,095,698	2,921,396	26	1,809,135	1,087,864	2,899,699	26	1,798,837	1,092,468	2,899,925	26	1,798,837	1,092,468	2,899,925	26
Tobacco products	1,607,763	1,204,554	2,816,167	27	1,685,938	1,229,503	2,925,442	26	1,631,325	1,211,758	2,943,083	27	1,648,889	1,133,387	2,862,257	29	1,656,997	1,196,163	2,853,16	27	1,628,235	1,207,97	2,836,12	28
Textile products	2,102,849	1,959,176	4,062,025	9	2,110,502	1,935,258	4,057,759	10	2,173,203	1,936,601	4,108,084	9	2,140,053	2,051,195	4,191,247	7	1,934,242	2,336,76	4,264,918	6	2,123,354	2,052,343	4,176,807	9
Footwear & wearing apparel	2,122,892	1,019,446	3,142,338	23	2,138,206	1,025,428	3,163,634	24	2,067,951	1,077,849	3,085,04	25	2,157,347	1,033,154	3,191,501	23	2,924,46	1,076,665	4,091,125	11	2,150,657	1,019,46	3,169,004	24
Wood products	1,886,751	1,437,704	3,300,456	20	1,926,805	1,451,019	3,377,824	20	1,920,988	1,427,164	3,350,263	20	1,915,208	1,423,232	3,338,531	20	1,800,62	1,442,431	3,342,689	22	1,922,825	1,442,37	3,366,095	20
Furniture & fixtures	1,758,466	1,026,652	2,785,028	28	1,859,003	1,025,869	2,848,972	28	1,779,098	1,027,338	2,806,436	28	1,790,138	1,027,084	2,817,121	28	1,837,957	1,041,568	2,879,525	26	1,810,848	1,038,748	2,849,597	28
Paper & paper products	2,058,993	2,301,222	4,360,216	6	2,112,112	2,345,008	4,457,119	5	2,116,195	2,362,244	4,478,439	6	2,112,032	2,413,657	4,525,099	5	1,984,473	2,277,883	4,467,756	7	2,108,67	2,339,37	4,442,808	5
Printed materials	1,887,968	1,207,375	3,095,342	25	1,941,475	1,192,267	3,133,742	25	1,920,458	1,218,003	3,138,462	24	1,942,611	1,201,751	3,144,462	25	1,870,815	1,194,897	3,067,711	24	1,935,093	1,208,904	3,143,996	25
Leather & leather products	1,967,175	1,399,002	3,366,177	18	2,014,83	1,407,587	3,422,416	17	2,020,94	1,421,946	3,447,35	18	2,097,754	1,488,023	3,585,777	16	2,037,749	1,385,594	3,399,333	18	2,019,556	1,418,875	3,438,431	17
Rubber products	1,897,491	1,328,865	3,226,476	21	1,964,109	1,320,79	3,261,088	21	1,994,215	1,343,439	3,275,654	21	1,933,893	1,340,185	3,274,077	21	1,815,995	1,318,899	3,180,254	23	1,930,016	1,332,919	3,262,935	21
Chemicals	2,039,977	2,946,15	4,986,892	2	2,075,886	3,096,045	5,171,931	2	2,090,885	3,037,784	5,124,669	2	2,059,897	2,972,111	5,032,008	2	1,951,646	2,972,699	4,924,945	3	2,078,449	3,002,037	5,080,068	3
Petroleum products	1,955,569	2,087,62	4,041,131	8	1,984,67	2,404,974	4,398,64	6	2,040,376	2,120,597	4,169,73	8	2,037,77	2,340,157	4,377,928	6	1,937,377	2,283,855	4,216,592	9	2,027,568	2,330,652	4,358,02	7
Non-metallic products	1,966,93	1,392,809	3,387,738	16	2,017,084	1,372,97	3,390,054	19	2,041,861	1,408,295	3,450,156	16	2,038,99	1,395,182	3,434,173	17	1,940,309	1,380,262	3,320,571	21	2,009,615	1,406,832	3,446,347	17
Ferrous metal products	2,066,13	2,984,5	5,191,153	1	2,277,969	3,152,809	5,430,778	1	2,264,319	3,085,364	5,349,684	1	2,252,02	3,040,537	5,295,557	1	2,138,419	2,954,553	5,095,972	2	2,263,959	2,955,557	5,218,716	2
Non-ferrous metal products	2,244,449	2,055,901	4,300,35	7	2,294,113	2,026,649	4,321,082	8	2,318,329	2,112,505	4,430,835	7	2,279,11	2,080,07	4,309,18	8	2,128,411	2,081,107	4,209,519	10	2,288,097	2,074,029	4,362,126	6
Non-electrical machinery	2,006,824	1,113,03	3,120,128	24	2,049,621	1,116,54	3,166,161	23	2,070,204	1,117,232	3,187,456	23	2,050,533	1,153,171	3,203,705	22	2,168,052	1,175,158	3,343,209	20	2,063,712	1,123,181	3,186,994	22
Electrical machinery	2,011,432	1,376,322	3,387,754	17	2,068,479	1,376,881	3,445,361	16	2,039,827	1,374,766	3,414,593	19	2,064,859	1,427,213	3,490,072	16	2,664,274	1,725,385	4,389,659	4	2,0764	1,487,854	3,564,253	14
Transport equipment	2,006,669	1,676,165	3,680,834	12	2,002,467	1,636,688	3,639,155	13	2,068,652	1,712,847	3,701,409	12	2,084,435	1,733,159	3,817,793	12	2,055,863	1,694,465	3,665,308	14	2,055,863	1,694,465	3,665,308	13
Miscellaneous manufactures	1,852,228	1,502,05	3,354,332	19	1,920,894	1,471,166	3,392,554	18	1,890,183	1,532,027	3,422,21	18	1,879,892	1,487,064	3,368,886	19	1,977,907	1,489,135	3,463,042	19	1,909,049	1,485,679	3,386,169	19
Construction	1,993,477	1,800,54	3,175,531	22	1,999,398	1,169,331	3,168,729	22	2,048,789	1,186,307	3,250,906	22	2,001,233	1,186,341	3,187,574	24	1,883,267	1,164,647	3,047,734	25	2,006,629	1,170,685	3,177,514	23
Wholesale & retail trade	1,394,032	3,575,757	4,968,408	3	1,375,053	3,745,229	5,120,881	3	1,409,497	3,694,762	5,104,169	3	1,413,601	3,591,99	5,005,591	3	1,407,754	3,879,971	5,245,725	1	1,397,78	3,698,665	5,074,745	2
Transport services	1,565,237	1,912,67	3,477,604	14	1,688,121	1,923,445	3,530,557	14	1,580,182	1,949,994	3,500,736	14	1,626,711	1,964,057	3,590,768	14	1,599,558	1,881,739	3,480,537	18	1,607,942	1,955,519	3,513,061	15
Communication	1,380,295	1,172,118	2,554,413	29	1,384,81	1,177,208	2,526,018	29	1,387,884	1,189,552	2,566,436	29	1,395,373	1,189,897	2,585,36	29	1,558,825	1,200,331	2,758,856	28	1,403,383	1,207,741	2,611,123	29
Electricity, gas & water	1,785,685	1,626,552	3,410,036	15	1,855,548	1,639,276	3,492,823	15	1,811,082	1,643,79	3,454,872	15	1,829,198	1,709,669	3,538,627	15	1,799,452	1,706,475	3,505,927	17	1,777,904	1,676,413	3,454,316	16
Banking, insurance & real estate	1,311,196	2,361,05	3,677,446	13	1,301,485	2,377,227	3,678,712	12	1,323,712	2,437,622	3,761,34	13	1,315,786	2,360,812	3,676,698	13	1,303,881	2,302,887	3,606,767	15	1,326,178	2,389,76	3,715,938	12
Other services	1,493,27	2,894,165	4,387,402	5	1,532,027	2,806,651	4,328,658	7	1,507,715	2,991,718	4,498,934	5	1,515,963	2,948,385	4,364,348	7	1,480,591	2,748,01	4,228,601	8	1,503,92	2,896,675	4,342,994	8
Average	1,836,674	1,836,764	3,675,527		1,871,246	1,871,246	3,742,493		1,871,246	1,871,246	3,742,493		1,871,246	1,871,246	3,742,493		1,871,246	1,871,246	3,742,493		1,865,499	1,865,499	3,730,999	

Note: Values in this table were taken from Table 7.24 by adding the change in intensities per year to the initial year's total.

Figure 7.6

Inverse Important Sectors in the Philippines based on Average Changes in Linkage Intensity Coefficients of the Field of Influence 1979-2006 compared to 1969

Figure 7.7

Key Sectors in the Philippines based on Average Total Linkages using Field of Influence Approach 1969-2006

After forty years from the reference decade, the changes in linkages shifted to some heavy industries like electrical and non-electrical machinery, and communications sector as the Philippines had migrated towards the end of the 1990s into the semiconductor business and the associated rise of call centers. Agriculture, fishery and forestry; other services; food manufacturing; construction; ferrous metals; paper and paper products; non-ferrous metals; tobacco and rubber products lagged in linkage intensity.

In the final year of the sample time frame 2006, the ten leading industries in linkage intensity were: 1) wholesale and retail trade; 2) petroleum products; 3) mining; 4) electrical machinery; 5) textiles; 6) chemicals; 7) paper and paper products; 8) non-electrical machinery; 9) wood products; and 10) furniture and fixtures. A couple of heavy industries now become central links to the economy – electrical and non-electrical machinery, chemicals, petroleum, mining, and ferrous metals along with some medium industries such as paper production, textiles, wood and furniture production. Other services; transport equipment; construction; food manufactures; ferrous metals; footwear and wearing apparel; miscellaneous manufactures; leather products; transport services and rubber products were weaker in their linkage interdependence with the rest of the economy.

While the above is based on rankings within the top 10 sectors every year of the sample period, the magnitude based on average changes in linkage intensities in the field of influence compared to the reference year 1969 found in Table 7.24 show that over the last fifty years, the following sectors dominate in terms of shares to global intensity: 1) electrical machinery; 2) petroleum products; 3) footwear and wearing apparel; 4) wholesale and retail trade; 5) mining; 6) non-electrical machinery; 7) textiles; 8) leather and leather products; 9) ferrous metals; and 10) chemicals. On the other hand, the weakest global intensive sectors by magnitude using averages over five decades are: 1) other services; 2) construction; 3) agriculture, fishery and forestry; 4) food manufacturing; 5) beverages; 6) banking, insurance and real estate; 7) non-metallic products; 8) rubber products; 9) non-ferrous metals; and 10) tobacco products. Figure 7.6 shows the key sectors in the Philippines in terms of average intensity changes weighted by the global intensity from 1979 to 2006 compared to the initial year 1969.

In summary, the change in total or global intensities for the past fifty years in the Philippines has not changed much with the following industries appearing within the count of the top ten inverse important sectors most of the time: 1) wholesale and retail trade; 2) petroleum products; 3) paper and paper products; 4) chemicals; 5) textiles; 6) electrical machinery; 7) mining; 8) non electrical machinery; 9) electricity, gas and water; and 10) food manufacturing.

If these changes in weighted linkage intensities were added to the linkage indices in 1969, the resulting total linkage indices for the sample years could be measured as shown in Table 7.26. The key sectors of the Philippine economy based on the linkage indices of the field of influence approach are illustrated in Figure 7.7 which show that eleven industries are key sectors and are generally dependent with both backward and forward linkages exceeding unity per classification of Miller & Blair (2009) and exceeding the national average following Rasmussen (1957) and Hirschman (1958) described in Chapter 6. Based on the global intensities, the key industries of the Philippines using the field of influence approach show sectors whose changes in coefficients generate the biggest share of interdependence with other sectors in the economy. These are: 1) ferrous metals; 2) wholesale and retail trade; 3) chemicals; 4) agriculture, fishery and forestry; 5) paper products; 6) other services; 7) non-ferrous metals; 8) petroleum products; 9) textiles; 10) food manufactures; and 11) mining. On the other hand, the sectors that ranked lowest were: communication; tobacco; furniture and fixtures; beverages; printing; construction; non-electrical machinery; rubber; footwear and wearing apparel; and wood products.

Table 7.27 in turn shows the key sectors obtained from the inverse coefficients of the Leontief inverses of each sample year. Comparison with the results of key sector analysis using the field of influence approach in Table 7.28 shows seven common industries among the top ten sectors between the two approaches although the rankings shifted – textiles, petroleum products, wholesale and retail trade, chemicals, ferrous metals, paper, and agriculture, forestry and fisheries.

Table 7.27

Key Sector Analysis using Leontief inverses of sample years, Philippines 1969-2006

Sector	1969			1979			1988			1994			2000			2006			AVERAGE									
	BL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank					
Agriculture, fishing & forestry	1.245167	3.314862	4	1.424156	3.24383	4.666637	7	1.088025	1.627917	2.715943	6	1.118619	1.585736	2.703995	16	1.098418	1.713956	2.812374	12	1.705056	3.59453	5.205966	9	1.79907	2.498187	3.778094	9	
Mining	1.58819	2.241772	3.292962	1.148678	3.681415	5.166033	5	1.194301	1.378829	2.57313	12	1.14464	1.893564	3.034994	13	1.046655	2.54285	3.58794	8	1.817922	5.736522	7.554444	4	1.793597	2.911696	4.2910594	7	
Food manufactures	2.077405	1.889462	3.666857	10	2.12679	2.450919	4.576998	8	1.273874	1.77695	2.449824	15	1.278802	1.215743	2.493945	22	1.377782	1.370125	2.747907	14	2.361635	1.769051	4.13084	13	1.748966	1.645399	3.394395	13
Beverages	1.784866	1.091931	2.976517	26	2.020964	1.075243	3.096207	28	1.253147	1.040948	2.294095	23	1.321592	1.020163	2.341756	27	1.139406	1.083885	2.40279	23	2.387489	1.259595	3.647084	25	1.68124	1.085211	2.776425	26
Tobacco products	1.607263	1.204364	2.811617	27	2.188205	1.455766	3.623971	17	1.176381	1.052401	2.228781	25	1.160088	1.061191	2.221289	29	1.155347	1.039246	2.194393	24	2.46941	1.119592	3.589002	26	1.62735	1.155425	2.778175	25
Textile products	2.102849	1.959176	4.062025	9	2.153635	1.821857	3.975492	10	1.110964	2.445881	3.546845	2	1.110689	9.153604	10.2643	2	1.168643	6.145774	7.31447	2	2.495614	3.03974	5.526388	7	1.688732	4.092879	7.681612	2
Footwear	2.122892	1.019446	3.142338	23	2.176612	1.056134	3.226746	26	2.775902	1.041801	3.815704	1	16.72716	4.249588	20.97643	1	9.36323	1.831968	11.03829	1	2.512619	1.018837	3.531556	27	5.918919	1.709296	7.621845	1
Wood products	1.886751	1.413704	3.300458	20	2.129072	1.621133	3.750206	13	1.232529	1.16634	2.98869	18	1.152983	1.216882	2.369875	26	1.246464	1.577035	2.823499	11	2.458211	1.865246	4.324458	11	1.68435	1.476892	3.16227	19
Furniture & fixtures	1.759466	1.056562	2.785028	28	2.406907	1.02534	3.429441	22	1.455989	1.09662	2.465311	14	1.569855	1.01528	2.583083	19	2.577901	1.098006	3.675907	7	2.684784	1.211036	3.89582	21	2.05647	1.063838	3.139485	20
Paper & paper products	2.058933	2.301221	4.36216	6	2.39127	2.558136	4.949406	6	1.171446	1.102611	2.531658	13	1.23209	1.72549	2.957339	14	1.480313	1.865524	3.346437	9	2.864894	2.762049	5.626943	6	1.86601	2.095432	3.920233	8
Printed materials	1.887968	1.207375	3.095342	25	2.80772	1.729547	3.390269	24	1.376453	1.059221	2.456574	16	1.496889	1.081941	2.58053	20	1.63768	1.066192	2.73966	15	2.783797	1.248199	4.031997	17	1.93356	1.132623	3.046529	22
Leather & leather products	1.967175	1.399002	3.365177	18	2.234482	1.450848	3.68333	16	1.127763	1.092898	2.22016	26	1.543885	1.809794	3.35368	9	3.30235	2.482109	5.94339	3	2.739515	1.28052	4.019567	18	2.05428	1.585784	3.771212	10
Rubber products	1.897491	1.328985	3.226476	21	2.362343	1.274053	3.600296	18	1.323319	1.103036	2.462555	17	1.358534	1.213384	2.571718	21	1.408154	1.153538	2.551682	19	2.494653	1.356337	3.85139	22	1.801399	1.280256	3.039654	23
Chemicals	2.039977	2.946915	4.968892	2	2.216867	3.810857	6.027724	2	1.175008	1.49866	2.676669	8	1.251332	1.784399	3.035732	12	1.338446	2.541088	3.899624	5	2.704105	3.803215	6.50732	5	1.790556	2.738872	4.521828	5
Petroleum products	1.995369	2.098762	4.094131	8	1.965523	4.021143	5.986667	3	1.230553	1.74946	2.98017	4	1.385804	3.52331	4.738146	4	1.526201	2.668878	4.195078	4	2.527823	6.038649	8.564672	3	1.771881	3.321237	5.08118	3
Non-metallic products	1.99693	1.392809	3.389728	16	2.086212	1.277189	3.373401	25	1.262356	1.106348	2.387105	19	1.51923	1.077869	2.597098	18	1.51923	1.077869	2.597098	18	2.717001	1.598683	4.315684	12	1.98837	1.265568	3.1142	21
Ferrous metal products	2.206613	2.98454	5.91115	1	2.64039	4.088661	6.728951	1	1.329376	1.463759	2.793135	5	1.454723	1.688758	3.153481	10	1.597399	1.200739	2.788678	13	3.080202	2.329409	5.405611	8	2.09874	2.294294	4.344168	6
Non-ferrous metal products	2.244449	2.055901	4.3005	7	2.566726	1.810678	4.377434	9	1.150912	1.12921	2.280122	24	1.17373	1.23737	2.411467	25	1.410358	1.272838	2.683696	16	2.817429	2.17016	4.987389	10	1.89407	1.612754	3.56771	12
Non-electrical machinery	2.006824	1.113303	3.120128	24	2.823331	1.122315	3.404647	23	1.058419	1.039375	2.097789	29	1.263689	1.21051	2.473741	23	1.770716	1.188339	2.348365	22	2.947396	1.77611	4.124007	14	1.805495	1.144166	2.947361	24
Electrical machinery	2.011432	1.376322	3.87754	17	2.369748	1.376876	3.746623	14	1.587128	1.447465	3.09439	3	2.846427	2.111890	5.058276	3	-7.54884	-4.02532	-11.5742	29	3.841038	5.13488	8.954536	2	0.851156	1.230114	2.10127	29
Transport equipment	2.006669	1.676165	3.682834	12	2.029181	1.454748	3.483929	21	1.102029	1.105174	2.203784	28	2.233833	1.891186	4.125019	5	0.69836	1.256642	1.866468	28	2.911577	1.039827	3.94704	20	1.855449	1.40269	3.21824	17
Miscellaneous manufactures	1.852228	1.502105	3.354332	19	2.270317	1.254663	3.52468	19	1.68846	1.095936	2.318444	22	1.298479	1.123619	2.422098	24	2.495453	1.259773	3.754226	6	2.692375	1.258643	3.951029	19	1.979616	1.247233	3.22085	16
Construction	1.994977	1.880654	3.173531	22	2.083693	1.05159	3.135752	27	1.129707	1.081245	2.210951	27	1.156495	1.101393	2.257998	28	1.150305	1.028044	2.178248	25	2.230217	1.000	3.230217	29	1.65116	1.080667	1.697783	27
Wholesale & retail trade	1.393032	3.575267	4.968408	3	1.28229	4.69827	5.981563	4	1.09833	1.61139	2.70972	7	1.234889	2.823282	4.057681	6	1.269716	0.790613	2.059789	27	1.653337	8.73347	10.02668	1	1.321759	3.645548	4.967307	4
Transport services	1.565227	1.912367	3.477404	14	1.799555	1.93147	3.731302	15	1.316365	1.333452	2.649757	10	1.501344	1.94124	3.447585	8	1.438391	1.089444	2.577895	20	2.340568	1.781261	4.121829	15	1.660293	1.66847	3.325141	14
Communication	1.380295	1.171218	2.552413	29	1.390188	1.190246	2.584434	29	1.253598	1.07903	2.336228	20	1.403425	1.210622	2.614046	18	0.932667	1.205515	2.142382	26	1.887887	1.86316	3.751047	24	1.374677	1.288115	2.662792	28
Electricity, gas & water	1.784865	1.626582	3.410086	15	2.122328	1.715031	3.837629	12	1.312576	1.340205	2.62781	9	1.954538	2.02346	3.978084	7	1.748943	1.511286	2.860229	10	1.683253	2.4054	4.089792	16	1.767594	1.770538	3.538092	11
Banking, insurance & real estate	1.311396	2.36105	3.672446	13	1.251548	2.26957	3.520604	20	1.09255	1.226031	2.318556	21	1.16836	1.914884	3.0834	11	1.740151	1.390095	1.637147	17	1.576524	2.31548	3.808072	23	1.73592	1.899719	3.173371	18
Other services	1.49327	2.894165	4.387402	5	1.651467	2.28911	3.940678	11	1.248709	1.350227	2.59836	11	1.391338	1.53158	2.922918	15	1.334848	1.183645	2.516493	21	1.669716	1.713693	3.383469	28	1.464896	1.826753	3.290649	15

Note: The linkages were calculated from the Leontief inverse matrices of each of the sample years.

Among the sectors which ranked lowest, the following seven industries consistently showed up in the two methods for key sector analysis – printing, rubber, non-electrical machinery, tobacco, beverages, construction, and communication.

Figure 7.8
Economic Landscape of the Philippines, 1969

Table 7.28
Comparison of Key Sector Analysis between using Field of Influence Results and Leontief inverses of each year based on averages, Philippines, 1969-2006

Leontief inverses per year	Rank	Multiplier Product Matrix
Footwear	1	Ferrous metal products
Textile products	2	Wholesale & retail trade
Petroleum products	3	Chemicals
Wholesale & retail trade	4	Agriculture, fishing & forestry
Chemicals	5	Paper & paper products
Ferrous metal products	6	Other services
Mining	7	Non-ferrous metal products
Paper & paper products	8	Petroleum products
Agriculture, fishing & forestry	9	Textile products
Leather & leather products	10	Food manufactures
Electricity, gas & water	11	Mining
Non-ferrous metal products	12	Transport equipment
Food manufactures	13	Banking, insurance & real estate
Transport services	14	Electrical machinery
Other services	15	Transport services
Miscellaneous manufactures	16	Electricity, gas & water
Transport equipment	17	Leather & leather products
Banking, insurance & real estate	18	Non-metallic products
Wood products	19	Miscellaneous manufactures
Furniture & fixtures	20	Wood products
Non-metallic products	21	Footwear
Printed materials	22	Rubber products
Rubber products	23	Non-electrical machinery
Non-electrical machinery	24	Construction
Tobacco products	25	Printed materials
Beverages	26	Beverages
Construction	27	Furniture & fixtures
Communication	28	Tobacco products
Electrical machinery	29	Communication

Note: Averages of the total linkages of Tables 26 and 27 were calculated and the sectors were ranked from highest to lowest.

The direct field of influence when weighted by the sum of the column and row totals (i.e., global intensity or volume) yields the multiplier product matrix as shown in Table 7.29. This allows the rearrangement into rank-size hierarchy of the backward and forward linkages to reveal the cross-structure of the field of influence as shown in Table 7.30 and hence, the economic landscape of the initial year as visually represented in Figure 7.8.

The economic structure in 1969 shows strong forward and backward linkages for the following sectors in terms of percent shares to total linkages: 1) ferrous metals; 2) non-ferrous metals; 3) chemicals; 4) petroleum; 5) textiles; 6) paper; and 7) food manufacturing. Sectors with strong forward linkages in addition to those listed above were: trade; agriculture, fishery and forestry; and other services; and banking, insurance and real estate. Sectors with strong backward linkages apart from those listed above were: footwear and wearing apparel; electrical machinery; transport equipment; non-electrical machinery; construction and non-metallic products. Changes in forward and backward linkages resulting from the change in coefficients are discussed in the section on applications to crisis.

As discussed in the conceptual framework, key sector analysis between the methods using the given Leontief inverse matrices each year and using the field of influence approach differ in the sense that the latter can further be processed into intersectoral dependencies as a way of decomposing the Leontief inverse into first round and second round effects.

This further decomposition of the inverse coefficients under the multiplier product matrix for the Philippines into self-influencing sectors and scaling effects under the N matrices, and sectoral balances and imbalances created under the residual matrices are explained in the section on applications on crisis.

7.2.2 Results for Malaysia

Malaysian economic description were sourced mainly from the following link: <https://www.encyclopedia.com/places/asia/malaysia-and-singapore-political-geography/malaysia>. Like the Philippines, the Malaysian economy relied on agriculture and mining production up to the 1970s based on rubber and tin exports which comprised 30 percent and 20 percent, respectively of its total export revenues. In the early 1980s, Malaysia diversified into the production of palm oil, petroleum, tropical hardwood, natural gas and manufactured goods notably electronics and semiconductors. In the mid-1980s, Malaysia's continuing streak of high growth was abruptly interrupted by the fall in oil including palm oil prices. During most of the 1990s, the Malaysian economy annually grew by about 9 percent until the Asian financial crisis took its toll in mid-1997.

Building up to the 1990s, Malaysia became the world's leading producer of natural rubber, contributing a quarter of world production. In the mid-1990s however Thailand and Indonesia became competitors in natural rubber production while the development of synthetic rubbers in the late 1990s undermined the natural rubber industry. Malaysia also became the world's largest producer of tropical hardwood in the 1990s, as well as the source of about three-fifths of total world production of palm oil. In the decade of 2000s, two-thirds of Malaysia's exports were attributed to electronics.

In the agricultural sector, competition from Thailand and Indonesia caused the Malaysian economy to diversify from rubber into newer crops such as palm oil, cocoa and pineapples. In forestry which

Table 7.29
Multiplier Product Matrix of the Philippines, 1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.00145	0.00186	0.00243	0.00208	0.00188	0.00246	0.00248	0.0022	0.00205	0.00241	0.00221	0.0023	0.00222	0.00238	0.00233	0.00233	0.00258	0.00262	0.00234	0.00235	0.00234	0.00216	0.00233	0.00163	0.00183	0.00161	0.00208	0.00153	0.00174	0.06222
2	0.00098	0.00125	0.00164	0.00141	0.00127	0.00166	0.00168	0.00149	0.00139	0.00163	0.00149	0.00155	0.0015	0.00161	0.00158	0.00158	0.00174	0.00177	0.00159	0.00159	0.00159	0.00146	0.00157	0.0011	0.00124	0.00109	0.00141	0.00104	0.00118	0.04208
3	0.00083	0.00106	0.00138	0.00119	0.00107	0.0014	0.00142	0.00126	0.00117	0.00137	0.00126	0.00132	0.00125	0.00136	0.00133	0.00133	0.00147	0.00149	0.00134	0.00134	0.00134	0.00123	0.00133	0.00093	0.00104	0.00092	0.00119	0.00087	0.00099	0.03547
4	0.00048	0.00061	0.0008	0.00069	0.00062	0.00081	0.00082	0.00073	0.00068	0.00079	0.00073	0.00076	0.00073	0.00078	0.00077	0.00077	0.00085	0.00086	0.00077	0.00077	0.00077	0.00071	0.00077	0.00054	0.0006	0.00053	0.00069	0.0005	0.00057	0.0205
5	0.00068	0.00067	0.00088	0.00076	0.00068	0.00089	0.0009	0.0008	0.00075	0.00087	0.0008	0.00083	0.00081	0.00087	0.00085	0.00085	0.00094	0.00095	0.00085	0.00085	0.00085	0.00081	0.00085	0.00085	0.00066	0.00059	0.00076	0.00056	0.00063	0.02161
6	0.00086	0.0011	0.00143	0.00123	0.00111	0.00145	0.00147	0.0013	0.00121	0.00142	0.0013	0.00136	0.00131	0.00141	0.00138	0.00138	0.00152	0.00139	0.00139	0.00139	0.00128	0.00138	0.00096	0.00096	0.00095	0.00123	0.00091	0.00103	0.03677	
7	0.00045	0.00057	0.00075	0.00064	0.00058	0.00076	0.00076	0.00068	0.00063	0.00074	0.00068	0.00071	0.00068	0.00073	0.00072	0.00072	0.00079	0.00081	0.00072	0.00072	0.00072	0.00067	0.00072	0.0005	0.00056	0.0005	0.00064	0.00047	0.00054	0.01914
8	0.00062	0.00079	0.00103	0.00089	0.0008	0.00105	0.00106	0.00094	0.00088	0.00103	0.00094	0.00098	0.00095	0.00102	0.00099	0.00099	0.0011	0.00112	0.001	0.001	0.001	0.00092	0.00099	0.00069	0.00078	0.00069	0.00089	0.00065	0.00074	0.02654
9	0.00045	0.00057	0.00075	0.00065	0.00058	0.00076	0.00077	0.00068	0.00064	0.00074	0.00068	0.00071	0.00069	0.00074	0.00072	0.00072	0.0008	0.00081	0.00073	0.00073	0.00073	0.00067	0.00072	0.0005	0.00057	0.0005	0.00065	0.00047	0.00054	0.01927
10	0.00101	0.00129	0.00168	0.00145	0.0013	0.00171	0.00172	0.00153	0.00143	0.00167	0.00153	0.0016	0.00154	0.00165	0.00162	0.00162	0.00179	0.00182	0.00163	0.00163	0.00163	0.0015	0.00162	0.00113	0.00127	0.00112	0.00145	0.00106	0.00121	0.0432
11	0.00053	0.00068	0.00088	0.00077	0.00068	0.00089	0.0009	0.0008	0.00075	0.00088	0.0008	0.00084	0.00081	0.00087	0.00085	0.00085	0.00094	0.00095	0.00085	0.00086	0.00085	0.00079	0.00085	0.00059	0.00067	0.00059	0.00076	0.00056	0.00064	0.02266
12	0.00061	0.00078	0.00102	0.00088	0.00079	0.00104	0.00105	0.00093	0.00087	0.00102	0.00093	0.00097	0.00094	0.00101	0.00098	0.00098	0.00109	0.00111	0.00098	0.00099	0.00099	0.00091	0.00098	0.00069	0.00077	0.00068	0.00088	0.00054	0.00074	0.02626
13	0.00059	0.00076	0.00098	0.00082	0.00076	0.001	0.001	0.0009	0.00083	0.00098	0.00089	0.00093	0.0009	0.00096	0.00133	0.00059	0.00106	0.00106	0.00095	0.00094	0.00094	0.00086	0.00091	0.00066	0.00076	0.00065	0.00089	0.00061	0.0007	0.02521
14	0.00129	0.00165	0.00216	0.00185	0.00167	0.00218	0.0022	0.00196	0.00183	0.00214	0.00196	0.00204	0.00197	0.00212	0.00207	0.00207	0.00229	0.00233	0.00208	0.00209	0.00208	0.00192	0.00207	0.00145	0.00163	0.00143	0.00185	0.00136	0.00155	0.05532
15	0.00092	0.00117	0.00154	0.00132	0.00119	0.00156	0.00157	0.0014	0.0013	0.00152	0.0014	0.00145	0.0014	0.00151	0.00148	0.00148	0.00163	0.00166	0.00148	0.00149	0.00149	0.00136	0.00147	0.00103	0.00116	0.00102	0.00132	0.00097	0.0011	0.0394
16	0.00061	0.00078	0.00102	0.00088	0.00079	0.00103	0.00104	0.00093	0.00086	0.00101	0.00093	0.00097	0.00093	0.001	0.00098	0.00098	0.00108	0.0011	0.00098	0.00099	0.00098	0.00091	0.00098	0.00068	0.00077	0.00068	0.00088	0.00064	0.00073	0.02614
17	0.00131	0.00167	0.00218	0.00188	0.00169	0.00221	0.00223	0.00198	0.00185	0.00217	0.00199	0.00207	0.002	0.00215	0.0021	0.0021	0.00232	0.00236	0.00211	0.00212	0.00211	0.00195	0.0021	0.00147	0.00165	0.00145	0.00188	0.00138	0.00157	0.05602
18	0.0009	0.00115	0.00151	0.00129	0.00116	0.00152	0.00154	0.00137	0.00127	0.00149	0.00137	0.00143	0.00137	0.00148	0.00145	0.00145	0.0016	0.00163	0.00145	0.00146	0.00145	0.00135	0.00144	0.00101	0.00113	0.001	0.00129	0.00095	0.00108	0.03859
19	0.00049	0.00062	0.00082	0.0007	0.00063	0.00082	0.00083	0.00074	0.00069	0.00081	0.00074	0.00077	0.00074	0.0008	0.00078	0.00078	0.00087	0.00088	0.00079	0.00079	0.00079	0.00073	0.00078	0.00055	0.00061	0.00054	0.0007	0.00051	0.00059	0.0209
20	0.0006	0.00077	0.00101	0.00087	0.00078	0.00102	0.00103	0.00092	0.00085	0.001	0.00092	0.00095	0.00092	0.00099	0.00097	0.00097	0.00107	0.00109	0.00097	0.00098	0.00097	0.0009	0.00097	0.00068	0.00076	0.00067	0.00087	0.00064	0.00072	0.02583
21	0.00074	0.00094	0.00123	0.00105	0.00095	0.00124	0.00125	0.00111	0.00104	0.00122	0.00112	0.00116	0.00112	0.0012	0.00118	0.00118	0.0013	0.00133	0.00119	0.00119	0.00119	0.00109	0.00118	0.00082	0.00092	0.00082	0.00105	0.00077	0.00088	0.03146
22	0.00066	0.00084	0.0011	0.00094	0.00085	0.00111	0.00112	0.001	0.00093	0.00109	0.001	0.00104	0.001	0.00108	0.00106	0.00106	0.00117	0.00119	0.00106	0.00106	0.00106	0.00098	0.00106	0.00074	0.00083	0.00073	0.00094	0.00069	0.00079	0.0282
23	0.00052	0.00066	0.00086	0.00074	0.00067	0.00087	0.00088	0.00078	0.00073	0.00086	0.00079	0.00082	0.00079	0.00085	0.00083	0.00083	0.00092	0.00093	0.00083	0.00084	0.00083	0.00077	0.00083	0.00058	0.00065	0.00057	0.00074	0.00055	0.00062	0.02115
24	0.00157	0.002	0.00262	0.00225	0.00203	0.00265	0.00267	0.00238	0.00222	0.00259	0.00238	0.00248	0.00239	0.00257	0.00251	0.00252	0.00278	0.00283	0.00253	0.00253	0.00253	0.00233	0.00251	0.00176	0.00197	0.00174	0.00225	0.00165	0.00188	0.06711
25	0.00084	0.00107	0.0014	0.0012	0.00108	0.00142	0.00143	0.00127	0.00118	0.00139	0.00127	0.00133	0.00128	0.00137	0.00134	0.00136	0.00147	0.00151	0.00135	0.00135	0.00135	0.00125	0.00134	0.00094	0.00105	0.00093	0.001	0.00088	0.00101	0.03588
26	0.00051	0.00066	0.00086	0.00074	0.00066	0.00087	0.00088	0.00078	0.00073	0.00085	0.00078	0.00081	0.00078	0.00084	0.00082	0.00082	0.00091	0.00093	0.00083	0.00083	0.00083	0.00077	0.00082	0.00058	0.00065	0.00057	0.00074	0.00054	0.00062	0.022
27	0.00091	0.00091	0.00116	0.00102	0.00092	0.00121	0.00122	0.00108	0.00101	0.00118	0.00108	0.00113	0.00109	0.00117	0.00114	0.00114	0.00126	0.00129	0.00115	0.00115	0.00115	0.00106	0.00114	0.0008	0.0009	0.00079	0.00102	0.00075	0.00086	0.03653
28	0.00104	0.00132	0.00173	0.00148	0.00134	0.00175	0.00177	0.00157	0.00146	0.00171	0.00157	0.00164	0.00158	0.0017	0.00166	0.00166	0.00184	0.00187	0.00167	0.00167	0.00167	0.00154	0.00166	0.00116	0.0013	0.00115	0.00148	0.00109	0.00124	0.04432
29	0.00127	0.00162	0.00212	0.00182	0.00164	0.00214	0.00216	0.00192	0.00179	0.0021	0.00192	0.002	0.00193	0.00208	0.00203	0.00204	0.00225	0.00229	0.00204	0.00205	0.00205	0.00187	0.00203	0.00142	0.0016	0.00141	0.00182	0.00131	0.00152	0.05424
SUM	0.02338	0.02983	0.039	0.03349	0.03016	0.03948	0.03985	0.03543	0.03301	0.03866	0.03544	0.03694	0.03561	0.0383	0.03785	0.03715	0.04142	0.04214	0.03768	0.03776	0.03768	0.03474	0.03739	0.02615	0.0294	0.02591	0.03354	0.02459	0.02803	1

Table 7.30
Hierarchical Cross Structure of the Multiplier Product Matrix, Philippines 1969

	18	17	7	6	3	10	14	15	20	21	19	23	16	12	13	11	8	22	27	4	9	5	2	25	29	24	26	28	1	SUM
24	0.002828	0.0028	0.002675	0.00269	0.00261	0.002594	0.00257	0.002514	0.002534	0.002528	0.002538	0.002512	0.002516	0.002479	0.002391	0.002379	0.002377	0.002334	0.002247	0.002249	0.002216	0.002025	0.002001	0.001972	0.001881	0.001755	0.001739	0.001652	0.001559	0.067112
1	0.002822	0.002578	0.00248	0.002466	0.002427	0.002405	0.002383	0.002331	0.002325	0.002344	0.002344	0.002329	0.002333	0.002298	0.002217	0.002205	0.002204	0.002154	0.002084	0.002085	0.002054	0.001877	0.001855	0.001828	0.001744	0.001627	0.001612	0.001532	0.001455	0.062222
17	0.002361	0.002321	0.002223	0.002224	0.002185	0.002165	0.002145	0.002099	0.002115	0.002111	0.002111	0.002097	0.0021	0.002069	0.001996	0.001986	0.001984	0.001948	0.001876	0.001877	0.001849	0.00169	0.00167	0.001646	0.00157	0.001465	0.001452	0.001379	0.00131	0.066021
14	0.002331	0.002291	0.002235	0.002232	0.002157	0.002138	0.002118	0.002079	0.002089	0.002084	0.002084	0.002074	0.002043	0.002043	0.001991	0.001961	0.001959	0.001923	0.001852	0.001853	0.001826	0.001669	0.001649	0.001625	0.001551	0.001447	0.001433	0.001362	0.00129	0.065315
29	0.002287	0.002247	0.002163	0.002143	0.002118	0.002098	0.002079	0.002034	0.00205	0.002045	0.002045	0.002032	0.002035	0.002004	0.001934	0.001924	0.001923	0.001866	0.001818	0.001819	0.001792	0.001639	0.001619	0.001595	0.001522	0.001418	0.001407	0.001315	0.00127	0.064242
28	0.001867	0.00188	0.001766	0.00175	0.001728	0.001713	0.001697	0.00166	0.001674	0.00167	0.00167	0.001659	0.001661	0.001637	0.001579	0.001571	0.00157	0.001541	0.001484	0.001485	0.001463	0.001337	0.001321	0.001302	0.001242	0.001159	0.001148	0.001091	0.00106	0.044318
10	0.00182	0.001789	0.001722	0.001705	0.001685	0.001657	0.001654	0.001618	0.001631	0.001627	0.001627	0.001617	0.001619	0.001595	0.001539	0.001531	0.00153	0.001502	0.001447	0.001447	0.001426	0.001303	0.001288	0.001269	0.001211	0.00113	0.001119	0.001063	0.00101	0.043195
2	0.001773	0.001743	0.001677	0.001661	0.001641	0.001627	0.001612	0.001576	0.001589	0.001585	0.001585	0.001575	0.001578	0.001554	0.001499	0.001491	0.00149	0.001463	0.001409	0.001401	0.001389	0.00127	0.001255	0.001237	0.00118	0.001109	0.001036	0.000984	0.00094	0.042079
15	0.00166	0.001631	0.00157	0.001555	0.001538	0.001523	0.001509	0.001476	0.001488	0.001492	0.001494	0.001474	0.001447	0.001455	0.001403	0.001396	0.001395	0.001364	0.001329	0.001329	0.001274	0.001154	0.001151	0.001134	0.001082	0.001009	0.00097	0.00092	0.00089	0.041936
18	0.001526	0.00159	0.001538	0.001524	0.001505	0.001492	0.001478	0.001446	0.001457	0.001454	0.001454	0.001437	0.001447	0.001425	0.001375	0.001368	0.001367	0.001347	0.00132	0.00132	0.001274	0.001164	0.001151	0.001134	0.001082	0.001009	0.00097	0.00092	0.00089	0.041852
6	0.00155	0.001523	0.001466	0.001452	0.001434	0.001422	0.001408	0.001378	0.001389	0.001385	0.001386	0.001376	0.001379	0.001358	0.00131	0.001303	0.001303	0.001279	0.001231	0.001232	0.001214	0.00111	0.001096	0.001081	0.001031	0.000962	0.000953	0.000905	0.00086	0.041675
25	0.001538	0.001472	0.001431	0.001417	0.001404	0.001387	0.001375	0.001344	0.001355	0.001352	0.00135	0.001343	0.001356	0.001326	0.001279	0.001272	0.001271	0.001248	0.001202	0.001203	0.001184	0.001083	0.001069	0.001055	0.001006	0.000939	0.000893	0.000884	0.000839	0.041588
3	0.001494	0.001469	0.001416	0.001404	0.001383	0.001371	0.001358	0.001329	0.001339	0.001336	0.001336	0.001327	0.00133	0.001319	0.001254	0.001257	0.001256	0.001233	0.001188	0.001188	0.001171	0.00107	0.001057	0.001042	0.000994	0.000927	0.000919	0.000873	0.000829	0.041567
21	0.001326	0.001303	0.001254	0.001242	0.001227	0.001216	0.001205	0.001179	0.001188	0.001185	0.001185	0.001177	0.00118	0.001162	0.001121	0.001115	0.001114	0.001094	0.001054	0.001054	0.001039	0.000949	0.000938	0.000925	0.000882	0.000823	0.000815	0.000775	0.000735	0.041462
27	0.001286	0.001265	0.001217	0.001205	0.001191	0.00118	0.001169	0.001144	0.001153	0.00115	0.00115	0.001142	0.001144	0.001127	0.001087	0.001082	0.001081	0.001062	0.001022	0.001023	0.001008	0.000921	0.00091	0.000897	0.000856	0.000798	0.000791	0.000752	0.000714	0.0413527
22	0.001188	0.001168	0.001124	0.001113	0.0011	0.00109	0.00108	0.001056	0.001065	0.001062	0.001062	0.001055	0.001057	0.001041	0.001004	0.000999	0.000999	0.00098	0.000944	0.000945	0.000931	0.000851	0.000841	0.000829	0.00079	0.000737	0.000731	0.000694	0.000659	0.041315
8	0.001118	0.001099	0.001058	0.001048	0.001035	0.001026	0.001016	0.000994	0.001002	0.001	0.001	0.000993	0.000995	0.00098	0.000945	0.000941	0.00094	0.000923	0.000889	0.000889	0.000876	0.000801	0.000791	0.00078	0.000744	0.000694	0.000688	0.000653	0.00062	0.0412536
12	0.001107	0.001088	0.001047	0.001037	0.001024	0.001015	0.001006	0.000984	0.000992	0.000989	0.000989	0.000983	0.000984	0.00097	0.000935	0.000931	0.00093	0.000913	0.000879	0.00088	0.000867	0.000792	0.000783	0.000772	0.000736	0.000687	0.00068	0.000647	0.000614	0.041266
16	0.001102	0.001083	0.001042	0.001032	0.00102	0.00101	0.00101	0.000979	0.000987	0.000985	0.000985	0.000978	0.00098	0.000966	0.000931	0.000927	0.000926	0.000909	0.000875	0.000876	0.000863	0.000789	0.00078	0.000768	0.000733	0.000684	0.000677	0.000644	0.000611	0.041144
20	0.001089	0.00107	0.00103	0.00102	0.001008	0.000999	0.000989	0.000968	0.000976	0.000973	0.000973	0.000973	0.000969	0.000954	0.00092	0.000916	0.000915	0.000898	0.000865	0.000866	0.000853	0.00078	0.00077	0.000759	0.000724	0.000676	0.000669	0.000636	0.000604	0.0410384
13	0.001064	0.001056	0.000998	0.000996	0.000978	0.000982	0.000962	0.000933	0.000945	0.000944	0.000951	0.000933	0.000938	0.000925	0.000896	0.000891	0.000897	0.000864	0.000881	0.000823	0.000829	0.000756	0.000762	0.000758	0.000701	0.000655	0.000649	0.000615	0.000587	0.0410521
11	0.000955	0.000959	0.00093	0.000895	0.000884	0.000876	0.000868	0.000849	0.000856	0.000854	0.000854	0.000848	0.00085	0.000837	0.000807	0.000803	0.000803	0.000798	0.000759	0.000766	0.000748	0.000676	0.000676	0.000666	0.000634	0.000599	0.000587	0.000558	0.00053	0.0412662
5	0.000953	0.000956	0.000901	0.000892	0.000882	0.000874	0.000866	0.000847	0.000854	0.000852	0.000852	0.000846	0.000848	0.000835	0.000805	0.000801	0.000801	0.000796	0.000757	0.000757	0.000742	0.000682	0.000674	0.000664	0.000636	0.000594	0.000586	0.000554	0.000528	0.0412606
23	0.000933	0.000918	0.000903	0.000884	0.000874	0.000865	0.000848	0.00083	0.000836	0.000834	0.000834	0.000829	0.00083	0.000818	0.000789	0.000785	0.000785	0.000777	0.000742	0.000742	0.000731	0.000668	0.000666	0.000651	0.000621	0.000579	0.000574	0.000548	0.000518	0.0412215
26	0.000927	0.000911	0.000877	0.000869	0.000858	0.000845	0.000838	0.000824	0.000831	0.000829	0.000829	0.000823	0.000825	0.000813	0.000784	0.00078	0.000779	0.000785	0.000737	0.000737	0.000726	0.000684	0.000656	0.000647	0.000617	0.000575	0.00057	0.000542	0.000514	0.0412001
19	0.00088	0.000866	0.000833	0.000825	0.000815	0.000808	0.008	0.000783	0.000789	0.000787	0.000787	0.000782	0.000783	0.000772	0.000744	0.000741	0.00074	0.000727	0.0007	0.0007	0.00069	0.000631	0.000623	0.000614	0.000586	0.000547	0.000542	0.000514	0.000489	0.0410897
4	0.000864	0.000849	0.000817	0.000809	0.000799	0.000792	0.000785	0.000768	0.000774	0.000772	0.000772	0.000767	0.000768	0.000757	0.00073	0.000726	0.000726	0.000713	0.000686	0.000687	0.000677	0.000618	0.000611	0.000602	0.000575	0.000536	0.000531	0.000505	0.000479	0.0410496
9	0.000842	0.000798	0.000768	0.000761	0.000752	0.000745	0.000738	0.000721	0.000728	0.000726	0.000726	0.000722	0.000722	0.000712	0.000686	0.000683	0.000683	0.000687	0.000645	0.000646	0.000636	0.000581	0.000575	0.000566	0.00054	0.000504	0.000499	0.000474	0.00045	0.0410269
7	0.000806	0.000793	0.000763	0.000755	0.000746	0.00074	0.000733	0.000717	0.000723	0.000721	0.000721	0.000716	0.000717	0.000707	0.000682	0.000678	0.000678	0.000678	0.000632	0.000641	0.000641	0.000632	0.000577	0.000571	0.000562	0.000536	0.000505	0.000496	0.00047	0.0410136
SUM	0.042136	0.041423	0.039853	0.039482	0.038998	0.038664	0.038297	0.037851	0.037756	0.037676	0.037675	0.037392	0.037145	0.036936	0.036614	0.035444	0.035427	0.03474	0.033535	0.033492	0.03301	0.030164	0.029827	0.029404	0.028803	0.026148	0.025911	0.024599	0.023376	1

is grouped under agriculture, Malaysia is a major exporter of tropical hardwoods like timber, logs, lumber, veneer, and plywood. Many federal states of Malaysia though began banning the exports of sawn logs in favour of higher value-added wood-using domestic industries and in view of the policy to preserve remaining forests.

In mining, Malaysia is a major producer of tin as well as iron ore, bauxite, coal, silver, zircon as well as metal minerals like gold. However, production of most of these minerals have declined in the late 1990s to 2000s due to depleted reserves. The states granted prospecting licenses and mining leases and received export duties on key minerals.

In energy and power, Malaysia is a key player in the world's energy markets with its vast natural gas reserves estimated at 75 trillion cu. ft. as of 2005 and crude oil production estimated at an average of around 750,000 barrels per day in the mid-2000s. Malaysia is also a major exporter of liquefied natural gas which is controlled by its National Petroleum Company (PETRONAS). Major destinations of its crude oil exports are neighbouring countries Japan, Thailand, South Korea and Singapore.

The establishment of import-substituting industries was the cornerstone of its industrial policy in the 1960s with the Malaysian Industrial Development Authority granting special incentives to labour-intensive and export-oriented industries that also utilized domestic rubber, wood and other resources. The country transformed into a manufacturing-based from a commodity-based economy in the mid-1980s with industries dominated by rubber processing, tire manufacturing, palm oil processing, tin smelting and chemical, plywood, furniture, textile, food processing and steel manufacturing. The Malaysian government relaxed its restrictions on foreign ownership of manufacturing to 100 percent in 1998 to encourage manufacturing activities. By the new millennium, two-thirds of Malaysian exports were accounted for by electronics and electrical products, chemical products, petroleum and liquefied natural gas, palm oil and textiles, clothing and footwear. Next to China with a little above 50 percent, Malaysia produces 15 percent of the world's DVD players.

In the 1990s, the Malaysian government embarked on the development of a multi-media super corridor transforming an area south of the capital Kuala Lumpur into its version of Silicon Valley that involved the construction of the world's tallest twin towers the Petronas Towers, the creation of two smart cities Putrajaya which houses the new seat of government and administrative capital, and Cyberjaya which is an intelligent city that nurtures multimedia industries, research and development centres, and a multimedia university. All these projects are linked by a fiber optic telecommunications system.

The transactions tables and Leontief inverse matrices of technical coefficients covering the years 1978, 1983, 1991, 2000 and 2005 for Malaysia are shown in Appendices 11 and 12, respectively. The direct field of influence for the base year 1978 is shown in Appendix 13. The field of influence for the same years multiplied by the sectoral changes in technical coefficients called first order intensities are shown in Appendix 14.

Malaysia began compiling input-output tables in 1960 but the tables were only for the capital city Kuala Lumpur. In 1965 and 1970, the Planning Unit of the Prime Minister's Department compiled input-output tables but never published them. The input-output table for 1978 was the first published statistic on input-output for Malaysia and was therefore taken as the base or initial year for this study.

Table 7.31 shows the sum of technical coefficients for 1978 and as depicted in Figure 7.9, thirteen industries of Malaysia at that time exceeded the sectoral averages of the inverse coefficients, namely: 1) agriculture, fishery and forestry; 2) trade; 3) food manufacturing; 4) private services; 5) mining; 6) wood and wooden products; 7) petrol and coal; 8) iron and steel; 9) electricity, gas and water; 10) miscellaneous manufacturing; 11) rubber and rubber products; 12) textile, leather, footwear and wearing apparel; and 13) transport services. Industries that were way below the averages and have the least impact on the economy given a change in final demand were transport and transport equipment; communication; public services; tobacco manufacturing; beverages; banking, finance and real estate; and non-ferrous and other metals.

Table 7.31
Inverse of Technical Coefficients in 1978
Malaysia

	Column Totals	Row Totals	Sum	Rank
Agriculture, Fishery and Forestry	1.201873119	3.157656004	4.35952912	1
Mining	1.204812344	2.182915306	3.38772765	5
Food manufacturing	1.934642635	1.649115811	3.58375845	3
Beverage	1.576856481	1.021569734	2.59842622	22
Tobacco manufacturing	1.382366632	1.024670515	2.40703715	23
Textile, leather, footwear, wearing apparel	1.617124698	1.423301317	3.04042602	12
Wood and wooden products	1.772993003	1.582636397	3.3556294	6
Furniture and fixtures	1.921944867	1.026549267	2.94849413	15
Paper and printing	1.420945805	1.462372094	2.8833179	18
Chemical manufacturing	1.478516829	1.412316862	2.89083369	17
Petrol and coal	1.367643237	1.868626436	3.23626967	7
Rubber and rubber products	1.915920241	1.158633608	3.07455385	11
Non metallic manufacturing	1.499588086	1.443058433	2.94264652	16
Iron and steel	1.701697213	1.450688722	3.15238594	8
Non-ferrous and other metals	1.528817973	1.178208567	2.70702654	20
Electrical and industrial machinery	1.388611685	1.354265948	2.74287763	19
Transport and transport equipment	1.185985452	1.069887226	2.25587268	26
Misc. manufacturing	1.809866747	1.286565354	3.0964321	10
Electricity, gas and water	1.575408895	1.542455542	3.11786444	9
Construction	1.739943558	1.257754153	2.99769771	14
Trade	1.367606865	2.557569266	3.92517613	2
Transport	1.423413543	1.610043488	3.03345703	13
Communication	1.138298511	1.187732754	2.32603126	25
Banking, finance and real estate	1.182287337	1.456362804	2.63865014	21
Private services	1.601578798	1.817310085	3.41888888	4
Public services	1.314751624	1.071230484	2.38598211	24
Average	1.509749853	1.509749853	3.01949971	

Note: This table tabulates the column and row totals of the inverse of the technological coefficients given in the Leontief inverse matrix of the initial year.

The intensities of the direct field of influence for 1978 in Malaysia which is calculated by summing up the products of the column and row vectors of the Leontief inverse matrix are shown on Table 7.32. The sectors that have highest linkage intensities were: 1) agriculture, fishery and forestry; 2) trade; 3) food manufacturing; 4) private services; 5) mining; 6) wood and wooden products; 7) petroleum and coal; 8) iron and steel; 9) electricity, gas and water; and 10) miscellaneous manufacturing.

Meanwhile, the sectors that showed the lowest first order intensities of interdependence were: 1) transport equipment; 2) communication; 3) public services; 4) tobacco manufacturing; 5) beverage; 6) banking, finance, and real estate; 7) electrical and industrial machinery; 8) non-ferrous metals; 9) paper and printing and 10) chemical manufacturing.

Figure 7.9
Sum of Inverse Coefficients Malaysia, 1978

Table 7.32
Intensities of the Direct Field of Influence, 1978
Malaysia

Sector	Column Totals	Row Totals	Average	Rank
Agriculture, Fishery and Forestry	47.1748	123.94904	85.5619	1
Mining	47.2842	85.687058	66.4856	5
Food manufacturing	75.9552	64.710657	70.3329	3
Beverage	61.9584	40.10054	51.0295	22
Tobacco manufacturing	54.1966	40.2219	47.2093	23
Textile, leather, footwear, wearing apparel	63.4698	55.869553	59.6697	12
Wood and wooden products	69.5879	62.124012	65.8560	6
Furniture and fixtures	75.4342	40.295648	57.8649	15
Paper and printing	55.7678	57.34214	56.5550	18
Chemical manufacturing	58.0378	55.438375	56.7381	17
Petrol and coal	53.6847	73.349933	63.5173	7
Rubber and rubber products	75.2823	45.48042	60.3813	11
Non-metallic manufacturing	58.7715	56.461378	57.6164	16
Iron and steel	66.7890	56.944604	61.8668	8
Non-ferrous and other metals	61.0694	46.252889	53.6611	19
Electrical and industrial machinery	53.4051	53.159673	53.2824	20
Transport and transport equipment	46.5343	41.996814	44.2656	26
Misc. manufacturing	70.9720	50.502402	60.7372	10
Electricity, gas and water	61.8280	60.54262	61.1853	9
Construction	68.3295	49.371248	58.8504	14
Trade	53.6397	100.39354	77.0166	2
Transport	55.8650	63.199836	59.5324	13
Communication	44.6730	46.622663	45.6478	25
Banking, finance and real estate	46.4078	57.167332	51.7876	21
Private services	62.8576	71.345018	67.1013	4
Public services	51.6030	42.049542	46.8263	24
Total (Global) Intensity=Volume	1540.5788	1540.5788	1540.5788	

Note: This table comes from the product of the column vectors and row vectors of the direct field of influence (Leontief inverse matrix) of the initial year summed up for all sectors to yield intensities of interdependency of that sector with other sectors.

Figure 7.10
**Surface Map of the 1978 Field of Influence and Changes
 in Technical Coefficients (E) over the Sample Years for Malaysia**

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles , Leather, Footwear & Wearing apparel 7 Wood & wooden products 8 Furniture & fixtures 9 Paper & paper products 10 Chemicals 11 Petrol & Coal 12 Rubber & rubber products 13 Non-Metallic Manufacturing 14 Iron & Steel 15 Non-Ferrous & other metals 16 Electrical & industrial machinery 17 Transport & transport equipment 18 Miscellaneous manufacturing 19 Electricity, gas & water 20 Construction 21 Trade 22 Transport services 23 Communication 24 Banking, finance and real estate 25 Private services 26 Public services

In terms of the change in technical coefficients mapped against the direct field of influence, Figure 7.10 shows the evolution of changes in the inverse coefficients from the base year 1978 to 2005.

As the change in technical coefficients multiplied by the direct field of influence is the basis for constructing the first order effects, the same ranking sectors in linkage intensities are also the inverse important sectors. There are sectors though that have revealed negative changes in technical coefficients. In 1983, these were in order of magnitude: miscellaneous manufacturing; textile, leather, footwear & wearing apparel; furniture and fixtures; trade; rubber and rubber products; electrical & industrial machinery; and paper and printing.

In 1991, sectors that displayed decrements in the inverse coefficients were: miscellaneous manufacturing; textile, leather, footwear and wearing apparel; construction; furniture and fixtures; and iron and steel. In 2000, decrements in inverse coefficients were measured again for miscellaneous manufacturing; textile, leather, footwear and wearing apparel; construction; furniture and fixtures; trade; iron and steel and in new sectors such as mining; wood and wooden products; and banking, finance and real estate. In the final year 2005 of the sample period, the inverse coefficients for miscellaneous manufactures and mining turned negative. The decrements in inverse coefficients as discussed in the theoretical part could be interpreted as either technical efficiency (less input intensity) or trade dependency if domestic production is replaced by imports. In the case of Malaysia, the input-output tables show imports along the rows with value added and intermediate inputs. However, these import figures do not segregate between imported inputs and imported finished goods. The import coefficients were calculated as shown in Table 7.33 and illustrated in Figure 7.11.

Table 7.33
Import Coefficients of Malaysia
1978-2005

	1978	1983	1991	2000	2005
Agriculture, Fishery and Forestry	0.057848	0.061634	0.043379	0.074285	0.073723
Mining	0.052103	0.061457	0.046407	0.101384	0.04769
Food manufacturing	0.152846	0.127554	0.155102	0.133251	0.128037
Beverage	0.178942	0.132534	0.150635	0.214101	0.243457
Tobacco manufacturing	0.206262	0.124897	0.236458	0.42072	0.206044
Textile, leather, footwear, wearing apparel	0.266481	0.281388	0.406305	0.347488	0.226389
Wood and wooden products	0.036978	0.045878	0.036647	0.095488	0.099256
Furniture and fixtures	0.077161	0.098802	0.125023	0.23906	0.169132
Paper and printing	0.275718	0.274173	0.304975	0.304349	0.174975
Chemical manufacturing	0.332568	0.277322	0.373523	0.231133	0.225941
Petrol and coal	0.595689	0.409201	0.126814	0.296808	0.288292
Rubber and rubber products	0.072198	0.068924	0.110187	0.209504	0.125799
Non metallic manufacturing	0.243111	0.2273	0.230601	0.275722	0.244259
Iron and steel	0.155091	0.284809	0.355533	0.48978	0.272442
Non-ferrous and other metals	0.323137	0.316445	0.305851	0.420785	0.315279
Electrical and industrial machinery	0.431889	0.462164	0.535044	0.59708	0.42827
Transport and transport equipment	0.662006	0.478766	0.24054	0.351431	0.269304
Misc. manufacturing	0.170621	0.298851	0.592945	0.376663	0.238837
Electricity, gas and water	0.051021	0.19005	0.103067	0.085451	0.07011
Construction	0.181692	0.202106	0.255514	0.229099	0.236564
Trade	0.039381	0.084749	0.048648	0.096259	0.046255
Transport	0.161674	0.256176	0.161634	0.240789	0.07557
Communication	0.075834	0.100796	0.033194	0.189341	0.053922
Banking, finance and real estate	0.01744	0.030779	0.033197	0.048947	0.013816
Private services	0.089231	0.067895	0.082023	0.203537	0.115453
Public services	0.135197	0.157379	0.115956	0.144242	0.109313

Source: Import coefficients were calculated from the input-output tables of Malaysia for the respective years.

Figure 7.11
Import Coefficients of Malaysia

The sectors that registered consistent decrements for Malaysia in linkage intensity reveal the following sectors with higher import coefficients compared to 1978: a) miscellaneous manufacturing in 1983 to 2005; b) textiles, leather, footwear & wearing apparel in 1983, 1991 and 2000; c) construction in 1983 to 2005; d) furniture and fixtures in 1983 to 2005; and e) wood products in 1983, 2000 and 2005. As for sectors with negative changes in inverse coefficients only in certain years, higher import coefficients resulted for mining in 2000; iron and steel in 1991 and 2000; trade in 1983 and 2000; and banking, finance and real estate in 2000. This can be indicative of replacement of domestic production for greater imports for these sectors instead of a rise in technical efficiency.

The first order or self-generated effects of changes in linkage intensities compared to the initial year were calculated by multiplying the column and row vectors of the field of influence (intensity matrix F) by the corresponding change in technical coefficients for the sector. These changes in linkage intensities over the years are depicted in Figure 7.12 based on calculations in Appendix 14.

Compared to 1978, the change in first round linkage intensities of four sectors consistently rose in 1983, 1991, 2000 and 2005 – food manufacturing; petrol; transport equipment; and transport services. Electricity, gas and water became linkage intensive in 1983, 2000 and 2005; non-ferrous metals in 1983, 1991 and 2005; beverage in 1983 and 2000; communication in 2000 and 2005; chemicals in 1983 and 2000; and non-metals in 1991 and 2000. The following sectors ranked among the top ten in terms of first round linkage intensities only once during the sample years

after the base year – mining and private services in 1983; trade, tobacco, and public services in 1991; paper and paper products in 2000; and electrical machinery, rubber and rubber products, and banking, finance and real estate in 2005.

On the other hand, the following sectors showed decrements in their first round linkage intensities – miscellaneous manufacturing, and textile, leather, footwear and wearing apparel throughout the whole sample years after 1978; furniture and fixtures in 1983, 1991 and 2000; iron and steel, trade, and construction in 1991 and 2000; wood and wooden products, and mining in 2000 and 2005. In contrast, electrical machinery, paper and rubber recorded declines in linkage intensities in 1983 and banking, finance and real estate in 2000.

Figure 7.12

Surface Map of the Change in Linkage Intensities (First Order Effects) over the Sample Years for Malaysia

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles , Leather, Footwear & Wearing apparel 7 Wood & wooden products 8 Furniture & fixtures 9 Paper & paper products 10 Chemicals 11 Petrol & Coal 12 Rubber & rubber products 13 Non-Metallic Manufacturing 14 Iron & Steel 15 Non-Ferrous & other metals 16 Electrical & industrial machinery 17 Transport & transport equipment 18 Miscellaneous manufacturing 19 Electricity, gas & water 20 Construction 21 Trade 22 Transport services 23 Communication 24 Banking, finance and real estate 25 Private services 26 Public services

Malaysia's input-output table in 1991 compared to the reference year 1978 revealed the linkage dominance of the following sectors: 1) food manufacturing; 2) transport and transport equipment; 3) non-ferrous metals; 4) non-metallic manufacturing; 5) trade; 6) transport services; 7) communication; 8) tobacco manufacturing; 9) petrol and coal; and 10) public services. The sectors that had lesser changes in linkage intensities compared to the base year 1978 were: miscellaneous manufacturing; textile, leather, footwear and wearing apparel; construction; iron and steel; furniture and fixtures; rubber and rubber products; and wood and wooden products.

Table 7.34
Ranking of Sectors based on Synergetic Effects of Changes in Inverse Coefficients from 1978 Malaysia, 1983-2005

Sector	2005	2000	1991	1983	1978	Average 1983-2005	Rank
Agriculture, Fishery and Forestry	13.0925	0.2748	0.1555	0.0619	4.3595	3.3962	19
Mining	-3.6321	-1.8115	0.3749	0.3178	3.3877	-1.1877	25
Food manufacturing	32.4790	2.9256	1.0193	0.7383	3.5838	9.2905	5
Beverage	19.1318	0.8417	0.1487	0.1435	2.5984	5.0664	16
Tobacco manufacturing	23.6157	0.2588	0.4485	0.0073	2.4070	6.0826	13
Textile, leather, footwear, wearing apparel	5.7574	-0.6115	-0.8689	-0.0401	3.0404	1.0593	23
Wood and wooden products	4.8090	-0.5229	0.1020	0.0487	3.3556	1.1092	22
Furniture and fixtures	6.4997	-0.1669	-0.0123	-0.0298	2.9485	1.5727	21
Paper and printing	24.0848	0.7120	0.1286	-0.0235	2.8833	6.2255	12
Chemical manufacturing	27.5573	1.6362	0.1286	0.2435	2.8908	7.3914	11
Petrol and coal	53.0306	0.6585	0.4447	0.4109	3.2363	13.6362	1
Rubber and rubber products	33.4442	0.1413	0.0086	-0.0045	3.0746	8.3974	7
Non-metallic manufacturing	21.6977	0.7204	0.6500	0.1122	2.9426	5.7951	15
Iron and steel	17.5354	-0.2597	-0.1076	0.0921	3.1524	4.3151	18
Non-ferrous and other metals	30.6149	0.5903	0.6773	0.1453	2.7070	8.0070	9
Electrical and industrial machinery	43.4422	0.6162	0.3863	-0.1760	2.7429	11.0672	3
Transport and transport equipment	29.2224	1.9090	0.8994	0.2869	2.2559	8.0794	8
Misc. manufacturing	-9.7739	-1.7990	-1.1865	-0.8852	3.0964	-3.4112	26
Electricity, gas and water	39.1273	1.1774	0.3758	0.2985	3.1179	10.2448	4
Construction	9.2003	-0.4993	-0.1479	0.0010	2.9977	2.1385	20
Trade	3.9348	-0.1005	0.5295	-0.1602	3.9252	1.0509	24
Transport	52.2268	0.9799	0.5026	0.1526	3.0335	13.4655	2
Communication	28.6690	0.9409	0.4671	0.0243	2.3260	7.5253	10
Banking, finance and real estate	36.0127	-0.1288	0.3109	0.0894	2.6387	9.0710	6
Private services	23.3144	0.5495	0.1485	0.1464	3.4189	6.0397	14
Public services	19.2460	0.0783	0.4075	0.0124	2.3860	4.9360	17
Average	22.4746	0.3504	0.2304	0.0775	3.0195	5.7832	

Note: Data from this table were obtained from the product of multiplying the direct field of influence matrix by the change in technical coefficients per sector and the reciprocal of the ratio of determinant of the Leontief inverse matrix of the initial year to the determinant of the Leontief inverse matrix of the succeeding year, i.e. $\frac{1}{Q(E)}$. Synergistic effects are second round effects of the change in technological coefficients on the direct field of influence arising from a change in final demand which triggers a successive round of buying and selling of inputs and outputs by sectors.

As for the synergetic or second round effects of the changes in inverse coefficients on the 1978 field of influence, Table 7.34 based on calculations shown in Appendix 15 shows the following sectors of the Malaysian economy having greater than average second round impacts: 1) petrol and coal; 2) transport services; 3) electrical and industrial machinery; 4) electricity, gas and water; 5) food manufacturing; 6) banking, finance and real estate; 7) rubber and rubber products; 8)

transport and transport equipment; 9) non-ferrous and other metals; 10) communication; 11) chemical manufacturing; 12) paper and printing; 13) tobacco manufacturing; 14) private services and 15) non-metallic manufacturing. The synergetic effects of technological change as depicted in Figure 7.13 was faster in 2005 compared to earlier years as Malaysia's investments into the super corridor project at the beginning of the new millennium begin to tell results.

The changes in linkage intensities weighted by the volume or global intensity using the field of influence formulation are shown in Table 7.35 using 1978 as the initial year for the field of influence calculations. Figure 7.14 in turn depicts a visual representation of how shares of sectoral linkage intensities to the total volume or global intensity changed through the sample years.

Figure 7.13
**Synergetic Effects of Changes in Inverse Coefficients
for Malaysia 1983-2005**

In the initial year 1978, the leading industries of Malaysia in terms of shares to total linkage intensity were: 1) agriculture, fishery and forestry; 2) trade; 3) food manufacturing; 4) private services; 5) mining; 6) wood and wooden products; 7) petrol and coal; 8) iron and steel; 9) electricity gas and water; and 10) miscellaneous manufacturing. These leading sectors were those most affected by a change in final demand during the base year. Industries with the weakest linkage intensities were transport and transport equipment; communication; public services; tobacco manufacturing, beverage; banking, finance and real estate; and non-ferrous metals.

In 1983, the shares of the following ten industries of Malaysia to the total intensity were the highest: 1) food manufacturing; 2) petrol and coal; 3) mining; 4) electricity, gas and water; 5) transport and transport equipment; 6) chemical manufacturing; 7) transport services; 8) private services; 9) non-ferrous metals; and 10) beverages. The industries with weakest linkage shares

Table 7.35
Linkage Intensities from the Field of Influence Approach Malaysia, 1978-2005

	1978				1983				1991				2000				2005			
	BL	FL	TL	Rank	ΔBL	ΔFL	ΔTL	Rank	ΔBL	ΔFL	ΔTL	Rank	ΔBL	ΔFL	ΔTL	Rank	ΔBL	ΔFL	ΔTL	Rank
Agriculture, Fishery and Forestry	1.201873	3.157656	4.359529	1	0.127258	-0.06578	0.061474	14	0.079989	-0.02807	0.05192	15	0.156259	-0.09594	0.060322	14	0.033613	0.011198	0.044811	19
Mining	1.204812	2.182915	3.387728	5	-0.00342	0.319009	0.315588	3	-0.01832	0.143487	0.12517	13	-0.06076	-0.33689	-0.39765	26	0.014721	-0.02715	-0.01243	25
Food manufacturing	1.934643	1.649116	3.583758	3	0.373534	0.359692	0.733227	1	0.166661	0.173623	0.340284	1	0.282665	0.359559	0.642224	1	0.049301	0.061863	0.111165	7
Beverage	1.576856	1.02157	2.598426	22	0.138498	0.00406	0.142559	10	0.05174	-0.00209	0.049652	16	0.130357	0.054418	0.184775	7	0.04434	0.021141	0.065482	17
Tobacco manufacturing	1.382367	1.024671	2.407037	23	0.005163	0.0021	0.007262	18	0.106018	0.043692	0.149709	8	0.039298	0.017523	0.056821	15	0.056017	0.024812	0.080829	13
Textile, leather, footwear, wearing apparel	1.617125	1.423301	3.040426	12	0.051148	-0.09096	-0.03981	23	-0.13966	-0.13504	-0.29006	25	-0.00889	-0.12534	-0.13423	24	0.028085	-0.00838	0.019706	22
Wood and wooden products	1.772993	1.582636	3.355629	6	0.024565	0.023802	0.048367	15	0.169155	-0.13511	0.034041	20	0.143596	-0.25838	-0.11478	23	0.026876	-0.01042	0.01646	23
Furniture and fixtures	1.921945	1.025549	2.948494	15	-0.01277	-0.01684	-0.02961	22	-0.00748	0.003374	-0.0041	22	-0.07453	0.037893	-0.03664	20	0.020679	0.001568	0.022246	21
Paper and printing	1.420946	1.462372	2.883318	18	-0.00219	-0.02111	-0.0233	21	0.004104	0.038819	0.042923	18	0.130479	0.025825	0.156304	9	0.050918	0.031516	0.082434	12
Chemical manufacturing	1.478517	1.412317	2.890834	17	0.057629	0.184177	0.241806	6	0.008918	0.033998	0.042916	19	0.176465	0.182709	0.359174	3	0.042411	0.051908	0.094319	11
Petrol and coal	1.367643	1.868626	3.23627	7	0.318997	0.089098	0.408095	2	0.346401	-0.19796	0.148442	9	0.100354	0.044191	0.144545	10	0.049046	0.13246	0.181506	1
Rubber and rubber products	1.91592	1.158634	3.074554	11	0.006303	-0.01082	-0.00452	20	-0.00863	0.011495	0.002867	21	-0.04731	0.078317	0.03101	16	0.05479	0.059678	0.114468	6
Nonmetallic manufacturing	1.499588	1.443058	2.94247	16	0.136055	-0.02464	0.111412	11	0.111175	0.105827	0.217002	4	0.080528	0.077613	0.15814	8	0.045102	0.029162	0.074264	15
Iron and steel	1.701697	1.450689	3.152386	8	0.018462	0.073036	0.091498	12	-0.03896	0.03051	-0.03591	23	-0.09912	0.042117	-0.05701	21	0.029628	0.03039	0.060018	18
Non-ferrous and other metals	1.528818	1.178209	2.707027	20	0.08987	0.054477	0.144347	9	0.066219	0.159872	0.226091	3	-0.02217	0.151765	0.129591	12	0.043172	0.061612	0.104785	8
Electrical and industrial machinery	1.388612	1.354266	2.742878	19	-0.05383	-0.12101	-0.17484	25	-0.00262	0.131595	0.128975	11	-0.06174	0.196999	0.135264	11	0.031604	0.117084	0.148688	3
Transport and transport equipment	1.185985	1.069887	2.25873	26	0.124229	0.160706	0.284934	5	0.134957	0.165282	0.300239	2	0.235125	0.183939	0.419064	2	0.067712	0.032306	0.100019	9
Misc. manufacturing	1.809867	1.286565	3.096432	10	-0.54094	-0.33816	-0.8791	26	-0.25998	-0.13612	-0.39611	26	-0.25452	-0.1404	-0.39492	25	-0.01566	-0.01779	-0.03345	26
Electricity, gas and water	1.575409	1.542456	3.117864	9	0.093922	0.202573	0.296495	4	0.015479	0.109888	0.123468	12	-0.06395	0.324222	0.259467	4	0.043622	0.090298	0.13392	4
Construction	1.739944	1.257754	2.997698	14	0.002414	-0.00141	0.001004	19	-0.04836	-0.00101	-0.04938	24	-0.04254	-0.06707	-0.10961	22	0.018782	0.012707	0.031489	20
Trade	1.367607	2.557569	3.925176	2	0.009247	-0.16835	-0.15911	24	0.011173	0.165603	0.176775	5	-0.06938	0.047323	-0.02206	18	0.01641	-0.00294	0.013467	24
Transport	1.423414	1.610043	3.033457	13	-0.04151	0.193073	0.151568	7	0.064878	0.102902	0.16778	6	0.141984	0.07313	0.215114	5	0.069595	0.10916	0.178755	2
Communication	1.138299	1.187733	2.326081	25	0.032491	-0.00832	0.024171	16	0.08927	0.06665	0.15592	7	0.119548	0.087009	0.206557	6	0.053689	0.044435	0.098124	10
Banking, finance and real estate	1.182287	1.456363	2.63865	21	0.040982	0.047827	0.088809	13	0.029023	0.074752	0.03775	14	0.036249	-0.06453	-0.02828	19	0.046928	0.076331	0.12326	5
Private services	1.601579	1.81731	3.418889	4	-0.00984	0.155222	0.145378	8	-0.06915	0.118715	0.049568	17	-0.00158	0.122208	0.120632	13	0.028992	0.050805	0.079797	14
Public services	1.314752	1.07123	2.385982	24	0.013729	-0.00145	0.012283	17	0.137999	-0.00196	0.136038	10	0.033595	-0.01641	0.017183	17	0.049626	0.016247	0.065873	16

Note: Table was created from the intensity of the direct field of influence for the initial year (Table 7.31) and for succeeding years, the result of multiplying the change in technological coefficients (i.e., e_{11s}) and the direct field of influence summed up row-wise and column-wise and weighted by this total (called volume).

Figure 7.14
**Change in Linkage Intensities from Field of Influence Approach
 Malaysia, 1978-2005**

were: miscellaneous manufacturing; electrical and industrial machinery; trade; textile, leather, footwear and wearing apparel; furniture and fixtures; paper and printing; and rubber products.

Malaysia's input-output table in 1991 compared to the reference year 1978 revealed the linkage dominance of the following sectors when weighted against the global intensity: 1) food manufacturing; 2) transport and transport equipment; 3) non-ferrous metals; 4) non-metallic manufacturing; 5) trade; 6) transport services; 7) communication; 8) tobacco manufacturing; 9) petrol and coal; and 10) public services. The sectors that had lesser weighted changes in linkage intensities compared to the initial year 1978 were: miscellaneous manufacturing; textile, leather, footwear and wearing apparel; construction; iron and steel; furniture and fixtures; rubber and rubber products; and wood and wooden products.

In 2000, the top linkage-intensive sectors weighted by global intensity or volume were: 1) food manufacturing; 2) transport and transport equipment; 3) chemical manufacturing; 4) electricity, gas and water; 5) transport services; 6) communication; 7) beverages; 8) non-metallic manufacturing; 9) paper and printing; and 10) petrol and coal. Compared to 1978, only three of the industries listed then continued to accrue higher shares to linkage intensity – food manufacturing; electricity, gas and water; and petrol and coal which were also the three consistent

linkage intensive sectors in the 1980s and 1990s. Of the remaining industries, transport and transport equipment; non-ferrous metals and transport services retained their linkage intensities in 2000 from the 1980s and 1990s. Meanwhile, the least linkage intensive sectors in 2000 compared to 1978 were mining; miscellaneous manufacturing; textile, leather, footwear and wearing apparel; wood and wooden products; construction; iron and steel; and furniture and fixtures.

For 2005, the following industries showed the most change in weighted linkage intensity compared to 1978: 1) petrol and coal; 2) transport services; 3) electrical and industrial machinery; 4) electricity, gas and water; 5) banking, finance and real estate; 6) rubber production; 7) food manufacturing; 8) non-ferrous metals; 9) transport and transport equipment; and 10) communication. Only three sectors retained their weighted linkage intensities – petrol and coal; food manufacturing; and transport services over the preceding two decades as the linkage influences of previously weak sectors like banking, finance and real estate; transport and transport equipment, communication; non-ferrous metals; and rubber production increased significantly. Trade, miscellaneous manufacturing, iron and steel; and mining reversed their positions from sectors with dominant into feeble intensity shares.

Table 7.36
**Ranking of Sectors based on Average Changes
in Linkage Intensity Coefficients from 1978
Malaysia, 1983-2005**

	2005	2000	1991	1983	Average	Rank
Agriculture, Fishery and Forestry	0.044811	0.060322	0.05192	0.061474	0.054632	17
Mining	-0.01243	-0.39765	0.12517	0.315588	0.007668	20
Food manufacturing	0.111165	0.642224	0.340284	0.733227	0.456725	1
Beverage	0.065482	0.184775	0.049652	0.142559	0.110617	10
Tobacco manufacturing	0.080829	0.056821	0.149709	0.007262	0.073655	12
Textile, leather, footwear, wearing apparel	0.019706	-0.13423	-0.29006	-0.03981	-0.1111	25
Wood and wooden products	0.01646	-0.11478	0.034041	0.048367	-0.00398	22
Furniture and fixtures	0.022246	-0.03664	-0.0041	-0.02961	-0.01203	23
Paper and printing	0.082434	0.156304	0.042923	-0.0233	0.06459	14
Chemical manufacturing	0.094319	0.359174	0.042916	0.241806	0.184554	5
Petrol and coal	0.181506	0.144545	0.148442	0.408095	0.220647	3
Rubber and rubber products	0.114468	0.03101	0.002867	-0.00452	0.035957	18
Non metallic manufacturing	0.074264	0.15814	0.217002	0.111412	0.140205	8
Iron and steel	0.060018	-0.05701	-0.03591	0.091498	0.01465	19
Non-ferrous and other metals	0.104785	0.129591	0.226091	0.144347	0.151203	7
Electrical and industrial machinery	0.148688	0.135264	0.128975	-0.17484	0.059522	15
Transport and transport equipment	0.100019	0.419064	0.300239	0.284934	0.276064	2
Misc. manufacturing	-0.03345	-0.39492	-0.39611	-0.8791	-0.4259	26
Electricity, gas and water	0.13392	0.258467	0.125468	0.296495	0.203587	4
Construction	0.031489	-0.10961	-0.04938	0.001004	-0.03162	24
Trade	0.013467	-0.02206	0.176775	-0.15911	0.00227	21
Transport	0.178755	0.215114	0.16778	0.151568	0.178304	6
Communication	0.098124	0.206557	0.15592	0.024171	0.121193	9
Banking, finance and real estate	0.12326	-0.02828	0.103775	0.088809	0.07189	13
Private services	0.079797	0.120632	0.049568	0.145378	0.098844	11
Public services	0.065873	0.017183	0.136038	0.012283	0.057844	16

Note: Data on Table 7.35 (change in total linkages column ΔTL) were averaged for all sample years and the sectors were ranked from highest to lowest

Based on magnitudes of the average change in linkage intensity coefficients from the base year shown in Table 7.36, the most linkage intensive sectors of Malaysia were: 1) food manufacturing; 2) transport and transport equipment; 3) petrol and coal; 4) electricity, gas and water; 5) chemical manufacturing; 6) transport services; 7) non-ferrous metals; 8) non-metallic manufacturing; 9) communication; and 10) beverage manufacturing. Sectors with the weakest linkage intensities on average over the last three decades of the sample period were: 1) miscellaneous manufacturing; 2)

textile, leather, footwear and wearing apparel; 3) construction; 4) furniture and fixtures; 5) wood and wooden products; 6) trade; 7) mining; 8) iron and steel; 9) rubber production; and 10) agriculture, fishery and forestry.

Figure 7.15

Inverse Important Sectors in Malaysia based on Average Changes in Linkage Intensity Coefficients of the Field of Influence 1983-2005 compared to 1978

Figure 7.16

Key Sectors in Malaysia based on Average Total Linkages using the Field of Influence Approach 1978-2006

The transition of key sectors in the Malaysian economy are depicted in Figure 7.15. From agriculture, fishery and forestry, rubber and rubber products, wood and wooden products and food manufacturing in 1978, the Malaysian economy has diversified into transport and transport equipment; petroleum and coal; electricity, gas and water; chemical manufacturing; transport services; non-ferrous metals; and non-metallic manufacturing.

Table 7.37

Total Linkages for Malaysia using Field of Influence, 1978-2005

	1978			1983			1991			2000			2005			AVERAGE								
	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank				
Agriculture, Fishery and Forestry	1.201873	3.157656	4.395929	1	1.329131	3.091872	4.421003	1	1.281862	3.129588	4.411449	1	1.358132	3.06172	4.419851	1	1.235486	3.188594	4.40434	1	1.281297	3.121998	4.403235	1
Mining	1.204812	2.182915	3.387728	5	1.201392	2.501925	3.703316	4	1.186495	2.36402	3.512898	4	1.14405	1.846024	2.990703	14	1.219533	2.155763	3.375296	6	1.191256	2.02606	3.39862	6
Food manufacturing	1.994643	1.649116	3.583758	3	2.308177	2.008808	4.316985	2	2.101304	1.822739	3.924043	3	2.217307	2.008675	4.225982	2	1.983944	1.710979	3.694923	3	2.109075	1.840664	3.949138	2
Beverage	1.576856	1.02157	2.598426	22	1.715355	1.02563	2.740985	19	1.628596	1.019482	2.648078	22	1.707214	1.075988	2.783201	20	1.621197	1.042711	2.663908	22	1.649844	1.037076	2.68692	22
Tobacco manufacturing	1.382367	1.024671	2.407037	23	1.387529	1.02677	2.4143	23	1.488384	1.068362	2.556746	23	1.421665	1.042193	2.463858	25	1.438383	1.049483	2.487866	23	1.423666	1.042296	2.465961	24
Textile, leather, footwear, wearing apparel	1.617125	1.423301	3.040426	12	1.668272	1.332345	3.006617	14	1.477469	1.272901	2.75037	19	1.688234	1.297959	2.906193	16	1.64521	1.414922	3.060132	13	1.603262	1.348286	2.951548	15
Wood and wooden products	1.77998	1.582636	3.355629	6	1.797558	1.606439	3.403997	8	1.942148	1.447523	3.389671	6	1.916589	1.324256	3.240945	9	1.799869	1.57222	3.372089	7	1.845832	1.506615	3.352446	7
Furniture and fixtures	1.921945	1.026549	2.948494	15	1.909714	1.009713	2.918887	16	1.914467	1.00923	2.94439	14	1.847411	1.064442	2.911853	15	1.942623	1.08117	2.97074	17	1.907124	1.071789	2.988073	16
Paper and printing	1.420946	1.462372	2.883318	18	1.418757	1.441259	2.860015	17	1.42505	1.501190	2.926241	17	1.551425	1.488197	3.039622	13	1.471864	1.493888	2.965752	18	1.457608	1.437749	2.93499	17
Chemical manufacturing	1.478517	1.412317	2.880834	17	1.536146	1.596494	3.13264	11	1.487434	1.464315	2.933749	15	1.654982	1.595026	3.25008	7	1.520928	1.464225	2.985153	16	1.535601	1.502875	3.038477	15
Petrol and coal	1.367643	1.86826	3.23627	7	1.686641	1.957724	3.644365	5	1.714044	1.670667	3.384711	7	1.467997	1.912817	3.380815	5	1.416689	2.001087	3.417776	5	1.530603	1.882184	3.410287	3
Rubber and rubber products	1.91592	1.158634	3.074554	11	1.922224	1.147814	3.070038	12	1.907292	1.170129	3.077421	12	1.888613	1.236951	3.105563	10	1.97071	1.20312	3.189022	11	1.916952	1.186368	3.132732	11
Non metallic manufacturing	1.499588	1.443058	2.942647	16	1.635643	1.418416	3.054059	13	1.610763	1.548886	3.159649	10	1.580116	1.520671	3.100787	11	1.54469	1.47221	3.01691	15	1.57416	1.48065	3.05481	12
Iron and steel	1.701697	1.450689	3.152386	8	1.72016	1.523725	3.243884	9	1.662735	1.463739	3.116474	11	1.602575	1.492805	3.09538	12	1.731325	1.481079	3.212404	9	1.683698	1.480407	3.164106	10
Non-ferrous and other metals	1.528818	1.178209	2.707027	20	1.618888	1.228686	2.851374	18	1.595037	1.388081	2.933117	16	1.506644	1.329973	2.836617	19	1.57109	1.298821	2.81811	20	1.564235	1.263754	2.827989	18
Electrical and industrial machinery	1.388612	1.354266	2.742878	19	1.334784	1.233256	2.56804	21	1.385992	1.485861	2.871852	18	1.326876	1.551265	2.878141	18	1.420216	1.47135	2.891566	19	1.371296	1.419199	2.790495	19
Transport and transport equipment	1.185985	1.069887	2.255873	26	1.310724	1.230593	2.540807	22	1.320942	1.23517	2.556112	24	1.42111	1.253826	2.674936	22	1.253697	1.102194	2.355891	26	1.29839	1.178334	2.476724	23
Misc. manufacturing	1.809867	1.286555	3.094632	10	1.268927	0.948403	2.21733	26	1.549882	1.150444	2.700326	21	1.555343	1.146169	2.701512	21	1.794206	1.28873	3.062979	12	1.595645	1.160071	2.755716	20
Electricity, gas and water	1.575409	1.542456	3.117864	9	1.669331	1.745028	3.414359	7	1.590888	1.652444	3.243332	8	1.511455	1.864877	3.376332	6	1.619031	1.632753	3.251784	8	1.593223	1.687512	3.280734	8
Construction	1.739944	1.257754	2.997698	14	1.742358	1.256344	2.998701	15	1.691579	1.25674	2.948319	13	1.697403	1.190686	2.888088	17	1.758726	1.270461	3.029187	14	1.726002	1.246397	2.972399	14
Trade	1.367607	2.557569	3.925176	2	1.376854	2.38917	3.766071	3	1.378178	2.723172	4.101952	2	1.298227	2.604882	3.903119	3	1.384017	2.54626	3.938644	2	1.361097	2.555895	3.926992	3
Transport	1.423474	1.610043	3.033457	13	1.381938	1.803117	3.185025	10	1.488291	1.712946	3.201237	9	1.565398	1.683173	3.248571	8	1.493009	1.719203	3.212212	10	1.470404	1.705697	3.1761	9
Communication	1.138299	1.87733	2.326031	25	1.170789	1.179413	2.350202	25	1.227568	1.254383	2.481951	26	1.257846	1.274742	2.523588	24	1.191888	1.232694	2.424156	25	1.197298	1.252688	2.422986	26
Banking, finance and real estate	1.182287	1.456363	2.63865	21	1.22369	1.594189	2.727469	20	1.21131	1.531115	2.742425	20	1.218536	1.391832	2.610368	23	1.229216	1.526294	2.76191	21	1.219294	1.483239	2.696162	21
Private services	1.601579	1.81731	3.418889	4	1.591755	1.972532	3.564267	6	1.532432	1.986025	3.468457	5	1.600003	1.939518	3.539521	4	1.630571	1.888116	3.49886	4	1.591264	1.9067	3.497964	4
Public services	1.314752	1.07123	2.385982	24	1.328481	1.069785	2.398265	24	1.452751	1.069169	2.5202	25	1.348346	1.054819	2.403165	26	1.364377	1.087477	2.451855	24	1.361741	1.070516	2.432357	25

Note: Values in this table were taken from Table 7.35 by adding the change in intensities per year to the previous year's total.

Table 7.38

Key Sector Analysis using Leontief inverses of sample years, Malaysia 1978-2005

Sector	1978			1983			1991			2000			2005			AVERAGE		
	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	TL
Agriculture, Fishery and Forestry	1.201873	3.157656	4.359529	1	1.3165	3.104582	4.421081	1	1.346411	3.049425	4.395836	1	1.463108	2.90951	4.366254	2	1.626145	2.954985
Mining	1.204812	2.182915	3.387728	5	1.198889	2.448958	3.647847	4	1.159731	2.293613	3.463343	6	1.119497	1.87681	2.807179	21	1.397735	2.022548
Food manufacturing	1.994643	1.649116	3.583758	3	2.293337	1.986664	4.279001	2	2.256472	1.987514	4.243986	2	2.423875	2.320436	4.744311	1	2.54993	2.439875
Beverage	1.576836	1.02157	2.598426	22	1.701038	1.024688	2.75726	19	1.670012	1.018103	2.688114	21	1.789395	1.105925	2.886319	18	2.163486	1.25539
Tobacco manufacturing	1.382367	1.024671	2.407037	23	1.383556	1.026476	2.440036	24	1.57506	1.105329	2.680388	22	1.439699	1.050162	2.489861	25	2.121377	1.311732
Textile, leather, footwear, wearing apparel	1.617125	1.423001	3.040426	12	1.661319	1.356277	3.017596	13	1.404379	1.208878	2.608258	25	1.618249	1.27156	2.888808	17	2.02051	1.73721
Wood and wooden products	1.772993	1.582636	3.355629	6	1.794695	1.602646	3.397341	7	2.082596	1.350919	3.433515	7	2.010663	1.221453	3.232115	9	2.143449	1.491894
Furniture and fixtures	1.921945	1.026549	2.948494	15	1.91451	1.012562	2.924412	16	1.878554	1.031842	2.910396	17	1.787255	1.083775	2.87103	19	2.247629	1.045133
Paper and printing	1.420946	1.462372	2.883318	18	1.411986	1.446607	2.866467	17	1.427611	1.530355	2.957966	15	1.637977	1.505279	3.143256	10	2.110566	1.870638
Chemical manufacturing	1.478517	1.412317	2.891834	17	1.52682	1.572539	3.095222	12	1.479051	1.477373	2.956424	16	1.799986	1.69578	3.490564	7	2.077054	2.082418
Petrol and coal	1.367643	1.868626	3.23627	7	1.620194	1.933303	3.561497	5	2.005772	1.521008	3.52678	4	1.588124	1.952626	3.52075	6	2.131641	3.852699
Rubber and rubber products	1.91502	1.158634	3.074554	11	1.954216	1.147388	3.101603	11	1.932915	1.174349	3.07264	12	1.70738	1.279758	3.071896	12	2.707069	2.133002
Non-metallic manufacturing	1.495988	1.443058	2.942647	16	1.574511	1.424204	2.998715	14	1.612784	1.637126	3.24991	10	1.576175	1.551299	3.127474	11	2.061994	1.819075
Iron and steel	1.701697	1.450689	3.152386	8	1.720377	1.516247	3.236624	9	1.648427	1.44085	3.089278	13	1.579819	1.490859	3.070677	13	2.210475	1.796149
Non-ferrous and other metals	1.528818	1.178209	2.707027	20	1.598141	1.221155	2.819296	18	1.654169	1.47471	3.128879	11	1.508896	1.41234	2.922236	16	2.114399	1.94838
Electrical and industrial machinery	1.388612	1.354266	2.742878	19	1.353078	1.264608	2.619586	21	1.387357	1.597076	2.984432	14	1.307397	1.66043	2.962228	15	1.815027	2.91926
Transport and transport equipment	1.185985	1.069887	2.255873	26	1.299547	1.21368	2.513227	22	1.45206	1.404342	2.857002	19	1.598843	1.396039	2.994882	14	2.092792	1.445681
Misc. manufacturing	1.809867	1.286555	3.096432	10	1.452176	1.060888	2.513164	23	1.446707	1.097699	2.544405	26	1.506252	1.120478	2.62673	22	1.806286	1.161434
Electricity, gas and water	1.575409	1.542456	3.117864	9	1.650046	1.704624	3.355083	8	1.517681	1.74432	3.262001	9	1.461344	2.084678	3.546022	5	2.153072	2.857824
Construction	1.739944	1.257754	2.997688	14	1.737976	1.255934	2.99391	15	1.64273	1.253788	2.865518	18	1.66975	1.168957	2.838707	20	2.042247	1.48305
Trade	1.367607	2.557569	3.925176	2	1.374806	2.435568	3.810374	3	1.378359	2.840884	4.221243	3	1.256221	2.624765	3.880986	3	1.571568	2.557963
Transport	1.423414	1.610048	3.033457	13	1.39055	1.777424	3.167974	10	1.540361	1.80546	3.345821	8	1.652199	1.718951	3.37115	8	2.485652	3.243615
Communication	1.132999	1.187733	2.263031	25	1.165208	1.180852	2.34606	26	1.297845	1.312545	2.610389	24	1.305253	1.316494	2.621747	23	1.866257	1.849133
Banking, finance and real estate	1.182287	1.56968	2.63865	21	1.215043	1.496823	2.711966	20	1.231311	1.592926	2.824236	20	1.240971	1.361444	2.605115	24	1.817254	2.566232
Private services	1.601579	1.8731	3.418889	4	1.587168	1.946485	3.536553	6	1.462644	2.028275	3.490919	5	1.598689	2.04492	3.623609	4	1.966986	2.494836
Public services	1.314752	1.07123	2.385982	24	1.326438	1.070538	2.396975	25	1.550946	1.066831	2.617779	23	1.37151	1.047343	2.418853	26	1.952298	1.28344

Note: The linkages were calculated from the Leontief inverse matrices of each of the sample years.

Table 7.39
Comparison of Key Sector Analysis between using Field of Influence Results and Leontief inverses of sample years based on averages, Malaysia, 1978-2005

Leontief inverses per year	Rank	Multiplier Product Matrix
Food manufacturing	1	Agriculture, Fishery and Forestry
Agriculture, Fishery and Forestry	2	Food manufacturing
Petrol and coal	3	Trade
Trade	4	Private services
Transport	5	Petrol and coal
Private services	6	Mining
Electricity, gas and water	7	Wood and wooden products
Rubber and rubber products	8	Electricity, gas and water
Wood and wooden products	9	Transport
Iron and steel	10	Iron and steel
Chemical manufacturing	11	Rubber and rubber products
Non metallic manufacturing	12	Non metallic manufacturing
Mining	13	Chemical manufacturing
Paper and printing	14	Construction
Electrical and industrial machinery	15	Textile, leather, footwear, wearing apparel
Non-ferrous and other metals	16	Furniture and fixtures
Construction	17	Paper and printing
Furniture and fixtures	18	Non-ferrous and other metals
Banking, finance and real estate	19	Electrical and industrial machinery
Textile, leather, footwear, wearing apparel	20	Misc. manufacturing
Beverage	21	Banking, finance and real estate
Transport and transport equipment	22	Beverage
Misc. manufacturing	23	Transport and transport equipment
Tobacco manufacturing	24	Tobacco manufacturing
Communication	25	Public services
Public services	26	Communication

Note: Averages of the total linkages of Tables 37 and 38 were calculated and the sectors were ranked from highest to lowest.

If the changes in linkage intensities were added to the linkage indices of 1978 using the field of influence formulation shown in Appendix 16, the backward, forward and total linkages for each year can be calculated as shown in Table 7.37. This reveals the key sectors of the Malaysian economy during the sample years as depicted in Figure 7.16, namely: 1) agriculture, fishery and forestry; 2) food manufacturing; 3) trade; 4) public services; 5) petrol and coal; 6) mining; 7) wood and wooden products; 8) electricity, gas and water; 9) transport; 10) iron and steel; and 11) rubber and rubber products. The sum of the backward and forward linkages of these sectors exceeded one and also exceeded the average linkage index for all sectors. The sectors that ranked least were: public services; communication; tobacco; transport and transport equipment; beverages; banking, finance and real estate; and miscellaneous manufacturing.

The key sector analysis using the traditional approach based on the given Leontief inverses of each sample year are shown on Table 7.38. Comparing the leading and lagging sectors in terms of total linkages shown in Table 7.39 discloses that nine of the sectors are the major sectors of Malaysia under both approaches although the rankings changed – 1) food manufacturing; 2) agriculture, fishery and forestry; 3) petrol and coal; 4) trade; 5) transport; 6) private services; 7) electricity, gas

Table 7.40
Multiplier Product Matrix of Malaysia, 1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26 SUM	
1	0.002463	0.002469	0.003965	0.00232	0.002833	0.003315	0.003634	0.003939	0.002912	0.00303	0.002803	0.003927	0.003074	0.003488	0.003134	0.002846	0.002431	0.00371	0.003229	0.003566	0.002803	0.002918	0.002333	0.002423	0.002383	0.002695	0.00046
2	0.001705	0.001707	0.002741	0.002234	0.001959	0.002291	0.002512	0.002723	0.002013	0.002095	0.001938	0.002715	0.002125	0.002411	0.002166	0.001968	0.00168	0.002564	0.002232	0.002465	0.001938	0.002017	0.001613	0.001675	0.002269	0.001863	0.00562
3	0.001286	0.00129	0.00207	0.001683	0.001479	0.001731	0.001898	0.002056	0.001521	0.001581	0.001464	0.002105	0.001551	0.001822	0.001636	0.001486	0.001271	0.001936	0.001686	0.001858	0.001463	0.001525	0.001218	0.001265	0.001714	0.001407	0.042
4	0.000797	0.000799	0.001283	0.001046	0.000917	0.001072	0.001176	0.001274	0.000942	0.00098	0.000907	0.00127	0.000994	0.001128	0.001014	0.000921	0.000786	0.00112	0.001045	0.001154	0.000907	0.000944	0.000755	0.000784	0.001062	0.000872	0.02603
5	0.000799	0.000801	0.001287	0.001049	0.000919	0.001076	0.001179	0.001278	0.000945	0.000983	0.00091	0.001274	0.000997	0.001132	0.001017	0.000924	0.000789	0.001204	0.001048	0.001157	0.00091	0.000947	0.000757	0.000786	0.001065	0.000874	0.02611
6	0.00111	0.001113	0.001787	0.001457	0.001277	0.001494	0.001638	0.001776	0.001313	0.001366	0.001264	0.00177	0.001385	0.001572	0.001412	0.001283	0.001096	0.001672	0.001455	0.001607	0.001263	0.001315	0.001062	0.001092	0.00148	0.001215	0.06627
7	0.001235	0.001238	0.001987	0.00162	0.00142	0.001661	0.001821	0.001974	0.00146	0.001519	0.001405	0.001968	0.001541	0.001748	0.001571	0.001427	0.001218	0.001859	0.001618	0.001787	0.001405	0.001462	0.001169	0.001215	0.001645	0.001351	0.04033
8	0.000801	0.000803	0.001289	0.001051	0.000921	0.001078	0.001181	0.001281	0.000947	0.000985	0.000911	0.001277	0.000999	0.001134	0.001019	0.000925	0.00079	0.001206	0.001005	0.001159	0.000911	0.000948	0.000758	0.000788	0.001067	0.000876	0.02616
9	0.00114	0.001143	0.001835	0.001495	0.001311	0.001533	0.001682	0.001822	0.001346	0.001401	0.001298	0.001817	0.001421	0.001614	0.001449	0.001315	0.001125	0.001713	0.001493	0.00168	0.001268	0.00135	0.00108	0.001123	0.001519	0.001249	0.03722
10	0.00102	0.00105	0.001774	0.001446	0.001267	0.001482	0.001625	0.001762	0.001303	0.001355	0.001254	0.001756	0.001375	0.00156	0.001402	0.001273	0.001087	0.001659	0.001444	0.001595	0.001254	0.001305	0.001044	0.001084	0.001468	0.001205	0.05999
11	0.001458	0.001461	0.002347	0.001952	0.001637	0.001961	0.002151	0.002331	0.001724	0.001793	0.001659	0.002324	0.001819	0.002064	0.001854	0.001684	0.001439	0.002195	0.001911	0.00211	0.001659	0.001727	0.001381	0.001434	0.001943	0.001595	0.04761
12	0.000904	0.000906	0.001455	0.001186	0.00104	0.001216	0.001333	0.001445	0.001069	0.001112	0.001029	0.001441	0.001128	0.00128	0.00115	0.001044	0.000892	0.001361	0.001185	0.001309	0.001029	0.001071	0.000865	0.000889	0.001205	0.000899	0.02952
13	0.001125	0.001123	0.001823	0.001484	0.001294	0.001512	0.001656	0.001798	0.001328	0.001389	0.001281	0.001791	0.001401	0.001589	0.001421	0.001260	0.001117	0.001704	0.001483	0.001638	0.001288	0.00134	0.001072	0.001113	0.001508	0.001238	0.06996
14	0.001132	0.001135	0.001822	0.001485	0.001302	0.001523	0.00167	0.00181	0.001338	0.001392	0.001288	0.001804	0.001412	0.001602	0.00144	0.001308	0.001117	0.001704	0.001483	0.001638	0.001288	0.00134	0.001072	0.001113	0.001508	0.001238	0.06996
15	0.000919	0.000921	0.00148	0.001206	0.001057	0.001237	0.001356	0.00147	0.001087	0.001131	0.001046	0.001465	0.001147	0.001301	0.001169	0.001062	0.000907	0.001385	0.001205	0.001331	0.001049	0.001086	0.000871	0.000904	0.001225	0.001006	0.03002
16	0.001057	0.001059	0.001701	0.001386	0.001215	0.001422	0.001559	0.00169	0.001249	0.0013	0.001202	0.001684	0.001318	0.001496	0.001344	0.001221	0.001043	0.001591	0.001385	0.001553	0.001202	0.001251	0.001001	0.001039	0.001408	0.001156	0.03451
17	0.000835	0.000837	0.001344	0.001095	0.00096	0.001123	0.001231	0.001335	0.000987	0.001027	0.00095	0.001331	0.001041	0.001182	0.001062	0.000964	0.000824	0.001257	0.001094	0.001208	0.00095	0.000899	0.000791	0.000821	0.001112	0.000913	0.02726
18	0.001004	0.001006	0.001616	0.001317	0.001154	0.001335	0.001481	0.001605	0.001187	0.001235	0.001142	0.0016	0.001252	0.001421	0.001277	0.00116	0.00099	0.001511	0.001316	0.001453	0.001142	0.001189	0.00095	0.000987	0.001338	0.001098	0.03278
19	0.001205	0.001206	0.00197	0.001579	0.001384	0.001619	0.001775	0.001924	0.001423	0.00148	0.001369	0.001918	0.001501	0.001704	0.001531	0.00139	0.0012	0.001797	0.001577	0.001742	0.001369	0.001425	0.00114	0.001184	0.001604	0.001316	0.0393
20	0.000981	0.000984	0.001579	0.001287	0.001129	0.001332	0.001448	0.001569	0.00116	0.001207	0.001117	0.001564	0.001224	0.001389	0.001248	0.001134	0.000968	0.001478	0.001286	0.001421	0.001117	0.001162	0.000929	0.000965	0.001308	0.001073	0.03205
21	0.001995	0.002	0.003212	0.002618	0.002295	0.002685	0.002943	0.003191	0.002359	0.002455	0.00227	0.003181	0.00249	0.002825	0.002538	0.002305	0.001969	0.003005	0.002615	0.002889	0.00227	0.002363	0.00189	0.001963	0.003269	0.002183	0.06517
22	0.001256	0.001259	0.002022	0.001648	0.001445	0.001669	0.001853	0.002009	0.001485	0.001545	0.001429	0.002002	0.001587	0.001778	0.001598	0.001451	0.001239	0.001891	0.001646	0.001818	0.001429	0.001488	0.00119	0.001236	0.001674	0.001374	0.04102
23	0.000927	0.000929	0.001492	0.001216	0.001066	0.001247	0.001367	0.001482	0.001095	0.001114	0.001054	0.001477	0.001156	0.001312	0.001179	0.001071	0.000914	0.001395	0.001215	0.001341	0.001054	0.001097	0.000878	0.000912	0.001235	0.001014	0.03026
24	0.001136	0.001139	0.001829	0.001491	0.001307	0.001529	0.001676	0.001817	0.001343	0.001398	0.001293	0.001811	0.001418	0.001609	0.001445	0.001313	0.001121	0.001711	0.001489	0.001645	0.001293	0.001346	0.001076	0.001118	0.001514	0.001243	0.03711
25	0.001418	0.001421	0.002282	0.00186	0.001631	0.001908	0.002092	0.002267	0.001676	0.001744	0.001613	0.00226	0.001769	0.002008	0.001804	0.001661	0.001378	0.002136	0.001859	0.002053	0.001613	0.001679	0.001343	0.001395	0.001889	0.001551	0.04631
26	0.000836	0.000838	0.001345	0.001096	0.000961	0.001124	0.001233	0.001336	0.000988	0.001028	0.000951	0.001332	0.001043	0.001183	0.001063	0.000966	0.000825	0.001258	0.001095	0.00121	0.000951	0.00099	0.000792	0.000822	0.001114	0.000914	0.02729
SUM	0.030621	0.030692	0.049303	0.040218	0.035179	0.041199	0.04517	0.048965	0.036199	0.037673	0.034847	0.048866	0.039149	0.043353	0.039641	0.034666	0.030206	0.040608	0.040133	0.043453	0.034818	0.036562	0.028998	0.030124	0.040801	0.033496	1

Table 7.41
Hierarchical Cross Structure of the Multiplier Product Matrix, Malaysia 1978

	3	8	12	18	7	20	14	6	25	4	19	15	13	10	22	9	5	11	21	16	26	2	1	17	24	23	SUM
1	0.003965	0.003939	0.003927	0.00371	0.003634	0.003566	0.003488	0.003315	0.003283	0.003232	0.003229	0.003134	0.003074	0.003003	0.002918	0.002912	0.002833	0.002803	0.002803	0.002846	0.002695	0.002469	0.002463	0.002431	0.002423	0.002333	0.00846
21	0.003212	0.003191	0.003181	0.003005	0.002943	0.002889	0.002825	0.002685	0.002659	0.002618	0.002615	0.002538	0.00249	0.002455	0.002363	0.002359	0.002295	0.00227	0.00227	0.002305	0.002183	0.002	0.001995	0.001969	0.001963	0.00189	0.006517
2	0.002741	0.002715	0.002715	0.002564	0.002512	0.002465	0.002411	0.002291	0.002269	0.002234	0.002232	0.002166	0.002125	0.002095	0.002017	0.002013	0.001959	0.001938	0.001938	0.001968	0.001863	0.001707	0.001703	0.00168	0.001675	0.001613	0.005562
11	0.002347	0.002331	0.002324	0.002195	0.002151	0.00211	0.002064	0.001961	0.001943	0.001952	0.001911	0.001854	0.001819	0.001793	0.001727	0.001724	0.001637	0.001659	0.001659	0.001684	0.001595	0.001461	0.001458	0.001439	0.001434	0.001381	0.004761
25	0.002282	0.002267	0.002226	0.002136	0.002092	0.002053	0.002008	0.001908	0.001889	0.00186	0.001859	0.001804	0.001769	0.001744	0.001679	0.001676	0.001631	0.001613	0.001613	0.001661	0.001551	0.001421	0.001418	0.001378	0.001395	0.001343	0.004631
3	0.00207	0.002056	0.002105	0.001996	0.001988	0.001858	0.001822	0.001731	0.001714	0.001683	0.001686	0.001636	0.001551	0.001581	0.001525	0.001521	0.001479	0.001464	0.001463	0.001486	0.001407	0.00129	0.001286	0.001271	0.001265	0.001218	0.042
22	0.002022	0.002009	0.002002	0.001891	0.001853	0.001818	0.001778	0.001669	0.001674	0.001648	0.001646	0.001598	0.001567	0.001545	0.001488	0.001485	0.001445	0.001429	0.001429	0.001451	0.001374	0.001259	0.001256	0.001239	0.001236	0.00119	0.0402
7	0.001987	0.001974	0.001968	0.001859	0.001821	0.001787	0.001748	0.001661	0.001645	0.00162	0.001618	0.001571	0.001541	0.001519	0.001462	0.00146	0.00142	0.001405	0.001405	0.001427	0.001351	0.001238	0.001235	0.001218	0.001215	0.001169	0.0403
19	0.001937	0.001924	0.001918	0.001797	0.001775	0.001742	0.001704	0.001619	0.001604	0.001579	0.001577	0.001531	0.001501	0.00148	0.001425	0.001423	0.001384	0.001369	0.001369	0.00139	0.001316	0.001206	0.001203	0.0012	0.001184	0.001114	0.0393
9	0.001835	0.001822	0.001817	0.001713	0.001682	0.00168	0.001614	0.001533	0.001519	0.001495	0.001493	0.001449	0.001421	0.001401	0.00135	0.001346	0.001311	0.001298	0.001288	0.001315	0.001249	0.001143	0.00114	0.001125	0.001123	0.00108	0.03722
24	0.001829	0.001817	0.001811	0.001711	0.001676	0.001645	0.001609	0.001529	0.001514	0.001491	0.001489	0.001445	0.001418	0.001398	0.001346	0.001343	0.001307	0.001293	0.001293	0.001313	0.001243	0.001139	0.001136	0.001121	0.001118	0.001076	0.03711
14	0.001822	0.00181	0.001804	0.001704	0.001657	0.001638	0.001602	0.001523	0.001508	0.001485	0.001483	0.00144	0.001412	0.001392	0.00134	0.001338	0.001302	0.001288	0.001288	0.001308	0.001238	0.001135	0.001132	0.001117	0.001113	0.001072	0.03666
13	0.001823	0.001798	0.001791	0.001669	0.001656	0.001625	0.001589	0.001512	0.001495	0.001484	0.00147	0.001421	0.001401	0.001389	0.00133	0.001328	0.001294	0.001281	0.001281	0.001281	0.001227	0.001123	0.001125	0.001106	0.001106	0.001061	0.03665
6	0.001787	0.001776	0.00177	0.001672	0.001638	0.001607	0.001572	0.001494	0.00148	0.001457	0.001455	0.001412	0.001385	0.001366	0.001315	0.001313	0.001277	0.001264	0.001263	0.001283	0.001215	0.001113	0.00111	0.001096	0.001092	0.001052	0.03627
10	0.001774	0.001762	0.001756	0.001659	0.001625	0.001595	0.001556	0.001482	0.001468	0.001446	0.001444	0.001402	0.001375	0.001355	0.001305	0.001303	0.001267	0.001254	0.001254	0.001273	0.001205	0.001105	0.001102	0.001087	0.001084	0.001044	0.03599
16	0.001701	0.00169	0.001684	0.001591	0.001559	0.00153	0.001496	0.001422	0.001408	0.001386	0.001385	0.001344	0.001318	0.001251	0.001249	0.001249	0.001215	0.001202	0.001202	0.001221	0.001156	0.001059	0.001057	0.001043	0.001039	0.001001	0.03451
18	0.001616	0.001605	0.0016	0.001511	0.001481	0.001453	0.001421	0.00135	0.001338	0.001317	0.001316	0.001277	0.001252	0.001235	0.001189	0.001187	0.001154	0.001142	0.001142	0.00116	0.001098	0.001006	0.001004	0.00099	0.000987	0.00095	0.03278
20	0.001579	0.001569	0.001564	0.001478	0.001448	0.001421	0.001389	0.00132	0.001308	0.001287	0.001286	0.001248	0.001224	0.001207	0.001162	0.00116	0.001129	0.001117	0.001117	0.001134	0.001073	0.000984	0.000981	0.000968	0.000965	0.000929	0.03205
23	0.001492	0.001482	0.001477	0.001395	0.001367	0.001341	0.001312	0.001247	0.001235	0.001216	0.001215	0.001179	0.001156	0.00114	0.001097	0.001095	0.001066	0.001054	0.001054	0.001071	0.001014	0.000929	0.000927	0.000914	0.000912	0.000878	0.03206
15	0.00148	0.00147	0.001465	0.001385	0.001356	0.001331	0.001301	0.001237	0.001225	0.001206	0.001205	0.001169	0.001147	0.001131	0.001086	0.001087	0.001057	0.001046	0.001049	0.001062	0.001006	0.000921	0.000919	0.000907	0.000904	0.000871	0.03202
12	0.001455	0.001445	0.001441	0.001361	0.001333	0.001309	0.00128	0.001216	0.001205	0.001186	0.001185	0.00115	0.001128	0.001112	0.001071	0.001069	0.00104	0.001029	0.001029	0.001044	0.000988	0.000906	0.000904	0.000892	0.000889	0.000856	0.02952
26	0.001345	0.001336	0.001332	0.001258	0.001233	0.00121	0.001183	0.001124	0.001114	0.001096	0.001095	0.001063	0.001043	0.001028	0.00099	0.000988	0.000961	0.000951	0.000951	0.000966	0.000914	0.000838	0.000836	0.000825	0.000822	0.000792	0.02729
17	0.001344	0.001335	0.001331	0.001257	0.001231	0.001208	0.001182	0.001123	0.001112	0.001095	0.001094	0.001062	0.001041	0.001027	0.000989	0.000987	0.00096	0.00095	0.00095	0.000964	0.000913	0.000837	0.000835	0.000824	0.000821	0.000791	0.02726
8	0.001289	0.001281	0.001277	0.001206	0.001181	0.001159	0.001134	0.001078	0.001067	0.001051	0.00105	0.001019	0.000999	0.000985	0.000948	0.000947	0.000921	0.000911	0.000911	0.000925	0.000876	0.000803	0.000801	0.00079	0.000788	0.000758	0.02616
5	0.001287	0.001278	0.001274	0.001204	0.001179	0.001157	0.001132	0.001076	0.001065	0.001049	0.001048	0.001017	0.000997	0.000983	0.000947	0.000945	0.000919	0.00091	0.00091	0.000921	0.000872	0.000801	0.000799	0.000789	0.000786	0.000757	0.02611
4	0.001283	0.001274	0.00127	0.001202	0.001176	0.001154	0.001128	0.001072	0.001062	0.001046	0.001045	0.001014	0.000994	0.00098	0.000944	0.000942	0.000917	0.000907	0.000907	0.000921	0.000872	0.000799	0.000797	0.000786	0.000784	0.000755	0.02603
SUM	0.049303	0.048965	0.048866	0.04668	0.04517	0.044353	0.043353	0.041199	0.040801	0.040218	0.040133	0.039641	0.038149	0.037673	0.036262	0.036199	0.035179	0.034847	0.034818	0.034666	0.033496	0.030692	0.031621	0.030206	0.030124	0.028998	1

Figure 7.17
Economic Landscape of Malaysia, 1978

and water; 8) wood and wooden products; and 9) iron and steel. Seven of the sectors ranked the lowest under both approaches with their rankings shifting led by public services; communication; tobacco; miscellaneous manufacturing; transport and transport equipment; beverages; and banking.

The multiplier product matrix which is derived by weighting the direct field of influence of Malaysia in 1978 by the sum of the column and row totals (i.e., global intensity or volume) is shown in Table 7.40. By ranking the backward and forward linkages the cross-structure of the field of influence is tabulated in Table 7.41 to depict the economic landscape of Malaysia showing strengths of backward and forward linkages as illustrated in Figure 7.17.

The economic structure of Malaysia indicates three sectors with dominant forward and backward linkages: 1) food manufacturing; 2) private services; and 3) wood and wood products. Sectors with strong forward linkages are: 1) agriculture, fishery and forestry; 2) trade; 3) mining; 4) petroleum and coal; 5) private services; 6) food manufacturing; 7) transport services; and 8) wood. Sectors with high backward linkages are: 1) food manufacturing; 2) furniture and fixtures; 3) rubber; 4) miscellaneous manufacturing; 5) wood; 6) construction; 7) iron and steel; 8) textiles, leather, footwear and wearing apparel; 9) private services; 10) beverages; 11) electricity, gas and water; and 12) non-ferrous metals.

As key sector analysis using the field of influence approach allows decomposition of the Leontief inverse into self-influence and scaling effects, and push-pull effects of backward and forward linkages that distort sectoral balances, this decomposition for the Malaysian data are discussed under the section on applications of the field of influence approach on crisis.

7.2.3 Results for Thailand

The main reference for the following description of the Thai economy was from <https://www.encyclopedia.com/places/asia/thai-political-geography/thailand>. For almost a decade, the Thai economy like Malaysia grew annually by a little less than 10 percent until it became the epicentre of the Asian financial crisis in 1997. The Thai economy continued to mature from the 1980s to the 1990s where agriculture's share to total output continued to shrink as agricultural workers moved in between farm work to self-employment and light industrial jobs in the metropolis. Manufacturing's share to total GDP continued to rise from just a fifth in the 1980s to about a third in the mid-1990s and further to almost two-fifths into the new millennium.

In agriculture, Thailand is the world's biggest rice exporter as its government bred higher-yielding varieties and launched large scale irrigation systems. Rubber is a second earner of foreign exchange from agriculture along with cassava, corn, soybeans, cocoa, jute, and coffee. In forestry, rubber trees occupy a tenth of the forested area in the southern part while the northern part is dominated by teak production which once was a major export that declined due to government deforestation restrictions.

Thailand has a small mining and mineral processing sector for ferrous and non-ferrous metals but has a large industry for industrial minerals. The country owns considerable resources of minerals particularly feldspar and gypsum, tin, diatomite, dolomite, limestone, gemstones, lead, silica and other industrial minerals. Its resources of fuel and metallic minerals like antimony, cadmium, iron ore, lead, manganese, zinc and zirconium are produced on a smaller scale. Exploration in the 2000s were concentrated on gold, copper, and potash with considerable reserves on the latter two that could make Thailand a top producer in the region. In the energy and power sector, Thailand is a net importer of crude oil and natural gas as its reserves of the latter are mostly consumed for electricity generation. It boasts of recoverable coal reserves as well with coal production mostly reserved for domestic demand.

The industrial sector of Thailand is overseen by eight institutions — the Ministries of Finance, Commerce and Industry, Board of Investment, Bank of Thailand, Industrial Finance Corporation, National Economic and Social Development Board and the Industrial Restructuring Committee as the coordinating agency for the five-year economic development plans. The extensive use of price controls and tariffs as import substitution policies in the 1960s and 1970s was relaxed in the 1980s leading Thailand into export-led boom beginning mid-1980s. In the 1990s, Thailand's automotive production was the world's fastest as the country became the world's second largest manufacturer of motorcycles and pick-up trucks. Dubbed as the Detroit of Asia, Thailand's automotive and auto parts industry generated the second highest share to the nation's export revenues by the 2000s, only next to computers and electronic parts.

Since mid-1980s, electronics has been Thailand's leading manufactured exporting sector with fully assembled computers, computer accessories and integrated circuits. Textiles and garments are another of its largest industries with synthetic fibre production growing fastest in the 1990s. Two-thirds of the output of this sector from an estimated 4,500 textile firms employing a million work force are ready-to-wear apparel destined for the American and European markets. During its decade of boom from the mid-1980s to mid-1990s, Thailand became the largest producer of petrochemicals, cement and textiles among the ASEAN nations. The country's four oil refineries were running at their peak capacity during the crisis years with distillate fuel oil, motor gasoline, residual fuel oil, jet fuel and liquefied petroleum gas as among the major refined outputs.

The transactions tables and Leontief inverse matrices of technical coefficients covering the years 1975, 1985, 1995 and 2005 for Thailand are shown in Appendices 21 and 22, respectively. The direct field of influence for the base year 1975 is shown in Appendix 23. The field of influence for the same years multiplied by the sectoral changes in technical coefficients to yield first round intensities are shown in Appendix 24.

The field of influence calculations for Thailand were based on 1975 matrix of inverse coefficients, the sum of the products of column and row totals of which are shown in Table 7.42 and illustrated in Figure 7.18. The sectors that ranked highest in terms of inverse coefficients in 1975 for Thailand were: 1) basic metals; 2) machinery; 3) chemical industries; 4) petroleum refineries; 5) textile industry; 6) food manufacturing; 7) mining and quarrying; 8) trade; 9) unclassified industries; and 10) paper and printing. Sectors that ranked lowest in terms of inverse coefficients were: 1) real estate; 2) fishery; 3) services; 4) forestry; 5) banking and insurance; 6) beverage and tobacco; 7) livestock; 8) restaurant and hotels; 9) non-metallic products; and 10) other manufacturing.

Table 7.42
Inverse of Technical Coefficients in 1975
Thailand

	Column Totals	Row Totals	Sum	Rank
Agriculture	1.285768073	2.946805069	4.232573142	11
Livestock	2.087395641	1.215493312	3.302888954	20
Forestry	1.229836541	1.531381462	2.761218003	23
Fishery	1.46257706	1.192518863	2.655095924	25
Mining and Quarrying	1.394873288	3.11507767	4.509950958	7
Food Manufacturing	2.12633042	2.448318973	4.574649393	6
Beverage and Tobacco Products	1.780686902	1.400472347	3.181159249	21
Textile Industry	2.548224391	2.557347476	5.105571866	5
Paper Products and Printing	2.416517797	1.904113243	4.320631039	10
Chemical Industries	2.344123072	2.965542449	5.309665521	3
Petroleum Refineries	2.021936292	3.177664136	5.199600428	4
Rubber and Plastic Products	2.103464247	1.516458759	3.619923005	16
Non-Metallic Products	2.201448435	1.34630835	3.547756786	17
Basic Metal	2.576711406	3.670561561	6.247272968	1
Fabricated Metal Products	2.594896177	1.330100895	3.924997072	14
Machinery	2.69864296	2.977816844	5.676459805	2
Other Manufacturing	2.06023206	1.461231677	3.521463736	18
Electricity and Water Works	2.216152229	1.881933543	4.098085772	13
Construction	2.383446714	1.37479369	3.758240404	15
Trade	1.351660405	3.021399408	4.373059813	8
Restaurants and Hotels	1.930617028	1.553811794	3.484428822	19
Transportation and Communication	1.993159983	2.14558856	4.138748543	12
Banking and Insurance	1.429741728	1.480339695	2.910081424	22
Real Estate	1.227568145	1.029407204	2.256975349	26
Services	1.349058328	1.357664831	2.706723159	24
Unclassified	3.061025931	1.273943443	4.334969373	9
Average	1.995234433	1.995234433	3.990468866	

Note: This table tabulates the column and row totals of the inverse of the technological coefficients given in the Leontief inverse matrix of the initial year.

Following the field of influence equation, the sum of the products of the column and row entries of the Leontief inverse of the initial year 1975 yields the intensity of the direct field of influence as shown on Table 7.43. In terms of linkage intensity, the following sectors in Thailand ranked the highest in 1975, the initial year of the analysis for this country: 1) basic metals; 2) machinery; 3) chemicals; 4) petroleum refinery; 5) textile industry; 2) basic metals; 3) machinery; 4) paper products and printing; 5) chemical industries; 6) food manufacturing; 7) mining and quarrying; 8) trade; 9) unclassified industries; and 10) paper and printing. Sectors that showed least interdependence with other sectors based on the linkage intensity were: 1) real estate; 2) fishery;

3) services; 4) forestry; 5) banking and insurance; 6) beverage and tobacco; 7) livestock; 8) restaurant and hotels; 9) non-metallic products; and 10) other manufacturing.

Figure 7.18
Sum of Inverse Coefficients Thailand, 1975

Table 7.43
**Intensities of the Direct Field of Influence, 1975
Thailand**

Sector	Column Totals	Row Totals	Average	Rank
Agriculture	66.68462	152.8687	109.7767	11
Livestock	108.2826	63.05505	85.6688	20
Forestry	63.79836	79.44269	71.6205	23
Fishery	76.11293	61.8237	68.9683	25
Mining and Quarrying	72.02148	161.5981	116.8098	7
Food Manufacturing	110.3021	127.0092	118.6557	6
Beverage and Tobacco Products	92.37679	72.65104	82.5139	21
Textile Industry	132.0871	132.6652	132.3762	5
Paper Products and Printing	125.2783	98.79596	112.0371	10
Chemical Industries	121.5419	153.8408	137.6913	3
Petroleum Refineries	104.6953	164.326	134.5106	4
Rubber and Plastic Products	109.0822	78.66796	93.8751	16
Non-Metallic Products	114.0568	68.09687	91.0768	18
Basic Metal	133.5183	190.4144	161.9664	1
Fabricated Metal Products	135.6103	68.99509	102.3027	14
Machinery	138.4	154.4775	146.4387	2
Other Manufacturing	106.8474	75.80299	91.3252	17
Electricity and Water Works	114.7484	97.64209	106.1952	13
Construction	123.5533	71.30808	97.4307	15
Trade	70.11636	156.7384	113.4274	8
Restaurants and Hotels	100.1465	80.60569	90.3761	19
Transportation and Communication	103.2125	111.3048	107.2586	12
Banking and Insurance	74.12635	76.79424	75.4603	22
Real Estate	63.6716	53.40163	58.5366	26
Services	69.9522	70.45531	70.2038	24
Unclassified	158.6451	66.08721	112.3662	9
Total (Global) Intensity=Volume	2688.869	2688.869	2688.869	

Note: This table comes from the product of the column vectors and row vectors of the direct field of influence (Leontief inverse matrix) of the initial year summed up for all sectors to yield intensities of interdependency of that sector with other sectors.

Seven sectors were highly interdependent in terms of linkage intensity – textiles; basic metals; machinery; paper products and printing; chemical industries; petroleum refineries; and food

manufacturing. While beverage and tobacco scored low in inverse coefficient rankings, these sectors were highly linkage intensive. On the other hand, mining and quarrying which was inverse coefficient-important was low in linkage intensity.

Figure 7.19
**Surface Map of the 1975 Field of Influence and Changes
in Technical Coefficients (E) over the Sample Years for Thailand**

As for the changes in technical coefficients, the surface map on Figure 7.19 shows substantial changes in the technical coefficients after 1975, the initial year of the study for Thailand. Increments in the technical coefficients were recorded for the following sectors in 1985, 1995, 2000, and 2005: mining and quarrying; rubber and plastic products; and fishery. From 1995 to 2005, technical coefficients for the following industries increased as well – machinery, and

chemicals. Finally, the following sectors registered positive changes in the inverse of technical coefficients for two or three intermittent or successive years: electricity and water works; paper and printing; basic metals; services; transport and communications; and banking and insurance.

Figure 7.20
**Surface Map of the Change in Linkage Intensities (First Order Effects)
over the Sample Years for Thailand**

Legend

1 Agriculture 2 Livestock 3 Forestry 4 Fishery 5 Mining & Quarrying 6 Food Manufacturing 7 Beverage & Tobacco Products 8 Textiles 9 Paper Products & Printing 10 Chemical Industries 11 Petroleum Refinery 12 Rubber & Plastic Products 13 Non-Metallic Products 14 Basic Metals 15 Fabricated Metallic Products 16 Machinery 17 Other Manufacturing 18 Electricity and Waterworks 19 Construction 20 Trade 21 Restaurants & Hotels 22 Transportation & Communication 23 Banking & Insurance 24 Real Estate 25 Services 26 Unclassified

Sectors that exhibited decrements in inverse coefficients compared to the base year 1975 were: machinery; trade; forestry, fabricated metals; beverage and tobacco, and construction in 1985; the last two sectors above along with petroleum, restaurant and hotels, textiles; and unclassified industries in 1995; forestry and trade in 2000 in addition to the same sectors in 1995; and

agriculture in 2005 in addition to the sectors mentioned in 2000. Like the Philippines, Thailand records imports on the final demand side and whether there was technical efficiency or simple import dependency signified by these decrements in technical coefficients could not be ascertained.

Table 7.44
**Ranking of Sectors based on Synergetic Effects of Changes in Inverse Coefficients from 1975
Thailand, 1985-2005**

Sector	2005	2000	1995	1985	1975	Average 1985-2005	Rank
Agriculture	-0.7217	3.9757	-1.0782	0.9977	4.2326	0.7934	18
Livestock	2.3989	5.3294	2.1637	0.5529	3.3029	2.6112	15
Forestry	-0.2930	-1.6296	-0.9751	-0.1799	2.7612	-0.7694	25
Fishery	3.3389	6.0721	1.8080	0.7795	2.6551	2.9996	13
Mining and Quarrying	8.5006	11.0833	2.5706	1.6977	4.5100	5.9630	4
Food Manufacturing	3.8502	8.2866	2.1158	0.7992	4.5746	3.7629	7
Beverage and Tobacco Products	0.5216	1.8998	-0.4041	-0.3024	3.1812	0.4287	22
Textile Industry	-0.5860	3.3061	-0.4930	-0.5163	5.1056	0.4277	23
Paper Products and Printing	2.0135	9.3954	2.9383	-0.0356	4.3206	3.5779	8
Chemical Industries	9.1111	27.3347	5.7699	0.3040	5.3097	10.6299	1
Petroleum Refineries	4.3515	4.0667	-1.6629	0.6009	5.1996	1.8391	17
Rubber and Plastic Products	3.6738	10.1991	2.4451	0.2554	3.6199	4.1433	5
Non-Metallic Products	3.2673	5.6741	1.8081	0.1325	3.5478	2.7205	14
Basic Metal	11.4334	7.2156	7.6124	0.1390	6.2473	6.6001	3
Fabricated Metal Products	4.4788	4.1044	1.7067	-0.2499	3.9250	2.5100	16
Machinery	10.1896	23.0561	6.3245	-0.8178	5.6765	9.6881	2
Other Manufacturing	4.3802	8.1467	3.0450	0.2902	3.5215	3.9655	6
Electricity and Water Works	5.1921	6.7632	1.1649	0.3806	4.0981	3.3752	10
Construction	1.6630	0.7965	-0.3181	-0.2872	3.7582	0.4636	21
Trade	2.6978	-13.3695	1.2398	-0.7121	4.3731	-2.5360	26
Restaurants and Hotels	0.3951	-0.1087	-0.4648	-0.2049	3.4844	-0.0958	24
Transportation and Communication	6.5294	4.0378	1.1684	0.5444	4.1387	3.0700	11
Banking and Insurance	3.9558	3.2694	6.7232	0.3623	2.9101	3.5777	9
Real Estate	0.9597	0.4816	0.5961	0.0654	2.2570	0.5257	19
Services	4.3117	5.6243	1.7337	0.3953	2.7067	3.0163	12
Unclassified	0.5105	1.7934	-0.0297	-0.3425	4.3350	0.4829	20
Average	3.6971	5.6463	1.8272	0.1788	3.9905	2.8374	

Note: Data from this table were obtained from the product of multiplying the direct field of influence matrix by the change in technical coefficients per sector and the reciprocal of the ratio of determinant of the Leontief inverse matrix of the initial year to the determinant of the Leontief inverse matrix of the succeeding year, i.e. $\frac{1}{Q(E)}$. Synergetic effects are second round effects of the change in technological coefficients on the direct field of influence arising from a change in final demand which triggers a successive round of buying and selling of inputs and outputs by sectors.

The first round intensities of the field of influence arising from the direct field of influence in the initial year 1975 multiplied by the change in inverse of technical coefficients are calculated per year in Appendix 24. When mapped onto the surface of the direct field of influence, the changes in linkage intensities which shows technological diffusion in the economy as defined by the authors of the field of influence approach are pictured in Figure 7.20.

The top 10 sectors that became linkage intensive after the change in inverse coefficients using the field of influence framework are: mining and quarrying and chemicals for the four sample years after the initial year 1975; food manufacturing in 1985, 1995 and 2000; machinery and other manufacturing in 1995, 2000 and 2005; electricity and waterworks in 1985, 2000 and 2005; transport and communications in 1985 and 2005; paper and printing, and rubber and plastics in 1995 and 2000; basic metals in 1995 and 2005; livestock in 1985 and 1995; fishery in 1985 and 2000; and petroleum, fabricated metals and services in 2005. Sectors the experienced declines in first order linkage intensities are: forestry for the entire sample years after 1975; textiles in 1985, 1995 and 2005; and twice for the following sectors – construction, and beverage and tobacco in 1985 and 1995; trade in 1985 and 2000; restaurant and hotels in 1995 and 2000; and agriculture in 1995 and 2005.

Figure 7.21
**Synergetic Effects of Changes in Inverse Coefficients
for Thailand from 1975
1985-2005**

Multiplying the first round effects by the reciprocal of the ratio of determinants of the initial year's inverse matrix of technical coefficients to that of the perturbed matrices of succeeding years due to changes in technical coefficients, the second round or synergetic effects for the sample years succeeding the base year are calculated and shown in Appendix 25.

The synergetic effects of the change in technical coefficients in Thailand shown in Table 7.44 depict that half of the sectors have higher than average sectoral impacts in the second round: 1) chemical industries; 2) machinery; 3) basic metals; 4) mining and quarrying; 5) rubber and plastic products; 6) other manufacturing; 7) food manufacturing; 8) paper products and printing; 9) banking and insurance; 10) electricity and waterworks; 11) transportation and communication; 12) services; and 13) fishery. As shown in Figure 7.21, the synergetic effects in Thailand, unlike

Malaysia, were more pronounced in 2000 indicating wider second round diffusion of technological change as represented by the change in technical coefficients after the crisis period.

Weighting the first round effects by the volume or global intensity, the resulting shares of linkage intensities from the field of influence approach for Thailand is derived in Table 7.45. Figure 7.22 in turn depicts a visual representation of these weighted changes in linkage intensities among the sectors from the reference year 1978.

Figure 7.22
Change in Linkage Intensities from Field of Influence Approach
Thailand, 1975-2005

Thailand like Malaysia began collecting input-output data in the 1970s so there are four years of changes in input coefficients to show. The results from the change in linkage intensities when weighted by the total volume show dominance by the following sectors: 1) basic metals; 2) machinery; 3) chemicals; 4) petroleum refinery; 5) textiles; 6) mining and quarrying; 7) paper and printing; 8) food manufacturing; 9) trade; and 10) transportation and communication. The sectors with weaker linkages with the rest of the economic sectors were real estate; unclassified sectors; fishery; services; forestry; banking and insurance; and beverage and tobacco products.

Table 7.45
Linkage Intensities from the Field of Influence Approach Thailand, 1975-2005

Sectors	1975			1985			1995			2000			2005		
	BL	FL	TL	Rank	ΔBL	ΔFL	ΔTL	Rank	ΔBL	ΔFL	ΔTL	Rank	ΔBL	ΔFL	ΔTL
Agriculture	1.28786	2.64898	3.93684	12	0.10971	0.23308	0.34279	3	0.03349	-0.0665	-0.0933	25	0.05134	0.00282	0.05416
Livestock	2.09073	1.18095	3.27168	19	0.09021	0.07407	0.16428	7	0.05755	0.02044	0.07799	11	0.04535	0.02725	0.07261
Forestry	1.232	1.51231	2.74431	22	0.08833	-0.1411	-0.0527	17	0.02218	-0.0548	-0.0327	24	0.01842	-0.0406	-0.0222
Fishery	1.46524	1.16706	2.6323	24	0.34375	-0.0244	0.31935	4	0.06338	0.06004	0.06942	14	0.06696	0.01576	0.08272
Mining and Quarrying	1.40113	3.03733	4.43846	6	0.11081	0.69359	0.8044	1	0.04923	0.10165	0.15088	5	0.02906	0.12193	0.15099
Food Manufacturing	2.13063	2.06109	4.19172	8	0.13299	0.04574	0.17873	6	0.05868	0.01479	0.07346	12	0.06469	0.0482	0.11289
Beverage and Tobacco Products	1.78744	1.36504	3.15248	20	-0.0628	-0.0619	-0.1248	21	0.01192	-0.0218	-0.0099	21	0.03928	-0.0134	0.02588
Textile Industry	2.55532	2.32653	4.88185	5	-0.0622	-0.1328	-0.195	23	0.00706	-0.09	-0.0829	26	0.04554	-0.0005	0.04504
Paper Products and Printing	2.44686	1.84896	4.29582	7	0.00606	0.10087	0.10693	12	0.04412	0.06662	0.11074	6	0.04584	0.08216	0.128
Chemical Industries	2.3654	2.86167	5.22706	3	0.05677	-0.0568	-3E-05	15	0.05722	0.19259	0.24982	3	0.05799	0.3144	0.3724
Petroleum Refineries	2.03153	3.05053	5.08207	4	0.02928	0.75828	0.78755	2	0.00794	-0.0328	-0.0248	23	0.01485	0.04056	0.0554
Rubber and Plastic Products	2.11163	1.48863	3.60026	15	0.2253	-0.1035	0.12179	11	0.05044	0.04067	0.09111	8	0.06793	0.07102	0.13895
Non-Metallic Products	2.2263	1.32421	3.55052	16	-0.0473	0.03608	-0.0112	16	0.04758	0.03288	0.08047	10	0.03977	0.03753	0.0773
Basic Metal	2.58393	3.578	6.16193	1	0.01644	-0.2281	-0.2116	24	0.10731	0.2409	0.34821	1	0.01152	0.08678	0.0983
Fabricated Metal Products	2.61356	1.29	3.90355	13	-0.0977	-0.0518	-0.1495	22	0.06709	0.01498	0.08207	9	0.01797	0.03794	0.05592
Machinery	2.71655	2.78194	5.49849	2	-0.0765	-0.1918	-0.2683	26	0.08342	0.2027	0.28612	2	0.0941	0.22	0.31411
Other Manufacturing	2.07173	1.40789	3.47962	17	0.05418	0.02129	0.07547	13	0.06691	0.03846	0.10537	7	0.06744	0.04354	0.11099
Electricity and Water Works	2.22831	1.7922	4.02051	11	-0.1249	0.27206	0.14716	8	-0.0294	0.07221	0.0428	16	-0.0204	0.11251	0.09214
Construction	2.39669	1.34332	3.74002	14	0.00293	-0.1213	-0.1184	20	0.03843	-0.036	0.00246	20	0.04394	-0.0331	0.01085
Trade	1.35787	2.81807	4.17593	9	0.00392	-0.2661	-0.2622	25	0.01606	0.0266	0.04266	17	0.00951	-0.1917	-0.1821
Restaurants and Hotels	1.93626	1.37861	3.31487	18	0.06111	-0.1332	-0.0721	18	0.03512	-0.0538	-0.0187	22	0.0479	-0.0494	-0.0015
Transportation and Communication	2.00645	2.03389	4.04034	10	0.14707	0.09518	0.24226	5	0.03348	0.01804	0.05152	15	0.0601	-0.0051	0.05501
Banking and Insurance	1.43693	1.43946	2.87639	21	-0.0454	0.17649	0.13109	9	0.00449	0.23276	0.23725	4	0.01089	0.03365	0.04454
Real Estate	1.22887	1.0281	2.25697	26	0.01542	0.01012	0.02554	14	0.0103	0.01201	0.02231	18	-0.0021	0.00869	0.00656
Services	1.35253	1.33396	2.68649	23	0.02861	0.10177	0.13038	10	0.02724	0.04299	0.07023	13	0.04192	0.0347	0.07662
Unclassified	3.06961	1.26253	4.33213	25	-0.0061	-0.1058	-0.1119	19	0.02878	-0.0216	0.00717	19	0.03015	-0.0057	0.02443

Note: Table was created from the intensity of the direct field of influence for the initial year (Table 7.42) and for succeeding years, the result of multiplying the change in technological coefficients (i.e., e_{ijts}) and the direct field of influence summed up row-wise and column-wise and weighted by this total (called volume).

Table 7.46
**Ranking of Sectors based on Average Changes
in Linkage Intensity Coefficients from 1975
Thailand, 1985-2005**

	2005	2000	1995	1985	Average	Rank
Agriculture	-0.015	0.05416	-0.033	0.34279	0.08722	16
Livestock	0.04991	0.07261	0.07799	0.16428	0.0912	15
Forestry	-0.0061	-0.0222	-0.0327	-0.0527	-0.0284	24
Fishery	0.06947	0.08272	0.06942	0.31935	0.13524	5
Mining and Quarrying	0.17687	0.15099	0.15088	0.8044	0.32079	1
Food Manufacturing	0.08011	0.11289	0.07346	0.17873	0.1113	9
Beverage and Tobacco Products	0.01085	0.02588	-0.0099	-0.1248	-0.0245	23
Textile Industry	-0.0122	0.04504	-0.0829	-0.195	-0.0613	25
Paper Products and Printing	0.04189	0.128	0.11074	0.10693	0.09689	12
Chemical Industries	0.18957	0.3724	0.24982	-3E-05	0.20294	3
Petroleum Refineries	0.09054	0.0554	-0.0248	0.78755	0.22716	2
Rubber and Plastic Products	0.07644	0.13895	0.09111	0.12179	0.10707	10
Non-Metallic Products	0.06798	0.0773	0.08047	-0.0112	0.05363	17
Basic Metal	0.23789	0.0983	0.34821	-0.2116	0.11819	8
Fabricated Metal Products	0.09319	0.05592	0.08207	-0.1495	0.02042	18
Machinery	0.21201	0.31411	0.28612	-0.2683	0.136	4
Other Manufacturing	0.09114	0.11099	0.10537	0.07547	0.09574	13
Electricity and Water Works	0.10803	0.09214	0.0428	0.14716	0.09753	11
Construction	0.0346	0.01085	0.00246	-0.1184	-0.0176	21
Trade	0.05613	-0.1821	0.04266	-0.2622	-0.0864	26
Restaurants and Hotels	0.00822	-0.0015	-0.0187	-0.0721	-0.021	22
Transportation and Communication	0.13585	0.05501	0.05152	0.24226	0.12116	7
Banking and Insurance	0.08231	0.04454	0.23725	0.13109	0.1238	6
Real Estate	0.01997	0.00656	0.02231	0.02554	0.01859	19
Services	0.08971	0.07662	0.07023	0.13038	0.09174	14
Unclassified	0.01062	0.02443	0.00717	-0.1119	-0.0174	20

Note: Data on Table 7.45 (change in total linkages column ΔTL) were averaged for all sample years and the sectors were ranked from highest to lowest

In the 1980s, represented by 1985 I-O data, the linkage intensive sectors resulting from the change in technology coefficients from 1975 weighted by the volume or total intensity of the system were: 1) unclassified sectors; 2) mining and quarrying; 3) agriculture; 4) food manufacturing; 5) petroleum refinery; 6) fishery; 7) transportation and communication; 8) livestock; 9) electricity and water; and 10) chemicals.

After ten years, four sectors – mining and quarrying; petroleum refinery; food manufacturing;; and transportation and communication retained their top rankings as linkage intensive while agriculture; livestock; fishery; electricity and water; and unclassified sectors extended their interdependence with other sectors in the Thai economy. In 1985, weaker weighted linkage intensities were observed for machinery; trade; beverage and tobacco products; construction; fabricated metals; and textiles from the reference year 1975 with beverage and tobacco continuing its low-ranking status for the two successive years.

In 1995, the globally-weighted linkage intensities of sectors compared to 1975 were dominated by: 1) basic metals; 2) machinery; 3); chemicals; 4) banking and insurance; 5) mining and

quarrying; 6) paper products and printing; 7) other manufacturing; 8) rubber and plastic products; 9) fabricated metals; and 10) non-metallic products. Of these, five sectors retained their rankings from 1975 – basic metals; machinery; chemicals; paper and printing; and mining and quarrying. Weaker industry interdependence were noted for textiles; agriculture; forestry; petroleum refineries; restaurants and hotels; beverage and tobacco products; and construction. The latter two retained their status among the lowest ranked sectors since 1975.

In 2000, the sectors the were most interdependent on other sectors were: 1) chemicals; 2) machinery; 3) mining and quarrying; 4) rubber and plastic products; 5) paper and printing; 6) food manufacturing; 7) other manufacturing; 8) basic metals; 9) electricity and water; and 10) fishery. Six of these leading sectors also ranked high in 1975 – machinery, basic metals, chemicals, paper and printing, food manufacturing, and mining and quarrying. Lesser shares to total intensity were observed in 2000 for trade, forestry, restaurant and hotels, real estate, construction, unclassified sectors, and beverage and tobacco products. Of these sectors, forestry, beverage and tobacco, real estate and unclassified industries retained their low rankings from 1975.

Figure 7.23

Inverse Important Sectors in Thailand based on Average Changes in Linkage Intensity Coefficients of the Field of Influence 1985-2005 compared to 1975

In 2005 or three decades on, the Thai economy was still led in terms of global intensity by 1) basic metals; 2) machinery; 3) chemicals; 4) mining and quarrying; 5) transportation and communication; 6) electricity and waterworks; 7) fabricated metal products; 8) other manufacturing; 9) petroleum refining; and 10) services. Six of these were top ranking in 1975 defining the fundamental economic structure of Thailand as being linkage intensive in the first five sectors listed plus petroleum refining. Meanwhile, agriculture, textiles, forestry, restaurants and hotels, unclassified sectors, beverages and tobacco; and real estate showed lesser impact on the whole Thai economy in 2005 with the last three and beverage and tobacco consistently ranking low since 1975.

In summary, Table 7.46 shows the inverse important sectors of Thailand based on averages of the linkage intensities using the field of influence approach. The Thai economy is led by: 1) mining and quarrying; 2) petroleum refinery; 3) chemical industries; 4) machinery; 5) fishery; 6) banking and insurance; 7) transportation and communication services; 8) basic metals; 9) food manufacturing; and 10) rubber and plastic products. Sectors with the weakest linkage intensities on average during the three decades after the base year were: 1) trade; 2) textiles; 3) forestry; 4) beverage and tobacco products; 5) restaurants and hotels; 6) construction; 7) unclassified sectors; 8) and real estate. The transformation of the Thai economy in terms of inter-industry linkages based on the field of influence approach is shown on Figure 7.23. From the dominance of agriculture, food manufacturing, livestock, rubber and plastic products, the mix of industries that emerged in 1985-2005 were more diffused and balanced with chemicals, mining, machinery, basic metals, food manufacturing, banking and insurance, unclassified industries and other manufacturing.

Figure 7.24
**Key Sectors in Thailand based on Average Total Linkages
using Field of Influence Approach 1975-2005**

Adding the changes in linkage intensities resulting from the field of influence calculations shown in Appendix 26 to the linkage indices of the base year 1975, the linkage indices of each year are computed in Table 7.47. The table reveals the key sectors of the Thai economy as shown on Figure 7.24, which are: 1) basic metals; 2) machinery; 3) chemical industries; 4) petroleum refinery; 5) textile industry; 6) mining and quarrying; 7) paper products and printing; 8) food manufacturing; 9) trade; 10) transportation and communication; 11) electricity and water works; 12) agriculture; and 13) fabricated metal products. The linkage indices of these sectors exceeded the average for all sectors and their backward and forward linkages exceeded unity. With backward and forward linkages exceeding the value of 1, the key sectors of Thailand are generally interdependent based on the taxonomy of Miller and Blair (2009) described in Chapter 6. The sectors with lower values of total linkages were: real estate; unclassified sectors; fishery; forestry; services; banking and insurance; and beverage and tobacco products.

Table 7.47

Total Linkages for Thailand using Field of Influence Results, 1975-2005

Sectors	1975				1985				1995				2000				2005				AVERAGE			
	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank
Agriculture	1.287863	2.648981	3.936844	12	1.397375	2.882061	4.279636	10	1.321356	2.582443	3.903799	14	1.339205	2.651803	3.991008	13	1.330732	2.591097	3.921829	14	1.335346	2.671277	4.006623	13
Livestock	2.090732	1.180953	3.271685	19	2.180944	1.25502	3.435963	19	2.148281	1.20139	3.49671	19	2.136084	1.208206	3.34429	20	2.127982	1.193615	3.321596	20	2.136804	1.207837	3.344641	19
Forestry	1.232004	1.512306	2.74431	22	1.320337	1.371232	2.691569	25	1.254182	1.457467	2.71648	24	1.250421	1.471688	2.722109	24	1.260667	1.478147	2.738214	24	1.263402	1.458168	2.727157	25
Fishery	1.465242	1.167055	2.632297	24	1.808996	1.14265	2.951646	23	1.52862	1.1731	2.70172	25	1.532204	1.182817	2.715021	25	1.526362	1.175407	2.707769	25	1.527285	1.168206	2.74049	24
Mining and Quarrying	1.401134	3.037331	4.438465	6	1.511945	3.73092	5.242865	3	1.450368	3.138977	4.589345	6	1.430195	3.159264	4.589459	6	1.43067	3.184663	4.615333	6	1.444863	3.250231	4.695093	6
Food Manufacturing	2.130629	2.061087	4.191716	8	2.263622	2.106827	4.37045	8	2.189304	2.075583	4.265178	9	2.19532	2.109289	4.304609	9	2.187205	2.084621	4.271826	9	2.193216	2.087539	4.280756	9
Beverage and Tobacco Products	1.787444	1.365038	3.152482	20	1.724602	1.303108	3.02771	21	1.799363	1.343218	3.142581	21	1.826728	1.351636	3.178364	21	1.816005	1.34733	3.163335	21	1.790829	1.342066	3.132894	21
Textile Industry	2.55532	2.326531	4.88185	5	2.493141	2.193726	4.686867	6	2.562376	2.236555	4.798931	5	2.600863	2.236028	4.926891	5	2.58265	2.287007	4.869657	5	2.55887	2.273969	4.832839	5
Paper Products and Printing	2.446859	1.848964	4.295823	7	2.452923	1.949829	4.402753	7	2.49098	1.915581	4.406561	7	2.492695	1.931126	4.423821	7	2.474448	1.863269	4.337716	8	2.471581	1.901754	4.373335	7
Chemical Industries	2.365399	2.861665	5.227064	3	2.422168	2.804867	5.227035	5	2.422621	3.05426	5.476881	3	2.423391	3.17607	5.59946	3	2.397905	3.087828	5.416633	3	2.406297	2.983118	5.338415	3
Petroleum Refineries	2.031534	3.050534	5.082068	4	2.060811	3.808809	5.869621	2	2.039478	3.017744	5.057222	4	2.046382	3.091089	5.137471	4	2.055817	3.16791	5.172608	4	2.046804	3.216993	5.263798	4
Rubber and Plastic Products	2.111633	1.488631	3.600264	15	2.336929	1.385129	3.722058	15	2.162076	1.529299	3.691375	16	2.179563	1.559649	3.739212	16	2.166219	1.510484	3.676703	16	2.191284	1.494638	3.685922	16
Non-Metallic Products	2.226303	1.324213	3.550516	16	2.17899	1.360296	3.539286	18	2.273886	1.357098	3.630984	17	2.266076	1.361741	3.627817	17	2.26992	1.348578	3.634898	17	2.243035	1.350885	3.59342	17
Basic Metal	2.583935	3.577997	6.161931	1	2.60378	3.349908	5.950286	1	2.691243	3.818895	6.510137	1	2.595455	3.664778	6.260233	1	2.649272	3.750548	6.39982	1	2.624057	3.632425	6.256482	1
Fabricated Metal Products	2.613558	1.289995	3.903554	13	2.515872	1.238188	3.754061	14	2.680646	1.304976	3.985622	13	2.63153	1.32794	3.95947	14	2.670167	1.326576	3.96743	13	2.622355	1.297535	3.91989	14
Machinery	2.716552	2.781939	5.498491	2	2.64051	2.590187	5.230238	4	2.799969	2.98464	5.784609	2	2.810654	3.001944	5.812598	2	2.789385	2.921117	5.710502	2	2.751322	2.855966	5.607288	2
Other Manufacturing	2.071728	1.407891	3.479619	17	2.125906	1.429186	3.555092	17	2.138642	1.465409	3.584991	18	2.139172	1.451435	3.590607	18	2.136958	1.433797	3.570755	18	2.122481	1.433732	3.556213	18
Electricity and Water Works	2.228312	1.792198	4.02051	11	2.103419	2.064254	4.167672	12	2.198998	1.864411	4.063309	12	2.207943	1.904707	4.11265	10	2.225255	1.939285	4.12854	12	2.192765	1.905771	4.098536	12
Construction	2.396695	1.343322	3.740017	14	2.399623	1.221988	3.621611	16	2.435122	1.307359	3.742481	15	2.440637	1.310231	3.750868	15	2.458065	1.316553	3.774618	15	2.426028	1.299891	3.725919	15
Trade	1.357866	2.818067	4.175933	9	1.361788	2.55197	3.913758	13	1.373922	2.844671	4.218593	10	1.367377	2.664616	3.993793	12	1.367236	2.864828	4.232064	10	1.365638	2.74119	4.106828	11
Restaurants and Hotels	1.936259	1.378607	3.314865	18	1.997373	1.245383	3.242757	20	1.971378	1.324809	3.296187	20	1.984154	1.329231	3.313385	20	1.977368	1.345719	3.323087	19	1.973306	1.32475	3.298056	20
Transportation and Communication	2.00645	2.033891	4.040342	10	2.153525	2.129073	4.282598	9	2.039927	2.051931	4.091858	11	2.066553	2.028798	4.095351	11	2.063995	2.1222	4.176195	11	2.06409	2.073179	4.137269	10
Banking and Insurance	1.43693	1.439463	2.876393	21	1.391525	1.615954	3.007478	22	1.441424	1.672222	3.113646	22	1.447824	1.473109	2.920933	22	1.457104	1.501595	2.958698	22	1.434961	1.540468	2.97543	22
Real Estate	1.228868	1.0281	2.256969	26	1.244287	1.038219	2.282506	26	1.239165	1.040109	2.279274	26	1.226744	1.036786	2.26353	26	1.235949	1.040988	2.276937	26	1.235003	1.036841	2.271843	26
Services	1.352535	1.33396	2.686495	23	1.381146	1.43573	2.816876	24	1.379775	1.376952	2.756727	23	1.394459	1.368659	2.763118	23	1.393716	1.38249	2.776206	23	1.380326	1.379558	2.759884	23
Unclassified	3.069606	1.262526	4.332132	25	3.063515	1.156728	4.220242	11	3.098386	1.240916	4.339302	8	3.099759	1.256806	4.356565	8	3.09094	1.251813	4.274753	7	3.084441	1.233758	4.318199	8

Note: Values in this table were taken from Table 7.45 by adding the change in intensities per year to the previous year's total.

Table 7.48

Key Sector Analysis using Leontief inverses of sample years, Thailand 1975-2005

	1975			1985			1995			2000			2005			AVERAGE								
	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank	BL	FL	TL	Rank				
Agriculture	1.285768	2.946805	4.232573	11	1.495853	3.38944	4.885293	7	1.501991	2.495847	3.997838	17	1.823385	2.92642	4.749805	11	1.782036	2.35018	4.132216	17	1.577807	2.821738	4.399545	11
Livestock	2.087396	1.215493	3.302889	20	2.280122	1.386994	3.667117	17	2.498166	1.374675	3.872842	18	2.562755	1.497465	4.06002	16	2.503195	1.356173	3.859368	20	2.386327	1.36616	3.752487	19
Forestry	1.229837	1.531381	2.761218	23	1.370725	1.264182	2.634307	25	1.376193	1.134113	2.510305	25	1.427586	1.131755	2.559341	24	1.582479	1.147415	2.729894	25	1.397244	1.241769	2.639013	25
Fishery	1.462577	1.192519	2.655096	25	2.016722	1.173493	3.190215	21	1.886511	1.243526	3.130036	23	2.180702	1.321887	3.502589	22	2.226393	1.271251	3.497643	23	1.954581	1.240535	3.195116	24
Mining and Quarrying	1.394873	3.115078	4.509951	7	1.566163	4.210405	5.776568	2	1.715917	3.465554	5.181471	4	1.719294	4.415493	6.134787	4	1.769389	4.985655	6.757954	4	1.633127	4.039019	5.672146	4
Food Manufacturing	2.12633	2.448319	4.574649	6	2.373893	2.702723	5.076616	6	2.546146	2.622141	5.168287	5	2.789162	2.917481	5.706643	7	2.774696	2.707568	5.482264	8	2.522046	2.679647	5.201692	6
Beverage and Tobacco Products	1.780687	1.400472	3.181159	21	1.668534	1.320462	2.988997	24	1.846003	1.271589	3.117592	24	2.138052	1.297939	3.435991	24	2.115001	1.24761	3.362611	24	1.909655	1.307615	3.212727	23
Textile Industry	2.548224	2.557347	5.105572	5	2.434388	2.377294	4.811632	8	2.713193	2.350063	5.063256	7	2.991911	2.630428	5.622338	8	2.844795	2.165664	5.010459	9	2.706492	2.416159	5.122651	7
Paper Products and Printing	2.416518	1.904113	4.320631	10	2.351144	1.959435	4.310579	11	2.731377	2.407379	5.138756	6	2.902493	2.847213	5.749706	6	2.741277	2.045201	4.786477	12	2.628562	2.232668	4.86123	8
Chemical Industries	2.344123	2.965542	5.309666	3	2.484076	3.020253	5.504329	4	2.715643	4.077986	6.793628	3	2.935026	6.656886	9.591912	2	2.695671	6.692477	7.388148	3	2.634908	4.282629	6.917537	3
Petroleum Refineries	2.021936	3.177664	5.1996	4	2.117084	3.443241	5.560325	3	2.11222	2.828148	4.940369	8	2.353326	3.618084	5.971409	5	2.439908	3.943044	6.382952	5	2.208895	3.402036	5.610931	5
Rubber and Plastic Products	2.103464	1.516459	3.619923	16	2.401518	1.391155	3.792673	14	2.598122	1.709965	4.308087	16	2.956343	2.036415	4.992758	10	2.859054	1.655569	4.514623	14	2.5837	1.661913	4.245613	14
Non-Metallic Products	2.201448	1.346308	3.547757	17	2.161855	1.464086	3.625941	18	2.352308	1.489721	3.842029	19	2.427385	1.570365	3.99775	17	2.523214	1.516162	4.039376	18	2.333242	1.477329	3.810571	17
Basic Metal	2.576711	3.670562	6.247273	1	2.668	3.677125	6.345125	1	3.311805	5.323004	8.634808	1	2.65377	4.535163	7.188933	3	3.372378	6.002564	9.374941	1	2.916533	4.641683	7.558216	1
Fabricated Metal Products	2.594896	1.330101	3.924997	14	2.495313	1.27148	3.766793	15	2.982447	1.416986	4.399433	13	2.770688	1.694303	4.46499	15	3.30074	1.689875	4.990615	10	2.828817	1.480549	4.309366	13
Machinery	2.698643	2.977817	5.67646	2	2.547787	2.608917	5.156705	5	3.237516	4.28643	7.523947	2	3.911531	5.8059	9.717431	1	3.64829	4.781753	8.430043	2	2.308754	4.092163	7.300917	2
Other Manufacturing	2.060232	1.461232	3.521464	18	2.163817	1.536058	3.698974	16	2.609809	1.768232	4.378941	14	2.811358	1.916382	4.72774	12	2.900917	1.753871	4.654788	13	2.509227	1.687155	4.196381	15
Electricity and Water Works	2.216152	1.881934	4.098086	13	1.904719	2.523313	4.427493	10	1.988004	2.556953	4.545757	11	2.001337	3.139777	5.141114	9	2.181334	3.313217	5.494551	7	2.058361	2.683039	4.7414	9
Construction	2.383447	1.374794	3.75824	15	2.431655	1.135537	3.566992	19	2.558697	1.097244	3.655941	20	2.840982	1.029551	3.870533	18	3.092917	1.042153	4.13507	16	2.6615	1.135856	3.797355	18
Trade	1.35166	3.021399	4.37306	8	1.345477	2.555955	3.901433	13	1.45353	3.179161	4.632691	10	1.450225	1.000019	2.450244	25	1.460537	3.413615	4.874152	11	1.412286	2.63403	4.046316	16
Restaurants and Hotels	1.930617	1.553812	3.484429	19	2.073261	1.303163	3.376424	20	2.172903	1.195335	3.368438	21	2.432757	1.110963	3.54372	19	2.405904	1.178179	3.584083	22	2.203088	1.26833	3.471419	21
Transportation and Communication	1.99316	2.145589	4.138749	12	2.164742	2.329578	4.49432	9	2.208646	2.255759	4.464404	12	2.709261	1.924674	4.633935	14	2.612285	1.346708	5.758993	6	2.337619	2.360461	4.69808	10
Banking and Insurance	1.429742	1.48034	2.910081	22	1.320597	1.769373	3.09035	22	1.446811	3.267054	4.713864	9	1.548176	1.772363	3.320539	23	1.665083	2.231278	3.89636	19	1.482158	2.104081	3.586239	20
Real Estate	1.227568	1.029407	2.569975	26	1.243384	1.047301	2.290485	26	1.274652	1.117403	2.392055	26	1.191914	1.101051	2.292965	26	1.277679	1.172327	2.450005	26	1.242999	1.093498	2.336497	26
Services	1.349058	1.357665	2.706723	24	1.388103	1.627409	3.015512	23	1.526425	1.61879	3.145215	22	1.785648	1.721795	3.507443	20	1.838771	1.997248	3.836019	21	1.577601	1.664581	3.242182	22
Unclassified	3.061026	1.273943	4.334969	9	3.077251	1.056601	4.133852	12	3.27699	1.089566	4.366556	15	3.483062	1.178359	4.661421	13	3.321414	1.125693	4.447108	15	3.245949	1.144832	4.388781	12

Note: The linkages were calculated from the Leontief inverse matrices of each of the sample years.

Table 7.49
Comparison of Key Sector Analysis between using Field of Influence Results and using Leontief inverses of sample years based on averages Thailand

Leontief inverses per year	Rank	Multiplier Product Matrix
Basic Metal	1	Basic Metal
Machinery	2	Machinery
Chemical Industries	3	Chemical Industries
Mining and Quarrying	4	Petroleum Refineries
Petroleum Refineries	5	Textile Industry
Food Manufacturing	6	Mining and Quarrying
Textile Industry	7	Paper Products and Printing
Paper Products and Printing	8	Unclassified
Electricity and Water Works	9	Food Manufacturing
Transportation and Communication	10	Transportation and Communication
Agriculture	11	Trade
Unclassified	12	Electricity and Water Works
Fabricated Metal Products	13	Agriculture
Rubber and Plastic Products	14	Fabricated Metal Products
Other Manufacturing	15	Construction
Trade	16	Rubber and Plastic Products
Non-Metallic Products	17	Non-Metallic Products
Construction	18	Other Manufacturing
Livestock	19	Livestock
Banking and Insurance	20	Restaurants and Hotels
Restaurants and Hotels	21	Beverage and Tobacco Products
Services	22	Banking and Insurance
Beverage and Tobacco Products	23	Unclassified
Fishery	24	Fishery
Forestry	25	Forestry
Real Estate	26	Real Estate

Note: Averages of the total linkages of Tables 47 and 48 were calculated and the sectors were ranked from highest to lowest.

The total linkages calculated directly from the Leontief inverse matrices per year shown on Table 7.48 reveal the following key sectors for the Thai economy when coefficients over the five sample years are averaged out: 1) basic metals; 2) machinery; 3) chemicals; 4) mining and quarrying; 5) petroleum refining; 6) food manufacturing; 7) textiles; 8) paper and printing; 9) electricity and waterworks; and 10) transport and communication. Linkages in turn were weaker for real estate; forestry; fishery; beverage and tobacco; banking and insurance; restaurants and hotels; and livestock.

Comparing the results of key sector analysis arising from the field of influence approach and from the Leontief inverses of each sample year shown in Table 7.49 indicate more commonalities. Nine sectors ranking the highest in both approaches were identical except for the standings which

Table 7.50
Multiplier Product Matrix of Thailand, 1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.001409	0.002288	0.001348	0.001603	0.001529	0.00233	0.001562	0.002793	0.002648	0.002569	0.002216	0.002305	0.002413	0.002824	0.002958	0.002258	0.002429	0.002612	0.001481	0.002116	0.002184	0.001567	0.001345	0.001478	0.003355	0.066862	
2	0.00381	0.003944	0.00556	0.00661	0.006631	0.00961	0.00885	0.001152	0.001092	0.00106	0.009914	0.00951	0.00995	0.001165	0.001173	0.002102	0.00931	0.001002	0.001077	0.000611	0.000873	0.00901	0.006646	0.00555	0.00061	0.001384	0.02345
3	0.00732	0.001189	0.007	0.000833	0.000794	0.002111	0.001014	0.001451	0.001376	0.001335	0.001152	0.001199	0.001252	0.001468	0.001478	0.001337	0.001173	0.001262	0.001357	0.00077	0.0011	0.001135	0.000814	0.000699	0.000768	0.001743	0.029545
4	0.00657	0.003926	0.00545	0.006648	0.006169	0.009943	0.000894	0.001108	0.001071	0.001039	0.000897	0.00931	0.00976	0.001143	0.001151	0.001196	0.009913	0.009983	0.001057	0.000599	0.000858	0.000884	0.006634	0.000544	0.000598	0.001356	0.022992
5	0.00149	0.002418	0.00425	0.001694	0.001616	0.002463	0.002063	0.002952	0.0028	0.002716	0.002342	0.002437	0.00255	0.002985	0.003106	0.003126	0.002387	0.002567	0.002761	0.001566	0.002237	0.002319	0.001656	0.000544	0.001563	0.003546	0.060099
6	0.001171	0.001901	0.00112	0.001332	0.00127	0.001936	0.001621	0.00232	0.0022	0.002134	0.001841	0.001915	0.002005	0.002346	0.002363	0.002457	0.001816	0.002018	0.00217	0.001231	0.001758	0.001815	0.001302	0.001118	0.002128	0.002787	0.047235
7	0.00667	0.000187	0.00641	0.000762	0.000727	0.001107	0.000927	0.001327	0.001259	0.001221	0.001053	0.001096	0.001147	0.001342	0.001352	0.001406	0.001073	0.001154	0.001241	0.000704	0.001006	0.001038	0.000745	0.000639	0.000703	0.001594	0.027019
8	0.00123	0.001985	0.00117	0.001391	0.001327	0.002022	0.001694	0.002424	0.002298	0.002229	0.001923	0.002001	0.002094	0.002451	0.002468	0.002567	0.001959	0.002108	0.002267	0.001286	0.001886	0.001896	0.00136	0.001168	0.001283	0.002911	0.049339
9	0.003911	0.001479	0.000871	0.001036	0.000888	0.001516	0.001261	0.001805	0.001712	0.00166	0.001492	0.00149	0.001559	0.001825	0.001838	0.001912	0.001459	0.00157	0.001688	0.000962	0.001363	0.001412	0.001012	0.000869	0.000955	0.002168	0.06743
10	0.001418	0.002302	0.001356	0.001613	0.001538	0.002345	0.001964	0.00281	0.002655	0.002585	0.00223	0.00232	0.002428	0.002842	0.002862	0.002976	0.002272	0.002444	0.002629	0.001491	0.002129	0.002198	0.001577	0.001354	0.001488	0.003376	0.057214
11	0.001518	0.00247	0.001452	0.001824	0.001544	0.002517	0.002103	0.003008	0.002851	0.002763	0.002336	0.002482	0.002596	0.00302	0.003053	0.003182	0.00243	0.002599	0.002806	0.001596	0.002283	0.002342	0.001688	0.00145	0.001593	0.003613	0.061113
12	0.000725	0.001177	0.000694	0.000825	0.000787	0.001199	0.001004	0.001437	0.001363	0.001322	0.00114	0.001186	0.001242	0.001453	0.001463	0.001522	0.001162	0.001058	0.001169	0.000762	0.001089	0.001124	0.000806	0.000692	0.000761	0.001726	0.029257
13	0.000639	0.001041	0.00617	0.000726	0.000676	0.001059	0.000879	0.001263	0.001184	0.001158	0.000993	0.001042	0.001065	0.001259	0.001683	0.000755	0.00102	0.001058	0.001169	0.000672	0.000962	0.000937	0.00071	0.000612	0.000665	0.001482	0.025325
14	0.001755	0.002849	0.00679	0.001997	0.001904	0.002903	0.002431	0.003479	0.003299	0.0032	0.00276	0.002871	0.003005	0.003517	0.003542	0.003584	0.002812	0.003025	0.003254	0.001845	0.002635	0.002721	0.001952	0.001676	0.001842	0.004179	0.070816
15	0.000636	0.001032	0.00608	0.000723	0.00669	0.001052	0.000881	0.00126	0.001195	0.001159	0.001	0.00104	0.001089	0.001275	0.001284	0.001335	0.001019	0.001096	0.001179	0.000669	0.000958	0.000982	0.000707	0.000607	0.000667	0.001514	0.02566
16	0.001424	0.002312	0.001362	0.00162	0.001545	0.002355	0.001972	0.002822	0.002676	0.002596	0.002239	0.00233	0.002438	0.002854	0.002874	0.002989	0.002282	0.002454	0.002654	0.001497	0.002138	0.002207	0.001583	0.001359	0.001494	0.00339	0.057451
17	0.000699	0.001134	0.00668	0.000795	0.000758	0.001156	0.000968	0.001385	0.001313	0.001274	0.001099	0.001143	0.001196	0.0014	0.00141	0.001467	0.001112	0.001204	0.001295	0.000735	0.001049	0.001083	0.000777	0.000667	0.000733	0.001663	0.028191
18	0.0009	0.001461	0.000861	0.001024	0.000976	0.001488	0.001246	0.001784	0.001692	0.001641	0.001415	0.001472	0.001541	0.001804	0.001816	0.001889	0.001442	0.001551	0.001669	0.000946	0.001351	0.001404	0.000993	0.000859	0.000944	0.002143	0.066313
19	0.000657	0.001067	0.000629	0.000748	0.000713	0.001087	0.00091	0.001309	0.001235	0.001198	0.001093	0.001075	0.001125	0.001317	0.001326	0.00138	0.001064	0.001123	0.001219	0.000691	0.000987	0.001019	0.000731	0.000628	0.00069	0.001565	0.02652
20	0.001445	0.002346	0.001382	0.001643	0.001567	0.002389	0.002001	0.002863	0.002715	0.002634	0.002272	0.002364	0.002474	0.002895	0.002916	0.003032	0.002315	0.00249	0.002678	0.001519	0.002169	0.00224	0.001607	0.001379	0.001516	0.00944	0.058292
21	0.000743	0.001206	0.000711	0.000845	0.000806	0.001229	0.001029	0.001473	0.001396	0.001355	0.001168	0.001216	0.001272	0.001489	0.0015	0.001559	0.001191	0.001281	0.001377	0.000781	0.001116	0.001152	0.000826	0.000709	0.001078	0.002978	
22	0.001026	0.001666	0.000981	0.001167	0.001113	0.001697	0.001421	0.002033	0.001928	0.00187	0.001613	0.001678	0.001757	0.002056	0.002071	0.002159	0.001644	0.001768	0.001902	0.000779	0.001541	0.00159	0.001141	0.00098	0.001076	0.002443	0.041395
23	0.000708	0.001149	0.00677	0.000805	0.000768	0.001171	0.00098	0.001403	0.00133	0.001291	0.001113	0.001158	0.001212	0.001419	0.001429	0.001486	0.001134	0.00122	0.001312	0.000744	0.001063	0.001097	0.000787	0.000676	0.0010743	0.001685	0.02856
24	0.000492	0.000799	0.00471	0.00056	0.000534	0.000814	0.000682	0.000976	0.000925	0.000897	0.000774	0.000805	0.000843	0.000986	0.000993	0.001033	0.000789	0.000848	0.000912	0.000517	0.000739	0.000763	0.000547	0.00047	0.000516	0.001172	0.01986
25	0.00049	0.001054	0.00621	0.000739	0.000705	0.001074	0.000899	0.001287	0.001221	0.001184	0.001021	0.001062	0.001112	0.001302	0.001311	0.001372	0.001084	0.00112	0.001204	0.000682	0.000975	0.001007	0.000722	0.00062	0.000681	0.001546	0.026203
26	0.000609	0.000989	0.00583	0.000693	0.000661	0.001007	0.000844	0.001207	0.001145	0.001111	0.000958	0.000997	0.001043	0.001221	0.001229	0.001279	0.000976	0.001005	0.001129	0.00064	0.000915	0.000944	0.000677	0.000582	0.000639	0.00145	0.024578
SUM	0.0248	0.040271	0.023727	0.028307	0.026785	0.041022	0.034355	0.049124	0.046591	0.045202	0.038937	0.041568	0.042418	0.049656	0.050434	0.051471	0.039737	0.042675	0.04595	0.026077	0.037245	0.038385	0.027568	0.02368	0.026015	0.059001	1

Table 7.51
Hierarchical Cross Structure of the Multiplier Product Matrix, Thailand 1975

	14	11	5	20	16	10	1	8	6	22	9	18	21	3	12	23	17	7	19	25	15	13	26	2	4	24	SUM
26	0.001221	0.000958	0.000661	0.000664	0.001279	0.001111	0.000669	0.001207	0.001007	0.000944	0.001145	0.000915	0.000583	0.000997	0.000677	0.000976	0.000844	0.001129	0.001639	0.001229	0.001043	0.00145	0.000989	0.000693	0.000982	0.0024578	
16	0.002854	0.002239	0.001545	0.001497	0.002989	0.002596	0.001424	0.002822	0.002355	0.002207	0.002676	0.002454	0.002138	0.001362	0.00233	0.001583	0.002282	0.001972	0.00264	0.001494	0.002874	0.002438	0.00339	0.002312	0.00162	0.001359	0.0051451
15	0.001275	0.001	0.000609	0.000669	0.001335	0.001159	0.000656	0.00126	0.001052	0.000982	0.001195	0.001096	0.000958	0.000608	0.00104	0.000707	0.000109	0.000881	0.001179	0.000667	0.001284	0.001089	0.001514	0.001032	0.000723	0.000607	0.002566
14	0.003517	0.00276	0.001904	0.001845	0.003684	0.0032	0.001755	0.003479	0.002903	0.002721	0.003299	0.003025	0.002635	0.001679	0.002871	0.001952	0.002812	0.002431	0.003254	0.001842	0.003542	0.003005	0.004179	0.002849	0.001997	0.001676	0.0070816
8	0.002451	0.001923	0.001327	0.001286	0.002567	0.002229	0.001123	0.002424	0.002022	0.001896	0.002298	0.002108	0.001936	0.00171	0.002001	0.00136	0.001959	0.001694	0.002267	0.001283	0.002468	0.002094	0.002911	0.001985	0.001391	0.001168	0.0049339
9	0.001825	0.001432	0.000988	0.000962	0.001912	0.00166	0.000911	0.001895	0.001393	0.001087	0.001412	0.001712	0.00157	0.001363	0.000871	0.00149	0.001012	0.001459	0.001261	0.001688	0.000955	0.001838	0.001559	0.002168	0.001479	0.001036	0.006743
19	0.001317	0.001033	0.000713	0.000691	0.00138	0.001198	0.000657	0.00139	0.001087	0.001019	0.001235	0.001123	0.000987	0.000629	0.001075	0.000731	0.001064	0.00091	0.00069	0.001326	0.001125	0.001555	0.001067	0.000748	0.000628	0.002652	
10	0.002842	0.00223	0.001538	0.001491	0.002976	0.002585	0.001418	0.00281	0.002345	0.002198	0.002665	0.002444	0.002129	0.001356	0.00232	0.001577	0.002272	0.001964	0.002629	0.001488	0.002862	0.002428	0.003376	0.002302	0.001613	0.001354	0.0057214
18	0.001804	0.001415	0.000976	0.000946	0.001889	0.001641	0.0009	0.001784	0.001488	0.001404	0.001692	0.001551	0.001351	0.000861	0.001472	0.000993	0.001442	0.001246	0.001669	0.000944	0.001816	0.001541	0.002143	0.001461	0.001024	0.000859	0.006313
13	0.001259	0.000993	0.000676	0.000672	0.000755	0.001158	0.000659	0.001263	0.001059	0.000957	0.001184	0.001058	0.000962	0.000617	0.001042	0.00071	0.00102	0.000879	0.001169	0.000665	0.001683	0.001165	0.001482	0.001041	0.000726	0.000612	0.0025325
6	0.002346	0.001841	0.00127	0.001231	0.002457	0.002134	0.001171	0.00232	0.001936	0.001815	0.0022	0.002018	0.001758	0.001112	0.001915	0.001302	0.001876	0.001621	0.00217	0.001228	0.002363	0.002005	0.002787	0.001901	0.001332	0.001118	0.0047235
12	0.001453	0.00114	0.000787	0.000762	0.001522	0.001322	0.000725	0.001437	0.001199	0.001124	0.001363	0.00125	0.001089	0.000694	0.001186	0.000806	0.001162	0.001004	0.001344	0.000761	0.001463	0.001242	0.001726	0.001177	0.000825	0.000692	0.0029257
2	0.001165	0.000914	0.000631	0.000611	0.00122	0.00106	0.000581	0.001152	0.000961	0.000901	0.001092	0.001002	0.000873	0.000556	0.000951	0.000646	0.000931	0.000895	0.001077	0.00061	0.001173	0.000995	0.001384	0.000944	0.000661	0.000555	0.002345
17	0.0014	0.001099	0.000758	0.000735	0.001467	0.001274	0.000699	0.001385	0.001156	0.001083	0.001313	0.001204	0.001049	0.000668	0.001143	0.000777	0.00112	0.000968	0.001295	0.000733	0.00141	0.001196	0.001663	0.001134	0.000795	0.000667	0.0028191
11	0.00802	0.00236	0.001544	0.001596	0.003182	0.002763	0.001518	0.003008	0.002517	0.002342	0.002851	0.002599	0.002283	0.001452	0.002482	0.001688	0.002432	0.002103	0.002806	0.001593	0.003053	0.002586	0.003613	0.00247	0.001824	0.00145	0.006113
22	0.002056	0.001613	0.001113	0.001079	0.002153	0.00187	0.001026	0.00203	0.001697	0.00159	0.001928	0.001768	0.001541	0.000981	0.001678	0.001141	0.001644	0.001421	0.001902	0.001076	0.002071	0.001757	0.002443	0.001666	0.001167	0.00098	0.0041395
21	0.001489	0.001168	0.000806	0.000781	0.001559	0.001355	0.000743	0.001473	0.001229	0.001152	0.001396	0.001281	0.001116	0.000711	0.001216	0.000826	0.001191	0.001029	0.001377	0.00078	0.0015	0.001272	0.001769	0.001206	0.000845	0.000709	0.0029978
7	0.001342	0.001053	0.000727	0.000704	0.001406	0.001221	0.00067	0.001327	0.001107	0.001038	0.001259	0.001154	0.001006	0.000641	0.001096	0.000745	0.001073	0.000927	0.001241	0.000703	0.001352	0.001147	0.001594	0.001087	0.000762	0.000639	0.0027019
4	0.001143	0.000897	0.000619	0.000599	0.001196	0.001039	0.00057	0.001108	0.000943	0.000884	0.001071	0.000983	0.000858	0.000545	0.000931	0.000634	0.000913	0.000804	0.001057	0.000598	0.001151	0.000976	0.001356	0.000926	0.000648	0.000544	0.0022992
23	0.001419	0.001113	0.000768	0.000744	0.001486	0.001291	0.000708	0.001403	0.001171	0.001097	0.00133	0.001222	0.001063	0.000677	0.001158	0.000787	0.001134	0.00098	0.001312	0.000743	0.001429	0.001212	0.001685	0.001149	0.000805	0.000676	0.002856
5	0.002985	0.002342	0.001616	0.001566	0.003126	0.002716	0.00149	0.002952	0.002463	0.002309	0.0028	0.002567	0.002237	0.001425	0.002437	0.001656	0.002387	0.002063	0.002761	0.001563	0.003006	0.00255	0.003546	0.002418	0.001694	0.001422	0.0060099
20	0.002895	0.002272	0.001567	0.001519	0.003032	0.002634	0.001445	0.002863	0.002389	0.00224	0.002715	0.00249	0.002169	0.001382	0.002364	0.001607	0.002315	0.002001	0.002678	0.001516	0.002916	0.002474	0.00344	0.002346	0.001643	0.001379	0.0058292
25	0.001302	0.001021	0.000705	0.000682	0.001372	0.001184	0.000649	0.001287	0.001074	0.001007	0.001221	0.001112	0.000975	0.000621	0.001062	0.000722	0.001034	0.000899	0.001204	0.000681	0.001311	0.001112	0.001546	0.001054	0.000739	0.00062	0.0026203
1	0.002824	0.002216	0.001529	0.001481	0.002958	0.002569	0.001409	0.002793	0.00233	0.002184	0.002648	0.002429	0.002116	0.001348	0.002305	0.001567	0.002258	0.001952	0.002612	0.001478	0.002844	0.002413	0.003355	0.002288	0.001603	0.001345	0.0056852
3	0.001468	0.001152	0.000794	0.00077	0.001537	0.001335	0.000732	0.001451	0.001211	0.001135	0.001376	0.001262	0.0011	0.0007	0.001199	0.000814	0.001173	0.001014	0.001357	0.000768	0.001478	0.001252	0.001749	0.001189	0.000833	0.000699	0.0029545
24	0.000986	0.000774	0.000534	0.000517	0.001033	0.000897	0.000492	0.000976	0.000814	0.000763	0.000925	0.000848	0.000739	0.000471	0.000805	0.000547	0.000789	0.000682	0.000912	0.000516	0.000993	0.000843	0.001172	0.000799	0.000356	0.000047	0.001986
SUM	0.049656	0.038937	0.026785	0.026077	0.051471	0.045202	0.0248	0.049124	0.041022	0.038385	0.046591	0.042675	0.037745	0.023727	0.040568	0.027568	0.039737	0.034355	0.045395	0.026015	0.050434	0.042418	0.059001	0.040271	0.028307	0.02368	1

Figure 7.25
Economic Landscape of Thailand, 1975

changed for some industries. Only electricity and water works which ranked ninth under the traditional approach and unclassified sectors which ranked eighth under the field of influence method differed between both approaches. As for sectors with weak linkage effects, only services which ranked 22nd under the old approach and unclassified sectors which ranked 23rd under the new approach were dissimilar. Under both approaches to key sector analysis, the analysis showed real estate; forestry; fishery; beverage and tobacco; banking and insurance; restaurants and hotels; and livestock consistently ranked as the least intensive sectors.

The multiplier product matrix of Thailand which weighs the field of influence by the total intensity is exhibited in Table 7.50. By reordering the multiplier product matrix by the rank size of forward and backward linkages, one obtains the hierarchical cross structure of Thailand in 1975 as detailed in Table 7.51. The graphical illustration of this cross structure portrays the economic landscape of Thailand pictured in Figure 7.25.

Five sectors dominate in terms of backward and forward linkages in Thailand's economic structure: 1) basic metals; 2) chemicals; 3) petroleum; 4) food manufacturing; and 5) textiles. In addition to these sectors, those with strong backward linkages are: agriculture, mining, trade, machinery, and transport and communications. Moreover, additional sectors with strong forward linkages are: unclassified industries; machinery; fabricated metals, paper and printing; construction; electricity and waterworks; non-metallic products; rubber and plastic products; livestock, and other manufacturing.

The section on applications of the field of influence approach to crisis will further analyse how the field of influence approach to key sector analysis decomposes the Leontief inverse into self-influence and scaling effects shown by the N matrix and the sectoral balancing effects revealed by the residual matrices for Thailand.

7.3 Applications on Crisis

As mentioned in Chapter 6 on the methodology part, the field of influence approach of input-output analysis can also be used to illustrate the propagation of crisis and not just spread of technological change across sectors. Thus, the results of the linkage intensities and the change in technical coefficients on the surface of the field of influence will also be used to show how a sector-specific shock can spread across the whole economy by influencing supplying and buying sectors. This follows the propagation model described in Alatríste Contreras (2014) and Alatríste Contreras & Fagiolo (2014) in Chapter 6. The ultimate result of multiplying the intensity of the direct field of influence on the change in technical coefficients and the reciprocal of the ratio of the determinants of the initial year's inverse matrix to that of the succeeding year maps out the extent of propagation of sector-specific shocks in the case of crisis. As explained by Sonis & Hewings (2009, n.d.), changes in inverse coefficients of these key sectors would create the largest volume of change in the input-output system. These maps of propagation will be presented. The variances of the change in linkage intensities will be calculated to show the extent of propagation by sector. The backward, forward and total linkages for each year based on the field of influence calculations and ranked in descending order reveal the key sectors of the economy that are sensitive to business cycles in accordance with the Forrester or bullwhip effect. Finally, decomposition of the Leontief inverse into scaling effects reflecting self-influence of sectors on the rest of the economy through the N matrix will be calculated, from which the diagonal matrix and residual matrices will be derived. The residual matrix will also be partitioned to show the symmetric and anti-symmetric matrices that represent sectoral distortions representing compensatory relations between different sectors adjusting to sector-specific shocks.

7.3.1 Results for the Philippines

Figure 7.26 compares the propagation extent of sectors in the Philippines compared to the base year period 1969 as revealed by the change in technical coefficients on the surface of the field of influence map (first round effects). The changes in technical coefficients were more dispersed in 1979, 1994 and 2006 compared to the base year 1969. In these years, heavier shades are observed in sectors 7 to 10 (footwear and wearing apparel, wood products, furniture and printing); sectors 14 to 16 (chemicals, petroleum products and non-metals) and sectors 20 to 22 (electrical machinery, transport equipment and miscellaneous manufactures).

To measure the spread of propagation, the variance was calculated for the linkage intensities for each sector following Sonis, Guilhoto, Hewings & Martins (1995). The variance in statistics measures how far a set of random observations are spread out from their average values. The variances were calculated for both backward (column totals) and forward (row totals) for each sector and their mean was calculated to indicate the average variance for the sector. Table 7.52 shows the variances of the linkage intensities for the Philippines using the direct field of influence multiplied by the change in technical coefficients and weighted by the volume, and the average variances for each sector are illustrated in Figure 7.27. In statistics, the variance measures the spread of a distribution from the mean and hence the extent of dispersion. The propagation of sector-specific shocks were extensive in 2000 and 1979 compared to the other years.

Following Acemoglu, Akcigit & Kerr (2015) who posited demand-side shocks to propagate upstream to supplier firms and supply-side shocks to propagate downstream to buyer firms, the next stage of the analysis for this study is to identify the sectors that have strong backward linkages (upstream or supplier sectors) and sectors that have strong forward linkages (downstream

or buying sectors). Table 7.26 presented earlier shows the backward, forward and total linkages for the Philippines. The backward linkage sectors have values exceeding both the average backward linkage for all sectors and the corresponding forward linkage indices for that sector. The forward linkage sectors, in turn, have higher values than the sectoral average forward linkage index and are higher than the backward linkage index for that sector. As described in Chapter 4, the upstream sectors are most sensitive to the business cycle due to the maintenance of safety stocks by suppliers even if demand has declined which suppliers could not foresee due to the bullwhip or Forrester effect.

Figure 7.26
Aerial Map of the Changes in Inverse Coefficients on the Field of Influence Surface over the Sample Years for the Philippines

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles 7 Footwear & wearing apparel 8 Wood products 9 Furniture & fixtures 10 Paper & products 11 Printed materials 12 Leather & leather products 13 Rubber products 14 Chemicals 15 Petroleum products 16 Non-metallic products 17 Ferrous metallic products 18 Non-ferrous metallic products 19 Non-electrical machinery 20 Electrical machinery 21 Transport equipment 22 Miscellaneous manufactures 23 Construction 24 Wholesale & retail trade 25 Transport services 26 Communication 27 Electricity, gas & water 28 Banking, insurance & real estate 29 Other services

In the Philippines, the propagation of shocks were extensive on average from 1979 to 2006 for the following sectors: 1) textiles; 2) footwear and wearing apparel; 3) electrical machinery; 4)

Figure 7.27
Average Variances of the Linkage Intensities for the Philippines 1979-2006

Figure 7.28
Backward and Forward Linkages based on Field of Influence Results Philippines, 1969-2006

wholesale and retail trade; 5) ferrous metal products; 6) transport equipment; 7) leather and leather products; 8) chemicals; 9) non-ferrous metal products; and 10) petroleum products. On the other hand, the sectors that exerted lesser spread of shocks on the economy were: 1) beverages; 2) construction; 3) communication; 4) non-metallic products; 5) other services; 6) rubber; 7) banking, insurance and real estate; 8) transport services; 9) printing; and 10) miscellaneous manufacturing.

Table 7.52
Variances of the Linkage Intensities of the Philippines, 1979-2006

Sectors	2006				2000				1994				1988				1979			
	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank
Agriculture, fishing & forestry	3.3573E-06	2.4846E-05	1.4102E-05	14	1.59597E-06	0.00015867	8.01063E-05	9	1.7862E-05	1.13904E-05	6.5883E-06	18	2.2032E-07	1.8452E-05	9.3227E-06	7	5.43387E-05	6.63096E-05	3.5871E-05	10
Mining	5.05939E-06	6.19712E-05	3.3515E-05	9	1.2663E-05	7.47281E-05	4.34977E-05	14	6.0391E-06	3.7188E-05	2.1614E-05	12	1.2967E-06	1.03742E-05	5.83505E-06	12	8.67014E-06	5.15777E-05	3.0121E-05	13
Food manufactures	2.33889E-06	1.4507E-05	8.4243E-06	20	6.929E-05	1.45198E-05	4.1904E-05	15	2.207E-06	8.19121E-06	5.1991E-06	20	1.2163E-05	4.93211E-06	8.54755E-06	8	1.14516E-05	2.5897E-05	1.8674E-05	19
Beverages	5.40275E-06	2.43302E-06	3.91789E-06	25	1.73301E-05	6.51194E-07	8.99666E-06	27	3.7076E-06	4.29155E-08	1.8753E-06	26	2.1452E-06	1.55976E-08	1.08041E-06	26	2.2539E-05	7.98842E-07	1.1669E-05	24
Tobacco products	1.98192E-05	2.22657E-05	1.10224E-05	17	2.7876E-05	1.96655E-05	2.34712E-05	23	1.6268E-05	6.29733E-06	9.4825E-06	16	2.8086E-05	1.82116E-06	2.315E-06	18	4.99798E-05	1.24603E-05	4.5613E-05	8
Textile products	1.31174E-05	0.000149852	8.14846E-05	3	0.000223299	0.006642309	0.03432354	1	4.3454E-06	6.78264E-05	3.6086E-05	5	2.8965E-05	0.0001792	0.000103248	1	2.82965E-05	7.76034E-05	1.6439E-05	14
Footwear & wearing apparel	0.000105904	3.25028E-08	5.25632E-05	5	0.006459602	9.9101E-05	0.00327951	2	7.8892E-05	4.03541E-06	4.1464E-05	3	0.00015742	7.25955E-09	7.87115E-05	2	1.67994E-05	1.23514E-06	9.073E-06	26
Wood products	2.55164E-05	2.22621E-05	2.8899E-05	12	5.75332E-05	4.16043E-05	4.95688E-05	12	3.664E-06	3.04445E-06	3.3542E-06	22	4.7809E-06	2.29644E-07	2.50529E-06	15	1.71121E-05	8.79624E-05	5.2937E-05	5
Furniture & fixtures	2.6385E-05	2.3E-07	1.32942E-05	15	7.06409E-05	1.24981E-06	3.59453E-05	18	5.547E-06	7.01219E-08	2.8086E-06	25	1.456E-06	1.57107E-08	7.31563E-07	27	0.000101029	6.83796E-08	5.0549E-05	6
Paper & paper products	3.5201E-05	1.52598E-05	2.52304E-05	11	2.31797E-05	1.2323E-05	2.2251E-05	25	3.4783E-05	8.3814E-05	5.9288E-05	1	1.2974E-05	1.18929E-05	1.24377E-05	6	2.17578E-05	4.66679E-05	3.4213E-05	11
Printed materials	1.29859E-05	7.32287E-07	6.85906E-06	23	1.61224E-05	6.8208E-07	8.40224E-06	29	5.0678E-05	1.77019E-05	2.5408E-05	10	3.0863E-06	4.86522E-08	1.56749E-06	23	5.02589E-05	2.16567E-07	2.5238E-05	15
Leather & leather products	9.34048E-05	2.51927E-05	5.92987E-05	4	0.000175218	0.000114632	0.000144925	7	3.8419E-05	3.50348E-05	3.6727E-05	4	8.4909E-06	6.32751E-06	7.4092E-06	10	2.92965E-05	1.30166E-05	2.1157E-05	17
Rubber products	1.9943E-05	1.73999E-06	1.08422E-05	18	5.38658E-05	2.1529E-06	2.80094E-05	21	5.7551E-06	2.47628E-06	4.1157E-06	21	3.8161E-06	1.95426E-07	2.0577E-06	19	2.56634E-05	2.9544E-06	1.4309E-05	23
Chemicals	2.3205E-05	1.86949E-05	2.09507E-05	13	5.51475E-05	0.000267955	0.000161551	6	1.0204E-05	5.34945E-06	7.7766E-06	17	8.2945E-06	7.98325E-06	8.13888E-06	9	6.2021E-05	7.55133E-05	6.8767E-05	4
Petroleum products	1.49182E-05	3.99438E-05	2.7431E-05	10	9.72654E-06	8.27097E-05	4.62191E-05	13	8.1238E-06	5.11906E-05	2.9657E-05	7	1.002E-05	1.06698E-06	5.54336E-06	13	6.78885E-06	0.00013347	7.0103E-05	3
Non-metallic products	1.30154E-05	2.54623E-05	7.7802E-06	22	1.12163E-05	5.5941E-06	8.4052E-06	28	1.9984E-05	9.09132E-07	1.0447E-05	15	3.0582E-06	5.67932E-07	1.81306E-06	22	2.08655E-05	9.48473E-07	1.0907E-05	25
Ferrous metal products	3.58041E-05	3.45435E-05	3.51738E-05	8	0.000148163	0.00033249	0.000240256	2	3.781E-05	2.91013E-05	3.3456E-05	6	1.4243E-05	3.1801E-05	2.302E-05	4	0.000188204	0.000146288	0.00012725	1
Non-ferrous metal products	9.58032E-05	4.4319E-06	5.01175E-05	6	8.28512E-05	7.48788E-05	7.8863E-05	10	3.1954E-05	8.49483E-06	2.0226E-05	13	1.8791E-05	6.44152E-06	1.2616E-05	5	6.0014E-05	1.33796E-05	3.6886E-05	9
Non-electrical machinery	2.36225E-05	1.20738E-06	1.24149E-05	16	0.000188775	2.47182E-05	6.7449E-05	11	5.5928E-05	2.05463E-05	2.3227E-05	11	1.244E-05	6.67559E-08	6.5342E-06	11	4.45112E-05	2.8752E-07	2.297E-05	16
Electrical machinery	9.48975E-05	9.26951E-05	9.37913E-05	2	0.002095668	0.001680486	0.001888077	3	3.124E-05	2.69158E-05	2.9078E-05	8	2.9461E-06	8.68031E-07	1.90706E-06	20	1.54084E-05	2.11968E-06	8.7691E-06	27
Transport equipment	0.00015333	8.84146E-05	0.000120873	1	0.000152377	8.513E-05	0.000118754	8	4.8366E-05	4.15466E-05	4.491E-05	2	2.6546E-05	2.51719E-05	2.98598E-05	3	5.92407E-05	3.76188E-05	4.8442E-05	7
Miscellaneous manufactures	1.38791E-05	4.7336E-06	9.50633E-06	19	2.48709E-05	2.09436E-05	2.29077E-05	24	8.8086E-05	3.37206E-06	6.0909E-06	19	3.4818E-06	1.47872E-06	2.48024E-06	16	5.48777E-05	8.88678E-06	3.1882E-05	12
Construction	6.10706E-06	2.29826E-06	1.31684E-06	26	2.99409E-05	1.07502E-06	1.55079E-05	26	5.5598E-06	1.331645E-07	2.8407E-06	24	4.5765E-06	6.09615E-08	2.31873E-06	17	8.045933E-06	9.40214E-07	4.6989E-06	28
Wholesale & retail trade	1.07974E-05	6.88776E-05	3.98375E-05	7	1.09711E-05	0.000171796	0.000591383	4	3.4245E-06	3.01919E-06	3.2218E-06	23	1.38E-06	7.50209E-06	4.44104E-06	14	7.54503E-06	3.03888E-05	1.9192E-05	18
Transport services	1.51826E-05	5.27245E-07	7.85492E-06	21	2.58024E-05	2.43179E-05	2.49402E-05	22	2.8941E-05	9.77134E-07	1.4959E-05	14	4.6442E-07	9.64556E-07	7.1454E-07	28	2.79316E-05	3.81641E-06	1.5874E-05	20
Communication	3.96095E-06	5.67362E-07	2.6516E-06	27	5.97421E-05	3.5314E-06	3.16368E-05	19	1.2574E-06	5.93181E-07	9.2591E-07	29	4.2306E-07	7.43722E-08	2.48715E-07	29	4.72592E-06	1.797194E-06	3.2989E-06	29
Electricity, gas & water	2.64852E-06	1.29307E-06	1.9708E-06	28	3.50228E-05	2.98897E-05	3.0407E-05	20	5.004E-05	3.54639E-06	2.6793E-05	9	1.9157E-06	1.75321E-06	1.83474E-06	21	0.000193612	1.78309E-05	0.00010572	2
Banking, insurance & real estate	4.12817E-06	6.31756E-06	5.22297E-06	24	2.13698E-06	7.44702E-05	3.8304E-06	16	6.9523E-06	1.22719E-06	9.6121E-07	28	5.6733E-07	1.87121E-06	1.20492E-06	25	1.73323E-06	2.87341E-05	1.5233E-05	21
Other services	9.16159E-07	2.25008E-06	1.58312E-06	29	4.82255E-06	7.16609E-05	3.82447E-05	17	1.3758E-06	2.01986E-06	1.6978E-06	27	9.6188E-07	2.05139E-06	1.56604E-06	24	2.2356E-05	7.89907E-06	1.5117E-05	22
Average	3.03891E-05	2.7493E-05	2.7041E-05		0.000347033	0.000384074	0.000365554		1.951E-05	1.58402E-05	1.7597E-05		1.2045E-05	1.1011E-05	1.15729E-05		3.74687E-05	3.0482E-05	3.3808E-05	

Note: The variances were calculated using the VAR.P (for population) formula in Excel and applied on the weighted changes in linkage intensities (Appendix 6).

Based on the average variances for all years, the five sectors that exceeded the average in the Philippines and therefore have the widest network of interdependency were: 1) textiles; 2) footwear and wearing apparel; 3) electrical machinery; 4) trade and 5) ferrous metals.

Figure 7.28 shows the backward and forward linkages based on the field of influence calculations. Averaging the data for the Philippines from 1969 to 2006 and following the criteria discussed in Sonis & Hewings (1999), Figure 7.29 shows that the sectors with strong forward and backward linkages are: 1) ferrous metals; 2) chemicals; 3) petroleum; 4) paper; 5) non-ferrous metals; 6) textiles; and 7) food manufacturing. Sectors with strong backward linkages and therefore most sensitive to business cycles are: 1) transport equipment; 2) electrical machinery; 3) leather; 4) rubber; 5) construction; 6) footwear; and 7) non-electrical machinery. This implies that a change in demand will starkly affect these supplier industries. On the other hand, the sectors with strong forward linkages are: 1) trade; 2) agriculture, fishery and forestry; 3) other services; 4) mining; 5) banking; and 6) transport services. Supply-side shocks such as changes in technology affect these buying industries the most. The weak interdependent sectors are: 1) electricity, gas and water; 2) wood; 3) communication; 4) non-metallic production; 5) tobacco; and 6) beverages.

The synergetic relationships among sectors that create the largest scaling effects on the volume of change in the economic system is further shown in the N matrices on Appendix 7 and portrayed in Figure 7.30.

Figure 7.29
Key Sectors based on Field of Influence Results
Philippines, Average 1969-2006

Figure 7.30
**Self-Influence and Scaling Effects
from the N Matrix Philippines, 1969**

Figure 7.31
**Sectoral Compensating Balances under
Residual Matrix Philippines, 1969**

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles
7 Footwear & wearing apparel 8 Wood products 9 Furniture & fixtures 10 Paper & products 11 Printed
materials 12 Leather & leather products 13 Rubber products 14 Chemicals 15 Petroleum products 16 Non-
metallic products 17 Ferrous metallic products 18 Non-ferrous metallic products 19 Non-electrical machinery
20 Electrical machinery 21 Transport equipment 22 Miscellaneous manufactures 23 Construction 24
Wholesale & retail trade 25 Transport services 26 Communication 27 Electricity, gas & water 28 Banking,
insurance & real estate 29 Other services

The diagonal elements of the N matrix reveal that the multipliers along the diagonals that exceeded the average value throughout the sample years were the highest for the following sectors: 1) textiles; 2) transport equipment; 3) ferrous metals; 4) paper; 5) chemicals; 6) tobacco; 7) non-ferrous metals; and 8) electrical machinery. This indicates that these sectors have the highest self-influence in cases of sector-specific technological change or sector-specific crisis that produces the most impact on the entire economic output. The sectors that exert the least self-influence for all sample years for the Philippines were: 1) furniture and fixtures; 2) communication; 3) printing; 4) wholesale and retail trade; 5) footwear and wearing apparel; 6) construction; 7) miscellaneous manufacturing; and 8) leather and leather products. The scaling effects were high for the following pairs of sectors: agriculture and food manufacturing; agriculture and wood products; agriculture and chemicals; mining and petroleum; paper and printing; leather and footwear; non-ferrous metals and ferrous metals; and non-electrical machinery and ferrous metals.

Meanwhile, the sectoral compensatory balances of the residual matrices for the Philippines are shown in Appendix 8 and depicted in Figure 7.31. The largest sectoral balancing effects occur between 1) food manufacturing and agriculture; 2) petroleum and mining; 3) printing and paper; 4) footwear/wearing apparel and leather; 5) ferrous and non-ferrous metals; 6) non-electrical machinery and ferrous metals; 7) food manufacturing and leather; 8) agriculture and chemicals; 9) agriculture and wood; 10) petroleum and electricity, gas and water; 11) rubber and chemicals; 12) wood and furniture; 13) trade and banking; and 14) mining and non-metals.

The symmetric and anti-symmetric components for these sectors shown respectively on Appendices 9 and 10 simply show the same coefficients with the correct signs under the column and row headings of each pair of sectors under symmetric and with opposite signs under anti-symmetric.

In Figures 7.32 and 7.33 are charted the respective N matrices and residual matrices for the rest of the sample years for the Philippines. It can be observed that the charts are very similar to the initial year due to the fact that the multiplier product matrices were calculated on the basis of the first order field of influence intensities using the inverse matrix of the base year. The only difference is that the multiplier product matrices are multiplied by the matrix of the change in technical coefficients and are scaled by these changes and weighed by their volume (sum of rows and column entries). From the N matrices, the sectors which exert strong scaling effects on other sectors are consistent throughout the sample years: electrical machinery, ferrous metals, chemicals, textiles, paper, tobacco, petroleum, food manufacturing, and electricity, gas and water. The economic self-influence of some sectors were stronger in selected years such as footwear and wearing apparel in 1988, 1994 and 2000; transport equipment in 1979, 1994 and 2000; and banking, finance and real estate in 2006. Meanwhile, the residual matrices in 1979 through 2006 show increasing bilateral balances and imbalances through push-pull backward and forward linkages among sectors similar to those depicted in 1969.

7.3.2 Results for Malaysia

The aerial map for Malaysia in Figure 7.34 depicts that the extent of propagation of inter-industry shocks triggered by the change in technical coefficients representing technological change was pronounced in 2000 and 2006 although the pattern of propagation is already discernible in 1983 and 1991. This implies that almost the same sectors have been experiencing changes in technical coefficients over the years. Sectors 11, 16, 19, 21 and 23 (representing

Figure 7.32
Scaling Effects from Self-Influencing Sectors from N Matrices
Philippines, 1979-2006

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles 7 Footwear & wearing apparel 8 Wood products 9 Furniture & fixtures 10 Paper & products 11 Printed materials 12 Leather & leather products 13 Rubber products 14 Chemicals 15 Petroleum products 16 Non-metallic products 17 Ferrous metallic products 18 Non-ferrous metallic products 19 Non-electrical machinery 20 Electrical machinery 21 Transport equipment 22 Miscellaneous manufactures 23 Construction 24 Wholesale & retail trade 25 Transport services 26 Communication 27 Electricity, gas & water 28 Banking, insurance & real estate 29 Other services

petrol and coal; electrical and industrial machinery; electricity, gas and water; trade; and communication) have pervasive effects across other sectors especially in 2000 and 2005 as evident from the shaded areas almost tracing a horizontal line. Analogously, the extent of propagation can be applied in the case of sector-specific shocks affecting these industries.

In Malaysia, the variances of the linkage intensities shown in Table 7.53 indicate the extent of propagation of shocks. Based on this information, the average variances of the linkage intensities as shown in Figure 7.35 were greater during the period 1983 to 2005 for the following sectors: 1) miscellaneous manufacturing; 2) mining; 3) petrol and coal; 4) food manufacturing; 5) iron and steel; 6) agriculture, fishery and forestry; 7) textile, leather, footwear and wearing apparel; 8) transport and transport equipment; 9) wood and wooden products; and 10) rubber and rubber products. The sectors that propagate lesser sector-specific shocks based on average variances of the linkage intensities were: 1) banking, finance and real estate; 2) public services; 3) construction; 4) communication; 5) paper and printing; 6) tobacco manufacturing; 7) beverages; 8) non-metallic manufacturing; 9) electrical and industrial machinery and 10) transport services.

Figure 7.34

Aerial Map of the Changes in Inverse Coefficients on the Field of Influence Surface over the Sample Years for Malaysia

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles , Leather, Footwear & Wearing apparel 7 Wood & wooden products 8 Furniture & fixtures 9 Paper & paper products 10 Chemicals 11 Petrol & Coal 12 Rubber & rubber products 13 Non-Metallic Manufacturing 14 Iron & Steel 15 Non-Ferrous & other metals 16 Electrical & industrial machinery 17 Transport & transport equipment 18 Miscellaneous manufacturing 19 Electricity, gas & water 20 Construction 21 Trade 22 Transport services 23 Communication 24 Banking, finance and real estate 25 Private services 26 Public services

Table 7.53
Variances of the Linkage Intensities of Malaysia, 1983-2005

Sectors	2005				2000				1991				1983			
	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank
Agriculture, Fishery and Forestry	5.3498E-06	4.56566E-06	2.55031E-05	9	3.58725E-05	0.002579226	0.001308	3	3.58725E-05	0.000761543	0.000399	7	9.85819E-05	0.000548659	0.000324	8
Mining	9.6125E-07	6.28016E-05	3.18814E-05	4	2.09211E-05	0.00320476	0.001613	1	2.09211E-05	0.004709474	0.002365	1	9.01434E-05	0.003526517	0.001808	3
Food manufacturing	2.5019E-05	2.72552E-05	2.61373E-05	8	0.000450023	0.001420248	0.000935	6	0.000450023	0.000470338	0.00046	6	0.002148697	0.002209593	0.002179	2
Beverage	1.7346E-05	1.65928E-05	1.69692E-05	12	5.89916E-05	0.000110398	8.47E-05	19	5.89916E-05	3.92715E-07	2.97E-05	23	0.00025852	1.05007E-06	0.00013	13
Tobacco manufacturing	1.4639E-05	1.24931E-05	1.35663E-05	14	0.000106132	1.45526E-05	6.03E-05	22	0.000106132	5.39818E-05	8.01E-05	16	0.000102597	1.60783E-07	5.14E-05	21
Textile, leather, footwear, wearing apparel	1.0401E-05	4.47551E-06	7.4381E-06	22	0.000552121	0.000462727	0.000507	8	0.000552121	0.00056162	0.000557	5	0.000372338	0.000351209	0.000362	7
Wood and wooden products	2.7505E-06	1.46759E-06	2.10904E-06	26	0.000352209	0.001016123	0.000684	7	0.000352209	0.000272582	0.000312	8	0.000146586	6.15133E-06	7.64E-05	16
Furniture and fixtures	9.2024E-06	1.74187E-07	4.68029E-06	24	0.000350699	5.0332E-05	0.0002	12	0.000350699	3.6388E-07	0.000176	12	9.81539E-05	9.43022E-06	5.38E-05	19
Paper and printing	1.8118E-05	1.90498E-05	1.85899E-05	11	5.97227E-06	0.000203333	0.000105	17	5.97227E-06	3.60032E-05	2.1E-05	25	4.56928E-05	5.75052E-05	5.16E-05	20
Chemical manufacturing	1.4711E-05	4.06659E-06	9.3889E-06	19	0.000125317	0.00018919	0.000157	14	0.000125317	1.8316E-05	7.18E-05	17	0.000318322	0.000284849	0.000302	9
Petrol and coal	5.4075E-06	1.37863E-05	9.59687E-06	16	0.002471722	0.000724934	0.001571	2	0.002471722	0.000240759	0.001329	2	0.002599419	5.56567E-05	0.001328	4
Rubber and rubber products	0.00012403	9.30806E-05	0.000108556	1	0.000324561	0.000382531	0.000354	10	0.000324561	2.88825E-05	0.000177	11	0.000112187	1.23806E-05	6.23E-05	17
Non metallic manufacturing	1.1123E-05	8.12219E-06	9.62271E-06	18	5.17925E-05	0.000142801	9.73E-05	18	5.17925E-05	5.75957E-05	5.47E-05	19	0.000109386	0.000120811	0.000115	15
Iron and steel	8.9607E-05	2.14034E-05	5.5505E-05	2	0.00221991	0.0003329	0.001276	4	0.00221991	0.000176495	0.001198	3	0.000828899	0.000133181	0.000481	6
Non-ferrous and other metals	1.6533E-05	1.64973E-05	1.6525E-05	13	0.000143852	0.000132689	0.000138	15	0.000143852	0.00024993	0.000134	13	6.8259E-05	5.20155E-05	6.01E-05	18
Electrical and industrial machinery	1.3463E-05	1.34721E-05	1.34676E-05	15	1.85829E-05	0.000136038	7.73E-05	21	1.85829E-05	9.06577E-05	5.46E-05	20	0.000115218	0.000163301	0.000139	12
Transport and transport equipment	1.5769E-05	8.89544E-06	1.23324E-05	16	0.000232019	0.000687447	0.00046	9	0.000232019	0.000210886	0.000221	9	0.000550651	0.000532783	0.000542	5
Misc. manufacturing	3.5331E-05	2.05463E-05	2.80386E-05	7	0.000957987	0.001093097	0.001026	5	0.000957987	0.000955584	0.000957	4	0.004555862	0.004237515	0.004397	1
Electricity, gas and water	2.8994E-05	2.77103E-05	2.80521E-05	6	0.000361707	0.000132385	0.000247	11	0.000361707	5.10307E-05	0.000206	10	0.000183461	7.73092E-05	0.00013	13
Construction	9.2245E-06	1.13413E-06	5.17932E-06	23	4.88676E-05	6.55369E-05	5.72E-05	23	4.88676E-05	6.74888E-05	2.78E-05	24	5.64505E-05	8.47999E-06	3.25E-05	22
Trade	2.3594E-06	1.55463E-05	8.95285E-06	21	2.61961E-05	0.00033034	0.000178	13	2.61961E-05	0.00019745	0.000109	14	9.62956E-05	0.000496603	0.000296	10
Transport	4.2395E-05	3.14054E-05	3.6902E-05	3	4.92635E-05	0.000109217	7.92E-05	20	4.92635E-05	4.43528E-05	4.68E-05	21	4.26058E-05	0.000212544	0.000128	14
Communication	1.7547E-05	5.41481E-06	1.14809E-05	17	8.61628E-05	1.82196E-05	5.22E-05	24	8.61628E-05	7.86519E-05	8.24E-05	15	3.45961E-05	4.33662E-06	1.95E-05	23
Banking, finance and real estate	1.3063E-05	2.43701E-05	1.87168E-05	10	1.67079E-05	5.12011E-05	3.4E-05	26	1.67079E-05	1.46583E-05	1.57E-05	26	1.09101E-05	1.49538E-05	1.29E-05	24
Private services	3.2653E-05	2.87465E-05	3.06998E-05	5	5.20883E-05	0.000197592	0.000125	16	5.20883E-05	6.9436E-05	6.08E-05	18	0.000143856	0.000160055	0.000152	11
Public services	3.8039E-06	3.0784E-06	3.44117E-06	25	9.07275E-05	5.81839E-06	4.83E-05	25	9.07275E-05	1.54778E-06	4.61E-05	22	1.77006E-05	4.10291E-06	1.09E-05	25
Average	2.2285E-05	2.02786E-05	2.1282E-05		0.000352146	0.000530521	0.000441		0.000352146	0.000354986	0.000354		0.0005079	0.000510807	0.000509	

Note: The variances were calculated using the VAR.P (for population) formula in Excel and applied on the weighted changes in linkage intensities (Appendix 16).

Figure 7.35
Average Variances of the Linkage Intensities for Malaysia
1983-2005

Figure 7.36
Backward and Forward Linkages based on Field of Influence Results
Malaysia, 1978-2005

Figure 7.37
Key Sectors based on Field of Influence Results
Malaysia, Average 1978-2005

In the case of Malaysia, the average variances were pronounced in 1983, 1991 and 2000 for selected sectors: food manufacturing, chemicals and miscellaneous manufacturing in 1983; mining; petrol and coal, iron and steel in 1991; and agriculture; wood and wood products; and rubber and rubber products in 2000. Taking sectors that exceed the average variances of all sectors for all years, the following sectors stood out as Malaysia's industries with the widest network for both upstream and downstream business: 1) miscellaneous manufacturing; 2) mining; 3) petrol and coal; 4) food manufacturing; 5) iron and steel; 6) agriculture, fishery and forestry; and 7) textile, leather, footwear and wearing apparel.

For the Malaysian economy, Figure 7.36 shows the forward and backward linkage-oriented sectors for each of the sample years including the initial year. Averaging the linkage coefficients, Figure 7.37 maps out the key sectors of Malaysia into the four quadrants using the Sonis & Hewings (1999) criteria. The key sectors of Malaysia which have both strong forward and backward linkages are: 1) private services; 2) petroleum; 3) food manufacturing; 4) electricity, gas and water; 5) iron and steel; 6) wood; 7) chemicals; and 8) non-metals. Sectors which are strongly backward oriented and hence

Figure 7.38
**Self-Influence and Scaling Effects
 from the N Matrix Malaysia, 1978**

Figure 7.39
**Sectoral Compensating Balances under the
 Residual Matrix Malaysia, 1978**

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles , Leather, Footwear & Wearing apparel 7 Wood & wooden products 8 Furniture & fixtures 9 Paper & paper products 10 Chemicals 11 Petrol & Coal 12 Rubber & rubber products 13 Non-Metallic Manufacturing 14 Iron & Steel 15 Non-Ferrous & other metals 16 Electrical & industrial machinery 17 Transport & transport equipment 18 Miscellaneous manufacturing 19 Electricity, gas & water 20 Construction 21 Trade 22 Transport services 23 Communication 24 Banking, finance and real estate 25 Private services 26 Public services

Figure 7.40
Scaling Effects from Self-Influencing Sectors from N Matrices
Malaysia, 1983-2005

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles, Leather, Footwear & Wearing apparel 7 Wood & wooden products 8 Furniture & fixtures 9 Paper & paper products 10 Chemicals 11 Petrol & Coal 12 Rubber & rubber products 13 Non-Metallic Manufacturing 14 Iron & Steel 15 Non-Ferrous & other metals 16 Electrical & industrial machinery 17 Transport & transport equipment 18 Miscellaneous manufacturing 19 Electricity, gas & water 20 Construction 21 Trade 22 Transport services 23 Communication 24 Banking, finance and real estate 25 Private services 26 Public services

Figure 7.41
Sectoral Bilateral Balances under Residual Matrices
Malaysia, 1983-2005

Legend

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles, Leather, Footwear & Wearing apparel 7 Wood & wooden products 8 Furniture & fixtures 9 Paper & paper products 10 Chemicals 11 Petrol & Coal 12 Rubber & rubber products 13 Non-Metallic Manufacturing 14 Iron & Steel 15 Non-Ferrous & other metals 16 Electrical & industrial machinery 17 Transport & transport equipment 18 Miscellaneous manufacturing 19 Electricity, gas & water 20 Construction 21 Trade 22 Transport services 23 Communication 24 Banking, finance and real estate 25 Private services 26 Public services

would be most sensitive to demand shocks are: 1) textile, leather, footwear, and wearing apparel; 2) rubber; 3) construction; 4) furniture; 5) miscellaneous manufacturing and 6) beverages. Sectors which are dominantly buyer industries and are sensitive to supply shocks are: 1) agriculture, fishery and forestry; 2) mining; 3) trade; 4) paper and printing; 5) transport services; and 6) banking. The weak-oriented sectors in terms of forward and backward linkages are: 1) electrical machinery; 2) non-ferrous metals; 3) communication; 4) transport equipment; 5) tobacco; and 6) public services.

Decomposition of the Leontief inverse into the N matrix and residual matrices are correspondingly found in Appendices 17 and 18. The self-influence and scaling effects of the diagonal elements of the N matrix for the base year 1978 are illustrated in Figure 7.38. The diagonals of the N matrix reveal the following sectors with the highest self-influence exceeding the average value for all sectors throughout the sample years: 1) textiles, leather, footwear and wearing apparel; 2) miscellaneous manufacturing; 3) food manufacturing; 4) paper and paper products; 5) wood and wood products; 6) electrical and industrial machinery; 7) chemicals; 8) transport services; and 9) banking and finance. Sectors with the weakest self-influence were: public services; beverages; transport equipment; electricity, gas and water; construction; mining; communication; furniture and fixtures; tobacco; and trade. The scaling effects were prominent for the following pairs of sectors: rubber and agriculture; mining, and iron and steel; petroleum and electricity, gas and water; agriculture and food manufacturing; wood and furniture; mining and petrol; and agriculture and wood.

As illustrated in Figure 7.39, the residual matrices in turn show that sectoral balances and imbalances were largest for agriculture and rubber; mining and iron and steel; agriculture and wood; wood and furniture; and petroleum and electricity, gas and water; and petroleum and mining. The corresponding symmetric and anti-symmetric components of the residual matrix are shown in Appendix 19 and 20 where the paired sectors discussed above simply show the same values and signs for the symmetric and with opposite signs for anti-symmetric matrices.

Replicating the derivation of the N matrix as the difference of the multiplier product matrix multiplied by the change in technical coefficients from the Leontief inverse matrices of the rest of the sample years for Malaysia showed similar scaling effects from self-influencing sectors as depicted in Figure 7.40 and similar sectoral distortions resulting from compensatory balances between buying and supplying sectors as illustrated in Figure 7.41. The self-influencing sectors consistently observed between the base year and succeeding years were: agriculture, fishery, forestry; food manufacturing; textile, leather, footwear & wearing apparel; petroleum; wood; paper; chemicals; rubber; iron & steel; electrical & industrial machinery; miscellaneous manufacturing; transport services; and banking, finance & real estate. Scaling effects of selected sectors became pronounced in selected years, notably transport equipment from 1991, 2000, and 2005; communication in 1991 and 2000; and beverages and electricity, gas and water in 2005.

The residual matrices, in turn, exhibited more push-pull backward and forward bilateral adjustments through the sample years. The agricultural and forestry sectors alone impact food manufacturing, tobacco, rubber, wood, and furniture; mining affects iron & steel, non-ferrous metals, petroleum, electricity, and construction; and trade with practically every sector.

7.3.3 Results for Thailand

In the case of Thailand, the propagation spread as depicted in Figure 7.42 was noticeable in 1985 but from 1995 through 2005, the shaded areas from the services sector (sectors 20 to 26) became more prominent. This also indicates the transformation to a service economy from manufacturing in the 1980s. As a result, sector specific shocks as measured by the change in technology coefficients can also be generated in the services sector.

Figure 7.42

Aerial Map of the Changes in Inverse Coefficients on the Field of Influence Surface over the Sample Years for Thailand

Legend

1 Agriculture 2 Livestock 3 Forestry 4 Fishery 5 Mining & Quarrying 6 Food Manufacturing 7 Beverage & Tobacco Products 8 Textiles 9 Paper Products & Printing 10 Chemical Industries 11 Petroleum Refinery 12 Rubber & Plastic Products 13 Non-Metallic Products 14 Basic Metals 15 Fabricated Metallic Products 16 Machinery 17 Other Manufacturing 18 Electricity and Waterworks 19 Construction 20 Trade 21 Restaurants & Hotels 22 Transportation & Communication 23 Banking & Insurance 24 Real Estate 25 Services 26 Unclassified

Table 7.54 presents the variances of the linkage intensities of Thailand from 1985 to 2005 as an indicator of the span of shock propagation in the economy. Based on the data, the average variances of the linkage intensities in Thailand as depicted in Figure 7.43 exhibited greater transmission for most sectors in 1985 such as agriculture, fishery, food manufacturing, beverage and tobacco, textiles, petroleum, rubber and plastics, non-metals, electricity and water, construction, trade, restaurant and hotels, transportation and communication and unclassified sectors; in 1995 for basic metals, banking and insurance, and real estate, portending the crisis to happen two years later; and in 2000 for paper and printing, chemicals, and machinery. On average, the sectors with the widest spread of propagation in Thailand were: 1) machinery; 2) basic metals; 3) unclassified sectors; 4) food manufacturing; 5) electricity and water; 6) chemicals; 7) agriculture; 8) petroleum refineries; 9) other manufacturing; and 10) rubber and plastic. The ten sectors listed with the widest spread plus paper products and printing exceeded the average variance for all sectors for all the years. This proves that Thailand's sectors are more interdependent on each other compared to Malaysia and the Philippines. Moreover, the sectors with the less propagative effects based on the average variances of backward and forward linkage intensities shown in Figure 7.44 were: 1) services; 2) real estate; 3) livestock; 4) banking and insurance; 5) fishery; 6) restaurant and hotels; 7) construction; 8) beverages and tobacco; 9) forestry; and 10) transport and communication.

Figure 7.43
**Average Variances of the Linkage Intensities for Thailand
1985-2005**

Table 7.54
Variances of the Linkage Intensities of Thailand, 1985-2005

Sectors	Year	2005				2000				1995				1985			
		Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank	Row Totals	Column Totals	Average	Rank
Agriculture		6.65214E-06	2.50077E-05	1.58299E-05	12	1.62099E-05	2.12888E-05	1.87494E-05	13	6.1652E-06	6.85056E-05	3.73354E-05	11	2.2517E-05	0.000317289	0.000169903	2
Livestock		6.21025E-06	2.2014E-06	4.20582E-06	23	1.70273E-05	5.56066E-06	1.1294E-05	21	1.70515E-05	6.47055E-06	1.1761E-05	23	1.0273E-05	1.39707E-05	1.21219E-05	21
Forestry		3.5952E-06	1.58239E-05	9.70954E-06	16	2.5553E-06	2.06081E-05	1.15817E-05	19	5.05853E-06	4.37709E-05	2.44147E-05	17	2.67E-06	4.45235E-05	2.35967E-05	18
Fishery		8.81856E-06	6.23835E-07	4.72121E-06	21	1.67544E-05	1.19502E-06	8.97473E-06	23	1.43538E-05	1.12234E-06	7.73806E-06	25	7.117E-05	2.44858E-06	3.68092E-05	14
Mining and Quarrying		6.96287E-06	3.40987E-05	2.05308E-05	10	8.26058E-06	3.0467E-05	1.93641E-05	11	1.41899E-05	4.25314E-05	2.83607E-05	15	3.671E-05	6.86965E-05	5.27032E-05	9
Food Manufacturing		2.39155E-05	3.03909E-05	2.71532E-05	8	3.18098E-05	5.62621E-05	4.4036E-05	7	4.66819E-05	8.2973E-05	6.48274E-05	6	1.58E-05	0.000292512	0.000154166	3
Beverage and Tobacco Products		1.52004E-05	3.66824E-06	9.43432E-06	17	2.20344E-05	1.12377E-06	1.15791E-05	20	2.39817E-05	5.44009E-06	1.47109E-05	21	2.9717E-05	3.66343E-05	3.31758E-05	16
Textile Industry		1.24191E-05	7.14139E-06	9.78025E-06	15	2.52659E-05	8.42448E-06	1.68442E-05	15	3.39217E-05	2.53072E-05	2.96145E-05	13	2.413E-05	7.674E-05	5.04351E-05	10
Paper Products and Printing		6.85767E-06	2.96263E-06	4.91015E-06	20	9.44515E-05	7.15001E-05	8.29758E-05	3	7.50473E-05	6.34624E-05	6.92548E-05	5	1.1958E-05	6.82569E-06	9.39166E-06	23
Chemical Industries		1.69146E-05	4.07031E-05	2.88089E-05	5	8.42765E-05	0.000140616	0.000112446	2	4.12837E-05	8.27547E-05	6.20192E-05	7	2.4939E-05	6.9886E-05	4.7199E-05	11
Petroleum Refineries		2.48899E-05	3.18022E-05	2.8346E-05	6	1.7735E-05	4.65758E-05	3.21554E-05	9	6.5891E-06	9.28572E-05	4.97231E-05	10	3.8951E-05	0.000208885	0.000123918	5
Rubber and Plastic Products		3.63335E-05	2.86015E-06	1.95988E-05	11	8.9642E-05	2.3264E-05	5.6453E-05	6	6.7865E-05	3.21926E-05	5.00288E-05	9	0.00013073	2.42424E-05	7.74764E-05	6
Non-Metallic Products		1.56477E-05	7.09008E-06	1.13689E-05	14	3.14863E-05	1.45861E-05	2.30862E-05	10	4.11656E-05	1.1074E-05	2.61198E-05	16	3.827E-05	2.83673E-05	3.33185E-05	15
Basic Metal		5.90099E-05	9.77223E-05	7.83661E-05	1	1.59573E-05	2.24034E-05	1.91804E-05	12	0.000293371	0.000309902	0.000301636	1	3.9188E-05	3.77061E-05	3.84472E-05	13
Fabricated Metal Products		3.77917E-05	3.68146E-06	2.07366E-05	9	1.64175E-05	5.83958E-06	1.11285E-05	22	5.4683E-05	2.11706E-06	2.84E-05	14	1.8262E-05	4.30793E-06	1.12851E-05	22
Machinery		8.09582E-05	6.5309E-05	7.31336E-05	2	0.000251175	0.000235681	0.000243428	1	0.000189214	0.000169052	0.000179133	2	7.3901E-05	7.04723E-05	7.21865E-05	7
Other Manufacturing		4.99584E-05	1.41561E-05	3.20708E-05	3	7.92832E-05	3.66057E-05	5.79445E-05	5	0.000116825	5.21812E-05	8.45029E-05	4	7.6082E-05	3.3738E-05	5.491E-05	8
Electricity and Water Works		4.3311E-05	1.12972E-05	2.73041E-05	7	5.68335E-05	1.70843E-05	3.69589E-05	8	0.000102099	1.61842E-05	5.91477E-05	8	0.00022196	6.18826E-05	0.000141924	4
Construction		1.62017E-05	1.39856E-06	8.80011E-06	18	3.36295E-05	2.01899E-06	1.78239E-05	14	1.89381E-05	3.71392E-06	1.1326E-05	24	4.163E-05	2.64311E-06	2.34032E-05	19
Trade		1.9556E-06	7.10922E-06	4.52441E-06	22	2.16233E-06	2.13441E-05	1.17532E-05	18	1.67545E-05	2.42107E-05	2.04826E-05	18	8.609E-06	8.34857E-05	4.61463E-05	12
Restaurants and Hotels		8.78288E-06	6.50283E-06	7.61555E-06	19	2.20697E-05	8.71435E-06	1.5392E-05	17	1.37692E-05	1.68767E-05	1.53229E-05	19	2.5389E-05	1.45544E-05	1.99719E-05	20
Transportation and Communication		1.40021E-05	1.06948E-05	1.23484E-05	13	2.54065E-05	7.94185E-06	1.66742E-05	16	1.94443E-05	4.98648E-06	1.22154E-05	22	3.0425E-05	3.01855E-05	3.03051E-05	17
Banking and Insurance		3.12455E-06	2.01243E-06	2.56849E-06	25	2.25979E-06	1.55947E-06	1.90963E-06	26	9.66906E-06	5.13297E-05	3.04994E-05	12	2.4819E-06	1.36033E-05	8.04256E-06	24
Real Estate		3.64202E-06	1.63636E-07	1.90283E-06	26	3.8506E-06	7.87055E-08	1.96465E-06	25	2.96884E-05	2.7752E-07	1.4983E-05	20	4.229E-06	5.02871E-07	2.36595E-06	26
Services		3.65366E-06	2.8014E-06	3.22753E-06	24	8.43776E-06	3.69E-06	6.06388E-06	24	2.97184E-06	6.62569E-06	4.79876E-06	26	2.1232E-06	9.07494E-06	5.59905E-06	25
Unclassified		5.81016E-05	2.88534E-07	2.91951E-05	4	0.00011641	9.81172E-07	5.86955E-05	4	0.000226359	7.61187E-07	0.00011356	3	0.00041131	2.02087E-06	0.000206667	1
Average		2.17263E-05	1.6428E-05	1.90845E-05		4.19778E-05	3.0975E-05	3.64777E-05		5.71977E-05	4.67954E-05	5.19966E-05		5.4488E-05	5.98146E-05	5.71311E-05	

Note: The variances were calculated using the VAR.P (for population) formula in Excel and applied on the weighted changes in linkage intensities (Appendix 26).

Figure 7.44
**Backward and Forward Linkages based on Field of Influence Results
 Thailand, 1975-2005**

Figure 7.45
**Key Sectors based on Field of Influence Results
 Thailand, Average 1975-2005**

As revealed in Figure 7.45, the key sectors of Thailand with strong forward and backward linkage coefficients exceeding unity and the average for all sectors are: 1) basic metals; 2) chemicals; 3) machinery; 4) petroleum; 5) textiles; 6) transportation; and 7) food manufacturing. The Thai economy's supplying or backward-linkage sectors that are sensitive to demand shocks are: 1) paper products and printing; 2) electricity and waterworks; 3) rubber and plastic products; 4) non-metallic products; 5) other manufacturing; 6) livestock; 7) fabricated metals; and 8) construction. The dominant buying or forward-linkage sectors that are sensitive to supply shocks are: 1) agriculture; 2) mining and quarrying; and 3) trade. The industries with weak forward and backward linkages are: 1) banking; 2) forestry; 3) beverage and tobacco; 4) fishery; 5) services; 5) real estate; and 6) restaurant and hotels.

Meanwhile, the Leontief inverse when decomposed into the N matrix as shown in Appendix 27 and charted in Figure 7.46 reveal that the diagonal elements which reflect self-influence was highest in Thailand for the following sectors: 1) textiles; 2) basic metals; 3) machinery; 4) paper and printing; 5) chemicals; and 6) beverage and tobacco. On the other hand, the sectors with weakest self-influence are: 1) real estate; 2) fisheries; 3) construction; 4) unclassified industries; 5) restaurants and hotels; 6) trade; 7) banking and insurance; 8) services; 9) livestock; and 10) mining and quarrying.

Scaling effects from Thailand's N matrix were highest for many pairs of sectors such as: agriculture and food manufacturing; food manufacturing and livestock; petroleum and mining; mining and basic metals; forestry and other manufacturing; electricity and waterworks and mining; fabricated metals and basic metals; electricity and petroleum; construction and basic metals; transportation & communications and petroleum; and food manufacturing and unclassified industries.

As for the residual matrix, pictured on Figure 7.47 with data found on Appendix 28 are sectoral distortions that required compensating balances arising from sector-specific shocks such as technological change or demand or supply shocks in times of economic crisis. These shifts in sectoral balances were pronounced between the following pairs: agriculture and food manufacturing; agriculture and unclassified industries; forestry and other manufacturing; mining and petroleum; mining and basic metals; food manufacturing and livestock; food manufacturing and unclassified industries; chemicals and rubber & plastic products; petroleum and electricity & waterworks; transportation/communication and petroleum; basic metals and fabricated metals; machinery and basic metals; and construction and basic metals. The symmetric and anti-symmetric residual matrices are provided in Appendix 29 and 30 indicating same multiplier and same sign for pairs of sectors under symmetric and same multiplier but opposite signs for anti-symmetric residuals.

Subtracting the inverse matrices of succeeding years from their respective multiplier product matrices obtained by taking the products of the first order intensities of the direct field of influence and the changes in technical coefficient, the N matrices of the rest of the sample years were derived and portrayed in Figure 7.48. As expected, the following self-influencing sectors consistently reflected large scaling effects as in the initial year — agriculture, mining, food manufacturing, beverage & tobacco, textiles, paper & printing, chemicals, petroleum, basic metals, machinery, other manufacturing, electricity & waterworks, and banking & insurance. In

Figure 7.46
**Self-Influence and Scaling Effects
 from the N Matrix Thailand, 1975**

Figure 7.47
**Sectoral Compensating Balances under the Residual Matrix
 Thailand, 1975**

Legend

1 Agriculture 2 Livestock 3 Forestry 4 Fishery 5 Mining & Quarrying 6 Food Manufacturing 7 Beverage & Tobacco Products 8 Textiles 9 Paper Products & Printing 10 Chemical Industries 11 Petroleum Refinery 12 Rubber & Plastic Products 13 Non-Metallic Products 14 Basic Metals 15 Fabricated Metallic Products 16 Machinery 17 Other Manufacturing 18 Electricity and Waterworks 19 Construction 20 Trade 21 Restaurants & Hotels 22 Transportation & Communication 23 Banking & Insurance 24 Real Estate 25 Services 26 Unclassified

Figure 7.48
Scaling Effects from Self-Influencing Sectors from N Matrices
Thailand, 1985-2005

Legend

1 Agriculture 2 Livestock 3 Forestry 4 Fishery 5 Mining & Quarrying 6 Food Manufacturing 7 Beverage & Tobacco Products 8 Textiles 9 Paper Products & Printing 10 Chemical Industries 11 Petroleum Refinery 12 Rubber & Plastic Products 13 Non-Metallic Products 14 Basic Metals 15 Fabricated Metallic Products 16 Machinery 17 Other Manufacturing 18 Electricity and Waterworks 19 Construction 20 Trade 21 Restaurants & Hotels 22 Transportation & Communication 23 Banking & Insurance 24 Real Estate 25 Services 26 Unclassified

Figure 7.49
Sectoral Bilateral Balances under Residual Matrices
Thailand, 1983-2005

Legend

1 Agriculture 2 Livestock 3 Forestry 4 Fishery 5 Mining & Quarrying 6 Food Manufacturing 7 Beverage & Tobacco Products 8 Textiles 9 Paper Products & Printing 10 Chemical Industries 11 Petroleum Refinery 12 Rubber & Plastic Products 13 Non-Metallic Products 14 Basic Metals 15 Fabricated Metallic Products 16 Machinery 17 Other Manufacturing 18 Electricity and Waterworks 19 Construction 20 Trade 21 Restaurants & Hotels 22 Transportation & Communication 23 Banking & Insurance 24 Real Estate 25 Services 26 Unclassified

some years, rubber & plast (except ffor 1985) and transport and communication (in 1995 and 2005) were self-influencing.

Lastly, as shown in Figure 7.49, the residual matrices calculated from the N matrices above showed increasing bilateral push-pull backward and forward linkage effects especially in 2000 and 2005 from agriculture with livestock, food manufacturing, rubber and unclassified sectors; mining with basic metals, non-metals, petroleum, electricity and construction; and trade with majority of the sectors to food manufacturing with restaurants & hotels; and machinery with mining, transport & communication, and construction.

In the final chapter, these applications of the field of influence approach to input output analysis will be linked to the Asian miracle and crisis episodes to draw on pertinent insights about the role of technological change in economic growth and business cycles.

7.4 Conclusion

This chapter presents the application of the field of influence approach of input-output analysis to the actual input-output tables of the Philippines, Thailand, and Malaysia in both growth and crisis episodes. In both cases, the direct field of influence is simply the Leontief inverse matrix of the initial year rearranged into a column vector and a row vector. The product of these two vectors yields linkage intensities which in turn are multiplied by the corresponding changes in coefficients of the succeeding years. The resulting product of the intensities of the direct field of influence and the matrix of changes in inverse coefficients are then weighted by the sum of all the entries in the inverse matrix, called volume, leading to a new matrix of linkage coefficients. The magnitude of these coefficients in the new matrix known as the multiplier product matrix (M) represent the first round effects of changes in technical coefficients which under the framework is interpreted as technological change. The second round effects could also be calculated by multiplying the negative of the determinant of the inverse matrix of the base or reference year by the elements of this inverse matrix and multiplied again by the corresponding matrix of changes in inverse coefficients of succeeding years. When weighted by the volume, this yields an N matrix. Thus, the inverse matrices after the change in technical coefficients in the succeeding years should equal the difference between the M and N matrices. The value added of this technique called field of influence is in decomposing the inverse coefficient matrix into first and second round effects arising from changes over time of the coefficients.

The diagonals of the N matrices reveal the sectors with the strongest self-influence and the off-diagonal elements show the scaling up effects. The difference of the diagonal matrix and the N matrix yields the residual matrix which can be decomposed into a symmetric part and anti-symmetric part by taking half of the sum of the residual matrix and its transpose in the former, and half the difference of the residual matrix and its transpose in the case of the latter. These components of the residual matrix represent sectoral balances and distortions among sectors arising from the change in technical coefficients. The multiplier product matrix also is used for key sector analysis showing total, forward, and backward linkages. By ranking the size of the linkage coefficients into hierarchies, a map of the country's economic landscape is produced. In using the field of influence approach to explain crisis, the variances of the linkage intensities were also measured to show the extent of propagation of shocks.

The sectoral similarities and differences between the three countries reveal some common key sectors that are key diffusers of technology or crisis using the averages of the linkage intensities

during the sample years. A comparison of the three countries show that petroleum and chemicals were the most linkage intensive while construction was the least linkage intensive sector. For Thailand and the Philippines, electrical machinery, mining and basic metals were highly linkage

intensive while tobacco, beverages and non-metals were least intensive. For Malaysia and Thailand, transport and food manufacturing had high linkage intensities while textiles and trade were low linkage intensive sectors. Finally, between the Philippines and Malaysia, agriculture, fishery and forestry along with rubber showed lower linkage intensities. Sectors that are uniquely linkage intensive also indicate where the economies differ. Strong linkage sectors in the Philippines alone were footwear, leather, wearing apparel, textiles and trade. In Malaysia, transport equipment, utilities (electricity, gas and water), non-metallic products, non-ferrous metals and beverages were highly linkage intensive compared to the other two. For Thailand, fishery, banking and insurance, rubber and plastic were high linkage intensive sectors.

REFERENCES

- Acemoglu, D., Akcigit, U. & Kerr, W. (2015). Networks and the Macroeconomy: An Empirical Exploration. *NBER Working Paper 21344*. Cambridge, MA, July.
- Alatraste Contreras, M.G. (2014). *The Impact of Final Demand and Technology Shocks in the French Economy*. Paper presented at the 22nd International Input-Output Conference, July 14-18, 2014, Lisbon, Portugal.
- Alatraste Contreras, M.G. & Fagiolo, G. (2014). Propagation of Economic Shocks in Input-Output Networks: A Cross-Country Analysis. *Physical Review E*, vol. 90, issue 6, pages 062812. Downloaded from arXiv:1401.4704v2 [q-fin.GN] on 15 May 2017.
- Department of Statistics (1978). *Jadual Input-Output Tables 1978*. Kuala Lumpur, Malaysia.
- Department of Statistics (1983). *Jadual Input-Output Tables 1983*. Kuala Lumpur, Malaysia.
- Department of Statistics (1987). *Jadual Input-Output Tables 1987*. Kuala Lumpur, Malaysia.
- Department of Statistics (1991). *Jadual Input-Output Tables 1991*. Kuala Lumpur, Malaysia.
- Department of Statistics (2000). *Jadual Input-Output Tables 2000*. Putra Jaya, Malaysia.
- Department of Statistics (2005). *Jadual Input-Output Tables 2005*. Putra Jaya, Malaysia.
- Hewings, G., Sonis, M. & Jensen, R. (1988). Field of Influence of Technological Change in Input-Output Models. *Papers of the Regional Science Association*, Vol. 64, pp.25-36.
- Hirschman, A.O. (1958). *The Strategy of Economic Development*. New York: Yale University Press.
- <https://www.encyclopedia.com/places/asia/malaysia-and-singapore-political-geography/malaysia>. Retrieved 15 August 2018.
- <https://www.encyclopedia.com/places/asia/philippines-political-geography/philippines>. Retrieved 15 August 2018.
- <https://www.encyclopedia.com/places/asia/thai-political-geography/thailand>. Retrieved 15 August 2018.

- National Economic Council (1961). *1961 Interdustry (Input-Output) Accounts of the Philippines*. Manila: Office of Statistical Coordination and Standards.
- National Economic and Development Authority (1969). *1969 Interdustry (Input-Output) Accounts of the Philippines*. Manila: National Census and Statistics Office.
- National Economic and Development Authority (1974). *1974 Interdustry (Input-Output) Accounts of the Philippines*. Manila: National Census and Statistics Office.
- National Economic and Development Authority (1979). *The Interdustry Accounts of the Philippines 1979*. Manila: National Census and Statistics Office and Statistical Coordination Office.
- National Economic and Development Authority (1983). *The Interdustry Accounts of the Philippines 1983 Update*. Manila: National Census and Statistics Office and Statistical Coordination Office.
- National Economic and Development Authority (1985). *1985 Input-Output Accounts of the Philippines*. Manila: National Census and Statistics Office and Statistical Coordination Office.
- National Economic and Development Authority (1988). *1988 Input-Output Accounts of the Philippines*. Manila: National Census and Statistics Office and Statistical Coordination Office.
- National Economic and Development Authority (1994). *1994 Input-Output Accounts of the Philippines*. Manila: National Census and Statistics Office and Statistical Coordination Office.
- National Economic and Development Authority (2000). *2000 Input-Output Accounts of the Philippines*. Manila: National Statistical Coordination Board
- National Economic and Development Authority (2006). *2006 Input-Output Accounts of the Philippines*. Manila: National Statistical Coordination Board.
- Office of the Prime Minister (1975). *Input-Output Table of Thailand 1975*. Bangkok: Office of the National Economic and Social Development Board.
- Office of the Prime Minister (1980). *Input-Output Table of Thailand 1980*. Bangkok: Office of the National Economic and Social Development Board.
- Office of the Prime Minister (1985). *Input-Output Table of Thailand 1985*. Bangkok: Office of the National Economic and Social Development Board.
- Office of the Prime Minister (1990). *Input-Output Table of Thailand 1990*. Bangkok: Office of the National Economic and Social Development Board.
- Office of the Prime Minister (1995). *Input-Output Table of Thailand 1995*. Bangkok: Office of the National Economic and Social Development Board.
- Office of the Prime Minister (1998). *Input-Output Table of Thailand 1998*. Bangkok: Office of the National Economic and Social Development Board.
- Office of the Prime Minister (2000). *Input-Output Table of Thailand 2000*. Bangkok: Office of the National Economic and Social Development Board.

- Office of the Prime Minister (2005). *Input-Output Table of Thailand 2005*. Bangkok: Office of the National Economic and Social Development Board.
- Rasmussen, P.N. (1957). *Studies in Inter-sectoral Relations*. Amsterdam: North-Holland.
- Sonis, M. & Hewings, G.J.D. (1988a). Superposition and decomposition principles in hierarchical social accounting and input-output analysis in Harrigan, F. & McGregor, P.G. (1988). *Recent Advances in Regional Economic Modelling*. London: Pion, 46-65.
- Sonis, M. & Hewings, G.J.D. (1988b). Error and sensitivity input-output analysis: a new approach. In Miller, R., Polenske, K. & Rose, A. (Eds.) (1989), *Frontiers of Input-Output Analysis* (pp. 232-244). New York: Oxford University Press.
- Sonis, M. & Hewings, G.J.D. (1992). Coefficient change in input-output models: theory and applications. *Economic Systems Research*, 4: 2, 143-158.
- Sonis, M. & Hewings, G.J.D. (1996). *Theoretical and applied dynamic input-output analysis: a new synthesis*. European Regional Science Association 36th European Congress, ETH Zurich, Switzerland, 29-30 August.
- Sonis, M. & Hewings, G.J.D. (1999). Economic landscapes: Multiplier product matrix analysis for multiregional input-output systems. *Hitotsubashi Journal of Economics* 40 (1): 59-74.
- Sonis, M. & Hewings, G.J.D. (2007). *Coefficient change and innovation spread in input-output models*. TD. Mestrado em Economia Aplicada, FEA/UFJF 004/2007.
- Sonis, M. & Hewings, G.J.D. (n.d.). *Analytical Formalization of the Concepts of Fields of Influence*. Draft of Chapter 3 replaced by New developments in input-output analysis: Fields of influence of changes, the temporal Leontief inverse and the reconsideration of classical key sector analysis in Sonis, M. & Hewings, G.J.D. (eds.) (2009).
- Sonis, M. & Hewings, G.J.D. (2009). New developments in input-output analysis: Fields of influence of changes, the temporal Leontief inverse and the reconsideration of classical key sector analysis in Sonis, M. & Hewings, G.J.D. (eds.) (2009). *Tool Kits in Regional Science*. Advances in Spatial Science. Springer-Verlag Berlin Heidelberg, 69-117.
- Sonis, M., Hewings, G.J.D. & Guo, J. (1996). Sources of structural change in input-output systems: a field of influence approach. *Economic Systems Research*, 8: 1, 15-32.
- Sonis, M., Guilhoto, J.J.M., Hewings, G.J.D., and Martins, E.B. (1995) " Linkages, key sectors, and structural change: Some new perspectives," *The Developing Economies*, XXXIII-3, September, 233-270.

Several important developments in growth theory established the foundation that made it possible to think about growth theory and business cycles within the same theoretical framework.....Modern business cycle theory starts with the view that growth and fluctuations are not distinct phenomena to be studied with separate data and different analytical tools

Cooley, T. & Prescott, E.

Economic Growth and Business Cycles (1995)

The field of influence approach of input-output analysis fulfills the potential of explaining both the diffusion of technology, hence economic growth, and the propagation of economic shocks arising from economic crisis using the change in input coefficients.

Norman Dytianquin

Technology in the Asian Miracle and Debacle
Debates: Applications of and Insights from the
Field of Influence Approach of Input-Output
Analysis (2019)

Chapter 8

Insights from the Field of Influence Results on the Debate on the Role of Technology in the Asian Growth and Debacle Episodes

The purpose of this final chapter is to tie up the debates on economic growth and crisis episodes in the case of the selected Asian economies of the Philippines, Malaysia and Thailand and the results of applying the field of influence approach of input-output analysis done in the previous chapter.

8.1 The Asian Miracle Debate and Insights from the Field of Influence Results

The accumulation-assimilation debate on the Asian miracle discussed in Chapter 3 points to the inconclusiveness of growth accounting calculations for many of the East Asian countries including the three crisis countries of the Philippines, Malaysia and Thailand due to differing assumptions and methodologies in the empirical models used by economists. Applying the field of influence approach, similarities and differences in technological change as represented by the linkage intensities of sectors among the three countries will be compared with the sectoral value-added, sectoral growth rates and their percent shares to total GDP to reveal any exceptional insights.

Taking the changes in linkage intensities arising from the changes in technical coefficients as indicative of technological change per Hewings, Sonis & Jensen (1988), Sonis & Hewings (1988a, 1988b, 1992, 1996, 1999, 2007, 2009) and Sonis, Hewings & Guo (1996), the Solow growth accounting can still be applied using the field of influence approach with the advantage of decomposing results by sectors or industries. The input-output table gives a breakdown of value added as shown in Quadrant 3 of Figure 6.2 in Chapter 6 by industry or sector. These value added coefficients in the Leontief inverse which also change over time using the field of influence approach would be an indicator of the capital and labour variables of the Solow equation. Table 8.1 below tabulates the change in linkage intensities along with the value added shares of each sector to total output, the percent share of each sector's output to total output as an indicator of their contribution or weight to total GDP, and the growth rates of the reference years of the input-output tables of the three countries compared to their respective initial or base year.

The results show that the Philippines had two sectors with among the highest average linkage intensities similar to Malaysia and Thailand – petroleum products, and chemicals. Her leading 10 industries which experienced the most technological change had the highest value added share to GDP at approximately 12 percent accounting for almost a third of the country's GDP (31 percent). The average growth of these key technological sectors over a span of half a century was a little more than twice (214 percent) over the initial or base year in 1969. The key sectors of the Philippines shared more in common with Thailand with electrical machinery, mining and basic metals ranking high as well. The bottom 10 industries, i.e., with the least technological change (or possibly technological efficiency depending on import coefficient trends) had a value added share to GDP averaging only 27 percent, and contributed a little more than half (55 percent) to GDP. Growth of the 10 sectors with decrements in technological coefficients averaged 40 percent during the past five decades. Only construction ranked low in linkage intensities for the Philippine as well as Malaysia and Thailand. Agriculture, fishery and forestry, and the rubber sectors ranked low in linkage intensities between the Philippines and Malaysia while tobacco, beverages and non-metals were least intensive in both the Philippines and Thailand. Sectors that ranked high in linkage intensity in the Philippines not common to the other two countries were footwear and wearing apparel; leather; textiles and trade. Non-ferrous metals; banking, insurance and real estate; food manufacturing and other services ranked low in the Philippines but not in the other two nations.

Malaysia's key sectors in linkage intensities had the lowest contribution to value added at 8 percent average over the 1978 to 2005 period with a share to GDP of more than a quarter (29 percent) during the same period. Their combined growth on average was however about 18 times more than in 1978. Malaysia's lagging ten sectors in technological change, in turn, had a value added share to GDP averaging 18 percent, contributing about a third to GDP (34 percent) and growing by close to seven and a half times more (766 percent) from the base year 1978. Common with Malaysia, the Philippines and Thailand, the petroleum and chemical industries ranked high as key sectors while construction placed as least intensive. Transport and communication and food manufacturing were highly linkage intensive in both Malaysia and Thailand as trade and textile sectors were least intensive in both countries as well. Five sectors that were uniquely linkage intensive in Malaysia were transport equipment; electricity, gas and water; non-ferrous metals; non-metallic products; and beverages. Five sectors were also uniquely least intensive for Malaysia – furniture and fixtures; wood; mining; iron and steel; and miscellaneous manufacturing.

Finally, Thailand's dominant sectors in terms of technological change, like the Philippines averaged slightly more than a tenth (11 percent) in terms of value added share to GDP and contributed about two-fifths (41 percent) to GDP over the three decades from 1975. Their growth combined was five times more (520 percent) than in 1975. The average value added share to GDP of its ten sectors with negative linkage intensities was 15 percent with a weight to GDP of more than a third (35 percent) and growing on average three times more (326 percent) than in 1975. Three sectors were highly linkage intensive only in Thailand – fishery; banking and insurance; and rubber and plastic products. Five sectors were least intensive only in Thailand – forestry; restaurant and hotels; real estate; unclassified sectors; and fabricated metals.

If we take the average value added shares to GDP as representing accumulation inasmuch as value added is represented by wages and salaries and operating surplus in the input-output framework,

Table 8.1

Comparative Table on Sectoral Linkage Intensity Coefficients, Value Added Share to GDP, Percent Contribution to GDP and Growth Rates of the Philippines, Malaysia and Thailand

Sectors	PHILIPPINES			MALAYSIA			THAILAND		
	Average Change in Linkage Intensities	Average Value Added Share to GDP	Average Growth Rates from Base Year	Average Change in Linkage Intensities	Average Value Added Share to GDP	Average Growth Rates from Base Year	Average Change in Linkage Intensities	Average Value Added Share to GDP	Average Growth Rates from Base Year
Agriculture, fishing & forestry	0.00687199	8.4%	-19.3%	Agriculture, Fishery and Forestry	0.054631961	7.34%	0.08722379	4.41%	99.8%
Mining	0.15190276	0.63%	-6.4%	Mining	0.007669152	4.59%	0.09119551	0.57%	124.9%
Food manufactures	0.01090756	3.49%	31.5%	Food manufacturing	0.45672498	6.73%	-0.0284245	0.28%	22.5%
Beverages	0.015213801	0.36%	-2.8%	Beverage	0.11061689	0.32%	0.13524197	0.60%	178.3%
Tobacco products	0.029403671	0.19%	-41.0%	Tobacco manufacturing	0.074655275	0.11%	0.32078574	0.66%	182.1%
Textile products	0.094882129	0.60%	6.3%	Textile, leather, footwear, wearing apparel	-0.11109801	0.46%	0.11129979	1.98%	159.1%
Footwear & wearing apparel	0.19730223	0.53%	434.2%	Wood and wooden products	-0.003978886	0.41%	-0.0244846	0.49%	244.2%
Wood products	0.034625197	0.23%	26.9%	Furniture and fixtures	-0.012026363	0.10%	-0.061264	1.58%	334.9%
Furniture & fixtures	0.06248205	0.15%	77.8%	Paper and printing	0.06458978	0.46%	0.09680003	0.31%	356.7%
Paper & paper products	0.073188531	0.16%	52.8%	Chemical manufacturing	0.184553903	0.90%	0.20293873	0.57%	546.7%
Printed materials	0.029912327	0.11%	-28.3%	Petrol and coal	0.220646899	0.34%	0.2271624	0.31%	603.9%
Leather & leather products	0.086704827	0.04%	0.1%	Rubber and rubber products	0.039597283	0.40%	0.10707258	0.36%	495.0%
Rubber products	0.020945824	0.10%	-15.1%	Non-metallic manufacturing	0.140247289	0.72%	0.05363005	0.45%	695.5%
Chemicals	0.079766136	0.90%	38.9%	Iron and steel	0.014649726	0.26%	0.11848773	0.31%	338.0%
Petroleum products	0.208540324	0.44%	156.0%	Non-ferrous and other metals	0.151203386	0.41%	0.02040204	0.22%	572.3%
Non-metallic products	0.018521973	0.28%	1.1%	Electrical and industrial machinery	0.059522214	3.05%	0.13999564	1.87%	4272.3%
Ferrous metal products	0.085788612	0.28%	141.7%	Transport and transport equipment	0.270604041	0.68%	0.09574198	1.37%	640.6%
Non-ferrous metal products	0.02619827	0.28%	1.1%	Misc. manufacturing	-0.425895452	0.16%	0.09753258	0.94%	924.3%
Non-electrical machinery	0.097357487	0.33%	218.4%	Electricity, gas and water	0.203587355	1.00%	-0.017622	1.68%	297.0%
Electrical machinery	0.27343344	1.46%	1114.7%	Construction	-0.031623836	2.01%	-0.066381	6.15%	291.4%
Transport equipment	0.02474896	0.32%	73.8%	Trade	0.002270187	4.64%	0.0210114	1.52%	270.0%
Miscellaneous manufactures	0.051839773	0.30%	94.3%	Transport	0.178304319	1.74%	0.12115977	2.34%	452.2%
Construction	-0.01020154	2.41%	37.2%	Communication	0.121193062	0.92%	0.1279616	1.63%	667.3%
Wholesale & retail trade	0.15480691	6.67%	20.9%	Banking, finance and real estate	0.07189036	4.34%	0.018593	0.65%	167.3%
Transport services	0.051415891	1.41%	59.0%	Private services	0.098843901	3.01%	0.09173705	4.87%	317.1%
Communication	0.064345929	0.62%	283.8%	Public services	0.057844086	3.01%	-0.0724164	0.02%	368.5%
Electricity, gas & water	0.079204632	0.95%	158.3%	Total		39.88%		37.98%	420.1%
Banking, insurance & real estate	0.019434306	4.53%	-5.9%	Top 10 sectors (average value added)	7.67%			10.63%	
Other services	-0.03565451	6.52%	-11.7%	Top 10 sectors (average % share GDP)	28.68%			41.05%	
Total (or Average)		42.72%	100.0%	Top 10 sectors (average value growth rate)	180.1%			519.5%	
				All Sectors (total value added)	39.89%			37.98%	
Top 10 sectors (average value added)	11.87%			All Sectors (total percent share to GDP)	100.00%			100.00%	
Top 10 sectors (average % share GDP)	31.2%			All Sectors (average growth rate)	1407.1%			420.1%	
Top 10 Sectors (average growth rate)	213.9%			Bottom 10 sectors (average value added)	18.23%			14.88%	
All Sectors (total value added)	42.72%			Bottom 10 sectors (average % share GDP)	34.33%			35.60%	
All Sectors (total percent share to GDP)	100.00%			Bottom 10 sectors (average growth rate)	766.35%			326.3%	
All Sectors (average growth rate)	102.68%								
Bottom 10 sectors (average value added)	26.59%								
Bottom 10 sectors (average % share GDP)	55.15%								
Bottom 10 sectors (average growth rate)	4.01%								

Note: The average change in linkage intensities come from the multiplier product matrices as shown on Tables 25, 34 and 42 for the Philippines, Malaysia and Thailand, respectively.

the industries where technological change occurred in the Philippines had slightly higher value added contributions to output (at 12 percent) compared to Malaysia and Thailand and these industries contributed also significantly to GDP (31 percent) but grew at a smaller rate among the three economies compared to the base year (214 percent). Malaysia's dominant industries in terms of linkage intensities were industries with lower value-added (average of 8 percent) compared to Philippines and Thailand, implying lower accumulation. With five of its industries topping the list of linkage intensities among the three countries, this indicates more assimilation of technological change. These industries with a weight of more than a quarter (28 percent) to total output grew also the largest among the three countries at 1801 percent or 18 times more, reflecting Solovian predictions to economic growth. Value addition of Thailand's dominant linkage intensive industries reached more than 10 percent yet contributed the most to GDP (41 percent) and grew also substantially by 5 times more than in the base year. Only two of her industries, which is chemical production and petroleum refining, entered the top ten industries combined and ranked for all three nations.

While the field of influence results of the three economies generally followed the predictions of the Solow model, Malaysia's, Thailand's and Philippines' linkage intensive industries had lower value addition at 8 percent, 11 percent, and 12 percent, respectively but corresponding explosive growths of 18 times, 5 times and 2 times more than the initial years, revealing technological progress as a driver of growth.

It would also be interesting to see the type of industries where technological change occurred most, i.e. whether these are high-technology, medium-technology or low technology industries. No authoritative definition of high technology industries exists. This was the conclusion of Baldwin & Gellatly (1998) in their study of the taxonomy of classification schemes for high and low-tech industries. Basically, the three approaches they came up with were innovation, technology use and worker skills from which they proposed a competency-based approach that removes the bias against small firms in favour of large multinationals by combining the three categories into a weighted index. In the USA, high-technology industries are defined by Wolf & Terrell (2016) as those "having high concentrations of workers in STEM (Science, Technology, Engineering and Mathematics) occupations." This is the classification based on worker skills.

The Organization for Economic Cooperation and Development (OECD), in turn, distinguishes high-tech sectors based on research and development (R&D) intensities as measured by the ratio of industry R&D expenditures to industry sales. The OECD definition is associated with the innovation index. Meanwhile, the technology use measurement pertains to sectors that develop or purchase new technologies or use computer process technologies or use inputs that reduce costs as a strategy. This study will take the Eurostat view for the simple reason that it has systematized the categorization of high technology manufacturing sectors based on the OECD classification. As described by Hatzichronoglou (1997), the OECD classification uses the International Standard Industrial Classification (ISIC) which are also used in constructing the input-output tables, but updates the classification using the *Nomenclature générale des Activités économiques dans les Communautés Européennes* or NACE (European system). A second and probably more overriding reason for the choice of the OECD classification is its added value of classifying services in terms of knowledge intensiveness. This Eurostat classification is reproduced in Table 8.2.

Using this taxonomy, the top-ranking linkage intensive sectors of Malaysia show that three industries are medium high-tech (transport and transport equipment; electricity, gas and water; chemical manufacturing); three are medium low-tech (petrol and coal; non-ferrous metals; non-

metallic manufacturing); two are low-tech (food manufacturing and beverage manufacturing); and two services are highly knowledge-intensive (transport and communication). For Thailand, of her

Table 8.2

OECD Classification of Industries Based on Technology Intensity

Manufacturing Industries	NACE Rev 1.1 codes	
High-technology	24.4	Manufacture of pharmaceuticals, medicinal chemicals and botanical products;
	30	Manufacture of office machinery and computers;
	32	Manufacture of radio, television and communication equipment and apparatus;
	33	Manufacture of medical, precision and optical instruments, watches and clocks;
	35.3	Manufacture of aircraft and spacecraft
Medium-high-technology	24	Manufacture of chemicals and chemical product, excluding 24.4 Manufacture of pharmaceuticals, medicinal chemicals and botanical products;
	29	Manufacture of machinery and equipment n.e.c. ;
	31	Manufacture of electrical machinery and apparatus n.e.c.;
	34	Manufacture of motor vehicles, trailers and semi-trailers;
	35	Manufacture of other transport equipment, excluding 35.1 Building and repairing of ships and boats and excluding 35.3 Manufacture of aircraft and spacecraft.
Medium-low-technology	23	Manufacture of coke, refined petroleum products and nuclear fuel;
	25 to 28	Manufacture of rubber and plastic products; basic metals and fabricated metal products; other non-metallic mineral products;
	35.1	Building and repairing of ships and boats
Low-technology	15 to 22	Manufacture of food products, beverages and tobacco; textiles and textile products; leather and leather products; wood and wood products; pulp, paper and paper products; publishing and printing;
	36 to 37	Manufacturing n.e.c.
Manufacturing Industries	NACE Rev 1.1 codes	
Knowledge-intensive services	61	Water transport;
	62	Air transport;
	64	Post and telecommunications;
	65 to 67	Financial intermediation;
	70 to 74	Real estate, renting and business activities;
	80	Education;
	85	Health and social work;
	92	Recreational, cultural and sporting activities
High-tech KIS	64	Post and telecommunications;
	72	Computer and related activities;
	73	Research and development
Market KIS (excl. financial intermediation and high-tech services)	61	Water transport;
	62	Air transport;
	70	Real estate activities;
	71	Renting of machinery and equipment without operator and of personal and household goods;
	74	Other business activities
Less Knowledge-intensive services	50 to 52	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods;
	55	Hotels and restaurants;
	60	Land transport; transport via pipelines;
	63	Supporting and auxiliary transport activities; activities of travel agencies;
	75	Public administration and defense; compulsory social security ;
	90	Sewage and refuse disposal, sanitation and similar activities;
	91	Activities of membership organization n.e.c. ;
	93	Other service activities;
	95 to 97	Activities of households;
	99	Extra-territorial organizations and bodies
Market services less KIS	50 to 52	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods;
	55	Hotels and restaurants;
	60	Land transport; transport via pipelines;
	63	Supporting and auxiliary transport activities; activities of travel agencies

Source: Eurostat (n.d.) https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf

most linkage intensive sectors, two are medium high-tech (chemicals and machinery); four are medium low-tech (mining and quarrying; basic metals; petroleum refinery and rubber and plastic products); two are low-tech (food manufacturing, and fishery); and two services industries are highly knowledge intensive (banking and insurance; and transportation and communication). The linkage intensive sectors of the Philippines show that three are medium high-tech (electrical machinery; non-electrical machinery and chemicals); three are medium low-tech (petroleum, mining, and chemicals); three are low-tech (footwear and wearing apparel, textiles, and leather and leather products) and one service is less knowledge-intensive (wholesale and retail trade).

The key sectors of the three countries based on total linkage indices using the field of influence computations are shown on Table 8.3. For the Philippines, out of eleven key sectors that exceeded the average for all sectors, one is medium high-tech (electricity, gas and water); four are medium low-tech (ferrous metals, non-ferrous metals, petroleum refinery and mining); four are low tech (agriculture, fishery and forestry; paper and paper products; textiles; and food manufactures); and two are less knowledge intensive services (wholesale and retail trade and other services).

For Malaysia, eleven industries were also classified as key sectors exceeding the national average. Of these, one is medium high tech (electricity, gas and water); four are medium low-tech (petrol and coal; mining; iron and steel; and rubber); three are low-tech (agriculture, fishery and forestry; food manufacturing; and wood); and of the two services, one is highly knowledge intensive (transport) and the other is less knowledge intensive (trade). Finally for Thailand, thirteen industries exceeded the overall average and thus were key sectors of which three are medium high-tech (chemicals; machinery; and electricity and waterworks); three are medium low-tech (basic metals; petroleum refineries; and mining and quarrying); five are low-tech (textiles; paper products and printing; food manufacturing; unclassified sectors and agriculture) and two are services, of which one is highly knowledge-intensive (transportation and communication) and the other less knowledge intensive (trade).

Five sectors of all three countries are commonly categorized as key industries using the total linkages from the field of influence formula – agriculture; food manufacturing; trade; petroleum; and mining. The latter two sectors are medium low-tech and the first two are low tech while trade is less knowledge intensive. The Philippines and Thailand are more alike with four common key sectors – metals (ferrous and non-ferrous) which are both medium low-tech; and textiles and paper products which are both low-tech sectors. Malaysia and Thailand, in turn, share two common key sectors – electricity and water, which is a medium high-tech industry; and transport services, which is a highly knowledge-intensive sector. The Philippines and Malaysia share services as a key sector, which is less knowledge intensive in the Philippines (other services) and more knowledge-intensive in Malaysia (private services). All key industries of the Philippines are common to both or one of the other two countries. Thailand has one key medium high-tech sector – machinery not common to the other two; whereas Malaysia has three sectors not common to the other two – iron and steel; and rubber and rubber products which are both medium low-tech; and wood, a low-tech sector.

One common feature for all three countries is that the linkage intensity of the machinery sector became prominent in the 1990s to mid-2000s as electronics became one among their major foreign exchange export earners. The three countries competed in the electronics and semiconductor industry. This reflected in the machinery sector entering the dominant sectors of the Philippines

Table 8.3

Key Sectors of the Philippines, Malaysia and Thailand based on Multiplier Product Matrices using Averages

	MALAYSIA	1978-2005	PHILIPPINES	1969-2006	THAILAND	1975-2005
Agriculture, Fishery and Forestry		4.4032	Ferrous metal products	5.2626	Basic Metal	6.2565
Food manufacturing		3.9491	Wholesale & retail trade	5.0975	Machinery	5.6073
Trade		3.9270	Chemicals	5.0534	Chemical Industries	5.3894
Private services		3.4980	Agriculture, fishing & forestry	4.5658	Petroleum Refineries	5.2638
Petrol and coal		3.4128	Paper & paper products	4.4212	Textile Industry	4.8328
Mining		3.3939	Other services	4.3577	Mining and Quarrying	4.6951
Wood and wooden products		3.3524	Non-ferrous metal products	4.3222	Paper Products and Printing	4.3733
Electricity, gas and water		3.2807	Petroleum products	4.2679	Unclassified	4.3182
Transport		3.1761	Textile products	4.1411	Food manufacturing	4.2808
Iron and steel		3.1641	Food manufactures	3.9759	Transportation and Communication	4.1373
Rubber and rubber products		3.1033	Mining	3.9565	Trade	4.1068
Non metallic manufacturing		3.0548	Transport equipment	3.7118	Electricity and Waterworks	4.0985
Chemical manufacturing		3.0385	Banking, insurance & real estate	3.6853	Agriculture	4.0066
Construction		2.9724	Electrical machinery	3.6156	Fabricated Metal Products	3.9199
Textile, leather, footwear, wearing apparel		2.9515	Transport services	3.5205	Construction	3.7259
Furniture and fixtures		2.9389	Electricity, gas & water	3.4760	Rubber and Plastic Products	3.6859
Paper and printing		2.9350	Leather & leather products	3.4384	Non-Metallic Products	3.5934
Non-ferrous and other metals		2.8280	Non-metallic products	3.4052	Other Manufacturing	3.5562
Electrical and industrial machinery		2.7905	Miscellaneous manufactures	3.3975	Livestock	3.3446
Misc. manufacturing		2.7557	Wood products	3.3293	Restaurant and Hotels	3.2981
Banking, finance and real estate		2.6962	Footwear & wearing apparel	3.2984	Beverage and Tobacco Products	3.1329
Beverage		2.6869	Rubber products	3.2439	Banking and Insurance	2.9754
Transport and transport equipment		2.4767	Non-electrical machinery	3.2013	Services	2.7599
Tobacco manufacturing		2.4660	Construction	3.1650	Fishery	2.7405
Communication		2.4230	Printed materials	3.1203	Forestry	2.7216
Public services		1.9551	Beverages	2.8893	Real Estate	2.2718
Average		3.0627	Furniture & fixtures	2.8371	Average	3.9651
			Tobacco products	2.8361		
			Communication	2.6060		
			Average	3.7310		

Note: Figures were taken from the individual tables on Total Linkages based on the field of influence calculations for each country averaged over the sample years.

and Thailand and in the case of Malaysia in the last three years of its sample period (entering the third spot in 2005).

Following the long wave theory, this can be traced to the invention of the microchip in the 1960s and decades later the computer and later the arrival of a peripheral industry(ies) — the Internet in the 1990s with World Wide Web and associated innovations revolving around it such as personal digital assistants (PDAs) in 1992 which was the precursor to smartphones, game consoles like Sony play stations in 1994, e-commerce and online stores like Amazon and Ebay and digital video discs (DVDs) in 1995. Hanna, Boyson & Gunaratne (1996) liken the pervasiveness of information technology as a second industrial revolution that transformed many East Asian economies like Japan, Korea, Taiwan, Hong Kong and Singapore into newly industrializing countries. Charnarik & Goonatilake (1994) attribute the catch-up process of the East Asian countries to two new technologies —information technology and biotechnology, where the Asian region was a late entrant that benefitted from greater speed of diffusion of these generic technologies that the countries could shop for and could acquire and master.

The microchip revolution comprise the general purpose technology described in Chapter 4 that drove this wave of technological change and revolutionized the production structure of the entire world economy. As noted in Ernst (2004), Sturgeon & Lester (2004), Urata (2001), Neilson, Prichard & Yeung (2015) and Yusuf (2004), the electronics industry, particularly the semiconductor industry, transformed business models with the introduction of the global production network or global supply chain. This can be considered in itself an organizational innovation since each activity of the value chain by an integrated network are performed across countries and regions that specialize in one activity compared to the old business model where one company engaged in all activities confined to its national territory and expanded abroad by simply exporting. The value chain governing the semiconductor industry is shown in Figure 8.1 while the extent of its global reach is shown in Figure 8.2 using six parent semiconductor companies.

Figure 8.1
Value Chain of Semiconductor Industry

Source: Nathan Associates, Inc. (2016), p. 6.

As described in Larsen, Millard, Pedersen, Rytz, Vet, Vodovar, Wymenga, Hay & Stenning (2012), the R&D stage centers on increasing the processing capability and speed of semiconductor devices and surpassing physical limitations of materials. Heavily skilled engineers conceive new products in design stage to meet customer specifications. The manufacturing stage involves the production of the designed chips using advanced technical and chemical/material precision characterized by high fixed costs and high capacity utilization rate which should reach 90 percent to be considered healthy. The assembly, testing and packaging stage which require higher material and labor costs involve connecting or mounting the integrated circuit to the chip and preparing the product for shipment. The finished devices are then shipped to distributors or sold directly to equipment manufacturers for use in final consumer electronic products. The value chain is supported by specialized activities relating to: 1) intellectual property companies that license predesigned blocks of circuits that are integrated into the latter's subset of chips; 2) electronic design automation (EDA) companies that develop computer-aided design (CAD) and other design services; 3) raw material suppliers that produce wafers, lead frames, chemicals and packaging materials; and 4) equipment suppliers that produce specialized equipment and machine tools for manufacturing, assembly, testing and packaging.

Figure 8.2
Geographical Dispersion of Six Semiconductor Companies

Source: Nathan Associates, Inc. (2016), p. 12.

Depicted in Figure 8.3 are two key operating business models emerging out of the so-called semiconductor ecosystem or value chain according to Nathan Associates, Inc. (2016) – an integrated device manufacturer (IDM) which carries out all the production stages in the value chain from design to packaging; and a fabless foundry model split into design companies, subcontracted manufacturing and outsourced semiconductor assembly and test companies (OSATs). While fabless foundries achieve operational efficiency by avoiding heavy installation, maintenance and upgrading expenditures, they also service many other companies to achieve the desired capacity utilization rate. OSATs function similarly except that they do not form part of the fabless foundry name. It is in the fabless foundry model where many developing countries participate as IDMs contract out or outsource chip manufacturing particularly the design, wafer manufacturing, assembly, testing and packaging stages. Figure 8.4 illustrates how vertical specialization into each activity of the value chain has evolved into an ecosystem over half a century from an earlier IDM type end-to-end one nation value chain.

The benefits to both developed and developing countries in participating in this global value chain for semiconductors, as noted by Nathan Associates (2016) include greater efficiency and higher productivity as countries specialize on activities of comparative advantage creating value at each stage on a competitive basis. Advanced countries concentrate on R&D, design and high-end manufacturing as the labor-intensive activities gravitated towards developing countries in Asia that possess skilled and unskilled labor needed in the assembly and testing activities of the supply chain. These value-creating activities in turn are passed onto a next tier of developing countries whose skill levels have risen as design activities have now migrated as well to locations such as Malaysia, Singapore, India, and China. According to Wellenius, Miller & Dahlman (1993), all three subject countries of the Philippines, Malaysia and Thailand along with Indonesia and China became labour intensive assembly and testing sites for global oligopolies of electronics and semiconductor devices as the first wave of countries that benefitted from the geographical shift in production like Hong Kong, Taiwan, South Korea and Singapore became more costly as their economies became affluent. With the global value chain of the semiconductor industry, countries are able to move up the chain for higher value creation while passing on lower value activities they previously performed to other nations that are less costly to perform them.

This process was described by Sturgeon & Lester (2004) as the supplier-oriented model of economic development. In such a model, local firms leverage their operations by building up own design capabilities to developing branded product lines then later become direct competitors to the dominant or flagship companies of developed countries. The upgrading process proceeds from simple assembly with parts and components supplied by foreign buyers to becoming original equipment manufacturers (OEM) where supply of the complete package is performed with locally sourced components based on industrial specifications of the lead company. The next stage is the addition of post-conceptual design services or original design manufacturing (ODM) and once design competencies are created, the local suppliers in developing countries can now fabricate and manufacture finished products under its own brand name to emerge as original brand manufacturers (OBM) and competitors of the flagship or lead companies. The supplier-oriented model is applied in industries like electronics (see Doner & Ritchie, 2003; Keller & Pauly, 2003; Hatch, 2003), motor vehicles (see Doner, Noble & Ravenhill, 2004; Winroth & Bennett, 2017; and Frigant & Zumpe, 2014) and footwear and wearing apparel (see Cammett, 2006; Schmitz, 2018; and Smakman, 2004).

Figure 8.3

Business Models in the Semiconductor Industry

Research and Development (R&D) CEA-Leti, IMEC, ITRI, SEMATECH, Semiconductor Research Corporation	Fabless-Foundry Model			Distribution (to OEMs / ODMs)* Allied Electronics, Arrow Electronics, Avnet, Digi-Key, Mouser Electronics
	Design (Fabless) AMD, Broadcom, MediaTek, Spreadtrum, Qualcomm	Manufacturing (Foundries) Global Foundries, HH Grace, SMIC, Tower Jazz, TSMC, UMC	Outsourced Assembly and Test (OSAT) Amkor, ASE, ChipPAC, JCET, J-Devices, Power-tech, SPIL	
	IDM Model			
	Integrated Device Manufacturer (IDM) Infineon, Intel, Micron, Renesas, Samsung, Texas Instruments			

Note: * Original Equipment Manufacturers (OEMs)/ Original Design Manufacturers (ODMs) integrate semiconductor devices they purchase into consumer end products.

Source: Nathan Associates, Inc. (2016), p. 7.

Growth effects of joining the global value chain of semiconductors has raised export earnings of participating nations. Based on various country reports by Salazar (1998) for the Philippines, Abad, Amalu, Kitamura, Lohan & Simalabwi (2015) for Malaysia, and the UNCTAD (2005) for Thailand, the three countries boosted their export earnings mostly from electronics and semiconductors. Salazar (1998) notes that in the Philippines, the electronics industry provided the highest export revenues since the early 1980s such that by 1996, more than half of its export proceeds originated from the electronics industry of which 80 percent were from semiconductors which are electronic devices that transform electrical signals into sound or pictures. Considered one of the world's largest assemblers of integrated circuits, the Philippines focuses on wafer fabrication, printed circuit boards and finished original equipment manufactures (OEMs).

Figure 8.4
Functional Evolution of the Semiconductor Ecosystem 1950s-2010s

Note: Colored blocks represent participation in the value chain at various points in time and not indicative of market shares.

Source: Nathan Associates, Inc. (2016), p. 8.

In Malaysia according to Abad et al. (2015), about 40 percent of the country's exports come from electronics, particularly semiconductors along with personal computer parts, with integrated circuits as the primary product and competing directly with the Philippines in wafer production, assembly and testing.

The UNCTAD report (2005) attributes Thailand's electronics industry to the role of foreign direct investments such that more than a third of the country's exports come from electronic products. Thailand not only produces integrated circuits but next to Singapore, is also the world's second major producer of hard disk drives (HDDs). As early as the 1970s, Thailand's exports have diversified into electronic products such as printed circuit boards, piezoelectric crystals and microwave isolators and further into floppy disk drives, computer keyboards and HDDs.

The electronics and semiconductor industry have strong backward linkages in the mining sector (copper, gold, and aluminium for wiring, germanium before silicon was used), metals (lead) and metalloids (silicon) and plastic, ceramics, and rubber for the frames. The industry has forward linkages in electrical components needed to produce high definition television sets (HDTVs), microwave ovens, dishwashers, dryers, washing machines, digital cameras, vacuum cleaners, stereo and audio equipment, refrigerators, coffee machines, musical instruments, computers,

laptops, tablets, mobile phones, laser printers, transport and communication equipment (navigation systems, dashboard cameras, USB chargers, rear vision cameras, Bluetooth adaptors, etc.). The upstream and downstream network of industries for the microchip industry which Perez (2001) identified as the fifth wave of technological revolution is shown in Figure 8.5.

Figure 8.5
**Upstream and Downstream Industry Networks
of the Microchip Industry**

Source: Adapted from Perez, C. (2001). "Technological Revolutions and Opportunities for Development as a Moving Target", Amilcar Herrera Lectures, UNU-MERIT.

Thus, it can be claimed that the invention of the microchip in the 1960s that led to the invention of the computer in the 1970s and the Internet in the 1990s modified the manufacturing structures of Malaysia, Thailand and the Philippines to become the world's largest assemblers and testers of electronic products. In 1995, the dot com bubble which burst in 2000 led to a proliferation of internet companies that stimulated the rapid diffusion of electronics and semiconductor devices, particularly the trend towards the further miniaturization of the microchip. Consumer-driven demand for greater and better capabilities, features, reliability and speed necessitates heavy investments in R&D, low-cost manufacturing, design, testing, assembling, packaging and distribution of semiconductor products which simultaneously requires production of new manufacturing equipment, development of design software and raw materials provision. As Nathan Associates (2016) observe, the industry is rapidly moving into pristine areas as brain-inspired computing, the Internet of Things, artificial intelligence, robotics, energy-efficient sensing, and automated devices that go beyond just scale economies and cost reductions to improve

device performance.

The semiconductor industry is characterized by rapid technological improvements that require substantial costs for upgrading and adoption of new knowhow along the global value chain such that participation in the value chain allows countries to adapt to industry complexity and innovative changes cascading from other suppliers and to adjust to new demand from fickle consumers. The *Galapagos syndrome* is avoided where the metaphor refers to the development of a product under a one nation value chain that becomes isolated from the rest of the globe because of its focus on the domestic market. According to Fasol (2013) this happened to Japan when imposing proprietary national standards on wireless communication, mobile data and frequency bands rendering its mobile phone incompatible with global standards. In the global value chain of the semiconductor industry, a one-nation value chain misses out on knowledge transfer and technological breakthroughs as well as international expertise apart from digging into deep pockets for capital investments to become self-sufficient in the industry and losing out on export opportunities on an international product.

8.2 The Asian Crisis Debate and Insights from the Field of Influence Results

The debate on the Asian crisis discussed in Chapter 5 focused on the structural versus contagion view of the Asian financial crisis where both views leaned on the monetarist explanation of the business cycle which is also macroeconomic in flavour. The field of influence approach, however, as explained in Chapter 6 can also show the propagation mechanism of a crisis which is traced theoretically to real business cycles. This propagation mechanism is supported by network theory which input-output tables actually demonstrate by showing interlinkages between and among sectors as suppliers and as buyers of inputs.

Relating these findings to the debate on the Asian crisis, the key sector analysis of the three countries indicate five common key sectors (agriculture, fishery and forestry; food manufacturing; trade; petroleum; and mining) that prove that the economic structures are similar and indicate elements of contagion in the presence of asymmetric information at the onset of the Asian crisis in 1997. Perceptions by investors that the countries were similar in the absence of information led to capital withdrawals. However, the field of influence analysis conducted in this study highlights as well some structural differences in the type of industries that propagate shocks during times of crisis as shown by the changes in linkage intensities and changes in technical coefficients following real business cycle principles.

From agriculture and food manufacturing as main industries, the three countries have diversified into medium high-tech and low-tech industries such as electrical machinery, petroleum products; and footwear and wearing apparel in the Philippines; transport and transport equipment; petroleum; and the utility sector – electricity, gas and water in Malaysia; and chemical manufacturing, mining, and machinery in Thailand. The extent of propagation of sector-specific shocks as measured by the variances of the changes in linkage intensities was more widespread in Thailand where the crisis started with thirteen industries exceeding the average variances for all sectors for the sample years, followed by Malaysia with seven industries and the Philippines with five industries. Lower variances for the changes in linkage intensities indicate less propagation of shocks so that the extent of crisis was somehow short-lived in Malaysia and the Philippines. Finally, the profile of industries where technological change occurred compared to their contributions to GDP and the value-added content of these sectors indicate why Malaysia was the first to recover from the crisis with her industries with the largest changes in technical coefficients

having the lowest valued added shares to GDP implying lesser impact on employment and business profitability relative to the other two countries that recovered much later.

Zeroing in on the timing of the Asian crisis and relating its occurrence to technology and demand shocks, the rapid development of semiconductor technology, the fall in semiconductor prices in 1995, the emergence of China as a major participant in the global value chain for semi-conductors, and the Japanese asset bubble burst that occurred at the beginning of the 1990s could have been triggers or impulses that propagated shocks in these three countries that have specialized in electronics and semiconductors and computer components.

A study by Aizcorbe, Oliner & Sichel (2006) recount the rapid drop in prices of integrated circuits specifically electronic chips for microprocessor units (MPUs) and dynamic random access memory chips (DRAMs) over the second half of the 1990s beginning 1995 or three years prior to the Asian crisis and onto the end of the millennium. (Figure 8.6). As discussed earlier, the three countries competed in the manufacturing of integrated circuits among electronics and semiconductor devices beginning 1980s and for some countries such as Thailand even a decade earlier.

Figure 8.6
Decline in Prices of Electronic Chips for MPUs and DRAMs

Source: Aizcorbe, Oliner & Sichel (2006), p. 38.

One of the findings of the study relate the drop in prices to shorter technology cycles particularly for lithographic processes used in a chip's circuitry onto a silicon base material. There was also innovation surrounding the architecture of electronic chips with the introduction of cache memory which is the storage area for frequently accessed data and quicker bus speeds or the rate at which the MPU sends signals to the other components. These functionalities shifted the consumers' demand preferences towards faster processors and more complex operating systems with added functionalities. This however did not affect the cost per chip due to Moore's Law which states that the components in a chip doubled every year without affecting the cost of manufacturing chips (Manners, 1990). This allowed possibilities for miniaturization as a greater number of components and transistors could be mounted on a same-sized piece of silicon. Figure 8.7 plots forty years of

Figure 8.7
Graphical Illustration of Moore's Law

Original data up to the year 2010 collected and plotted by M. Horowitz, F. Labonte, O. Shacham, K. Olukotun, L. Hammond, and C. Batten
 New plot and data collected for 2010-2015 by K. Rupp

Source: Rupp, K. (2015) 40 Years of Microprocessor Trend Data. Retrieved from <https://www.karlsruhp.net/research/> on 1 March 2019.

Figure 8.8
Decline in Prices of Semiconductor Products

Source: Flamm (2004), p. 45

trends in micro processing following Moore’s Law in terms of number of transistors, frequency, power and number of logical cores.

Thus, prices of electronic products declined and a structural break in prices was found to occur in 1995 by Aizorbe et al. (2006) and a breakdown of the steep decline in prices of almost all semiconductor devices is shown in Figure 8.8. The decline in prices brought about by new technologies involving the shrinkage in size of components in the chips would have repercussions the three countries which are producers of electronic chips. As shown by the bullwhip effect, upstream sectors such as suppliers and manufacturers would be faced with demand variabilities causing overstocking and associated inventory, warehousing, transport and other ordering costs of electronic products that have been replaced by newer and faster systems which consumers prefer. Buying sectors in the supply chain would order these more innovative electronic chips. The rapid pace of technological change in semiconductors as described by Flamm (2004) would make inventory buffers as a way of smoothing out demand fluctuations inefficient as short lifecycles of semiconductor products would cause inventories to lose value or quicken their obsolescence so that supplier firms must sell what is on hand as fast as possible.

Macher & Mowery (2004) further support this effect on the value chain for the semiconductor industry by citing that it has become harder for a foundry or fabrication facility to determine whether product demand would fully utilize capacity. This is due to the shorter design cycle for semiconductor devices given the expansion in range of potential end-user applications for semiconductors and more uncertain product life cycles exposing semiconductor companies to higher risks of investing in such committed capacity in an industry that has very high capital requirements.

Figure 8.9
Growth of Semiconductor Enterprises in China

Source: Nathan Associates, Inc. (2016), p. 20.

Nathan Associates, Inc. (2016) in a report submitted to the Semiconductor Industry Association recount the rising participation of China in the production of semiconductors as shown by the growth of semiconductor enterprises in Figure 8.9. Ernst (2004) similarly observes the emergence of China as the hub of network location in semiconductor global production. The semiconductor industry’s growth in China was attributed to the increase in foreign investments and establishment of facilities by Taiwanese firms, most especially in fabrication, assembly, testing and packaging companies. Many design engineers in China were also trained by Taiwanese companies as they moved up the value chain in semiconductor device design next only to the United States and South

Korea. Following the example of Taiwanese producers of personal computers like ACER, many Taiwanese producers of integrated circuits set up manufacturing facilities in China because of higher production costs and to access design engineering skills resulting from the training done by these companies in China. As observed in this report by Nathan Associates, Inc. (2016), integrated circuits production surged exponentially by 20 times from 3.5 billion units in 1984 to 71.4 billion units in 2012.

This surge is shown in Figure 8.10 where the transformation to design activities from packaging is pronounced in the ten years from 2003 to 2013 with design rising from 13 percent to 32 percent and packaging declining from 69 percent to 44 percent. Ernst (2004) attributes the migration to China in addition to providing cheap labor to other factors as well like a booming market for electronics products, an unlimited supply of IT skills, abundant land, and support policies from government. Thus, the China factor is likewise a supply shock to the Asian economies as she became a heavy competitor in the global value chain for semiconductor devices as the USA, Europe, Japan, and South Korea following the footsteps of Taiwan which began building industry bases and R&D centers in China as well.

Figure 8.10
China's Semiconductor Industry by Sector 2003-2015

Source: Price Waterhouse Coopers (2017). China's impact on the semiconductor industry: 2016 update (January), p.17. Retrieved from <https://www.pwc.com/gx/en/technology/chinas-impact-on-semiconductor-industry/assets/china-impact-of-the-semiconductor-industry-2016-update.pdf> on 3 March 2019.

Another shock that could have triggered the crisis was the Japanese asset price bubble of 1991 when Japanese investors lent heavily to the Asian emerging economies in their efforts to restructure balance sheets and increase profitability in the aftermath of the Japanese asset price bubble in the 1990s. As Japan was the leading exporter of electronics in the 1980s, the Plaza accord which led to the appreciation of the yen to reduce US trade deficits damaged the exports of Japan that led to monetary expansion through lower interest rates to counter the currency appreciation. The easing of monetary policy prompted speculation in property, real estate and stocks that led to a substantial rise in property values depicted in Figure 8.11. The bubble burst in 1990 catapulted

Japan into a recession and led to the reduction of credit exposure by banks to the Asian countries to meet capital adequacy requirements of the Bank of International Settlements (King, 2001) which was breached with the Daiwa banking scandal in New York covering substantial losses on bond investments (Zarathustra, 2011). Shiratsuka (2003) traces the factors building up to the Japanese asset price bubble mainly to the excessive optimism by market participants on the long-term economic performance of Japan in the 1980s.

Ito (1999), on the other hand, describes how the weak Japanese economy and the Asian crisis mutually reinforced each other as the failure of the banking system in Japan pressured banks to curtail lending succumbing Asian exporters to the credit crunch. As Japan served also as one of the biggest markets of electronics which were outsourced or subcontracted to the Philippines, Malaysia and Thailand, the decline in Japanese investments and its domestic demand influenced adversely the economies of the three countries. King (2001) attributes the Asian crisis also to Japanese commercial banks which triggered the Asian crisis by withdrawing loans in advance and signalling to foreign creditors the change in market sentiment that started the financial panic. In this sense, the bubble which weakened the Japanese financial and economic systems could have propelled a demand shock on the three economies which would affect in turn the supplier sectors. Figure 8.12 shows the decline in profitability of Japanese banks in the aftermath of the property bubble while Figure 8.13 shows movements in Japan's key monetary aggregates including bank lending which began declining towards the end of the 1990s.

Figure 8.11
Japan's Asset Price Bubble

Source: Bank of Japan Financial and Economics Statistics Monthly, Ministry of Public Management Home Affairs, Posts and Telecommunications, Consumer Price Index; Japan Real Estate Institute Urban Land Price Index as cited in Shiratsuka, S. (2003), p. 53.

Figure 8.12
Profitability of Japanese Banks

Source: Japanese Bankers Association as cited in Shiratsuka, S. (2003), p. 56

Figure 8.13
Movements of Monetary Aggregates in Japan

Source: Bank of Japan Financial and Economic Statistics Monthly; Cabinet Office Annual Report on National Accounts as cited in Shiratsuka, S. (2003), p. 57.

Flamm (2004) cited four other cyclical factors affecting supplier firms: a) the very large scale of R&D investments needed to invest in the new technologies surrounding semiconductors; b) the high sunk costs that a semiconductor company incurs and the long gestation lag to turn out production such that “a spike in demand might promote a decision to build a fab, but it would not be ready for mass production for a year and a half to two years” with the result that “demand might be fading just as new capacity reaches the market”; c) steep learning curves of close to 70 percent in semiconductors due to die-shrinks or the increase in the number of chips in a wafer and yield learning which is the ratio of good chips on a wafer to the total number of chips; and d) capacity constraints leading to optimization bottlenecks given that the semiconductor industry is a

mixed bag of old, trailing, and new leading-edge products, the latter being run normally at full capacity.

8.3 Conclusion, Policy Implications and Scope for Further Research

In conclusion, the field of influence approach can be a valuable supplement to Solowian growth accounting as it could decompose growth at the macro-level to growth at the meso-level and possibly the micro level if data on firms exists. The changes in technology coefficients yield changes in linkage intensities that represent technological change by industry which present meaningful insights about economic structures when compared with the sectoral value added components of the input-output table to represent the capital and labour components of the Solow model and their contributions to GDP in terms of their percentage shares. Thus, the field of influence approach has the potential to remedy shortcomings of the Solowian growth accounting approach by providing a more detailed analysis of technological change among different industries or sectors. Moreover, the field of influence approach as discussed in Section 6.2 of Chapter 6 can also illustrate Schumpeterian waves of technological change occurring in each industry or sector over a time frame as these changes in technology coefficients vary over time.

The field of influence approach also has the capability to explain real business cycle propagation using network theory of inter-industry supplier-buyer relationships. The extent of diffusion of technological change during periods of growth could be construed as the extent of propagation of shocks during times of crisis using the same empirical methodology of field of influence approach to input-output analysis. The change in technical coefficients as viewed from the technological change perspective as the diffusion of technology arising from competition for shares of inputs among sectors is in reverse fashion during times of shocks, the propagation of crisis between and among sectors that supply and buy inputs from each other. Thus, the field of influence approach bridges the gap between separate theories for economic growth and crisis by using interdependence of industries or sectors as platform for technology diffusion or crisis propagation. This is reflected in the self-influence of the diagonal elements of the input-output table while the sectoral balances and imbalances caused by a sector-specific shock indicated by the residual matrix can trace which related sectors linked to the sector where the shock originates from (called the trigger sector) are affected and to what extent do these sectors compensate for the distortions through push-pull effects of backward and forward linkages.

Policy Implications

There are policy implications that could be culled from the results of the field of influence approach of input-output analysis. First, the field of influence focuses on intermediate inputs and its relationship to economic growth as well as propagation of crisis which was ignored in the literature on growth theories (where focus was more on value addition from capital and labour); and business cycles (where focus was more on monetary impulses). Global concerns about environmental impacts of material and energy usage could be addressed using linkage intensities of industries and policies relating to the use of subsidies on resource use could be correspondingly be reviewed.

Secondly, the technology intensity of industries as to high tech or low tech could be targeted by states or even directed by markets to raise productivity in a way where more high technology and more knowledge intensive sectors are fostered and encouraged by economies. In the case of Thailand, Malaysia and the Philippines, their respective governments initiated in the late 1990s in

the aftermath of the Asian crisis, the conduct of innovation surveys to support and stimulate more innovative activities from firms and inspire entrepreneurial undertakings under the triple helix of the national innovations systems involving state, academic and commercial actors. In the case of governments that steer industrial policy by choosing industry champions, the results of the field of influence approach that traces complex linkages to different branches of the economy could help in identifying the right balance of industries that promote growth and minimize vulnerabilities arising from sectoral or even global disturbances. A case in point is the Malaysian economy where sectors with highest input intensities had lower employment and business profitability impacts allowing her to recover instantly from the crisis. Again, the global value chain characterizing the semiconductor industry points to lessons for governments to move up the value chain into own design and equipment manufacturing by arranging knowledge transfer, training and upgrading of skills rather than just serving as assembly and testing sites of major electronics companies.

The key sector analysis resulting from the field of influence exercise enables policy makers to identify bottlenecks that could limit the growth of the economy and in determining which sectors will be responsible for changing the level of national output and other macroeconomic indicators. The analysis is enriched by explicitly addressing temporal changes in outputs between two time intervals that could be attributed to changes in coefficients or changes in final demand or changes in their interactive or synergetic effects, as well as in differentiating between changes that originate within a sector and changes arising elsewhere in the economic structure.

There are policy implications as well for statistical compilation as national accounting frameworks with their focus on value-added measures of productivity tend to overstate the productivity of intermediate input intensive sectors. If the scope and quality of measuring inputs decomposed into material, energy and natural resources can be improved, then efficient use of these resources and their maximum productivity can be assured in an age where sustainability and environmental concerns become imperative.

Scope for Further Research

There are scopes for further research and improvement in the study. For one, the analysis could be extended to the other two crisis economies of Indonesia and South Korea as well as the less affected countries of Viet Nam, China, Japan, Taiwan and Singapore to come up with more discernible patterns that may reveal stylized facts or the analysis could be done at a more disaggregated level of industry classification although this depends heavily on the quality and available size of the input output tables of the base or reference year. Another possible extension of the study is exploring further the Schumpeterian sigmoid waves or logistic functions to show other applications of the field of influence approach that may show interesting results as well. With the emergence of global integration and finance, the crisis episodes can also be further studied using a similar analysis for monetary shocks using the flow of funds matrix.

During the number of years it took time to complete this study, a lot of friends and colleagues question the relevance and currentness of the topic. And the response is that there will always be episodes of growth and crisis in the economy as learned from the work of Pritchett (2000). The Eurozone is currently still in crisis and the field of influence approach can be applied in the case of Greece and other crisis countries in the European Union like Spain and Portugal, Ireland and Italy to test its validity. One value of this study is the development of a simple Excel software for calculating the field of influence approach which could easily be extended depending on the size

of the input-output matrices by just inserting additional rows and columns and copying existing ones into them.

However, this is only secondary to its basic contribution which is in its ability to explain both growth and crisis using a single framework. To echo Cooley & Prescott (1995), the “*study of short-term economic behaviour or fluctuations and study of long-term growth were divorced. The generally accepted view was that we needed one theory to explain long term growth and a completely different one to explain short term fluctuations in real output. Several important developments in growth theory established the foundation that made it possible to think about growth theory and business cycles within the same theoretical framework....Modern business cycle theory starts with the view that growth and fluctuations are not distinct phenomena to be studied with separate data and different analytical tools (p.4).*” Indeed the economic analysis of growth and crisis needs a single set of theories and metric as one is just the reverse of the other. The field of influence approach of input-output analysis fulfills the potential of explaining both the diffusion of technology, hence economic growth, and the propagation of economic shocks arising from economic crisis using the change in input coefficients. It also has the potential to explain not only short-term but also long term fluctuations following Schumpeterian waves of technological change given a longer time series of input-output data.

Final Words

In this study, we have encountered numerous examples of debates among economists – the theoretical and empirical debates on the causes of economic growth and use of growth accounting between accumulationists and assimilationists; the theoretical and empirical debates on causes of business cycles between monetarists and real business cycle adherents; the conceptual debate about the causes of the Asian crisis between contagionists and structuralists; and to an extent the debate between demand-driven and supply-driven models of input-output analysis and its usefulness according to neoclassical economists and input-output practitioners. These all substantiate Machlup’s (1965) discourse on why economists disagree which according to him could be attributed to a variety of reasons – differences in semantics, differences in logical reasoning; differences in factual assumptions and differences in value judgments. One can only take solace at the fact that “the economist’s work becomes known only where it deals with the real-life world, in which most things are unknown and almost everything is uncertain (so that) in explaining, predicting, and prescribing for this uncertain world, economists will unavoidably disagree (p. 7)”. To this, can be added the reality that there are also moments when economists attempt either by intent or by chance to resolve these disagreements. The application of the field of influence approach to input-output analysis in reconciling the debates on growth and crisis in the Asian episode of miracle and debacle is one such attempt.

REFERENCES

- Abad, L., Amalu, N., Kitamura, K., Lohan, R. & Simalabwi, A. (2005). *The Malaysian Semiconductor Cluster*. Retrieved from https://www.isc.hbs.edu/resources/courses/moc-course-at-harvard/Documents/pdf/student-projects/Malaysia_Semiconductor_Cluster_2015.pdf on 10 August 2018.
- Aizcorbe, A., Oliner, S. & Sichel, D. (2006). Shifting Trends in Semiconductor Prices and the Pace of Technological Progress. *Finance and Economics Discussion Series 2006-44*. Federal Reserve Board: Washington D.C.

- Baldwin & Gellatly (1998). Are there high-tech industries or only high-tech firms? Evidence from new technology-based firms. Microeconomic Analysis Division, *Statistics Canada No. 120*, ISSN: 1200-5223 ISBN: 0-660-17666-1.
- Cammett, M. (2006). Development and the Changing Dynamics of Global Production: Global Value Chains and Local Clusters in Apparel Manufacturing. *Competition and Change*, Vol. 10, No. 1 (March): 23-48.
- Charnarik, S. & Goonatilake, S., Eds. (1994). *Technological Independence: The Asian Experience*. Tokyo: United Nations University Press.
- Cooley, T. & Prescott, E. (1995). Economic Growth and Business Cycles. In Cooley, T. (ed) (1995). *Frontiers of Business Cycle Research*. New Jersey, Princeton. Princeton University Press.
- Doner, R. & Ritchie, B. (2003). Economic Crisis and Technological Trajectories: Hard Disk Drive Production in Southeast Asia. In W.W. Keller & R.J. Samuels (Eds). *Crisis and Innovation in Asian Technology*. Cambridge University Press: 187-225.
- Doner, R., Noble, G. & Ravenhill, J. (2004). Production Networks in East Asia's Auto Parts Industry. In Yusuf, S., Altaf, M.A., & Nabeshima, K. (Eds.). *Global Production Networking and Technological Change in East Asia*. Washington, D.C.: The World Bank: 159-208.
- Ernst, D. (2004). Global Production Networks in East Asia's Electronics Industry and Upgrading Prospects in Malaysia. In Yusuf, S., Altaf, M.A., & Nabeshima, K. (Eds.). *Global Production Networking and Technological Change in East Asia*. Washington, D.C.: The World Bank: 89-157.
- Eurostat (n.d.) https://ec.europa.eu/eurostat/cache/metadata/Annexes/htec_esms_an3.pdf Retrieved 16 August 2018.
- Fasol, G. (2013). Japan Galapagos Effect (Galapagos Syndrome). *Eurotechnology Japan* (5 August). Retrieved from <https://www.eurotechnology.com/2013/08/05/galapagos-2/> on 28 February 2019.
- Frigant, V. & Zumpe, M. (2014). Are automotive Global Production Networks becoming more global? Comparison of regional and global integration processes based on auto parts trade data. *Cahiers du GRETha (Groupe de Recherche en Économie Théorique et Appliquée) No. 2014-09*. Université Montesquieu Bordeaux.
- Flamm, Kenneth (2004). 'Factors underpinning cyclicity in the semiconductor industry' in Jorgenson, D. & Wessner, C. (Eds.) *Productivity and Cyclicity in Semiconductors*. Report of a Symposium. Washington, D.C.: National Research Council of the National Academies; 60-64.
- Hanna, N., Boyson, S. & Gunaratne, S. (1996). The East Asian Miracle and Information Technology: Strategic Management of Technological Learning. *World Bank Discussion Papers No. 326*. Washington, D.C.: The World Bank.
- Hatch, W. (2003). Japanese Production Networks in Asia: Extending the Status Quo. In W.W. Keller & R.J. Samuels (Eds). *Crisis and Innovation in Asian Technology*. Cambridge University Press: 23-56.
- Hatzichronoglou, T. (1997). Revision of the High-Technology Sector and Product Classification. *STI Working Papers 1997/2*. Paris: Organization for Economic Cooperation and Development.
- Hewings, G.J.D., Sonis, M. & Jensen R.C. (1988). Fields of influence of technological change in input-output models. *Papers of the Regional Science Association*, Vol. 64: 25-36.

- Ito, T. (1999). Japan and the Asian Financial Crisis: The Role of Financial Supervision in Restoring Growth. *International Center for the Study of East Asian Development Working Paper Series Vol. 99-10*. Kitakyushu, Japan.
- Keller, W. & Pauly, L. (2003). Crisis and Adaptation in Taiwan and South Korea: The Political Economy of Semiconductors. In W.W. Keller & R.J. Samuels (Eds). *Crisis and Innovation in Asian Technology*. Cambridge University Press: 137-159.
- Keller, W. W. & Samuels, R.J. (Eds). *Crisis and Innovation in Asian Technology*. Cambridge University Press: 137-159.
- King, M. (2001). Who Triggered the Asian Financial Crisis? *Review of International Political Economy*, 8:3, 438-466.
- Larsen, P., Millard, J., Pedersen, K., Rytz, B., Vet, J., Vodovar, M., Wymenga, P., Hay, G. & Stenning, J. (2012). *Study on Internationalization and Fragmentation of Value Chains and Security of Supply*. Brussels: European Commission, DG Enterprise and Industry, February.
- Macher, J. and Mowery, D. (2004). Vertical Specialization and Industry Structure in High technology Industries. Business Strategy over the Industry Lifecycle. *Advances in Strategic Management*, Vol. 21, 317-356.
- Machlup, F. (1965). Why Economists Disagree. *Proceedings of the American Philosophical Society*, Vol. 109, No.1 (18 February): 1-7.
- Manners, D. (1990). *Hitchhikers Guide to Electronics in the '90s*. Reed Business Publishing Group.
- Nathan Associates, Inc. (2016). *Beyond Borders: The Global Semiconductor Value Chain*. Report submitted to the Semiconductor Industry Association, May.
- Neilson, J., Pritchard, B. & Yeung, H.W. (Eds.) (2015). *Global Value Chains and Global Production Networks: Changes in the International Political Economy*. Taylor and Francis.
- Perez, C. (2001). Technological Revolutions and Opportunities for Development as a Moving Target. *Amilcar Herrera Lectures*, UNU-MERIT.
- Price Waterhouse Coopers (2017). *China's impact on the semiconductor industry: 2016 update* (January). Retrieved from <https://www.pwc.com/gx/en/technology/chinas-impact-on-semiconductor-industry/assets/china-impact-of-the-semiconductor-industry-2016-update.pdf> on 3 March 2019.
- Prichett, L. (2000). Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains. *The World Bank Economic Review No. 14*, 1: 221-250.
- Rupp, K. (2015). *42 Years of Microprocessor Trend Data*. Retrieved from <https://www.karlrupp.net/2018/02/42-years-of-microprocessor-trend-data/> on 1 March 2019.
- Salazar, C. (1998). Semiconductors from the Philippines. *Global Product Chains: Northern Consumers, Southern Producers and Sustainability*. United Nations Environment Programme.
- Schmitz, H. (2018). Learning and Earning in Global Garment and Footwear Chains. *The European Journal of Development Research*, Vol. 18, No. 4 (December): 546-571.

- Shiratsuka S. (2003). The asset price bubble in Japan in the 1980s: Lessons for financial and macroeconomic stability. *Paper for the IMF-BIS Conference on Real Estate Indicators and Financial Stability*. Washington, D.C.: 27-28 October.
- Smakman, F. (2004). *Local Industry in Global Networks: Changing Competitiveness, Corporate Strategies and Pathways of Development in Singapore and Malaysia's Garment Industry*. PhD Thesis, Utrecht University.
- Sonis, M. & Hewings, G.J.D. (1988a). Superposition and decomposition principles in hierarchical social accounting and input-output analysis. In Harrigan, F. & McGregor, P.G. (1988). *Recent Advances in Regional Economic Modelling*. London: Pion, 46-65.
- Sonis, M. & Hewings, G.J.D. (1988b). Error and sensitivity input-output analysis: a new approach. In Miller, R., Polenske, K. & Rose, A. (Eds.) (1989), *Frontiers of Input-Output Analysis* (pp. 232-244). New York: Oxford University Press.
- Sonis, M. & Hewings, G.J.D. (1992). Coefficient change in input-output models: theory and applications. *Economic Systems Research*, 4: 2, 143-158.
- Sonis, M. & Hewings, G.J.D. (1996). *Theoretical and applied dynamic input-output analysis: a new synthesis*. European Regional Science Association 36th European Congress, ETH Zurich, Switzerland, 29-30 August.
- Sonis, M. & Hewings, G.J.D. (1999). Economic landscapes: Multiplier product matrix analysis for multiregional input-output systems. *Hitotsubashi Journal of Economics* 40 (1): 59-74.
- Sonis, M. & Hewings, G.J.D. (2007). *Coefficient change and innovation spread in input-output models*. TD. Mestrado em Economia Aplicada, FEA/UFJF 004/2007.
- Sonis, M. & Hewings, G.J.D. (2009). New developments in input-output analysis: Fields of influence of changes, the temporal Leontief inverse and the reconsideration of classical key sector analysis in Sonis, M. & Hewings, G.J.D. (eds.) (2009). *Tool Kits in Regional Science*. Advances in Spatial Science. Springer-Verlag Berlin Heidelberg, 69-117.
- Sonis, M., Hewings, G.J.D. & Guo, J. (1996). Sources of structural change in input-output systems: a field of influence approach. *Economic Systems Research*, 8: 1, 15-32.
- Sturgeon, T. and Lester, R. (2004). The New Global Supply Base: New Challenges for Local Suppliers in East Asia. In Yusuf, S., Altaf, M.A., & Nabeshima, K. (Eds.). *Global Production Networking and Technological Change in East Asia*. Washington, D.C.: The World Bank: 35-87.
- UNCTAD (2005). *A Case Study of the Electronics Industry in Thailand*. Transfer of Technology for Successful Integration into the Global Economy. United Nations: New York and Geneva.
- Wellenius, B., Miller, A. & Dahlgren, C. (1993), *Developing the Electronics Industry*. Washington, D.C.: World Bank.
- Winroth, M. & Bennett, D. (2017). International Production Networks in the Automotive Industry: Drivers and Enablers. Paper presented at the 24th International Conference on Production Research. Posnan, Poland, 30 July – 3 August 2017.
- Wolf, M. & Terrell, D. (2016). The high tech industry: what it is and why it matters to our economic future. *Beyond the Numbers*, 5

- Yusuf, S. (2004). Competitiveness through Technological Advances under Global Production Networking. In Yusuf, S., Altaf, M.A., & Nabeshima, K. (Eds.). *Global Production Networking and Technological Change in East Asia*. Washington, D.C.:The World Bank: 1-34.
- Yusuf, S., Altaf, M.A., & Nabeshima, K. (Eds.). *Global Production Networking and Technological Change in East Asia*. Washington, D.C.:The World Bank.
- Zarathustra, W. (2011). Japan's Role in Asian Financial Crisis 1997. *Business Insider*. March 17.

APPENDICES

Explanation of Appendices

Appendix 1, 11, 21: Basic Transactions Tables (at constant prices)

These tables are the basic transactions table appearing in the input-output tables per sample year of each subject country. Since I-O tables are in current prices, the tables were deflated using the GDP sectoral deflators of the sample years. In cases where sectoral GDP deflators are not available (as in the early years for Malaysia), the overall GDP deflator was used.

Appendix 2, 12, 22: Leontief inverse matrices

These tables are the Leontief inverses of the transactions table calculated by dividing the values in the transactions table by the total per column to get the input coefficients. The resulting coefficients were deducted from the identity matrix and then the inverse of this matrix ($I - A$) was taken using matrix inversion function MINVERSE in Excel.

Appendix 3, 13, 23: Direct Field of Influence

These matrices are calculated by arranging the Leontief inverse matrix of the initial year for each subject country into column and row vectors and taking their product by using matrix multiplication function MMULT in Excel. For a 29 x 29 matrix such as for the Philippine case, this will translate into 841 elements in one column vector and 841 elements in one row vector leading to an 841 x 841 matrix when multiplying both vectors. For a 26 x 26 matrix as in the cases of Malaysia and Thailand, there will be 676 elements in the column vector and the same number for the row vector leading to a 676 x 676 matrix when multiplying both vectors. Since the matrices are too huge to present, what is shown here is the condensed version where the sums of the sum of the first order intensities are calculated as in the formula:

$\sum_{k=1}^n \sum_{i_r \neq i_s} \sum_{j_r \neq j_s} {}'F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix}$. This is the raw matrix prior to multiplying each element by the global intensity or volume to obtain the multiplier product matrix.

Appendix 4, 14, 24: Changes in Linkage Intensities (First Order Effects)

These matrices are calculated by multiplying the direct field of influence (Appendix 3, 13, 23) by the corresponding change in technical coefficients and summing up the results for each sector's column and row elements. This is the term inside the brackets in the field of influence

formula: $\sum_{k=1}^n \sum_{i_r \neq i_s} \sum_{j_r \neq j_s} {}'F \begin{pmatrix} i_1 & \dots & i_k \\ j_1 & \dots & j_k \end{pmatrix} e_{j_1 i_1} \dots e_{j_k i_k}$. The row and column totals were added to yield the change in linkage intensities per sector.

Appendix 5, 15, 25: Synergetic or Second Round Effects

These matrices are calculated by first taking the ratio of the determinant of the Leontief inverse of the initial year to the determinant of the Leontief inverse of the sample year $Q(e)$ and taking the reciprocal to yield $\frac{1}{Q(e)}$. The latter was then multiplied by the first order effect which is Appendix 4, 14, 24. The alternative calculation is to multiply the negative of the determinant of the Leontief inverse of the initial year by the field of influence (Appendix 3, 13, 23) that yields a matrix which is then multiplied by the determinant of the matrix of change in technical coefficients. The sum of this matrix and the direct field of influence are then multiplied by $\frac{1}{Q(e)}$.

Appendix 6, 16, 26: *Changes in Linkage Intensities Weighted by Volume or Total/Global Intensity*

These matrices are calculated by taking the first order effects (Appendix 4, 14, 24) and multiplying the matrix by a scalar which is the reciprocal of the volume or sum total of columns and rows of the first order effects called global intensity. The multiplier product matrix is simply the first order effects weighted by the sum total of column and row elements showing percent shares to total intensity which add up to unity.

Appendix 7, 17, 27: *N Matrix*

The N matrices are calculated by subtracting the Leontief inverse matrix (Appendix 2,12, 22) from the Multiplier Product Matrix (Appendix 4,14,24) resulting from the product of the direct field of influence and the corresponding matrix of changes in technical coefficients (E). The diagonals of the N matrix must contain the largest coefficients in any row or column and hence measures self-influence of a sector and its scaling effects. For the base year, the Leontief inverse matrix is subtracted from the first order intensity matrix weighted by the volume (sum of column and row entries) of that year.

Appendix 8, 18, 28: *Residual Matrix*

The residual matrices are calculated by first taking the diagonal matrix of the N matrix called D matrix and deducting from it the N matrix ($R = -D - N$) such that the diagonal elements of the residual matrices contain zeroes.

Appendix 9, 19, 29: *Symmetric Matrix*

The symmetric matrices (S) which is part of the residual matrix are calculated by taking half of the sum of the residual matrix and its transpose ($S = \frac{1}{2}(R + R^T)$). The row and column totals of this matrix must be identical to the row and column totals of the residual matrix. The symmetric shows sectoral compensating balances as a result of a shock in the influence sector with identical coefficients and signs between buying and selling sectors and vice-versa.

Appendix 10, 20, 30: *Anti-Symmetric Matrix*

The anti-symmetric matrices (S_a) of the residual matrix are calculated by taking half of the difference of the residual matrix and its transpose ($S_a = R - R^T$). The row and column totals of this matrix must equal zero as the coefficients on a particular row and column position are negated in the corresponding column and row position. Thus, the sectoral imbalances are washed out.

Legend for rows and columns for each country

Philippines

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles 7 Footwear & wearing apparel 8 Wood products 9 Furniture & fixtures 10 Paper & products 11 Printed materials 12 Leather & leather products 13 Rubber products 14 Chemicals 15 Petroleum products 16 Non-metallic products 17 Ferrous metallic products 18 Non-ferrous metallic products 19 Non-electrical machinery 20 Electrical machinery 21 Transport equipment 22 Miscellaneous Manufactures 23 Construction 24 Wholesale & retail trade 25 Transport services 26 Communication 27 Electricity, gas & water 28 Banking, insurance & real estate 29 Other services 30 Total intermediate inputs 31 Wages and salaries 32 Depreciation allowances 33 Indirect taxes and import duties 34 Other value added 35 Total

Malaysia

1 Agriculture, fishery & forestry 2 Mining 3 Food manufactures 4 Beverages 5 Tobacco products 6 Textiles , Leather, Footwear & Wearing apparel 7 Wood & wooden products 8 Furniture & fixtures 9 Paper & paper products 10 Chemicals 11 Petrol & Coal 12 Rubber & rubber products 13 Non-Metallic Manufacturing 14 Iron & Steel 15 Non-Ferrous & other metals 16 Electrical & industrial machinery 17 Transport & transport equipment 18 Miscellaneous manufacturing 19 Electricity, gas & water 20 Construction 21 Trade 22 Transport services 23 Communication 24 Banking, finance and real estate 25 Private services 26 Public services 27 Total intermediate inputs 28 Direct purchases abroad 29 Domestic services 30 Commodity taxes (Domestic) 31 Commodity taxes (Imports) 32 Imported commodities 33 Value added 34 Total

Thailand

1 Agriculture 2 Livestock 3 Forestry 4 Fishery 5 Mining & Quarrying 6 Food Manufacturing 7 Beverage & Tobacco Products 8 Textiles 9 Paper Products & Printing 10 Chemical Industries 11 Petroleum Refinery 12 Rubber & Plastic Products 13 Non-Metallic Products 14 Basic Metals 15 Fabricated Metallic Products 16 machinery 17 Other Manufacturing 18 Electricity and Waterworks 19 Construction 20 Trade 21 Restaurants & Hotels 22 Transportation & Communication 23 Banking & Insurance 24 Real Estate 25 Services 26 Unclassified 27 Total intermediate inputs 28 Wages and Salaries 29 Operating surplus 30 Depreciation 31 Indirect taxes less subsidies 32 Total

Appendix 1
Basic Transactions Table for the Philippines at Constant Prices
1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
1	1863530	219231	1426230	131407	283803	1036078	0	5203550	47483	0	0	448	613847	8895333	632	0	0	0	0	2699	0	107191	1183426	0	316251	0	38049	0	38049	0	676192	16029400
2	142081	157263	655105	69	0	5523	0	0	0	24526	243	313	32932	781207	1775945	1608165	12541	14590	3752	89348	3985	83165	1351514	0	8685	0	0	0	0	53810	22765572	
3	6679548	11394	22940899	3097666	257623	45473	521	51935	0	79309	1563	520100	278	317191	0	0	0	10561	0	0	0	36267	0	366088	1157324	1424	3439	8288	15140885	50736306		
4	56034	973	12020	1097886	0	0	0	0	0	0	0	0	0	3891	0	0	0	0	0	0	0	0	0	0	97234	0	0	0	0	416948	5428994	
5	34448	0	0	6223739	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0	0	0	0	6253922	
6	1594088	83998	1218708	104	5801	18536432	94177	8164	145486	28738	164075	86619	789440	5107	1007	13887	0	175813	1320	2710	9727	120955	82678	383368	150940	5246	5280	0	447297	24134386		
7	0	0	0	0	0	0	0	0	0	0	0	0	5767	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8546	107204	
8	763972	112693	118182	188562	208016	95289	5940	948378	632907	76842	7121	24282	5767	19662	3787	126380	59389	175283	203570	36476	27756	66039	465911	212810	74376	0	4829	847454	213366	9923217		
9	0	0	35	0	347	1146	0	0	11588	0	0	0	556	0	0	14590	0	0	0	17478	0	0	0	0	15007	0	0	122346	93482	431456		
10	22727	29146	781832	341448	715352	190786	64937	129194	13887	3690952	2425952	9935	73507	1061897	72399	857942	16540	10347	19384	153337	14417	250224	599141	1807544	232646	75453	70346	59473	1086770	15452388		
11	55200	13930	465982	161605	177376	103417	45716	42742	13479	69334	73160	1945	22546	543107	27096	59024	12888	62704	16536	19801	27235	137670	89279	488349	268288	110713	123343	538076	2451172	6178614		
12	0	6496	0	0	0	3543	1813645	0	0	0	2144	62599	382	452	0	0	0	730	660	0	1459	8937	0	0	0	0	0	0	0	18307	192005	
13	289198	97651	163794	50222	30744	80004	188528	67346	42173	24248	14938	27027	567702	17452	54022	14540	14243	33801	38907	176682	329549	21940	41617	506075	2564038	13201	99527	33620	326337	604894		
14	6645573	1391012	6245347	1095454	604699	3845172	24178	491937	273707	206617	414400	212741	1487621	9554994	225938	537085	52317	454523	46203	418082	183842	1290443	2183822	106165	339651	52317	224413	735491	526251	45561783		
15	2936882	1259422	1802007	358822	136280	791628	8789	440002	11895	353224	34843	5662	97512	664884	1434071	1889540	469843	302992	85390	102202	84763	48664	1661454	714745	4007554	22120	2722899	375594	853630	23827051		
16	76052	58004	814417	1591212	0	4724	0	18099	12471	8198	1320	347	5037	338053	8129	1048140	11776	33766	15876	166920	32029	278744	8996593	295488	50892	2466	17626	366182	887334	15319199		
17	306258	1463026	195640	0	0	4759	0	25116	283543	9310	2883	0	834	14764	104	107774	4413846	6150649	1148396	239246	268089	248209	6749755	0	109288	1563	34321	283144	103209	2243146		
18	579270	1058145	2788938	383829	6844	25590	17057	51657	166503	19245	53428	21712	29945	454504	221252	100708	473768	3834646	762205	934961	164071	470815	7259349	123844	332207	38421	155608	27791	495515	21045687		
19	194950	456781	273470	13340	7052	31543	5211	16883	13331	15563	18168	973	15383	47627	34878	22476	6844	28868	380133	24248	7643	7939	0	16953	9553	0	29881	38769	123705	1692823		
20	145417	121482	45265	14451	11707	17578	1390	10352	3196	7538	6566	1077	3648	56312	10074	7990	3578	36754	44067	1952079	83234	91085	1751914	140071	458973	357671	125407	43146	55677	6095067		
21	328545	189605	114013	13548	15806	30929	5836	10526	5697	9657	16804	1702	18203	53046	54227	12263	13027	20357	15841	11985	6240657	4620	38421	272387	2109585	15380	33620	112137	208294	9972963		
22	87307	14521	1083116	109636	58431	216145	57389	15980	31508	297781	8754	113040	48950	394008	51935	296461	841687	642564	83616	50771	8997	146980	259117	47071	23101	7360	15285	14823	807296	582441		
23	0	32793	31882	9179	11082	12124	0	69	2466	3161	11915	208	19245	35746	345235	86395	40436	39845	27374	16397	1919487	64247	54486	17856	54193	4547938	63895	863941				
24	5089167	1372770	2068339	210995	1651595	3388818	276493	1657552	301200	1032041	692183	144670	599398	3222015	554863	131955	173190	2040720	470652	715940	1522239	532308	6160049	1153448	2710019	13574	92800	684353	4898616	6512605		
25	2878243	547703	5066843	230965	246844	526530	49681	697595	67356	207708	207199	19006	124490	1314709	455602	323665	254751	518738	134750	157670	155656	1678492	713282	2178647	257754	33860	112368	302331	3005168			
26	469566	45081	319190	34514	46602	100887	23947	39266	18473	57701	131747	1406	31283	154549	48122	29801	28338	55610	18549	15699	51553	22959	134864	1594948	526639	25201	69864	993803	1051122	6140446		
27	423188	361284	755804	123983	78579	642321	48294	150897	60773	163952	106902	15424	173451	516517	38143	567320	210448	226428	86152	118703	85701	96887	15305	2114136	374693	95184	277843	591880	2281751	12578403		
28	333765	40541	2839547	434953	486213	770524	90999	3904545	84499	3904545	265172	25810	142504	1236993	668312	325442	181845	461493	144075	246649	334156	187395	1415497	25954557	1782913	174281	598361	6805137	6747626	56573710		
29	6775564	972781	2256547	1208010	486595	995920	149536	337121	57017	597583	593885	27357	247757	2380448	796800	698081	208491	435947	171734	529913	447429	214245	5716915	11402358	3134932	588093	889423	10978571	18652795	71287993		
30	58514256	10447826	85547458	11874355	14294035	31418408	3065415	10715514	2300359	7134035	5599636	1330804	5166917	31982314	22844152	10929892	8486376	15881163	3850261	6240333	10090655	4654274	5390770	56704646	22642174	1978733	9265077	2971984	77396128	71360174		
31	14109497	6387785	1746034	457085	2354226	9567894	807927	2493260	1440535	1406035	2345161	532526	1364803	508075	1115282	3266496	1973569	3968110	1603297	2013110	3475394	2128826	23497746	6164558	17554106	4293870	4823318	2118333	126884065	47001744		
32	15813415	2932381	4307907	1269892	476649	2116848	68764	466773	204433	501429	410625	42957	397670	1662996	1006619	1148396	489130	968148	327992	354341	636976	361005	7852437	7038088	541456	1598189	950940	7009134	72708426			
33	2004180	404130	3394825	4263935	13465210	1273748	66261	384827	259194	232845	453883	37646	208796	889349	6922984	477292	198514	565438	131914	163289	530599	241042	1524013	9212719	2159805	179011	1295802	8403702	516154	63726828		
34	163693586	13512801	39474837	624087	2400788	10560937	1020676	3700020	1441381	3122238	2510393	714534	3155012	10271480	5278523	2882340	2737149	4157467	1557499	2846416	3937995	286302	1974440	79875495	24024995	1788760	409607	83738897	47831693	549746551		
35	381134914	32876663	249483610	27990465	3673376	5487385	589044	17086393	5454592	12475582	11388898	2658197	10293258	50627815	37161561	17967416	13884738	25540311	7470963	11919369	18671728	10244249	101355073	215105266	69819167	8741830	21078989	15527957	26482165	1871739824		

1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1	3223932	147311	226378048	6011	4920701	6712936	0	22008769	376427	316638	0	0	1883575	189661	0	0	0	0	0	0	640088	2127739	0	1053694	0	195752	0	5875375	34042478		
2	44756	0	1976	0	0	0	0	0	0	16568	0	235	38790	1619968	8894038	242522	5378550	93786	7521	134063	3942	1594	5708518	0	1056	0	0	106775	3552	105510339	
3	3283006	0	7634658	9963826	154643	787758	39562	118690	0	25723	0	627595	587	9386160	0	0	0	0	0	0	0	40580	0	0	2055586	0	0	0	2162763	153462486	
4	19190	0	0	296672	0	0	0	0	0	0	0	0	0	10798	0	0	0	0	0	0	0	0	0	0	98236	0	0	0	91046	399742	
5	861	0	0	1860709	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18608740		
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1988

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1994

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20	1349	359	76	170	2	248	66	64	89	8	2	5	4	263	92	218	57	374	332	250566	3082	650	1210	720	4865	8190	1907	109	3375	278342	
21	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	665	0	21	69	522	2	0	0	63	1346	
22	81	68	144	28	28	58	4	46	10	48	126	3	26	106	26	87	14	48	54	112	27	3598	141	116	246	117	83	124	2228	7795	
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
24	6896	512	29879	2527	996	6676	115	4777	183	4891	890	248	858	5958	3345	3843	2920	4039	3000	28596	10269	5262	3837	69918	5600	2392	152	99	6998	215333	
25	3039	563	1203	148	39	245	9	155	51	51	43	4	12	394	259	286	82	363	638	4811	131	165	1459	7358	3631	1026	260	2191	3729	32346	
26	1046	354	2187	478	65	490	12	204	29	229	50	12	31	301	168	330	83	344	229	7129	557	421	293	6846	815	4113	807	2266	9561	39452	
27	1156	694	3064	501	92	712	62	189	182	392	263	59	62	944	10	1729	688	1627	482	5913	223	543	503	630	715	910	10970	1511	10722	45349	
28	4301	193	1859	386	47	618	15	84	404	243	34	16	25	347	289	249	90	239	271	1310	100	402	731	3437	6762	4964	768	26150	23528	77863	
29	1543	418	1190	410	35	293	8	79	15	139	129	4	61	350	192	346	149	413	135	1184	325	162	983	422	3226	2549	601	7370	22230	44963	
30	84273	8196	285323	15187	37548	934	10395	8660	13227	6018	2755	4897	44402	78941	26750	36533	15590	316292	22125	23982	57986	117307	64196	27400	23821	48100	38201	141002	1543878		
31	64731	2008	27320	1297	277	11162	258	1484	1625	633	884	447	841	5761	2274	2235	721	1467	1162	18639	1511	3051	29541	57901	13854	12683	7749	46043	148771	436871	
32	13233	1630	10919	782	138	1064	45	156	247	135	174	110	168	2013	1794	689	224	568	327	8871	529	656	8756	20389	19156	17757	10053	9269	23213	152566	
33	7758	2924	13270	2657	1485	1165	63	428	187	209	215	205	204	1128	592	1251	211	840	282	6418	1029	528	4857	10736	3847	4890	5018	8472	12800	93767	
34	79409	9635	63540	4794	609	8104	142	1759	1779	1365	1258	353	773	110285	18656	4607	2042	4760	2826	34841	2350	4073	21962	126648	14371	14844	27257	71432	11444	644417	
35	249403	24993	401572	24717	7785	59043	1442	14223	12497	14668	8549	3869	6883	63588	1101657	35532	19921	44108	20587	385162	27545	31390	123202	332980	115505	77313	73391	155676	437230	2870815	

Appendix 2 The Leontief inverse matrices for the Philippines

1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	1.049251	0.025376	0.550667	0.087984	0.144474	0.062805	0.063772	0.346619	0.066178	0.024114	0.023586	0.143105	0.114652	0.245348	0.01748	0.023363	0.014788	0.018799	0.021136	0.024424	0.013235	0.045372	0.045713	0.009739	0.026782	0.009637	0.014501	0.010971	0.072591	3.314862
2	0.006394	1.021335	0.014269	0.021996	0.057375	0.018539	0.008733	0.020265	0.010621	0.029508	0.012299	0.010708	0.019191	0.013546	0.513887	0.155612	0.034776	0.022624	0.018978	0.025708	0.008852	0.025443	0.045428	0.05825	0.034674	0.005838	0.079325	0.004865	0.006897	2.241772
3	0.022863	0.005477	1.115855	0.134561	0.014551	0.007822	0.088269	0.015958	0.009544	0.018008	0.012472	0.231265	0.008611	0.029575	0.007662	0.005455	0.007814	0.005148	0.011278	0.008602	0.007964	0.024072	0.006863	0.006344	0.00651	0.00651	0.00651	0.00651	0.00651	1.89452
4	0.006618	0.00092	0.00084	1.04206	0.00569	0.00907	0.010159	0.000941	0.000644	0.010604	0.002141	0.00162	0.00162	0.000985	0.001347	0.000904	0.000986	0.00096	0.001459	0.001008	0.000979	0.001588	0.000436	0.001255	0.001479	0.001294	0.001255	0.001479	0.017929	1.091931
5	0.000115	2.77E-06	5.94E-05	9.53E-06	1.204003	6.81E-06	7.01E-06	3.74E-05	7.2E-06	2.75E-06	1.56E-05	1.56E-05	2.65E-05	1.24E-05	2.65E-05	1.91E-06	2.27E-06	1.98E-06	2.7E-06	1.45E-06	1E-05	5E-06	1.06E-06	2.9E-06	1.05E-06	1.59E-06	1.05E-06	1.59E-06	7.85E-06	1.204534
6	0.007355	0.006004	0.013118	0.003383	0.002113	1.511232	0.055225	0.004898	0.042092	0.007744	0.025062	0.057437	0.124752	0.004287	0.003775	0.004329	0.004096	0.015309	0.004473	0.006364	0.005949	0.021248	0.00457	0.00383	0.004985	0.002593	0.002864	0.0009	0.004811	1.959176
7	1.82E-06	4.85E-06	3.26E-06	4.64E-06	2.38E-06	4.3E-06	1.018621	5.83E-06	7.24E-06	6.29E-06	6.73E-06	8.92E-06	0.000607	6.3E-06	4.86E-06	5.08E-06	4.39E-06	4.8E-06	6.94E-06	1.53E-05	1.91E-05	4.82E-06	5.71E-05	5.08E-06	2.63E-05	5.27E-06	7.08E-06	3.95E-06	3.76E-05	1.019446
8	0.00262	0.005714	0.00277	0.009356	0.00822	0.00968	0.006476	1.058523	0.129579	0.010791	0.003945	0.011721	0.00235	0.0027	0.003919	0.010839	0.009254	0.012263	0.033855	0.008744	0.003792	0.009502	0.053103	0.002627	0.002401	0.001158	0.002105	0.008261	0.002149	1.413704
9	3.87E-05	0.000137	8.08E-05	0.000142	6.77E-05	0.000125	0.000101	0.0001	1.00214	0.000138	0.00014	8.54E-05	9.92E-05	0.000157	0.000119	0.00099	0.000118	0.000143	0.000201	0.017465	0.000205	0.000273	0.000489	0.000177	0.000424	0.000791	0.00022	0.000913	0.000481	1.026562
10	0.002449	0.006979	0.010827	0.030111	0.038866	0.016344	0.03083	0.019662	0.012053	1.418634	0.309312	0.16274	0.022408	0.045931	0.00269	0.07998	0.012399	0.016735	0.012356	0.031233	0.007688	0.051047	0.022993	0.01631	0.00226	0.019767	0.012586	0.008729	0.013227	2.301222
11	0.001008	0.002629	0.004005	0.008841	0.00724	0.005896	0.012593	0.004672	0.00514	0.010558	1.011179	0.004543	0.006469	0.01579	0.002844	0.006442	0.004835	0.006374	0.005301	0.005335	0.004713	0.017664	0.004264	0.004097	0.005829	0.014513	0.008537	0.005134	0.011498	1.207375
12	6.22E-06	0.000527	1.69E-05	2.44E-05	1.02E-05	0.00012	0.371818	1.55E-05	2.7E-05	5.23E-05	0.000276	1.024717	0.000291	4.45E-05	0.00102	6.57E-05	0.000102	0.000143	3.83E-05	0.000141	0.000942	3.85E-05	1.17E-05	1.39E-05	1.56E-05	3.27E-05	1.95E-05	0.000101	1.399002	
13	0.00166	0.005542	0.003447	0.003991	0.002322	0.004553	0.046179	0.007385	0.010619	0.005598	0.004459	0.013452	1.06115	0.005888	0.05282	0.004399	0.004738	0.005198	0.008992	0.024837	0.029867	0.005247	0.003755	0.004562	0.002219	0.00437	0.008172	0.001163	0.002844	1.328985
14	0.026627	0.062713	0.053636	0.067547	0.032064	0.136282	0.070138	0.051661	0.078418	0.044286	0.063351	0.130687	0.209538	1.250736	0.04218	0.065278	0.031898	0.046762	0.0272	0.070896	0.030707	0.173469	0.048933	0.012606	0.023259	0.016435	0.028434	0.012225	0.035949	2.946915
15	0.011234	0.051883	0.020069	0.030144	0.010224	0.032854	0.017934	0.039363	0.017934	0.052471	0.021216	0.01451	0.024792	0.30267	1.068705	0.137951	0.065346	0.040894	0.34653	0.027544	0.015148	0.022972	0.044713	0.010644	0.069945	0.010024	0.161507	0.007413	0.010718	2.098762
16	0.000898	0.003928	0.005475	0.065181	0.001005	0.00261	0.00294	0.002807	0.004602	0.004009	0.002722	0.004259	0.003777	0.011378	0.003703	1.065645	0.06252	0.055772	0.005806	0.020603	0.004613	0.032627	0.098967	0.00329	0.002529	0.002376	0.012037	0.006492	0.006461	1.392809
17	0.003459	0.008921	0.010823	0.011973	0.002204	0.005337	0.008276	0.008362	0.092242	0.010159	0.007537	0.010847	0.007306	0.011764	0.049458	0.031679	1.489752	0.429948	0.290225	0.083344	0.040408	0.063197	0.141442	0.003387	0.011085	0.007726	0.040868	0.008444	0.004993	2.98454
18	0.003472	0.047574	0.018849	0.023057	0.002228	0.005355	0.013634	0.007955	0.04263	0.009074	0.010304	0.019171	0.009385	0.01745	0.022926	0.020326	0.069625	1.209897	0.142626	0.119286	0.029398	0.063893	0.099842	0.003086	0.011225	0.012003	0.01855	0.00467	0.006327	2.055901
19	0.00074	0.015393	0.00169	0.001369	0.000562	0.001529	0.001848	0.001767	0.003087	0.002612	0.002548	0.001194	0.002272	0.002171	0.008725	0.004306	0.001692	0.002282	1.43902	0.003487	0.00104	0.001752	0.0001352	0.000955	0.000996	0.000391	0.002937	0.000493	0.0009	1.113393
20	0.000916	0.005819	0.001586	0.001896	0.001174	0.001974	0.002196	0.002248	0.002161	0.003084	0.002938	0.002152	0.002151	0.003397	0.003899	0.0093204	0.00315	0.004327	0.008934	1.197701	0.009214	0.012502	0.022908	0.002172	0.009608	0.050035	0.009574	0.001895	0.003608	1.376322
21	0.002169	0.011009	0.003789	0.002856	0.002053	0.003461	0.004035	0.004705	0.00389	0.004423	0.004937	0.003305	0.005339	0.005113	0.008676	0.005521	0.005241	0.0051	0.006509	0.004904	1.503906	0.003473	0.003747	0.004215	0.048251	0.048932	0.005649	0.002068	0.002724	1.676165
22	0.001103	0.00849	0.00728	0.008833	0.003643	0.008438	0.031085	0.003086	0.014005	0.056427	0.010336	0.048425	0.009093	0.013018	0.006672	0.023552	0.095102	0.058497	0.034449	0.015692	0.004794	0.023832	0.017193	0.001482	0.002613	0.002908	0.005269	0.00163	0.005114	1.502105
23	0.00792	0.003451	0.002181	0.002814	0.001754	0.002821	0.002508	0.002461	0.002784	0.003716	0.003866	0.002404	0.004637	0.003751	0.009201	0.007795	0.006287	0.00667	0.004913	0.005341	0.005617	1.02296	0.007661	0.0019471	0.003471	0.006756	0.032508	0.004321	1.880054	
24	0.002461	0.067099	0.110695	0.078386	0.066863	0.113135	0.106733	0.118664	0.092488	0.136747	0.104149	0.01005	0.09584	0.010692	0.054672	0.112757	0.149935	0.017276	0.109668	0.03311	0.0110802	0.015643	0.030245	0.070954	0.030245	0.070954	0.015012	0.034729	3.575376	
25	0.011481	0.027782	0.035939	0.02233	0.015104	0.026275	0.026089	0.045786	0.028603	0.036054	0.034319	0.024728	0.028593	0.04043	0.02958	0.036269	0.041913	0.034509	0.038312	0.039239	0.023209	0.031692	0.034079	0.038947	0.040693	0.036357	0.031905	0.012218	0.019492	1.912267
26	0.001994	0.003387	0.004097	0.003675	0.003085	0.005389	0.007745	0.005106	0.005864	0.009376	0.015574	0.003327	0.006131	0.006657	0.003772	0.005014	0.005952	0.006291	0.005854	0.004666	0.006476	0.005376	0.004542	0.009354	0.009511	1.0045	0.005942	0.00776	0.005703	1.172118
27	0.002824	0.018022	0.008487	0.012325	0.005795	0.024749	0.02003	0.014778	0.01953	0.026056	0.020045	0.013594	0.027514	0.019093	0.011558	0.045796	0.031538	0.024605	0.024343	0.022014	0.01285	0.019755	0.013964	0.013853	0.010642	0.015614	1.126266	0.006863	0.013224	1.626352
28	0.015389	0.030869	0.038131	0.038065	0.029091	0.045617	0.046961	0.044306	0.038869	0.059622	0.052202	0.036495	0.041211	0.055323	0.040202	0.049488	0.049863	0.056226	0.050444	0.05215	0.051865	0.045451	0.044354	0.133778	0.002456	0.003844	0.047744	1.053787	0.039247	2.36105
29	0.026529	0.051216	0.039319	0.071766	0.032097	0.051701	0.061084	0.049014	0.035744	0.09412	0.127042	0.037779	0.058501	0.089307	0.056113	0.078136	0.051087	0.055739	0.05479	0.084892	0.059716	0.055409	0.093125	0.075268	0.067316	0.084204	0.073342	0.088976	1.091283	2.894165
SUM	1.245167	1.58819	2.077405	1.748466	1.607263	2.102849	2.122892	1.886751	1.754866	2.065993	1.87968	1.567175	1.897491	2.039977	1.995369	2.206613	2.244449	2.006629	2.01432	2.006669	1.655228	1.993477	1.393032	1.565237	1.382095	1.783685	1.311396	1.492327	53.26015	

1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	1.07874	0.007234	0.484736	0.113688	0.276781	0.075584	0.045474	0.453387	0.228354	0.023258	0.014777	0.120357	0.138932	0.051509	0.00623	0.01051	0.009528	0.006387	0.008622	0.014542	0.010888	0.064158	0.043701	0.003706	0.021906	0.004722	0.009059	0.007879	0.060297	3.242481
2	0.019569	1.066381	0.035564	0.048853	0.027659	0.049514	0.031708	0.049828	0.043083	0.000289	0.055126	0.041273	0.061257	0.070802	0.794542	0.215519	0.071817	0.076188	0.045894	0.051516	0.085939	0.021241	0.117176	0.017778	0.273926	0.009288	0.019324	0.036415		3.681415
3	0.067749	0.00628	1.183634	0.271027	0.018381	0.029664	0.089245	0.037562	0.025183	0.013994	0.0164	0.284295	0.039885	0.112475	0.006597	0.011275	0.007614	0.008512	0.008757	0.013367	0.008228	0.043489	0.017355	0.003886	0.022222	0.006025	0.006158	0.006023	0.090595	2.450919
4	9.57E-05	0.000119	0.000107	1.066671	0.000171	0.000138	0.000117	0.000145	0.000132	0.000195	0.0002	0.000108	0.000212	0.000327	0.000165	0.000253	0.000149	0.000157	0.00016	0.000272	0.000162	0.000231	0.000197	0.000118	0.000816	0.000172	0.000123	0.000191	0.003338	1.075243
5	1.99E-06	1.33E-07	1.45E-07	1.45E-07	1.39E-07	8.39E-08	8.37E-07	4.29E-07	2.73E-08	2.73E-07	2.58E-07	5.51E-08	1.15E-08	1.94E-08	1.94E-08	1.94E-08	1.94E-08	1.18E-08	1.59E-08	2.68E-08	2.01E-08	1.38E-07	8.66E-08	6.84E-09	4.04E-08	8.71E-09	1.67E-08	1.45E-08	1.11E-07	1.45E766
6	0.001547	0.001054	0.007403	0.002662	0.003916	1.377961	0.00237	0.005705	0.066042	0.025088	0.02593	0.033702	0.097799	0.00343	0.000995	0.003794	0.000518	0.001534	0.002386	0.003564	0.004753	0.048461	0.002578	0.001204	0.005229	0.00172	0.000909	0.001519	0.007954	1.828357
7	2.92E-06	2.33E-06	2.37E-06	4.27E-06	3.51E-06	2.32E-06	1.055968	7.48E-06	4.29E-06	3.4E-06	3.73E-06	1.92E-06	3.5E-06	4.22E-06	3.21E-06	4.84E-06	2.84E-06	2.8E-06	1.61E-06	5.17E-06	2.85E-06	3.72E-06	4.66E-06	2.33E-06	2.99E-06	3.55E-06	2.29E-06	4.08E-06	1.28E-05	1.056134
8	0.000719	0.001939	0.001431	0.002127	0.002221	0.001383	0.002275	1.056377	0.418399	0.0054	0.002509	0.001437	0.001398	0.002211	0.001297	0.004408	0.001392	0.001708	0.003378	0.012667	0.02331	0.005958	0.070919	0.001401	0.001563	0.000889	0.001032	0.009005	0.002358	1.621133
9	0.000236	7.33E-05	0.00017	0.000266	0.000109	0.000359	0.000626	0.001008	1.001129	0.000156	0.000108	0.000352	0.000146	0.000146	6.85E-05	0.003837	0.000107	0.00019	0.000275	0.024296	0.006737	0.038677	0.014849	0.019059	0.010991	0.032635	0.007504	0.017499	0.01788	2.558136
10	0.006409	0.04037	0.013611	0.018148	0.110033	0.019425	0.025725	0.010454	0.013071	1.479865	0.522991	0.013758	0.019743	0.033114	0.005422	0.048512	0.00702	0.001831	0.012549	0.024296	0.006737	0.038677	0.014849	0.019059	0.010991	0.032635	0.007504	0.017499	0.01788	2.558136
11	0.000994	0.001102	0.002	0.005013	0.003876	0.003301	0.005121	0.002319	0.002657	0.007291	0.016944	0.002243	0.005377	0.007972	0.001198	0.002999	0.001558	0.002195	0.002398	0.00457	0.002135	0.004505	0.00305	0.004293	0.005099	0.012988	0.003074	0.00733	0.005847	1.129547
12	1.3E-05	7.72E-05	3.86E-05	2.68E-05	2.79E-05	0.005374	0.304694	0.000428	0.001157	0.000124	0.001078	1.134828	0.001337	3.33E-05	4.47E-05	5.1E-05	2.53E-05	4.77E-05	3.94E-05	5.27E-05	0.000228	0.000347	5.78E-05	1.59E-05	6.02E-05	2.72E-05	2.75E-05	2.21E-05	5.68E-05	1.450848
13	0.001051	0.003919	0.001699	0.0018	0.00148	0.001765	0.00169	0.002098	0.018528	0.002813	0.002574	0.005229	1.9218	0.002374	0.003227	0.003996	0.002494	0.00224	0.015385	0.004521	0.044495	0.00347	0.005266	0.003041	0.032335	0.002295	0.002249	0.000871	0.002438	1.274053
14	0.084266	0.038653	0.053977	0.031261	0.036285	0.177797	0.091339	0.087018	0.10514	0.090578	0.134873	0.133113	0.355141	1.386731	0.028497	0.058036	0.048539	0.057466	0.053541	0.077364	0.047806	0.424248	0.065564	0.009508	0.027249	0.019014	0.035108	0.009919	0.037625	3.810857
15	0.033465	0.111424	0.061551	0.080616	0.049434	0.086615	0.054933	0.087263	0.063455	0.178382	0.096153	0.071623	0.096531	0.097632	1.070505	0.264015	0.149683	0.117642	0.099168	0.099793	0.054337	0.077868	0.083558	0.038338	0.274611	0.030318	0.503668	0.014144	0.033086	4.021143
16	0.001393	0.001286	0.001484	0.049354	0.00991	0.002262	0.001453	0.001871	0.004923	0.002758	0.002303	0.001877	0.003811	0.012188	0.001003	1.058774	0.004419	0.003205	0.002545	0.009828	0.002254	0.008524	0.081968	0.001046	0.001469	0.001246	0.005316	0.005261	0.002807	1.277189
17	0.004823	0.065253	0.018652	0.020425	0.005514	0.007964	0.010364	0.019215	0.082867	0.027071	0.015933	0.010789	0.01534	0.019482	0.036649	0.038814	1.814801	0.699153	0.189264	0.177918	0.050383	0.197682	0.003471	0.019335	0.01124	0.024659	0.005642	0.006347	4.088561	
18	0.003617	0.015468	0.012334	0.020894	0.00361	0.005273	0.010333	0.005436	0.023207	0.020364	0.01262	0.008545	0.015628	0.018348	0.009438	0.009847	0.01601	1.818173	0.055286	0.176546	0.017789	0.050207	0.076121	0.001982	0.007911	0.012564	0.010892	0.004686	0.004547	1.810678
19	0.004447	0.006744	0.007702	0.003164	0.001038	0.001565	0.000851	0.002609	0.002047	0.006333	0.005183	0.001264	0.002192	0.001836	0.003814	0.003415	0.002041	0.00191	1.05689	0.003399	0.002762	0.00126	0.002956	0.000695	0.001107	0.000415	0.002137	0.000707	0.000833	1.122315
20	0.000865	0.002563	0.001174	0.001427	0.001304	0.001387	0.001233	0.001133	0.001252	0.005132	0.001287	0.001249	0.002038	0.002278	0.001731	0.001977	0.0012528	0.008445	0.024852	1.240495	0.004246	0.002085	0.019177	0.001071	0.006869	0.026485	0.001363	0.002052	1.376876	
21	0.001602	0.001522	0.002531	0.0008831	0.004564	0.002311	0.0018	0.002618	0.002263	0.009938	0.004844	0.002275	0.003407	0.002701	0.001708	0.002996	0.002382	0.002423	0.003504	0.005385	1.37638	0.002976	0.003207	0.00112	0.043855	0.001839	0.005135	0.000645	0.002128	1.454748
22	0.001334	0.007187	0.002391	0.002769	0.003009	0.029145	0.040383	0.003149	0.005262	0.006974	0.007854	0.017524	0.013635	0.010128	0.004438	0.017281	0.002646	0.006606	0.006628	0.010269	0.005411	1.031835	0.004544	0.000899	0.00217	0.001528	0.002594	0.00192	0.004998	1.254663
23	0.000767	0.007808	0.001745	0.002146	0.001864	0.001506	0.00155	0.001743	0.001685	0.00579	0.00381	0.001675	0.002198	0.00262	0.004918	0.004983	0.006496	0.004533	0.003738	0.004152	0.002776	0.002887	1.006927	0.003487	0.002586	0.002274	0.009654	0.00821	0.006631	1.051519
24	0.006651	0.0539	0.144321	0.130539	0.180096	0.143244	0.175148	0.172219	0.174237	0.148484	0.137122	0.23238	0.178132	0.180043	0.087999	0.136755	0.160169	0.15862	0.1513218	0.153221	0.125277	0.163096	0.104424	0.111607	0.111998	0.039006	0.11469	0.016857	0.04141	4.699272
25	0.016695	0.051621	0.029496	0.026692	0.02751	0.033403	0.027322	0.037325	0.031135	0.053296	0.029662	0.024174	0.047182	0.038567	0.025358	0.043143	0.038607	0.038145	0.055665	0.049491	0.044131	0.047616	0.033847	0.016996	1.045707	0.012338	0.024165	0.00796	0.014348	1.931347
26	0.001687	0.002189	0.003261	0.0019508	0.003014	0.004918	0.004395	0.004177	0.005511	0.004353	0.003391	0.004028	0.005308	0.006055	0.00266	0.004495	0.004599	0.005338	0.006991	0.00774	0.003939	0.008088	0.00534	0.007773	0.007093	1.047524	0.002424	0.007945	0.0105	1.94246
27	0.0063	0.011126	0.014027	0.018707	0.016812	0.024939	0.018466	0.017822	0.01759	0.073108	0.049742	0.024182	0.031116	0.012547	0.012145	0.040038	0.03731	0.031017	0.028114	0.016648	0.015854	0.031901	0.016633	0.024409	0.009839	0.015186	1.01981	0.014248	0.025664	1.715301
28	0.012243	0.017505	0.024911	0.031293	0.031583	0.034718	0.031629	0.033738	0.037597	0.05109	0.048891	0.034426	0.046435	0.060181	0.022974	0.036617	0.043361	0.049125	0.050023	0.073198	0.02945	0.058033	0.03363	0.053055	0.036461	0.037555	0.021335	1.038011	0.171997	2.69057
29	0.014649	0.04015	0.022124	0.059009	0.048238	0.032117	0.029054	0.03222	0.039098	0.049141	0.054449	0.024978	0.047879	0.060762	0.046887	0.070726	0.038614	0.040983	0.038091	0.074943	0.041551	0.052785	0.054294	0.034089	0.043444	0.052153	0.033443	0.059337	1.068138	2.289211
SUM	1.424156	1.484678	2.126079	2.020964	2.168205	2.153635	2.170612	2.129072	2.406907	2.39127	2.260722	2.326248	2.326248	1.965523	2.096272	2.64039	2.566726	2.283231	2.369748	2.029181	2.270317	2.030593	1.28229	1.799955	1.390188	2.122328	1.251548	1.651467	59.26069	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	1.03155	0.00283	0.165131	0.01349	0.017818	0.004639	0.010421	0.112814	0.113078	0.010762	0.032407	0.001323	0.039851	0.008303	0.000852	0.001461	0.001003	0.000504	0.000177	0.001563	0.000022	0.000815	0.000821	0.005029	0.005148	0.001905	0.033706	0.001104	0.013504	1.627917
2	0.001151	1.039388	0.001321	0.003325	0.000649	0.000769	0.004965	0.000192	0.002673	0.001645	0.001877	0.000482	0.000185	0.010763	0.110718	0.037899	0.067625	0.006399	0.000991	0.005686	0.000184	0.030073	0.007154	0.001127	0.011112	0.003088	0.018401	0.00114	0.003538	1.738829
3	0.001246	0.001577	1.035386	0.057813	0.001567	0.000459	0.002824	0.004408	0.004294	0.001855	0.001802	0.000664	0.001398	0.001802	0.000815	0.000443	0.000298	0.000215	9.5E-05	0.000876	6.1E-05	0.001351	0.000667	0.001409	0.003957	0.000764	0.000782	0.000586	0.019862	1.17695
4	5.4E-06	2.09E-05	0.000127	1.038701	0.004444	2.6E-06	5.5E-05	5.6E-06	1.05E-05	7.35E-06	2.68E-05	4.67E-06	6.94E-06	2.95E-05	5.73E-06	7.18E-06	5.98E-06	3.28E-06	1.57E-06	1.55E-05	2.56E-06	1.33E-05	6.06E-06	1.25E-05	6.43E-05	4E-05	1.3E-05	8.19E-05	0.001226	1.040948
5	4.6E-07	2.49E-06	7.83E-06	2.03E-06	1.0522	2.74E-07	6.36E-06	6.32E-07	1.22E-06	9.02E-07	3.14E-06	4.99E-07	7.43E-07	1.14E-06	6.5E-07	1.16E-06	7.09E-07	3.82E-07	1.82E-07	1.8E-06	3.03E-07	1.24E-06	7.28E-07	1.5E-06	7.76E-06	4.83E-06	1.55E-06	7.33E-06	0.000149	1.052401
6	0.001032	0.000083	0.002059	0.000457	0.000251	1.050231	1.151046	0.00047	0.039166	0.000427	0.002456	0.018745	0.09702	0.001332	0.000244	0.000881	0.000571	0.000447	0.000347	0.008545	0.001187	0.045632	0.00026	0.007668	0.002642	0.000966	0.000373	0.00185	0.000846	2.445881
7	7.45E-05	0.000111	0.000156	0.000148	0.00013	0.000109	1.028711	0.000128	0.000329	0.000139	0.000307	9.68E-05	0.000646	0.00013	7.11E-05	0.00011	0.000159	9.15E-05	3.64E-05	0.000335	0.000723	0.000386	4.78E-05	0.006667	0.000218	0.000125	0.000139	4.89E-05	0.001657	1.041801
8	0.000744	0.005996	0.000285	0.000149	0.000124	0.00014	0.000718	1.04031	0.007721	0.000592	0.000381	0.000187	0.000364	0.001043	0.00069	0.000387	0.000851	0.00036	0.000253	0.00107	0.000148	0.000996	0.001389	0.000309	0.000207	0.000175	0.000341	0.001361	0.000599	1.16634
9	1.27E-06	7.14E-06	2.04E-06	5.2E-06	1.6E-05	6.13E-05	6.77E-06	1.083556	2.28E-06	1.05E-05	0.000126	0.000358	3.27E-06	3.13E-06	1.87E-06	3.15E-06	2.16E-06	2.55E-06	6.39E-07	5.36E-06	2.54E-05	0.000218	2.28E-06	4.3E-06	2.68E-05	1.33E-05	4.24E-06	1.87E-05	0.000375	1.009662
10	0.000361	0.000662	0.000864	0.003506	0.045073	0.000609	0.004143	0.000724	0.002738	1.088679	0.178213	0.000441	0.001024	0.001439	0.001075	0.011337	0.00031	0.000699	0.000139	0.003228	0.000114	0.002625	0.00079	0.002133	0.000787	0.001938	0.000603	0.001676	0.000582	1.360211
11	0.000184	0.000377	0.000722	0.001537	0.0009321	0.00059	0.005667	0.000463	0.000538	0.000141	1.017889	0.000156	0.000359	0.000383	0.000194	0.000283	0.000396	6.51E-05	0.002721	0.000117	0.00047	0.000143	0.000282	0.000907	0.002683	0.001113	0.001326	0.0007515	1.059221	
12	4.92E-06	3.22E-05	9.83E-06	9.96E-06	7.61E-06	0.000283	0.03996	4.62E-05	0.002261	1.49E-05	2.67E-05	1.045783	0.002576	0.000214	1.07E-05	1.45E-05	4.13E-05	1.61E-05	7.08E-05	2.88E-05	5.59E-05	0.000825	7.43E-06	0.000271	6.59E-05	1.6E-05	1.56E-05	2.53E-05	0.000207	1.092988
13	0.000135	0.002235	0.000233	0.000265	0.000102	7.62E-05	0.002422	0.000473	0.000805	0.000181	0.000573	9.55E-05	1.65724	0.000449	0.000547	0.000402	0.000381	0.000261	0.000233	0.000925	0.000597	0.009514	0.001073	0.000789	0.019756	0.001151	0.000165	0.000471	0.001498	1.03036
14	0.009875	0.026988	0.004658	0.004794	0.005439	0.016829	0.087824	0.004459	0.01558	0.006571	0.041679	0.024394	0.037453	1.070634	0.021617	0.009181	0.00554	0.004444	0.00196	0.030762	0.001711	0.023698	0.004474	0.002274	0.004805	0.002954	0.006515	0.00267	0.018568	1.49866
15	0.009777	0.029347	0.008878	0.023028	0.005155	0.005597	0.036001	0.017004	0.016651	0.012077	0.012805	0.001842	0.013346	0.008112	1.048792	0.096999	0.02652	0.005944	0.001661	0.01034	0.002228	0.010709	0.012731	0.007706	0.010518	0.02562	0.169869	0.007359	0.020586	1.74946
16	8.88E-05	0.00165	0.00112	0.018201	0.000377	0.000133	0.001301	0.000397	0.004435	0.000899	0.000465	0.000183	0.000607	0.005113	0.000353	1.029479	0.001748	0.000582	0.00039	0.00679	0.000423	0.005893	0.023372	0.000134	0.000265	0.000451	0.000743	0.001727	0.00103	1.06348
17	0.000222	0.014334	0.001152	0.003289	0.000641	0.000209	0.002246	0.000927	0.010249	0.004579	0.00295	0.000444	0.000752	0.001041	0.002108	0.006993	1.166397	0.0002	0.012397	0.058357	0.01638	0.023307	0.016778	0.004522	0.001674	0.00317	0.001409	0.001141	0.009372	1.463759
18	0.000828	0.008585	0.002041	0.022012	0.000414	0.000186	0.001944	0.003977	0.021191	0.000889	0.000604	0.000248	0.000567	0.001324	0.002575	0.002142	0.001786	1.001943	0.003632	0.02091	0.003387	0.003299	0.012294	0.000503	0.002537	0.003765	0.003139	0.000772	0.002045	1.12921
19	0.000958	0.002473	0.000307	0.000308	0.000137	4.85E-05	0.000536	0.003101	0.000863	0.001831	0.000742	3.33E-05	0.000301	0.000298	0.000347	0.001091	0.000644	0.000196	1.015557	0.002768	0.000115	0.000501	0.000472	0.000184	0.002585	0.000436	0.000198	0.00014	0.002203	1.039375
20	0.000275	0.006101	0.000347	0.000434	0.000716	0.000308	0.002654	0.002437	0.001033	0.000485	0.002745	0.000393	0.002323	0.00102	0.001437	0.003259	0.001666	0.000595	0.008027	1.32659	0.004368	0.001821	0.005023	0.00047	0.006248	0.053101	0.008469	0.000921	0.004096	1.447465
21	0.000555	0.000514	0.000345	0.000383	0.000167	0.000104	0.002614	0.000465	0.000608	0.000162	0.000566	0.000142	0.000347	0.000263	0.000901	0.000448	0.000475	0.000178	5.44E-05	0.000607	1.049389	0.001263	0.000269	0.001133	0.002386	0.001936	0.006911	0.000593	0.006322	1.01574
22	7.62E-05	0.000597	8.49E-05	0.000164	0.000124	0.000117	0.005315	0.000653	0.002475	0.000898	0.000881	0.001196	0.000349	0.000281	0.000246	0.000326	0.000837	0.001107	0.000414	0.001833	0.000165	1.020861	0.000193	0.000195	0.001055	0.003621	0.000558	0.000992	0.004255	1.049598
23	0.000656	0.006309	0.000102	0.001563	0.000552	0.001313	0.005656	0.000848	0.002769	0.001499	0.003447	0.000402	0.00082	0.000894	0.001049	0.001397	0.002798	0.000738	0.001398	0.0052	0.047634	0.008975	0.025229	0.006022	0.108448	0.001749	0.011246	0.017928	0.002404	1.613139
24	0.006088	0.012744	0.022254	0.019183	0.018441	0.008393	0.11223	0.018229	0.047559	0.019713	0.041435	0.013711	0.029071	0.017783	0.009636	0.014764	0.022751	0.001398	0.0052	0.047634	0.008975	0.025229	0.006022	0.108448	0.001749	0.011246	0.017928	0.002404	1.613139	
25	0.004251	0.006589	0.007935	0.008198	0.003932	0.002997	0.076778	0.01346	0.016568	0.00374	0.011982	0.003151	0.007131	0.006055	0.01585	0.00949	0.008477	0.003872	0.001301	0.017221	0.003774	0.012143	0.007491	0.014578	1.028195	0.016754	0.00406	0.006846	0.012626	1.333452
26	0.000409	0.000516	0.000538	0.001352	0.000643	0.000338	0.010637	0.000871	0.002893	0.000434	0.002883	0.000851	0.001058	0.000673	0.000649	0.000619	0.000358	0.000348	0.001014	0.00249	0.000306	0.004374	0.00071	0.004085	0.004548	1.027572	0.000297	0.004041	1.07903	
27	0.001787	0.002277	0.007307	0.012886	0.00372	0.001912	0.075071	0.004529	0.013331	0.002662	0.019811	0.004187	0.016855	0.007968	0.001586	0.025529	0.009639	0.003528	0.001349	0.014149	0.002277	0.014745	0.002114	0.008599	0.006307	0.037469	1.00276	0.00719	0.022715	1.340295
28	0.001686	0.004262	0.003778	0.004257	0.003061	0.002438	0.060077	0.003968	0.010942	0.002562	0.007118	0.004682	0.004685	0.003659	0.002797	0.004133	0.00315	0.002164	0.001784	0.007473	0.001791	0.009542	0.002201	0.011403	0.013951	0.01575	0.007162	1.00987	0.018064	1.226031
29	0.003126	0.016936	0.00515	0.013826	0.005185	0.001814	0.042017	0.004244	0.007636	0.00551	0.021415	0.003298	0.004983	0.007778	0.004346	0.007894	0.00479	0.00257	0.001203	0.012193	0.00204	0.008278	0.004988	0.009795	0.053551	0.032943	0.010511	0.01663	1.035886	1.350277
SUM	1.088025	1.94301	1.27894	1.25347	1.176381	1.00964	2.77902	1.232529	1.455969	1.17446	1.376453	1.127263	1.323319	1.175008	1.230553	1.262356	1.293376	1.150912	1.058413	1.587128	1.102209	1.58846	1.129707	1.09833	1.316305	1.253598	1.312576	1.09525	1.248709	37.16312

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	1.142921	0.018513	0.586538	0.131263	0.096508	0.124772	0.05704	0.350909	0.15767	0.094455	0.056387	0.050661	0.205756	0.086174	0.020054	0.021783	0.014627	0.016025	0.021352	0.023878	0.04147	0.032664	0.023206	0.022585	0.034292	0.008484	0.012786	0.006551	0.077589	3.53631	
2	0.047657	1.126639	0.060853	0.096579	0.062	0.083774	0.061832	0.086866	0.068007	0.12721	0.104434	0.06357	0.089142	0.126011	0.624337	0.354395	0.076361	0.264894	0.117921	0.129375	0.144375	0.133887	0.146075	0.073481	0.249349	0.041703	0.315231	0.027013	0.062513	5.362188	
3	0.059242	0.009551	1.111997	0.156232	0.011798	0.020566	0.01339	0.023143	0.015382	0.01295	0.012286	0.010194	0.023229	0.076112	0.027251	0.008975	0.007983	0.010626	0.007752	0.01118	0.008732	0.010843	0.008788	0.00741	0.024903	0.005874	0.007713	0.00451	0.07566	1.775904	
4	0.000122	0.000355	0.000237	1.031148	0.000139	0.000225	0.000195	0.000179	0.000222	0.000172	0.000151	0.000353	0.000299	0.000278	0.000321	0.000321	0.000321	0.000297	0.000205	0.000222	0.000378	0.000378	0.000378	0.000378	0.000378	0.000491	0.000371	0.000195	0.000304	0.006884	1.044771
5	4.97E-06	1.53E-06	6.21E-06	1.42E-05	1.330516	9.22E-06	8.21E-06	7.17E-06	7.06E-06	7.55E-06	6.38E-06	7.16E-06	7.77E-06	1.16E-05	1.27E-05	1.19E-05	1.39E-05	1.1E-05	1.38E-05	1.26E-05	9.4E-06	1.64E-05	1.39E-05	1.39E-05	1.62E-05	8.33E-06	1.62E-05	1.33E-05	0.000292	1.331105	
6	0.008594	0.011478	0.009626	0.004758	0.000245	1.629325	0.060804	0.020399	0.12585	0.010911	0.012229	0.267062	0.257211	0.00925	0.008619	0.008395	0.007889	0.00789	0.016395	0.010304	0.049383	0.168774	0.005214	0.006487	0.020837	0.003833	0.005446	0.000192	0.011542	3.390332	
7	0.0002	0.000386	0.000287	0.000346	0.00025	0.016028	1.18921	0.000489	0.001498	0.000465	0.000462	0.004252	0.010188	0.00041	0.000458	0.000404	0.000471	0.000533	0.000484	0.001954	0.002074	0.000338	0.001755	0.001002	0.000277	0.000339	0.000185	0.000219	1.235847		
8	0.0038	0.011723	0.003679	0.002391	0.001808	1.165258	0.198542	0.002563	0.00225	0.002046	0.003043	0.006057	0.007334	0.007795	0.005816	0.002852	0.002234	0.004989	0.006932	0.04043	0.002285	0.004351	0.001932	0.004287	0.002998	0.002445	1.555179				
9	3.64E-05	0.000129	4.34E-05	5.95E-05	3.89E-05	0.000201	0.00013	0.002569	1.016064	6.97E-05	6.78E-05	0.010192	0.000115	0.000163	0.000104	8.58E-05	9.92E-05	8.89E-05	0.001943	0.000415	9.38E-05	0.0005	0.000149	0.000144	0.000114	6.49E-05	7.4E-05	4.04E-05	0.000393	1.025287	
10	0.010891	0.031018	0.022605	0.041824	0.436666	0.041076	0.025384	0.022186	0.032329	1.955063	1.086667	0.033817	0.030042	0.057534	0.027501	0.165764	0.025945	0.033148	0.042717	0.069758	0.024555	0.057469	0.003249	0.003566	0.003978	0.003274	0.023898	0.015618	0.047828	4.387139	
11	0.000173	0.003602	0.003954	0.005258	0.01564	0.004453	0.003358	0.004225	0.003933	0.003731	1.043137	0.00326	0.003132	0.003761	0.011573	0.008047	0.004601	0.005422	0.003812	0.007005	0.003249	0.003566	0.003978	0.003274	0.027292	0.002533	0.007183	0.004067	0.031772	1.196785	
12	0.000295	0.000629	0.000296	0.000319	0.000255	0.008251	0.03931	0.005219	0.034009	0.000543	0.000494	1.68173	0.045597	0.006614	0.006601	0.000499	0.000532	0.000502	0.005349	0.001131	0.007313	0.010165	0.000542	0.000607	0.00285	0.000407	0.000454	0.000217	0.001178	1.716277	
13	0.002795	0.007545	0.004226	0.004789	0.004172	0.005901	0.005403	0.007586	0.005845	0.00908	0.007697	0.01597	1.096777	0.06331	0.008922	0.007291	0.007445	0.006605	0.006621	0.006472	0.171275	0.025486	0.006084	0.011046	0.062866	0.005877	0.007042	0.003402	0.009191	1.529818	
14	0.065315	0.081543	0.05602	0.065465	0.053786	0.205931	0.104043	0.068151	0.094673	0.095351	0.116953	0.118149	0.191221	1.372005	0.133332	0.08631	0.060755	0.070644	0.058122	0.117628	0.068879	0.109195	0.052447	0.02697	0.07486	0.019593	0.072951	0.012764	0.066557	3.71934	
15	0.093174	0.233944	0.117247	0.169969	0.124499	0.157889	0.1198	0.170124	0.126823	0.251917	0.201845	0.121834	0.168862	0.155904	1.315244	0.49307	0.285671	0.22801	0.145897	0.144685	0.154048	0.143498	0.174747	0.149572	0.514143	0.076701	0.656744	0.047935	0.117283	8.695929	
16	0.004771	0.005666	0.003405	0.0384	0.001755	0.00435	0.002801	0.002395	0.002952	0.003121	0.00331	0.003089	0.004095	0.019174	0.005037	1.171115	0.04517	0.07424	0.00708	0.011779	0.006221	0.011851	0.127389	0.002897	0.012519	0.037944	0.020314	0.029303	0.008508	0.020035	3.661045
17	0.008777	0.041588	0.015412	0.050421	0.012063	0.01365	0.010653	0.023742	0.02372	0.030387	0.02875	0.011061	0.017037	0.02818	0.0382	0.028417	1.528633	0.687581	0.191634	0.232092	0.311557	0.097417	0.102049	0.012519	0.037944	0.020314	0.029303	0.008508	0.020035	3.661045	
18	0.007824	0.024894	0.016538	0.069074	0.008725	0.008373	0.006803	0.024011	0.025022	0.026191	0.018953	0.00803	0.012186	0.019792	0.032037	0.020056	0.038255	1.051275	0.063125	0.059669	0.023313	0.021396	0.068279	0.007394	0.019182	0.01287	0.022017	0.006012	0.013924	1.736062	
19	0.006794	0.042718	0.007672	0.008013	0.005402	0.010768	0.007663	0.031084	0.028935	0.017279	0.009652	0.006982	0.010275	0.010948	0.027218	0.018663	0.02496	0.01884	1.508609	0.033074	0.01594	0.013519	0.012162	0.006534	0.030101	0.008163	0.02101	0.003521	0.010492	1.951941	
20	0.007737	0.059724	0.009531	0.011725	0.008485	0.017084	0.011583	0.014825	0.012809	0.019494	0.016476	0.010272	0.016464	0.013905	0.049671	0.026238	0.033075	0.026031	0.114605	1.730658	0.099369	0.029189	0.026291	0.015099	0.04543	0.074405	0.037142	0.006783	0.02132	2.551918	
21	0.008854	0.028882	0.01185	0.014921	0.009489	0.014794	0.013315	0.016808	0.013527	0.017704	0.018317	0.013861	0.014974	0.015251	0.029135	0.02136	0.037098	0.0271	0.018188	0.019567	1.63728	0.02917	0.015581	0.031387	0.011046	0.01345	0.040036	0.007175	0.031272	2.80693	
22	0.00074	0.002343	0.00153	0.002538	0.001415	0.002331	0.004773	0.001274	0.001552	0.002678	0.004048	0.007449	0.005485	0.003419	0.00252	0.002731	0.001886	0.006007	0.002381	0.002281	0.00353	1.0013	0.002041	0.001881	0.003405	0.007415	0.001866	0.001861	0.009015	1.190508	
23	0.00375	0.026739	0.0048	0.006166	0.004702	0.007862	0.006198	0.006178	0.007503	0.007781	0.017777	0.006236	0.006432	0.007092	0.017494	0.012527	0.014402	0.008752	0.008455	0.006953	0.007259	0.106801	0.007634	0.011241	0.008938	0.012068	0.014831	0.009893	1.303596		
24	0.03637	0.580012	0.07523	0.095445	0.087959	0.09391	0.08573	0.118499	0.10874	0.158662	0.143058	0.164422	0.135085	0.118839	0.137408	0.112709	0.151297	0.159111	0.055399	0.15619	0.163209	0.116534	0.06663	0.109433	0.112416	0.036131	0.11293	0.015567	0.057721	4.116606	
25	0.035072	0.054405	0.054784	0.055996	0.044091	0.067703	0.063403	0.090199	0.088761	0.070927	0.073569	0.065385	0.06589	0.058497	0.094347	0.069759	0.058579	0.06152	0.058853	0.067098	0.070322	0.064516	0.07353	0.111586	0.078773	0.048777	0.055621	0.032626	0.043349	2.857939	
26	0.005064	0.007647	0.006818	0.008457	0.007346	0.01052	0.010758	0.011381	0.011527	0.010486	0.013515	0.013925	0.011573	0.010103	0.010711	0.010064	0.011131	0.012267	0.048341	0.018957	0.021285	0.014204	0.012667	0.048007	0.017012	1.048092	0.008197	0.016733	0.01488	1.44258	
27	0.022406	0.075109	0.051071	0.069402	0.049198	0.098367	0.074429	0.056675	0.06387	0.109668	0.086176	0.065868	0.07451	0.067472	0.054915	0.096492	0.11542	0.096525	0.068807	0.081027	0.061702	0.076257	0.039759	0.057322	0.049994	0.034183	1.077744	0.027577	0.056115	2.952529	
28	0.021077	0.039862	0.028075	0.035969	0.029143	0.050427	0.055666	0.041435	0.04594	0.04135	0.046802	0.046756	0.049756	0.041936	0.052118	0.044664	0.046298	0.04584	0.073895	0.061171	0.041964	0.053249	0.056573	0.09135	0.063941	0.070087	0.041304	1.046567	0.046094	2.430821	
29	0.018268	0.056199	0.022842	0.052362	0.021743	0.033934	0.030215	0.026358	0.025962	0.027773	0.034515	0.026331	0.028595	0.042779	0.046741	0.043731	0.051007	0.046623	0.043295	0.046506	0.032187	0.03457	0.060319	0.051138	0.077381	0.059441	0.030638	0.048754	1.075238	2.189443	
SUM	1.621171	2.061697	2.86108	2.229495	2.433299	2.756771	2.710938	2.392164	2.317553	3.102849	3.072058	2.710675	2.576819	2.358181	2.757953	2.788228	3.015097	2.909996	2.827795	3.072781	3.692709	2.734441	2.173691	1.813642	2.676892	1.633068	2.640234	1.406156	1.915723	72.34264	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	1.031532	0.000479	0.22941	0.01739	0.011669	0.012841	0.083143	0.04769	0.049442	0.019554	0.008931	0.040365	0.039907	0.030863	0.000989	0.002916	0.001661	0.001108	0.002598	-0.04085	-0.00235	0.077961	0.000884	0.018919	0.003948	0.007791	0.001616	0.00255	0.028911	1.713956
2	0.004911	1.012238	0.012887	0.020962	0.004731	0.008826	0.211994	0.030674	0.017885	0.024402	0.041908	0.057823	0.032658	0.412368	0.14237	0.219695	0.05155	0.043589	-0.36612	-0.08916	0.112032	0.023622	0.023404	0.090447	0.015658	0.257986	0.015005	0.019158	2.541285	
3	0.015829	0.000267	1.057672	0.052393	0.001375	0.001917	0.047356	0.002289	0.020973	0.002416	0.006192	0.075826	0.040083	0.04445	0.00668	0.002221	0.001864	0.001212	0.003521	-0.06015	-0.00425	0.016254	0.000438	0.002365	0.006401	-0.00348	0.001859	0.002983	0.043862	1.770125
4	2.2E-05	2.01E-06	7.73E-05	1.075104	6.11E-05	4.55E-05	0.00372	0.000107	0.000407	2.43E-05	0.001334	0.001316	0.000119	8.87E-05	1.33E-05	0.000118	0.000235	0.000331	0.000364	-0.0071	-0.00051	0.000731	1.96E-05	0.00349	0.000461	-0.00069	0.000166	0.000243	0.004491	1.083385
5	5.44E-06	-1.5E-05	3.64E-05	1.23E-05	1.037358	3.55E-05	0.002231	6.32E-05	0.000235	1.09E-05	7.08E-05	0.000789	6.72E-05	3.83E-05	-9.7E-07	6.18E-05	0.000135	7.38E-05	0.000232	-0.00405	-0.00028	0.0004	-5.4E-06	0.002123	-6.9E-05	-0.00053	5.08E-05	4.5E-06	0.000163	1.039246
6	0.002626	0.000383	0.001883	0.000987	0.000507	1.061432	4.375825	0.014782	0.152616	0.00106	0.009717	0.355864	0.027721	0.002954	0.00223	0.00636	0.002168	0.001055	0.003525	-0.03236	0.000655	0.10469	0.001358	0.011914	0.005045	0.013996	0.001384	0.001878	0.009424	6.145774
7	1.92E-05	1.03E-05	0.000206	0.00124	5.06E-05	5.37E-05	1.796708	0.004479	0.006151	4.95E-05	0.000725	0.019106	0.001128	0.00114	2.42E-05	0.001418	0.000209	0.000111	0.000306	-0.00566	-0.00037	0.001046	0.000361	0.002594	0.00084	-0.00029	0.000125	0.000185	0.002649	1.831968
8	0.000309	0.001062	0.000683	0.000824	0.000813	0.000781	0.010588	1.059041	0.404563	0.006231	0.002079	0.003748	0.000695	0.002643	0.002402	0.013727	0.000801	0.000955	0.000857	-0.02784	-0.00166	0.03844	0.01101	0.003971	0.009832	0.019313	0.001325	0.002694	0.001109	1.577055
9	6.22E-05	0.001092	0.000164	0.000243	0.000135	0.000129	0.006012	0.0002	1.034594	0.000172	0.004515	0.001933	0.000312	0.000294	0.000598	0.000451	0.000595	0.000276	0.001304	-0.00971	-0.00056	0.001699	0.001045	0.003099	0.00893	0.040126	0.001028	0.002504	0.000861	1.098066
10	0.000972	-6.9E-05	0.003717	0.008809	0.043829	0.001998	0.088381	0.001939	0.019534	1.304042	0.290996	0.04049	0.003796	0.018338	0.002724	0.012419	0.002147	0.001219	-0.00792	-0.08169	-0.0061	0.081026	0.002485	0.003674	0.007473	0.000209	0.001245	0.006946	0.013395	1.865524
11	0.000302	0.000127	0.000428	0.000742	0.001694	0.000252	0.006486	0.000241	0.001563	0.016866	1.017261	0.002078	0.000347	0.001507	0.000678	0.000934	0.000423	0.000334	-0.00027	-0.00977	-0.00074	0.003187	0.000636	0.001546	0.001268	0.001216	0.00141	0.009564	0.011153	1.066192
12	4.35E-05	0.000639	0.00014	0.000207	0.000102	0.0004	0.26347	0.011292	0.390666	0.000167	0.000361	1.765464	0.002268	0.000495	0.000395	0.000772	0.00043	0.000239	0.000919	-0.00812	-0.00041	0.026191	0.000598	0.002937	0.003648	0.015878	0.00055	0.001187	0.001241	2.482109
13	0.000112	0.000685	0.000278	0.000318	0.000151	0.004556	0.025629	0.000502	0.001774	0.000418	0.010253	0.003928	1.017273	0.001754	0.00048	0.00306	0.000645	0.000474	0.003178	-0.01444	0.025175	0.017148	0.000934	0.003352	0.020145	0.019779	0.001281	0.001404	0.003294	1.153538
14	0.014462	0.003657	0.008251	0.012846	0.014432	0.028537	0.342221	0.016839	0.167585	0.029787	0.124043	0.579014	0.051372	1.090745	0.012499	0.032965	0.005993	0.007624	0.026253	-0.27672	-0.01746	0.189861	0.004141	0.009502	0.012366	-0.00065	0.011882	0.041115	0.025826	2.541188
15	0.010907	0.022932	0.016065	0.037684	0.010105	0.019271	0.472948	0.015789	0.053316	0.03495	0.039842	0.086906	0.144567	0.070298	1.070108	0.144129	0.043846	0.028533	0.025396	-0.43861	-0.02424	0.082291	0.019263	0.042423	0.23472	0.057984	0.277768	0.031416	0.038468	2.668878
16	8.82E-05	0.001237	0.001584	0.019279	0.000117	0.000134	0.003319	0.000126	0.002821	0.000303	0.000746	0.003308	0.000379	0.004573	0.000567	1.051213	0.002063	0.000981	-0.00729	-0.01777	-0.00214	0.036135	0.028273	0.002564	-0.00135	-0.00689	0.00061	0.004943	0.001933	1.077869
17	0.000331	-0.00225	0.001612	0.00201	0.000239	0.000158	-0.00282	0.003356	0.015282	0.00045	0.004643	1.8E-05	0.00021	0.000968	-0.00028	0.003133	1.132408	0.19188	0.224459	-0.58315	0.054606	0.113178	0.013765	0.001648	0.008013	0.013808	0.000909	0.001506	0.000677	1.200739
18	0.001345	0.000197	0.008787	0.021904	0.00087	0.000941	0.03068	0.014926	0.013883	0.040637	0.021548	0.012577	0.002497	0.010095	0.005109	0.004706	0.043308	1.025576	0.143699	-0.30431	-0.01418	0.106286	0.011751	0.006114	0.006474	0.079555	0.005106	0.003707	0.005564	1.272838
19	0.001798	-0.00024	0.002305	0.002838	0.000584	0.001818	0.035688	0.00178	0.010887	0.00119	0.003135	0.006394	0.001323	0.001527	0.000771	0.005097	0.002507	0.008704	1.081281	-0.20268	-0.02483	0.014709	0.00168	0.010418	0.018844	0.184161	0.007932	0.003512	0.003707	1.888839
20	-0.00265	-0.01228	-0.00552	-0.01739	-0.00162	-0.00338	-0.1478	-0.005	-0.02345	-0.00475	-0.00754	-0.03156	-0.00502	-0.00944	-0.00934	-0.01832	-0.01293	-0.01578	-0.45873	-2.19482	-0.36781	-0.06018	-0.01376	-0.026	-0.08019	-0.44216	-0.01619	-0.01133	-0.02018	-0.2532
21	0.000319	0.001456	0.001453	0.001372	0.00016	0.0004	0.035787	0.000615	0.002077	0.000596	0.000857	0.002838	0.000438	0.00044	0.001002	0.001189	0.006235	0.001376	0.000945	-0.04722	1.17467	0.009342	0.001238	0.005777	0.043593	-0.00414	0.000176	0.001577	0.008661	1.25642
22	0.000232	0.000354	0.000741	0.000369	0.000551	0.000557	0.044378	0.00148	0.005437	0.000771	0.003301	0.011633	0.001875	0.002932	0.001892	0.006132	0.00202	0.002171	-0.00079	-0.04203	-0.00021	1.138844	0.001521	0.007327	0.003311	0.04498	0.001826	0.008005	0.006166	1.58773
23	0.000496	0.001562	0.000316	0.000498	0.000138	0.00019	0.003481	0.000159	0.00176	0.000297	0.000619	0.000796	0.000326	0.000353	0.000986	0.000783	0.000666	0.000313	0.000278	-0.00617	-6.8E-05	0.00146	1.001671	0.000417	0.001081	0.003122	0.002334	0.005786	0.003992	1.028044
24	0.002327	-0.00763	0.016874	0.045201	0.016002	0.011032	1.017924	0.029416	0.108561	0.040989	0.032741	0.356488	0.031133	0.017501	-0.00074	0.028561	0.062703	0.035319	0.109045	-1.88632	-0.13061	0.185902	-0.0028	0.991594	-0.03334	-0.24921	0.022294	-0.00158	0.008091	0.79613
25	0.001103	-0.00019	0.00153	0.000976	0.001225	0.001065	0.077449	0.002198	0.008684	0.000488	0.00307	0.021945	0.002427	0.001929	0.00021	0.002245	0.004417	0.002338	0.036016	-0.20627	-0.0214	0.016436	0.005279	0.056297	0.102716	-0.00034	0.00364	0.019967	0.014095	1.089444
26	0.000947	0.002458	0.000495	0.002257	0.001944	0.007894	0.007226	0.014197	0.003472	0.007112	0.016663	0.004197	0.003883	0.004296	0.003383	0.005735	0.005474	0.003379	0.017714	-0.10211	-0.00389	0.020449	0.001498	0.019976	0.040824	1.046577	0.017016	0.01587	0.007835	1.209515
27	0.000764	0.000304	0.009118	0.033209	0.004005	0.009213	1.727771	0.006622	0.045843	0.031456	0.056218	0.296071	0.013153	0.012382	0.004982	0.055409	0.05	0.053748	0.018802	-0.29551	-0.01538	0.050935	0.002947	0.0004302	0.000886	-0.01212	0.115373	0.01202	0.026835	1.511286
28	0.002801	0.002657	0.002617	0.004621	0.001601	0.00191	0.081899	0.002269	0.013561	0.002427	0.013075	0.02398	0.006393	0.007702	0.006786	0.005277	0.00467	0.004195	0.014814	-0.10171	0.013069	0.090475	0.006379	0.002382	0.029375	0.056603	0.006299	1.028399	0.021728	1.396095
29	0.003107	0.006656	0.002013	0.008019	0.001203	0.001591	0.038164	0.000974	0.006269	0.001575	0.004425	0.008762	0.002343	0.000667	0.004151	0.004192	0.003757	0.001754	-0.00711	-0.11257	-0.01154	0.019422	0.003901	0.008213	0.019135	0.039305	0.020338	0.055787	1.041743	1.818145
SUM	1.098408	1.046655	1.377782	1.319406	1.155147	1.168643	9.206233	1.246464	2.577901	1.480913	1.673768	3.50225	1.408154	1.338446	1.526201	1.51923	1.587939	1.410858	1.277016	-7.54884	6.60826	2.95453	1.150205	1.269176	1.438391	0.932667	1.749843	1.241051	1.334848	41.61323

2006

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	1.194259	0.011347	0.580726	0.109946	0.282389	0.032593	0.11068	0.160278	0.103752	0.057211	0.039113	0.027569	0.313894	0.073802	0.010453	0.024761	0.018131	0.016636	0.020469	0.015476	0.034859	0.035154	0.026558	0.044151	0.01896	0.007784	0.004099	0.00652	0.0547	3.50453
2	0.038177	1.118649	0.049283	0.087804	0.055691	0.11767	0.073329	0.100594	0.083379	0.105805	0.052609	0.050605	0.153515	0.202957	0.757488	0.351621	0.390908	0.55566	0.286541	0.081814	0.123887	0.154279	0.166998	0.048441	0.224962	0.038028	0.108327	0.030143	0.032799	5.736522
3	0.087906	0.003601	1.207015	0.150829	0.027155	0.006587	0.011795	0.018743	0.011911	0.013144	0.009472	0.005813	0.026945	0.009599	0.003524	0.006444	0.007021	0.005776	0.007775	0.006633	0.011354	0.012916	0.005213	0.011821	0.011202	0.004688	0.001739	0.00503	0.071452	1.76920
4	0.001753	0.000817	0.016887	0.000335	0.000466	0.100213	0.003798	0.002213	0.004536	0.002995	0.001842	0.002176	0.001917	0.000965	0.001937	0.002543	0.001786	0.002491	0.002371	0.004438	0.002692	0.001334	0.000859	0.001466	0.001062	0.000382	0.000765	0.00065	1.259595	
5	0.000152	0.000169	0.000335	0.000466	0.100213	0.003798	0.002213	0.004536	0.002995	0.001842	0.002176	0.001917	0.000965	0.001937	0.002543	0.001786	0.002491	0.002371	0.004438	0.002692	0.001334	0.000859	0.001466	0.001062	0.000382	0.000765	0.00065	1.259595		
6	0.008956	0.003874	0.011771	0.010567	0.015909	1.411757	0.416655	0.29732	0.066828	0.043791	0.041729	0.669878	0.059972	0.013573	0.00332	0.016068	0.05283	0.007364	0.012372	0.006611	0.008157	0.112309	0.008521	0.006362	0.007237	0.007361	0.002356	0.003353	0.015527	3.090974
7	6.46E-05	0.000108	0.000131	0.000117	0.000119	0.000133	0.000607	0.004364	0.002093	0.000249	0.000192	0.000147	8.47E-05	0.000305	8.83E-05	0.000176	0.000121	0.000159	0.000267	0.0003	0.000152	0.000228	0.001421	0.000199	0.000154	0.000162	0.000148	6.02E-05	0.000446	1.018937
8	0.003116	0.010308	0.003744	0.00878	0.006661	0.007102	0.005997	1.052118	0.475971	0.028565	0.018244	0.010647	0.007356	0.013576	0.007495	0.010391	0.006904	0.011805	0.012522	0.05621	0.005335	0.031366	0.08964	0.002425	0.009533	0.00345	0.002306	0.003816	0.004112	1.866246
9	0.001104	0.002782	0.002068	0.011154	0.003466	0.005453	0.006365	0.006562	1.039298	0.011384	0.013968	0.041618	0.002283	0.005903	0.005613	0.008766	0.007544	0.009995	0.007726	0.004218	0.003802	0.004958	0.003438	0.002925	0.009598	0.003302	0.002389	0.002332	0.0031	1.211036
10	0.010052	0.007154	0.002508	0.045443	0.230823	0.036884	0.026785	0.039835	0.032198	1.316176	0.139402	0.032817	0.002316	0.008343	0.002618	0.004423	0.023167	0.030764	0.045357	0.031034	0.01924	0.063421	0.01832	0.009226	0.019104	0.012535	0.014101	0.019766	0.02197	2.762049
11	0.001861	0.002375	0.000409	0.010973	0.230634	0.003968	0.002947	0.003495	0.003627	0.058384	1.046951	0.003066	0.002216	0.008343	0.002618	0.004423	0.023167	0.030764	0.045357	0.031034	0.01924	0.063421	0.01832	0.009226	0.019104	0.012535	0.014101	0.019766	0.02197	2.762049
12	0.000578	0.00071	0.0008	0.001292	0.001578	0.072552	0.038469	0.002087	0.053383	0.057161	0.003971	1.067167	0.003305	0.00162	0.000553	0.002172	0.000751	0.001005	0.001197	0.000662	0.00071	0.013622	0.001144	0.000512	0.001341	0.000628	0.000301	0.0004	0.001781	1.280052
13	0.001075	0.00727	0.002094	0.001861	0.001608	0.017734	0.011214	0.003122	0.003282	0.003013	0.007623	0.02187	1.153024	0.002646	0.005119	0.006204	0.005405	0.00534	0.009811	0.002635	0.039218	0.004559	0.007346	0.002426	0.002742	0.00206	0.002129	0.001778	0.002528	1.356737
14	0.086446	0.064777	0.080111	0.096382	0.123712	0.096138	0.069403	0.141808	1.20592	0.135654	0.250036	0.081343	0.05954	1.47626	0.056233	0.205051	0.062785	0.090575	0.064357	0.042021	0.055406	0.142974	0.050027	0.017099	0.034804	0.021622	0.019265	0.023159	0.035345	3.803215
15	0.057305	0.178882	0.064081	0.118596	0.07726	0.180524	0.100828	0.1473	0.118441	0.147735	0.129002	0.140268	0.249079	0.332712	1.302467	0.369065	0.406181	0.328862	0.334195	0.080719	0.137532	0.195775	0.174091	0.0443	0.366641	0.047658	0.110297	0.047047	0.047006	6.036849
16	0.002013	0.008936	0.006059	0.067858	0.003043	0.039428	0.044026	0.004545	0.009702	0.006318	0.01401	0.113376	0.005355	0.009264	0.006339	1.023278	0.006754	0.009442	0.01658	0.00767	0.006379	0.021443	0.074684	0.003701	0.003758	0.003837	0.001884	0.006044	0.006358	1.598683
17	0.002835	0.029766	0.003509	0.006185	0.005948	0.00657	0.006102	0.007024	0.021381	0.017184	0.012093	0.006885	0.023541	0.011779	0.022009	0.018107	1.41319	0.091535	0.182836	0.033438	0.180206	0.023809	0.170369	0.006084	0.027509	0.009384	0.005226	0.002133	0.003771	2.329409
18	0.00949	0.032989	0.009796	0.018116	0.014444	0.014054	0.013367	0.021015	0.02251	0.036604	0.025448	0.020273	0.013001	0.018024	0.02869	0.030724	0.130485	1.144701	0.233854	0.04778	0.065742	0.043266	0.086652	0.008643	0.031381	0.024258	0.014299	0.003919	0.006634	2.17016
19	0.001372	0.001902	0.002106	0.002748	0.001544	0.003663	0.001771	0.001906	0.002883	0.002237	0.004093	0.002655	0.003825	0.001555	0.001776	0.001856	0.002642	0.002722	1.052807	0.002158	0.05572	0.003465	0.001275	0.001095	0.011051	0.001364	0.000997	0.001072	0.001697	1.716611
20	0.029565	0.066341	0.024533	0.052057	0.024544	0.040707	0.163084	0.044745	0.052121	0.037559	0.032762	0.03572	0.028715	0.044381	0.050759	0.080515	0.054595	0.075967	0.095432	2.900133	0.366974	0.100862	0.055131	0.026351	0.152721	0.334194	0.101788	0.017646	0.042428	5.113488
21	0.000116	0.000129	0.000162	0.00018	0.00016	0.000158	0.00027	0.000184	0.000275	0.000208	0.000143	0.000158	0.000191	0.000225	0.000225	0.000246	0.000246	0.000259	0.000361	0.000314	0.125051	0.000212	0.000352	0.000383	0.000438	0.0002792	0.002759	0.002316	0.006971	1.258643
22	0.001119	0.004419	0.001552	0.003199	0.006707	0.003079	0.004551	0.005387	0.004065	0.007387	0.002063	0.003091	0.006428	0.004518	0.003476	0.005574	0.003525	0.0043	0.005701	0.002732	0.00332	1.131523	0.003258	0.001083	0.004328	0.0002792	0.002759	0.002316	0.006971	1.258643
23	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	1.00000
24	0.077487	0.085397	0.170831	0.23712	0.327477	0.270174	0.284547	0.517497	0.29385	0.629557	0.397603	0.251178	0.251358	0.256466	0.114043	0.249555	0.339588	0.224294	0.327352	0.322538	0.068682	0.359218	0.168349	1.291627	0.141346	0.097138	0.035389	0.029102	0.064479	8.737347
25	0.020187	0.032398	0.018509	0.021001	0.021939	0.019138	0.021396	0.031879	0.02404	0.027276	0.027673	0.016679	0.018665	0.024481	0.028819	0.028843	0.02833	0.032993	0.055761	0.050175	0.032625	0.025349	0.026013	0.033062	0.047171	0.024836	0.005651	0.021242	0.015673	1.781261
26	0.010778	0.024041	0.017226	0.037505	0.026391	0.024953	0.026044	0.034232	0.023507	0.043113	0.021981	0.021567	0.018953	0.02157	0.020173	0.028506	0.025863	0.029117	0.033433	0.068804	0.049402	0.0488	0.015937	0.031317	0.022413	1.069405	0.019806	0.023261	0.031064	1.86316
27	0.013196	0.046315	0.021515	0.045433	0.033393	0.034905	0.071339	0.030686	0.03981	0.058342	0.066998	0.045879	0.026731	0.041233	0.032837	0.086031	0.082596	0.079519	0.065264	0.064323	0.037915	0.044513	0.031534	0.008555	0.026633	0.027922	0.018439	0.020676	0.038402	2.0654
28	0.031434	0.021267	0.027296	0.039617	0.030358	0.031253	0.032335	0.028197	0.059254	0.047631	0.031492	0.02675	0.023906	0.025473	0.020412	0.028173	0.026724	0.027307	0.03925	0.030158	0.027818	0.03782	0.020813	0.024025	0.087097	0.092102	0.021343	0.0214859	0.077385	2.231548
29	0.012659	0.025778	0.012972	0.030603	0.016115	0.015852	0.016775	0.015579	0.014022	0.024772	0.023835	0.013015	0.020599	0.018596	0.020762	0.025512	0.025752	0.028604	0.024502	0.019315	0.02537	0.038367	0.019187	0.007712	0.043444	0.046526	0.015436	0.064729	1.061976	1.713693
SUM	1.705056	1.81792	2.361635	2.387489	2.46941	2.956514	2.512619	2.458211	2.684794	2.864894	2.783797	2.739515	2.494653	2.704005	2.527823	2.717001	3.080202	2.817429	2.947396	3.840338	2.915177	2.692375	2.23027	1.653337	2.340568	1.887887	1.883253	1.576524	1.669776	71.05611

Appendix 3 The Direct Field of Influence for the Philippines 1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	4.12755	5.26431	6.88632	5.91598	5.32785	6.97055	7.03704	6.25432	5.82972	6.85279	6.25834	6.52015	6.2892	6.76242	6.61474	6.61947	7.314619	7.40039	6.65234	6.66762	6.651831	6.13988	6.608103	6.417708	5.188545	4.575488	5.91267	4.34708	4.94875	176.5699	
2	2.79138	3.56589	4.65768	4.00869	3.60317	4.71408	4.75908	4.22666	3.94209	4.61593	4.23293	4.40957	4.25741	4.573162	4.473162	4.47166	4.94673	5.03154	4.498842	4.59371	4.494989	4.15272	4.468921	3.127859	3.508104	3.094307	2.998614	2.998614	3.347497	119.4105	
3	3.252642	3.00878	3.92072	3.37981	3.03678	3.973123	4.01907	3.564745	3.220071	3.880231	3.567121	3.741616	3.559255	3.854294	3.770027	3.770956	4.169175	4.240653	3.791581	3.79987	3.790773	3.495588	3.766488	2.631954	2.956407	2.607894	3.369887	2.477792	2.821332	100.6455	
4	1.359633	1.73408	2.28379	1.94874	1.755012	2.296161	2.319071	2.059134	1.922071	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	2.059134	58.16254	
5	1.459622	1.912743	2.501931	2.149894	1.935704	2.532574	2.557713	2.272316	2.117815	2.279757	2.349173	2.369175	2.2835	2.456854	2.40313	2.40501	2.180498	2.409439	2.470311	2.191279	2.196335	2.191139	2.022495	1.521091	1.79128	1.507185	1.917658	1.431946	1.630509	58.16254	
6	2.439502	3.111544	4.070002	3.496514	3.148912	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	4.159173	64.5129	
7	1.269381	1.63975	2.117803	1.819392	1.638519	2.143742	2.164174	1.924442	1.792652	2.099331	2.09482	2.05429	1.99439	2.079647	2.094172	2.035762	2.49524	2.288095	2.04935	2.050547	2.046591	1.888247	2.032245	1.420121	1.556575	1.407137	1.818371	1.336898	1.522775	54.30138	
8	1.760298	2.45231	2.98837	2.523019	2.277195	2.972807	3.001141	2.667309	2.465951	2.910808	2.669029	2.781004	2.682491	2.883934	2.820862	2.823668	3.119499	3.172988	2.87056	2.84357	2.838837	2.618503	2.818108	1.963335	2.212783	1.951329	2.521603	1.653927	1.810996	75.30259	
9	1.278421	1.63075	2.132585	1.832091	1.640956	2.158705	2.17928	1.99867	1.805174	2.113883	1.981116	2.019428	1.947892	2.094163	2.04837	2.049972	2.265226	2.306077	2.060131	2.065105	2.059663	1.901429	2.046432	1.430033	1.608805	1.416968	1.831064	1.34623	1.532901	54.80096	
10	2.865406	3.65479	4.780571	4.10696	3.69867	4.839124	4.885246	4.341835	4.046621	4.782002	4.344634	4.526908	4.366548	4.694441	4.591788	4.595379	5.079508	5.164976	4.618149	4.628752	4.617791	4.262388	4.57435	3.205676	3.601599	3.176366	4.104656	3.017813	3.436271	122.5713	
11	1.503392	1.917556	2.50822	1.713192	1.519511	2.538942	2.563144	2.278032	2.123138	2.486004	2.279522	2.375129	2.291	2.463045	2.409175	2.411066	2.664025	2.709808	2.423005	2.428577	2.42818	2.23635	2.406902	1.681934	1.888974	1.666558	2.155598	1.583373	1.808213	64.3102	
12	1.741992	2.221881	2.906294	2.49678	2.248555	2.941891	2.96993	2.63957	2.460098	2.880536	2.644271	2.752082	2.654954	2.853952	2.791526	2.795709	3.087057	2.813988	2.807552	2.813988	2.807334	2.591271	2.788879	1.948854	2.18977	1.951036	2.495379	1.834647	2.089042	74.5196	
13	1.665777	2.161579	2.776328	2.334642	2.145764	2.82675	2.82617	2.546256	2.351123	2.787797	2.528707	2.625224	2.544037	2.731144	3.781948	1.669468	1.995364	3.020109	2.697651	2.680529	2.678012	2.451338	2.59173	1.859122	2.15716	1.842508	2.529101	1.749804	1.980007	71.5394	
14	3.669401	4.800361	6.121035	5.239318	4.736468	6.196917	6.255981	5.50096	5.182049	6.067678	5.56368	5.797097	5.591743	6.011638	5.880182	5.884782	6.502701	6.0142	5.91394	5.927518	5.913482	5.458357	5.874607	4.105146	4.61262	4.067612	5.256367	3.864573	4.400442	156.9708	
15	2.613326	3.33271	4.359926	3.745541	3.373239	4.413305	4.45504	3.959867	3.690448	4.320857	3.962314	4.127948	3.982325	4.281306	4.187853	4.190804	4.629795	4.709756	4.211423	4.221354	4.234229	3.871929	4.183631	2.933684	3.285752	2.886942	3.749336	2.752316	3.133913	111.7956	
16	1.794279	2.121045	2.89427	2.485726	2.23861	2.928866	2.956782	2.627883	2.489206	2.867783	2.625878	2.739898	2.642841	2.841297	2.779167	2.781341	3.07339	3.126088	2.795122	2.80154	2.794905	2.579799	2.776532	1.940226	1.80076	1.92487	2.494331	1.826524	2.079793	74.18954	
17	3.71625	4.740016	6.20097	5.326466	4.79594	6.271036	6.335854	5.631084	5.248211	6.145147	5.634715	5.871112	5.663136	6.088391	5.555258	5.959915	6.585724	6.68647	5.989446	6.031398	5.988892	5.528047	5.949611	4.157558	4.671512	4.119545	5.323478	3.313914	4.456625	158.9749	
18	2.559944	3.365231	4.271008	3.66922	3.3044	4.323326	4.364944	3.878983	3.615385	4.233532	3.881563	4.044947	3.901117	4.194117	4.102201	4.105685	4.537761	4.615076	4.126197	4.135452	4.125506	3.821858	4.0847	2.863852	3.217961	2.837739	3.667059	2.695881	3.069958	106.5143	
19	1.386249	1.783154	2.312779	1.968893	1.789371	2.341109	2.36342	2.100527	1.951775	2.292284	2.101088	1.910059	2.112482	2.271111	2.221457	2.223193	2.457189	2.489451	2.234262	2.23932	2.234039	2.062091	2.219361	1.550867	1.742584	1.536685	1.985791	1.459983	1.662425	59.30174	
20	1.713751	2.183861	2.89179	2.456303	2.121212	2.894198	2.921783	2.596778	2.420216	2.833838	2.598452	2.707467	2.611558	2.807665	2.746217	2.748419	3.019701	3.089085	2.762037	2.768378	2.761823	2.549262	2.743667	1.91726	2.154271	1.889731	2.454925	1.804904	2.055175	73.3138	
21	2.087105	2.662069	3.482074	2.991428	2.694038	3.524772	3.558317	3.162507	2.947479	3.451212	3.164546	3.29731	3.118507	3.419338	3.344588	3.347184	3.698648	3.762067	3.363769	3.371492	3.365508	3.104639	3.341397	2.349451	2.623596	2.313602	2.98975	2.198117	2.502912	89.2825	
22	1.870371	2.385628	3.12048	2.680785	2.414277	3.158699	3.188085	2.834098	2.6414	3.092823	2.835925	2.954483	2.850229	3.064259	2.997253	3.014654	3.371397	3.014446	3.021381	3.014226	2.78224	2.994411	2.092479	2.35115	2.073348	2.679281	1.949851	2.242998	80.0133		
23	1.449364	1.87415	2.45145	2.160206	1.966567	2.481475	2.505126	2.226468	2.075084	2.429723	2.227904	2.321373	2.239141	2.407882	2.354465	2.356485	2.649457	2.368161	2.373938	2.367977	2.185728	2.35241	1.980632	1.847064	1.628823	2.104884	1.547518	1.7621	62.85692		
24	4.45194	5.078716	7.427504	6.380923	5.74657	7.518476	7.590136	6.745846	6.287176	7.361675	6.750195	7.033391	6.784042	7.293684	7.134194	7.139774	7.889472	8.024079	7.175151	7.191025	7.174695	6.6241	7.127431	4.980612	5.956311	4.953074	3.677344	4.68875	5.338884	190.4465	
25	2.811403	3.972608	3.434963	3.014496	3.073544	4.021341	4.059195	3.680002	3.360326	3.937375	3.61035	3.761772	3.628597	3.910854	3.814569	3.848427	4.177178	4.280881	3.829652	3.848802	3.839463	3.541265	3.311045	2.663985	2.993603	2.639478	3.477344	4.68875	5.338884	190.4465	
26	1.459402	1.861546	2.434963	2.091862	1.838902	2.464787	2.488279	2.211495	2.061129	2.413382	2.21292	2.305761	2.224082	2.391093	3.317719	3.345171	3.24771	3.588729	3.650633	3.623802	3.271295	3.265549	3.012373	3.242095	2.652559	2.956262	2.244845	2.900899	1.537111	7.5025	
27	2.025079	2.820555	3.378591	2.919527	2.613975	3.794829	4.364932	5.012253	4.454714	4.151826	4.861386	4.475987	4.64499	4.48007	4.816487	4.741166	4.714851	5.209524	5.292556	4.738212	4.749091	4.737845	4.373202	4.706699	3.289017	3.695603	3.258946	4.211369	3.096272	3.525607	125.764
28	2.939902	3.749796	4.90857	4.213733	3.794829	4.364932	5.012253	4.454714	4.151826	4.861386	4.475987	4.64499	4.48007	4.816487	4.741166	4.714851	5.209524	5.292556	4.738212	4.749091	4.737845	4.373202	4.706699	3.289017	3.695603	3.258946	4.211369	3.096272	3.525607	125.764	
29	3.602711	4.594079	6.00578	5.16231	4.649684	6.082689	6.13923	5.457674	5.086057	5.553198	5.46027	5.688141	5.488577	5.894854	5.771063	5.774981	6.488797	5.802894	5.817271	5.804168	5.295336	5.765692	4.023401	4.527301	3.992678	5.159039	3.739928	4.318964	153.925		
SUM	66.33512	84.6482	110.6679	85.04311	85.99909	112.0393	113.0397	100.3345	93.61475	109.7199	100.5804	104.3314	101.0652	108.6774	107.4114	105.4093	117.5492	119.5708	106.9128	107.1424	106.9159	98.3829	106.1083	74.20083	83.44237	73.52879	95.16438	69.78906	79.54105	2827.757	

Appendix 4
Changes in Linkage Intensities (First Order Effects), PHILIPPINES
1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.020346	-0.01993	-0.05882	0.028961	0.01195	0.02192	-0.0126	0.111396	0.132168	0.007655	0.000554	-0.01442	0.045538	-0.16419	-0.01125	-0.01151	0.003089	-0.0044	-0.00234	-0.00537	-0.00011	0.045552	-0.00047	-0.00639	-0.002	-0.00405	-0.00086	-0.00344	-0.00983	0.0962
2	0.009679	0.037511	0.017893	0.021745	0.012872	0.027963	0.021325	0.022585	0.025562	0.051361	0.026875	0.024285	0.037715	0.028216	0.066498	0.046565	0.167941	0.072642	0.053501	0.031958	0.019746	0.019907	0.032566	0.013918	0.017426	0.011887	0.015642	0.003548	0.008677	1.181821
3	0.039579	0.003003	0.067665	0.129881	0.004411	0.019133	0.003239	0.01607	0.011798	-0.00542	0.002173	0.049558	0.020364	0.087098	0.002886	0.00449	0.002131	0.002342	0.002192	0.005989	0.00222	0.01527	0.003073	0.00318	-0.00138	-0.00022	0.000091	0.000158	0.019097	0.594209
4	-0.00062	-0.00105	-0.00094	0.023902	-0.00014	-0.001	-0.0013	-0.00096	-0.00045	-0.00189	-0.00277	-0.00066	-0.00085	-0.00164	-0.00091	-0.00117	-0.00084	-0.00099	-0.00095	-0.00123	-0.0107	-0.00065	-0.00189	-0.00176	-0.00204	-0.00166	-0.00167	-0.01067	-0.01449	-0.02336
5	-9.2E-05	-4.4E-06	-5.5E-05	-4.6E-06	0.208218	-3.1E-06	-7E-06	-1.8E-05	8.37E-06	-1.5E-06	-2E-06	-1.4E-05	-5.2E-06	-3.9E-05	-2.8E-06	-3.4E-06	-1.6E-06	-2.5E-06	-2.3E-06	-2.8E-06	-1.2E-06	-3.3E-06	-4.2E-06	-1.6E-06	-2.6E-06	-1.3E-06	-1.4E-06	-1.3E-06	-7.4E-06	0.207941
6	-0.0061	-0.00568	-0.00626	0.000144	0.001082	-0.14633	0.005546	0.001694	0.026441	0.019565	-0.01616	-0.02302	-0.02857	-0.00121	-0.00289	6.23E-05	-0.00013	-0.00132	-0.00058	0.024549	-0.00173	-0.00275	-0.00425	-0.001	-0.00121	0.00079	0.003317	-0.00317	-0.1415	
7	1.34E-06	-2.8E-06	1.1E-06	3.7E-07	-2.7E-06	0.036007	-8.5E-07	1.24E-06	1.1E-06	-1E-05	-0.00056	-2.3E-06	-2.3E-06	-5.9E-07	-2.8E-06	4.01E-07	-1.8E-05	-5.8E-06	-1.4E-06	9.89E-07	-2.3E-06	-2.7E-05	-1.9E-06	-6.0E-06	1.29E-06	3.45E-05	0.003587			
8	-0.00081	-0.00427	-0.00128	-0.00693	-0.00462	-0.00254	-0.00467	-0.00212	0.29877	-0.0048	-0.00052	-0.00934	-0.00065	-0.00237	-0.00717	-0.00656	-0.0095	-0.02975	0.007016	-0.00078	-0.00356	0.017861	-0.00038	8.69E-05	-0.00038	8.69E-05	-0.00038	0.0015	0.000122	0.20752
9	0.000185	-8E-05	9.26E-05	0.000199	2.04E-05	0.000242	0.000493	0.000867	-0.0013	1.27E-05	-5.6E-05	0.000231	3.94E-05	3.79E-06	-6E-05	0.002864	-6.8E-06	8.48E-05	0.000211	-0.00747	-2.4E-05	-0.00012	0.001333	8.76E-05	-0.00015	-0.00069	-2.9E-05	-0.00084	-0.00019	-0.0041
10	0.00485	-0.00278	0.003306	-0.01149	0.057393	0.004509	-0.0032	-0.0058	0.003166	0.060188	-0.00347	-0.00827	-0.00265	-0.02964	-0.0041	-0.00505	0.001014	-0.00592	8.31E-05	-0.00751	-0.00767	0.002839	0.001204	0.012188	-0.0034	0.00316	0.005129	0.025932		
11	0.000302	-0.00185	-0.00196	-0.00392	-0.00268	-0.00234	-0.00731	-0.00228	-0.00242	-0.00315	-0.00118	-0.00211	-0.00687	-0.00705	-0.00183	-0.00355	-0.00359	-0.00432	-0.00305	-0.00068	-0.00211	-0.01186	-0.00138	-0.00099	-0.00099	-0.00173	-0.00585	0.002054	-0.0061	-0.08937
12	2.85E-05	-0.00012	4.3E-05	1.31E-05	1.79E-05	0.005616	-0.05727	0.00378	0.00834	7.8E-06	0.000767	0.009552	0.000971	2.15E-05	-4.7E-05	-3.9E-06	-4.8E-05	9.24E-06	7.2E-05	8.77E-05	-0.00019	1.83E-05	1.41E-05	6.34E-05	1.59E-05	3.62E-05	5.71E-06	-5.6E-06	0.050794	
13	-0.00031	-0.00169	-0.00159	-0.00193	-0.00044	-0.00257	-0.03487	-0.00509	0.00919	-0.00204	-0.00132	-0.00704	0.030753	-0.00287	-0.00239	-0.00066	-0.00175	-0.00255	0.006665	-0.01574	0.016291	-0.00104	0.001656	-0.00161	-0.00926	-0.00241	-0.0057	-0.00019	-0.00035	-0.04086
14	0.053009	-0.01866	0.006724	-0.02737	0.004189	0.033116	0.021556	0.028993	0.017226	0.047544	0.060454	0.04521	0.128592	0.136742	-0.00878	-0.00186	0.037294	0.021806	0.034427	0.009851	0.014495	0.226678	0.018005	-0.00247	0.007439	0.002987	0.01499	-0.00211	0.002859	0.882248
15	0.017201	0.067736	0.040506	0.047536	0.025386	0.053682	0.043015	0.046509	0.034849	0.03723	0.051344	0.05083	0.063582	0.060383	0.001016	0.132135	0.069387	0.067295	0.055195	0.061739	0.032783	0.043242	0.038071	0.028108	0.14518	0.023509	0.382723	0.005163	0.019688	1.811535
16	0.006637	-0.00265	-0.00375	-0.001505	0.000139	0.000272	-0.00128	-0.00088	0.000306	-0.00159	-0.00046	-0.00251	0.000199	0.001202	-0.00277	-0.00696	-0.00377	-0.00341	-0.00365	-0.01026	-0.00258	-0.02424	-0.01766	-0.00241	-0.00081	-0.00139	-0.00676	-0.00166	-0.00362	-0.11737
17	0.00125	-0.01271	0.007888	0.007354	0.00237	0.003989	0.003416	0.010462	-0.00653	0.01325	0.006242	0.002886	0.007047	0.007526	-0.00397	0.00959	0.271961	0.226589	0.175223	0.080122	0.128516	-0.00756	0.05062	0.001041	0.01067	0.00453	-0.00638	-0.00172	0.002601	0.995475
18	0.000718	-0.03154	-0.00516	-7.6E-05	0.001267	0.00158	-0.00251	-0.001	0.01865	0.013239	0.001685	-0.00858	0.007533	0.002802	-0.02221	-0.00779	-0.04033	-0.01038	-0.08007	0.059729	0.002729	-0.01302	-0.02101	-0.00052	0.000253	0.002174	-0.00055	-0.00032	-0.00114	-0.17116
19	0.000781	-0.00807	0.000237	0.001972	0.000358	0.000313	-0.00072	0.001024	-0.011	0.04001	0.002289	0.000294	0.000227	0.001041	-0.00426	-0.0003	0.00167	0.00022	0.013236	0.00021	0.002081	-0.00022	0.00196	0.000814	0.000118	0.000119	0.00028	3.05E-05	0.019146	
20	2.06E-05	-0.00288	-0.00038	-0.00039	0.000121	-0.00026	-0.00079	-0.00083	-0.00056	0.001512	-0.00026	-0.00087	0.000146	-0.00091	-0.00184	-0.00095	-0.0007	0.003837	0.015688	0.035252	-0.00543	-0.00891	-0.00363	-0.00124	-0.0024	-0.02794	0.003981	-0.00068	-0.00139	0.003308
21	-0.00038	-0.0004	-0.00108	0.00708	0.002423	-0.00091	-0.00237	-0.00179	-0.00106	0.006748	-0.00069	-0.00045	-0.00149	-0.0019	-0.00725	-0.00179	-0.00126	-0.00194	-0.00265	0.001452	-0.1993	0.00017	-0.00013	-0.00334	-0.0039	-0.00316	-0.00241	-0.00154	-0.00023	-0.23354
22	0.000679	-0.00283	-0.00044	-0.00532	0.000655	0.023035	0.064002	0.000561	-0.01009	-0.0271	0.002334	-0.02716	0.005389	-0.00183	-0.00326	-0.00644	-0.07635	-0.03782	0.01861	0.000541	0.008661	0.006838	-0.01013	-0.00039	0.000317	-0.00072	-0.00361	0.000194	-3.3E-05	-0.18011
23	0.000146	-0.00058	-0.00029	-0.00034	0.000241	-0.00107	-0.00063	-0.00047	-0.00091	0.002753	0.00175	7.91E-05	-0.00144	-0.0002	-0.00837	-0.00347	-0.00179	-0.00172	-0.03667	0.00024	-0.003	-0.00208	-0.01618	-0.00539	0.00019	-0.00093	-0.00108	-0.02481	0.005961	-0.06344
24	0.034713	-0.01183	0.034272	0.049905	0.001218	0.025855	0.073906	0.047927	0.065499	0.005389	0.02674	0.12808	0.068796	0.07465	0.036114	0.021069	0.013764	0.008904	0.023924	0.041253	-0.00376	0.054561	-0.00842	0.00077	0.056031	0.009953	0.037743	0.001388	0.004118	1.00484
25	0.006159	-0.01183	-0.00477	0.006217	0.007404	0.008231	0.003131	-0.01658	0.008002	0.016854	-0.00682	0.003251	0.019595	0.001746	-0.00243	0.007985	7.58E-05	-0.00518	0.007649	0.012535	0.023178	0.017382	0.000461	-0.00289	0.00684	-0.02249	-0.00626	-0.00418	-0.00419	0.05983
26	-8.4E-05	-0.00012	-0.00059	8.55E-05	0.000293	-0.00032	-0.00275	-0.0007	9.55E-05	-0.00042	-0.00054	-0.00024	-0.00092	0.00028	-0.00018	0.000528	0.001466	0.003179	-0.00251	0.002819	0.001058	-0.00133	-0.00195	0.041475	-0.00042	-0.01174	0.000893	0.010478	0.030117	
27	0.00281	-0.00598	0.00598	0.006852	0.000203	-0.00063	-0.00122	0.002694	-0.00341	0.050256	0.02509	0.009927	0.001756	0.013188	0.0014	-0.00527	0.002784	0.007151	0.003628	0.014941	0.003537	0.011067	0.003741	0.012565	-0.00118	-0.00042	-0.01724	0.000493	0.01292	0.76658
28	0.001277	-0.011	-0.00772	0.004088	0.008001	-0.00647	-0.00438	-0.00397	0.006324	0.001206	0.009728	0.009575	0.011831	0.014835	-0.00128	-0.00861	-0.00036	-0.00272	0.00483	0.026707	-0.02362	0.017007	-0.00544	-0.00594	0.003842	0.011586	-0.01432	-0.01184	0.14786	0.095703
29	-0.00946	-0.01905	-0.0165	-0.01062	0.017843	-0.01935	-0.02953	-0.01442	0.000718	-0.0401	-0.06676	-0.00768	-0.00651	-0.02539	-0.00843	-0.00797	-0.0092	-0.0136	-0.01461	-0.00675	-0.01959	0.003953	-0.03968	-0.04983	-0.02176	-0.031	-0.0423	-0.03073	-0.0193	-0.5532
SUM	0.1716481	-0.0757	0.069337	0.248861	0.465442	0.045272	0.09058	0.239653	0.594772	0.314246	0.316546	0.281922	0.394111	0.212499	-0.00414	0.119234	0.422137	0.293817	0.253183	0.337489	-0.02486	0.406229	0.035028	0.106536	0.25424	0.026708	0.413305	-0.05864	0.177301	5.915954

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	-0.04868942	-0.0364804	-0.44009	-0.12586	-0.12728	-0.11727	-0.0757	-0.25735	0.027373	-0.03947	-0.03943	-0.26016	-0.12268	-0.2909	-0.04905	-0.04028	-0.03441	-0.04617	-0.04737	-0.04086	-0.03385	-0.089	-0.0701	-0.01428	-0.03764	-0.017	0.00528	-0.02024	-0.08818	-2.567868	
2	-0.00614366	0.00032653	-0.01949	-0.02723	0.00784	-0.03727	0.01543	-0.02811	-0.0071	-0.05028	-0.017	-0.01986	-0.02577	-0.03732	-0.04309	-0.14385	0.027835	0.02213	-0.02444	-0.0278	0.01646	-0.05777	-0.05736	-0.00636	-0.01127	0.002647	-0.05592	-0.00433	-0.00098	-1.015323	
3	-0.01343093	-0.09342	-0.0078274	-0.08342	-0.08795	-0.01852	-0.01577	-0.15829	-0.0203	-0.08312	-0.02551	-0.01995	-0.02481	-0.02728	-0.01142	-0.00995	-0.01484	-0.01226	-0.01328	-0.01313	-0.01232	-0.01719	-0.01719	-0.02129	-0.02143	-0.0099	-0.011	-0.01081	-0.0621	-0.989207	
4	-0.0019929	-0.0017732	-0.0181	-0.0047	-0.00074	-0.00256	-0.00664	-0.00216	-0.00137	-0.00389	-0.00425	-0.00188	-0.00307	-0.00367	-0.00222	-0.0027	-0.00232	-0.0027	-0.00255	-0.00294	-0.0027	-0.00229	-0.00368	-0.00299	-0.00232	-0.00269	-0.0027	-0.00177	-0.089487		
5	-0.00013278	1.4753E-06	-0.00011	-1.2E-05	-0.17371	-1.2E-05	-6E-06	-6.2E-05	8.36E-07	8.41E-06	1.4E-05	-4E-05	-1.8E-05	-4.7E-05	3.59E-06	4.86E-06	2.22E-06	1.55E-06	1.18E-06	6.61E-06	4.71E-06	-1.2E-05	2.21E-06	1.04E-05	3.96E-06	1.1E-05	1.15E-05	1.7E-05	0.000162	-0.173803	
6	-0.00949272	-0.0085044	-0.01948	-0.00572	-0.00364	1.55218	-0.66438	1.55218	-0.00662	-0.00477	-0.01719	-0.03373	-0.05686	-0.04019	-0.00654	-0.00751	-0.00613	-0.00364	-0.00271	-0.00834	0.00112	-0.01026	0.03249	-0.0082	-0.00474	-0.01063	-0.00291	-0.0044	0.001335	0.002572	
7	0.00017842	0.00051592	0.000781	0.000613	0.000483	0.000882	0.009935	0.000846	0.001026	0.000862	0.000709	0.000555	0.00079	0.000438	0.000848	0.001054	0.00065	0.000855	0.000827	0.000893	0.000692	0.000856	0.000676	0.000451	0.000318	0.000565	0.000232	0.001888	0.037509		
8	-0.00225798	-0.0015293	-0.00424	-0.01106	-0.00992	-0.00663	-0.00632	-0.03675	-0.0145	-0.01473	-0.0576	-0.01383	-0.0344	-0.0038	-0.00483	-0.01321	-0.0134	-0.01834	-0.04036	-0.00981	-0.00643	-0.01114	-0.04546	-0.00809	-0.00288	-0.00146	-0.00285	-0.00817	-0.00214	-0.316126	
9	-6.8024E-05	-0.0001894	-0.00018	-0.00026	-0.00012	-0.00026	-0.00019	-0.0017	0.006112	-0.0003	-0.00021	7.2E-05	0.000174	-0.0003	-0.00023	-0.00111	-0.00025	-0.00033	-0.00034	-0.01582	-0.00028	-0.0003	-0.00089	-0.00032	-0.00048	-0.00076	-0.00031	-0.00096	-0.00013	-0.018222	
10	-0.00394928	-0.0133352	-0.01934	-0.0486	0.00847	-0.05568	-0.02602	-0.02716	-0.01806	-0.43759	-0.178	-0.03	-0.042	-0.07651	-0.01505	-0.09428	-0.02873	-0.0463	-0.01884	-0.07503	-0.04312	-0.02225	-0.01572	-0.02512	-0.02752	-0.01152	-0.0132	-1.433175			
11	-0.00147789	-0.0042362	-0.00608	-0.00897	0.001405	-0.01072	-0.00434	-0.00649	-0.00683	-0.0162	-0.00811	-0.01023	-0.01907	-0.02006	-0.00289	-0.00807	-0.0093	0.01139	-0.0096	-0.00544	-0.00798	-0.02107	-0.00788	-0.00512	-0.00653	-0.01236	-0.00994	-0.00472	-0.05093	-0.24963	
12	6.82087E-05	-1.793E-06	0.000281	0.000215	0.000178	0.000567	-0.32183	0.000352	0.002425	0.000216	5.8E-05	0.021452	0.002468	0.000478	-2.1E-05	0.000239	0.000302	0.000275	0.000229	0.000358	0.000603	0.000129	0.000269	0.00024	0.00021	0.000189	0.000101	0.000708	-0.286725		
13	-0.00203738	-0.0051561	-0.0054	-0.00529	-0.00327	-0.00839	-0.0421	-0.00931	-0.01103	-0.00883	-0.00574	-0.01557	-0.00611	-0.00833	-0.0079	-0.00593	-0.00704	-0.00888	-0.01247	-0.02103	-0.04346	0.001903	-0.00582	-0.0045	-0.02396	-0.00379	-0.01018	-0.0018	-0.0017	-0.292488	
14	-0.02273833	-0.0495758	-0.07217	-0.08577	-0.03802	-0.20234	0.097108	-0.06609	-0.08034	-0.06751	-0.03999	-0.15102	-0.21139	-0.22772	-0.0427	-0.08293	-0.05735	-0.07955	-0.05379	-0.0592	-0.0567	-0.18128	-0.07335	-0.03905	-0.01826	-0.0352	-0.01462	-0.02566	-2.040249		
15	-0.00120281	-0.0269658	-0.01462	-0.01232	-0.00615	-0.0424	0.041322	-0.02463	-0.00628	-0.05396	-0.01459	-0.02013	-0.01691	-0.02806	-0.03146	-0.04987	-0.05252	-0.0539	-0.04988	-0.02189	-0.02059	-0.02024	-0.04501	-0.00285	0.031915	0.01479	0.006943	-0.00068	0.00922	-0.512832	
16	-0.00131261	-0.0037458	-0.00635	-0.05042	-0.00157	-0.00569	-0.00097	-0.00413	-0.00169	-0.00683	-0.00416	-0.00797	-0.00572	-0.00944	-0.00618	-0.04057	-0.0101	-0.01081	-0.01013	-0.01538	-0.00799	-0.02998	-0.08496	-0.00478	-0.00331	-0.00228	-0.01383	-0.00652	-0.0069	-0.363722	
17	-0.00547622	-0.1119717	-0.02088	-0.01514	-0.00384	-0.0143	-0.00883	-0.01356	-0.11283	-0.01542	-0.0104	-0.02479	-0.01537	-0.02386	0.00993	-0.05477	-0.44894	-0.48768	-0.40969	-0.06594	-0.0456	-0.07161	-0.19405	-0.00084	-0.00477	-0.01247	-0.00998	-0.02474	-0.0679	-0.0513	-1.329434
18	-0.00422992	-0.0539712	-0.02505	-0.00655	-0.00408	-0.01317	-0.01717	-0.00833	-0.03246	-0.07796	-0.01594	-0.03237	-0.01611	-0.02636	0.05595	-0.0442	-0.1061	-0.26265	-0.19014	-0.11399	-0.03968	-0.07901	-0.11996	-0.00477	-0.01247	-0.00998	-0.02474	-0.0679	-0.0513	-1.329434	
19	0.000151564	-0.013396	-0.0168	-0.00155	-0.00055	-0.00268	-0.00033	0.00118	-0.00251	-0.00158	-0.00294	-0.00188	-0.00258	-0.00252	0.01385	-0.0523	-0.0112	-0.003	-0.02981	-0.00729	-0.00158	-0.00163	-0.00182	-0.00019	0.001458	0.00079	-0.00364	-0.00034	0.001364	-0.092278	
20	-0.00074638	-0.0004273	-0.00201	-0.00193	0.00079	-0.00305	0.001453	-0.00058	-0.00159	-0.0041	-0.00098	-0.00306	-0.00083	-0.00337	-0.00296	-0.00113	-0.00362	0.00584	-0.00264	0.11531	-0.00727	-0.01054	-0.01771	-0.00194	-0.00338	0.00267	-0.00148	-0.00026	0.0055561		
21	-0.00256829	-0.0159508	-0.00662	-0.00471	-0.00339	-0.00744	-0.00019	0.00762	-0.00558	-0.0083	-0.0707	-0.06661	-0.00869	-0.00885	0.01557	-0.00946	-0.00881	-0.00206	-0.01203	-0.00713	-0.65218	-0.00471	-0.00721	-0.00472	-0.03557	-0.00454	-0.00148	-0.00205	0.004966	-0.861522	
22	-0.00186577	-0.017102	-0.01086	-0.01278	-0.0044	-0.01487	-0.03448	-0.00496	-0.02031	-0.00465	-0.01548	-0.05206	-0.01394	-0.01863	0.01509	-0.0313	-0.12534	-0.09546	-0.06551	-0.02274	-0.00992	-0.01308	-0.03517	-0.00207	-0.00372	-0.00081	-0.00235	-0.00215	-0.00155	-0.702762	
23	-0.00045711	0.0013881	-0.00253	-0.00264	-0.00207	-0.00379	0.003899	-0.0031	-0.00126	-0.00465	-0.00176	-0.00356	-0.00508	-0.00477	-0.01173	-0.00975	-0.00882	-0.00998	-0.01128	-0.00469	-0.00993	-0.00406	-0.002618	-0.00027	-0.00199	-9.1E-05	0.001669	-0.01247	0.00025	-0.14866	
24	-0.02101636	-0.077315	-0.11358	-0.08437	-0.06168	-0.16995	0.073053	-0.12056	-0.06636	-0.16946	-0.0894	-0.13159	-0.09458	-0.11695	-0.08167	-0.13369	-0.18567	-0.21623	-0.18096	-0.08801	-0.19879	-0.01715	-0.15679	-0.02025	-0.04799	-0.02487	-0.07381	-0.01995	-0.02765	-2.80184	
25	-0.00950001	-0.0292877	-0.03892	-0.02374	-0.01629	-0.04301	0.064182	-0.05093	-0.01973	-0.05042	-0.03165	-0.03807	-0.03283	-0.04832	-0.02743	-0.04272	-0.05244	-0.06687	-0.05916	-0.03138	-0.03547	-0.03258	-0.04482	-0.02868	-0.01715	-0.02136	-0.03683	-0.00807	-0.01025	-0.883727	
26	-0.00202337	-0.0043828	-0.00562	-0.0041	-0.0034	-0.00915	0.006884	-0.00616	-0.00433	-0.01322	-0.01487	-0.00523	-0.00736	-0.00888	0.00554	-0.00701	-0.00851	-0.01013	-0.00851	-0.00413	-0.01033	-0.00359	-0.00688	-0.00575	-0.00587	0.021929	-0.00738	-0.00556	-0.00191	-0.151112	
27	-0.00151127	-0.020381	-0.00332	-0.00155	-0.00281	-0.03737	0.008409	-0.01335	-0.00968	-0.03396	-0.00339	-0.01369	-0.01515	-0.01644	-0.01868	-0.02794	-0.03198	-0.0346	-0.03498	-0.01192	-0.01769	-0.01024	-0.01998	-0.00612	-0.00602	0.023495	-0.13097	0.00057	0.009678	-0.409563	
28	-0.00904377	-0.0444269	-0.05962	-0.05427	-0.03981	-0.06688	0.043803	-0.06499	-0.04442	-0.0991	-0.06753	-0.06349	-0.06114	-0.08287	0.06138	-0.07629	-0.08065	-0.03932	-0.0909	-0.06478	-0.09565	-0.0623	-0.07887	-0.13323	-0.04005	-0.02169	-0.05917	-0.05094	-0.02856	-1.798395	
29	-0.02997154	-0.0536412	-0.06183	-0.08238	-0.04087	-0.09871	0.015596	-0.07052	-0.045	-0.14115	-0.13468	-0.06909	-0.08485	-0.12198	-0.07969	-0.0571	-0.08486	-0.01058	-0.09523	-0.09321	-0.10409	-0.07973	-0.12917	-0.08208	-0.0256	-0.0578	-0.08511	-0.08362	-0.05645	-2.291193	
SUM	-0.22298047	-0.5983685	-1.05514	-0.76508	-0.56512	-1.65237	1.308219	-0.85366	-0.48458	-1.34346	-0.76308	-1.26274	-0.86252	-1.19565	-1.05527	-1.35531	-1.73518	-1.48903	-0.66691	-1.45365	-0.89143	-1.29908	-0.3867	-0.351	-0.17024	-0.64046	-0.28025	-0.3283	-23.86642		

1994

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.072003	-0.00657	0.03268	0.038058	-0.02567	0.059239	-0.04537	0.05495	0.083625	0.04892	0.009426	-0.0654	0.074245	-0.13495	0.008775	-0.00619	-0.00102	-0.0031	0.000133	0.00296	0.01335	-0.0361	-0.0221	0.01035	0.004939	-0.00111	-0.00252	-0.00455	0.00571	0.133659
2	0.025647	0.082897	0.031456	0.04467	0.026334	0.033701	0.030405	0.041641	0.051222	0.052324	0.044914	0.030263	0.043349	0.057036	0.075928	0.153569	0.39487	0.152169	0.101496	0.045165	0.034598	0.078316	0.092291	0.039152	0.169941	0.023949	0.021833	0.031338	0.033098	2.232095
3	0.032421	0.003696	-0.009509	0.027081	-0.00036	0.015397	-0.1165	0.089466	0.011453	-0.00647	0.000334	-0.13916	0.018556	0.056807	0.003633	0.001095	0.000904	0.00346	0.001781	0.002313	0.003137	0.00372	0.000762	-0.00126	-0.00179	-0.00088	-0.00163	-0.0018	0.001781	-0.08458
4	-0.0005	-0.00093	-0.00074	-0.01115	-0.00483	-0.00073	-0.00109	-0.00092	-0.00046	-0.00178	-0.0025	-0.0006	-0.00108	-0.00173	-0.00061	-0.00133	-0.0006	-0.0009	-0.00071	-0.00135	-0.0009	-0.00096	-0.00151	-0.00113	-0.00194	-0.00128	-0.00151	-0.00156	-0.01142	-0.05172
5	-9E-05	9.35E-06	-4E-05	1.31E-05	0.11483	1.29E-05	3.66E-06	-2.1E-05	1.12E-05	2.59E-05	3E-05	-1.2E-05	1.12E-05	-1.7E-05	1.3E-05	1.61E-05	1.08E-05	1.12E-05	1.12E-05	1.91E-05	1.45E-05	9.64E-07	1.59E-05	1.88E-05	1.45E-05	1.97E-05	1.63E-05	2.03E-05	0.000262	0.114883
6	0.00086	0.004398	-0.00318	0.002013	0.001668	0.101702	0.551755	0.012243	0.073148	0.095861	0.01258	0.129401	0.110343	0.004929	0.003605	0.005052	0.01209	-0.0037	0.010302	0.005694	0.018508	0.123568	0.001267	0.000399	0.006066	-5.5E-05	0.0013	0.000648	0.003311	1.17042
7	0.000153	0.000272	0.000348	0.000238	0.000181	0.012876	1.40525	0.000331	0.000595	0.000463	0.000629	0.00145	0.006961	0.000381	0.000247	0.000365	0.000355	0.000461	0.000349	0.000478	0.000559	0.000455	0.000392	0.001473	0.000539	0.00026	0.000307	0.00074	0.000245	0.17428
8	0.000843	0.00485	0.00051	-0.00654	-0.00346	-0.0012	-0.00542	0.096733	0.069177	-0.00574	0.000873	-0.00522	0.000699	0.002515	0.002349	-0.00333	-0.00567	-0.00663	-0.00548	0.009397	0.000545	-0.00248	-0.07226	-0.00095	0.000873	0.00074	0.000607	-0.0047	9.94E-05	0.122322
9	3.31E-05	0.000429	4.58E-06	-3.9E-05	1.37E-05	0.000167	0.000262	0.002244	0.013579	4.22E-05	6.06E-06	0.000893	6.98E-05	5.01E-05	0.000219	-0.00073	6.74E-05	4.21E-05	0.001913	-0.01161	0.00038	0.000264	-0.00029	1.46E-05	-0.00013	-0.00047	-3.2E-05	-0.00081	0.000235	0.000663
10	0.003372	0.015144	0.008294	0.009421	0.259513	0.017277	-0.00185	0.00333	0.013428	0.391783	0.485567	0.009566	0.002255	0.013419	0.01259	0.057219	0.003386	0.00936	0.016032	0.022502	0.008895	0.009331	0.003905	0.005296	0.007046	0.005288	0.002466	0.005517	0.021539	1.42238
11	0.000691	-0.00011	-0.00151	-0.00438	0.008187	-0.00123	-0.00964	-0.00089	-0.00179	-0.00537	0.000486	-0.00414	-0.01251	-0.01127	0.007803	-0.00055	-0.00251	-0.00234	-0.00163	0.000861	-0.00084	-0.01406	-0.00112	-0.00093	-0.00165	-0.01167	-0.005	-0.00096	0.006762	-0.07152
12	0.000147	0.000238	0.000307	0.000312	0.000191	0.009218	-0.16463	0.003024	0.02127	0.000537	0.000355	0.372352	0.029971	0.000494	0.00026	0.000431	0.000717	0.000624	0.002669	0.001464	0.001017	0.004772	0.000497	0.00071	0.001382	0.000281	0.000447	0.000183	0.0013	0.29518
13	0.000596	0.00146	0.000534	0.000131	0.000954	0.001352	-0.03372	-0.00027	-0.00496	0.003006	0.001973	0.001903	0.03404	0.000356	0.001589	0.002437	0.002477	0.001048	-0.00067	-0.01027	0.096227	0.016772	0.00161	0.004189	0.015857	0.001055	-0.00357	0.001878	0.004471	0.142427
14	0.023339	0.006984	-0.00513	-0.01246	0.007768	0.049176	-0.00273	0.007399	0.004183	0.024076	0.026789	-0.01582	-0.02861	0.109011	0.067387	-0.00369	0.005856	0.06001	0.013542	0.025388	0.021744	-0.06255	-0.00453	0.00393	0.017511	-0.00034	0.010573	-0.00133	0.020934	0.320431
15	0.050498	0.128432	0.064212	0.08919	0.051448	0.0614	0.057929	0.082077	0.060718	0.10615	0.085895	0.035956	0.08699	0.09407	0.170311	0.265154	1.25711	0.110186	0.068662	0.058028	0.050216	0.070427	0.090076	0.079448	0.35003	0.045813	0.437144	0.021297	0.064466	3.69935
16	0.00654	0.001496	-0.00184	-0.02561	0.000688	0.001589	-0.00138	-0.00025	-0.00173	-0.00102	0.000718	-0.00158	0.000586	0.007105	0.000975	0.04884	-0.00334	0.001484	0.000721	-0.00547	0.001771	-0.01757	0.026909	-0.00019	0.000788	0.00013	-0.00878	0.005081	-0.00077	0.030187
17	0.004537	-0.03974	0.006497	0.028961	0.006155	0.00779	0.003167	0.013558	-0.05967	0.015111	0.015373	0.005799	0.009985	0.018592	-0.01131	0.002767	0.057914	0.29726	-0.04289	0.122608	0.185281	0.044089	-0.02687	0.006179	0.024996	0.011656	-0.00753	0.000639	0.011254	0.71246
18	0.0046	-0.02461	-0.00906	0.052758	0.003073	0.003844	-0.01135	0.0178	-0.02199	0.013208	0.002913	-0.0108	0.002797	0.003794	-0.00193	-0.00149	-0.03194	-0.16465	-0.06903	-0.05007	0.006351	-0.04384	0.0572	0.006267	0.001976	0.016108	0.004945	0.00959	0.001568	0.05076
19	0.002954	0.016564	0.003006	0.002671	0.001555	0.00413	0.001961	0.007183	0.015275	0.004271	0.002099	0.002422	0.003408	0.00463	0.009495	0.006846	0.010742	0.007232	0.327442	0.013632	0.004344	0.00572	0.006267	0.001976	0.016108	0.004945	0.00959	0.001568	0.05076	0.07026
20	0.002711	0.03308	0.0061	0.003524	0.001877	0.006992	0.002935	0.004761	0.003445	0.00465	0.004519	0.002603	0.006244	0.004227	0.017664	0.009078	0.006131	0.00655	0.05041	0.365931	0.04082	0.006542	-0.00133	0.005481	0.015127	0.015402	0.010956	0.002628	0.009214	0.647201
21	0.003285	0.010697	0.004805	0.005967	0.003046	0.005479	0.004602	0.006603	0.005137	0.006924	0.006926	0.004738	0.004204	0.0045987	0.010417	0.008662	0.019064	0.011242	0.007524	0.006851	0.454905	0.014719	0.007842	0.016142	0.038754	0.005184	0.02221	0.003197	0.01811	0.724813
22	0.000534	-0.00787	-0.00474	-0.003	0.004616	-0.00341	-0.02778	0.000182	-0.01402	-0.02035	0.006936	-0.02381	-0.00101	-0.00602	-0.0037	0.01672	-0.08319	-0.0335	-0.02968	-0.00376	0.010655	0.072444	-0.01583	0.000914	0.002998	0.005033	-0.00311	0.000642	0.005256	-0.19128
23	0.002342	0.002223	0.002108	0.002504	0.000372	0.001352	0.002179	0.002879	0.003314	0.002725	0.002402	0.002376	0.000922	0.002643	0.003569	0.001584	-0.00164	-0.00308	0.002694	0.020596	0.029646	0.01142	0.016579	-0.05091	0.013146	0.030313	0.001852	0.010981	0.004518	0.009246
24	0.010146	-0.02082	-0.04175	0.008364	0.01182	-0.01104	0.011317	-0.00738	0.004668	0.008196	0.02337	0.029148	0.02786	0.01407	0.064202	-0.02008	-0.00308	0.002694	0.020596	0.029646	0.01142	0.016579	-0.05091	0.013146	0.030313	0.001852	0.010981	0.004518	0.009246	0.00494
25	0.018085	0.018311	0.017064	0.027339	0.019699	0.033881	0.026838	0.026866	0.030275	0.022985	0.024666	0.023862	0.024785	0.01489	0.04882	0.01873	0.005443	0.009444	0.010793	0.018071	0.029834	0.02318	0.036871	0.064826	0.044555	0.008767	9.43E-05	0.019661	0.01769	0.657864
26	0.002292	0.003497	0.003884	0.004051	0.003537	0.005037	0.003657	0.005496	0.004214	0.002182	-0.00123	0.006326	0.003436	0.003324	0.003379	0.004904	0.004708	0.005702	0.023332	0.009781	0.004839	0.007078	0.009206	0.036588	0.004069	0.041204	0.000107	0.008768	0.008103	0.227248
27	0.014824	0.05556	0.044214	0.054076	0.025819	0.066879	0.039192	0.036557	0.039027	0.063688	0.038874	0.039864	0.037416	0.043664	0.036699	0.041149	0.070124	0.060474	0.03761	0.041245	0.022633	0.048094	0.026861	0.041019	0.017908	0.016592	-0.06548	0.02168	0.038893	1.051952
28	0.005227	0.005014	-0.01314	-0.00315	0.002003	0.00243	0.010128	-0.00508	0.003973	-0.01521	-0.00168	0.015667	0.005297	-0.01168	0.011998	-0.00882	-0.00807	-0.01321	0.012729	0.005241	-0.01083	0.004155	0.007897	-0.04551	0.017312	0.036071	-0.0118	-0.00497	0.006247	-0.00176
29	-0.00561	0.009098	-0.01604	-0.01814	0.002358	-0.01258	-0.02669	-0.01999	-0.0062	-0.04855	-0.07214	-0.01075	-0.02838	-0.04295	-0.00296	-0.03007	-0.00204	-0.01699	-0.00652	-0.0274	-0.01837	-0.0216	-0.03347	-0.02381	0.014974	-0.0225	-0.04339	-0.03972	-0.01177	-0.58221
SUM	0.285589	0.342424	0.127863	0.310928	0.529126	0.473133	0.438186	0.361893	0.401513	0.674522	0.69492	0.454085	0.462942	0.253338	0.339226	0.534905	0.577469	0.440802	0.555869	0.079456	0.989899	0.350934	0.098631	0.261595	0.781798	0.191758	0.578811	0.055825	0.289022	12.71746

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	-0.0441	-0.03933	-0.35519	-0.10689	-0.13862	-0.0912	0.112357	-0.31936	0.074741	-0.01054	-0.06671	-0.07883	-0.11273	-0.24211	-0.027	-0.02655	-0.01227	-0.02787	-0.00248	0.04009	-0.0031	0.035301	-0.0689	0.01337	-0.02466	0.014464	-0.01361	-0.0122	-0.05568	-1.51269	
2	0.006627	0.001225	0.05231	0.002483	0.002278	-0.00592	0.152281	-0.00557	0.032719	-0.00429	0.014128	0.026069	0.059897	0.011469	-0.0882	-0.01098	0.25402	0.071466	0.08522	0.145606	0.034632	0.079187	0.003944	0.024535	0.087704	0.056463	0.266468	0.012389	0.016245	1.281389	
3	-0.0078	-0.00474	-0.06202	-0.08409	-0.01626	-0.00645	-0.04363	-0.01377	0.052405	-0.01783	-0.01046	-0.10816	-0.02027	0.026626	-0.00561	-0.00645	-0.00313	-0.00559	0.004273	0.022455	0.004343	0.007191	-0.00944	0.016224	-0.01707	0.000916	-0.00426	-0.00429	-0.03211	-0.33481	
4	-0.00089	-0.00147	-0.00132	0.031171	-0.00095	-0.00381	0.002364	-0.00153	-0.00046	-0.00261	-0.00329	-0.00011	-0.0018	-0.00276	-0.00161	-0.00211	-0.00114	-0.00154	-7.6E-06	0.022566	-0.00081	-0.00049	-0.00267	0.001388	-0.00222	-0.0006	-0.00222	-0.00156	-0.01139		
5	-0.00013	8.79E-07	-0.0001	-1.1E-05	-0.19347	9.9E-06	1.47E-05	-7E-05	6.04E-06	1.09E-05	1.77E-05	-2E-05	-1.5E-05	-4E-06	6.78E-06	4.28E-06	3.32E-06	5.82E-06	1.62E-05	1.62E-05	1.76E-06	1.9E-06	1.85E-06	1.25E-05	5.06E-06	1.46E-05	8.63E-06	1.18E-05	0.000162	-0.19354	
6	-0.00703	-0.0082	-0.01789	-0.00442	-0.00295	-0.03981	3.523071	-0.00514	0.046569	-0.00661	-0.02067	0.07469	-0.15133	-0.00227	-0.00315	-0.00073	0.006794	-0.01718	0.05743	0.010696	-4.5E-05	0.099584	-0.00552	0.001225	-0.01172	0.01236	-0.00237	-0.0026	-0.0028	3.05423	
7	8.12E-05	0.000199	0.000331	0.000329	0.000169	0.000269	0.441774	0.002687	0.000595	0.000374	0.000362	0.006224	0.000476	0.000319	0.000183	0.001046	0.000354	0.000356	0.000361	0.000361	0.000318	0.000297	0.000643	0.00163	0.000635	0.000199	0.000233	0.000181	0.001801	0.462589	
8	-0.00234	-0.00578	-0.00269	-0.00813	-0.00876	-0.00448	0.008793	0.006062	0.275192	-0.00409	-0.00158	-0.0039	-0.00206	-0.0003	-0.00295	0.002889	-0.00757	-0.01244	-0.02365	0.025733	0.001764	0.028111	-0.04349	-0.00011	0.007237	0.01958	-0.0004	-0.00738	-0.00101	0.232244	
9	0.000221	0.001385	0.000667	0.000483	0.000337	0.00057	0.001602	0.000894	0.03134	0.000916	0.001095	0.000874	0.000654	0.000085	0.001047	9.25E-05	0.000493	0.000956	0.004131	0.010459	0.004318	0.001123	0.001199	0.002564	0.009416	0.040433	0.000713	0.001295	0.000536	0.121314	
10	-0.0016	-0.00927	-0.00975	-0.02601	0.006144	-0.02414	0.004615	-0.01814	0.05049	-0.12441	-0.01829	0.022938	-0.02776	-0.03307	-0.00798	-0.07378	-0.00859	-0.01843	0.016818	0.077041	0.010505	0.036274	-0.2812	-0.01263	0.001814	0.005849	-0.01107	-0.00211	0.000699	-0.19354	
11	-0.00092	-0.00379	-0.00465	-0.00872	-0.00679	-0.0094	0.01238	-0.00518	-0.00264	0.006229	-0.0002	-0.00041	-0.01688	-0.01627	-0.00301	-0.00566	-0.00604	-0.00821	-2.6E-05	0.013127	-0.00186	-0.01141	-0.00549	-0.00145	-0.0041	-0.00724	-0.00676	0.004764	-0.00026	-0.10088	
12	8.75E-05	0.00029	0.000324	0.000375	0.000217	0.000478	0.030837	0.007201	0.218202	0.000749	0.000262	0.43168	0.001451	0.000548	0.000222	0.001019	0.001424	0.00098	0.000395	0.00438	0.000239	0.012809	0.000916	0.001392	0.000478	0.000447	0.000313	0.000363	0.000971	0.719696	
13	-0.00177	-0.00561	-0.00432	-0.00406	-0.00283	-0.00041	-0.0119	-0.00831	-0.00551	-0.00566	0.00657	-0.00519	-0.04598	-0.0503	-0.00412	-0.00323	-0.00328	-0.00539	0.003125	0.021501	0.00262	0.012973	-0.00328	-0.00042	-0.02089	0.023458	-0.0062	0.000419	0.000849	-0.08187	
14	-0.01457	-0.06686	-0.05643	-0.06226	-0.02324	-0.17008	0.495228	-0.04683	-0.00326	-0.01651	0.071659	0.296118	-0.19419	-0.1809	-0.03951	-0.03488	-0.01573	-0.04591	0.079681	0.197528	0.01948	0.03337	-0.05306	0.000482	0.006632	0.051186	-0.00635	0.001846	-0.00999	0.208453	
15	0.003368	-0.01625	0.007391	0.016397	0.005579	-0.00568	0.289762	-0.00835	0.033283	-0.00432	0.024349	0.038443	0.138392	0.059359	0.009616	0.017467	-0.00821	-0.0029	0.063866	0.202526	0.049331	0.063323	-0.01517	0.035643	0.189193	0.1234	0.131677	0.023095	0.031817	1.496397	
16	-0.00087	-0.00276	-0.00443	-0.04498	-0.00128	-0.00418	0.010052	-0.00318	-0.00058	-0.00396	-0.00134	0.000387	-0.00459	-0.00763	-0.00403	-0.01468	-0.00405	-0.00514	0.00654	0.051529	0.011831	0.006277	-0.07262	-0.00032	-0.00024	0.010396	-0.01082	-0.00305	-0.00432	-0.10144	
17	-0.00257	-0.11535	-0.00949	-0.00529	-0.00094	-0.00557	0.032765	-0.00171	-0.09174	-0.00505	0.007518	0.000959	-0.00139	-0.00709	-0.07001	-0.03067	-0.44665	-0.32078	0.093676	0.423396	0.214687	0.090401	-0.16824	0.005201	0.035876	0.17178	-0.02885	-0.00854	0.003232	-0.24243	
18	-0.00151	-0.04984	-0.00973	0.002172	-0.00065	-0.00447	0.032313	0.009982	-0.0305	-0.00088	0.018543	-0.00046	-0.00346	-0.00391	-0.0333	-0.01378	-0.01555	-0.19667	0.093133	0.223407	0.05309	0.057508	-0.09678	0.006759	0.015864	0.153876	-0.00339	-0.00192	0.003947	0.20378	
19	0.0019	-0.0115	0.003281	0.00365	0.001165	0.002713	0.01557	0.002981	0.008274	0.002269	0.000445	0.003596	0.002097	0.002839	-0.0066	0.003551	0.00809	0.012303	0.067579	0.08985	0.008838	0.013961	0.005473	0.009545	0.026675	0.202034	0.00862	0.002338	0.004524	0.500667	
20	0.002411	0.015313	0.005324	0.010694	0.002283	0.004297	0.035124	0.006057	0.009701	0.00744	0.008448	0.010278	0.005704	0.009352	0.010439	0.012744	0.010351	0.01239	0.231254	1.814191	0.252355	0.030573	0.020581	0.01037	0.044562	0.211168	0.012395	0.004683	0.010843	2.82025	
21	-0.00202	-0.01089	-0.00254	-0.00084	-0.00226	-0.0044	0.031355	-0.00464	9.51E-05	-0.00319	-0.00288	0.000741	-0.00551	-0.00492	-0.00931	-0.00371	0.006529	-0.00203	0.00625	0.031219	-0.40429	0.009587	-0.00145	0.003248	-0.000182	0.002096	-0.00145	8.61E-06	0.008718	-0.36829	
22	-0.00084	-0.01537	-0.00671	-0.00612	-0.00267	-0.0107	0.021939	-0.00089	-0.00543	-0.03385	-0.04004	-0.01598	-0.00844	-0.01025	-0.00923	-0.01882	-0.10972	-0.07395	-0.01607	0.044831	0.018806	0.111601	-0.02707	0.006295	0.005414	0.060457	-0.00468	0.005082	0.001556	-0.10485	
23	-0.00072	-0.00334	-0.00349	-0.00373	-0.00282	-0.00559	0.012805	-0.00413	-0.00107	-0.0059	-0.00403	0.000212	-0.00468	-0.00486	-0.01321	-0.01017	-0.01041	-0.00967	-0.00194	0.014945	-0.00264	-0.00039	-0.02455	-0.00963	-0.00028	0.005826	-0.00449	-0.00267	-0.00039	-0.12601	
24	-0.01941	-0.06743	-0.10288	-0.07728	-0.05972	-0.14895	0.867293	-0.09804	-0.01236	-0.13497	-0.05958	0.007832	-0.07986	-0.08635	-0.05551	-0.07787	-0.07256	-0.12391	0.402481	1.081082	0.10209	0.154358	-0.10975	-0.00548	-0.01015	0.092871	-0.02707	-0.01036	-0.01477	1.435454	
25	-0.00193	-0.03112	-0.0387	-0.02376	-0.01654	-0.03748	0.092829	-0.05527	-0.00633	-0.03608	-0.02609	0.000303	-0.03112	-0.0421	-0.03259	-0.03441	-0.0403	-0.05155	0.046203	0.288828	0.001663	-0.00088	-0.01478	0.021785	-0.01537	0.016495	-0.02131	0.009701	-0.00324	-0.25214	
26	-0.00072	0.000276	-0.00075	0.00216	-0.00027	-0.00347	0.045148	-0.00193	0.006681	-0.00367	-0.00674	0.007683	-0.00173	-0.0017	0.001662	0.00214	0.001835	-0.00136	0.027741	0.043951	0.008161	0.013998	-0.00066	0.011831	-0.00549	0.007297	0.025776	-0.0042	0.00693	0.017568	0.647764
27	0.002079	-0.00342	0.002531	0.024466	-0.00021	-0.02084	0.140976	-0.00722	0.029294	0.008727	0.039755	0.017433	-0.01434	-0.00328	-0.00287	0.015028	0.032615	0.04803	0.060437	0.171162	0.030849	0.037719	-6.5E-05	-0.00549	0.007297	0.025776	-0.0042	0.00693	0.017568	0.647764	
28	-0.01585	-0.04033	-0.05259	-0.04513	-0.03895	-0.07741	0.192877	-0.05798	-0.00242	-0.07491	-0.04316	0.015251	-0.05108	-0.06348	-0.04413	-0.05565	-0.05173	-0.07187	0.042517	0.192384	0.001094	0.068152	-0.05838	-0.11224	-0.00514	0.067311	-0.04086	-0.02761	-0.019	-0.47023	
29	-0.02773	-0.05959	-0.05757	-0.07382	-0.04372	-0.08902	0.156955	-0.06787	-0.01933	-0.11366	0.12676	0.003016	-0.07903	-0.10799	-0.06654	-0.0896	-0.05744	-0.0772	0.012295	0.187031	-0.0339	-0.00678	-0.11428	-0.06857	-0.03722	0.017692	-0.05016	-0.05517	-0.05127	-1.18159	
SUM	-0.15355	-0.55235	-0.77813	-0.48951	-0.53775	1.36312	6.787549	-0.69923	0.642652	-0.5863	0.13868	1.055673	0.63137	-0.71442	-0.50635	-0.45775	-0.55132	-0.93811	1.303455	5.277947	0.381304	0.983722	-0.891	-0.04274	0.275855	1.443335	0.127472	-0.06076	-0.10224	0.8048575	

2006

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0.1845432	-0.0177041	0.030808	0.01382	0.161774	-0.03344	0.04562	-0.16544	0.03922	0.033842	0.024525	-0.10663	0.139555	-0.12631	-0.00491	0.01781	0.069492	0.007609	-0.00419	-0.00461	0.013521	0.035283	-0.0114	0.022884	-0.00353	-0.00093	-0.00054	-0.00466	-0.01645	0.2406185	
2	0.014754926	0.08016144	0.093574	0.046411	0.01959	0.069311	0.04363	0.046584	0.059217	0.047342	0.035842	0.049134	0.095358	0.030389	0.266335	0.134081	0.294168	0.547838	0.188189	0.079806	0.04715	0.0324	0.011189	0.029841	0.128929	0.020424	0.04862	0.016889	0.019091	2.6822222	
3	0.055843607	-0.006681	0.084719	0.013346	0.004128	0.015575	-0.15301	0.011173	0.01657	-0.00878	-0.0029	-0.28083	-0.00301	-1.1E-05	-0.00113	-0.00059	0.008862	0.000453	-0.001504	-0.00074	0.032364	-0.00068	-0.00258	0.006149	-0.00139	-0.00093	-0.0011	-0.00085	-0.00073	0.118796	
4	-3.5098E-05	-0.0003126	0.021739	0.114093	0.000469	0.000635	0.000221	0.000185	-0.000138	-0.00143	0.002704	-0.00087	-0.00086	-0.00031	-0.00052	-0.00044	0.000449	0.000432	0.000454	-0.00044	0.000464	-0.00011	-0.00118	0.004541	-0.00139	-0.00093	-0.0011	-0.00085	-0.00073	0.118796	
5	-0.0001143	-1.167E-06	-5.9E-05	-4.1E-06	-0.1101	-7.8E-06	-2.3E-06	-5.6E-05	5.58E-06	6.53E-06	7.96E-06	-2.6E-05	5.27E-06	-3.7E-05	9.36E-07	3.97E-06	1.49E-06	1.6E-06	2.81E-07	1.9E-06	3.7E-06	-3.2E-06	-8.1E-07	6.1E-06	7.55E-07	4.11E-06	1.99E-06	3.86E-06	5.91E-05	-0.110291	
6	0.000973069	-0.002363	-0.00176	0.006696	0.008736	-0.15524	0.616488	0.223402	-0.01482	0.04204	0.010478	0.651395	-0.06732	0.008568	-6.3E-05	0.013945	0.009455	-0.003716	0.011041	0.000444	0.00314	0.083059	0.009406	0.002698	0.000957	0.005147	0.000129	0.002236	0.010473	1.984284	
7	4.17407E-05	9.1224E-05	0.000124	0.0001	6.73E-05	0.000181	-0.0122	0.004389	0.00054	0.000119	0.000103	0.000115	-0.00047	0.000237	8.01E-05	0.000125	0.000108	0.000151	0.000316	0.000106	7.01E-05	0.000114	0.001326	0.000191	0.000434	0.000151	0.000172	0.000107	0.000442	-0.002692	
8	-8.4328E-05	0.00126314	0.0003	-0.00381	-0.00329	0.00208	-0.0045	-0.009	0.345738	0.015694	0.007357	-0.00561	0.007707	0.007515	0.001365	0.005839	-0.00372	-0.00523	-0.02395	0.004276	0.00412	0.019847	0.016983	-0.00093	0.004613	0.002678	-0.00023	-0.00334	0.001324	0.3980974	
9	0.000551992	0.00771004	0.00163	0.009115	0.00104	0.00394	0.009151	0.005123	0.033637	0.009661	0.011072	0.011676	0.001636	0.004078	0.040413	0.006327	0.005025	0.007559	0.005251	-0.00395	0.004226	0.003601	0.002332	0.002719	0.008138	0.003629	0.002844	0.00924	0.002468	0.1640836	
10	0.005615156	0.02137908	0.01114	0.013945	0.222768	0.252317	-0.0032	0.024581	0.021701	-0.11972	0.124827	0.015985	0.007198	0.033113	0.131113	-0.04325	0.006538	0.007103	0.032996	0.001589	0.016001	0.01228	-0.00802	-0.00004	0.005826	-0.00642	0.00276	0.007249	0.009035	0.4405015	
11	0.00099626	-0.0005146	7E-05	0.002716	0.007845	-0.00224	-0.00942	0.000307	-0.0017	0.053635	0.012604	-0.00264	-0.01099	-0.00634	-5.6E-05	0.001017	-0.00201	-0.00332	-0.00129	-0.00051	0.00012	-0.01138	-0.00131	-0.0001	-0.00258	-0.0109	-0.00655	0.016861	-3.8E-05	0.0205887	
12	0.00427468	0.00025478	0.000819	0.000431	0.000282	0.076733	-0.35346	0.001969	0.05011	0.03771	0.001907	0.011215	0.006103	0.000881	0.000265	0.001358	0.00084	0.001264	0.000536	0.001422	0.000279	0.007213	0.001398	0.000376	0.000892	0.000342	0.000319	0.000234	0.001138	-0.180681	
13	4.13878E-05	0.00248803	-0.00111	-0.00124	0.000291	0.013172	-0.03422	-0.00336	-0.00513	-0.00196	0.00363	0.00209	0.084973	-0.0023	0.001835	0.000723	0.000913	0.000366	0.001898	-0.00648	0.015773	-0.00051	0.003533	-0.00152	-0.01637	-0.00047	-0.00486	0.000834	-5.6E-05	0.052697	
14	0.046005096	0.00264197	0.021522	0.02771	0.065795	-0.03993	-0.00873	0.084339	0.016834	0.073526	0.146288	-0.02376	-0.1259	0.156726	0.012501	0.118339	0.02256	0.043981	0.029419	-0.00086	0.031387	-0.01562	0.002043	0.002661	0.007461	0.008693	-0.00393	0.005877	0.000366	0.7421116	
15	0.02421642	0.11953579	0.08289	0.067181	0.031842	0.128358	0.06475	0.076956	0.074918	0.053655	0.05377	0.069497	0.198726	0.225597	0.195036	0.171032	0.286831	0.283346	0.240067	0.071686	0.066763	0.144161	0.108588	0.025501	0.239601	0.028203	-0.0289	0.029235	0.031466	3.12266	
16	0.00066784	0.00497636	0.00045	0.002749	0.001533	0.031335	0.06222	0.001136	-0.00057	0.000257	0.010499	0.089199	0.001603	0.000735	-0.00125	0.001539	0.025283	-0.00187	-0.00141	0.009218	-0.00541	0.003375	-0.0127	-0.02498	-0.00019	0.001017	0.002428	-0.00938	-0.00141	-0.00033	0.1888179
17	0.001903777	-0.0600823	-0.00743	-0.00421	0.005435	0.007527	0.001434	0.004903	-0.0748	0.007184	0.010153	-0.00417	0.021331	0.004735	-0.01924	-0.00332	-0.05794	-0.33914	-0.07518	-0.04842	0.211774	-0.0386	0.03274	0.005676	0.039657	0.001799	-0.03117	-0.00319	0.001332	-0.392943	
18	0.006626552	-0.0094585	-0.00767	-0.00392	0.007839	0.009956	-0.00105	0.014871	-0.02	0.028724	0.013158	-0.00493	0.003051	0.002464	0.000491	0.004233	0.071019	-0.03581	0.02202	-0.03066	0.063259	-0.01682	-0.01395	0.005284	0.025331	0.019445	0.001124	-0.001	0.001107	0.2400897	
19	0.000801593	-0.0115445	0.001175	0.001948	0.001176	0.003363	0.000524	0.000983	0.000904	-0.00014	0.002246	0.001578	0.002984	0.001404	-0.00354	-0.00022	0.005312	0.008583	0.011389	0.000865	0.079525	0.002948	0.001598	0.00202	0.014	0.001693	-0.00058	0.000778	0.001235	0.1330063	
20	0.009156578	0.02339773	0.008644	0.015263	0.004787	0.013751	0.063239	0.014835	0.01561	0.00916	0.008213	0.008351	0.008381	0.014269	0.0015427	0.019425	0.014073	0.022491	0.028052	0.070568	0.201524	0.029973	0.011487	0.008015	0.059607	0.113528	0.038175	0.004191	0.013763	1.5017572	
21	-0.00206101	-0.016367	-0.00535	-0.00291	-0.00122	-0.00397	-0.00552	-0.00596	-0.00402	-0.0048	-0.00589	-0.00383	-0.00651	-0.00583	-0.01018	-0.00561	-0.00431	-0.00255	-0.00561	-0.00464	-0.00466	-0.00326	-0.00406	-0.0051	-0.06125	-0.00673	-0.00863	-0.0021	-0.00333	-0.898372	
22	0.00884318	-0.0071019	-0.00493	-0.00452	0.008387	-0.00045	0.03628	0.004142	-0.01232	-0.02689	0.013492	-0.03805	-0.0015	-0.00517	-0.00391	-0.01583	-0.00406	-0.0703	-0.02692	-0.01299	0.01521	0.094693	-0.01134	0.000265	0.004776	0.001584	-0.00435	0.000144	0.002072	-0.22117	
23	0.001994925	-0.002523	-0.00178	-0.00127	-0.00014	-0.00095	-0.00121	0.00023	-0.00123	-0.00066	-0.00231	-0.00063	-0.00211	-0.00127	-0.01091	-0.00705	-0.00441	-0.00423	-0.00425	-0.00333	-0.00189	-0.00306	-0.02269	-0.00091	0.000793	-0.00133	-0.00796	-0.02851	-0.00285	-0.126151	
24	0.03527506	0.01392268	0.043393	0.011032	0.156287	0.119035	0.08696	0.309829	0.06498	0.40502	0.004944	0.117225	0.019099	0.040096	0.040096	0.008357	0.155356	0.088819	0.169716	0.103448	0.47531	0.18349	0.03713	0.21727	0.071654	0.042261	-0.02077	0.006714	0.018056	3.3558029	
25	0.009408529	0.0052689	-0.01531	-7.4E-05	0.009554	-0.00589	-0.00578	-0.01744	0.00206	-0.00441	-0.00651	-0.00797	-0.01133	-0.01048	-0.00237	-0.0046	-0.01229	-0.01535	0.018597	0.003271	0.016945	-0.09507	-0.00683	-0.00477	0.007252	-0.01206	-0.02133	0.007981	-0.00326	-0.092206	
26	0.0057969	0.01770514	0.010409	0.025754	0.014662	0.014951	0.011589	0.020811	0.006542	0.025513	0.006362	0.010205	0.000879	0.009837	0.011288	0.017582	0.011605	0.014399	0.018024	0.028476	0.034487	0.019126	0.009187	0.018007	0.005977	0.055094	0.012398	0.01275	0.022654	0.4796607	
27	0.007420429	0.2680223	0.011555	0.028148	0.022179	0.00665	0.054202	0.015638	0.015216	0.031948	0.039993	0.028342	-0.00183	0.017649	0.016485	0.034903	0.04357	0.05217	0.033423	0.025481	0.020656	0.02379	0.016109	-0.0028	0.008636	0.008125	0.056577	0.011145	0.023401	0.6740666	
28	0.018156219	-0.0049622	-0.00231	0.014754	0.019123	0.003456	0.00087	0.027226	0.028019	0.039482	0.009382	0.04495	-0.00184	-0.0028	-0.00786	0.000483	0.00542	-0.00658	0.014519	0.001049	0.031523	0.16016	-0.01189	-0.06931	0.050705	0.057808	-0.02278	0.140966	0.036247	0.3865751	
29	-0.00627444	-0.0193666	-0.01998	-0.02624	0.008822	-0.02633	-0.02956	-0.00723	-0.00753	-0.03843	-0.071188	-0.01027	-0.031	-0.05096	-0.02564	-0.03551	-0.00459	-0.00808	-0.00828	-0.02936	0.002909	-0.01886	-0.07054	-0.05607	-0.002916	-0.05837	-0.02007	-0.02525	-0.733698		
SUM	0.355901649	0.18105909	0.240756	0.467722	0.696662	0.776088	0.378959	0.485723	0.705322	0.668894	0.634531	0.627114	0.437954	0.518017	0.433558	0.574407	0.764078	0.587718	0.765992	0.874779	0.662395	0.649846	0.179783	0.198239	0.586826	0.310869	-0.07784	0.11903	0.135162	13.464857	

Appendix 5
Synergetic or Second Round Effects, Philippines
1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.03297	-0.03229	-0.09532	0.046932	0.018141	0.035521	-0.02042	0.180515	0.214177	0.012405	0.000898	-0.02337	0.073794	-0.26807	-0.01822	-0.01866	0.05005	-0.00712	-0.00379	-0.00871	-0.00017	0.073817	-0.00077	-0.01036	-0.00356	-0.00656	-0.0004	-0.00557	-0.01593	0.155891
2	0.015685	0.060786	0.028986	0.035238	0.020859	0.045314	0.034557	0.040974	0.041424	0.083229	0.04355	0.039353	0.053014	0.045723	0.10776	0.075458	0.270689	0.117716	0.086697	0.051787	0.031988	0.038001	0.052918	0.022554	0.120315	0.019283	0.317086	0.00575	0.015682	1.915127
3	0.043438	0.004857	0.109651	0.21047	0.007148	0.031004	0.005249	0.026041	0.019119	-0.00878	0.003521	0.080957	0.032999	0.141411	0.004676	0.072777	0.003453	0.003796	0.003551	0.009705	0.003598	0.024745	0.004979	-0.00516	-0.00224	-0.00035	0.00031	0.000256	0.030947	0.817064
4	-0.001	-0.0017	-0.00152	0.038733	-0.00022	-0.00161	-0.00211	-0.00156	-0.00073	-0.00307	-0.0045	-0.00106	-0.00138	-0.00266	-0.00147	-0.00189	-0.00136	-0.0016	-0.00154	-0.00199	-0.00174	-0.00105	-0.00306	-0.00285	-0.0033	-0.00269	-0.00271	-0.00271	-0.02348	-0.03785
5	-0.00015	-7.2E-06	-8.9E-05	-7.5E-06	0.337415	-5E-06	-1.1E-05	-3E-05	1.36E-05	-2.5E-06	-3.3E-06	-2.3E-05	-8.3E-06	-6.4E-05	-4.5E-06	-5.5E-06	-2.6E-06	-4E-06	-3.7E-06	-4.5E-06	-1.9E-06	-5.3E-06	-6.7E-06	-2.5E-06	-4.2E-06	-2.1E-06	-2.3E-06	-2.2E-06	-1.2E-05	0.338966
6	-0.00988	-0.00918	-0.01014	0.000234	0.001753	-0.23712	0.073807	0.002745	0.042848	0.031704	-0.02618	-0.0373	-0.04629	-0.00196	-0.00469	0.000101	-0.00054	-0.02139	-0.00264	-0.00295	-0.00094	0.039782	-0.0028	-0.00445	-0.00689	-0.00162	-0.00197	0.001281	0.006376	-0.293
7	2.71E-06	4.4E-06	-1.7E-06	-1.7E-06	5.9E-07	-4.4E-06	0.058348	-1.4E-06	2.01E-06	3.8E-06	-1.7E-06	-1.6E-05	-0.00091	-3.7E-06	-3.8E-06	-9.6E-07	-3.4E-06	4.5E-06	6.5E-07	-3E-05	-9.4E-06	-2.2E-06	1.6E-06	-3.7E-06	-4.4E-05	-3.1E-06	-1.1E-05	2.09E-06	5.59E-05	0.057344
8	-0.00132	-0.00692	-0.00208	-0.01122	-0.00749	-0.00412	-0.00757	-0.00344	0.484153	-0.00778	-0.00084	-0.01514	-0.00106	-0.00059	-0.00416	-0.01161	-0.01062	-0.0154	-0.04821	0.011369	-0.00126	-0.00577	0.028943	-0.00177	-0.00063	0.000141	-0.00054	0.002431	0.000198	0.35726
9	0.003	-0.00013	0.00015	0.000241	3.31E-05	0.000392	0.0008	0.001405	-0.00211	2.05E-05	-0.00214	0.000375	6.39E-05	6.14E-06	-9.7E-05	0.00464	-1.1E-05	0.000137	0.003441	-0.01211	-3.9E-05	-0.00019	0.00216	0.000142	-0.00025	-0.00111	-4.6E-05	-0.00137	-0.00031	-0.00665
10	0.007859	-0.00451	0.005357	-0.01861	0.093004	0.007306	-0.00519	-0.0094	0.00513	0.075534	0.328706	-0.00307	-0.00562	-0.01341	-0.00429	-0.04803	-0.00664	-0.00819	0.001542	-0.0096	0.000135	-0.01216	-0.01243	0.004601	0.001952	0.019751	-0.00551	0.005121	0.008312	0.019759
11	0.00049	-0.003	-0.00318	-0.00635	-0.00434	-0.00379	-0.01185	-0.0037	-0.00343	-0.0051	-0.0019	-0.00342	-0.01114	-0.01143	-0.00296	-0.00575	-0.00582	-0.00701	-0.00094	-0.00111	-0.00343	-0.01922	-0.00224	0.000231	-0.0016	-0.00281	-0.00948	0.003328	-0.00989	-0.14483
12	4.61E-05	-0.00019	6.9E-05	2.13E-05	2.9E-05	0.008452	-0.09281	0.00613	0.001352	1.2E-05	0.001243	0.16197	0.001574	3.49E-05	-7.7E-05	-6.3E-06	-7.8E-05	1.5E-05	-0.00012	7.0E-05	0.000142	-0.00031	2.9E-05	2.29E-05	0.000103	2.58E-05	5.8E-05	9.25E-06	-1.1E-05	0.082295
13	-0.0005	-0.00273	-0.00258	-0.00313	-0.00072	-0.00416	-0.05651	-0.00824	0.014893	-0.0033	-0.00214	-0.01141	0.049835	-0.00465	-0.00387	-0.00107	-0.00283	-0.00413	0.010801	-0.0255	0.026399	-0.00169	0.002683	-0.00261	-0.01501	-0.0039	-0.00924	-0.00031	-0.00056	-0.06621
14	0.0859	-0.03024	0.010896	-0.04434	0.006789	0.053665	0.048311	0.046983	0.027914	0.077045	0.097965	0.023531	0.208382	0.221589	-0.01423	-0.00301	0.060435	0.035337	0.055788	0.015963	0.022488	0.367329	0.029176	-0.004	0.012055	0.004841	0.024291	-0.00342	0.004634	1.429674
15	0.027875	0.109765	0.06564	0.077032	0.041137	0.086991	0.069705	0.075367	0.056472	0.168083	0.083202	0.082369	0.103834	0.097849	0.001679	0.214124	0.11244	0.10905	0.089444	0.10047	0.053124	0.070074	0.061694	0.045549	0.235263	0.038095	0.620199	0.008367	0.031903	2.935573
16	0.001033	-0.00429	-0.00608	-0.02439	0.000226	0.000441	-0.00208	-0.00142	0.000497	-0.00258	-0.00075	-0.00407	0.000323	0.001948	-0.00448	-0.00127	-0.00511	-0.00553	-0.00592	-0.01663	-0.00418	-0.03928	-0.02862	-0.0039	-0.00131	-0.00225	-0.01095	-0.00269	-0.00587	-0.19019
17	0.002025	-0.0206	0.027282	0.011917	0.003841	0.006464	0.005536	0.016954	-0.01059	0.021472	0.010114	0.00338	0.011419	0.021906	0.00643	0.01554	0.440709	0.367185	0.283947	0.129837	0.208259	-0.01226	0.08203	0.001688	0.017291	0.00734	-0.01033	-0.00278	0.004215	1.613156
18	0.001164	-0.05111	-0.00836	-0.00012	0.002052	0.00256	-0.00407	-0.00162	-0.03023	0.021454	0.00273	-0.01391	0.012208	0.00454	-0.03599	-0.01262	-0.06535	-0.01683	-0.12976	0.09679	0.004423	-0.02211	-0.03404	-0.00084	0.00041	0.003522	-0.00089	-0.00053	-0.00185	-0.27737
19	0.001265	-0.01307	0.000384	0.003195	0.000579	0.000508	-0.00116	0.001659	-0.00178	0.006483	0.003709	0.000477	0.000367	0.000229	-0.00691	-0.00049	0.002706	0.000356	0.021449	0.00034	0.003372	-0.00036	0.003089	0.000803	0.001319	0.000191	0.001813	0.000454	4.94E-05	0.031026
20	3.34E-05	-0.00466	-0.00062	-0.00063	0.000196	-0.00042	-0.00127	-0.00134	-0.00091	0.00245	-0.00042	-0.00141	0.000236	-0.00147	-0.00298	-0.00154	-0.00114	0.006218	0.025422	0.057125	-0.00881	-0.01445	-0.00588	-0.00202	-0.00388	-0.00356	0.006451	-0.0011	-0.00225	0.00536
21	-0.00661	-0.01685	-0.00175	0.011473	0.003927	-0.00147	-0.00384	-0.0029	-0.00171	0.010935	-0.0112	-0.00072	-0.00241	-0.00307	-0.01175	-0.0029	-0.00205	-0.00314	-0.00429	0.002353	-0.32296	0.000275	-0.0002	-0.00542	-0.00633	-0.00513	-0.00391	-0.0025	-0.00038	-0.37845
22	0.001101	-0.00459	-0.00654	0.001062	0.037327	0.010375	0.00091	-0.01635	-0.04392	0.003782	-0.04402	0.008732	-0.00296	-0.00528	-0.01044	-0.12373	-0.06129	-0.03015	0.008877	0.014359	0.11081	-0.01642	-0.00063	0.000222	-0.00116	-0.00585	0.000314	-5.3E-05	-0.29187	
23	0.00237	0.07486	-0.00048	-0.00055	0.000391	-0.00173	-0.00103	-0.00076	-0.00148	0.004462	0.000284	0.000129	-0.00233	-0.00032	-0.01356	-0.00562	-0.00291	-0.00278	-0.00595	0.00039	-0.00486	-0.00336	-0.02622	-0.00874	0.000308	-0.0015	-0.00176	-0.0402	0.009659	-0.1028
24	0.056252	-0.01916	0.055337	0.080871	0.162401	0.041988	0.119763	0.077665	0.10614	0.008733	0.043331	0.190406	0.111483	0.120969	0.95823	0.34143	0.022304	0.014429	0.047519	0.06685	-0.03039	0.088416	-0.01364	0.001247	0.990797	0.016129	0.061162	0.002249	0.006673	1.628332
25	0.009915	-0.01917	-0.00773	0.010074	0.011998	0.013338	0.005074	-0.02686	0.012967	0.027312	-0.01106	0.005269	0.031754	0.002829	-0.00394	0.01294	0.000123	-0.0084	0.0286	0.020313	0.037559	0.028167	0.007148	-0.03709	0.011084	0.03644	-0.01015	-0.00677	-0.00679	0.095657
26	-0.00014	-0.00091	-0.00096	0.000139	0.000475	-0.00052	-0.00446	-0.00113	0.000155	-0.00051	-0.00932	0.002765	-0.00087	-0.00039	-0.00149	-0.00066	-0.00045	0.002376	0.002512	-0.00406	0.004568	0.000745	-0.00216	-0.00035	0.067209	-0.00508	0.000601	0.007747	0.048805	
27	0.004553	-0.01066	0.009574	0.011104	0.011673	-0.00102	-0.00198	0.004365	-0.00553	0.000198	0.004365	0.040659	0.016086	0.002846	0.021371	0.002269	-0.00853	0.011803	0.011588	0.005879	0.024212	0.005732	0.017933	0.006062	0.020362	-0.00192	-0.00068	-0.18998	0.013764	0.020936
28	0.00207	-0.01783	-0.01251	0.000791	0.012966	-0.01048	-0.0071	-0.00644	0.010247	0.001954	0.015763	0.015516	0.019172	0.024039	-0.02104	-0.01396	-0.00058	-0.00441	0.007826	0.043279	-0.03828	0.027559	-0.00882	-0.00685	0.006225	0.018774	-0.02221	-0.01919	0.239605	0.155085
29	-0.01533	-0.03087	-0.02673	-0.01721	0.028915	-0.03135	-0.04785	-0.02337	0.001163	-0.06646	-0.10819	-0.01244	-0.01056	-0.04115	-0.01367	-0.01292	-0.0149	-0.02283	-0.02368	-0.01095	-0.03174	0.004948	-0.04631	-0.07069	-0.03526	-0.05023	-0.06855	-0.0498	-0.03128	-0.89649
SUM	0.28596	-0.12267	0.11236	0.04327	0.754244	0.073362	0.146814	0.38398	0.963821	0.59231	0.512959	0.450851	0.33653	0.344255	-0.0667	0.19327	0.68069	0.476119	0.410281	0.548098	-0.04028	0.658289	0.056763	-0.17236	0.411993	0.043281	0.669756	-0.09502	0.287315	9.586731

1988

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	-0.00721292	-0.054143	-0.06533	-0.01864	-0.01886	-0.01737	-0.01121	-0.03812	0.04055	-0.00585	-0.00584	-0.03854	0.01817	-0.04309	-0.00594	-0.00715	-0.00684	-0.00702	-0.0062	-0.0062	-0.00501	-0.01318	-0.01038	-0.00212	-0.00538	-0.00257	0.00142	-0.003	-0.01306	-0.38048	
2	-0.00091013	4.8377E-05	-0.00289	-0.00403	-0.00116	-0.00552	0.00286	-0.00416	-0.00745	-0.00745	-0.00252	-0.00294	0.00382	-0.00537	-0.00597	-0.02311	0.004124	-0.00328	-0.00362	-0.00412	-0.00244	-0.00085	-0.00826	-0.00094	-0.00167	0.000392	-0.00828	-0.00064	-0.00014	-0.150411	
3	-0.00198988	-0.0011596	-0.01384	-0.01303	-0.00274	-0.00234	-0.02345	-0.00301	-0.00406	-0.00378	-0.00296	-0.00366	-0.00169	-0.00147	-0.0022	-0.00182	-0.00218	-0.00218	-0.00197	-0.00183	-0.00233	-0.00255	-0.00157	-0.00357	-0.00147	-0.00163	-0.0016	-0.0092	-0.146542		
4	-0.00016295	-0.0001267	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011	-0.00011		
5	-1.9671E-05	2.1858E-07	-1.6E-06	-0.0573	-0.0573	-1.7E-06	-8.9E-07	-9.2E-06	1.24E-07	1.25E-06	2.08E-06	-5.9E-06	-2.6E-06	-6.9E-06	5.32E-07	7.19E-07	3.29E-07	2.3E-07	1.75E-07	9.8E-07	6.98E-07	-1.7E-06	3.27E-07	1.54E-06	5.86E-07	1.63E-06	1.71E-06	2.52E-06	2.4E-05	-0.025761	
6	-0.00140619	-0.0012599	-0.00085	-0.00054	-0.00054	-0.00942	0.229934	-0.00128	-0.00071	-0.00181	-0.005	-0.00942	0.00609	-0.00097	-0.00111	-0.00091	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	-0.00054	
7	2.64227E-05	7.6429E-05	0.000116	9.04E-05	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	0.000116	
8	-0.0003345	-0.000286	-0.00063	-0.00164	-0.00147	-0.00098	-0.00094	-0.00054	-0.00215	-0.00218	-0.00085	-0.00205	-0.00051	-0.00056	-0.00072	-0.00196	-0.00198	-0.00272	-0.00598	-0.00145	-0.00095	-0.00165	-0.00673	-0.00013	-0.00043	-0.00022	-0.00042	-0.00121	-0.00032	-0.046831	
9	-1.0077E-05	-2.75E-05	-2.6E-05	-3.8E-05	-1.8E-05	-3.8E-05	-1.7E-05	-2.6E-05	0.000905	4.4E-05	-3.2E-05	-1.1E-05	2.58E-05	-4.4E-05	-3.3E-05	-0.00016	-3.7E-05	-5E-05	-0.00234	4.2E-05	-4.5E-05	-0.00013	4.7E-05	-7E-05	-0.00011	-4.5E-05	-0.00011	-4.5E-05	-0.00014	-2E-05	-0.002999
10	-0.00059172	-0.0019755	-0.00287	-0.00646	0.001255	-0.00529	-0.00385	-0.00402	-0.00268	-0.06483	-0.02634	-0.00489	-0.0061	-0.01045	-0.00223	-0.01471	-0.00426	-0.00528	-0.00441	-0.00617	-0.00279	-0.01112	-0.00639	-0.0033	-0.00233	-0.00372	-0.00319	-0.00171	-0.00196	-0.212313	
11	-0.00021894	-0.0006276	-0.0009	-0.00146	0.000208	-0.00159	-0.00064	-0.00096	-0.001	-0.0024	-0.0012	-0.00152	-0.00282	-0.00297	-0.00043	-0.0012	-0.00138	-0.00169	-0.00142	-0.00081	-0.00118	-0.00312	-0.00117	-0.00076	-0.00097	-0.00183	-0.00147	-0.0007	-0.00075	-0.036981	
12	1.01045E-05	-2.658E-07	4.16E-05	3.19E-05	2.63E-05	8.39E-05	-0.04768	5.21E-05	0.000359	4.83E-05	1.01E-05	0.003178	0.000356	7.07E-05	-3E-06	3.54E-05	4.47E-05	4.08E-05	3.39E-05	5.3E-05	8.39E-05	1.9E-05	3.9E-05	0.000368	3.55E-05	1.79E-05	2.81E-05	1.5E-05	0.000105	-0.042476	
13	-0.00030192	-0.0007638	-0.0008	-0.00078	-0.00048	-0.00124	-0.00624	-0.00138	-0.00163	-0.00131	-0.00085	-0.00231	-0.0009	-0.00123	-0.00117	-0.00088	-0.00104	-0.00132	-0.00185	-0.00312	-0.00644	0.000282	-0.00086	-0.00067	-0.00355	-0.00056	-0.00151	-0.00017	-0.00025	-0.04333	
14	-0.00336849	-0.0073442	-0.01069	-0.01271	-0.00577	-0.02998	0.014386	-0.00979	-0.0119	-0.01001	-0.00578	-0.02237	-0.03132	-0.03299	-0.00633	-0.01229	-0.0085	-0.01178	-0.00797	-0.00877	-0.0084	-0.02685	-0.01087	-0.00253	-0.00445	-0.00271	-0.00521	-0.00217	-0.0038	-0.302495	
15	-0.00031151	-0.0039948	-0.00217	-0.00183	-0.00091	-0.00628	0.006121	-0.00365	-0.00093	-0.00799	-0.00216	-0.00298	-0.0025	-0.00416	-0.00466	-0.00739	-0.00778	-0.00799	-0.00774	-0.00324	-0.00305	-0.003	-0.00667	-0.00442	0.004728	0.002191	0.001029	-0.0001	0.001366	-0.075972	
16	-0.00019445	-0.0005549	-0.00094	-0.00147	-0.00023	-0.00084	-0.00014	-0.00061	-0.00025	-0.00101	-0.00062	-0.00118	-0.00085	-0.0014	-0.00092	-0.00601	-0.0015	-0.0016	-0.00228	-0.00228	-0.00118	-0.00444	-0.01259	-0.00071	-0.00049	-0.00034	-0.00205	-0.00097	-0.00102	-0.053982	
17	-0.00081125	-0.0163876	-0.00309	-0.00224	-0.00057	-0.00212	-0.00131	-0.00201	-0.01671	-0.00228	-0.00154	-0.00367	-0.00228	-0.00354	-0.00448	-0.00811	-0.00651	-0.00725	-0.00609	-0.00977	-0.00676	-0.01061	-0.02878	-0.00012	-0.00232	-0.00105	-0.00926	-0.00176	0.000755	-0.358801	
18	-0.00062663	-0.0079954	-0.00371	-0.00097	-0.0006	-0.00105	-0.00254	-0.00123	-0.00481	-0.00266	-0.00223	-0.00479	0.00239	-0.00391	-0.00829	-0.00507	-0.01572	-0.03891	-0.02847	-0.01689	-0.00455	-0.0117	-0.01777	-0.00071	-0.00185	-0.00148	-0.00366	-0.00101	-0.00076	-0.196944	
19	2.24529E-05	-6.329E-05	-0.00025	-0.00023	-8.2E-05	-0.0004	-5E-05	0.000166	-0.00037	-0.00023	-0.0003	-0.00028	-0.00038	-0.00037	-0.0005	-0.00044	-0.00017	-0.00054	-0.00087	-0.00039	0.017085	-0.00108	-0.00156	-0.00262	-0.00029	-0.0005	0.000396	-0.00022	-0.00018	4.23E-05	0.0054555
20	-0.0001057	-6.329E-05	-0.00025	-0.00023	-8.2E-05	-0.0004	-5E-05	0.000166	-0.00037	-0.00023	-0.0003	-0.00028	-0.00038	-0.00037	-0.0005	-0.00044	-0.00017	-0.00054	-0.00087	-0.00039	0.017085	-0.00108	-0.00156	-0.00262	-0.00029	-0.0005	0.000396	-0.00022	-0.00018	4.23E-05	0.0054555
21	-0.00038047	-0.002363	-0.00098	-0.0007	-0.0005	-0.0011	2.8E-05	-0.0013	-0.0083	-0.00123	-0.00105	-0.00098	-0.00129	-0.00131	-0.00231	-0.0014	-0.00131	-0.00152	-0.00178	-0.00106	-0.00662	-0.0007	-0.00107	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.0007	-0.127627	
22	-0.0002764	-0.0025335	-0.00161	-0.00189	-0.00065	-0.00222	-0.00511	-0.00073	-0.0001	-0.00713	-0.00229	-0.00771	-0.00193	-0.00276	-0.00224	-0.00464	-0.01857	-0.01414	-0.0097	-0.00329	-0.00147	-0.00194	-0.00521	-0.00031	-0.00055	-0.00012	-0.00153	-0.00032	-0.00023	-0.10408	
23	-6.7798E-05	0.00020267	-0.00037	-0.00039	-0.00031	-0.00056	0.000578	-0.00046	-0.00046	-0.00069	-0.00026	-0.00053	-0.00075	-0.00071	-0.00174	-0.00145	-0.00131	-0.00148	-0.00167	-0.00068	-0.00134	-0.0006	-0.00388	-0.00123	-0.0003	-0.00711	-0.00368	-0.00094	-0.00185	1.86E-05	-0.021756
24	-0.00311339	-0.0114535	-0.00633	-0.0125	-0.00914	-0.02518	0.018822	-0.01786	-0.00983	-0.0251	-0.01324	-0.00459	-0.01401	-0.01733	-0.0121	-0.0198	-0.02751	-0.03203	-0.02681	-0.01394	-0.02945	-0.01507	-0.02323	-0.003	-0.00711	-0.00368	-0.00094	-0.00296	-0.0041	-0.130917	
25	-0.00140734	-0.0043387	-0.00577	-0.00352	-0.00241	-0.00637	0.009508	-0.00755	-0.00292	-0.00747	-0.00469	-0.00564	-0.00486	-0.00716	-0.00406	-0.00633	-0.00777	-0.00991	-0.00876	-0.00465	-0.00525	-0.00483	-0.00664	-0.00425	-0.00316	-0.00546	-0.00102	-0.00152	-0.130917	-0.30917	
26	-0.00029974	-0.0006493	-0.00083	-0.00061	-0.0005	-0.00135	0.00102	-0.00091	-0.00064	-0.00196	-0.002	-0.00078	-0.00109	-0.00131	-0.00084	-0.00104	-0.00126	-0.0015	-0.00126	-0.00061	-0.00153	-0.00053	-0.00102	-0.00085	-0.00087	0.003249	-0.00109	-0.00082	-0.00028	-0.022386	
27	-0.00022388	-0.0030193	-0.00049	-0.00023	-0.00042	-0.00544	0.011912	-0.00198	-0.00143	-0.00503	-0.0005	-0.00203	-0.00224	-0.00244	-0.00277	-0.00414	-0.00513	-0.00518	-0.00177	-0.00177	-0.00262	-0.00152	-0.00296	-0.00091	-0.00089	0.003481	-0.0194	8.45E-05	0.001434	-0.006073	
28	-0.00282117	-0.0065815	-0.00883	-0.00803	-0.0059	-0.01287	0.006489	-0.00963	-0.00658	-0.01468	-0.01	-0.0094	0.00906	-0.01278	-0.00909	-0.0113	-0.01288	-0.01539	-0.01347	-0.0096	-0.01417	-0.00923	-0.01168	-0.01974	-0.00543	-0.00321	-0.00877	-0.00755	-0.00423	-0.266417	
29	-0.00440403	-0.0077983	-0.00916	-0.01223	-0.00605	-0.01462	0.002325	-0.01045	-0.00667	-0.02091	-0.01995	-0.01023	-0.01257	-0.01807	-0.0118	-0.01566	-0.01257	-0.01506	-0.01441	-0.01381	-0.01542	-0.01181	-0.01913	-0.01216	-0.00379	-0.00856	-0.01261	-0.01239	-0.0097	-0.339421	
SUM	-0.03155257	-0.086442	-0.15631	-0.11334	-0.08372	-0.24478	0.193801	-0.12646	-0.07719	-0.19902	-0.11304	-0.18706	0.12778	-0.17712	-0.15659	-0.15633	-0.20078	-0.25705	-0.22059	-0.0888	-0.21535	-0.13206	-0.19245	-0.05729	-0.052	-0.0264	-0.09532	-0.04285	-0.04863	-3.479313	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0.993894	-0.09065	0.45922	0.525332	-0.36678	0.817713	-0.62901	0.075408	1.154328	0.679132	0.130117	-0.90274	1.024848	-1.86279	0.12113	-0.08548	-0.01407	-0.04028	0.001839	0.400114	0.156671	-0.48826	-0.30514	0.152321	0.06817	-0.0153	-0.03478	-0.06278	0.078812	1.568908	
2	0.354018	1.144271	0.434208	0.616608	0.363593	0.465194	0.419694	0.5748	0.707955	0.722526	0.619981	0.417744	0.598373	0.925342	1.048076	2.11981	5.450531	2.100478	1.401013	0.623446	0.477584	1.081049	1.27395	0.540445	2.345794	0.330579	3.040663	0.184116	0.45687	30.81095	
3	0.461329	0.051013	-0.07025	0.290999	-0.00497	0.125236	-1.60851	0.116863	0.158093	-0.08937	0.004604	-1.92098	0.257518	0.784148	0.950151	0.051508	0.012482	0.047764	0.024585	0.036807	0.018178	0.051352	0.010516	-0.0174	-0.02473	-0.01211	-0.02257	-0.02484	0.02459	1.16747	
4	-0.00697	-0.00588	-0.01021	-0.15389	-0.00422	-0.01001	-0.01498	-0.01712	-0.00664	-0.02942	-0.03454	-0.0083	-0.01495	-0.0239	-0.00839	-0.01533	-0.00833	-0.01247	-0.00981	-0.0187	-0.0124	-0.01322	-0.02087	-0.01555	-0.02681	-0.01761	-0.02083	-0.02151	-0.15763	-0.71395	
5	-0.00124	0.000129	-0.00056	0.000181	1.580273	0.000179	5.05E-05	-0.00029	0.000155	0.000357	0.000413	-0.00017	0.000154	-0.00023	0.000179	0.000222	0.000142	0.000154	0.000154	0.000259	0.0002	1.33E-05	0.00022	0.000259	0.0002	0.000271	0.000225	0.000281	0.000261	0.000316	1.5858
6	0.011865	0.060703	-0.04383	0.027788	0.023021	1.40385	7.616202	0.168956	1.009707	0.080909	-0.17358	1.780672	1.523131	0.068037	0.049758	0.069736	0.166886	-0.05109	0.142207	0.078596	0.255479	0.017494	0.005514	0.084013	-0.00076	0.01794	0.008939	0.045703	0.045703	16.15356	
7	0.002112	0.003761	0.004804	0.004107	0.002502	0.177734	1.939749	0.004565	0.008213	0.006392	0.008683	0.02002	0.096082	0.005257	0.003412	0.005036	0.004906	0.006358	0.004813	0.006601	0.007712	0.006285	0.005412	0.002334	0.007438	0.003594	0.004238	0.003035	0.0332	2.406355	
8	0.011643	0.066653	0.007035	-0.09029	-0.04779	-0.01661	-0.07475	1.335259	0.963076	-0.07924	0.012652	-0.07212	0.009655	0.034719	0.032428	-0.0459	-0.07823	-0.09148	-0.0757	0.129706	0.007523	-0.03419	-0.16918	-0.01317	0.012046	0.01022	0.008377	-0.06492	0.001373	1.684978	
9	0.000457	0.005922	6.3E-05	-0.00054	0.00019	0.002306	0.003622	0.030979	0.187441	0.009583	8.37E-05	0.009571	0.009063	0.000691	0.00302	-0.01002	0.000931	0.000581	0.029412	-0.16021	0.00524	0.003649	-0.00401	0.00202	-0.00175	-0.00653	-0.00044	-0.01113	0.003244	0.091512	
10	0.07416	0.290307	0.114484	0.130048	3.82221	0.238491	-0.02555	0.045972	0.18535	5.480015	6.702578	0.125007	0.031121	0.185233	0.137379	0.789826	0.046735	1.1292	0.221301	0.310604	0.12782	0.128805	0.053896	0.073103	0.097256	0.072996	0.094038	0.076152	0.29715	19.63396	
11	0.009539	-0.00153	-0.02082	-0.06041	0.113013	0.01695	-0.13309	-0.01224	-0.0245	-0.07695	0.006711	-0.05708	-0.17271	-0.15552	0.107711	-0.00764	-0.03471	-0.03234	-0.02254	0.011887	-0.01165	-0.19404	-0.01551	-0.01279	-0.02728	-0.16103	-0.06901	-0.0133	0.093346	-0.98719	
12	0.00203	0.003283	0.004244	0.004394	0.002639	0.127239	-2.27249	0.041744	0.235956	0.007416	0.005032	5.139794	0.413704	0.006819	0.003593	0.005947	0.009898	0.008616	0.036836	0.020202	0.014036	0.065874	0.006863	0.009795	0.019074	0.003879	0.005754	0.002526	0.017939	4.01019	
13	0.008232	0.020159	0.007366	0.001807	0.013176	0.01866	-0.4654	-0.00377	-0.06846	0.041496	0.027234	0.02627	0.469875	0.00492	0.021651	0.033845	0.034195	0.01447	-0.0093	-0.14183	1.382876	0.231515	0.022231	0.057823	0.218887	0.014557	-0.0493	0.025926	0.061714	1.966011	
14	0.404981	0.09641	-0.0708	-0.17203	0.107224	0.678806	-0.0377	0.102132	0.057874	0.332332	0.369783	-0.21839	-0.39486	1.504739	0.93019	-0.05093	0.080835	0.082959	0.186933	0.350447	0.300142	-0.86335	-0.06246	0.054255	0.24472	-0.00465	0.145951	-0.0184	0.288969	4.423108	
15	0.697059	1.772831	0.88636	1.231137	0.710073	0.840754	0.799654	1.132957	0.838121	1.462552	1.195661	0.744793	1.200778	1.160465	2.350907	3.660085	1.73526	1.520958	0.947785	0.800989	0.693157	0.97124	1.243374	1.096664	4.831681	0.632388	6.03416	0.293971	0.898968	42.37615	
16	0.009028	0.026654	-0.02543	-0.353556	0.011981	0.027934	-0.01899	-0.0034	-0.0239	-0.01403	0.009916	-0.02716	0.008086	0.090669	0.013461	0.074171	0.04616	0.020481	0.009955	-0.07537	0.024453	-0.4253	0.371434	-0.00258	0.010878	0.001798	-0.12121	0.070134	-0.01061	0.416694	
17	0.06263	-0.54855	0.089684	0.399763	0.084968	0.107528	0.043713	0.187149	-0.82372	0.20859	0.212201	0.08004	0.137833	0.256633	-0.15615	0.038193	0.799422	4.103265	-0.59204	1.69243	2.557545	0.608582	-0.37095	0.08529	0.345038	0.160891	-0.10396	0.008826	0.155344	9.830185	
18	0.063404	-0.33977	-0.04227	0.728256	0.042425	0.053066	-0.15662	0.245702	-0.30340	0.182322	0.040215	-0.14909	0.038605	0.052371	-0.02669	-0.02054	-0.44095	-2.27774	-0.95283	-0.69109	0.087666	-0.69519	-0.49719	0.058656	0.128744	0.028698	0.055086	0.027555	0.131066	-4.53455	
19	0.040772	0.228642	0.041492	0.036874	0.021458	0.057006	0.027074	0.23718	0.21085	0.058955	0.028969	0.033426	0.04704	0.063915	0.137281	0.094503	0.148274	0.099833	4.437057	1.188176	0.059965	0.078955	0.08651	0.027779	0.223458	0.059978	0.132379	0.02164	0.069495	6.998788	
20	0.037428	0.45662	0.049825	0.048841	0.025944	0.096519	0.035827	0.065717	0.047555	0.0849035	0.06238	0.035931	0.086189	0.058343	0.243822	0.125311	0.084632	0.09401	0.695842	5.051164	0.563458	0.090395	-0.0183	0.074966	0.208812	0.212744	0.151225	0.036269	0.127182	8.933698	
21	0.045346	0.147652	0.066323	0.082369	0.04204	0.075631	0.06352	0.091149	0.070907	0.095572	0.095604	0.065406	0.0538035	0.082641	0.143798	0.119561	0.263148	0.155316	0.103864	0.094575	6.301269	0.20318	0.08244	0.222812	0.534947	0.071563	0.336575	0.044337	0.249966	10.00503	
22	0.007376	-0.10861	-0.06539	-0.04139	0.063715	-0.04709	-0.38345	0.002513	-0.19356	-0.28085	0.095748	-0.32866	-0.01391	-0.08317	-0.05104	-0.2308	-1.14836	-0.46238	-0.40968	-0.05191	0.147072	0.999994	-0.21847	0.072616	0.041378	0.069469	-0.04296	0.008865	0.072548	-2.64039	
23	0.032334	0.30685	0.029097	0.039459	0.025432	0.051796	0.038084	0.03974	0.045745	0.037611	0.033154	0.0328	0.012732	0.036479	0.054636	0.021865	-0.02282	0.00512	-0.00772	0.025913	0.001587	-0.002	-0.10763	-0.01051	0.082553	0.062371	0.056607	0.127631	0.068189	1.03718	
24	0.140046	-0.28732	-0.57626	0.115448	0.163161	-0.15243	0.156212	-0.10181	0.064434	0.113138	0.083336	0.407249	0.38457	0.194231	0.886214	-0.27714	0.04246	0.037189	0.367123	0.409235	0.157633	0.228848	-0.70273	0.181464	0.418428	0.025566	0.151584	-0.01897	0.17042	2.91646	
25	0.20639	0.25303	0.23542	0.377383	0.271911	0.467675	0.70466	0.395974	0.417902	0.31727	0.340084	0.239375	0.342123	0.20553	0.73789	0.25854	0.075129	0.130365	0.148885	0.294039	0.411811	0.319969	0.508948	0.894832	0.198158	0.121018	0.001302	0.263109	0.244189	9.07399	
26	0.031644	0.048268	0.053616	0.055924	0.060148	0.06953	0.050485	0.075863	0.058165	0.030125	-0.01704	0.087321	0.04743	0.045331	0.046664	0.067698	0.06499	0.078711	0.391088	0.13501	0.065946	0.097702	0.127073	0.550545	0.056164	0.568761	0.001477	0.121031	0.111895	3.136839	
27	0.204628	0.766932	0.610314	0.74645	0.356396	0.923176	0.540993	0.50462	0.538709	0.879128	0.5366	0.550263	0.516481	0.607274	0.465162	0.568007	0.967968	0.834753	0.519149	0.569335	0.312414	0.663868	0.370772	0.566208	0.247197	0.226271	-0.9039	0.299258	0.536858	14.52073	
28	0.072157	0.069215	-0.18142	-0.04340	0.027648	0.033542	0.139797	-0.07013	0.054848	-0.20991	-0.02316	0.216264	0.073114	-0.16117	0.165621	-0.1218	-0.11146	-0.18322	0.175709	0.072348	-0.14946	0.057348	0								

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.065384	0.059194	0.534613	0.160879	0.196595	0.13727	-0.16911	0.480674	-0.1125	0.015367	0.010097	0.118646	0.168677	0.364403	0.040638	0.039963	0.018461	0.041953	0.003726	-0.07376	0.004673	-0.05313	0.03706	-0.02012	0.037118	-0.02177	0.02049	0.018365	0.083799	2.76793
2	-0.00094	-0.00184	-0.00787	-0.00374	-0.00493	0.008909	-0.2292	0.008384	-0.04925	0.006463	-0.02216	-0.03924	-0.09015	-0.00726	0.132746	0.016523	-0.38246	-0.10757	0.12827	-0.21916	-0.0521	-0.11919	-0.00594	-0.05993	-0.13201	-0.10004	-0.31076	-0.01865	-0.02445	-1.92866
3	0.011746	0.007136	0.01344	0.125688	0.02448	0.00344	0.125688	0.027277	-0.07888	0.02684	0.015743	0.16279	0.008415	-0.04008	0.008441	0.009716	0.00471	0.008415	-0.00643	-0.00338	-0.00052	-0.01082	-0.02442	0.025685	-0.00138	0.006409	0.004661	0.048332	0.163927	
4	0.00134	0.002219	0.00198	-0.04692	0.00143	0.00273	-0.00356	0.002303	0.000698	0.003924	0.004956	0.000168	0.002705	0.004153	0.002516	0.000712	0.002324	1.15E-05	-0.00392	0.00122	0.000742	0.004025	-0.00209	0.003347	0.000994	0.00227	0.002365	0.020409	0.017144	
5	0.000202	-1.3E-06	0.000152	1.64E-05	0.2912	-1.5E-05	-2.2E-05	0.000105	-9.1E-06	-1.6E-05	-2.6E-05	2.99E-05	2.33E-05	6.38E-05	-6E-06	-1E-05	-6.4E-06	-5E-06	-8.8E-06	-2.4E-05	-1.2E-05	-2.9E-06	-2.8E-06	-1.9E-05	-7.6E-06	-2.2E-05	-1.3E-05	-1.8E-05	-0.00024	0.2913
6	0.010574	0.012343	0.02693	0.006654	0.044444	0.962998	-5.30268	0.007738	-0.07009	0.009951	0.031116	-0.31227	0.027767	0.003414	0.004736	0.001101	-0.01023	0.023851	-0.00864	-0.0161	6.76E-05	-0.14989	0.008308	-0.00184	0.017634	-0.0186	0.003563	0.000391	0.004221	-4.52954
7	-0.00012	-0.0003	-0.0005	-0.0005	-0.00025	-0.0004	-0.66493	-0.00404	-0.0009	-0.00056	-0.00054	-0.00937	-0.00072	-0.00048	-0.00028	-0.00157	-0.00053	-0.00054	-0.00054	-0.00054	-0.00054	-0.00048	-0.00095	-0.00097	-0.00245	-0.00096	-0.0003	-0.00035	-0.00027	-0.00241
8	0.003518	0.008699	0.004055	0.012241	0.013189	0.006742	-0.01323	-0.00912	-0.4142	0.006158	0.002384	0.00587	0.003105	0.000456	0.004446	0.00435	0.011389	0.01873	0.03559	-0.03873	0.00265	-0.04231	0.065452	0.000161	-0.01089	0.02947	0.000595	0.011103	0.001527	-0.34956
9	-0.00033	-0.00239	-0.001	-0.00073	-0.00051	-0.00086	-0.00241	-0.00135	-0.04717	-0.00138	-0.00155	-0.00132	-0.00098	-0.00128	-0.00138	-0.00014	-0.00142	-0.00144	-0.00622	-0.01574	-0.0065	-0.00169	-0.0018	-0.00386	-0.01417	-0.06086	-0.00107	-0.00195	-0.00081	-0.18259
10	0.002413	0.013948	0.014671	0.03915	-0.00925	0.036326	-0.12716	0.027305	-0.00766	0.18725	0.027527	-0.03453	0.041779	0.049775	0.012004	0.111048	0.012929	0.027739	-0.01598	-0.11596	-0.01581	-0.0546	0.042326	0.019004	-0.00273	-0.0088	0.01666	0.00317	-0.00105	0.29129
11	0.001389	0.005711	0.006994	0.013122	0.010223	0.014152	-0.01863	0.007799	0.003977	-0.00938	0.000306	0.00062	0.025404	0.024483	0.004531	0.008518	0.00909	0.012555	3.9E-05	-0.01976	0.002894	0.0171	0.008267	0.002176	0.006177	0.010894	0.010173	-0.00717	0.000395	0.151834
12	-0.00013	-0.00044	-0.00049	-0.00056	-0.00033	-0.00072	-0.04641	-0.01084	-0.22857	-0.00113	-0.0004	-0.64963	-0.00218	-0.00082	-0.00033	-0.00153	-0.00214	-0.00147	-0.00148	-0.00659	-0.00045	-0.01928	-0.00138	-0.00209	-0.00072	-0.00063	-0.00047	-0.00055	-0.00146	-1.08324
13	0.002658	0.008437	0.006497	0.006109	0.004266	0.006615	0.017917	0.012514	0.008293	0.008524	-0.00989	0.007818	0.069207	0.007565	0.006206	0.004859	0.004936	0.008106	-0.0047	-0.03236	-0.00394	-0.01953	0.004938	0.000631	0.031435	-0.003531	0.009327	-0.00063	-0.00128	0.12218
14	0.02193	0.100639	0.084938	0.09371	0.034982	0.255992	-0.74538	0.070486	0.004902	0.024857	-0.10786	-0.4457	0.292276	0.271055	0.05796	0.052506	0.02367	0.069106	-0.11993	-0.2973	-0.02932	-0.05023	0.079669	-0.00073	-0.00095	-0.07704	0.009556	-0.00278	0.015032	-0.31375
15	-0.00507	0.024456	-0.01112	-0.02468	-0.0084	0.008552	-0.43613	0.017562	-0.0501	0.006504	-0.03665	-0.05786	-0.2083	-0.08934	-0.01447	-0.02629	0.012359	0.004369	-0.09613	-0.30483	0.07425	-0.09531	0.028228	-0.05365	-0.28476	-0.18573	-0.19819	-0.03476	-0.04789	-2.5227
16	0.001303	0.004148	0.006663	0.067702	0.001923	0.006296	-0.05133	0.00478	0.000878	0.005964	0.002016	-0.00149	0.006905	0.011478	0.006064	0.022102	0.006099	0.00774	-0.00984	-0.07756	-0.01781	-0.00945	0.09297	0.000488	0.000357	-0.01565	0.016289	0.004595	0.006505	0.152673
17	0.003873	0.17361	0.014279	0.007966	0.001422	0.008383	-0.04932	0.00257	0.138081	0.007604	0.01132	-0.00144	0.002093	0.010668	0.05368	0.046158	0.672161	0.482814	-0.14009	-0.63426	0.32313	-0.13807	0.253219	-0.00783	-0.054	0.25855	0.043428	0.012858	-0.00486	0.364889
18	0.002267	0.075017	0.014646	-0.00327	0.000881	0.006722	-0.04864	-0.01502	0.045904	0.001325	-0.02791	0.000699	0.005214	0.00539	0.050122	0.020741	0.023401	0.296011	-0.14018	-0.33626	-0.07991	-0.08656	0.145667	-0.01017	-0.02388	-0.2316	0.005107	0.002891	-0.00594	-0.30672
19	-0.00286	0.017312	-0.00494	-0.00175	-0.00408	-0.02343	-0.00449	-0.01245	-0.00342	-0.0067	-0.00541	-0.00316	-0.00427	-0.00993	-0.00534	-0.01218	-0.01852	-0.1071	-0.13524	-0.0133	-0.02101	-0.00824	-0.01437	-0.04015	-0.30409	-0.01297	-0.00352	-0.00681	-0.75267	
20	-0.00363	-0.02305	-0.00801	-0.0161	-0.00344	-0.00647	-0.05287	-0.00912	-0.0146	-0.0112	-0.01272	-0.01547	-0.00859	-0.01408	-0.01571	-0.01918	-0.01558	-0.01865	-0.24807	-2.7306	-0.38118	-0.04002	-0.03998	-0.01561	-0.06707	-0.31784	-0.01835	-0.00705	-0.01632	-4.24752
21	0.003043	0.016393	0.03819	0.01261	0.003405	0.006623	-0.04719	0.00698	-0.00014	0.004795	0.004337	-0.00111	0.00829	0.00741	0.014012	0.005579	-0.00983	0.003049	-0.00941	-0.04699	0.608515	-0.01443	0.002175	-0.00489	0.002745	-0.00316	0.002181	-1.3E-05	-0.01312	0.55433
22	0.00127	0.023141	0.010092	0.009205	0.004023	0.016109	-0.03302	0.001334	0.008176	0.059494	0.006082	0.024045	0.017203	0.015427	0.013899	0.02833	0.165147	0.111301	0.021482	-0.06748	-0.0283	-0.16797	0.040746	-0.00947	-0.00815	-0.091	0.007041	-0.00765	-0.00234	0.157816
23	0.001077	0.005034	0.005253	0.005608	0.004251	0.00841	-0.01927	0.006217	0.001611	0.008881	0.006065	-0.00032	0.007044	0.00731	0.019889	0.015314	0.015666	0.014557	0.002914	-0.02749	0.003974	0.00059	0.036945	0.014499	0.000419	-0.00877	0.006762	0.041647	0.000587	0.189667
24	0.029214	0.01498	0.15484	0.07286	0.089882	0.224184	-1.30539	0.147567	0.0186	0.23147	0.089671	-0.26871	0.120204	0.129962	0.083547	0.117597	0.109216	0.186504	-0.06739	-1.62717	-0.15366	-0.23233	0.165187	0.008251	0.015284	-0.13978	0.03322	0.015595	0.022225	-2.16055
25	0.016456	0.046834	0.058244	0.035757	0.02489	0.054015	-0.13972	0.083187	0.009535	0.054309	0.039276	-0.00046	0.048337	0.063362	0.049056	0.051789	0.060651	0.07759	-0.06954	-0.1939	-0.0025	0.00133	0.022246	-0.03279	0.02313	-0.02483	0.032073	-0.0146	0.004881	0.379507
26	0.001079	-0.00042	0.001129	-0.00325	0.00041	0.005225	-0.06795	0.0029	-0.01006	0.005519	0.010146	-0.01156	0.002607	0.002553	-0.0025	-0.00322	-0.00276	0.00205	-0.041	-0.0648	-0.01228	-0.02107	0.000998	-0.01781	0.001617	-0.08226	-0.01813	-0.01245	-0.00437	-0.33966
27	-0.00313	0.003635	-0.00381	-0.03686	0.000317	0.031363	-0.21219	0.010864	-0.04409	-0.01314	-0.05984	-0.02624	0.021585	0.004941	0.00432	-0.02262	-0.04909	-0.06477	-0.09097	-0.25762	-0.04643	-0.05677	9.79E-05	0.008262	-0.00346	-0.0388	0.00632	-0.01043	-0.02644	-0.97497
28	0.023857	0.060703	0.07915	0.067931	0.058621	0.116512	-0.29031	0.087265	0.003643	0.112756	0.064963	-0.02296	0.07688	0.059545	0.066428	0.083757	0.077859	0.108177	-0.06399	-0.28956	-0.00165	-0.10258	0.087877	0.168788	0.00774	-0.10131	0.061946	0.041561	0.028597	0.107751
29	0.041739	0.089688	0.086644	0.117695	0.065805	0.133981	-0.23624	0.10215	0.02909	0.17108	0.190786	-0.00454	0.118947	0.162543	0.100148	0.134861	0.086455	0.116196	-0.0185	-0.28151	0.051025	0.010209	0.017999	0.103242	0.056015	-0.02663	0.075494	0.052937	0.07717	1.778453
SUM	0.231114	0.831366	1.17186	0.736773	0.809387	2.051671	-0.2162	1.053433	-0.96728	0.882465	0.208726	-1.5893	0.950296	1.074842	0.762128	0.688979	0.829807	1.411984	-1.96187	-7.944	-0.57391	-1.48063	1.340704	0.064333	-0.4152	-2.17241	-0.19186	0.091453	0.153885	-12.1683

2006

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.520461387	-0.0558189	0.135757	0.071977	0.170797	-0.14062	0.063982	-0.72689	0.45661	0.148696	0.107755	-0.40652	0.614929	-0.55498	0.021556	0.078252	0.030504	0.03343	-0.01941	-0.02026	0.05941	0.155025	-0.05011	0.106545	-0.01551	-0.004008	-0.03752	-0.02048	-0.07227	1.074981
2	0.06483858	0.35221116	0.134337	0.203919	0.086074	0.304537	0.191702	0.20468	0.260187	0.15233	0.157482	0.215882	0.418982	0.45339	0.09659	0.589123	1.248572	2.407075	0.82886	0.350649	0.207167	0.453614	0.4446	0.131117	0.557699	0.089739	0.213627	0.074207	0.083883	11.780575
3	0.245354013	-0.0023922	0.727236	0.05864	0.018138	0.068872	-0.67227	0.051541	0.072803	-0.03857	-0.07272	-0.09525	0.025487	-4.7E-05	-0.00496	-0.0026	0.003785	0.001591	0.066608	-0.00314	0.014782	-0.00299	-0.01136	0.027017	-0.05153	-0.00983	-0.01774	-0.03148	-0.00282	-0.77569
4	-0.00017179	-0.0013722	0.055973	0.507297	0.002062	-0.00059	0.00279	0.00097	0.000814	-0.00168	-0.0063	-0.01879	-0.00158	-0.00382	-0.00228	-0.00208	0.001839	0.001592	0.008656	-0.00195	0.00204	-0.0005	-0.00517	0.019553	-0.00612	-0.00408	-0.00484	-0.00374	-0.03398	0.521751
5	-0.00048959	-5.128E-06	-0.00026	-1.8E-05	-0.48374	-3.4E-05	-1E-05	-0.00024	2.45E-05	2.87E-05	3.5E-05	-0.00012	2.32E-05	-0.00016	4.11E-06	1.74E-05	6.55E-06	7.05E-06	1.23E-06	8.36E-06	1.63E-05	-1.4E-05	-3.6E-06	2.88E-05	3.32E-06	1.81E-05	8.77E-06	1.69E-05	0.00026	-0.484594
6	0.004275443	-0.0103826	-0.00772	0.29422	0.038384	-0.68211	2.709709	0.102823	-0.06513	0.176649	0.046038	2.862914	-0.2958	0.037546	-0.00028	0.061271	0.041545	-0.01651	0.048512	0.00195	0.013795	0.364942	0.021555	0.011852	0.004203	0.022614	0.000567	0.009826	0.046016	5.5775804
7	0.001818399	0.00040082	0.000546	0.000441	0.000296	0.000794	-0.0536	0.019285	0.002371	0.000521	0.000453	0.000506	-0.00205	0.001043	0.000553	0.000549	0.000475	0.000661	0.00139	0.000468	0.000309	0.000501	0.005826	0.000839	0.001908	0.000664	0.000757	0.000471	0.00181	-0.01183
8	-0.00039249	0.00554995	0.00132	-0.01673	-0.01445	0.009138	-0.01979	-0.03953	1.51906	0.068957	0.323226	-0.02466	0.007499	0.033807	0.005995	0.025654	-0.01633	-0.02299	-0.10522	0.018787	0.0181	0.083248	0.162494	-0.00407	0.020269	0.017167	-0.00103	-0.01468	0.005847	1.7491495
9	0.002453238	0.01914729	0.00716	0.040409	0.00457	0.016871	0.040206	0.025209	0.147795	0.042447	0.048648	0.051303	0.007188	0.017918	0.017634	0.027799	0.022079	0.032323	0.023073	-0.01737	0.018568	0.015821	0.010245	0.009749	0.057359	0.015944	0.012495	0.004058	0.010842	0.720461
10	0.024655728	0.09393484	0.489495	0.061272	0.078793	0.111236	-0.01404	0.108004	0.055805	5.52604	0.546264	0.070233	0.009658	0.147677	0.057165	-0.19005	0.082785	0.031211	0.141023	0.00698	0.070307	0.053957	-0.05523	-0.02654	0.025596	-0.0282	0.021227	0.031848	0.0397	1.9354636
11	0.003996691	-0.0022611	0.000308	0.009737	0.03447	-0.00983	-0.0414	0.001351	-0.00749	0.231267	0.05538	-0.01161	-0.04828	-0.02787	-0.00025	0.004467	-0.00881	-0.01459	-0.05566	-0.00225	0.000528	-0.04999	-0.00574	-0.00046	-0.01136	-0.0479	-0.02922	0.074084	-0.00017	0.0904621
12	0.001878199	0.00111946	0.003599	0.001896	0.001239	0.337147	-1.55302	0.008653	0.220172	0.016567	0.008377	0.049275	0.026815	0.003872	0.001165	0.005966	0.003680	0.003680	0.002357	0.006249	0.001226	0.031691	0.006141	0.001653	0.003918	0.001503	0.001403	0.001027	0.004999	-0.793873
13	0.000181849	0.01093183	-0.00488	-0.00546	0.001279	0.057873	-0.15034	-0.01478	-0.02255	-0.00862	0.015947	0.009183	0.373353	-0.01013	0.008064	0.003178	0.00401	0.001609	0.00834	-0.02849	0.069903	-0.00225	0.01561	-0.00669	-0.07194	-0.00207	-0.02134	0.003662	-0.00024	0.2327867
14	0.202135948	0.01160822	0.094561	0.100409	0.289087	-0.17543	-0.038336	0.370565	0.070448	0.323057	0.642757	-0.10439	-0.53318	0.86437	0.054926	0.519956	0.099125	0.19324	0.12526	-0.00377	0.137907	-0.06863	0.008974	0.011691	0.032783	0.038194	-0.01726	0.025823	0.001608	3.2611093
15	0.10640145	0.52521311	0.168274	0.295178	0.139908	0.659377	0.284497	0.338128	0.329173	0.235748	0.236255	0.307333	0.873156	0.991221	0.856945	0.751474	1.260269	1.249558	1.054798	0.314973	0.293343	0.633409	0.477109	0.112847	1.057753	0.123917	-0.1182	0.128453	0.138256	13.710967
16	0.004687209	0.02786501	0.001979	0.009881	0.006734	0.137678	0.273382	0.004992	-0.00252	0.00113	0.045866	0.391922	0.070743	-0.00989	0.006762	0.111088	-0.00821	-0.00619	0.040501	-0.02378	0.014829	-0.05579	-0.00978	0.000469	0.010667	-0.04122	-0.00622	-0.00143	0.829623	
17	0.008745263	-0.263988	-0.03256	-0.01851	0.023879	0.030702	0.006209	0.021543	-0.32867	0.075503	0.044609	-0.01832	0.093722	0.020807	-0.08453	-0.01461	-0.25459	-1.4901	-0.3303	-0.22276	0.930485	-0.16962	0.14385	0.024941	0.162382	0.047449	-0.13895	-0.01404	0.005851	-1.7265
18	0.029116002	-0.0415497	-0.03369	-0.01724	0.034443	0.043744	-0.00462	0.065342	-0.08786	0.126206	0.57815	-0.02165	0.013406	0.010825	0.002158	0.062536	0.308411	-0.15734	0.449653	-0.13473	0.277947	-0.07391	-0.06131	0.023216	0.1113	0.085439	0.004941	-0.0044	0.004866	1.072476
19	0.00352338	-0.0507241	0.005161	0.008561	0.005166	0.014776	0.002303	0.004319	0.00397	-0.00061	0.009866	0.009311	0.013113	0.006168	-0.01556	-0.00095	0.023341	0.037713	0.050042	0.003799	0.394445	0.012955	0.007021	0.008876	0.061514	0.007437	-0.00256	0.003418	0.005425	0.5849994
20	0.040231923	0.028043	0.037978	0.067062	0.021054	0.060417	0.27786	0.065181	0.068586	0.040249	0.036084	0.036692	0.036826	0.062694	0.067785	0.080957	0.06579	0.098822	0.123252	3.09791	0.885453	0.131696	0.050472	0.035215	0.261899	0.498817	0.167731	0.018414	0.06047	6.5983801
21	-0.00090556	-0.0638711	-0.02351	-0.0128	-0.00537	-0.01745	-0.02425	-0.02617	-0.01767	-0.02109	-0.02386	-0.01683	-0.02861	-0.02564	-0.04471	-0.02465	-0.01894	-0.0112	-0.02464	-0.02041	-0.30648	-0.01433	-0.01784	-0.0224	-0.26914	-0.02956	-0.0379	-0.00924	-0.01465	-3.947242
22	0.003885493	-0.0308043	-0.02167	-0.01987	0.036849	-0.002	-0.1594	0.018197	-0.05411	-0.11814	0.059282	-0.16717	-0.00659	-0.02272	-0.01719	-0.009554	-0.36933	-0.389	-0.11827	-0.05708	0.06683	0.416862	-0.04983	0.001164	0.020883	0.006958	-0.0191	0.000632	0.009105	-0.971769
23	0.00087458	-0.0110826	-0.00783	-0.00558	-0.00061	-0.00418	-0.00533	0.00101	-0.00541	-0.0029	-0.01016	-0.00278	-0.00929	-0.0056	-0.04794	-0.03087	-0.01937	-0.01857	-0.01869	-0.01375	-0.00829	-0.01343	-0.00972	-0.03957	0.003485	-0.00585	-0.03499	-0.12527	-0.0125	-0.554278
24	0.154999604	0.06117308	0.19066	0.48387	0.686689	0.232011	0.389708	1.361316	0.285508	1.779567	0.791319	0.372727	0.515059	0.447763	0.193748	0.167096	0.718539	0.390249	0.745692	0.454526	0.208403	0.806213	0.16314	0.956645	0.295103	0.185684	-0.09124	0.029498	0.079335	15.535515
25	0.041861653	0.0229649	-0.06728	-0.00032	0.041977	-0.02588	-0.02538	-0.07663	0.011451	-0.01939	-0.02859	-0.03501	-0.04978	-0.04066	-0.01039	-0.02021	-0.05398	-0.06745	0.087111	0.014371	0.074451	-0.02277	-0.03002	-0.02094	0.031863	-0.053	-0.09373	0.035065	-0.01435	-4.05133
26	0.02451589	0.07779235	0.045733	0.113156	0.064449	0.065993	0.050919	0.091438	0.028745	0.11298	0.027952	0.04484	0.035488	0.043222	0.049598	0.077249	0.050989	0.063286	0.079194	0.125117	0.151529	0.084035	0.040364	0.079161	0.026263	0.242069	0.057109	0.056019	0.099535	2.107203
27	0.032603679	0.11176334	0.050768	0.123675	0.09745	0.029218	0.238151	0.068708	0.06854	0.140374	0.175722	0.12087	-0.00805	0.077546	0.072432	0.153557	0.191438	0.229221	0.146851	0.111956	0.090758	0.098328	0.070779	-0.01732	0.037946	0.035701	0.248586	0.04897	0.10282	2.9616956
28	0.079774305	-0.0218027	-0.01015	0.064827	0.084024	0.015584	0.003822	0.123109	0.173477	0.041224	0.020628	-0.00809	-0.01231	-0.03453	0.000212	0.023813	-0.04209	0.063194	0.004611	-0.05223	-0.30453	0.070371	-0.05223	-0.30453	0.222788	0.253987	-0.10007	0.619374	0.15926	1.698233
29	-0.02756848	-0.0850926	-0.08781	-0.11531	0.038761	-0.1157	-0.12987	-0.03178	-0.03309	-0.16887	-0.31583	-0.04514	-0.13619	-0.22392	-0.11265	-0.15604	-0.02018	-0.03548	-0.03638	-0.12902	0.027281	-0.08288	-0.30994	-0.24635	-0.04647	-0.12812	-0.25646	-0.08818	-0.11093	-3.227701
SUM	1.56751032	0.79553254	1.057828	2.033095	2.942341	1.23113	1.640553	2.134158	3.099024	2.938068	2.787986	2.755396	1.934268	2.76051	1.904956	2.519422	3.357186	2.582288	3.365595	3.845379	2.910414	2.855277	0.789927	0.871015	2.502818	1.365887	-0.34202	0.874492	0.596609	59.161525

Appendix 6
First Round Effects of Changes in Linkage Intensities Weighted by Global Intensity, Philippines
 1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.00344	-0.0034	-0.0099	0.0049	0.00189	0.00371	-0.0021	0.01883	0.02234	0.00129	9.4E-05	-0.0024	0.0077	-0.0278	-0.0019	-0.0019	0.00052	-0.0007	-0.0004	-0.0009	-2E-05	0.0077	-8E-05	-0.0011	-0.0004	-0.0007	-0.0001	-0.0006	-0.0017	0.016261
2	0.00164	0.00634	0.00302	0.00368	0.00218	0.00473	0.00936	0.00427	0.00432	0.00868	0.00454	0.0041	0.00553	0.00477	0.01124	0.00787	0.02824	0.01228	0.00904	0.0054	0.00334	0.00321	0.00552	0.00235	0.01255	0.00201	0.03307	0.0006	0.00164	0.199768
3	0.00669	0.00051	0.01144	0.02195	0.00075	0.00323	0.00055	0.00272	0.00199	0.00037	0.00844	0.00344	0.01472	0.00049	0.00076	0.00036	0.0004	0.00037	0.00101	0.00038	0.00258	0.00052	-0.0005	-0.0002	-4E-05	3.2E-05	2.7E-05	0.0323	0.085229	
4	-0.0001	-0.0002	-0.0002	0.00404	-2E-05	-0.0002	-0.0002	-0.0002	-8E-05	-0.0003	-0.0005	-0.0001	-0.0001	-0.0003	-0.0002	-0.0002	-0.0001	-0.0002	-0.0002	-0.0002	-0.0002	-0.0001	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0003	-0.0024	-0.00395
5	-2E-05	-7E-07	-9E-06	-8E-07	0.0352	-5E-07	-1E-06	-3E-06	1.4E-06	-3E-07	-3E-07	-2E-06	-9E-07	-7E-06	-5E-07	-6E-07	-3E-07	-4E-07	-4E-07	-5E-07	-2E-07	-6E-07	-7E-07	-3E-07	-4E-07	-2E-07	-2E-07	-2E-07	-1E-06	0.035149
6	-0.001	-0.001	-0.0011	2.4E-05	0.00018	-0.0247	0.0077	0.00029	0.00447	0.00331	-0.0027	-0.0039	-0.0048	-0.0002	-0.0005	1.1E-05	-6E-05	-0.0022	-0.0003	-0.0003	-1E-04	0.00415	-0.0003	-0.0005	-0.0007	-0.0002	-0.0002	0.00013	0.00056	-0.02392
7	2.3E-07	-5E-07	-2E-07	6.3E-08	-5E-07	0.00609	-1E-07	2.1E-07	-4E-07	-2E-07	-2E-06	-1E-04	-2E-06	-1E-04	-4E-07	-1E-07	-5E-07	6.8E-08	-3E-06	-1E-06	-2E-07	1.7E-07	-4E-07	-5E-06	-3E-07	-1E-06	2.2E-07	5.8E-06	0.005982	
8	-0.0001	-0.0007	-0.0002	-0.0012	-0.0008	-0.0004	-0.0008	-0.0004	0.0505	-0.0008	-9E-05	-0.0016	-0.0001	-6E-05	-0.0004	-0.0012	-0.0011	-0.0016	-0.005	0.00119	-0.0001	-0.0006	0.00302	-0.0002	-6E-05	1.5E-05	-6E-05	0.00025	2.1E-05	0.037315
9	3.1E-05	-1E-05	1.6E-05	2.5E-05	3.5E-06	4.1E-05	8.3E-05	0.00015	-0.0002	2.1E-06	-9E-06	3.9E-05	6.7E-06	6.4E-07	-1E-05	0.00048	-1E-06	1.4E-05	3.6E-05	-0.0013	-4E-06	-2E-05	0.00023	1.5E-05	-3E-05	-0.0001	-5E-06	-0.0001	-3E-05	-0.00069
10	0.00082	-0.0005	0.00056	-0.0019	0.0097	0.00076	-0.0005	-0.001	0.00054	0.01017	0.03429	-0.0003	-0.0006	-0.0014	-0.0004	-0.005	-0.0007	-0.0009	0.00017	-0.001	1.4E-05	-0.0013	-0.0013	0.00048	0.0002	0.00206	-0.0006	0.00053	0.00087	0.043785
11	5.1E-05	-0.0003	-0.0003	-0.0007	-0.0005	-0.0004	-0.0012	-0.0004	-0.0004	-0.0005	-0.0002	-0.0004	-0.0012	-0.0003	-0.0006	-0.0006	-0.0006	-0.0007	-0.0005	-0.0001	-0.0004	-0.002	-0.0002	2.4E-05	-0.0002	-0.0003	-0.0001	0.00035	-0.001	-0.01511
12	4.8E-06	-2E-05	7.3E-06	2.2E-06	3E-06	0.00088	-0.0097	6.4E-05	0.00014	1.3E-06	0.00013	0.0169	0.00016	3.6E-06	-8E-06	-7E-07	-8E-06	1.6E-06	-1E-05	7.4E-06	1.5E-05	-3E-05	3.1E-06	2.4E-06	1.1E-05	2.7E-06	6.1E-06	9.7E-07	-1E-06	0.008584
13	-5E-05	-0.0003	-0.0003	-0.0003	-8E-05	-0.0004	-0.0059	-0.0009	0.00155	-0.0003	-0.0002	-0.0012	0.0052	-0.0005	-0.0004	-0.0001	-0.0003	-0.0004	0.00113	-0.0027	0.00275	-0.0002	0.00028	-0.0003	-0.0016	-0.0004	-0.001	-3E-05	-6E-05	-0.00691
14	0.00896	-0.0032	0.00114	-0.0046	0.00071	0.0056	0.00364	0.0049	0.00291	0.00804	0.01022	0.00245	0.02174	0.02311	-0.0015	-0.0003	0.0063	0.00369	0.00582	0.00167	0.00245	0.03832	0.00304	-0.0004	0.00126	0.0005	0.00253	-0.0004	0.00048	0.14913
15	0.00291	0.01145	0.00685	0.00804	0.00429	0.00907	0.00727	0.00786	0.00589	0.01753	0.00868	0.00859	0.01075	0.01021	0.00018	0.02234	0.01173	0.01138	0.00933	0.01044	0.00554	0.00731	0.00644	0.00475	0.02454	0.00397	0.06469	0.00087	0.00333	0.306212
16	0.00011	-0.0004	-0.0006	-0.0025	2.4E-05	4.6E-05	-0.0002	-0.0001	5.2E-05	-0.0003	-8E-05	-0.0004	3.4E-05	-0.0002	-0.0005	-0.0002	-0.0006	-0.0006	-0.0006	-0.0017	-0.0004	-0.0041	-0.003	-0.0004	-0.0001	-0.0002	-0.0001	-0.0003	-0.0006	0.01984
17	0.00021	-0.0021	0.00133	0.00124	0.0004	0.00067	0.00058	0.00177	-0.0011	0.00224	0.00106	0.00035	0.00119	0.00127	-0.0007	0.00162	0.04597	0.0383	0.02962	0.01354	0.02172	-0.0013	0.00856	0.00018	0.00018	0.00077	-0.0011	-0.0003	0.00004	0.16827
18	0.00012	-0.0053	-0.0009	-1E-05	0.00021	0.00027	-0.0004	-0.0002	-0.0032	0.00224	0.00028	-0.0015	0.00127	0.00047	-0.0038	-0.0013	-0.0068	-0.0018	-0.0135	0.0101	0.00046	-0.0022	-0.0036	-9E-05	4.3E-05	0.00037	-9E-05	-0.0002	-0.02883	
19	0.00013	-0.0014	4E-05	0.00033	6E-05	5.3E-05	-0.0001	0.00017	-0.0002	0.00068	0.00039	5E-05	3.8E-05	2.4E-05	-0.0007	-5E-05	0.00028	3.7E-05	0.00224	3.5E-05	0.00035	-4E-05	0.00032	8.4E-05	0.00014	2E-05	0.00019	4.7E-05	5.2E-06	0.003236
20	3.5E-06	-0.0005	-7E-05	-7E-05	-2E-05	-4E-05	-0.0001	-0.0001	-1E-04	0.00026	-4E-05	-0.0001	2.5E-05	-0.0002	-0.0003	-0.0002	-0.0001	0.00065	0.00265	0.00596	-0.009	-0.015	-0.0006	-0.0002	-0.0004	-0.0037	0.00067	-0.0001	-0.0002	0.000559
21	-6E-05	-0.0018	-0.0002	0.0012	0.00041	-0.0002	-0.0004	-0.0003	-0.0002	0.00114	-0.0001	-8E-05	-0.0003	-0.0003	-0.0012	-0.0003	-0.0002	-0.0003	-0.0004	0.00025	-0.0337	2.9E-05	-2E-05	-0.0006	-0.0007	-0.0005	-0.0004	-0.0003	-4E-05	0.03948
22	0.00011	-0.0005	-0.0007	-0.0009	0.00011	0.00389	0.0108	9.5E-05	-0.0017	-0.0046	0.00039	-0.0046	0.00091	-0.0003	-0.0006	-0.0011	-0.0129	-0.0064	-0.0031	9.1E-05	0.0015	0.00116	-0.0017	-7E-05	2.3E-05	-0.0001	-0.0006	3.3E-05	-6E-06	-0.03044
23	2.5E-05	0.00078	-5E-05	-6E-05	4.1E-05	-0.0002	-0.0001	-8E-05	-0.0002	0.00047	3E-05	1.3E-05	-0.0002	-3E-05	-0.0014	-0.0006	-0.0003	-0.0003	-0.0006	4.1E-05	-0.0005	-0.0004	-0.0027	-0.0009	3.2E-05	-0.0002	-0.0002	-0.0042	0.00101	-0.01072
24	0.00587	-0.002	0.00579	0.00844	0.01694	0.00437	0.01249	0.0081	0.01107	0.00091	0.00452	0.02045	0.01163	0.01262	0.0061	0.00356	0.00233	0.00151	0.00496	0.00697	-0.0032	0.00922	-0.0014	0.00013	0.00947	0.00168	0.00638	0.00023	0.0007	0.169853
25	0.00013	-0.0002	0.00008	0.00105	0.00125	0.00139	0.00053	-0.0028	0.00135	0.00285	-0.0012	0.00055	0.00331	0.0003	-0.0004	0.00135	1.3E-05	-0.0009	0.00298	0.00212	0.00392	0.00294	7.8E-05	-0.00039	0.00116	-0.0038	-0.0011	-0.0007	0.000978	
26	-1E-05	-0.0002	-0.0001	1.4E-05	5E-05	-5E-05	-0.0005	-0.0001	1.6E-05	-0.0007	-0.0001	0.00029	-9E-05	-4E-05	-0.0002	-7E-05	-1E-04	-5E-05	0.00025	0.00054	-0.0004	0.00048	-0.0002	-0.0003	0.00001	-0.0002	0.00001	0.00071	0.0005	6.3E-05
27	0.00047	-0.0011	0.001	0.00116	0.00122	-0.0001	-0.0002	0.00046	-0.0006	0.00849	0.00424	0.00168	0.0003	0.00223	0.00024	-0.0009	0.00123	0.00121	0.00061	0.00253	0.0006	0.00187	0.00063	0.00212	-0.0002	-0.0002	-0.0198	0.00144	0.00218	0.012924
28	0.00022	-0.0019	-0.0013	8.3E-05	0.00135	-0.0011	-0.0007	-0.0007	0.00107	0.0002	0.00164	0.00162	0.002	0.00251	-0.0022	-0.0015	-6E-05	-0.0005	0.00082	0.00451	-0.004	0.00287	-0.0009	-0.0111	0.00065	0.00196	-0.0024	-0.002	0.02499	0.016177
29	-0.0016	-0.0032	-0.0028	-0.0018	0.00302	-0.0033	-0.005	-0.0024	0.00012	-0.0069	-0.0113	-0.0013	-0.0011	-0.0043	-0.0014	-0.0013	-0.0016	-0.0023	-0.0025	-0.0011	-0.0033	0.00052	-0.0067	-0.0074	-0.0037	-0.0052	-0.0072	-0.0052	-0.0033	-0.09351
SUM	0.02983	-0.0128	0.01172	0.04207	0.07868	0.00765	0.01531	0.04005	0.10054	0.05312	0.05351	0.04765	0.06662	0.03591	-0.0007	0.02015	0.07136	0.04966	0.0428	0.05705	-0.0042	0.06867	0.00592	-0.0318	0.04298	0.00451	0.06986	-0.0099	0.02997	1

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.0020731	0.0015501	0.0037765	0.0053387	0.0054195	0.004993	0.003223	0.0019575	-0.001165	0.0016807	0.001679	0.0010769	0.0052234	0.0023639	0.0014497	0.00050538	0.0014652	0.0019559	0.00207	0.0017823	0.001442	0.0037893	0.0029446	0.000608	0.0016026	0.0007239	-0.000406	0.0006619	0.0037543	0.003341
2	0.0002616	-1.39E-05	0.0008296	0.0001536	0.0003337	0.0013867	-0.000657	0.0011968	0.0003022	0.0021408	0.0007238	0.0008457	0.0010974	0.0015892	0.0071628	0.0006147	-0.001185	0.0009421	0.0010405	0.0011835	0.0007089	0.0002456	0.002374	0.0002709	0.0004299	-0.000113	0.0023811	0.0001844	4.152E-05	0.0032302
3	0.0005719	0.0003333	0.0039774	0.0037446	0.0007985	0.0006736	0.0008644	0.000133	0.0010862	0.0008496	0.0019539	0.0005231	0.0006318	0.0005221	0.0005555	0.0005221	0.0005555	0.0005221	0.0005555	0.0005221	0.0005555	0.0005221	0.0005555	0.0004807	0.0010272	0.0004214	0.0004884	0.0004603	0.002644	0.0021282
4	4.681E-05	7.55E-05	7.172E-05	0.0002003	3.168E-05	0.0001089	2.708E-05	9.176E-05	5.822E-05	0.0001566	0.0001811	7.991E-05	0.0001937	0.0001561	9.886E-05	0.0001148	0.0001087	0.0001561	9.886E-05	0.0001148	0.0001087	0.0001561	9.886E-05	0.0001148	0.0001087	0.0001561	9.886E-05	0.0001148	0.0001087	0.0001561
5	5.846E-06	-6.28E-08	4.633E-06	5.301E-07	0.0073962	4.987E-07	2.544E-07	2.65E-06	-3.58E-08	-3.58E-08	-3.58E-08	7.491E-07	1.691E-06	1.95E-06	-1.53E-07	-2.07E-07	-9.45E-08	-6.61E-08	-5.02E-08	-2.82E-07	-2.01E-07	4.949E-07	-9.4E-08	-4.44E-07	-1.86E-07	-4.7E-07	-4.92E-07	-7.25E-07	6.89E-06	0.007404
6	0.0004042	0.0003621	0.0008294	0.0002344	0.0001549	0.0028278	-0.066086	0.0035671	0.0002833	0.0005188	0.0004561	0.0024208	0.0074787	0.000794	0.0003198	0.0002612	0.0001552	0.0001095	0.0003551	-4.77E-05	0.000437	-0.001383	0.0003492	0.0002018	0.0004526	0.0001238	0.0003872	-5.68E-05	-0.00011	-0.002675
7	-7.59E-06	-2.2E-05	-3.31E-05	-2.61E-05	-3.75E-05	-0.000423	-3.6E-05	-2.78E-05	-4.37E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05	-3.67E-05
8	9.614E-05	6.511E-05	0.0001805	0.000471	0.0004223	0.0002823	0.0002691	0.0015446	0.0006172	0.000627	0.0002453	0.000589	0.0001466	0.0001617	0.0002957	0.0005624	0.0005705	0.0007808	0.0071787	0.0004476	0.0002738	0.0004742	0.0019354	3.78E-05	0.0001228	6.214E-05	0.0001212	0.000348	5.114E-05	0.01346
9	2.896E-06	7.833E-06	7.51E-06	1.106E-05	5.045E-06	1.1E-05	-5.06E-06	7.406E-06	-0.00026	1.274E-05	9.127E-06	3.049E-06	7.172E-05	1.063E-05	1.424E-05	1.432E-05	0.0006735	1.397E-05	1.289E-05	3.806E-05	1.362E-05	2.026E-05	3.244E-05	1.307E-05	4.077E-05	5.741E-06	0.0007758			0.0007758
10	0.0007701	0.0005678	0.0008236	0.0018565	0.0015191	0.0011077	0.0011565	0.0007691	0.00186316	0.00075701	0.001405	0.0017542	0.0030021	0.000641	0.0042773	0.0012322	0.0015167	0.0011808	0.0007773	0.000802	0.0031946	0.00018359	0.0009472	0.0006692	0.0010694	0.0009164	0.0004907	0.0005619	0.00061214	
11	6.295E-05	0.0001804	0.000259	0.0004203	-5.98E-05	0.0004563	0.0001948	0.0002763	0.0002907	0.0006889	0.0003452	0.0004537	0.0008119	0.000539	0.0001231	0.0003436	0.000396	0.000485	0.0004088	0.0002318	0.0003397	0.0008972	0.0003354	0.0002382	0.0002779	0.0005262	0.0004231	0.000208	0.000242	0.006287
12	-2.9E-06	7.65E-08	-1.19E-05	-9.17E-06	-7.57E-06	-2.41E-05	0.0137028	-1.5E-05	-0.000103	-1.39E-05	-2.9E-06	-0.000813	-0.000105	-2.06E-05	8.47E-07	-1.02E-05	-1.28E-05	-1.17E-05	-9.74E-06	-1.52E-05	-2.57E-05	-5.07E-06	-1.14E-05	-0.000106	-1.02E-05	-5.16E-06	-8.06E-06	-4.32E-06	-3.02E-05	0.0122081
13	8.675E-05	0.0002195	0.0002301	0.000252	0.001394	0.0003574	0.0017925	0.0035962	0.0004697	0.0003761	0.0002443	0.0006628	0.0002601	0.0003547	0.0003382	0.0002523	0.0002946	0.003782	0.0005531	0.0008956	0.0018504	-8.1E-05	0.0002477	0.0010202	0.0001612	0.0004333	5.017E-05	7.237E-05	0.0124535	
14	0.0009681	0.0021108	0.003073	0.0036517	0.0016573	0.0086153	-0.004135	0.002814	0.0034209	0.002877	0.0018601	0.0064301	0.0009004	0.009483	0.001882	0.0035309	0.002442	0.0033869	0.0022901	0.0025206	0.002414	0.007185	0.0031231	0.0007272	0.002794	0.0007776	0.0014987	0.0006225	0.000925	0.086893
15	8.95E-05	0.0011481	0.0006223	0.0005248	0.0002619	0.0038054	-0.007759	0.0010488	0.0002674	0.0029276	0.006214	0.00057	0.0007198	0.0011948	0.001338	0.0021234	0.002726	0.002951	0.0028811	0.0009321	0.0008767	0.000862	0.0019164	0.0001215	-0.001359	-0.00063	-0.000296	2.949E-05	6.00393	0.023833
16	5.89E-05	0.0001395	0.0002702	0.0021469	6.88E-05	0.0002423	4.116E-05	0.0001757	7.202E-05	0.0002909	0.0001772	0.0003392	0.0002494	0.0004018	0.0002631	0.0017274	0.0004301	0.0004604	0.0004312	0.0006549	0.0003401	0.0012755	0.0036175	0.0002305	0.0001409	9.772E-05	0.0005888	0.0002777	0.000294	0.0154865
17	0.0002332	0.0047675	0.000889	0.0006445	0.0001634	0.0006889	0.0003758	0.0005772	0.0048041	0.0006567	0.000443	0.0010553	0.0006544	0.0001061	0.0042546	0.0023319	0.019147	0.0207642	0.0174436	0.0028076	0.0019417	0.003949	0.0082707	3.59E-05	0.0006678	0.0003022	0.0026822	0.000569	-0.000217	0.008249
18	0.0001801	0.002298	0.0010668	0.0002788	0.0007738	0.0005606	0.000731	0.0003547	0.0013822	0.0007649	0.0006404	0.0013781	0.000686	0.0011224	0.0023821	0.001457	0.0045177	0.01183	0.0009538	0.0048535	0.0013965	0.0033641	0.0051075	0.000203	0.0005307	0.000425	0.0001533	0.0002891	0.0002184	0.056604
19	-6.45E-06	0.000568	7.59E-05	6.62E-05	2.345E-05	0.0001141	1.424E-05	-4.76E-05	0.0001067	6.78E-05	8.86E-05	8E-05	0.0001097	0.0001073	0.0005813	0.0002228	4.782E-05	0.0001278	0.0012691	5.931E-05	6.713E-05	6.932E-05	7.74E-05	8.209E-06	-6.21E-05	-7.62E-06	0.0001548	1.45E-05	5.81E-05	0.003929
20	3.178E-05	1.819E-05	6.574E-05	8.205E-05	3.345E-05	0.0001297	-6.19E-05	2.453E-05	6.775E-05	0.000745	4.157E-05	0.0001303	1.577E-05	0.0001435	0.0001261	4.817E-05	0.000154	0.0002489	0.0001125	-0.004911	0.0003987	0.0004486	0.0007542	8.255E-05	0.00044	-0.000114	6.32E-05	5.158E-05	-4.22E-05	-0.001556
21	0.0001084	0.000791	0.0002818	0.0002004	0.0001445	0.0003167	8.45E-06	0.0002345	0.0002374	0.0005332	0.000309	0.0002815	0.00037	0.000377	0.0006631	0.0004029	0.0003752	0.0004349	0.0005121	0.0003837	0.0277684	0.0002084	0.0003688	0.0002012	0.0015144	0.0001934	-5.74E-05	8.78E-05	0.000211	0.036887
22	7.944E-05	0.0007282	0.0004626	0.0005442	0.0001872	0.0006372	0.0014882	0.000211	0.0006647	0.00020495	0.0006589	0.0022167	0.0005552	0.0007931	0.0008424	0.0013328	0.0053368	0.0040643	0.0027892	0.000947	0.0004228	0.000557	0.0014974	8.831E-05	0.0001582	3.462E-05	0.0004386	9.087E-05	6.595E-05	0.029922
23	1.946E-05	-5.83E-05	0.0001076	0.0001123	8.808E-05	0.0001612	-0.000166	0.0003322	5.348E-05	0.000198	7.506E-05	0.0001518	0.0002165	0.0002033	0.0004994	0.0004153	0.0003756	0.000425	0.0004803	0.0001956	0.0003943	0.0001728	0.0011114	0.0003523	8.849E-05	3.878E-06	-7.11E-05	0.000531	-5.34E-06	0.00623
24	0.0008948	0.0032919	0.0048361	0.0035922	0.0005922	0.002562	0.0073861	-0.00311	0.0051331	0.0028253	0.0007215	0.0003805	0.005603	0.0004071	0.0004974	0.0034771	0.0079656	0.0092667	0.0077051	0.0037472	0.008464	0.0043325	0.0066756	0.0008621	0.0002463	0.00010589	0.0031429	0.0009495	0.0011773	0.192861
25	0.0004045	0.001247	0.001657	0.0010106	0.0006937	0.0018313	-0.002733	0.0021686	0.000401	0.0021469	0.001477	0.0016207	0.0019377	0.0026752	0.001677	0.0018189	0.0022238	0.002473	0.0025187	0.0013361	0.0015101	0.0013873	0.0019085	0.0007213	0.0007302	0.0009094	0.0015881	0.0003436	0.0004935	0.0176271
26	8.451E-05	0.0001866	0.0002395	0.0001744	0.0001495	0.0003894	-0.000293	0.0002621	0.0001844	0.0006529	0.000331	0.0002228	0.0003135	0.000179	0.0002403	0.0002983	0.0003624	0.0004312	0.0003625	0.0001757	0.00044	0.0001527	0.0002931	0.0002449	0.00025	-0.000934	0.0003142	0.0002366	6.144E-05	0.00644
27	6.45E-05	0.0006678	0.0001445	6.59E-05	0.0001196	0.0015913	-0.003424	0.0005683	0.0004123	0.0014459	0.0001443	0.0005827	0.000645	0.0007951	0.0011897	0.0013618	0.00014731	0.0004893	0.0005077	0.0007533	0.0004381	0.0008056	0.0002604	0.0002562	-0.001	0.0055765	-2.43E-05	-0.000412	0.0174883	
28	0.000108	0.0018916	0.0025238	0.0002395	0.0015949	0.0036991	-0.001865	0.002767	0.0018912	0.0042366	0.0002794	0.0027031	0.0026031	0.0035283	0.0026133	0.0037022	0.0044436	0.0038703	0.0001956	0.0003943	0.0001728	0.0011114	0.0003523	8.849E-05	3.878E-06	-7.11E-05	0.000531	-5.34E-06	0.00623	
29	0.0012761	0.0022413	0.0026526	0.003562	0.00174	0.004203	-0.000668	0.00038027	0.001916	0.0001	0.0057343	0.0029416	0.0018127	0.0035937	0.0033928	0.0045011	0.0036132	0.0041293	0.0040548	0.003986										

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.0056617	-0.005616	0.0026159	-0.0029925	-0.0020809	0.0046501	-0.003583	0.0004321	0.0065756	0.0039687	0.0007412	-0.005142	0.005338	-0.010611	0.00669	-0.000487	-8.02E-05	-0.000244	1.048E-05	0.0002285	0.0008925	-0.002938	-0.001738	0.0008677	0.0003883	-8.72E-05	-0.000198	-0.000358	0.000449	0.0008373
2	0.0020167	0.0065183	0.0024735	0.0020207	0.00265	0.0023908	0.0032749	0.0040277	0.0041143	0.0035317	0.0023797	0.0032397	0.0034086	0.0035514	0.0079809	0.0035514	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653	0.0019653
3	0.002628	0.0002906	-0.0004	0.0016577	-2.83E-05	0.0012107	-0.009161	0.0006657	0.0009006	0.000594	2.623E-05	-0.010943	0.0014669	0.0004469	0.0002857	8.606E-05	7.11E-05	0.0002721	0.00014	0.0002955	0.0002925	5.991E-05	-0.000149	-6.9E-05	-0.000149	-6.9E-05	-0.000149	-6.9E-05	-0.000149	-6.9E-05
4	-3.97E-05	3.35E-05	-5.82E-05	-0.0008717	-2.4E-05	-5.7E-05	-8.33E-05	-7.24E-05	-3.65E-05	-0.00014	0.0001917	-4.73E-05	-8.52E-05	-0.000136	-4.78E-05	-0.000104	-4.74E-05	-7.1E-05	-5.59E-05	-0.000107	-7.08E-05	-7.53E-05	-0.000119	-8.86E-05	-0.000153	-0.0001	-0.000119	-0.000123	-0.000098	-0.000467
5	-7.08E-06	7.532E-07	-3.18E-06	0.0004002	1.017E-06	2.870E-07	-1.67E-06	8.842E-07	2.08E-06	2.355E-06	-9.44E-07	8.783E-07	1.31E-06	1.022E-06	1.267E-06	8.137E-07	8.798E-07	8.798E-07	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06	1.473E-06
6	6.759E-05	0.0004348	-0.00025	0.0001583	0.0001311	0.007997	0.0043856	0.0009627	0.0057538	0.0004609	0.00010436	0.0008765	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876	0.0003876
7	1.203E-05	7.242E-05	2.339E-05	2.339E-05	1.425E-05	0.0010125	0.0110488	2.601E-05	4.678E-05	3.641E-05	4.948E-05	0.000114	0.0005473	2.944E-05	1.944E-05	2.869E-05	2.795E-05	3.627E-05	3.76E-05	4.393E-05	3.58E-05	3.083E-05	0.0001158	4.237E-05	2.048E-05	2.444E-05	1.729E-05	0.000181	0.0037078	0.0013708
8	6.632E-05	0.0003814	4.007E-05	-0.000514	-0.000272	-9.46E-05	-0.000426	0.007603	0.0054861	-0.000451	8.655E-05	-0.000411	5.5E-05	0.0001918	0.0001947	-0.000261	-0.000446	-0.000521	-0.000431	0.0007389	2.855E-05	-0.000195	-0.000964	-7.5E-05	6.862E-05	5.822E-05	4.772E-05	-0.00037	7.82E-06	0.0096184
9	2.603E-06	3.373E-06	-3.07E-06	1.081E-06	1.314E-05	2.603E-06	0.0007765	0.0010678	3.32E-06	4.766E-07	5.452E-06	5.408E-06	3.938E-06	1.72E-05	-5.71E-05	5.303E-06	3.308E-06	0.0001505	-0.000913	2.985E-05	2.078E-05	-2.29E-05	1.151E-06	-9.97E-06	-3.72E-05	-2.53E-06	-6.34E-05	1.848E-05	0.0005233	0.0005233
10	0.004028	0.001908	0.006522	0.007408	0.004061	0.001356	-0.000146	0.0005538	0.000867	0.001811	0.0007121	0.0001773	0.0010552	0.0009	0.004992	0.0002362	0.000736	0.001266	0.001764	0.000694	0.0007337	0.000307	0.0004164	0.000554	0.0004158	0.000393	0.000393	0.001696	0.011846	0.011846
11	5.444E-05	8.71E-06	-0.000119	-0.000344	-0.000648	-9.66E-05	-0.000758	-6.97E-05	-0.000141	-0.000438	3.823E-05	-0.000235	-0.000984	-0.0006136	-4.35E-05	-0.000198	-0.000184	-0.000128	6.771E-05	6.64E-05	-0.001105	-8.84E-05	-7.28E-05	-0.00013	-0.000917	-0.000393	7.57E-05	0.000537	-0.000524	0.000524
12	1.158E-05	1.87E-05	2.438E-05	2.452E-05	1.594E-05	0.0007248	-0.012945	0.0002378	0.0016725	4.225E-05	0.0292788	0.0023567	3.895E-05	2.047E-05	3.388E-05	5.638E-05	4.908E-05	0.0002088	0.0001151	7.995E-05	0.0003753	3.91E-05	5.58E-05	0.0001087	2.21E-05	3.78E-05	1.498E-05	0.0001022	0.022844	0.022844
13	4.69E-05	0.0001148	1.96E-05	1.03E-05	7.505E-05	0.0001063	-0.002651	-2.15E-05	-0.00019	0.0002364	0.0001551	0.0001496	0.0026766	2.803E-05	0.0001233	0.0001917	0.0001948	8.243E-05	-5.3E-05	-0.000808	0.007565	0.0013188	0.001266	0.0003294	0.001269	8.292E-05	-0.000281	0.000477	0.0003516	0.011994
14	0.002307	0.0005492	-0.000403	-0.00088	0.0006108	0.003868	-0.000215	0.005819	0.0003297	0.0018931	0.0027085	-0.001244	-0.00249	0.0008717	0.0052988	-0.00029	0.0004605	0.0004726	0.0010649	0.0019683	0.0017098	-0.004918	-0.000356	0.0003991	0.001377	-2.65E-05	-0.0008314	-0.000105	0.0016461	0.025962
15	0.0039708	0.0100989	0.0050491	0.0070132	0.0040455	0.0048238	0.0045551	0.0064539	0.0047743	0.0083468	0.007541	0.0042427	0.0068402	0.0065106	0.0133919	0.0208496	0.0098949	0.0086641	0.005399	0.0045628	0.005378	0.0070829	0.0062471	0.0275236	0.0036024	0.0343735	0.0016746	0.0050691	0.241952	
16	5.143E-05	0.0001177	-0.000145	-0.002014	6.825E-05	0.0001249	-0.000108	-1.94E-05	-0.000136	-7.99E-05	5.648E-05	-0.000124	4.606E-05	0.0005536	7.688E-05	0.0038404	-0.000263	0.0001167	5.671E-05	-0.00043	0.0003183	-0.001382	0.0021159	-1.47E-05	6.196E-05	1.024E-05	-0.00069	0.0003995	-6.04E-05	0.0023737
17	0.003568	-0.003125	0.0005109	0.002772	0.000484	0.0006125	0.000249	0.0010661	-0.004692	0.0011882	0.0012088	0.0004559	0.0007852	0.0014619	-0.00089	0.0002176	0.0045539	0.0233742	-0.003373	0.0094509	0.0014569	0.0034668	-0.002113	0.0004859	0.0019655	0.0009165	-0.000592	5.028E-05	0.0008849	0.059975
18	0.003617	-0.001936	-0.000241	0.0004485	0.0002417	0.0003023	-0.000892	0.0013996	-0.001729	0.0010386	0.0002291	-0.000849	0.0002199	0.0002983	-0.000152	-0.000117	-0.002512	-0.012947	-0.005428	-0.003937	0.0004994	-0.003447	-0.002832	0.0003341	0.0001635	0.0003138	0.000157	0.0007466	-0.025831	
19	0.002323	0.0013025	0.002364	0.0002101	0.000222	0.0003247	0.0001542	0.001551	0.0012011	0.0003358	0.000165	0.0001904	0.000268	0.0009641	0.000782	0.0005383	0.0008446	0.0015697	0.0025756	0.0010719	0.0004416	0.0004498	0.0004928	0.0003554	0.0012729	0.0003447	0.000754	0.0001233	0.0003979	0.0398685
20	0.002132	0.0026011	0.0002838	0.0002771	0.0001472	0.0005498	0.0002041	0.0003744	0.0002709	0.0003553	0.0002947	0.000491	0.0003324	0.0013889	0.0004821	0.000515	0.0039539	0.0287739	0.0032097	0.0005144	-0.000104	0.000427	0.001895	0.0012119	0.0008615	0.0002066	0.0002454	0.0050807	0.050807	
21	0.0002583	0.0008411	0.0003778	0.0004692	0.0002395	0.0004308	0.0003619	0.0005192	0.000449	0.0005444	0.0003776	0.0003386	0.0004708	0.0008191	0.0006811	0.001499	0.000884	0.0005917	0.0005387	0.038951	0.0011574	0.0006166	0.0012692	0.0039473	0.0004077	0.0002514	0.001424	0.056935	0.056935	
22	4.202E-05	-0.000619	-0.000372	-0.000236	0.000363	-0.000268	-0.002184	1.432E-05	-0.001103	-0.0016	0.0005454	-0.001072	-7.33E-05	-0.000474	-0.000291	-0.001315	-0.006542	-0.002634	-0.002334	-0.000296	0.0008378	0.005965	-0.001245	7.186E-05	0.0002357	0.0003957	-0.000245	5.05E-05	0.0004133	-0.015041
23	0.0001842	0.0001658	0.0001969	0.0001449	0.0002951	0.0001774	0.0002764	0.0002606	0.0002443	0.0001889	0.0001868	7.253E-05	0.0002078	0.0003112	0.0001246	-0.000129	2.917E-05	-4.4E-05	0.000147	9.043E-06	-1.4E-05	-0.000613	-5.99E-05	0.0004703	0.0003553	0.0003191	0.000727	0.0003884	0.0062873	0.0062873
24	0.0007978	-0.001637	-0.003283	0.0006576	0.0009294	-0.000668	0.0008899	-0.00058	0.000367	0.0006445	0.0017564	0.002392	0.0021907	0.0011063	0.0050483	-0.001579	-0.000492	0.0002118	0.0020913	0.0023311	0.000898	0.001306	-0.004003	0.0003337	0.0023836	0.0001456	0.0008635	-0.000108	0.0009708	0.0161356
25	0.004221	0.004414	0.003248	0.0021498	0.0015489	0.0023641	0.0012104	0.0022557	0.0023806	0.00181873	0.001396	0.0018763	0.0019489	0.0011708	0.0038388	0.0014728	0.000428	0.0007426	0.0008487	0.0014209	0.0023459	0.0018227	0.0023992	0.0005974	0.001288	0.0006894	7.417E-06	0.0014988	0.001391	0.0516899
26	0.0001803	0.000275	0.0003654	0.0003186	0.0003426	0.0003961	0.0002876	0.0004322	0.0003313	0.0001716	-7.71E-05	0.0004974	0.0002702	0.0002582	0.0002657	0.0003856	0.0003702	0.0004484	0.0022278	0.0007691	0.0003805	0.0005566	0.0007239	0.002977	0.0003199	0.0032399	8.413E-06	0.0006895	0.006371	0.017869
27	0.001057	0.004888	0.004746	0.0042521	0.0020302	0.0052589	0.0013818	0.0028746	0.0039688	0.0050079	0.0039567	0.0031346	0.0029421	0.0014834	0.0026498	0.0032356	0.005514	0.0047552	0.0029573	0.0034343	0.0037817	0.0021121	0.0032254	0.0014082	0.0012889	-0.005149	0.0039582	0.0027171	0.0027171	
28	0.000411	0.0003943	-0.001033	-0.000248	0.0001575	0.0001911	0.0007964	-0.000399	0.0003124	-0.001196	-0.000132	0.0012119	0.0004165	-0.000918	0.0009435	-0.000694	-0.000635	-0.0001039	0.0001009	0.0004121	-0.000851	0.0003267	0.000621	-0.003579	0.0013612	0.0028364	-0.000928	-0.000391	0.0004912	-0.000138
29	-0.000441	0.0007154	-0.001261	-0.001427	0.0001354	-0.000989	-0.002098	-0.001572	-0.000487	-0.003818	-0.005673	-0.000232	-0.003377	-0.002334	-0.001264	-0.00016	-0.000136	-0.000136	-0.0002154	-0.001444	-0.001699	-0.002632	-0.00372	0.0011774	-0.001769	-0.003412	-			

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	-0.00545	-0.00485	-0.04395	-0.01321	-0.016156	-0.011281	-0.0138076	-0.039502	0.0092449	-0.001304	-0.00083	-0.00975	-0.013944	-0.029947	-0.00334	0.003284	-0.001517	-0.001448	0.000306	0.000602	-0.003394	0.004565	-0.00523	0.001538	-0.00395	0.0017891	-0.001684	-0.001509	-0.006887	0.187108
2	7.75E-05	0.0001515	0.000647	0.003072	0.0002817	-0.000732	0.018836	-0.000689	0.0040471	-0.000531	0.0017475	0.0022346	0.0074088	0.0014186	-0.010909	-0.003158	0.014304	0.0083397	0.010541	0.0180103	0.0042813	0.0009794	0.0004879	0.0030347	0.0104883	0.008221	0.0253585	0.0015324	0.002094	0.1534981
3	-0.000965	-0.000586	-0.007671	-0.010401	-0.002012	-0.000798	-0.005396	-0.007109	0.0064821	-0.002206	-0.001284	-0.013378	-0.000257	0.0023294	-0.000694	-0.000798	-0.000387	-0.000692	0.0005286	0.0027773	4.27E-05	0.000167	0.0020667	-0.002111	0.000133	-0.000527	-0.000531	-0.000372	-0.004413	
4	-0.00013	-0.000182	-0.000163	0.0038556	-0.000117	-0.000224	0.0002924	-0.000189	-5.73E-05	-0.000322	-0.000407	-1.38E-05	-0.000222	-0.003341	-0.000207	-0.000261	-0.000141	-0.000191	-9.46E-05	0.0003223	-0.000141	-6.09E-05	-0.000331	0.0001717	-7.43E-05	-0.000187	-0.000194	-0.000194	-0.001409	
5	-1.66E-05	1.087E-07	-1.25E-05	-1.35E-06	-0.029391	1.225E-06	1.82E-06	-8.64E-06	7.466E-07	1.352E-06	2.131E-06	-2.45E-06	-1.92E-06	-5.24E-06	4.946E-07	8.384E-07	5.299E-07	4.103E-07	7.201E-07	2.006E-06	6.594E-07	2.347E-07	2.285E-07	1.549E-06	6.26E-07	1.806E-06	1.608E-06	1.459E-06	2.008E-05	-0.002469
6	-0.000689	-0.001014	-0.002213	-0.000547	-0.000365	-0.079514	0.8357769	-0.000636	0.0057602	-0.000818	-0.002557	0.0256624	-0.018718	-0.000281	-0.000389	-9.05E-05	0.0008404	-0.002124	0.0007104	0.001323	-5.55E-06	0.023178	-0.000683	0.0001516	-0.001449	0.0015288	-0.000293	-3.21E-05	-0.000347	0.3715904
7	1.04E-05	2.57E-05	4.09E-05	4.07E-05	2.09E-05	3.328E-05	0.0546441	0.003324	7.358E-05	4.624E-05	4.473E-05	0.0007699	5.891E-05	3.94E-05	2.266E-05	0.0001294	4.374E-05	4.402E-05	4.468E-05	4.468E-05	3.934E-05	3.678E-05	1.952E-05	0.0002017	7.855E-05	2.462E-05	2.885E-05	2.239E-05	0.0001981	0.0572887
8	-0.000289	-0.000715	-0.000333	-0.001006	-0.001004	-0.000554	0.010876	0.0007489	0.0340391	-0.000506	-0.000196	-0.000482	-0.000255	-3.74E-05	-0.000365	0.0003573	-0.000936	-0.0001539	-0.002325	0.0033829	0.002382	0.0034772	-0.0005379	-1.32E-05	0.0008951	0.002422	-4.89E-05	-0.000912	-0.000125	0.0287268
9	2.728E-05	0.000196	8.24E-05	5.978E-05	4.188E-05	7.054E-05	0.0001981	0.0001106	0.0038766	0.0001333	0.0001354	0.0001081	8.094E-05	0.0001052	0.0001295	1.144E-05	0.0001166	0.0001182	0.000511	0.0012937	0.0005341	0.0001389	0.0001483	0.0003177	0.0011647	0.0050012	8.815E-05	0.0001602	6.656E-05	0.0150567
10	-0.000198	-0.001146	-0.001206	-0.003217	0.00076	-0.002985	0.0104662	-0.002744	0.0006296	-0.015388	-0.002262	0.0028373	-0.03433	-0.04091	-0.000986	-0.009126	-0.001062	-0.00228	0.0013133	0.005294	0.0012994	0.0044688	-0.003478	-0.01562	0.0002244	0.0007235	-0.001369	-0.00026	8.646E-05	-0.023939
11	-0.000114	-0.000469	-0.000575	-0.001078	-0.00084	-0.001163	0.0015313	-0.000641	-0.000327	0.0007704	-2.52E-05	-5.1E-05	-0.002088	-0.002012	-0.000372	-0.0007	-0.000747	-0.001015	-3.28E-06	0.0016236	-0.00023	-0.001411	-0.000679	-0.000179	-0.000568	-0.000895	-0.000836	0.0005892	-3.25E-05	-0.012478
12	1.08E-05	3.582E-05	4.002E-05	4.635E-05	2.682E-05	5.917E-05	0.0038143	0.0008908	0.0270023	9.267E-05	3.247E-05	0.0533866	0.0001794	6.774E-05	2.741E-05	0.000126	0.0001761	0.0001212	0.0001219	0.0005418	3.698E-05	0.0015844	0.0001133	0.0001722	5.917E-05	5.158E-05	3.867E-05	4.495E-05	0.0001201	0.0890209
13	-0.000218	-0.000693	-0.000534	-0.000502	-0.000351	-5.06E-05	-0.001472	-0.001028	-0.000682	-0.0007	0.0008127	-0.000642	-0.005687	-0.000622	-0.00051	-0.000399	-0.000406	-0.000666	0.0003865	0.0025595	0.0003241	0.0010407	-0.000406	-5.19E-05	-0.002583	0.0029016	-0.000787	-0.000105	-0.000105	-0.010726
14	-0.001807	-0.008271	-0.000948	-0.007701	-0.002875	-0.021038	0.0612559	-0.05739	-0.000403	-0.002043	0.008637	0.036675	-0.024019	-0.022775	-0.004763	-0.004935	-0.001945	-0.0005679	0.0098539	0.0244326	0.0024096	0.0041276	-0.006564	5.595E-05	7.823E-05	0.0063313	-0.000785	0.000284	-0.001235	0.025784
15	0.0004167	-0.00201	0.0009143	0.0020282	0.0006901	-0.000703	0.0358414	-0.000733	0.0041169	-0.000535	0.0030117	0.0047551	0.017118	0.0073422	0.001894	0.0021638	-0.001016	-0.000359	0.0078997	0.0250509	0.0061018	0.0078325	-0.001876	0.0044887	0.0234018	0.0012556	0.0162375	0.0028567	0.0039555	0.1856929
16	-0.00107	-0.000341	-0.000548	-0.0005564	-0.000158	-0.000517	0.0012494	-0.000393	-7.71E-05	-0.00049	-0.000166	0.0001721	-0.000657	-0.000943	-0.000498	-0.001816	-0.000501	-0.000636	0.000809	0.0063738	0.0014634	0.0007765	-0.000882	-4.01E-05	-2.94E-05	0.0012859	-0.001339	-0.000378	-0.000535	-0.012547
17	-0.000318	-0.014267	-0.001173	-0.000655	-0.000117	-0.000689	0.0040528	-0.000211	-0.011348	-0.000625	0.0009299	0.0001186	-0.000172	-0.000877	-0.008659	-0.003793	-0.055247	-0.039678	0.001587	0.0521235	0.0255552	0.0111819	-0.02081	0.0006434	0.004376	0.0212479	-0.003569	-0.001057	0.000998	-0.029887
18	-0.000186	-0.006165	-0.001204	0.0002886	-8.06E-05	-0.000552	0.0039869	0.0012347	-0.003772	-0.000109	0.0022936	-5.74E-05	-0.000429	-0.000484	-0.004119	-0.001705	-0.001924	-0.024326	0.0151598	0.0276337	0.0065668	0.0071133	-0.019171	0.0088361	0.0019622	0.0190333	-0.00042	-0.000238	0.0004882	0.025206
19	0.000235	-0.01423	0.0004059	0.0004515	0.0001441	0.0003355	0.0019258	0.0035888	0.0010234	0.0002807	0.0005505	0.0004448	0.0002593	0.0003512	-0.000816	0.0004392	0.0010006	0.0015218	0.008359	0.0111138	0.0010932	0.0017269	0.0006769	0.0011807	0.0032995	0.02499	0.001662	0.0002892	0.0005586	0.0618544
20	0.000282	0.001894	0.0006585	0.001328	0.0002823	0.005315	0.0043446	0.0007492	0.001	0.0009203	0.001045	0.00012713	0.0007056	0.0011568	0.0012913	0.0015764	0.0012803	0.0015326	0.0266044	0.2244015	0.0313258	0.0037816	0.0025458	0.0012827	0.005512	0.0261199	0.001584	0.0005793	0.0013411	0.3406229
21	-0.00025	-0.001347	-0.000314	-0.000104	-0.00028	-0.000544	0.0038784	-0.005734	1.177E-05	-0.000394	-0.000356	9.15E-05	-0.000681	-0.000609	-0.001152	-0.000458	0.0008075	-0.000251	0.0007371	0.0038616	-0.050008	0.0001058	-0.000179	0.0004017	-0.000226	0.0002593	-0.000179	1.065E-06	0.001783	-0.045555
22	-0.000104	-0.001902	-0.000829	-0.000756	-0.000331	-0.001324	0.0027137	-0.00011	-0.000672	-0.004187	-0.0005	-0.001976	-0.001044	-0.002368	-0.001142	-0.002228	-0.013572	-0.009147	-0.001897	0.0054552	0.0023261	0.0133804	-0.003349	0.0007786	0.0006696	0.0074781	-0.000579	0.0006285	0.0001925	-0.012969
23	-8.85E-05	-0.000414	-0.000432	-0.000461	-0.000349	-0.000691	0.0015839	-0.000511	-0.000132	-0.00073	-0.000498	2.52E-05	-0.000579	-0.000601	-0.001634	-0.002158	-0.001287	-0.001196	-0.000239	0.0018486	-0.000327	-4.85E-05	-0.000306	-0.001192	-3.44E-05	0.0007206	-0.000556	-0.003423	-4.82E-05	-0.015587
24	-0.02401	-0.008341	-0.01725	-0.008817	-0.007387	-0.019424	0.107775	-0.012127	-0.001529	-0.016695	-0.007369	0.022883	-0.009878	-0.01068	-0.008666	-0.00631	-0.008975	-0.015327	0.0407838	0.1337216	0.0226278	0.0199228	-0.013575	-0.000678	-0.0001256	0.0114875	-0.00273	-0.001282	-0.001826	0.1775547
25	-0.01352	-0.003849	-0.004786	-0.002939	-0.002945	-0.004636	0.0114822	-0.00838	-0.000784	-0.004463	-0.003328	3.72E-05	-0.003349	-0.005207	-0.004031	-0.004256	-0.004984	-0.006376	0.005715	0.015935	0.0002057	0.0001009	-0.001828	0.0028946	-0.001901	0.0020403	-0.002636	0.0011999	-0.000401	-0.031188
26	-8.87E-05	3.410E-05	-0.0002672	-3.37E-05	-0.000429	0.0055844	-0.000238	0.0008264	-0.000454	-0.000354	0.0009504	-0.000214	-0.00021	0.0002056	0.0002648	0.000227	-0.000168	0.0003395	0.005325	0.0010094	0.0007314	-8.21E-05	0.0014634	-0.000133	0.0067605	0.0014898	0.00010233	0.0003587	0.0279133	
27	0.0002571	-0.000299	0.000331	0.0003288	-2.61E-05	-0.002577	0.0174376	-0.000893	0.0036235	0.000195	0.00049173	0.0021563	-0.000774	-0.000406	-0.000355	0.0018588	0.0004342	-0.005325	0.004756	0.0215714	0.0138157	0.0046655	-8.05E-06	-0.000679	0.0002841	0.0031883	-0.000519	0.0008572	0.0027371	0.0807234
28	-0.001961	-0.004989	-0.00605	-0.005583	-0.004817	-0.009575	0.0238574	-0.007171	-0.000299	-0.009266	-0.005339	0.0018865	-0.006318	-0.007852	-0.005459	-0.006883	-0.006398	-0.00889	0.005259	0.0237965	0.0001353	0.0004299	-0.002722	-0.013871	-0.000636	0.0082359	-0.005054	-0.003416	-0.00235	-0.58163
29	-0.00343	-0.007371	-0.00712	-0.009672	-0.005408	-0.011011	0.0194141	-0.008395	-0.002391	-0.014059	-0.015679	0.0003731	-0.009775	-0.013358	-0.00823	-0.011083	-0.007105	-0.009549	0.0015207	0.0231343	-0.004193	-0.000839	-0.004135	-0.008482	-0.004603	0.0021883	-0.006204	-0.00435	-0.006342	-0.146154
SUM	-0.008993	-0.083322	-0.096249	-0.060548	-0.066516	-0.186607	0.8395679	-0.068489	0																					

2006

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.0087973	-0.000944	0.0022947	0.0021266	0.0120145	-0.002483	0.0010815	-0.012286	0.007718	0.0025134	0.0018214	0.007919	0.0103941	-0.009381	-0.003164	0.001327	0.0005156	0.0005651	-0.000311	-0.000342	0.0010042	0.0002604	-0.000847	0.0016995	-0.000262	-6.9E-05	-0.000564	-0.000346	-0.001222	0.0181672
2	0.001096	0.0059534	0.0022707	0.0034468	0.0014549	0.0051016	0.0032403	0.0014597	0.0049379	0.0025148	0.0026619	0.001649	0.007082	0.0071636	0.015324	0.0009579	0.0211045	0.040865	0.0139763	0.005927	0.003507	0.0071674	-0.007515	0.0022162	0.0094267	0.0005168	0.0006109	0.0012543	0.0014179	0.1992017
3	0.0041474	-5.6E-05	0.0062919	0.0009912	0.0003066	0.0011641	-0.011363	0.0088712	0.0012306	-0.000652	-0.000215	0.0004308	-8E-07	-8.3E-05	-3.8E-05	-4.3E-05	6.39E-05	3.35E-05	0.0001117	-5.1E-05	0.0002499	-5.9E-05	-0.000192	0.0004567	-0.000871	-0.000166	-0.0003	-6.9E-05	-4.71E-05	-0.013111
4	-2.9E-06	-2.32E-05	0.0009461	0.0084734	3.48E-05	-9.9E-06	4.71E-05	-1.74E-07	1.377E-05	2.83E-05	-0.000107	0.0002008	-2.6E-05	-6.4E-05	-3.5E-05	-3.52E-05	3.10E-05	2.53E-05	1.447E-05	3.44E-05	-8.4E-06	-0.000192	0.0003373	-0.000103	6.89E-05	-8.19E-05	-6.32E-05	-8.19E-05	-0.000574	0.0088185
5	-8.28E-06	-8.67E-06	-4.38E-06	-3.03E-07	-0.008177	-5.7E-07	-1.74E-07	-4.12E-06	4.44E-07	4.84E-07	5.91E-07	-1.95E-06	3.91E-06	-2.74E-06	6.94E-06	2.94E-07	1.107E-07	1.192E-07	2.04E-08	1.413E-07	2.751E-07	-2.41E-07	-6.03E-08	4.33E-08	5.69E-08	3.05E-07	1.482E-07	2.86E-07	4.307E-06	-0.008191
6	7.22E-05	-0.000175	-0.00013	0.0004973	0.0004688	-0.0133	0.045785	0.001738	-0.001101	0.0029859	0.0007782	0.0483915	-0.005	0.0006383	-4.6E-06	0.001057	0.0007022	-0.000279	0.0002	3.29E-05	0.0002332	0.0001686	0.0003643	0.0002083	7.104E-05	0.0003822	9.57E-06	0.0001661	0.0007178	0.0042772
7	3.1E-06	6.75E-06	9.27E-06	7.45E-06	4.99E-06	1.342E-05	-0.000906	0.000326	4.007E-05	8.807E-06	7.649E-06	8.549E-06	-3.47E-05	1.764E-05	5.967E-06	9.28E-06	8.021E-06	1.118E-05	2.35E-05	7.907E-06	5.23E-06	8.461E-06	9.847E-05	1.418E-05	3.25E-05	1.122E-05	1.28E-05	7.96E-06	3.10E-05	-0.0002
8	-6.63E-06	9.381E-05	2.23E-05	-0.000283	-0.000244	0.0001545	-0.000335	-0.000668	0.0056771	0.0011656	0.005464	-0.000447	0.0001288	0.0005581	0.0001013	0.0004336	-0.000276	-0.000388	-0.0001779	0.0003675	0.0003959	0.0014071	0.0027466	-6.87E-05	0.0003428	0.0001989	-1.73E-05	-0.000248	9.83E-05	0.0296567
9	4.1E-05	0.00054	0.000121	0.006749	7.72E-05	0.0002852	0.0006796	0.0003905	0.0024982	0.0007175	0.0008223	0.0006672	0.0001215	0.0003029	0.0029381	0.0004699	0.0003732	0.0005614	0.00039	-0.000294	0.0003138	0.0002674	0.000732	0.0001648	0.000644	0.0002695	0.0002112	6.85E-05	0.000333	0.012861
10	0.0004168	0.0015878	0.0008273	0.0010357	0.0105444	0.0018802	-0.000237	0.0018256	0.0009433	-0.000892	0.0092334	0.0011871	0.0001632	0.0024662	0.0009739	-0.002212	0.0004855	0.0005276	0.0023837	0.0001118	0.0011884	0.000912	-0.000595	-0.000449	0.0004327	-0.000477	0.000205	0.0005383	0.000671	0.0327149
11	6.75E-05	-3.82E-05	5.201E-06	0.0001646	0.0005826	-0.000166	-0.0007	2.28E-05	-0.000127	0.0039091	0.0009361	-0.000196	-0.000816	-0.000471	-4.14E-06	7.551E-05	-0.000149	-0.000247	-5.7E-05	-3.8E-05	8.919E-06	-0.000845	-9.7E-05	-7.78E-06	-0.000192	-0.00081	-0.000494	0.0012522	-2.79E-06	0.0012591
12	3.17E-05	1.892E-05	6.083E-05	3.204E-05	2.095E-05	0.0056988	-0.026251	0.0001463	0.0037215	0.00028	0.0001416	0.0008329	0.0004532	6.54E-05	1.996E-05	0.0001008	6.23E-05	9.394E-05	0.0001056	2.07E-05	0.0005357	0.0003038	2.794E-05	6.622E-05	2.54E-05	2.371E-05	1.739E-05	8.45E-05	-0.013419	
13	3.074E-06	0.0001048	-8.25E-05	-9.23E-05	2.162E-05	0.0009782	-0.02541	-0.00025	-0.000381	-0.000146	0.0002696	0.0001552	0.0061307	-0.0001721	0.0001163	5.372E-05	6.778E-05	2.77E-05	0.000141	-0.000482	0.0011774	-3.8E-05	0.0002639	-0.000113	-0.002716	-3.49E-05	-0.000361	6.191E-05	-4.13E-06	0.0038339
14	0.0034617	0.0001962	0.0015984	0.0018911	0.0048864	-0.002965	-0.000648	0.0062636	0.0011908	0.0054606	0.0108644	-0.001764	-0.00035	0.0146103	0.0009284	0.0007888	0.0016755	0.0032663	0.0021849	-6.3E-05	0.002331	-0.00116	0.0001517	0.0001976	0.0005541	0.0006456	-0.000292	0.0004365	2.717E-05	0.051221
15	0.0017985	0.0088776	0.0028443	0.0049894	0.0023648	0.0095328	0.048808	0.0057153	0.005564	0.0039848	0.0039834	0.0051948	0.0147589	0.0167545	0.0144848	0.0127021	0.0213022	0.0210434	0.0178291	0.0053239	0.049583	0.0107064	0.0006645	0.0018939	0.017946	0.0002946	-0.001998	0.0027172	0.0023369	0.23189
16	7.92E-05	0.0003696	3.34E-05	0.000167	0.0001138	0.0023271	0.046209	8.43E-05	-4.2E-05	1.909E-05	0.0007753	0.0066246	0.000119	-0.0001657	0.0001143	0.0018777	-0.000139	-0.000105	0.0006446	-0.000402	0.0002507	-0.000943	-0.000856	-1.39E-05	7.53E-05	0.0001803	-0.000697	-0.000105	-2.42E-05	0.014023
17	0.0001478	-0.004462	-0.000532	-0.000313	0.0004036	0.000559	0.0001065	0.0003641	-0.00555	0.002762	0.000754	-0.00031	0.0015842	0.0003517	-0.001429	-0.000247	-0.004303	-0.025387	-0.005583	-0.003596	0.0157279	-0.002867	0.0024315	0.0004216	0.0027447	0.000802	-0.002315	-0.000237	9.8E-05	-0.029183
18	0.0004921	-0.000702	-0.00057	-0.000291	0.0005822	0.0007394	-7.8E-05	0.0011045	-0.001485	0.0021332	0.0009772	-0.000366	0.0002266	0.000183	3.54E-05	0.000157	0.005323	-0.002859	0.0075903	-0.002277	0.0046981	-0.001249	-0.00036	0.0003924	0.0038813	0.0014442	8.351E-05	-7.43E-05	8.25E-05	0.0182779
19	5.95E-05	-0.000857	8.723E-05	0.0001447	8.732E-05	0.0002498	3.892E-05	7.301E-05	6.711E-05	-1.04E-05	0.0001668	0.0001172	0.0002216	0.0001043	-0.000263	-1.61E-05	0.0003945	0.0006375	0.0008459	6.421E-05	0.0059061	0.000219	0.0001187	0.00015	0.0001938	0.0001257	-4.33E-05	5.779E-05	9.171E-05	0.008978
20	0.00068	0.0017377	0.0006419	0.0011335	0.0003555	0.0010212	0.046696	0.0011017	0.0011593	0.0006803	0.0006099	0.0006202	0.0006225	0.0010597	0.0011458	0.0013684	0.001112	0.0016704	0.0020833	0.0523636	0.0149667	0.002226	0.0008531	0.0005952	0.0044269	0.0084314	0.0028351	0.0003112	0.0010221	0.1115316
21	-0.000153	-0.00108	-0.000397	-0.000216	-5.07E-05	-0.000295	-0.000441	-0.000442	-0.000299	-0.000356	-0.000437	-0.000294	-0.000484	-0.000433	-0.000756	-0.000417	-0.00032	-0.000189	-0.000416	-0.000345	-0.051883	-0.000242	-0.000302	-0.000379	-0.004549	-0.0005	-0.000641	-0.000156	-0.000248	-0.06672
22	6.58E-05	-0.000521	-0.000366	-0.000338	0.0006229	-3.3E-05	-0.02694	0.0003076	-0.000915	-0.001997	0.001002	-0.002826	-0.000111	-0.000384	-0.000291	-0.001175	-0.006243	-0.005221	-0.000199	-0.000965	0.001296	0.0070226	-0.000842	1.967E-05	0.0003547	0.0001176	-0.000323	1.68E-05	0.000159	-0.016426
23	1.48E-05	-0.000187	-0.000132	-9.42E-05	-1.04E-05	-7.07E-05	-9E-05	1.70E-05	-9.15E-05	-4.89E-05	-0.000172	-4.69E-05	-0.000157	-9.4E-05	-0.00081	-0.000523	-0.000327	-0.000314	-0.000316	-0.000232	-0.00014	-0.000227	-0.001685	-0.000669	5.891E-05	-9.88E-05	-0.000591	-0.002117	-0.000211	-0.009369
24	0.0026198	0.001034	0.0032227	0.008793	0.011607	0.0088404	0.0065872	0.0123012	0.0404259	0.0300798	0.0133756	0.0063086	0.000706	0.0075685	0.0032749	0.0080474	0.0121654	0.065963	0.0126443	0.007828	0.0353	0.0136373	0.0027575	0.0167101	0.040881	0.0031386	-0.001542	0.0004986	0.001341	0.2625949
25	0.0007945	0.0003882	-0.00137	-5.4E-06	0.0007095	-0.000438	-0.000429	-0.000295	0.0001936	-0.000328	-0.000483	-0.000592	-0.000841	-0.000778	-0.000716	-0.000342	-0.000933	-0.00114	0.0013811	0.0002429	0.0012584	-0.000376	-0.000507	-0.000354	0.0005386	-0.000896	-0.001584	0.0005927	-0.000242	-0.006848
26	0.0004144	0.0013149	0.000773	0.001927	0.0010889	0.0011104	0.0008607	0.0015456	0.0004859	0.0018948	0.0004725	0.0007579	0.0006	0.0007306	0.0008384	0.0013657	0.0006619	0.001694	0.0013386	0.0021148	0.0025613	0.0014204	0.0008823	0.0001381	0.0004939	0.0004937	0.0009653	0.0009469	0.0016824	0.056232
27	0.0005511	0.0019905	0.0008581	0.0028905	0.0016472	0.0004939	0.040254	0.0011614	0.00113	0.0023727	0.0028702	0.0028974	-0.000136	0.0013108	0.0012243	0.0025922	0.0032358	0.0038745	0.0024822	0.0018824	0.0015341	0.001662	0.0011964	-0.000208	0.0006414	0.0006035	0.0002018	0.0008277	0.00178	0.0596612
28	0.0013484	-0.000369	-0.000172	0.0010958	0.0014202	0.0002566	6.461E-05	0.002022	0.002889	0.0029333	0.0006568	0.0003487	-0.000137	-0.000208	-0.000584	3.54E-05	0.0004025	-0.000711	0.0010783	7.794E-05	0.0023411	0.0011895	-0.000883	-0.005147	0.0037658	0.0042933	-0.001692	0.0104692	0.002692	0.0287099
29	-0.000466	-0.001438	-0.001484	-0.001549	0.0006552	-0.001956	-0.000537	-0.000537	-0.000559	-0.002854	-0.005338	-0.000763	-0.002302	-0.003785	-0.001904	-0.002638	-0.000341	-0.0006	-0.000615	-0.002181	0.0002216	-0.001401	-0.005239	-0.004164	-0.000785	-0.002166	-0.004335	-0.001491	-0.01875	-0.05449
SUM	0.0264319	0.0134468</																												

Appendix 7
N Matrix, Philippines
1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	-1.0749	-0.00761	-0.4854	-0.1134	-0.12657	-0.07317	-0.04571	-0.4513	-0.2587	-0.02311	-0.01477	-0.12063	-0.13908	-0.05459	-0.00644	-0.01073	-0.00587	-0.00647	-0.00867	-0.01464	-0.01089	-0.0633	-0.04371	-0.00383	-0.02195	-0.0048	-0.00007	-0.00794	-0.06048
2	-0.01939	-1.06568	-0.03523	-0.04844	-0.02742	-0.04899	-0.03131	-0.04935	-0.0426	-0.09933	-0.05462	-0.04082	-0.06064	-0.07027	-0.5782	-0.21464	-0.23804	-0.12637	-0.09681	-0.07559	-0.04552	-0.05116	-0.08533	-0.02098	-0.11632	-0.01756	-0.27025	-0.00922	-0.01914
3	-0.06701	-0.06622	-1.18236	-0.26863	-0.0183	-0.02931	-0.08918	-0.03726	-0.02496	-0.0141	-0.01636	-0.28336	-0.0395	-0.11084	-0.00654	-0.01119	-0.00757	-0.00847	-0.00872	-0.01325	-0.00819	-0.0432	-0.0123	-0.00395	-0.02225	-0.00603	-0.00615	-0.06062	-0.09024
4	-0.00011	-0.00014	-0.00012	-1.06622	-0.00017	-0.00016	-0.00014	-0.00016	-0.00014	-0.00023	-0.00025	-0.00012	-0.00023	-0.00036	-0.00018	-0.00027	-0.00017	-0.00018	-0.00018	-0.0003	-0.00018	-0.00024	-0.00023	-0.00015	-0.00085	-0.0002	-0.00015	-0.00022	-0.00361
5	-3.7E-06	-9.6E-08	-1.9E-06	-3E-07	-1.45185	-2E-07	-2.2E-07	-1.2E-06	-2.6E-07	-7.2E-08	-6.5E-08	-4.9E-07	-3.5E-07	-8.3E-07	-6.4E-08	-8.3E-08	-4.1E-08	-5.8E-08	-5.9E-08	-7.9E-08	-4.2E-08	-1.8E-07	-1.6E-07	-3.6E-08	-8.9E-08	-3.3E-08	-4.3E-08	-4E-08	-2.5E-07
6	-0.00166	-0.00116	-0.00752	-0.00266	-0.0039	-1.38071	-0.09938	-0.00567	-0.06555	-0.02472	-0.0129	-0.03413	-0.09834	-0.00345	-0.00105	-0.00379	-0.00092	-0.00178	-0.00242	-0.00036	-0.00476	-0.0432	-0.00261	-0.00126	-0.00531	-0.00174	-0.00093	-0.0015	-0.00789
7	-2.9E-06	-2.4E-06	-4.2E-06	-3.5E-06	-1.05529	-2.4E-06	-1.05529	-7.5E-06	-4.3E-06	-3.4E-06	-3.8E-06	-2.1E-06	-1.4E-05	-4.3E-06	-3.2E-06	-4.8E-06	-2.7E-06	-2.9E-06	-2.6E-06	-5.5E-06	-3E-06	-3.7E-06	-4E-06	-2.4E-06	-3.5E-06	-3.6E-06	-2.4E-06	-4.1E-06	-7.2E-05
8	-0.00173	-0.00202	-0.00145	-0.00226	-0.00231	-0.00143	-0.00236	-1.05642	-0.41279	-0.00549	-0.00252	-0.00161	-0.00141	-0.00222	-0.00135	-0.00454	-0.00152	-0.00189	-0.00394	-0.01254	-0.00235	-0.00603	-0.07058	-0.00142	-0.00157	-0.00089	-0.00104	-0.00898	-0.00236
9	-0.00023	-7.5E-05	-0.00017	-0.00026	-0.00011	-0.00035	-0.00062	-0.00099	-1.00115	-0.00016	-0.00011	-0.00035	-0.00018	-0.00015	-0.00015	-7E-05	-0.00378	-0.00011	-0.00019	-0.00027	-0.00091	-0.00018	-0.00032	-0.0003	-0.00025	-0.00017	-7.7E-05	-0.00018	-0.00018
10	-0.00641	-0.00409	-0.01355	-0.01836	-0.10896	-0.01934	-0.02579	-0.01056	-0.01301	-1.47874	-0.51918	-0.01379	-0.01881	-0.03327	-0.00547	-0.04907	-0.0071	-0.01013	-0.01253	-0.02441	-0.00674	-0.03882	-0.01499	-0.01901	-0.01097	-0.03241	-0.00757	-0.01244	-0.01778
11	-0.00099	-0.00114	-0.00204	-0.00509	-0.00393	-0.00334	-0.00526	-0.00236	-0.0027	-0.00735	-1.01697	-0.00228	-0.00551	-0.0081	-0.00123	-0.00307	-0.00173	-0.00228	-0.00245	-0.00458	-0.00218	-0.00473	-0.00308	-0.00429	-0.00512	-0.01302	-0.00318	-0.00729	-0.00596
12	-1.2E-05	-7.5E-05	-3.8E-05	-2.7E-05	-2.8E-05	-0.00528	-0.30577	-0.00042	-0.00114	-0.00012	-0.00106	-1.13295	-0.00132	-5.3E-05	-4.6E-05	-5.1E-05	-2.6E-05	-4.8E-05	-4.1E-05	-5.2E-05	-0.00023	-0.0008	-5.7E-05	-1.6E-05	-6.8E-05	-2.7E-05	-2.7E-05	-2.2E-05	-9.7E-05
13	-0.00106	-0.00395	-0.00173	-0.00184	-0.00149	-0.00181	-0.00982	-0.00219	-0.01836	-0.00285	-0.0026	-0.00536	-1.0916	-0.00243	-0.00327	-0.00311	-0.00253	-0.00229	-0.01526	-0.00482	-0.04419	-0.00344	-0.00524	-0.00307	-0.03251	-0.00234	-0.00236	-0.00087	-0.00244
14	-0.08327	-0.0392	-0.05385	-0.03177	-0.03621	-0.17717	-0.09093	-0.08647	-0.10482	-0.08969	-0.13374	-0.13284	-0.35273	-1.38416	-0.02866	-0.58007	-0.04784	-0.05706	-0.05789	-0.07718	-0.04753	-0.41999	-0.06523	-0.00955	-0.02711	-0.01896	-0.03483	-0.00996	-0.03757
15	-0.03314	-0.11015	-0.06079	-0.07972	-0.04896	-0.08561	-0.05413	-0.08639	-0.0628	-0.17643	-0.09519	-0.07067	-0.09734	-0.0965	-1.07049	-0.26162	-0.14838	-0.11638	-0.09813	-0.09863	-0.05372	-0.07626	-0.08284	-0.03785	-0.21189	-0.02988	-0.49648	-0.01405	-0.03272
16	-0.00138	-0.00134	-0.00155	-0.00964	-0.00091	-0.00226	-0.00148	-0.00189	-0.00492	-0.00279	-0.00231	-0.00192	-0.00381	-0.01217	-0.00105	-1.05886	-0.00419	-0.00327	-0.00261	-0.01002	-0.0023	-0.00898	-0.0823	-0.00109	-0.00148	-0.00127	-0.00544	-0.00529	-0.00287
17	-0.0048	-0.06549	-0.0185	-0.02029	-0.00547	-0.00789	-0.01013	-0.01902	-0.08299	-0.02682	-0.01582	-0.01075	-0.01521	-0.01954	-0.03672	-0.03863	-1.8097	-0.6949	-0.48602	-0.18776	-0.17551	-0.05053	-0.19673	-0.00345	-0.01914	-0.01115	-0.02478	-0.00567	-0.0063
18	-0.0036	-0.01606	-0.01243	-0.02089	-0.00359	-0.00524	-0.01038	-0.00545	-0.02356	-0.02012	-0.01259	-0.00871	-0.01549	-0.0183	-0.00985	-0.00999	-0.01677	-1.18137	-0.05679	-0.17542	-0.01774	-0.05045	-0.07652	-0.00199	-0.00791	-0.01252	-0.0109	-0.00469	-0.00457
19	-0.00143	-0.0069	-0.0077	-0.00313	-0.00103	-0.00156	-0.00086	-0.00259	-0.02007	-0.00626	-0.00514	-0.00126	-0.00219	-0.00183	-0.00389	-0.00342	-0.00201	-0.00191	-1.05664	-0.00339	-0.00272	-0.00126	-0.00232	-0.00069	-0.00109	-0.0041	-0.00212	-0.007	-0.00083
20	-0.00086	-0.00262	-0.00118	-0.00143	-0.0013	-0.00139	-0.00125	-0.00135	-0.00126	-0.0051	-0.00329	-0.00127	-0.00204	-0.0023	-0.00177	-0.002	-0.00254	-0.00837	-0.02456	-1.23338	-0.00435	-0.00302	-0.01925	-0.00109	-0.00691	-0.0269	-0.01259	-0.00138	-0.00208
21	-0.00161	-0.00172	-0.00255	-0.0087	-0.00452	-0.00233	-0.00184	-0.00265	-0.00228	-0.00981	-0.00486	-0.00228	-0.00343	-0.00274	-0.00184	-0.00303	-0.00241	-0.00246	-0.00355	-0.00556	-1.33138	-0.00297	-0.00321	-0.00118	-0.04393	-0.0019	-0.00158	-0.00067	-0.00213
22	-0.00132	-0.00724	-0.00247	-0.00287	-0.003	-0.02871	-0.04026	-0.00314	-0.00545	-0.00748	-0.00781	-0.01803	-0.01353	-0.01031	-0.0045	-0.0174	-0.00408	-0.00732	-0.00698	-0.01026	-0.00524	-1.03171	-0.00473	-0.00091	-0.00217	-0.00154	-0.00266	-0.00192	-0.005
23	-0.00076	-0.00772	-0.00175	-0.00215	-0.00186	-0.00153	-0.00156	-0.00175	-0.0017	-0.00574	-0.00381	-0.00167	-0.00222	-0.00262	-0.00508	-0.00505	-0.00653	-0.00457	-0.00381	-0.00415	-0.00283	-0.00293	-1.00723	-0.00359	-0.00258	-0.00229	-0.00367	-0.00868	-0.00652
24	-0.06	-0.05412	-0.14368	-0.1296	-0.18621	-0.14276	-0.17376	-0.17132	-0.17301	-0.14838	-0.13662	-0.23011	-0.17684	-0.17864	-0.08732	-0.13636	-0.15991	-0.15945	-0.15067	-0.15245	-0.12563	-0.16207	-0.10458	-1.016	-0.11095	-0.03882	-0.11398	-0.01683	-0.04133
25	-0.01658	-0.01584	-0.02959	-0.02658	-0.02237	-0.03325	-0.02776	-0.03764	-0.03098	-0.05298	-0.03009	-0.02411	-0.04681	-0.03853	-0.0254	-0.04299	-0.03861	-0.03824	-0.05533	-0.04071	-0.0437	-0.04729	-0.03384	-0.01743	-1.04558	-0.01276	-0.02428	-0.00804	-0.01443
26	-0.00169	-0.00221	-0.00351	-0.00301	-0.00492	-0.00445	-0.00419	-0.00551	-0.00443	-0.0085	-0.0048	-0.00532	-0.00606	-0.00268	-0.0045	-0.00461	-0.00554	-0.00696	-0.00768	-0.00399	-0.00804	-0.00532	-0.0078	-0.00713	-1.04675	-0.00248	-0.00794	-0.01041	-0.01041
27	-0.00625	-0.01125	-0.01392	-0.01858	-0.01668	-0.02495	-0.01849	-0.01777	-0.01765	-0.07216	-0.04927	-0.024	-0.03108	-0.0323	-0.01212	-0.04014	-0.03717	-0.03088	-0.02805	-0.03637	-0.01579	-0.03169	-0.01656	-0.02417	-0.00986	-0.01519	-1.02201	-0.01409	-0.02542
28	-0.01222	-0.01771	-0.02506	-0.03128	-0.03143	-0.03484	-0.03171	-0.03381	-0.03748	-0.05107	-0.04871	-0.03425	-0.04621	-0.0599	-0.02322	-0.03678	-0.04337	-0.04918	-0.04993	-0.0727	-0.02989	-0.05771	-0.03373	-0.06429	-0.03639	-0.03735	-0.0216	-0.13823	-0.1772
29	-0.01483	-0.03437	-0.02243	-0.05921	-0.0479	-0.03248	-0.02961	-0.03249	-0.03098	-0.04991	-0.0557	-0.02512	-0.048	-0.06124	-0.04715	-0.07088	-0.03879	-0.04124	-0.03837	-0.07507	-0.04192	-0.05273	-0.05504	-0.03491	-0.04385	-0.05273	-0.03424	-0.05991	-1.0685

1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
1	-1.07543	-0.0106	-0.49468	-0.10879	-0.12489	-0.07188	-0.0476	-0.43456	-0.20601	-0.02196	-0.01468	-0.12279	-0.13223	-0.07926	-0.00813	-0.01246	-0.00541	-0.00713	-0.00902	-0.01545	-0.01091	-0.05646	0.04378	-0.00479	-0.02228	-0.00541	-0.0092	-0.00846	-0.06196
2	-0.01793	-1.06004	-0.03254	-0.04518	-0.02548	-0.04479	-0.0281	-0.04555	-0.03876	-0.09161	-0.05058	-0.03717	-0.05573	-0.06603	-0.56821	-0.20765	-0.21294	-0.11546	-0.08877	-0.07079	-0.04256	-0.0483	-0.08042	-0.01889	-0.01577	-0.01577	-0.24086	-0.00869	-0.01769
3	-0.06106	-0.00577	-1.1772	-0.24912	-0.01764	-0.02643	-0.0887	-0.03485	-0.02319	-0.01491	-0.01603	-0.27595	-0.03644	-0.09775	-0.00611	-0.01052	-0.00725	-0.00812	-0.00839	-0.01236	-0.00785	-0.04091	-0.01184	-0.00442	-0.02246	-0.00606	-0.00613	-0.006	-0.08737
4	-0.0002	-0.0003	-0.0027	-1.06263	-0.00019	-0.00031	-0.00034	-0.00031	-0.00021	-0.00052	-0.00067	-0.00022	-0.00036	-0.0006	-0.00032	-0.00032	-0.00048	-0.00034	-0.00034	-0.00048	-0.00048	-0.00034	-0.00041	-0.00116	-0.00045	-0.00041	-0.00041	-0.0004	-0.00579
5	-1.7E-05	-7.6E-07	-1E-05	-9.9E-07	-1.42056	-6.6E-07	-1.3E-06	-3.9E-06	9.9E-07	-3E-07	-3.7E-07	-2.7E-06	-1.1E-06	-6.7E-06	-4.8E-07	-5.9E-07	-2.8E-07	-4.3E-07	-4E-07	-5E-07	-2.1E-07	-6.7E-07	-7.8E-07	-2.7E-07	-4.8E-07	-2.3E-07	-2.5E-07	-2.4E-07	-1.4E-06
6	-0.02558	-0.00201	-0.00846	-0.00264	-0.00373	-1.4027	-0.09254	-0.00542	-0.06157	-0.02278	-0.01532	-0.03759	-0.10263	-0.0363	-0.00148	-0.00378	-0.00097	-0.00377	-0.00266	-0.00387	-0.00485	-0.03951	-0.00287	-0.00167	-0.00595	-0.00189	-0.00111	-0.00319	-0.00739
7	-2.7E-06	-2.8E-06	-2.8E-06	-4.4E-06	-3.4E-06	-2.8E-06	-1.04988	-7.6E-06	-4.1E-06	-3.8E-06	-3.9E-06	-3.6E-06	-9.9E-05	-4.6E-06	-3.6E-06	-4.9E-06	-3E-06	-3.3E-06	-2.5E-06	-8.3E-06	-3.8E-06	-4E-06	-3.9E-06	-2.7E-06	-7.5E-06	-3.9E-06	-3.4E-06	-3.9E-06	-6.7E-05
8	-0.00186	-0.00266	-0.0165	-0.0033	-0.003	-0.00181	-0.00306	-1.05674	-0.3679	-0.00621	-0.0026	-0.03002	-0.00151	-0.00227	-0.00173	-0.00562	-0.0025	-0.00331	-0.00841	-0.01148	-0.00246	-0.00566	-0.0679	-0.00159	-0.00163	-0.00087	-0.00109	-0.00875	-0.00234
9	-0.0002	-8.7E-05	-0.00015	-0.00024	-0.00011	-0.00032	-0.00054	-0.00086	-1.00135	-0.00015	-0.00012	-0.00031	-0.00014	-7.9E-05	-0.00335	-0.00335	-0.00011	-0.00018	-0.00024	-0.01103	-0.00249	-0.00017	-0.00158	-0.00031	-0.00032	-0.00035	-0.00018	-0.0002	-0.00021
10	-0.00568	-0.00451	-0.01305	-0.02009	-0.01033	-0.01866	-0.02627	-0.01144	-0.01254	-1.46969	-0.4887	-0.01408	-0.01933	-0.03451	-0.00587	-0.05352	-0.00771	-0.01089	-0.01238	-0.0253	-0.00672	-0.03995	-0.00328	-0.00427	-0.00527	-0.01328	-0.00406	-0.00698	-0.00688
11	-0.00094	-0.00141	-0.00233	-0.00567	-0.00433	-0.0037	-0.00636	-0.0027	-0.00301	-0.00782	-0.0095	-0.00095	-0.00095	-0.00054	-0.00916	-0.00151	-0.0036	-0.00226	-0.00293	-0.00291	-0.00469	-0.00249	-0.00551	-0.00328	-0.00427	-0.00527	-0.01328	-0.00406	-0.00698
12	-8.2E-06	-9.3E-05	-3.1E-05	-2.5E-05	-2.5E-05	-0.00449	-0.31438	-0.00036	-0.00002	-0.00012	-0.00095	-1.1793	-0.00117	-5E-05	-5.3E-05	-5.2E-05	-3.3E-05	-4.6E-05	-0.00267	-0.00426	-0.00718	-0.00359	-0.00499	-0.00331	-0.0339	-0.0027	-0.00321	-0.0009	-0.00025
13	-0.0011	-0.0042	-0.00197	-0.00213	-0.00156	-0.0022	-0.01506	-0.00296	-0.01697	-0.00316	-0.0028	-0.00642	-1.08698	-0.00286	-0.00363	-0.00321	-0.00279	-0.00267	-0.01426	-0.00718	-0.004174	-0.00359	-0.00499	-0.00331	-0.0339	-0.0027	-0.00321	-0.0009	-0.00025
14	-0.07531	-0.04201	-0.05284	-0.03589	-0.03558	-0.1722	-0.0877	-0.08212	-0.10223	-0.08254	-0.12465	-1.3066	-0.3334	-1.36362	-0.02998	-0.05835	-0.04223	-0.05378	-0.05272	-0.0757	-0.04536	-0.38593	-0.06252	-0.00993	-0.02599	-0.01851	-0.03257	-0.01028	-0.03714
15	-0.03056	-0.09997	-0.0547	-0.07258	-0.0514	-0.07754	-0.04766	-0.07994	-0.05756	-0.16085	-0.08747	-0.06303	-0.08778	-0.08743	-1.07033	-0.24177	-0.13795	-0.10627	-0.08984	-0.08936	-0.0488	-0.06976	-0.07712	-0.03363	-0.19007	-0.02634	-0.43897	-0.01327	-0.02976
16	-0.00129	-0.00173	-0.00212	-0.0519	-0.00089	-0.00222	-0.00167	-0.00202	-0.00487	-0.00303	-0.00238	-0.0023	-0.00378	-0.01198	-0.00147	-1.0599	-0.00476	-0.00378	-0.00316	-0.01156	-0.00269	-0.01262	-0.08495	-0.00145	-0.00161	-0.00148	-0.00646	-0.00554	-0.00342
17	-0.00461	-0.0674	-0.01732	-0.01918	-0.00511	-0.00729	-0.00979	-0.01745	-0.08397	-0.02483	-0.01488	-0.01044	-0.01415	-0.01841	-0.03732	-0.03719	-1.76883	-0.66085	-0.45969	-0.17572	-0.15619	-0.05166	-0.18913	-0.0033	-0.01753	-0.01047	-0.02574	-0.00593	-0.00591
18	-0.0035	-0.0208	-0.01321	-0.02091	-0.0034	-0.00501	-0.01076	-0.00561	-0.02656	-0.01813	-0.01234	-0.01	-0.01435	-0.01787	-0.01319	-0.01116	-0.02283	-1.18293	-0.66882	-0.16645	-0.07333	-0.05241	-0.07967	-0.00207	-0.00787	-0.0122	-0.01098	-0.00474	-0.00474
19	-0.00131	-0.00811	-0.00166	-0.00283	-0.00098	-0.00151	-0.00097	-0.00244	-0.00223	-0.00566	-0.0048	-0.00121	-0.00215	-0.00181	-0.00454	-0.00347	-0.00176	-0.00187	-1.05465	-0.00336	-0.00241	-0.0013	-0.00263	-0.00061	-0.00097	-0.0004	-0.00195	-0.00666	-0.00083
20	-0.00086	-0.00395	-0.00124	-0.00149	-0.00128	-0.00143	-0.00137	-0.00147	-0.00135	-0.00488	-0.00333	-0.0014	-0.00201	-0.00243	-0.00204	-0.00214	-0.00265	-0.0078	-0.0222	-1.22809	-0.00516	-0.00436	-0.01979	-0.00128	-0.00727	-0.03019	-0.01199	-0.00148	-0.00229
21	-0.00167	-0.00328	-0.00271	-0.00763	-0.00415	-0.00246	-0.0022	-0.00292	-0.00244	-0.0088	-0.00496	-0.00235	-0.00366	-0.00302	-0.00293	-0.0033	-0.0026	-0.00275	-0.00395	-0.00534	-1.36133	-0.00295	-0.00323	-0.00169	-0.04452	-0.00237	-0.00194	-0.00091	-0.00217
22	-0.00222	-0.00767	-0.03007	-0.00367	-0.0029	-0.02525	-0.0393	-0.00305	-0.00697	-0.01155	-0.00746	-0.02212	-0.01272	-0.01059	-0.00499	-0.01837	-0.01555	-0.013	-0.00977	-0.01018	-0.00391	-1.03068	-0.00626	-0.00096	-0.00215	-0.00165	-0.0032	-0.00189	-0.005
23	-0.00074	-0.00703	-0.00179	-0.0022	-0.00182	-0.00169	-0.00166	-0.00182	-0.00184	-0.00532	-0.00378	-0.00166	-0.00244	-0.00285	-0.00633	-0.00557	-0.0068	-0.00482	-0.00436	-0.00411	-0.00328	-0.00324	-1.09466	-0.0044	-0.00255	-0.00243	-0.00384	-0.0124	-0.00562
24	-0.05478	-0.0559	-1.3853	-0.1221	-0.17116	-0.13887	-0.16265	-0.16412	-0.16317	-0.14757	-0.1326	-0.21193	-0.1665	-0.16742	-0.08189	-0.13319	-0.15784	-0.15712	-0.14626	-0.14625	-0.12845	-0.15387	-0.0585	-0.10589	-0.10253	-0.03732	-0.10831	-0.01662	-0.04071
25	-0.01566	-0.01762	-0.0303	-0.00254	-0.02126	-0.03201	-0.02679	-0.04013	-0.02978	-0.05045	-0.03112	-0.02362	-0.04387	-0.03827	-0.02577	-0.04179	-0.03859	-0.03902	-0.05268	-0.04782	-0.04021	-0.04468	-0.03377	-0.02087	-1.04455	-0.01614	-0.02322	-0.00867	-0.01506
26	-0.0017	-0.00238	-0.00336	-0.00349	-0.00296	-0.00497	-0.00486	-0.0043	-0.00549	-0.00503	-0.00936	-0.00454	-0.0054	-0.0061	-0.00282	-0.00456	-0.0047	-0.00558	-0.00674	-0.0072	-0.00436	-0.00761	-0.00516	-0.008	-0.00742	-1.04051	-0.00295	-0.00788	-0.00969
27	-0.00583	-0.01224	-0.01303	-0.01755	-0.01559	-0.02505	-0.01867	-0.01737	-0.01817	-0.06461	-0.0455	-0.0225	-0.03082	-0.03032	-0.01191	-0.04093	-0.03608	-0.02981	-0.0275	-0.03412	-0.01526	-0.03003	-0.016	-0.02228	-0.01004	-0.01526	-1.03963	-0.01281	-0.02348
28	-0.01203	-0.01937	-0.02622	-0.03121	-0.03023	-0.03581	-0.03237	-0.03441	-0.03653	-0.05089	-0.04725	-0.03281	-0.04444	-0.05767	-0.02517	-0.03807	-0.03432	-0.04959	-0.04921	-0.06688	-0.03344	-0.05516	-0.03455	-0.0742	-0.03581	-0.03561	-0.02376	-1.04001	-0.15498
29	-0.01625	-0.03723	-0.02491	-0.0608	-0.04522	-0.03539	-0.03405	-0.03466	-0.03088	-0.05607	-0.06573	-0.02628	-0.04988	-0.06505	-0.04841	-0.07207	-0.04017	-0.04328	-0.04056	-0.07608	-0.04486	-0.05227	-0.061	-0.04146	-0.04712	-0.05739	-0.04059	-0.06453	-1.0714

1988

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	-1.02942	-0.001274	-0.146355	-0.00799	-0.012398	0.0003541	-0.007198	-0.114243	-0.009081	-0.0071568	0.0097355	-0.034628	0.0040832	0.0005978	0.0005944	0.0004625	0.0014623	0.0018395	0.0002189	0.001221	-0.00436	-0.005936	-0.004421	-0.0003545	-0.001181	-0.034012	-0.000242	-0.000749	
2	-0.00089	-1.039402	-0.000492	-0.002166	-0.000315	0.0003881	-0.005622	-0.000724	-0.002371	0.0004962	-0.001153	0.0003637	-0.000728	-0.009174	-0.0093536	-0.031775	-0.06881	-0.005457	0.0001302	-0.004503	-0.000483	-0.029828	-0.00478	-0.000856	-0.010632	-0.003201	-0.01602	-0.000955	-0.003516
3	-0.011624	-0.001244	-1.031409	-0.054068	-0.000778	0.0002122	0.0039154	-0.004144	-0.004275	-0.003208	-0.001006	-0.00093	-0.000875	-0.017526	0.0001886	0.0002239	0.0004104	0.0004596	-0.000317	0.0004327	-0.000882	6.16E-05	-0.000328	-0.00293	-0.000343	-0.000314	-0.000226	-0.0007218	
4	4.414E-05	5.459E-05	-4.97E-05	-1.038501	-0.000412	0.0001063	-2.8E-05	8.617E-05	4.774E-05	0.0001383	0.0001545	7.524E-05	9.678E-05	0.0001266	9.15E-05	0.0001288	9.27E-05	0.0001115	0.0001071	0.000198	0.0001126	8.427E-05	0.0001595	9.77E-05	5.873E-05	5.945E-05	3.295E-05	-0.00047	
5	5.194E-06	-2.58E-06	3.831E-06	-1.5E-06	-1.04804	2.248E-07	-6.1E-06	2.018E-06	-1.26E-06	-1.26E-06	-3.74E-06	1.192E-06	6.469E-06	8.495E-07	-0.00127	-1.37E-06	-8.04E-07	-4.48E-07	-2.33E-07	-2.08E-06	-5.04E-07	-7.43E-07	-8.22E-07	-1.94E-06	-7.93E-06	-5.3E-06	-2.04E-06	-8.05E-06	-0.000156
6	-0.006628	-0.000468	-0.001229	-0.000213	-9.57E-05	-1.021943	-1.217133	-0.000103	-0.038963	9.18E-05	-0.00102	-0.001024	-0.00527	-0.001054	-1.502E-05	-0.00062	-0.000416	0.0005626	0.0001076	0.008393	-0.00075	-0.007015	8.888E-05	-0.007466	-0.002189	-0.000842	-0.000386	-0.001907	-0.008955
7	-5.3E-05	-0.000133	-0.000189	-0.000174	-0.000151	-0.000147	-1.029134	-0.000164	-0.000357	-0.000183	-0.000344	-0.000127	-0.00067	-0.000163	-8.98E-05	-0.000146	-0.000203	-0.000137	-7.28E-05	-0.00037	-0.000804	-0.000216	-8.42E-05	-0.006955	-0.000238	-0.000139	-0.000163	-5.88E-05	-0.001734
8	-0.006648	-0.005931	-0.000104	0.0003218	0.0002988	0.0001419	-0.000449	-1.029466	-0.000449	-0.000135	0.0004015	-0.000237	-0.000881	-0.000484	0.0001753	-0.000281	0.0004207	0.001457	-0.00652	0.0001259	-0.00552	-0.01454	-0.03901	-8.39E-05	-0.000113	-0.00022	-0.000103	-0.000508	
9	1.620E-06	6.374E-07	5.466E-06	5.855E-06	3.047E-06	-5.05E-06	-6.54E-05	6.326E-07	-1.008616	1.046E-05	-1.42E-06	-0.000123	-0.000365	9.412E-06	7.734E-06	4.398E-05	8.471E-06	1.169E-05	1.336E-05	0.0006681	-1.44E-05	-0.000305	3.579E-05	9.316E-06	-4.57E-06	1.918E-05	8.831E-06	2.21E-05	-0.000369
10	-0.000391	-9.43E-05	-0.001649	-0.045634	0.0009102	-0.003935	0.0004327	-0.001969	-1.07047	-0.170643	0.0009637	0.0007395	0.0013636	-0.000434	-0.0007109	0.0009137	0.0008178	0.0010421	-0.001456	0.0008876	0.00057	0.0010456	-0.000286	-0.000117	-0.000869	0.0003137	-0.001185	-0.00462	
11	-0.000121	-0.000196	-1.32E-05	-0.001117	-0.009381	-0.000134	-0.05482	-0.000187	-0.000247	0.0005384	-0.016744	0.0002797	0.0004525	0.000471	-0.002085	-0.00157	0.000113	8.915E-05	0.0003437	-0.002489	0.0002225	0.0004269	0.0001929	-6.34E-05	-0.000629	-0.002157	-0.00069	-0.001125	-0.0073
12	-7.82E-06	-3.22E-05	-2.18E-05	-1.91E-05	-1.52E-05	-0.000307	-0.026257	-6.12E-05	-0.002364	-2.98E-05	-2.96E-05	-1.046697	-0.002681	-0.000235	-9.85E-06	-2.47E-05	-5.41E-05	-2.78E-05	-8.06E-05	-4.4E-05	-8.16E-05	-0.00083	-1.89E-05	-0.000377	-7.61E-05	-2.11E-05	-2.07E-05	-2.96E-05	-0.000237
13	-4.79E-05	-0.002015	7.38E-06	-4.02E-05	3.72E-05	0.0002812	-0.00063	-7.66E-05	-0.000336	0.0001951	-0.000329	0.0005673	-1.056979	-9.45E-05	-0.00021	-0.00015	-8.12E-05	0.000117	0.0002978	-2.94E-05	0.0012532	-0.009595	-0.000825	-0.000597	-0.018735	-0.00099	0.0002885	-0.00042	-0.001425
14	-0.008906	-0.024887	-0.001785	-0.001142	-0.003781	-0.008314	-0.019959	-0.001645	-0.012159	-0.003694	-0.040019	-0.017964	-0.028453	-1.061151	-0.019799	-0.00565	-0.030998	-0.01057	0.0003303	-0.028241	0.0007028	-0.015981	-0.001351	-0.001547	-0.003526	-0.002176	-0.005047	-0.002048	-0.017475
15	-0.009687	-0.028199	-0.008255	-0.022593	-0.004893	-0.003792	-0.037761	-0.015955	-0.016384	-0.009779	-0.011443	-0.000985	-0.012626	-0.006917	-1.047452	-0.094876	-0.024284	-0.003649	0.0004203	-0.009408	-0.001351	-0.009947	-0.010815	-0.007585	-0.104876	-0.02625	-4.170165	-0.00733	-0.026978
16	-3.29E-05	-0.00149	-0.00085	-0.016055	-0.00031	0.0001089	-0.007259	-0.000221	-0.004563	-0.000608	0.0001563	-0.000364	-0.0004711	-8.95E-05	-1.027752	-0.001318	-0.000121	4.133E-05	0.006135	-8.28E-05	-0.04617	-0.017754	6.98E-05	-0.000124	-0.000353	-0.000154	-0.001449	-0.000736	
17	1.163E-05	-0.009566	-0.000263	-0.002644	-0.000478	0.0003994	-0.001837	-0.00035	-0.005445	-0.003922	-0.002507	0.0006118	-9.77E-05	-2.52E-05	0.0021467	-0.001361	-1.147282	-0.079256	0.0050469	-0.055549	-0.014438	-0.020258	-0.008508	-0.004466	-0.001006	-0.002868	0.0012534	-0.000634	-0.009589
18	-0.006648	-0.06287	-0.000374	-0.027133	-0.00024	0.0003746	-0.001213	-0.003622	-0.019809	-0.000124	3.677E-05	0.0011305	0.0001188	-0.000201	-0.000193	0.0002152	0.0027317	-0.99076	0.0044634	-0.016057	-0.00228	6.02E-05	-0.007186	-0.0003	-0.002006	-0.00334	-0.002086	-0.000483	-0.002196
19	-0.000965	-0.001905	-0.000235	-0.000242	-0.000114	6.501E-05	-0.000522	-0.003148	-0.000756	-0.0001763	-0.000656	4.574E-05	-0.000192	-0.000191	0.0002345	-0.000868	-0.000596	-6.86E-05	-1.014288	-0.002713	-4.74E-05	-0.000432	-0.000395	-0.000176	-0.002647	-0.000444	-4.35E-05	-0.000126	-0.002261
20	-0.000244	-0.066883	-0.000262	-0.000352	-0.000682	-0.000179	-0.027716	-0.002412	-0.000965	-0.00031	-0.002703	-0.000263	-0.002288	-0.000877	-0.001311	-0.003211	-0.001512	-0.000347	-0.007915	-1.3315	-0.004058	-0.001473	-0.004269	-0.000388	-0.006104	-0.052215	-0.008406	-0.000869	-0.004108
21	-0.000446	0.0001647	-6.32E-05	-0.000183	-2.26E-05	0.0002126	-0.002606	-0.000141	-0.000371	0.0001916	-0.000265	0.0001398	2.61E-05	0.0001144	-0.000237	-4.54E-05	-9.94E-05	0.0002591	0.0004577	-0.000304	-1.021621	-0.001062	3.788E-05	-0.000932	-0.022345	-0.001743	-0.006969	-0.000506	-0.006334
22	3.197E-06	0.001309	0.0003771	0.00038	6.31E-05	0.0005201	-0.003847	-0.000442	-0.001611	0.0011514	-2.18E-05	0.0001028	0.0002063	0.0005119	0.000396	0.0001069	0.0044997	0.0029578	0.0023752	-0.000886	0.0002575	-1.020304	0.0013043	-0.000107	-0.000897	-0.003586	-0.00012	-0.000829	-0.004189
23	-0.006537	-0.006367	-0.000394	-0.001451	-0.000464	-0.001152	-0.05832	-0.000715	-0.002716	-0.001301	-0.003372	-0.00025	-0.000604	-0.000691	-0.00055	-0.000981	-0.002423	-0.000314	0.000239	-0.001815	0.0001701	-0.004244	-0.999103	-0.000617	-0.001832	-0.003936	-0.0088	-0.020369	-0.004762
24	-0.005193	-0.009452	-0.007418	-0.015591	-0.015815	-0.001357	-0.115341	-0.013096	-0.044734	-0.012498	-0.037629	-0.008108	-0.025044	-0.012803	0.006159	-0.00072	-0.014046	-0.003991	0.0029055	-0.043807	-0.000511	-0.020896	0.0006538	-1.002786	-0.015448	-0.010187	-0.014785	-0.001554	-0.007051
25	-0.003846	-0.05342	-0.007187	-0.003229	-0.001166	-0.079511	-0.011291	-0.015728	-0.001643	-0.010635	-0.00153	-0.005734	-0.003998	0.0014683	-0.00559	-0.006244	-0.001025	0.0012176	-0.015805	-0.007264	-0.010756	-0.005582	-0.03357	-1.027464	-0.015845	-0.002638	-0.006502	-0.002189	
26	-0.000323	-0.000329	-0.000299	-0.000178	-0.000498	5.121E-05	-0.01093	-0.000609	-0.002709	0.0001292	-0.002005	-0.000629	-0.000744	-0.000295	-3.4E-05	-0.000351	-0.000257	-7.24E-06	-0.000651	-0.002314	0.0001344	-0.0004221	-0.000417	-0.00044	-0.0004298	-1.028506	1.72E-05	-0.00251	-0.004328
27	-0.001723	-0.001409	-0.007166	-0.01282	-0.0036	-0.000321	-0.078495	-0.003861	-0.012919	-0.001216	-0.019667	-0.003604	-0.016121	-0.007268	-0.000791	-0.024339	-0.008277	-0.002054	0.0001408	-0.013641	-0.001524	-0.013739	-0.001264	-0.008338	-0.006051	-0.03847	-1.0047	-0.007215	-0.022127
28	-0.000875	-0.002371	-0.00124	-0.001949	-0.001366	0.0012615	-0.061942	-0.001201	-0.008151	0.0016573	-0.004243	-0.019579	-0.002082	-0.000141	0.0004164	-0.000885	0.0005423	0.0027604	0.0028666	-0.004715	0.0027822	-0.00689	0.0011568	-0.00573	-0.011346	-0.014827	-0.004643	-1.007701	-0.016848
29	-0.00185	-0.002517	-0.01031	-0.003445	0.0023893	-0.042685	-0.001241	-0.00572	0.0005002	-0.015681	-0.000356	-0.00137	-0.002584	-0.000953	-0.003393	-0.001177	0.001759	0.002852	-0.008224	0.002392	-0.02492	-0.004883	0.0006199	-0.006301	-0.052261	-0.030483	-0.006687	-0.01307	-1.033099

1994

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28		
1	-1.13729	-0.019029	-0.583922	-0.12827	-0.089597	-0.12814	-0.06623	-0.350477	-0.151095	-0.090586	-0.055646	-0.055204	-0.199918	-0.096786	-0.019364	-0.02227	-0.014708	-0.016269	-0.021341	-0.023649	-0.040577	-0.035503	-0.024944	-0.021717	-0.033983	-0.008571	-0.012984	-0.060908	-0.07714	
2	-0.04541	-1.12021	-0.05379	-0.09367	-0.05993	-0.08124	-0.05941	-0.08352	-0.063979	-0.123095	-0.10902	-0.06119	-0.085734	-0.12874	-0.615467	-0.34232	-0.445312	-0.252728	-0.10994	-0.125824	-0.141655	-0.17529	-0.138818	-0.070402	-0.235987	-0.03982	0.29802	-0.025964	-0.05991	
3	-0.05656	-0.009219	-1.11297	-0.154574	0.01826	-0.02449	0.022551	-0.02477	-0.014481	-0.031459	-0.04226	-0.02277	-0.02162	-0.07185	0.009389	-0.007912	-0.010354	-0.007613	-0.007613	-0.010975	-0.008629	-0.008728	-0.007509	-0.025944	-0.005943	-0.005943	0.007302	-0.004652	-0.07552	
4	-0.00162	-0.00388	-0.00295	-1.032024	-0.00163	-0.00282	-0.00028	-0.00024	-0.000319	-0.000219	-0.000219	-0.000219	-0.000219	-0.000489	-0.000347	-0.000347	-0.000347	-0.000347	-0.000347	-0.000347	-0.000347	-0.000409	-0.000644	-0.000471	0.000314	-0.000314	-0.000426	-0.007582		
5	-1.25	-0.145	-0.99	-0.132	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125	-0.125		
6	-0.00826	-0.01132	-0.00976	-0.0046	-0.00414	-1.62128	-0.642699	-0.09436	-0.123099	-0.010451	-0.013218	-0.256918	-0.286534	-0.08863	-0.008336	-0.008197	-0.006938	-0.008181	-0.015385	-0.009856	-0.047927	-0.159558	-0.055114	-0.006456	-0.023559	-0.038177	-0.005344	-0.00187	-0.011281	
7	-0.00088	-0.000365	-0.00026	-0.000323	-0.00236	-0.015015	-1.175871	-0.000463	-0.01451	-0.000428	-0.000413	-0.004137	-0.00964	-0.00038	-0.000439	-0.000375	-0.000443	-0.000443	-0.000445	-0.000525	-0.000447	-0.00191	-0.002038	-0.000307	-0.00164	-0.00096	-0.000256	-0.000315	-0.000168	-0.00273
8	-0.00373	-0.011342	-0.00829	-0.00296	-0.00243	-0.00295	-0.002234	-1.157652	-0.193056	-0.033014	-0.002182	-0.002457	-0.002988	-0.000589	-0.007149	-0.000857	-0.006262	-0.006756	-0.027284	-0.021495	-0.009446	-0.00191	-0.002038	-0.000347	-0.000443	-0.000172	-0.000443	-0.00236	-0.000143	-0.002481
9	-3.38	-0.52	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	
10	-0.00469	-0.02827	-0.02183	-0.04083	-0.4026	-0.039717	-0.025529	-0.021924	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	-0.040295	
11	-0.001718	-0.003611	-0.00373	-0.005602	-0.014996	-0.00465	-0.004116	-0.004295	-0.004074	-0.004169	-1.043099	-0.033385	-0.004116	-0.004447	-0.000959	-0.000891	-0.004799	-0.005606	-0.003941	-0.006937	-0.003315	-0.004765	-0.004066	-0.003347	-0.007422	-0.00345	0.007576	-0.00443	-0.01824	
12	-0.000209	-0.00611	-0.000271	-0.000295	-0.00024	-0.007527	-0.052255	-0.04981	-0.032336	-0.000501	-0.000465	-1.578894	-0.04324	-0.00575	-0.000581	-0.000465	-0.000475	-0.000452	-0.005139	-0.007233	-0.00979	-0.00503	-0.000552	-0.000741	-0.000385	-0.000421	-0.000385	-0.000421	-0.000385	
13	-0.002748	-0.00753	-0.004184	-0.004778	-0.004997	-0.005795	-0.008054	-0.007608	-0.006235	-0.008844	-0.007542	-0.015948	-1.049051	-0.006303	-0.008798	-0.0071	-0.007251	-0.006523	-0.006674	-0.00728	-0.013708	-0.024167	-0.005357	-0.010717	-0.061619	-0.005794	0.007322	-0.003254	-0.008839	
14	-0.063008	-0.082994	-0.056423	-0.066445	-0.053175	-0.202064	-1.04258	-0.16757	-0.094343	-0.093457	-0.114046	-0.119394	-0.19347	-1.365334	-0.128034	-0.0866	-0.060294	-0.070171	-0.057057	-0.115632	-0.067169	-0.14413	-0.052802	-0.026661	0.071109	-0.019619	0.072119	-0.072869	-0.064911	
15	-0.089204	-0.222395	-0.112198	-0.162956	-0.19463	-0.153661	-0.115245	-0.16367	-0.122049	-0.245571	-0.195091	-0.117591	-0.162022	-0.149294	-1.301852	-0.47222	-0.275786	-0.20346	-0.104089	-0.140722	-0.1501	-0.13796	-0.167664	-0.143325	-0.086619	-0.073908	-0.622371	-0.04626	-0.112214	
16	-0.00166	-0.005548	-0.00355	-0.004014	-0.001686	-0.004225	-0.002909	-0.002415	-0.003088	-0.003201	-0.003254	-0.003213	-0.004049	-0.001815	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	-0.004961	
17	-0.00842	-0.044713	-0.014901	-0.048143	-0.011579	-0.013038	-0.009804	-0.02676	-0.028412	-0.029109	-0.027541	-0.006065	-0.01652	-0.026718	-0.039089	-0.0282	-1.52408	-0.664207	-0.05007	-0.222451	-0.296988	-0.09395	-0.014612	-0.012833	-0.007212	-0.003607	-0.002493	-0.004547	-0.01513	-0.005891
18	-0.007462	-0.02683	-0.016621	-0.064026	-0.008483	-0.009071	-0.007695	-0.022611	-0.026751	-0.025152	-0.018774	-0.008879	-0.011967	-0.019494	-0.032189	-0.020173	-0.040765	-1.064222	-0.068533	-0.053606	-0.022813	-0.024844	-0.071111	-0.00706	-0.018448	-0.012706	-0.021703	-0.005855	-0.013177	
19	-0.005651	-0.040915	-0.007436	-0.007803	-0.00528	-0.010444	-0.007509	-0.029733	-0.027734	-0.012394	-0.009487	-0.06792	-0.010007	-0.010584	-0.026436	-0.008124	-0.024116	-0.018272	-1.482332	-0.032002	-0.015399	-0.013609	-0.011669	-0.006379	-0.028828	-0.007822	-0.020255	-0.003398	-0.010094	
20	-0.007524	-0.057123	-0.009247	-0.011448	-0.008337	-0.016535	-0.011379	-0.01445	-0.012338	-0.018807	-0.01612	-0.010668	-0.015973	-0.013572	-0.035382	-0.025524	-0.023593	-0.025516	-0.110641	-1.701284	-0.096159	-0.028675	-0.026395	-0.014672	-0.04424	-0.073193	-0.03628	-0.006576	-0.020596	
21	-0.008595	-0.02804	-0.01472	-0.014452	-0.009249	-0.014933	-0.012953	-0.016289	-0.013123	-0.01716	-0.017773	-0.013488	-0.014643	-0.014781	-0.028316	-0.00679	-0.035599	-0.026216	-0.077596	-0.019028	-2.127833	-0.028013	-0.014965	-0.030118	-0.107099	-0.013942	-0.03829	-0.006923	-0.029947	
22	-0.006958	-0.002962	-0.001903	-0.002774	-0.001952	-0.002579	-0.006957	-0.00126	-0.002655	-0.004278	-0.003503	-0.00321	-0.005584	-0.003893	-0.002811	-0.004046	-0.008428	-0.008441	-0.004715	-0.002576	-0.002592	-1.94433	-0.003266	-0.00181	-0.00317	-0.00702	-0.002111	-0.001811	-0.006602	
23	-0.003566	-0.024991	-0.004634	-0.005969	-0.004557	-0.007567	-0.006026	-0.005951	-0.007742	-0.007566	-0.007588	-0.006139	-0.006359	-0.006895	-0.017182	-0.012483	-0.014531	-0.010212	-0.008796	-0.008308	-0.006944	-0.00772	-1.071414	-0.007444	-0.010771	-0.008583	-0.011740	-0.041104	-0.009505	
24	-0.035572	-0.059468	-0.078206	-0.04788	-0.08703	-0.110178	-0.107683	-0.119079	-0.104507	-0.158018	-0.141301	-0.16213	-0.132894	-0.117733	-0.12326	-0.114288	-0.15539	-0.13899	-0.163307	-0.153859	-0.162311	-0.1523	-0.076833	-0.038399	-1.038399	-0.110032	-0.035985	-0.112056	-0.051575	-0.056251
25	-0.03365	-0.052964	-0.03443	-0.053946	-0.042542	-0.065038	-0.061292	-0.087943	-0.066381	-0.06912	-0.071629	-0.063309	-0.063941	-0.057226	-0.096508	-0.082266	-0.058151	-0.060778	-0.058004	-0.065677	-0.067916	-0.062693	-0.076631	-0.106489	-1.077644	-0.040888	-0.055614	-0.031127	-0.041958	
26	-0.04883	-0.007372	-0.006513	-0.008139	-0.007003	-0.010124	-0.01047	-0.010949	-0.011196	-0.010314	-0.013428	-0.013428	-0.011303	-0.009944	-0.010445	-0.009678	-0.01078	-0.011819	-0.046113	-0.018188	-0.011805	-0.013648	-0.011944	-0.04514	-0.016892	-1.044852	-0.008189	-0.016043	-0.014243	
27	-0.021241	-0.07074	-0.047594	-0.06515	-0.047168	-0.093108	-0.071348	-0.0538	-0.068001	-0.10406	-0.083119	-0.062733	-0.071568	-0.064039	-0.052265	-0.093526	-0.109006	-0.09177	-0.06592	-0.077783	-0.059922	-0.072475	-0.037167	-0.054096	-0.043586	-0.032894	-1.082893	-0.02587	-0.053857	
28	-0.02665	-0.039297	-0.029109	-0.036216	-0.028986	-0.050236	-0.05487	-0.041834	-0.045628	-0.042546	-0.046934	-0.065016	-0.049339	-0.042854	-0.051175	-0.045538	-0.046933	-0.046978	-0.072095	-0.060759	-0.042915	-0.052922	-0.055592	-0.094929	-0.16248	-0.167751	-0.04232	-1.050408	-0.045602	
29	-0.018709	-0.055484	-0.024013	-0.053788	-0.025157	-0.034923	-0.03233	-0.02793	-0.026449	-0.03159	-0.040188	-0.027716	-0.038827	-0.046156	-0.046974	-0.046095	-0.051177	-0.04196	-0.043798	-0.04866	-0.033631	-0.036269	-0.062951	-0.053011	-0.076204	-0.06121	-0.03405	-0.053878	-0.071613	

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	-1.03687	-0.00543	-0.27345	-0.03611	-0.027825	-0.024122	-0.069245	-0.084271	-0.040197	-0.020858	-0.009761	-0.050116	-0.053851	-0.06081	-0.004329	-0.0062	-0.003179	-0.004556	-0.002904	0.0559075	0.0019621	-0.073594	0.009406	-0.017266	-0.006898	-1.71E-06	-0.003	-0.004159	-0.035798
2	-0.004833	-1.012866	-0.01224	-0.020655	-0.009558	-0.193158	-0.008467	-0.026627	-0.019416	-0.022654	-0.036883	-0.050451	-0.03124	-0.423277	-0.143728	-0.188264	-0.04072	-0.033048	0.3841325	0.0134446	-0.012327	-0.023134	-0.02837	-0.079599	-0.007437	-0.232448	-0.013473	-0.017148	
3	-0.016794	-0.008854	-1.065344	-0.627704	-0.003387	-0.002715	-0.052752	-0.033993	-0.014491	-0.004622	-0.007386	-0.089204	-0.004339	-0.041257	-0.001373	-0.003019	-0.002251	-0.001983	-0.002992	0.0629255	0.0042915	-0.015365	-0.001606	-0.021649	-0.008511	0.0035894	-0.007386	-0.003514	-0.047833
4	-0.001332	-0.000394	-0.00024	-1.071249	-0.000179	-0.00027	-0.003428	-0.000296	-0.000244	-0.000347	-0.00541	-0.00133	-0.000341	-0.00043	-0.000222	-0.000379	-0.000376	-0.000322	-0.000365	0.007452	0.000441	-0.000792	-0.00035	-0.003319	-0.000736	0.0006191	-0.000352	0.000437	-0.000618
5	-2.2E-05	1.549E-05	-4.89E-05	-1.35E-05	-1.061287	-3.43E-05	-0.002229	-7.19E-05	0.000234	-9.55E-06	-6.85E-05	-0.000792	-5.91E-05	1.47E-06	-6.09E-05	-0.000134	-7.54E-05	-0.000232	0.0040537	0.000282	-0.000399	5.67E-06	-0.002121	6.92E-05	0.000529	-4.95E-05	-3.04E-06	-0.000143	
6	-0.003495	-0.001398	-0.000496	-0.001533	-0.000873	-1.140571	-3.940048	-0.015418	-0.146816	-0.001878	-0.021274	-0.340201	-0.041439	-0.003235	-0.002619	-0.00645	-0.001328	-0.003179	-0.002815	0.0536878	0.000661	-0.092372	-0.002041	-0.011762	-0.006494	-0.001567	-0.001677	-0.001911	-0.009771
7	-9.18E-06	1.422E-05	-8.35E-05	-2.97E-05	-2.05E-05	-1.742064	-0.004147	-0.006077	3.5E-07	-8.07E-05	-0.003336	-0.001069	-7.47E-05	-1.57E-06	-0.001289	-0.000155	-6.08E-05	-0.000261	0.0051068	0.0004121	-0.000493	-0.000243	-0.000381	-0.002493	-0.000762	0.0003131	-9.67E-05	-0.00163	-0.002451
8	-0.000598	-0.001777	-0.000016	-0.00183	-0.001896	-0.001335	-0.00095	-1.064291	0.370524	-0.006373	-0.002735	-0.00423	-0.00095	-0.00238	-0.002807	-0.01337	-0.001737	-0.002495	-0.003782	0.0310278	0.0018741	-0.004963	-0.016389	-0.000384	-0.008937	-0.0016891	-0.001374	0.003606	-0.001235
9	-3.49E-05	-0.000896	-8.13E-05	-0.00183	-9.35E-05	-5.88E-05	-0.058813	-8.91E-05	-1.030717	-5.9E-05	-0.00028	-0.001825	-0.000231	-0.000189	-0.000468	-0.000439	-0.000478	-0.000157	-0.000793	0.010989	0.0010958	-0.0156	-0.000897	-0.002782	-0.007765	-0.035124	-0.0094	-0.002344	-0.000795
10	-0.001171	-0.001077	-0.004923	-0.001206	-0.043069	-0.004884	-0.077915	-0.004183	-0.018904	-1.319431	-0.293259	-0.037652	-0.007729	-0.022429	-0.00321	-0.021545	-0.003209	-0.003498	0.0932409	0.0012325	0.0073948	-0.076539	-0.005863	-0.005235	-0.007249	0.0005142	-0.002614	-0.007206	-0.013309
11	-0.000416	-0.000596	-0.001003	-0.00182	-0.002534	-0.001415	-0.049954	-0.00882	-0.00189	-0.01696	-0.01287	-0.002129	-0.002435	-0.003519	-0.001051	-0.001634	-0.00117	-0.00135	0.0002626	0.011391	0.005134	-0.049599	-0.00104	-0.001725	-0.001775	-0.002111	-0.002246	-0.008975	-0.01186
12	-3.27E-05	-0.001378	-0.000812	-0.00082	-0.000502	-0.004606	-0.027102	-0.01053	-0.002455	-0.001119	-0.00944	-0.004571	-1.02296	-0.002375	-0.00099	-0.003459	-0.001051	-0.00114	-0.002791	0.0017016	-0.024851	-0.015543	-0.00134	-0.003494	-0.002778	-0.016877	-0.002048	-0.001353	-0.003189
13	-0.000331	-0.001378	-0.000812	-0.00082	-0.000502	-0.004606	-0.027102	-0.01053	-0.002455	-0.001119	-0.00944	-0.004571	-1.02296	-0.002375	-0.00099	-0.003459	-0.001051	-0.00114	-0.002791	0.0017016	-0.024851	-0.015543	-0.00134	-0.003494	-0.002778	-0.016877	-0.002048	-0.001353	-0.003189
14	-0.016264	-0.011927	-0.015231	-0.020547	-0.017307	-0.049574	-0.280965	-0.021831	-0.167988	-0.03183	-0.115179	-0.542386	-0.075391	-1.11302	-0.017263	-0.03728	-0.07938	-0.033803	-0.016397	0.301155	0.0198664	-0.185734	-0.010705	-0.009443	-0.012288	0.006983	-0.012668	-0.013886	-0.027061
15	-0.01049	-0.024941	-0.015151	-0.035655	-0.009415	-0.019974	-0.437106	-0.016821	-0.049199	-0.035485	-0.03683	-0.082151	-0.127448	-0.062956	-1.689919	-0.141969	-0.04661	-0.028992	-0.017496	0.4636584	0.0303404	-0.074459	-0.021139	-0.038014	-0.211318	-0.04272	-0.26148	-0.02856	-0.034533
16	-0.000195	-0.001578	-0.002132	-0.024842	-0.000275	-0.000651	-0.002076	-0.000519	-0.002893	-0.000793	-0.000911	-0.003186	-0.000947	-0.005516	-0.001066	-1.053029	-0.002564	-0.001617	0.008096	0.0781408	0.036012	-0.035359	-0.037255	-0.002605	0.0013201	0.0081732	-0.001949	-0.005321	-0.002468
17	-0.000628	-0.012047	-0.002785	-0.002664	-0.000356	-0.000847	-0.008743	-0.003568	-0.02663	-0.001075	-0.003713	0.0001068	-0.000382	-0.001845	-0.008378	-0.006927	-1.187655	-0.231558	-0.212872	0.6352698	-0.02805	-0.099173	-0.023722	-0.005278	-0.004512	-0.060522	-0.005526	-0.009345	-0.005076
18	-0.001532	-0.006362	-0.000999	-0.021635	-0.00095	-0.001493	-0.025683	-0.013691	-0.071655	-0.004146	-0.019255	-0.012634	-0.002925	-0.010579	-0.009318	-0.00641	-0.045232	-1.049903	-0.132179	0.3319484	0.020746	-0.099173	-0.023722	-0.005278	-0.004512	-0.060522	-0.005526	-0.009345	-0.005076
19	-0.001563	-0.001187	-0.001899	-0.002387	-0.00044	-0.001482	-0.033762	-0.007411	-0.009863	-0.000909	-0.002385	-0.005949	-0.001064	-0.001176	-0.001587	-0.004658	-0.001507	-0.007182	-1.072922	0.2137943	0.025928	-0.012982	-0.001003	-0.009238	-0.015545	-0.159171	-0.008666	-0.003223	-0.003147
20	-0.0029433	0.0141704	0.0061832	0.0387165	0.0018981	0.003916	0.1521442	0.0057446	0.0246512	0.056688	0.0085894	0.0328321	0.0057229	0.0107942	0.0106313	0.0198988	0.0142144	0.0713122	0.4873304	2.419223	0.3991393	0.0639585	0.0163024	0.0272836	0.0857027	0.4682778	0.0176953	0.0119094	0.0215248
21	-0.000569	-0.002883	-0.001767	-0.001475	-0.000439	-0.000944	-0.031909	-0.001189	-0.002066	-0.00099	-0.001214	-0.002747	-0.001119	-0.001049	-0.002753	-0.001647	-0.005427	-0.001626	-0.000192	0.0510814	-1.226475	-0.008156	-0.001405	-0.005375	-0.049818	0.0044011	-0.001955	-0.001576	-0.007583
22	-0.000337	-0.002256	-0.00157	-0.004125	-0.000881	-0.001881	-0.041665	-0.00159	-0.006109	-0.004958	-0.003801	-0.013609	-0.002919	-0.0042	-0.003034	-0.00846	-0.015592	-0.011318	-0.001198	0.0005179	0.0002549	-1.12594	-0.040469	-0.006548	-0.002641	-0.037502	-0.007405	-0.007376	-0.005973
23	-0.000584	-0.002376	-0.000748	-0.000599	-0.000488	-0.000882	-0.001897	-0.00667	-0.001892	-0.001027	-0.001117	-0.00077	-0.000904	-0.000954	-0.00262	-0.002041	-0.001953	-0.001509	-0.000517	0.0080179	-0.000258	-0.001599	-1.04708	-0.001609	-0.001116	-0.002402	-0.002989	-0.009309	-0.00404
24	-0.004727	-0.00073	-0.029599	-0.401018	-0.023389	-0.029456	-0.010646	-0.041544	-0.11009	-0.021683	-0.04011	-0.344415	-0.04011	-0.028181	-0.006327	-0.038192	-0.071678	-0.050646	-0.059261	2.000416	0.1432369	-0.165909	-0.01078	-0.99272	0.0328088	0.2606931	-0.052024	0.000279	-0.009918
25	-0.002455	-0.003654	-0.006316	-0.003915	-0.00327	-0.005701	-0.065966	-0.009934	-0.009467	-0.004952	-0.006298	-0.021908	-0.006277	-0.007136	-0.004241	-0.006501	-0.009401	-0.008713	-0.038301	0.2222073	0.0216046	-0.016545	-0.027357	-0.053603	-1.04077	0.0023844	-0.006276	-0.038167	-0.04496
26	-0.001036	-0.001894	-0.002551	-0.004082	-0.002291	-0.002373	-0.073109	-0.002464	-0.00337	-0.003926	-0.007345	-0.015712	-0.004411	-0.004493	-0.00409	-0.00547	-0.005247	-0.003547	-0.014345	0.071934	0.048099	-0.001718	-0.00158	-0.018513	-0.004957	-0.03087	-0.015326	-0.014846	-0.007476
27	-0.003819	-0.009602	-0.008804	-0.03018	-0.004831	-0.011791	-0.155333	-0.007515	-0.042219	-0.039357	-0.0513	-0.027514	-0.04827	-0.013226	-0.005337	-0.055361	-0.049566	-0.048425	-0.011327	0.3166769	0.0191916	-0.046269	-0.002855	-0.004981	-0.000402	-0.0153078	-1.15892	-0.011245	-0.024661
28	-0.004762	-0.007646	-0.009122	-0.002093	-0.006419	-0.011485	-0.058041	-0.00944	-0.031861	-0.011693	-0.018444	-0.022093	-0.027711	-0.015554	-0.012245	-0.01216	-0.011069	-0.0033085	-0.009555	0.1253064	0.012934	-0.082045	-0.0136	-0.037693	-0.030412	-0.048277	-0.011353	-1.031814	-0.024078
29	-0.006538	-0.014027	-0.009134	-0.017691	-0.00661	-0.012602	-0.018749	-0.009369	-0.00866	-0.015635	-0.020104	-0.008389	-0.021218	-0.019425	-0.012381	-0.015275	-0.010862	-0.011303	0.0086315	0.1357059	0.0073476	-0.020261	-0.018036	-0.016695	-0.023738	-0.037117	-0.026542	-0.060138	-1.040805

2006

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
1	-1.05461	-0.01291	-0.75431	-0.10879	-0.27037	0.03507	-0.10948	-0.17255	-0.09604	-0.05467	-0.03792	-0.03548	-0.305	-0.08313	-0.01018	-0.02448	-0.07161	0.016071	-0.02078	-0.01518	-0.03385	-0.10094	-0.027405	-0.04252	-0.01922	-0.00785	-0.00473	-0.00686	-0.05522	
2	-0.037081	-1.112696	-0.04703	-0.084357	-0.054236	-0.112523	-0.07089	-0.09734	-0.078981	-0.10323	-0.08947	-0.101416	-0.14643	-0.195293	-0.742164	-0.341663	-0.369803	-0.514973	-0.272565	-0.075887	-0.119585	-0.146612	-0.159483	-0.046225	-0.215535	-0.037411	-0.047161	-0.028888	-0.031381	
3	-0.083758	-0.003652	-1.200723	-0.149838	-0.026848	-0.054523	-0.023158	-0.07872	-0.10168	-0.031796	-0.096887	-0.021114	-0.026514	-0.0096	-0.003608	-0.006484	-0.00957	-0.005142	-0.007063	-0.006383	-0.011104	-0.012977	-0.005405	-0.013564	-0.004854	-0.002039	-0.00051	-0.00715		
4	-0.001756	-0.00084	-0.015941	-1.163004	-0.002614	-0.00201	-0.001751	-0.003781	-0.002199	-0.004555	-0.003102	-0.001641	-0.002293	-0.002935	-0.001083	-0.001973	-0.002511	-0.002716	-0.002477	-0.002404	-0.004345	-0.002701	-0.004142	-0.008521	-0.001357	-0.001131	-0.000464	-0.00828	-0.010225	
5	-0.000161	-0.000169	-0.000469	-0.000466	-1.11193	-0.00053	-0.000448	-0.001017	-0.000575	-0.001233	-0.000779	-0.000494	-0.000441	-0.000506	-0.000234	-0.000489	-0.000666	-0.00044	-0.000652	-0.000632	-0.001192	-0.000331	-0.002527	-0.000279	-0.000919	-7.12E-05	-6.04E-05	-0.000184		
6	-0.008883	-0.004049	-0.011902	-0.010069	-0.01526	-1.423287	-0.37087	-0.027994	-0.067929	-0.048085	-0.040451	-0.621287	-0.054872	-0.012936	-0.00324	-0.015033	-0.004581	-0.007643	-0.011552	-0.006578	-0.007924	-0.00122	-0.000219	-0.001323	-0.000185	-0.004472	-0.000151	-0.000135	-5.22E-05	-0.000145
7	-6.15E-05	-0.000102	-0.000122	-0.00011	-0.000114	-0.00017	-1.007513	-0.040438	-0.001963	-0.000241	-0.000185	-0.011064	-0.00353	-0.013018	-0.007394	-0.018877	-0.00718	-0.021294	-0.0143	-0.005304	-0.005029	-0.003488	-0.002494	-0.00185	-0.004472	-0.000151	-0.000135	-5.22E-05	-0.000145	
8	-0.003122	-0.010214	-0.003724	-0.009063	-0.008905	-0.006948	-0.006332	-1.052786	-0.450194	-0.027399	-0.017698	-0.011064	-0.00353	-0.013018	-0.007394	-0.018877	-0.00718	-0.021294	-0.0143	-0.005304	-0.005029	-0.003488	-0.002494	-0.00185	-0.004472	-0.000151	-0.000135	-5.22E-05	-0.000145	
9	-0.001063	-0.007312	-0.001947	-0.010477	-0.003389	-0.005167	-0.006585	-0.006182	-1.0368	-0.010667	-0.013146	-0.01365	-0.020161	-0.0056	-0.005315	-0.008296	-0.007336	-0.003488	-0.002494	-0.00185	-0.004472	-0.000219	-0.001323	-0.000185	-0.004472	-0.000151	-0.000135	-5.22E-05	-0.000145	
10	-0.009635	-0.025566	-0.02168	-0.044607	-0.214288	-0.035004	-0.027022	-0.038009	-0.031255	-1.325067	-0.429168	-0.031629	-0.023027	-0.080309	-0.023078	-0.047925	-0.02582	-0.042973	-0.039516	-0.018051	-0.062509	-0.038916	-0.009674	-0.018671	-0.013012	-0.013896	-0.01927	-0.02729		
11	-0.001794	-0.02413	-0.004044	-0.010808	-0.020051	-0.004134	-0.003647	-0.003472	-0.003754	-0.054475	-1.046015	-0.003262	-0.003076	-0.008814	-0.002622	-0.004155	-0.002851	-0.003296	-0.004026	-0.002856	-0.002141	-0.005364	-0.002382	-0.001222	-0.004124	-0.004029	-0.001828	-0.023926	-0.01209	
12	-0.000546	-0.00691	-0.000739	-0.00126	-0.001557	-0.066853	-0.06472	-0.001941	-0.049662	-0.005481	-0.00383	-1.066334	-0.02851	-0.001555	-0.000533	-0.002071	-0.000689	-0.000911	-0.001157	-0.000556	-0.000689	-0.013086	-0.00104	-0.000494	-0.001275	-0.000602	-0.000278	-0.000382	-0.001696	
13	-0.001072	-0.007085	-0.002377	-0.001953	-0.001586	-0.016756	-0.013755	-0.003372	-0.003663	-0.003158	-0.007354	-0.021714	-1.146713	-0.002818	-0.004982	-0.006151	-0.005337	-0.005342	-0.00967	-0.003116	-0.003806	-0.004597	-0.007082	-0.002539	-0.002959	-0.002095	-0.00249	-0.000717	-0.002532	
14	-0.003029	-0.064581	-0.078513	-0.094691	-0.118826	-0.099103	-0.070051	-0.135545	-0.119401	-0.130193	-0.239171	-0.083108	-0.06809	-1.46165	-0.055595	-0.196262	-0.061109	-0.087308	-0.062172	-0.042085	-0.053075	-0.144134	-0.049875	-0.016902	-0.03425	-0.020977	-0.019556	-0.02272	-0.055318	
15	-0.055507	-0.170005	-0.061237	-0.113807	-0.074895	-0.170991	-0.096019	-0.141585	-0.112877	-0.13775	-0.125009	-0.135073	-0.23432	-0.319557	-1.287982	-0.356363	-0.384879	-0.07819	-0.316566	-0.04395	-0.132574	-0.185069	-0.166026	-0.042406	-0.48847	-0.04553	-0.112295	-0.044876	-0.04669	
16	-0.001034	-0.008566	-0.006025	-0.067691	-0.00293	-0.037101	-0.039405	-0.00446	-0.009745	-0.006299	-0.013234	-0.106752	-0.056236	-0.009431	-0.006224	-1.099501	-0.006893	-0.007046	-0.015895	-0.008072	-0.006128	-0.022386	-0.076539	-0.003715	-0.003583	-0.003656	-0.00258	-0.006149	-0.006382	
17	-0.002687	-0.034228	-0.004061	-0.006498	-0.005544	-0.006011	-0.005995	-0.00666	-0.026937	-0.015908	-0.011339	-0.007195	-0.021957	-0.011428	-0.022438	-0.018354	-1.417494	-0.116722	-0.188419	-0.037034	-0.144478	-0.026676	-0.167938	-0.05562	-0.024764	-0.008582	-0.007541	-0.00237	-0.003672	
18	-0.008998	-0.033691	-0.019365	-0.018407	-0.013862	-0.013315	-0.013445	-0.019911	-0.023995	-0.03447	-0.024471	-0.020639	-0.021775	-0.017841	-0.028654	-0.029667	-0.125272	-1.147361	-0.226264	-0.050057	-0.061044	-0.044515	-0.097688	-0.008251	-0.0295	-0.022814	-0.014215	-0.003993	-0.006552	
19	-0.001312	-0.002759	-0.002018	-0.002694	-0.001457	-0.003413	-0.001732	-0.001833	-0.002816	-0.002248	-0.009326	-0.002538	-0.003863	-0.001451	-0.002039	-0.001872	-0.002248	-0.002894	-1.051761	-0.002093	-0.049814	-0.003246	-0.001156	-0.0018	-0.010011	-0.001238	-0.001041	-0.001015	-0.001605	
20	-0.028885	-0.064603	-0.023891	-0.050923	-0.026099	-0.039866	-0.158387	-0.043843	-0.050962	-0.016879	-0.032152	-0.0351	-0.028093	-0.043321	-0.049613	-0.059147	-0.053283	-0.074296	-0.093349	-2.847769	-0.32007	-0.098636	-0.054278	-0.02755	-0.147744	-0.32762	-0.098653	-0.017335	-0.041406	
21	-0.000269	-0.00136	-0.000527	-0.000378	-0.00027	-0.000455	-0.000568	-0.000713	-0.000483	-0.000631	-0.000645	-0.000428	-0.000642	-0.000624	-0.000981	-0.006642	-0.005566	-0.000448	-0.000778	-0.000659	-1.076934	-0.000454	-0.000653	-0.000811	-0.009467	-0.000678	-0.000712	-0.000274	-0.000496	
22	-0.001054	-0.004939	-0.001919	-0.003535	-0.006084	-0.003113	-0.007245	-0.005079	-0.04098	-0.009384	-0.019681	-0.005917	-0.00654	-0.004902	-0.003767	-0.006749	-0.009718	-0.009521	-0.0077	-0.003196	-0.001991	-1.124491	-0.0041	-0.001064	-0.003974	-0.002675	-0.002582	-0.002395	-0.000817	
23	1.48E-05	-0.000187	-0.000132	-9.42E-05	-1.04E-05	-7.07E-05	-9E-05	1.708E-05	-9.15E-05	-4.88E-05	-0.000172	-6.68E-05	-0.000157	-9.46E-05	-0.00081	-0.000523	-0.000327	-0.000314	-0.000316	-0.000232	-0.00014	-0.000227	-1.001685	-0.000669	5.89E-05	-9.88E-05	-0.000591	-0.002117	-0.000211	
24	-0.074067	-0.084563	-0.071609	-0.22894	-0.31587	-0.261333	-0.221867	-0.049466	-0.288024	-0.599477	-0.394228	-0.246699	-0.242652	-0.248898	-0.110768	-0.241507	-0.327447	-0.271697	-0.320148	-0.341055	-0.573382	-0.345591	-0.165591	-1.275457	-0.136358	-0.099999	-0.037531	-0.028603	-0.063138	
25	-0.019482	-0.03201	-0.019546	-0.021006	-0.02123	-0.009576	-0.021825	-0.033174	-0.023847	-0.021603	-0.024156	-0.017271	-0.019507	-0.025259	-0.026995	-0.029184	-0.025433	-0.05438	-0.049932	-0.031366	-0.002726	-0.006521	-0.032416	-0.047719	-0.023732	-0.021246	-0.020649	-0.015916		
26	-0.003064	-0.002276	-0.001653	-0.035592	-0.025302	-0.023943	-0.025183	-0.032687	-0.023021	-0.041218	-0.029339	-0.028009	-0.038353	-0.02804	-0.019334	-0.0272	-0.025001	-0.028048	-0.032095	-0.066719	-0.04684	-0.003461	-0.015354	-0.029979	-0.021969	-1.065313	-0.01884	-0.022314	-0.029381	
27	-0.012945	-0.044234	-0.020657	-0.043342	-0.031746	-0.044411	-0.067313	-0.029525	-0.03868	-0.055969	-0.064028	-0.043782	-0.026867	-0.039923	-0.031613	-0.083449	-0.07936	-0.075844	-0.062782	-0.062431	-0.036381	-0.042851	-0.003838	-0.008763	-0.025688	-0.027319	-1.180147	-0.019849	-0.056664	
28	-0.008086	-0.021636	-0.021467	-0.038521	-0.028938	-0.038997	-0.03227	-0.026175	-0.057173	-0.044699	-0.030795	-0.029401	-0.024043	-0.025681	-0.020995	-0.028137	-0.026222	-0.028019	-0.038171	-0.03008	-0.025477	-0.036531	-0.021695	-0.029172	-0.083331	-0.087809	-0.020305	-1.20439	-0.074693	
29	-0.013125	-0.027217	-0.014456	-0.032552	-0.01546	-0.017808	-0.01897	-0.016516	-0.014681	-0.027626	-0.035574	-0.013778	-0.022901	-0.022381	-0.022666	-0.02815	-0.026993	-0.029303	-0.025117	-0.021316	-0.025154	-0.019768	-0.024425	-0.011284	-0.044229	-0.047792	-0.019771	-0.06622	-1.063851	

Appendix 8
Residual Matrix, Philippines
1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	0.00761	0.48584	0.11314	0.12657	0.07517	0.04571	0.4513	0.22587	0.02311	0.01477	0.12063	0.13908	0.05459	0.00644	0.01073	0.00587	0.00647	0.00867	0.01464	0.01089	0.0633	0.04371	0.00383	0.02195	0.0048	0.00907	0.00794	0.06048	2.16218	
2	0.01939	0	0.03523	0.04844	0.02742	0.04099	0.03131	0.04935	0.0426	0.09933	0.05462	0.04082	0.06064	0.07027	0.5782	0.21464	0.23804	0.12637	0.09681	0.07559	0.04552	0.05116	0.08533	0.02098	0.11632	0.01756	0.27025	0.00922	0.01914	2.59355	
3	0.06701	0.06622	0	0.28663	0.0183	0.02931	0.08918	0.03726	0.02496	0.0141	0.01636	0.28336	0.0395	0.11084	0.00654	0.01119	0.00757	0.00847	0.00872	0.01325	0.00819	0.0432	0.0123	0.00395	0.02225	0.00603	0.00615	0.06062	0.09024	1.25909	
4	0.00011	0.00014	0.00012	0	0.00017	0.00016	0.00014	0.00016	0.00014	0.00023	0.00025	0.00012	0.00023	0.00036	0.00018	0.00027	0.00017	0.00018	0.00018	0.0003	0.00018	0.00024	0.00023	0.00015	0.00085	0.0002	0.00015	0.00022	0.00361	0.00946	
5	3.7E-06	9.6E-08	1.9E-06	3E-07	0	2E-07	2.2E-07	1.2E-06	2.6E-07	7.2E-08	6.5E-08	4.9E-07	3.5E-07	8.3E-07	6.4E-08	8.3E-08	4.1E-08	5.8E-08	5.9E-08	7.9E-08	4.2E-08	1.8E-07	1.6E-07	3.6E-08	8.9E-08	3.3E-08	4.3E-08	4E-08	2.5E-07	1.1E-05	
6	0.00166	0.00116	0.00752	0.00266	0.0039	0	0.09938	0.00567	0.06555	0.02472	0.0129	0.03413	0.09834	0.00345	0.00105	0.00379	0.00092	0.00178	0.00242	0.0036	0.00476	0.0432	0.00261	0.00126	0.00531	0.00174	0.00093	0.0015	0.00789	0.44381	
7	2.9E-06	2.4E-06	2.4E-06	4.2E-06	3.5E-06	2.4E-06	0	7.5E-06	4.3E-06	3.4E-06	3.8E-06	2.1E-06	1.4E-05	4.3E-06	3.2E-06	4.8E-06	2.7E-06	2.9E-06	2.6E-06	5.5E-06	3E-06	3.7E-06	4E-06	2.4E-06	3.5E-06	3.6E-06	2.4E-06	4.1E-06	7.2E-05	0.00018	
8	0.00173	0.00202	0.00145	0.00226	0.00231	0.00143	0.00236	0	0.41279	0.00549	0.00252	0.00161	0.00141	0.00222	0.00135	0.00454	0.00152	0.00189	0.00394	0.01254	0.00235	0.00603	0.07058	0.00142	0.00157	0.00089	0.00104	0.00898	0.00236	0.56057	
9	0.00023	7.5E-05	0.00017	0.00026	0.00011	0.00035	0.00062	0.00099	0	0.00016	0.00011	0.00035	0.00015	0.00015	7E-05	0.00378	0.00011	0.00019	0.00027	0.00091	0.00019	0.00015	0.00018	0.00032	0.0003	0.00085	0.00025	0.00017	7.7E-05	0.00246	0.02146
10	0.00641	0.00409	0.01355	0.01836	0.10896	0.01934	0.02579	0.01056	0.01301	0	0.51918	0.01379	0.01881	0.03327	0.00547	0.04907	0.0071	0.01013	0.01253	0.02441	0.00674	0.03882	0.01499	0.01901	0.01097	0.03241	0.00757	0.01244	0.01778	1.07454	
11	0.00099	0.00114	0.00204	0.00509	0.00393	0.00334	0.00526	0.00236	0.0027	0.00735	0	0.00228	0.00551	0.0081	0.00123	0.00307	0.00173	0.00228	0.00245	0.00458	0.00218	0.00473	0.00308	0.00429	0.00512	0.01302	0.00318	0.00729	0.00596	0.11426	
12	1.2E-05	7.5E-05	3.8E-05	2.7E-05	2.8E-05	0.00528	0.30577	0.00042	0.00114	0.00012	0.00106	0	0.00132	5.3E-05	4.6E-05	5.1E-05	2.6E-05	4.8E-05	4.1E-05	5.2E-05	0.00023	0.0008	5.7E-05	1.6E-05	6.8E-05	2.7E-05	2.7E-05	9.7E-05	0.31695		
13	0.00106	0.00395	0.00173	0.00184	0.00149	0.00181	0.00982	0.00219	0.01836	0.00285	0.0026	0.00536	0	0.00243	0.00327	0.00311	0.00253	0.00229	0.01526	0.00482	0.04419	0.00344	0.00524	0.00307	0.03251	0.00234	0.00236	0.00087	0.00244	0.18322	
14	0.88327	0.0392	0.05385	0.03177	0.03621	0.17717	0.09093	0.08647	0.10482	0.08969	0.13374	0.13284	0.35273	0	0.02866	0.05807	0.04784	0.05706	0.05789	0.07718	0.04753	0.41999	0.06523	0.00955	0.02711	0.01896	0.03483	0.00996	0.03757	2.41013	
15	0.03314	0.11015	0.06079	0.07972	0.04896	0.08561	0.05413	0.08639	0.0628	0.17643	0.09519	0.07067	0.09734	0.0965	0	0.26162	0.14838	0.11638	0.09813	0.09863	0.05372	0.07626	0.08284	0.03785	0.21189	0.02988	0.49648	0.01405	0.03272	2.91665	
16	0.00138	0.00134	0.00155	0.00464	0.00091	0.00226	0.00148	0.00189	0.00492	0.00279	0.00231	0.00192	0.00381	0.01217	0.00105	0	0.00419	0.00327	0.00261	0.01002	0.0023	0.00898	0.0823	0.00109	0.00148	0.00127	0.00544	0.00529	0.00287	0.22054	
17	0.0048	0.06549	0.0185	0.02029	0.00547	0.00789	0.0103	0.01902	0.08299	0.02682	0.01582	0.01075	0.01521	0.01954	0.03672	0.03863	0	0.6949	0.48602	0.18776	0.17551	0.05053	0.19673	0.00345	0.01914	0.01115	0.02478	0.00567	0.0063	2.26018	
18	0.0036	0.01606	0.01243	0.02089	0.00359	0.00524	0.01038	0.00545	0.02356	0.02012	0.01259	0.00871	0.01549	0.0183	0.00985	0.00999	0.01677	0	0.05679	0.17542	0.01774	0.05045	0.07652	0.00199	0.00791	0.01252	0.0109	0.00469	0.00457	0.63252	
19	0.0143	0.0069	0.0017	0.00313	0.00103	0.00158	0.00086	0.00259	0.00207	0.00626	0.00514	0.00126	0.00219	0.00183	0.00389	0.00342	0.00201	0.00191	0	0.00339	0.00272	0.00126	0.00292	0.00669	0.00109	0.00041	0.00212	0.0007	0.00083	0.06531	
20	0.00086	0.00262	0.00118	0.00143	0.0013	0.00139	0.00125	0.00135	0.00126	0.0051	0.00329	0.00127	0.00204	0.0023	0.00177	0.002	0.00254	0.00837	0.02456	0	0.00435	0.00302	0.01925	0.00109	0.00691	0.0269	0.01259	0.00138	0.00208	0.14343	
21	0.00161	0.00172	0.00255	0.0087	0.00452	0.00233	0.00184	0.00265	0.00228	0.00981	0.00486	0.00228	0.00343	0.00274	0.00184	0.00303	0.00241	0.00246	0.00355	0.00556	0	0.00297	0.00321	0.00118	0.04393	0.0019	0.00158	0.00067	0.00213	0.12775	
22	0.00132	0.00724	0.00247	0.00287	0.003	0.02871	0.04026	0.00314	0.00545	0.00748	0.00781	0.01803	0.01353	0.01031	0.0045	0.0174	0.00408	0.00732	0.00698	0.01026	0.00524	0	0.00473	0.00091	0.00217	0.00154	0.00266	0.00192	0.005	0.22634	
23	0.00076	0.00772	0.00175	0.00215	0.00186	0.00153	0.00156	0.00175	0.0017	0.00574	0.00381	0.00167	0.00222	0.00262	0.00508	0.00505	0.00653	0.00457	0.00381	0.00415	0.00283	0.00293	0	0.00359	0.00258	0.00229	0.00367	0.00868	0.00652	0.09912	
24	0.06	0.05412	0.14368	0.1296	0.18621	0.14276	0.17376	0.17132	0.17301	0.14838	0.13662	0.23011	0.17684	0.17864	0.08732	0.13636	0.15991	0.15845	0.15067	0.15245	0.12563	0.16207	0.10458	0	0.11095	0.03882	0.11398	0.01683	0.04133	3.6644	
25	0.01658	0.01594	0.02959	0.02658	0.02237	0.03325	0.02726	0.03764	0.03908	0.05298	0.03009	0.02411	0.04681	0.03853	0.0254	0.04299	0.03861	0.03824	0.05533	0.04971	0.0437	0.04729	0.03384	0.01743	0	0.01276	0.02428	0.00804	0.01443	0.88466	
26	0.00169	0.00221	0.00327	0.00351	0.00301	0.00492	0.00445	0.00419	0.00551	0.00443	0.0085	0.0048	0.00532	0.00606	0.00268	0.0045	0.00461	0.00554	0.00696	0.00768	0.00399	0.00804	0.00532	0.0078	0.00713	0	0.00248	0.00794	0.01041	0.14694	
27	0.00625	0.01125	0.01392	0.01858	0.01668	0.02495	0.01849	0.01777	0.01765	0.02716	0.04927	0.024	0.03108	0.0323	0.01212	0.04014	0.03717	0.03088	0.02805	0.03637	0.01579	0.03169	0.01656	0.02417	0.00986	0.01519	0	0.01409	0.02542	0.69185	
28	0.01222	0.01771	0.02506	0.03128	0.03143	0.03484	0.03171	0.03381	0.03748	0.05107	0.04871	0.03425	0.04621	0.0599	0.02322	0.03678	0.04337	0.04918	0.04993	0.0727	0.02989	0.05771	0.03373	0.06429	0.03639	0.03735	0.0216	0	0.1772	1.22903	
29	0.01483	0.03437	0.02243	0.05921	0.0479	0.03248	0.02961	0.03249	0.03908	0.04991	0.0557	0.02512	0.048	0.06124	0.04715	0.07088	0.03879	0.04124	0.03837	0.07507	0.04192	0.05273	0.05504	0.03491	0.04385	0.05733	0.03424	0.05991	0	1.2311	
SUM		0.34235	0.42042	0.94241	0.95007	0.70762	0.77208	1.11362	1.06821	1.39459	0.90664	1.23781	1.09424	1.22774	0.82871	0.89512	1.03512	0.82277	1.37984	1.22094	1.13003	0.69827	1.23098	1.0227	0.26828	0.7496	0.34294	1.09256	0.21442	0.57964	25.6892

1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	0.0106	0.49468	0.10879	0.12489	0.07188	0.0476	0.43456	0.20601	0.02196	0.01468	0.12279	0.13223	0.07926	0.00813	0.01246	0.00541	0.00713	0.00902	0.001545	0.01091	0.05646	0.04378	0.00479	0.02228	0.00541	0.0092	0.00846	0.06196	2.150785	
2	0.01793	0	0.03254	0.04518	0.02548	0.04479	0.0281	0.04555	0.03876	0.09161	0.05058	0.03717	0.05573	0.06603	0.58821	0.20765	0.21294	0.11546	0.08877	0.07079	0.04256	0.0483	0.08042	0.01889	0.10517	0.01577	0.24086	0.00869	0.01769	2.421607	
3	0.06106	0.00577	0	0.24912	0.01764	0.02643	0.0887	0.03485	0.02319	0.01491	0.01603	0.27585	0.03644	0.09775	0.00611	0.01052	0.00725	0.00812	0.00839	0.01236	0.00785	0.04091	0.01184	0.00442	0.02246	0.00606	0.00613	0.006	0.08737	1.193494	
4	0.0002	0.0003	0.00027	0	0.00019	0.00031	0.00034	0.00031	0.00021	0.00052	0.00067	0.00022	0.00036	0.0006	0.00032	0.00045	0.00029	0.00032	0.00032	0.00048	0.00034	0.00034	0.00052	0.00041	0.00116	0.00045	0.00041	0.00047	0.00579	0.016561	
5	1.7E-05	7.6E-07	1E-05	9.9E-07	0	6.6E-07	1.3E-06	3.9E-06	-1E-06	3E-07	3.7E-07	2.7E-06	1.1E-06	6.7E-06	4.8E-07	5.9E-07	2.8E-07	4.3E-07	4E-07	5E-07	2.1E-07	6.7E-07	7.8E-07	2.7E-07	4.8E-07	2.3E-07	2.5E-07	2.4E-07	1.4E-06	5.26E-05	
6	0.00258	0.00201	0.00846	0.00264	0.00373	0	0.09254	0.00542	0.06157	0.02178	0.01532	0.03759	0.10263	0.00363	0.00148	0.00378	0.00097	0.00377	0.00266	0.00387	0.00485	0.03951	0.00287	0.00167	0.00595	0.00189	0.00111	0.00139	0.00739	0.44308	
7	2.7E-06	2.8E-06	2.6E-06	4.4E-06	3.4E-06	2.8E-06	0	7.6E-06	4.1E-06	3.8E-06	3.9E-06	3.6E-06	9.9E-05	4.6E-06	3.6E-06	4.9E-06	3E-06	3.3E-06	2.5E-06	8.3E-06	3.8E-06	4E-06	3.9E-06	2.7E-06	7.5E-06	3.9E-06	3.4E-06	3.9E-06	6.7E-05	0.000271	
8	0.00186	0.00266	0.00165	0.0033	0.003	0.00181	0.00306	0	0.3679	0.06621	0.0026	0.00302	0.00151	0.00227	0.00173	0.00562	0.0025	0.00331	0.00841	0.01148	0.00246	0.00656	0.0679	0.00159	0.00163	0.00087	0.00109	0.00875	0.00234	0.527083	
9	0.0002	8.7E-05	0.00015	0.00024	0.00011	0.00032	0.00054	0.00086	0	0.00015	0.00012	0.00031	0.00014	0.00014	7.9E-05	0.00335	0.00011	0.00018	0.00024	0.01103	0.00019	0.00017	0.00158	0.00031	0.00032	0.00035	0.00018	0.0002	0.00021	0.021879	
10	0.00568	0.00451	0.01305	0.02009	0.10033	0.01866	0.02627	0.01144	0.01254	0	0.4887	0.01408	0.01933	0.03451	0.00587	0.05352	0.00771	0.01089	0.01238	0.0253	0.00672	0.03995	0.01615	0.01858	0.01079	0.03058	0.00808	0.01197	0.01701	1.046459	
11	0.00094	0.00141	0.00233	0.00567	0.00433	0.0037	0.00636	0.0027	0.00301	0.00782	0	0.0026	0.00654	0.00916	0.00151	0.0036	0.00226	0.00293	0.00291	0.00469	0.00249	0.00651	0.00328	0.00427	0.00527	0.01328	0.00406	0.00698	0.00688	0.127512	
12	8.2E-06	9.3E-05	3.1E-05	2.5E-05	0.00449	0.31438	0.00036	0.00102	0.00012	0.00095	0	0.00117	5E-05	5.3E-05	5.2E-05	3.3E-05	4.6E-05	0.00279	0.00267	0.01426	0.00718	0.04174	0.00359	0.00499	0.00331	0.00339	0.0027	0.00321	0.0009	0.0025	0.324337
13	0.0011	0.0042	0.00197	0.00213	0.00156	0.0022	0.01506	0.00296	0.01697	0.00316	0.0028	0.00642	0	0.00286	0.00363	0.00321	0.00279	0.00267	0.01426	0.00718	0.04174	0.00359	0.00499	0.00331	0.00339	0.0027	0.00321	0.0009	0.0025	0.193977	
14	0.07531	0.04201	0.05284	0.03589	0.03558	0.1722	0.0877	0.08212	0.10223	0.08254	0.12465	0.13066	0.3334	0	0.02998	0.05835	0.04223	0.05378	0.05372	0.0757	0.04536	0.38593	0.06252	0.00993	0.02599	0.01851	0.03257	0.01028	0.03714	2.298109	
15	0.03056	0.09997	0.0547	0.07258	0.04514	0.07754	0.04766	0.0794	0.05756	0.16085	0.08747	0.06303	0.08778	0.08743	0	0.24177	0.13795	0.10627	0.08984	0.08936	0.00884	0.06976	0.07712	0.03363	0.19007	0.02634	0.43897	0.01327	0.02976	2.644601	
16	0.00129	0.00173	0.00212	0.0519	0.00089	0.00222	0.00167	0.00202	0.00487	0.00303	0.00238	0.0023	0.00378	0.01198	0.00147	0	0.00476	0.00378	0.00316	0.01156	0.00269	0.01262	0.08495	0.00145	0.00161	0.00148	0.00646	0.00554	0.00342	0.237127	
17	0.00461	0.0674	0.01732	0.01918	0.00511	0.00729	0.00979	0.01745	0.08397	0.02483	0.01488	0.01044	0.01415	0.01841	0.03732	0.03719	0	0.66085	0.45969	0.17572	0.15619	0.05166	0.18913	0.0033	0.01753	0.01047	0.02574	0.00593	0.00591	2.151461	
18	0.0035	0.0208	0.01321	0.02091	0.0034	0.00501	0.01076	0.00561	0.02636	0.01813	0.01234	0.01	0.01435	0.01787	0.01319	0.01116	0.02283	0	0.06882	0.16645	0.01733	0.05241	0.07967	0.00207	0.00787	0.0122	0.01098	0.00474	0.00474	0.656682	
19	0.00131	0.00811	0.00166	0.00283	0.00098	0.00151	0.00097	0.00244	0.00223	0.00566	0.0048	0.00121	0.00215	0.00181	0.00454	0.00347	0.00176	0.00187	0	0.00336	0.00241	0.0013	0.00263	0.00061	0.00097	0.0004	0.00195	0.00066	0.00083	0.064426	
20	0.00086	0.00305	0.00124	0.00149	0.00128	0.00143	0.00137	0.00147	0.00135	0.00488	0.00333	0.0014	0.00201	0.00243	0.00204	0.00214	0.00265	0.0078	0.0222	0	0.00516	0.00436	0.01979	0.00128	0.00727	0.03019	0.01199	0.00148	0.00229	0.14823	
21	0.00167	0.00328	0.00271	0.00763	0.00415	0.00246	0.0022	0.00292	0.00244	0.0088	0.00496	0.00235	0.00366	0.00302	0.00293	0.0033	0.0026	0.00275	0.00395	0.00534	0	0.00295	0.00323	0.00169	0.04452	0.00237	0.00194	0.00091	0.00217	0.132899	
22	0.00122	0.00767	0.00307	0.00367	0.0029	0.02525	0.0393	0.00395	0.00697	0.01155	0.00746	0.02212	0.01272	0.01059	0.00499	0.01837	0.01555	0.013	0.00977	0.01018	0.00391	0	0.00626	0.00096	0.00215	0.00165	0.0032	0.00189	0.005	0.254429	
23	0.00074	0.00703	0.00179	0.0022	0.00182	0.00169	0.00166	0.00182	0.00184	0.00532	0.00378	0.00166	0.00244	0.00265	0.00633	0.00557	0.0068	0.00482	0.00436	0.00411	0.00328	0.00324	0	0.0044	0.00255	0.00243	0.00384	0.0124	0.00562	0.106219	
24	0.05478	0.0559	0.13853	0.1221	0.17116	0.13887	0.16265	0.16412	0.16317	0.14757	0.1326	0.21193	0.1665	0.16742	0.08189	0.13319	0.15784	0.15712	0.14626	0.14625	0.12845	0.15387	0.10585	0	0.10253	0.03732	0.01831	0.01662	0.04071	3.513533	
25	0.01566	0.01762	0.0303	0.02564	0.02126	0.03201	0.02679	0.04013	0.02978	0.05045	0.03112	0.02362	0.04387	0.03827	0.02577	0.04179	0.03859	0.03902	0.05268	0.04782	0.04021	0.04468	0.03377	0.02087	0	0.01614	0.02522	0.00867	0.01506	0.876818	
26	0.0017	0.00238	0.00336	0.00349	0.00296	0.00497	0.00486	0.00403	0.00549	0.00503	0.00936	0.00454	0.0054	0.00661	0.00282	0.00456	0.0047	0.00558	0.00674	0.0072	0.00436	0.00761	0.00516	0.008	0.00742	0	0.00295	0.00788	0.00969	0.148642	
27	0.00583	0.01224	0.01303	0.01755	0.01559	0.02505	0.01867	0.01737	0.01817	0.06461	0.0445	0.0225	0.03082	0.03032	0.01191	0.04093	0.03608	0.02981	0.0275	0.03412	0.01526	0.03003	0.016	0.02228	0.01004	0.01526	0	0.01281	0.03248	0.146275	
28	0.01203	0.01937	0.02622	0.03121	0.03023	0.03581	0.03327	0.03441	0.03653	0.05089	0.04725	0.03281	0.04444	0.05767	0.02517	0.013807	0.04342	0.04959	0.04921	0.06868	0.03344	0.05516	0.03455	0.016	0.02228	0.01004	0.01526	0	0.01281	0.03248	0.146275
29	0.01625	0.03723	0.02491	0.0608	0.04522	0.03539	0.03405	0.03466	0.03088	0.05607	0.06573	0.02628	0.04898	0.06055	0.04841	0.07207	0.04017	0.04328	0.04056	0.07608	0.04486	0.05227	0.061	0.04146	0.04712	0.05739	0.04059	0.06453	0	1.311323	
SUM	0.31889	0.43743	0.94216	0.91627	0.68896	0.74329	1.10542	1.03228	1.30502	0.86846	1.19007	1.0669	1.17264	0.81734	0.89589	1.01616	0.8002	1.33413	1.18488	1.08461	0.67206	1.17097	1.01501	0.28438	0.71243	0.34516	1.01284	0.22145	0.5501	24.88541	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	0.0012739	0.1463549	0.0079901	0.0012393	-0.000354	0.0079798	0.1114567	0.1142432	0.0090814	0.0015882	-0.009753	0.0346277	-0.004083	-0.000598	-0.000594	-0.00463	-0.001462	-0.00184	-0.000219	-0.001221	0.0043603	0.0059361	0.0044208	0.0035455	0.001809	0.0341116	0.0002416	0.0097493	0.4895509	
2	0.0008897	0	0.0004919	0.0021656	0.0003149	-0.000818	0.0056222	0.0007241	0.002371	-0.000496	0.0011528	-0.000364	0.0007278	0.009174	0.0935557	0.0317747	0.0688012	0.0554567	-0.00013	0.0045029	0.000483	0.0298277	0.0087796	0.0008562	0.0106324	0.0032008	0.0102023	0.0009533	0.0035161	0.2961969	
3	0.0116243	0.0012439	0	0.0540682	0.0007412	-0.000212	-0.003915	0.0014141	0.0042747	0.0033082	0.0010057	-0.000993	0.0017526	0.0003911	-0.0003911	-0.000189	-0.000224	-0.00041	-0.00047	0.0003166	0.0003902	0.0008824	-6.16E-05	0.0009284	0.0029392	0.0003427	0.0003139	0.0001255	0.017218	0.1034228	
4	-4.14E-05	-5.46E-05	0	0.000442	0	0.000442	-0.000106	2.80E-05	-4.77E-05	-0.000154	-0.000154	-7.52E-05	-6.68E-05	-0.000127	-9.15E-05	-0.000121	-9.27E-05	-0.000111	-0.000107	-0.00011	-0.00011	-8.43E-05	-0.000151	-9.78E-05	-6.32E-05	-5.87E-05	-8.85E-05	-3.29E-05	0.0004696	-0.00132	
5	-5.19E-06	2.57E-06	-3.85E-06	1.50E-06	0	-2.25E-07	6.10E-06	-2.02E-06	1.26E-06	3.78E-06	-1.19E-06	-1.19E-06	-6.47E-09	-8.5E-07	8.03E-07	1.369E-06	8.036E-07	4.48E-07	2.326E-07	2.078E-06	5.038E-07	7.429E-07	8.271E-07	1.942E-06	7.927E-06	5.298E-06	2.045E-06	8.054E-06	0.0001564	0.0001925	
6	0.000628	0.0004682	0.0007293	0.0002133	9.57E-05	0	1.217126	0.0001028	0.0389631	-9.18E-05	0.0010197	0.0163244	-0.0052701	0.0010538	-7.58E-05	0.00062	0.0004159	-0.000563	-0.000108	0.0005931	0.0007099	0.0470153	-8.89E-05	0.0074659	0.0021891	0.0008449	0.0001861	0.0019666	0.0089551	1.450533	
7	5.83E-05	0.0001328	0.0001889	0.0001741	0.0001506	0.000147	0	0.0001636	0.000357	0.0001829	0.0003437	0.000127	0.000669	0.0001504	8.97E-05	0.0001462	0.0003033	0.0001369	7.279E-05	0.0003701	0.0008035	0.0002159	8.427E-05	0.0069554	0.0002376	0.0001386	0.0001629	5.87E-05	0.0017345	0.0142643	
8	0.000483	0.0053905	0.0001044	-0.000322	-0.00029	-0.000142	0.0004488	0	0.0170104	-3.48E-05	0.0001353	-0.000402	0.0002175	0.000881	0.0004838	-0.0001735	0.0002805	-0.000421	-0.001466	0.0006525	-0.000126	0.0005215	0.014539	0.0030008	8.39E-05	0.0001131	0.00022	0.00010314	0.0005881	0.130442	
9	-1.63E-06	-6.97E-07	-5.47E-06	-5.86E-06	-3.05E-06	5.05E-06	6.04E-05	-6.33E-07	0	-1.05E-05	1.42E-06	0.0001233	0.0003649	-9.41E-06	-7.73E-06	-4.4E-05	-8.47E-06	-1.17E-05	-1.37E-05	-0.000668	1.44E-05	0.0002051	-3.38E-05	-9.32E-06	6.565E-06	-1.92E-05	-8.83E-06	-2.71E-05	0.0003689	0.00027	
10	0.000199	9.43E-05	4.087E-05	0.0016494	0.0454338	-0.00091	0.0030353	-0.000433	0.0015944	0	0.1706426	-0.000964	-0.000731	-0.001564	0.0004344	0.0071095	-0.000914	-0.000818	-0.001042	0.0014556	-0.000688	-0.00057	-0.001046	0.000286	0.0001173	0.0008688	-0.000314	0.0011852	0.0046204	0.229426	
11	0.0001214	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	0.0001962	
12	7.82E-06	3.216E-05	2.718E-05	1.913E-05	1.518E-05	0.0003074	0.0262575	6.118E-05	0.002364	2.88E-05	2.962E-05	0	0.0025807	0.0002347	9.48E-06	2.47E-05	5.413E-05	2.781E-05	8.056E-05	4.401E-05	8.158E-05	0.00083	1.888E-05	0.0003769	7.609E-05	2.113E-05	2.065E-05	2.957E-05	0.0002371	0.0339929	
13	4.794E-05	0.0020152	-7.38E-06	4.024E-05	-3.72E-05	-0.000281	0.0006299	7.659E-05	0.0003358	-0.000195	0.0003291	-0.000567	0	9.449E-05	0.0002103	0.00015	8.125E-05	-0.000117	-0.000298	2.938E-05	-0.001253	0.005947	0.0002551	0.0037354	0.0009493	-0.000269	0.0004205	0.001452	0.0336035		
14	0.009064	0.024873	0.0017947	0.0011422	0.0037813	0.008314	0.0191936	0.0016445	0.0121387	0.0039339	0.0400136	0.0179441	0.0284526	0	9.449E-05	0.0002103	0.00015	8.125E-05	-0.000117	-0.000298	2.938E-05	-0.001253	0.005947	0.0002551	0.0037354	0.0009493	-0.000269	0.0004205	0.001452	0.0336035	
15	0.009872	0.028199	0.002554	0.022593	0.004893	0.0037919	0.0377508	0.0159555	0.0163837	0.0097792	0.0114405	0.0009852	0.0262528	0.0069173	0	0.0048755	0.024284	0.0036488	-0.00042	0.0094078	0.0013511	0.009468	0.0108148	0.0075946	0.1048764	0.0262496	0.1701646	0.00733	0.0209781	0.680719	
16	3.29E-05	0.0014904	0.0009496	0.016045	0.00031	-0.000109	0.0002594	0.0001221	0.0043632	0.0006079	0.000288	-0.000156	0.0003639	0.004711	8.94E-05	0	0.001318	0.0001213	-1.13E-05	0.0061353	8.294E-05	0.0046168	0.0177544	-6.99E-05	0.0001232	0.0003534	0.0001543	0.001449	0.0007362	0.0631103	
17	-1.16E-05	0.0095662	0.0002629	0.026442	0.0044719	-0.000399	0.0018699	0.0003498	0.0054447	0.0039224	0.002507	-0.000612	9.76E-05	2.521E-05	-0.002147	0.0013609	0	0.0792538	-0.005497	0.0554991	0.034483	0.0202585	0.0085076	0.0044863	0.0010663	0.0028675	0.0001253	0.0006339	0.0095889	0.2156514	
18	0.000482	0.0062871	0.0059742	0.0277334	0.0002404	-0.000375	0.0012134	0.0036221	0.0198088	0.0001241	-3.67E-05	-0.00113	-0.000119	0.0002014	0.0001928	-0.000215	-0.007732	0	-0.004463	0.0169567	0.0022801	-6.49E-05	0.0071864	0.0003304	0.0020062	0.0033397	0.002086	0.004931	0.0021961	0.0818451	
19	0.0009646	0.0019048	0.0002353	0.0002445	0.0001138	-5.18E-05	0.000522	0.0031483	0.0007564	0.0017632	0.0006556	-4.67E-05	0.0001918	0.0001507	-0.000235	0.0006882	0.0005957	6.86E-05	0	0.002713	4.738E-05	0.0004321	0.0003951	0.0001763	0.0026468	0.0004437	4.351E-05	0.0001259	0.0022614	0.0211587	
20	0.0002435	0.006083	0.0002617	0.0003524	0.0006824	0.0001785	0.002716	0.024422	0.009648	0.003102	0.007033	0.0002628	0.002282	0.008767	0.0013111	0.032111	0.015123	0.009466	0.009149	0	0.004581	0.0014728	0.0042687	0.0003879	0.0061041	0.053215	0.008406	0.0006889	0.004082	0.117524	
21	0.0004456	-0.000165	6.316E-05	0.0001827	2.55E-05	-0.000213	0.0026057	0.0001408	0.0003709	-0.000192	0.0002648	-0.00014	-2.26E-05	-0.000114	0.0002375	4.539E-05	9.938E-05	-0.000239	-0.000458	0.0009337	0	0.0010623	-3.79E-05	0.0009315	0.0223464	0.007428	0.009686	0.0005358	0.0065338	0.0282719	
22	-3.2E-06	-0.00131	-0.000378	-0.00038	-6.31E-05	-0.00052	0.0038471	0.0004421	0.0016105	-0.001151	2.81E-05	-0.001021	-0.00206	-0.000512	-0.000396	-0.001007	-0.0045	-0.002958	-0.002375	0.0008859	-0.000257	0	-0.003304	0.0001066	0.000897	0.003586	0.0001159	0.0008294	0.004887	-0.000628	
23	0.0006366	0.0063871	0.0009343	0.001451	0.0004637	0.0011522	0.0058218	0.0007154	0.0027157	0.0013915	0.0033715	0.0002504	0.000604	0.0006905	0.0005499	0.0009813	0.0024226	0.0003135	-0.000239	0.0018146	-0.00017	0.0034236	0	0.0006171	0.0018322	0.0009359	0.0007998	0.0203688	0.0047624	0.0758884	
24	0.0051934	0.009452	0.0074718	0.015912	0.0158151	0.0013566	0.1133406	0.013957	0.0447339	0.024984	0.0376289	0.0081079	0.0250441	0.0128032	0.0061593	0.000715	0.0148457	0.0039909	-0.002505	0.0438781	0.0005141	0.0208963	-0.000654	0	0.0154881	0.00101869	-0.0147852	0.0015544	0.0070514	0.4893079	
25	0.0038463	0.0053416	0.0067184	0.0071787	0.0032285	0.001166	0.0795109	0.0112914	0.015728	0.0016429	0.0106347	0.00155301	0.007337	0.0039982	0.0146827	0.0055899	0.0062439	0.0010248	-0.001218	0.0158851	0.00022843	0.0107561	0.0055822	0.013357	0	0.015845	0.0026383	0.0065022	0.0121892	0.268161	
26	0.0002321	0.0003293	0.0002989	0.0011777	0.0004981	-5.12E-05	0.01093	0.0006094	0.0027089	-0.000129	0.0002605	0.0006285	0.0007441	0.0002949	3.401E-05	0.0003509	0.0007566	7.239E-06	0.006512	0.0023139	-0.000134	0.0042213	0.0004173	0.0044397	0.0042984	0	-1.72E-05	0.00025104	0.004281	0.0404899	
27	0.0017229	0.0014091	0.0071659	0.0128202	0.006	0.0003212	0.0794948	0.0039606	0.0129136	0.001759	0.0196668	0.0036044	0.0152102	0.0072684	0.0007908	0.0003438	0.0002768	0.00020544	-0.000141	0.0034009	0.00015237	0.0137386	0.00012636	0.0003187	0.0001348	0.014358	0.0148268	0.0046425	0	0.0168477	0.1417585
28	0.0008754	0.0023706	0.0001949	0.0019485	0.0013657	-0.001261	0.0619422	0.0012014	0.0081508	-0.001657	0.0042429	0.0019786	0.0020819	0.0001408	-0.000416	0.000885	-0.000226	-0.002087	0.004715	-0.002282	0.00689	-0.000157	0.0057301	0.0114828	0.0063006	0.0522608	0.0304826	0.0068869	0.0130696	0	0.2195741
29	0.0018502	0.0146946	0.00251	0.0103102	0.0034454	0.002389	0.0426852	0.0012409	0.0057203	-0.0005	0.015681	0.0003562	0.0013705	0.0025944	0.000953	0.0013382	0.0011766	-0.001759	-0.002852	0.0082241	-0.002392	0.0048834	-0.00062	0.0063006	0.0522608	0.0304826	0.0068869	0.0130696	0	0.2195741	
SUM	0.0495246	0.29421	0.965384	0.1820705																											

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	0.019293	0.539321	0.1282704	0.0985969	0.120142	0.066228	0.3504767	0.151047	0.0905861	0.0556455	0.0552036	0.1999176	0.0967858	0.0193637	0.0222699	0.047076	0.0162983	0.0213411	0.0236491	0.0465772	0.0555026	0.0249444	0.0227168	0.0339033	0.0085708	0.0219838	0.0069082	0.0771391	2.3901135	
2	0.0456408	0	0.0383792	0.0939669	0.0599297	0.0811244	0.0594415	0.0835918	0.0639789	0.0123095	0.1009204	0.0611901	0.0857337	0.1207402	0.6154669	0.423196	0.4453119	0.2527294	0.1099404	0.1388719	0.0704021	0.2359865	0.0980198	0.2986018	0.2398655	0.0980198	0.2398655	0.0980198	0.2398655	0.0980198	
3	0.0656593	0.0092193	0	0.1547411	0.11826	0.0244902	0.0225513	0.02724769	0.0148811	0.0134539	0.0122601	0.0228789	0.0217616	0.0175490	0.0119652	0.0092888	0.0093888	0.0076119	0.0109745	0.0086288	0.0087284	0.0075504	0.0087881	0.0004006	0.0066437	0.0073015	0.0064516	0.0755596	0.0755596	0.6701579	
4	0.001619	0.003882	0.0002949	0	0.0016133	0.0002821	0.0002803	0.0002423	0.0002047	0.000319	0.0004192	0.0022189	0.0002761	0.0004888	0.0003471	0.000382	0.0003685	0.0003284	0.0002754	0.0002974	0.0004006	0.0002974	0.0004006	0.0006437	0.0004711	0.0004711	0.0004711	0.0004711	0.0004711	0.0004711	
5	1.205E-05	1.454E-05	9.302E-06	1.32E-05	0	8.208E-06	7.926E-06	8.832E-06	6.173E-06	5.514E-06	7.027E-06	8.102E-06	6.895E-06	1.294E-05	1.168E-05	1.062E-05	1.306E-05	1.016E-05	1.098E-05	1.117E-05	7.608E-06	9.322E-06	1.548E-05	1.248E-05	1.99E-05	1.461E-05	1.749E-06	1.166E-05	0.0002718	0.0002718	
6	0.008562	0.011325	0.0098757	0.004596	0.004114	0	0.6426989	0.019436	0.1200987	0.0194506	0.032381	0.2569184	0.2483345	0.0088626	0.008336	0.0081973	0.0069383	0.0081814	0.0155852	0.009538	0.0479274	0.1590576	0.0055141	0.0064556	0.0293589	0.0038173	0.0053437	0.0018697	0.0112814	0.1677855	
7	0.001881	0.0003649	0.0002598	0.0002238	0.0150151	0	0.0004632	0.001451	0.0004282	0.0004129	0.0041375	0.0096404	0.00038	0.0004049	0.0003751	0.0004432	0.0004148	0.0005251	0.0004467	0.0191013	0.0020383	0.0019396	0.0009599	0.0002563	0.0003151	0.0001882	0.0027301	0.0462895	0.0027301	0.0462895	
8	0.0037333	0.0113419	0.0036394	0.0029058	0.0025433	0.0029253	0	0.002234	0	0.1939568	0.0030143	0.0021817	0.0024567	0.0058594	0.0071493	0.0006569	0.0062615	0.0067562	0.0272837	0.0274947	0.0094949	0.0071271	0.041394	0.0023598	0.0042827	0.0018735	0.0042393	0.0033675	0.0024373	0.3879066	
9	3.379E-05	9.517E-05	4.301E-05	6.258E-05	3.784E-05	0.0001879	0.0001094	0.0023925	0	6.640E-05	6.732E-05	0.001037	0.000109	0.0001595	8.654E-05	0.0001428	9.387E-05	5.539E-05	0.0007929	0.0013274	6.396E-05	0.0004797	0.0007177	0.000143	0.0001238	0.0001021	7.652E-05	0.0001038	0.005742	0.0097693	
10	0.004689	0.0298271	0.0219528	0.0410834	0.4102601	0.0397174	0.0253291	0.0219342	0.0312731	0	0.9704654	0.0331049	0.0296465	0.0564789	0.0315106	0.1612649	0.0256785	0.0324125	0.0445654	0.0679891	0.0238551	0.0567352	0.0393205	0.0234812	0.025806	0.0202375	0.0204028	0.0151843	0.0461339	2.3510382	
11	0.007184	0.0036106	0.0031726	0.0050017	0.0149958	0.0045407	0.0041163	0.0042948	0.0040737	0.0041693	0	0.0035852	0.0041157	0.0046473	0.0095932	0.0080905	0.0047986	0.0056064	0.0039406	0.0069373	0.0033151	0.0047654	0.0040663	0.0032473	0.0074227	0.0034499	0.0075355	0.0044431	0.03824	0.1593092	
12	0.0020391	0.0006108	0.0002715	0.0002947	0.00024	0.0075266	0.0525551	0.0049807	0.0023364	0.0005011	0.0004649	0	0.0032402	0.000575	0.0005807	0.0004653	0.0004753	0.0004524	0.0051391	0.00710163	0.0072327	0.0097901	0.0006502	0.0005516	0.0027411	0.0003854	0.0004212	0.0002023	0.0007154	0.1745395	
13	0.0027477	0.0075298	0.0041945	0.0047784	0.0049058	0.0057949	0.0080541	0.007608	0.006235	0.0084836	0.0075416	0.013477	0	0.0063026	0.0093983	0.0070995	0.0072505	0.0065228	0.0066738	0.0072796	0.1637085	0.024672	0.05957	0.007177	0.0616194	0.0057941	0.0073223	0.0032344	0.0088391	0.4245682	
14	0.0630082	0.0829517	0.0564231	0.0664451	0.053175	0.2020643	0.153608	0.1152466	0.1636697	0.1220486	0.2455707	0.1950911	0.1175908	0.1620221	0.1402837	0	0.4722202	0.2757861	0.2194455	0.1404976	0.1407127	0.1500999	0.1379603	0.167664	0.143247	0.4866194	0.0730985	0.622371	0.0462602	0.122448	5.3162847
15	0.0092036	0.222951	0.1121892	0.1629559	0.1194534	0.153608	0.1152466	0.1636697	0.1220486	0.2455707	0.1950911	0.1175908	0.1620221	0.1402837	0	0.4722202	0.2757861	0.2194455	0.1404976	0.1407127	0.1500999	0.1379603	0.167664	0.143247	0.4866194	0.0730985	0.622371	0.0462602	0.122448	5.3162847	
16	0.0016598	0.0055479	0.0095946	0.004414	0.0016863	0.0042552	0.002909	0.0024145	0.0030883	0.0022013	0.0032538	0.0032133	0.0040486	0.018615	0.0049605	0	0.0047799	0.0073075	0.0070231	0.0122097	0.0060821	0.0132323	0.1252729	0.0027115	0.0036071	0.0024931	0.0045474	0.0115131	0.005891	0.3094578	
17	0.0084205	0.0471731	0.0149007	0.0481433	0.011579	0.0130378	0.0090041	0.0276758	0.0284119	0.0291992	0.0275413	0.0106046	0.0165251	0.0267185	0.0390891	0.0281999	0	0.6642666	0.1950666	0.2274511	0.2569878	0.0939498	0.1041621	0.0218335	0.035979	0.0193916	0.0298954	0.0084574	0.0191497	2.0809675	
18	0.0074623	0.0288296	0.0166208	0.040259	0.0084834	0.0090711	0.0076948	0.0276514	0.026751	0.0251523	0.038726	0.0089794	0.0119465	0.0164355	0.0321891	0.0201727	0.0407665	0	0.085529	0.0636057	0.028132	0.0248438	0.0711114	0.00706	0.0194482	0.0127063	0.0217033	0.0056551	0.0131774	0.6976713	
19	0.0056133	0.0409154	0.0074356	0.0078026	0.0052801	0.004437	0.0075087	0.0279325	0.0277338	0.0123936	0.0094875	0.0067918	0.0100067	0.0105841	0.0204356	0.0181243	0.0241157	0.0182716	0	0.0320022	0.0155988	0.0136964	0.0116689	0.0063789	0.0288277	0.0078218	0.0202555	0.0033981	0.010094	0.4287396	
20	0.0075239	0.0571225	0.0092468	0.0114483	0.0083374	0.0155347	0.0137388	0.0144503	0.0123378	0.0188873	0.0161204	0.0100675	0.0159733	0.0135723	0.0355821	0.0255237	0.0235926	0.0255158	0.1106407	0	0.0061595	0.0286747	0.0263949	0.0474722	0.0442401	0.0731929	0.0082801	0.0065763	0.0205957	0.7997426	
21	0.0085952	0.0280044	0.0114719	0.0144517	0.0092495	0.0145354	0.0162888	0.0131229	0.0177599	0.0177728	0.0134885	0.0146431	0.0147806	0.038316	0.0206789	0.0355985	0.0262163	0.0175965	0.0190284	0	0.028027	0.0149646	0.0301179	0.0179988	0.013902	0.0362801	0.0069232	0.0298475	0.6220396	0.6220396	
22	0.006568	0.002962	0.0019026	0.0027744	0.0010517	0.0025791	0.006957	0.0012599	0.0026548	0.0042781	0.0035208	0.0093224	0.0055539	0.003993	0.0028109	0.0040461	0.0084278	0.0086408	0.004715	0.002964	0.0062922	0	0.003266	0.0018096	0.0031695	0.0070197	0.012111	0.0018107	0.0086018	0.1111159	
23	0.0035641	0.026914	0.0046343	0.0046343	0.0045575	0.0057971	0.009627	0.0025954	0.0072423	0.0075663	0.0061388	0.0061391	0.0068945	0.0171824	0.0124029	0.0145312	0.010212	0.0087964	0.0083076	0.0069441	0.0072704	0	0.007494	0.0107706	0.0085829	0.0070197	0.027487	0.0411042	0.009505	0.2798949	
24	0.0355722	0.0594684	0.0785056	0.0947876	0.0870288	0.1107718	0.0716833	0.1139074	0.045066	0.1580178	0.1433032	0.1623303	0.1328941	0.117733	0.1323602	0.1142877	0.1515388	0.1538995	0.1633072	0.1538589	0.1623111	0.1152801	0.0106333	0	0.1100321	0.0359863	0.0129562	0.0157151	0.0562507	3.0613932	
25	0.0338496	0.0526441	0.0534427	0.0538465	0.0455447	0.0560385	0.0672921	0.0879433	0.0663806	0.0691198	0.0716293	0.0635909	0.0639414	0.0573265	0.0905079	0.0802838	0.0815836	0.0807776	0.0580045	0.0656771	0.0679762	0.0626934	0.0706311	0.1064887	0	0.0480879	0.0556141	0.0311273	0.0415881	1.7886054	
26	0.0404883	0.0073719	0.0065127	0.0081388	0.0070034	0.010124	0.0104705	0.0109492	0.0111958	0.0103144	0.0136117	0.0134279	0.0111303	0.0094445	0.010445	0.0096784	0.0101818	0.046113	0.01931881	0.0118046	0.0136479	0.0119436	0.0451407	0.0166924	0	0.0081889	0.0160404	0.0424327	0.3798589		
27	0.0272406	0.0707402	0.0475945	0.06515	0.047168	0.093108	0.0713477	0.0538004	0.0680012	0.040601	0.0831108	0.0677334	0.071568	0.0640389	0.0522649	0.093256	0.0199603	0.0877702	0.0659197	0.077833	0.05992	0.077499	0.0376471	0.0540961	0.0455859	0.0328943	0	0.0258719	0.0536566	1.7869189	
28	0.0266555	0.0392973	0.0291089	0.0362165	0.0289857	0.0502362	0.0548699	0.0418343	0.045277	0.0425463	0.0469337	0.0650158	0.0893194	0.0428544	0.0511749	0.0453575	0.0469333	0.0487783	0.0720495	0.0607586	0.0482153	0.0529224	0.059537	0.0490286	0.0624801	0.0672506	0.0422315	0	0.045023	1.389811	
29	0.03709	0.055484	0.0241035	0.037884	0.0215571	0.0494222	0.032313	0.0279295	0.0264487	0.0315905	0.0400375	0.0271761	0.030827	0.0461563	0.0469738	0.0460954	0.0511766	0.0495946	0.0437979												

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	0.0053483	0.2733448	0.036115	0.0278253	0.0247219	0.0692451	0.0842709	0.040197	0.0208354	0.009761	0.0501159	0.053851	0.0060086	0.004329	0.0626204	0.0031785	0.0045557	0.0029402	-0.0055907	-0.001562	0.0735944	0.0094062	0.0077655	0.0068981	1.707E-06	0.003	0.004159	0.035798	0.864077	
2	0.0048332	0	0.0122403	0.0205458	0.0095577	0.0315756	0.0084673	0.019416	0.022554	0.038833	0.0504145	0.0312399	0.4232769	0.1437277	0.1802642	0.04272	0.0330482	-0.384133	-0.013445	0.0272369	0.0231334	0.0203897	0.0795987	0.0795987	0.0074374	0.232448	0.0134726	0.071482	1.370705		
3	0.0167938	0.0008536	0	0.0627043	0.0033872	0.0272153	0.0057427	0.0039027	0.0144912	0.0074858	0.0802045	0.0043288	0.0042588	0.0033734	0.0030101	0.0025909	0.0019031	0.0028935	-0.004926	-0.004926	-0.004926	0.0153646	0.0016567	0.0215094	0.0085114	-0.003580	0.0023859	0.0035136	0.0478335	0.3461947	
4	0.0001321	0.0001844	0.0002401	0	0.0001786	0.0002599	0.0034278	0.0002562	0.000464	0.0003467	0.000541	0.0003138	0.0003432	0.0004221	0.000379	0.0003757	0.0003217	0.0003763	-0.000411	0.0007918	0.0003524	0.0003186	0.0007363	-0.000619	0.0003524	0.0004374	0.0061679	0.0061679	0.0135447		
5	2.205E-05	-1.55E-05	4.886E-05	1.361E-05	0	3.427E-05	0.0002294	7.187E-05	0.0002341	5.554E-06	6.845E-06	0.000793	6.91E-05	4.356E-05	-1.47E-06	6.802E-05	0.0002316	0.0002351	-0.000425	-0.000425	-0.000425	0.0003994	-5.55E-06	0.0002316	-6.92E-05	-0.000529	4.95E-05	3.04E-06	0.0001432	0.0018986	
6	0.0039495	0.0013976	0.0004961	0.0015334	0.0008727	0	3.9404883	0.0154384	0.1468558	0.0018777	0.012724	0.3402012	0.0443887	0.0032248	0.0026191	0.0064502	0.0013275	0.0031792	0.00028148	0.0003888	0.0006066	0.0923733	0.0020409	0.01762	0.0064937	0.011567	0.0016772	0.00019105	0.0097711	4.633707	
7	9.177E-06	-1.42E-05	0.000165	8.301E-05	2.973E-05	0.204E-05	0	0.0041469	0.0601772	-3.6E-07	8.088E-05	0.0183357	0.0010692	7.414E-05	1.575E-06	0.001289	0.0001655	6.685E-05	0.0002614	-0.0005707	-0.000412	0.0010094	0.0002814	0.0020428	0.0007618	-0.000313	9.65E-05	0.0001626	0.0024513	0.032852	
8	0.0005983	0.0017772	0.001016	0.000383	0.0018965	0.0013347	0.0095002	0	0.3705238	0.0067367	0.0022753	0.0042383	0.0009503	0.0028805	0.0028073	0.0133699	0.0077368	0.0024947	0.0037821	-0.031028	-0.01874	0.049627	0.0163892	0.0039838	0.0089371	0.0168911	0.0013737	0.0036064	0.0012347	0.4840172	
9	3.489E-05	0.0008959	8.135E-05	0.0001831	9.348E-05	5.805E-05	0.0581835	8.914E-05	0	5.940E-05	0.0002797	0.0018248	0.0002313	0.0001897	0.0004685	0.0004392	0.0004784	0.0001574	0.0007329	-0.001099	-0.001096	0.0015599	0.0008971	0.002782	0.0077649	0.0351244	0.0004902	0.0023456	0.0007945	0.052825	
10	0.0011706	0.0010772	0.0049229	0.0202654	0.043069	0.0049838	0.0779152	0.0041829	0.0189044	0	0.2932356	0.0376523	0.007729	0.024289	0.0032104	0.021545	0.0032094	0.0034983	-0.00235	-0.00235	-0.00235	0.0765393	0.0056534	0.0052355	0.0072487	-0.000514	0.0026142	0.0072863	0.0133808	0.5700328	
11	0.0004156	0.0005962	0.001003	0.0018204	0.0023537	0.0014153	0.0049542	0.0008819	0.0018902	0.018957	0	0.0021292	0.0024351	0.0035194	0.0010506	0.0016337	0.0011697	0.0013496	-0.000263	-0.000263	-0.000263	0.004585	0.0010398	0.0017253	0.0017753	0.002111	0.0024541	0.0089748	0.0111857	0.0653831	
12	3.205E-05	0.0006033	0.0001003	0.000161	7.497E-05	0.0003405	0.2596557	0.010401	0.3636636	7.461E-05	0.0003281	0	0.0022883	0.0004276	0.0003575	0.0005956	0.0002541	0.0001181	0.0007973	-0.008657	-0.000445	0.0246667	0.000476	0.0027652	0.003589	0.015826	0.0005113	0.0011425	0.0012123	0.680107	
13	0.0003309	0.0013783	0.0008119	0.0008198	0.0005017	0.0046063	0.0271017	0.0015304	0.0024551	0.0011186	0.0094403	0.0045709	0	0.0023754	0.0009896	0.0034595	0.0010508	0.0011403	0.0027912	-0.071702	-0.071702	0.055433	0.0013402	0.003404	0.0272782	0.0168771	0.0020476	0.0013526	0.0031886	0.1407038	
14	0.016264	0.0119272	0.0152315	0.0205449	0.0173073	0.0495744	0.2806653	0.023813	0.167987	0.0318297	0.1151794	0.5423861	0.0753909	0	0.0172626	0.0372804	0.0079379	0.0133028	0.0165974	-0.301155	-0.019866	0.1857338	0.00107652	0.0944429	0.012288	-0.006983	0.0126676	0.0138864	0.0276609	1.4023832	
15	0.0104899	0.0249414	0.0151508	0.0356554	0.0094145	0.0199742	0.4371064	0.0168215	0.0491988	0.0354847	0.0368304	0.0821511	0.1274485	0.0629561	0	0.141569	0.0446613	0.0288022	0.0174864	-0.463658	-0.18894	0.0744588	0.0211388	0.038014	0.2113183	0.04027	0.26148	0.0285596	0.0345328	1.4168661	
16	0.0010163	0.0015784	0.0021316	0.0248424	0.0002746	0.0066514	0.0202755	0.0005191	0.0028928	0.0007928	0.0009114	0.0031858	0.0009469	0.0055163	0.0010656	0	0.0025641	0.0016171	-0.008096	-0.078141	-0.003601	0.035359	0.0372552	0.0028946	-0.00132	-0.008173	0.0019489	0.005321	0.0024676	0.0373862	
17	0.0006284	0.0120174	0.0027852	0.0026542	0.0003561	0.0008469	-0.068874	0.0035677	0.0266295	0.0010746	0.0037129	-0.000107	0.0018824	0.0018446	0.0083178	0.0069266	0	0.2315576	0.212872	-0.61527	0.0280504	0.1019958	0.0345744	0.0100405	0.0035754	-0.00744	0.0044776	0.002563	0.0007771	0.0430712	
18	0.0015318	0.0053622	0.0099904	0.0216349	0.0009504	0.0014931	0.0268832	0.013891	0.0176553	0.0041458	0.0192546	0.0126342	0.0029355	0.0105791	0.0093184	0.0064102	0.0452323	0	0.1321789	-0.331948	-0.020746	0.0991728	0.023725	0.0052784	0.0045117	0.0065218	0.005257	0.003945	0.0050756	0.1977293	
19	0.0015632	0.001187	0.001899	0.0023866	0.0004402	0.001482	0.0337623	0.0014111	0.0098631	0.0009089	0.0005348	0.0054987	0.0010636	0.0011763	0.0015874	0.0046578	0.0015065	0.007182	0	-0.213794	-0.399139	-0.069358	-0.016302	-0.027284	0.0155448	0.1591708	0.0086659	0.0032233	0.0031474	0.0526631	
20	-0.002943	-0.01417	-0.006183	-0.018716	-0.001898	-0.003916	-0.152144	-0.005745	-0.024651	-0.005669	-0.000858	-0.032832	-0.005723	-0.001794	-0.010631	-0.019899	-0.052473	-0.04214	-0.077342	-0.40733	0	0.399139	-0.069358	-0.016302	-0.027284	-0.085703	-0.468278	-0.017695	-0.011909	-0.021525	-1.951555
21	0.0005995	0.0028029	0.0017672	0.001754	0.0004395	0.0009442	0.0319087	0.0011891	0.0020656	0.0009902	0.0021235	0.0027467	0.0011191	0.0001489	0.0021531	0.001647	0.005427	0.0016384	0.0001924	-0.051081	0	0.0081559	0.0001447	0.0053749	0.0438184	-0.004401	0.0019553	0.0015762	0.007826	0.071727	
22	0.0003367	0.0022556	0.0015702	0.0041255	0.0008815	0.0018808	0.0416648	0.0015899	0.0061088	0.00049585	0.003801	0.0136086	0.002919	0.0041999	0.0030341	0.0084604	0.0015518	0.0113182	0.0011979	-0.045755	-0.002541	0	0.0048995	0.0056481	0.0026412	0.0375017	0.002894	0.003716	0.0059731	0.1467018	
23	0.0005945	0.0023759	0.0007482	0.0009591	0.0004876	0.0008816	0.0018972	0.0006697	0.0018923	0.0010267	0.0011172	0.0007699	0.0009044	0.0009542	0.0026203	0.0020411	0.0019531	0.0015598	0.0005174	-0.008018	0.0002584	0.001589	0	0.00169	0.0011158	0.0024016	0.0028084	0.0092086	0.0040399	0.0389229	
24	0.0047474	0.0007132	0.0295988	0.040477	0.0233889	0.0401437	0.5106463	0.0415436	0.110899	0.0216835	0.0401099	0.3444153	0.0410112	0.081812	0.0061265	0.0381925	0.0716779	0.0506456	0.059269	-2.00042	-0.143237	0.1659087	0.0107798	0	-0.032081	-0.260893	0.0250244	-0.000278	0.0099177	-1.379214	
25	0.0024551	0.0036539	0.0063161	0.0039149	0.0032703	0.0005709	0.0059665	0.00090341	0.0094673	0.0049516	0.0062919	0.0219079	0.0062765	0.0071364	0.0042411	0.0065007	0.0094044	0.008712	0.0383014	-0.222807	-0.021065	0.016454	0.027572	0.0538025	0	-0.002384	0.0062757	0.0187674	0.044995	0.1065547	
26	0.0010361	0.001894	0.0025506	0.0046823	0.0022909	0.00023733	0.0731092	0.0024644	0.0133702	0.0039256	0.0079453	0.0157123	0.0044113	0.0040427	0.0049094	0.0054698	0.0052473	0.0035472	0.0443449	-0.107439	-0.049899	0.0187176	0.0015796	0.005129	0.004957	0	0.0155259	0.0148465	0.007476	0.1417848	
27	0.0038106	0.0094024	0.0088045	0.018085	0.0048309	0.0117907	0.1553332	0.0075146	0.0427192	0.030357	0.0513304	0.0275144	0.0149266	0.0132759	0.0053388	0.0035606	0.049658	0.0484254	0.0113265	-0.316677	-0.019192	0.046269	0.0078548	0.0049813	0.0004021	-0.015308	0	0.0112446	0.024615	0.3152706	
28	0.0047019	0.0076456	0.0091216	0.0210327	0.0064105	0.0114851	0.0580411	0.0094004	0.0316088	0.0116929	0.0184138	0.0220931	0.0127114	0.0155543	0.012245	0.0121601	0.011686	0.0095551	-0.125596	0.0129341	0.020452	0.0136003	0.0376934	0.0394115	0.0482774	0.0113529	0	0.0240783	0.4224445		
29	0.0065375	0.0140268	0.0091318	0.0076914	0.0066105	0.0126018	0.0187494	0.009349	0.0066595	0.0156347	0.0201016	0.0083891	0.0121184	0.010425	0.012381	0.0153747	0.008623	0.0113032	-0.008631	-0.113706	-0.007348	0.0202608	0.0180359	0.0166953	0.0273785	0.037171	0.0265418	0.003137	0	0.279	

2006

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	0.012906	0.5794309	0.1087294	0.2703741	0.0150705	0.1094884	0.1725647	0.0960337	0.0546374	0.1372917	0.0354888	0.3049897	0.081383	0.0081739	0.0234379	0.0176157	0.0160713	0.02078	0.0158194	0.0338549	0.100835	0.0274047	0.0424518	0.0192223	0.0078529	0.0047328	0.0006664	0.055922	2.3009016	
2	0.037081	0	0.0470127	0.0484568	0.0542358	0.1125228	0.0708866	0.0971339	0.0789807	0.0323204	0.0899471	0.1014163	0.1484314	0.1953933	0.7421643	0.3416628	0.3698034	0.5149731	0.272565	0.0758873	0.119385	0.146611	0.1594826	0.0462746	0.2153552	0.0374114	0.1047155	0.0288883	0.0313809	4.4264246	
3	0.037381	0.003652	0	0.1488377	0.0264884	0.0054232	0.0231538	0.0178718	0.0106804	0.0217956	0.098487	0.0211445	0.0255142	0.0953997	0.0376075	0.0054637	0.006957	0.0057024	0.0070633	0.0093183	0.0111043	0.0212916	0.005405	0.0183642	0.0210726	0.0048543	0.0020387	0.0050966	0.0714966	0.5815929	
4	0.001756	0.0008398	0.0159406	0	0.0026138	0.0020101	0.0027514	0.0037815	0.0021988	0.0045645	0.0031016	0.0011611	0.0022031	0.0020394	0.0019726	0.0019176	0.0017604	0.002477	0.0024037	0.0043451	0.0027006	0.0044234	0.0085214	0.0015699	0.0011399	0.0008278	0.0002388	0.0022486	0.0017771		
5	0.001606	0.000169	0.0003393	0.0004659	0	0.00053	0.0004481	0.0010174	0.0027325	0.000779	0.0004941	0.0004925	0.0005055	0.0002242	0.0004964	0.0006657	0.0004403	0.0006657	0.0004403	0.0006319	0.0011919	0.000704	0.0003395	0.0025267	0.0002729	0.0001024	7.115E-05	0.0402E-05	0.001836	0.01583	
6	0.0088834	0.0040493	0.0119017	0.0100694	0.0152604	0	0.3708699	0.0279944	0.0679294	0.0400488	0.0404506	0.0212867	0.0467213	0.0212934	0.0033243	0.0150235	0.0443811	0.0076426	0.0115523	0.0065784	0.0017624	0.059202	0.008157	0.0060618	0.0119658	0.0069785	0.0024463	0.0031874	0.047494	1.5134015	
7	6.152E-05	0.000107	0.0001219	0.0001098	0.0001141	0.0001096	0	0.0040376	0.001963	0.0002406	0.0001946	0.0001382	0.0001193	0.0002369	8.238E-05	0.0001668	0.0001129	0.0001483	0.0002437	0.0002122	0.0001466	0.0002194	0.0001325	0.0001849	0.000472	0.0001511	0.000135	5.222E-05	0.0004154	0.0116241	
8	0.0019124	0.0102142	0.0049724	0.0090633	0.0080949	0.0094978	0.0063317	0	0.4501937	0.0273992	0.0177697	0.0110641	0.0035297	0.0130182	0.0073939	0.0188774	0.0077798	0.0121942	0.0143905	0.0053038	0.0050206	0.0297189	0.0068929	0.0024935	0.0091905	0.003451	0.0023233	0.0040637	0.0040139	0.7838945	
9	0.0006361	0.0073118	0.0019465	0.0040773	0.0033885	0.0051075	0.0050851	0.0061887	0	0.106667	0.0134358	0.0136504	0.0021642	0.0055399	0.005315	0.0082957	0.0077708	0.0093891	0.0073357	0.0045111	0.0049884	0.0040944	0.0032647	0.0027603	0.0089935	0.0030323	0.0021779	0.0022634	0.0029163	0.1620504	
10	0.0096355	0.025566	0.0216804	0.044073	0.2142882	0.0350908	0.0270222	0.0380095	0.0312551	0	0.4259184	0.0316295	0.0230269	0.0080387	0.0230783	0.0479249	0.0228818	0.002736	0.0429729	0.0395183	0.018514	0.0625091	0.0189158	0.0095744	0.018671	0.0130117	0.0138958	0.0192272	0.0213989	0.14042673	
11	0.001797	0.0024133	0.0040441	0.0108081	0.0209512	0.0041338	0.0034668	0.0034722	0.0037539	0.004748	0	0.0032623	0.0030759	0.0088139	0.0026225	0.0041549	0.0028508	0.0032957	0.0040265	0.0028556	0.0021444	0.0053641	0.0023816	0.0021224	0.004124	0.0040288	0.001828	0.0239258	0.0120896	0.2006552	
12	0.0005458	0.0006911	0.0007389	0.0022599	0.001557	0.0068834	0.0647199	0.0019408	0.0496616	0.005481	0.0038295	-0.080379	0.0028514	0.001555	0.0005334	0.00202708	0.0006889	0.0009112	0.0011571	0.0005564	0.0006894	0.0139865	0.0010401	0.0004839	0.0012752	0.00066024	0.0002777	0.0003823	0.00166	0.1467575	
13	0.0010722	0.0070848	0.0021767	0.0019534	0.0015864	0.016756	0.0137547	0.003372	0.0038633	0.0031585	0.0073539	0.027144	0	0.0028076	0.0049822	0.0061507	0.003337	0.0053124	0.0096701	0.0031165	0.0390463	0.0445973	0.0070847	0.0025393	0.0239585	0.0020954	0.00249	0.0017165	0.0025322	0.2060899	
14	0.0830292	0.0645805	0.078513	0.049911	0.1188258	0.0991032	0.070051	0.1335445	0.1194009	0.1301933	0.2391713	0.0831079	0.0688899	0	0.0555948	0.1962619	0.0611094	0.0873083	0.0627722	0.0420846	0.053075	0.1441344	0.0498754	0.0169017	0.0342497	0.0029768	0.0095564	0.0227224	0.0333383	2.2864429	
15	0.0555066	0.1700048	0.0612367	0.1138066	0.0748947	0.1709914	0.0960194	0.1415846	0.1128767	0.3375	0.1250088	0.1507333	0.2343199	0.3158573	0	0.3563825	0.3490793	0.3078186	0.3163656	0.0439552	0.1325741	0.095089	0.1660263	0.0424056	0.3494657	0.0455633	0.112951	0.0448762	0.0446688	4.516977	
16	0.0019483	0.0085601	0.0060255	0.076791	0.0029297	0.0371002	0.0940409	0.0044603	0.0097451	0.0062991	0.0132345	0.0167516	0.0052363	0.0094307	0.0062243	0	0.0068931	0.0070462	0.0158955	0.0080719	0.0061284	0.0223958	0.00765392	0.0037146	0.0036827	0.0036563	0.0025804	0.006149	0.0063818	0.4901595	
17	0.0262867	0.0342278	0.0040642	0.0064977	0.0055444	0.0060111	0.0059954	0.0066601	0.0269365	0.0159077	0.0113389	0.0071947	0.0219568	0.014227	0.0234391	0.0183355	0	0.1167223	0.1804194	0.0080719	0.0370344	0.1444777	0.0266758	0.0167938	0.0056623	0.0247654	0.0085819	0.0074517	0.0023698	0.006723	0.9401978
18	0.008998	0.0336911	0.0103654	0.0184071	0.0138616	0.013315	0.0134451	0.019107	0.023995	0.0347205	0.024471	0.0206392	0.0127747	0.0179444	0.028654	0.0296669	0.152723	0	0.226356	0.0506574	0.0510441	0.044515	0.0878878	0.0082508	0.0295	0.0228137	0.0042155	0.0009932	0.0065516	1.0046716	
19	0.0031321	0.0027591	0.0012083	0.0028038	0.0014571	0.0034133	0.0017318	0.0018233	0.0028164	0.0027476	0.0039359	0.0025381	0.0036031	0.0014511	0.0020387	0.0018717	0.0027476	0.0020841	0	0.0020933	0.049814	0.0034463	0.0011565	0.0071995	0.0100113	0.001238	0.0014006	0.0010147	0.0010563	0.1149725	
20	0.028885	0.064603	0.0238911	0.0509235	0.026099	0.039866	0.1583869	0.0456433	0.0598618	0.0388785	0.0321521	0.0350999	0.0280926	0.0433209	0.0496131	0.059447	0.0512828	0.0742962	0.0333491	0	0.3520669	0.998563	0.0542777	0.0257553	0.1477438	0.3257624	0.9980529	0.0173349	0.0414056	2.1543876	
21	0.000269	0.0013603	0.0005266	0.0003781	0.0002702	0.0004553	0.0005678	0.0007126	0.0004831	0.0006312	0.0006454	0.0004276	0.0006447	0.0006241	0.0009809	0.0006417	0.000556	0.0004485	0.0007777	0.000586	0	0.000454	0.0006532	0.0008115	0.0094671	0.0066776	0.0007122	0.0002741	0.0004959	0.0253119	
22	0.0016535	0.0048395	0.0019186	0.0035246	0.006084	0.0311249	0.0072449	0.005079	0.0049799	0.0083894	0.0194811	0.0591617	0.0065396	0.0049022	0.003767	0.0067491	0.0097678	0.0095213	0.0076996	0.0031964	0.0019495	0	0.0041008	0.0016538	0.0039736	0.0026745	0.002589	0.0023652	0.006817	0.1505783	
23	-1.48E-05	0.0001873	0.0001324	9.425E-05	1.038E-05	7.07E-05	9.004E-05	-1.71E-05	9.148E-05	4.895E-05	0.0001717	4.694E-05	0.000157	9.46E-05	0.0008103	0.0005235	0.0002274	0.0003139	0.0031519	0.0002325	0.0001401	0.000227	0	0.0006688	-5.88E-05	0.0005914	0.0021174	0.0020214	0.0076834		
24	0.074867	0.0845635	0.0766087	0.289403	0.3158701	0.2613333	0.221867	0.4944864	0.280245	0.594077	0.3842718	0.244695	0.2405216	0.2488978	0.1107676	0.2415017	0.3274423	0.2178974	0.3201475	0.1349548	0.5733818	0.345906	0.1655914	0	0.1383583	0.0339994	0.0375312	0.0286032	0.063377	6.8352948	
25	0.0194922	0.02801	0.0196463	0.0210667	0.0212298	0.0195756	0.0218246	0.033174	0.0238469	0.0271634	0.0214154	0.0177209	0.0195068	0.0255591	0.0269948	0.0291943	0.0294292	0.04133	0.0543798	0.0498323	0.0313462	0.025757	0.0285206	0.0340465	0	0.0257319	0.0214565	0.0286492	0.0159159	0.7409299	
26	0.0019367	0.022759	0.0146527	0.0359294	0.0253019	0.0238429	0.025183	0.0326868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	0.0230214	0.0312868	
27	0.0124652	0.0442344	0.0205649	0.043421	0.031746	0.0444009	0.0673131	0.0295248	0.0380799	0.0559691	0.064028	0.0437817	0.0278674	0.0399226	0.0316127	0.0824485	0.0793599	0.0756443	0.0627819	0.0634305	0.0363806	0.0428508	0.003838	0.008763	0.0256882	0.0273387	0	0.0198404	0.0223141	0.0293811	1.7653315
28	0.030066	0.0216537	0.0274672	0.0385208	0.0289382	0.0309968	0.03227	0.0261746	0.0571727	0.044699	0.0307947	0.0264014	0.0240427	0.0258813	0.0289953	0.0381369	0.0635218	0.0280185	0.0381734	0.0308081	0.0254769	0.0365306	0.0216954	0.0291723	0.0833309	0.0878089	0.0023047	0	0.0746933	0.998482	
29	0.0131247	0.0272166	0.014456	0.0325234	0.0154599	0.0178081	0.0189702	0.0165163	0.0146808	0.0277626	0.0365736	0.0337784	0.02229012	0.0223809	0.0226684	0.0281468	0.0260932	0.02													

Appendix 9
Symmetric Matrix, Philippines
1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0	0.0135	0.27642	0.05663	0.06329	0.03842	0.02286	0.22651	0.11305	0.01476	0.00788	0.06032	0.07007	0.06893	0.01979	0.00605	0.00533	0.00504	0.00505	0.00775	0.00625	0.03231	0.02224	0.03191	0.01926	0.00324	0.00766	0.01008	0.03765	1.25227
2	0.0135	0	0.02073	0.02429	0.01371	0.02507	0.01566	0.02569	0.02134	0.05171	0.02788	0.02045	0.0323	0.05474	0.34418	0.10799	0.15177	0.07122	0.05185	0.0391	0.02362	0.0292	0.04652	0.03755	0.06608	0.00988	0.14075	0.01347	0.02676	1.50699
3	0.27642	0.02073	0	0.13438	0.00915	0.01841	0.04459	0.01936	0.01256	0.01382	0.0092	0.1417	0.02062	0.08235	0.03367	0.06337	0.01304	0.01045	0.00521	0.00722	0.00537	0.02283	0.00702	0.07381	0.02592	0.00465	0.01004	0.01554	0.05634	1.0075
4	0.05663	0.02429	0.13438	0	8.7E-05	0.00141	7.3E-05	0.00121	0.0002	0.0093	0.00267	7.3E-05	0.00103	0.01607	0.03995	0.02496	0.01023	0.01054	0.00165	0.00086	0.00444	0.00156	0.00119	0.06488	0.01371	0.00185	0.00937	0.01575	0.03141	0.47976
5	0.06329	0.01371	0.00915	8.7E-05	0	0.00195	1.9E-06	0.00115	5.4E-05	0.05448	0.00196	1.4E-05	0.00074	0.0181	0.02448	0.00045	0.00273	0.00179	0.00052	0.00065	0.00226	0.0015	0.00093	0.09311	0.01119	0.0015	0.00834	0.01572	0.02395	0.35381
6	0.03842	0.02507	0.01841	0.00195	0.04969	0.00355	0.03295	0.02203	0.00812	0.0197	0.05007	0.09031	0.04333	0.00303	0.00441	0.00351	0.00199	0.00249	0.00355	0.03596	0.02027	0.07201	0.01928	0.00333	0.01294	0.01817	0.02019	0.60794	1.60794	
7	0.02286	0.01566	0.04459	7.3E-05	1.9E-06	0.04969	0	0.00119	0.00031	0.01289	0.00263	0.15289	0.00492	0.04547	0.02706	0.00074	0.00515	0.00519	0.00043	0.00063	0.00092	0.02013	0.00078	0.08688	0.01363	0.00223	0.00925	0.01586	0.01484	0.5569
8	0.22651	0.02569	0.01936	0.00121	0.00115	0.00355	0.00119	0	0.20689	0.00803	0.00244	0.00102	0.0018	0.04435	0.04387	0.00322	0.00367	0.00326	0.00694	0.0025	0.00458	0.03617	0.08637	0.0196	0.00254	0.0094	0.02139	0.01742	0.81439	
9	0.11305	0.02134	0.01256	0.0002	5.4E-05	0.03295	0.00031	0.20689	0	0.00658	0.00074	0.00074	0.00925	0.05248	0.03144	0.00435	0.04155	0.01187	0.00558	0.00124	0.0028	0.00174	0.08667	0.01564	0.00288	0.00891	0.01878	0.01758	0.70802	
10	0.01476	0.05171	0.01382	0.0093	0.05448	0.02203	0.01289	0.00803	0.00658	0	0.26327	0.00696	0.01083	0.06148	0.09095	0.02593	0.01696	0.01512	0.00939	0.01476	0.00827	0.02315	0.01037	0.08369	0.03197	0.01842	0.03987	0.03175	0.03385	0.99059
11	0.00788	0.02788	0.0092	0.00267	0.00196	0.00812	0.00263	0.00244	0.0014	0.26327	0	0.00167	0.00405	0.07092	0.04821	0.00269	0.00877	0.00743	0.0038	0.00394	0.00352	0.00627	0.00344	0.07046	0.0176	0.01076	0.02623	0.028	0.03083	0.67604
12	0.06032	0.02045	0.1417	7.3E-05	1.4E-05	0.0197	0.15289	0.00102	0.00074	0.00696	0.00167	0	0.00334	0.06645	0.03536	0.00099	0.00539	0.00438	0.00065	0.00066	0.00125	0.00942	0.00087	0.11506	0.01209	0.00241	0.01201	0.01713	0.01261	0.7056
13	0.07007	0.0323	0.02062	0.00103	0.00074	0.05007	0.00492	0.0018	0.00925	0.01083	0.00405	0.00334	0	0.17758	0.0503	0.00346	0.00887	0.00889	0.00872	0.00343	0.02381	0.00849	0.00373	0.08996	0.03966	0.00383	0.01672	0.02354	0.02522	0.70523
14	0.06893	0.05474	0.08235	0.01607	0.0181	0.09031	0.04547	0.04435	0.05248	0.06148	0.07092	0.06645	0.17758	0	0.06258	0.03512	0.03369	0.03768	0.02986	0.03974	0.02514	0.21515	0.03392	0.0941	0.03282	0.01251	0.03356	0.03493	0.04941	1.61942
15	0.01979	0.34418	0.03367	0.03995	0.02448	0.04333	0.02706	0.04387	0.03144	0.09095	0.04821	0.03536	0.0503	0.06258	0	0.13134	0.09255	0.06312	0.05101	0.0502	0.02778	0.04038	0.04396	0.06259	0.11864	0.01628	0.2543	0.01863	0.03993	1.90588
16	0.00605	0.10799	0.06637	0.02496	0.00045	0.00303	0.00074	0.00322	0.00435	0.02593	0.00269	0.00099	0.00346	0.03512	0.13134	0	0.02141	0.00663	0.00307	0.00601	0.00267	0.01319	0.04367	0.06873	0.02224	0.00289	0.02279	0.02104	0.03688	0.62783
17	0.00533	0.15177	0.01304	0.01023	0.00273	0.00441	0.00515	0.01027	0.04155	0.01696	0.00877	0.00539	0.00887	0.03369	0.09255	0.02141	0	0.35583	0.24402	0.09515	0.08896	0.0273	0.01063	0.08168	0.02887	0.00788	0.03098	0.02452	0.02254	1.54147
18	0.00504	0.07122	0.01045	0.01054	0.00179	0.00351	0.00519	0.00367	0.01187	0.01512	0.00743	0.00438	0.00889	0.03768	0.06312	0.00663	0.35583	0	0.2935	0.0919	0.0101	0.02888	0.04054	0.08022	0.02307	0.00903	0.02089	0.02693	0.0229	1.00618
19	0.00505	0.05185	0.00521	0.00165	0.00052	0.00199	0.00043	0.00326	0.00117	0.00939	0.0038	0.00065	0.00872	0.02986	0.05101	0.00302	0.24402	0.2935	0	0.01398	0.00314	0.00412	0.00336	0.07568	0.02821	0.00369	0.01508	0.02532	0.0196	0.64313
20	0.00775	0.0391	0.00722	0.00086	0.00065	0.00249	0.00063	0.00694	0.00558	0.01476	0.00394	0.00066	0.00343	0.03974	0.0502	0.00601	0.09515	0.0919	0.01398	0	0.00495	0.00664	0.0117	0.07677	0.02831	0.01729	0.02448	0.03704	0.03857	0.63673
21	0.00625	0.02362	0.00537	0.00444	0.00226	0.00355	0.00092	0.0025	0.00124	0.00827	0.00352	0.00125	0.02381	0.02514	0.27778	0.00267	0.08896	0.0101	0.00314	0.00495	0	0.00411	0.00302	0.06341	0.04381	0.00294	0.00868	0.01528	0.02203	0.41301
22	0.03231	0.0292	0.02283	0.00156	0.0015	0.03596	0.02013	0.00458	0.0028	0.02315	0.00627	0.00942	0.00840	0.21515	0.04038	0.01319	0.0273	0.02888	0.00412	0.00664	0.00411	0	0.00383	0.08149	0.02473	0.00479	0.01718	0.02981	0.02886	0.72866
23	0.02224	0.04652	0.00702	0.00119	0.00093	0.00207	0.00078	0.03617	0.00174	0.01037	0.00344	0.00087	0.00373	0.03392	0.04396	0.04367	0.0163	0.04054	0.00336	0.0117	0.00302	0.00383	0	0.05409	0.01821	0.00381	0.01012	0.0212	0.03078	0.56091
24	0.03191	0.03755	0.07381	0.06488	0.09311	0.07201	0.08688	0.08637	0.08667	0.08369	0.07046	0.11506	0.08996	0.0941	0.06259	0.06873	0.08168	0.08022	0.07568	0.07677	0.06341	0.08149	0.05409	0	0.06419	0.02331	0.06908	0.04056	0.03812	1.96634
25	0.01926	0.06608	0.02592	0.01371	0.01119	0.01928	0.01363	0.0196	0.01564	0.03197	0.0176	0.01209	0.03966	0.03282	0.11864	0.02224	0.02887	0.02307	0.02821	0.02831	0.00341	0.00473	0.01821	0.06419	0	0.00994	0.01707	0.02221	0.02914	0.81713
26	0.00324	0.00988	0.00465	0.00185	0.0015	0.00333	0.00223	0.00254	0.00288	0.01842	0.01076	0.00241	0.00383	0.03251	0.01628	0.00289	0.00369	0.00303	0.00369	0.00179	0.00438	0.00479	0.01031	0.02331	0.00994	0	0.00884	0.02264	0.03157	0.24494
27	0.00766	0.14075	0.01004	0.00937	0.00834	0.01294	0.00925	0.0094	0.00891	0.03987	0.02623	0.01201	0.01672	0.03356	0.2543	0.02279	0.03098	0.02089	0.01508	0.02448	0.00868	0.01718	0.01082	0.00908	0.01707	0.00884	0	0.01785	0.02983	0.89221
28	0.01008	0.01347	0.01554	0.01575	0.01572	0.01817	0.01817	0.02139	0.01878	0.03175	0.028	0.01713	0.02354	0.03493	0.01863	0.02104	0.02452	0.02693	0.02532	0.03704	0.01528	0.02981	0.0212	0.04056	0.02221	0.02264	0.01785	0	0.11856	0.72172
29	0.03765	0.02676	0.05634	0.03141	0.02395	0.02019	0.01484	0.01742	0.01558	0.03385	0.03083	0.01261	0.02522	0.04941	0.03993	0.03688	0.02254	0.0229	0.0196	0.03957	0.02033	0.02886	0.03078	0.03812	0.02914	0.03157	0.02983	0.11856	0	0.90537
SUM	1.25227	1.50699	1.0075	0.47976	0.35381	0.60794	0.5569	0.81439	0.70802	0.99059	0.67604	0.7056	0.70523	1.61942	1.90588	0.62783	1.54147	1.00618	0.64313	0.63673	0.41301	0.72866	0.56091	0.96634	0.81713	0.24494	0.89221	0.72172	0.90537	25.6892

1979

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0	0.01427	0.27787	0.0545	0.06245	0.03723	0.0238	0.21821	0.10311	0.01382	0.00781	0.0614	0.06667	0.07728	0.01934	0.00687	0.00501	0.00531	0.00517	0.00816	0.00629	0.02884	0.02226	0.02978	0.01897	0.00355	0.00751	0.01024	0.0391	1.234838
2	0.01427	0	0.01916	0.02274	0.0234	0.01405	0.02411	0.01942	0.01942	0.04806	0.026	0.01863	0.02997	0.05402	0.33409	0.10469	0.14017	0.06813	0.04844	0.03692	0.02292	0.02798	0.04372	0.03739	0.06139	0.00907	0.12555	0.01403	0.02746	1.429521
3	0.27787	0.01916	0	0.12469	0.00882	0.01745	0.04435	0.01825	0.01167	0.01398	0.00918	0.13794	0.01921	0.0753	0.03041	0.00632	0.01129	0.01066	0.00502	0.00658	0.00528	0.02199	0.00681	0.07148	0.02638	0.00471	0.00958	0.01611	0.05614	1.067828
4	0.0545	0.02274	0.12469	0	9.8E-05	0.00147	0.00017	0.00018	0.00022	0.0103	0.00317	0.00012	0.00124	0.01825	0.03645	0.02617	0.00974	0.01062	0.00158	0.00099	0.00399	0.002	0.00136	0.06126	0.0134	0.00197	0.00898	0.01584	0.0333	0.466414
5	0.06245	0.01274	0.00882	9.8E-05	0	0.00187	2.4E-06	0.0015	5.2E-05	0.05017	0.00216	1.4E-05	0.00078	0.01779	0.02257	0.00044	0.00256	0.0017	0.00049	0.00064	0.00208	0.00145	0.00091	0.08558	0.01063	0.00148	0.0078	0.01512	0.02261	0.334509
6	0.03723	0.0234	0.01745	0.00147	0.00187	0	0.04627	0.00362	0.03095	0.02022	0.00951	0.02104	0.05241	0.08792	0.03951	0.003	0.00413	0.00439	0.00209	0.00265	0.03238	0.00228	0.07027	0.01898	0.00343	0.01308	0.0186	0.02139	0.593183	
7	0.0238	0.01405	0.04435	0.00017	2.4E-06	0.04627	0	0.00154	0.00027	0.01314	0.00318	0.15719	0.00758	0.04385	0.02383	0.00084	0.00489	0.00538	0.00049	0.00069	0.0011	0.01965	0.00083	0.08133	0.0134	0.00243	0.00934	0.01619	0.01706	0.552843
8	0.21821	0.02411	0.01825	0.0018	0.0015	0.00362	0.00154	0	0.18438	0.00882	0.00265	0.00169	0.00223	0.04219	0.04057	0.00382	0.00997	0.00446	0.00542	0.00648	0.00269	0.00481	0.03486	0.08285	0.02088	0.00258	0.00923	0.02158	0.0185	0.779683
9	0.0311	0.01942	0.01167	0.00022	5.2E-05	0.03095	0.00027	0.18438	0	0.00634	0.00157	0.00066	0.00856	0.05119	0.02882	0.00411	0.04204	0.01327	0.00124	0.00619	0.00132	0.00357	0.00171	0.08174	0.01505	0.00292	0.00917	0.01837	0.01554	0.66345
10	0.01382	0.04806	0.01398	0.0103	0.05017	0.02022	0.01314	0.00882	0.00634	0	0.24826	0.0071	0.01124	0.05853	0.08336	0.02827	0.01627	0.01451	0.00902	0.01509	0.00776	0.02575	0.01074	0.08308	0.03062	0.0178	0.03635	0.03143	0.03654	0.95656
11	0.00781	0.026	0.00918	0.00317	0.00216	0.00951	0.00318	0.00265	0.00157	0.24826	0	0.00177	0.00467	0.06691	0.04449	0.00299	0.00857	0.00763	0.00385	0.00401	0.00373	0.00698	0.00353	0.06844	0.01819	0.01132	0.02478	0.02711	0.03631	0.658792
12	0.0614	0.01863	0.13794	0.00012	1.4E-05	0.02104	0.15719	0.00169	0.00066	0.0071	0.00177	0	0.0038	0.06535	0.03154	0.00118	0.00523	0.00502	0.00063	0.00072	0.00147	0.00086	0.10597	0.01184	0.00228	0.01126	0.01641	0.01319	0.695618	
13	0.06667	0.02997	0.01921	0.00124	0.00078	0.05241	0.00758	0.00223	0.00856	0.01124	0.00467	0.0038	0	0.16813	0.04571	0.00349	0.00847	0.00851	0.00821	0.0046	0.0227	0.00816	0.00371	0.08491	0.03889	0.00405	0.01702	0.02267	0.02574	0.88331
14	0.07728	0.05402	0.0753	0.01825	0.01779	0.08792	0.04385	0.04219	0.05119	0.05853	0.06691	0.06535	0.16813	0	0.0587	0.03517	0.03032	0.03583	0.02727	0.03907	0.02419	0.19826	0.03359	0.08868	0.03213	0.0123	0.03145	0.03397	0.0511	1.557725
15	0.01934	0.33409	0.03041	0.03645	0.02257	0.03951	0.02383	0.04057	0.02882	0.08336	0.04449	0.03154	0.04571	0.0587	0	0.12162	0.08764	0.05973	0.04719	0.0457	0.02586	0.03737	0.04173	0.05776	0.10792	0.01458	0.22544	0.01922	0.03909	1.770247
16	0.00687	0.10469	0.00632	0.02617	0.00044	0.003	0.00084	0.00382	0.00411	0.02827	0.00299	0.00118	0.00349	0.03517	0.12162	0	0.02097	0.00747	0.00331	0.00685	0.00299	0.0155	0.04526	0.06732	0.0217	0.00302	0.02369	0.02181	0.03775	0.626642
17	0.00501	0.14017	0.01229	0.00974	0.00256	0.00413	0.00489	0.00997	0.04204	0.01627	0.00857	0.00523	0.00847	0.03032	0.08764	0.02097	0	0.34184	0.23073	0.08918	0.07939	0.03361	0.09796	0.08057	0.02806	0.00758	0.03091	0.02468	0.02304	1.475833
18	0.00531	0.06813	0.01066	0.01062	0.0017	0.00439	0.00538	0.00446	0.01327	0.01451	0.00763	0.00502	0.00851	0.03583	0.05973	0.00747	0.34184	0	0.03535	0.08712	0.01004	0.0327	0.04225	0.07959	0.02345	0.00889	0.0204	0.02716	0.02401	0.995408
19	0.00517	0.04844	0.00502	0.00158	0.00049	0.00209	0.00049	0.00542	0.00124	0.00902	0.00385	0.00063	0.00821	0.02727	0.04719	0.00331	0.23073	0.03535	0	0.01278	0.00318	0.00554	0.0035	0.07344	0.02683	0.00357	0.01472	0.02493	0.02069	0.624654
20	0.00816	0.03692	0.0068	0.00099	0.00064	0.00265	0.00069	0.00648	0.00619	0.01509	0.00401	0.00072	0.0046	0.03907	0.0457	0.00685	0.08918	0.08712	0.01278	0	0.00525	0.00727	0.01195	0.07376	0.02755	0.0187	0.02306	0.03508	0.03919	0.616422
21	0.00629	0.02292	0.00528	0.00399	0.00208	0.00366	0.0011	0.00269	0.00132	0.00776	0.00373	0.00128	0.0227	0.02419	0.02586	0.00299	0.07939	0.01004	0.00318	0.00525	0	0.00343	0.00326	0.06507	0.04236	0.00337	0.0086	0.01717	0.02352	0.402478
22	0.02884	0.02798	0.02199	0.002	0.00145	0.03238	0.01965	0.00481	0.00357	0.02575	0.00698	0.01147	0.00816	0.19826	0.03737	0.0155	0.03361	0.0327	0.00554	0.00727	0.00343	0	0.00475	0.07742	0.02341	0.00463	0.01662	0.02852	0.02864	0.7127
23	0.02226	0.04372	0.00681	0.00136	0.00091	0.00228	0.00083	0.03486	0.00171	0.01074	0.00353	0.00086	0.00371	0.03259	0.04713	0.04526	0.09796	0.04225	0.0035	0.01195	0.00326	0.00475	0	0.05512	0.01816	0.0038	0.00992	0.02348	0.03331	0.560615
24	0.02978	0.03739	0.07148	0.06126	0.08558	0.07027	0.08133	0.08285	0.08174	0.08308	0.06844	0.10597	0.08491	0.08868	0.05716	0.06732	0.08057	0.07959	0.07344	0.07376	0.06507	0.07742	0.05512	0	0.0617	0.02266	0.0653	0.04541	0.04109	1.898957
25	0.01897	0.06139	0.02638	0.0134	0.01063	0.01898	0.0134	0.02088	0.01505	0.03062	0.01819	0.01184	0.03889	0.03213	0.10792	0.0217	0.02806	0.02345	0.02683	0.02755	0.04236	0.02341	0.01816	0.0617	0	0.01178	0.01763	0.02224	0.03109	0.794623
26	0.00355	0.00907	0.00471	0.00197	0.00148	0.00343	0.00243	0.00258	0.00292	0.0178	0.01132	0.00228	0.00405	0.0123	0.01458	0.00302	0.00758	0.00889	0.00357	0.0187	0.00337	0.00463	0.0038	0.02266	0.01178	0	0.00911	0.02174	0.03354	0.246901
27	0.00751	0.12555	0.00568	0.00898	0.0078	0.01308	0.00934	0.00923	0.00917	0.03635	0.02478	0.01126	0.00702	0.03343	0.22544	0.02369	0.03901	0.0204	0.01472	0.02306	0.0086	0.01662	0.00992	0.0653	0.01763	0.00911	0	0.01828	0.03204	0.837794
28	0.01024	0.01403	0.01611	0.01584	0.01512	0.0186	0.01619	0.02158	0.01837	0.03143	0.02711	0.01641	0.02267	0.03195	0.01922	0.02181	0.02468	0.01757	0.02493	0.03508	0.01357	0.02852	0.02348	0.04541	0.02224	0.02174	0.01828	0	0.10976	0.717157
29	0.0391	0.02746	0.05614	0.0333	0.02261	0.02139	0.01706	0.0185	0.01554	0.03654	0.03631	0.03139	0.02574	0.0511	0.03909	0.03775	0.02304	0.02401	0.02069	0.03919	0.02172	0.02864	0.03331	0.04109	0.03109	0.03354	0.03204	0.10976	0	0.93071
SUM	1.23484	1.42952	1.06783	0.46641	0.33451	0.59318	0.55284	0.77968	0.66345	0.95656	0.65879	0.69562	0.68331	1.55772	1.77025	0.62664	1.47583	0.99541	0.62465	0.61642	0.40248	0.7127	0.56061	1.89896	0.79462	0.2469	0.83779	0.71716	0.93071	24.88541

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.0010818	0.078906	0.039744	0.061366	0.001369	0.0036254	0.0560525	0.0571208	0.046361	0.000448	-0.004073	0.073738	0.0024416	0.0045447	-0.000281	-0.000237	-0.000407	-0.000437	1.23E-05	-0.000388	0.0021786	0.0032864	0.0048071	0.0039559	0.000752	0.0179172	0.0005585	0.0057397	0.293378	
2	0.0010818	0	0.0008679	0.0010555	0.0001587	-0.000715	0.0028775	0.0033273	0.0011851	-0.000201	0.0006745	0.001666	0.0017215	0.0179307	0.0088773	0.0166236	0.0391882	0.0638219	0.0008873	0.005293	0.0001591	0.0148484	0.0053733	0.0051541	0.007987	0.001785	0.0087147	0.0016629	0.0091053	0.212809
3	0.078906	0.0008679	0	0.0270589	0.0002687	-0.0005085	-0.001863	0.0007592	0.001346	0.0016245	0.0005095	-0.004954	0.0004339	0.0096553	0.0043232	0.0003305	1.94E-05	0.0002819	-0.000117	0.0002391	-0.000385	0.0001524	0.0004363	0.0009131	0.0045543	0.0003208	0.0037399	0.0006827	0.0098675	0.149811
4	0.0039744	0.0010555	0.0270589	0	0.0002687	5.352E-05	0.0001011	-0.000204	-2.68E-05	0.0007456	0.0004811	-2.81E-05	-2.83E-05	0.0005078	0.0112657	0.0079669	0.0012758	0.0108109	6.72E-05	0.0001231	3.50E-05	-0.0001232	0.0006593	0.0077467	0.0005595	0.0006389	0.0009578	0.0005789	0.0009753	
5	0.0061366	0.0001587	0.0003974	0.0010555	0.0002687	0	4.71E-05	7.87E-05	-0.00015	-8.93E-07	0.0227175	6.94E-06	-1.86E-05	0.0018902	0.0024469	0.0001557	0.0002394	0.0001204	1.15E-05	0.0003422	1.15E-05	-0.0002323	0.0079085	0.0016182	0.0002517	0.001801	0.0006869	0.0018009	0.063838	
6	0.0001369	-0.000175	0.0005085	5.352E-05	4.71E-05	0	6.0866398	-1.95E-05	0.0194841	-0.000501	0.000577	0.00083159	0.0470495	0.0048389	0.001858	0.0002556	8.21E-06	-0.000469	8.66E-05	0.0043959	0.0002687	0.0232476	0.0005317	0.004412	0.0016776	0.0003954	0.0002536	0.0003226	0.023829	0.729588
7	0.0036254	0.0028775	-0.001863	0.0010555	1.837E-05	0.006398	0	0.003362	0.0002117	0.0016091	0.0029128	0.0191922	0.0006499	0.046061	0.0189253	0.0007028	0.001366	0.0006751	0.0002974	0.0051431	0.0077046	0.0028315	0.002953	0.061148	0.038743	0.0053343	0.0039289	0.0310005	0.0228098	0.077669
8	0.0560525	0.0033273	0.0007592	-0.000204	-0.00015	-1.95E-05	0.0003062	0	0.0535534	-0.000234	0.0001612	-0.00017	0.001427	0.0012628	0.0082306	2.287E-05	0.0003152	0.001007	0.000843	0.0053233	7.41E-06	0.0040418	0.0060846	0.0080483	0.005877	0.0003612	0.0020983	0.0011074	0.008745	0.152051
9	0.0571208	0.0011851	0.0021346	-2.68E-05	-8.93E-07	0.0194841	0.0002117	0.0535514	0	0.0009795	0.0001243	0.0012436	0.003504	0.0060747	0.008188	0.0025596	0.0007181	0.0098986	0.003714	0.0001483	0.0001926	0.0009078	0.0013399	0.0223623	0.0078673	0.0013448	0.0064549	0.0040644	0.0030446	0.219451
10	0.0046361	-0.000201	0.0016245	0.0007456	0.0227175	-0.000501	0.0016091	-0.000234	0.0009795	0	0.0854971	-0.00467	0.0010652	0.0051068	0.0038387	0.0015444	-0.000347	0.0033606	0.0008829	-0.00044	-0.000861	0.0001279	0.0063922	0.0008801	0.0003688	0.0004511	-0.000236	0.0020601	0.13667	
11	0.0008448	0.006745	0.0005095	0.0004811	0.0004623	0.000577	0.0029128	0.0001612	0.0001243	0.0854971	0	-0.000125	-6.17E-05	0.0137738	0.0067644	0.000929	0.001197	-6.24E-05	0.0001559	0.0025963	2.11E-05	-0.000203	0.0015893	0.0188461	0.0056318	0.0021035	0.001785	0.0026841	0.0014607	0.795339
12	-0.004873	-0.000166	-0.004954	-2.81E-05	6.94E-06	0.0033159	0.0131922	-0.00017	0.0012436	-0.000467	-0.000125	0	0.0010567	0.0090994	0.0004975	-5.58E-05	-0.000279	-0.000551	1.69E-05	0.0001534	-2.91E-05	-5.4E-05	0.0001346	0.0042424	0.0008831	0.0003248	0.0018125	0.0010041	0.0002567	0.0303971
13	0.073738	0.0013715	0.0004339	-2.83E-05	0.0470495	0.0006409	0.000147	0.0003504	-0.000463	-6.17E-05	0.0010567	0	0.0142736	0.0064181	0.0002569	8.94E-05	-0.000118	-5.3E-05	0.0011588	-0.000638	0.0046942	0.0007145	0.0128206	0.022346	0.0006672	0.0007979	0.0012512	0.0013978	0.131082	
14	0.0024116	0.0179307	0.0003715	0.0003982	0.0018902	0.0004839	0.046061	0.0012628	0.0060747	0.0010652	0.0197738	0.0090994	0.0142736	0	0.0133581	0.0053806	0.0015616	0.0006294	4.58E-05	0.004559	-0.000409	0.0007943	0.0047254	0.0058223	0.0068719	0.0597795	0.0131488	0.0054777	0.0034587	0.267946
15	0.005447	0.0688773	0.0043232	0.0112657	0.0012557	0.0001557	0.0002558	0.0007028	2.287E-05	0.0021596	0.0038387	0.000929	-5.58E-05	0.0002569	0.0053806	0.0047825	0	0.0474825	0.0110837	0.0003208	-0.0004325	0.0007943	0.0047254	0.0058223	0.0068719	0.0597795	0.0131488	0.0054777	0.0034587	0.4891331
16	-0.000237	0.0391882	1.948E-05	0.0012758	0.0002394	8.21E-06	0.001809	0.0001204	-0.000469	0.0006751	0.001607	0.0098986	-0.000347	-6.24E-05	0.0001559	0.0025963	2.11E-05	-0.000203	0.0015893	0.0188461	0.0056318	0.0021035	0.001785	0.0026841	0.0056318	0.0021035	0.001785	0.0026841	0.0056318	0.263918
17	-0.000237	0.0391882	1.948E-05	0.0012758	0.0002394	8.21E-06	0.001809	0.0001204	-0.000469	0.0006751	0.001607	0.0098986	-0.000347	-6.24E-05	0.0001559	0.0025963	2.11E-05	-0.000203	0.0015893	0.0188461	0.0056318	0.0021035	0.001785	0.0026841	0.0056318	0.0021035	0.001785	0.0026841	0.0056318	0.263918
18	-0.000407	0.0058719	0.0002819	0.0108109	0.001204	-0.000469	0.0006751	0.001607	0.0098986	-0.000347	-6.24E-05	-0.000531	-0.000118	0.0006294	0.0019208	-4.7E-05	0.038262	0	-0.002197	0.0002016	0.0010105	-0.001511	0.00375	0.0021457	0.0051515	0.0016735	0.0020702	-0.000889	0.0002386	0.840584
19	-0.000437	0.0008873	-0.000117	6.72E-05	5.69E-05	-8.66E-05	0.0002974	0.0008443	0.0003714	0.0003606	0.0001559	1.69E-05	-5.3E-05	-6.98E-05	-0.000327	0.0004135	-0.002226	-0.002197	0	0.0053139	-0.000205	-0.000972	7.80E-05	-0.001165	0.0007146	0.0005474	-4.86E-05	-0.00098	-0.000205	0.0004924
20	1.23E-05	0.005293	0.0002891	0.0001233	0.0003422	0.0043858	0.0015481	0.0015523	0.0001483	0.0008829	0.002563	0.0001534	0.001588	0.014559	0.0053594	0.0046732	0.0026307	0.002016	0.0053139	0	0.0023809	0.0011794	0.0030416	0.0231375	0.0109946	0.0276644	0.0110235	0.00792	0.0061661	0.172768
21	-0.000388	0.0001591	-0.000185	3.58E-05	1.153E-05	0.0002687	0.0017046	7.41E-06	0.0001926	-0.00044	2.11E-05	-2.91E-05	-0.000638	-0.000409	0.0007943	6.412E-05	0.0072688	0.0010105	-0.000205	0.0021809	0	0.0004024	-0.000104	0.0007215	0.0123048	0.0008042	0.002461	-0.000888	0.0020709	0.009837
22	0.0021786	0.0148484	0.0001524	-0.000232	-3.12E-05	0.0232476	0.0028315	0.0004818	0.0009078	-0.000861	-0.000203	-9.54E-05	0.0046942	0.0077346	0.0047254	0.001805	0.0017894	-0.001511	-0.000972	0.0011794	0.0004024	0	0.0010597	0.0105014	0.0058205	0.0039037	0.0069292	0.0038597	0.0045361	0.010497
23	0.0032864	0.0057373	0.0004363	0.0006593	0.0002233	0.0005317	0.002953	0.0006946	0.0013399	0.0009179	0.0015893	0.0001346	0.0007145	0.0010206	0.0058823	0.003679	0.0054651	0.00375	7.80E-05	0.0030416	-0.000104	0.0010597	0	-1.84E-05	0.0037072	0.0021766	0.0050317	0.009606	0.0020713	0.075599
24	0.048071	0.0051541	0.0091731	0.0077467	0.0079085	0.0044112	0.061148	0.0008483	0.0023623	0.0063922	0.0188461	0.0042424	0.0218206	0.0071751	0.0045008	0.009666	0.002457	0.001165	0.0221375	0.0007215	0.0007215	0.0105014	-1.84E-05	0	0.0144026	0.0073133	0.0115619	0.0036422	0.011676	0.284196
25	0.0039959	0.007987	0.0004543	0.0035619	0.0016182	0.016776	0.0398743	0.0055877	0.0078673	0.0008801	0.0056318	0.0008031	0.0022346	0.0037621	0.003795	0.0029588	0.0036251	0.0051515	0.001746	0.0109946	0.0123048	0.0058205	0.0037072	0.0144026	0	0.0107177	0.0043445	0.008924	0.032225	0.271283
26	0.000752	0.0007167	0.0003208	0.0005595	0.0002517	0.0003954	0.0055343	0.003612	0.0013448	0.0003698	0.0021035	0.0003248	0.0008672	0.0012355	0.0131418	0.0003522	0.0015621	0.0015893	0.005474	0.0277644	0.0008042	0.0039037	0.002766	0.0073133	0.0100717	0	0.0192263	0.0066686	0.0174054	0.1307965
27	0.0179172	0.0007399	0.0006309	0.0001801	0.0002539	0.0393209	0.020903	0.0064549	0.0004511	0.0010785	0.0018125	0.0007979	0.000426	0.0054777	0.0027072	-4.86E-05	0.0110235	0.0042461	0.0069292	0.0042461	0.0039292	0.0050317	0.015619	0.0043445	0.003263	0	0.005286	0.0145068	0.293731	
28	0.005385	0.0016629	0.0006827	0.0009578	0.0006869	0.0003226	0.0310005	0.0011074	0.0006544	-0.0002316	0.0026841	0.0010041	0.0013517	0.0001994	0.0043568	0.001167	4.53E-05	-0.000889	-0.00098	0.002792	-0.000888	0.0038597	0.009606	0.0036422	0.008924	0.0086686	0.0050286	0.0149586	0.017335	
29	0.0057997	0.0091053	0.0098675	0.0053899	0.0018009	0.0033829	0.022098	0.008745	0.0039446	0.0020601	0.0114907	0.0002967	0.0015893	0.0100299	0.0109555	0.0026647	0.0053828	-0.0002386	-0.000295	0.0061661	0.0020709	0.0045361	0.011676	0.032225	0.0174054	0.0054568	0.0149586	0	0.210627	
SUM	0.2693378	0.222809	0.149811	0.0903753	0.0538538	0.729588	0.9073669																							

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM		
1	0	0.032351	0.20259	0.064262	0.0403045	0.0434202	0.0304054	0.177105	0.0755402	0.0565275	0.028682	0.0277064	0.0103326	0.079897	0.0542836	0.0119490	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483		
2	0.032351	0	0.037993	0.0467276	0.0299721	0.0461284	0.0298032	0.0474669	0.032037	0.0746413	0.0522455	0.0309004	0.0466317	0.010867	0.0439381	0.179338	0.2450215	0.139719	0.0754279	0.0914732	0.0848476	0.052455	0.0819407	0.050252	0.1444753	0.0235959	0.034401	0.0262309	0.057697	2.4913169		
3	0.20259	0.037993	0	0.0774945	0.0593177	0.071625	0.0114056	0.0139582	0.0072624	0.0177059	0.0077163	0.0115742	0.012973	0.0346034	0.0620887	0.0645492	0.0114062	0.0134802	0.0073237	0.01010107	0.0100504	0.0062581	0.0066812	0.0430074	0.0392433	0.0662277	0.072408	0.0168803	0.0498163	1.9169073		
4	0.064262	0.0467276	0.0774945	0	8.82E-05	0.0024408	0.0003015	0.005174	0.0001338	0.0207012	0.0303004	0.0002568	0.0002572	0.063407	0.0816515	0.020398	0.0242559	0.0326272	0.040657	0.0502458	0.0015358	0.0015358	0.0023233	0.0475981	0.0277451	0.004305	0.027242	0.0383213	0.0306851	1.5940225		
5	0.0493045	0.0299721	0.0593177	8.82E-05	0	0.0020611	0.0001219	0.0012761	2.20E-05	0.2081328	0.0075014	0.000124	0.00020519	0.026594	0.0597325	0.0008404	0.0575796	0.0042468	0.0025455	0.0501743	0.0406285	0.0005305	0.0022863	0.0432111	0.0212808	0.003509	0.0253875	0.0444987	0.0109144	1.5353082		
6	0.064302	0.0461284	0.071625	0.0024408	0.0020611	0	0.32857	0.0111807	0.0601433	0.025984	0.0088839	0.132225	0.1271647	0.054635	0.0806984	0.0621112	0.099881	0.086562	0.0130145	0.0131953	0.0311404	0.0808183	0.0063406	0.0383167	0.0426987	0.0069706	0.0402258	0.0260529	0.0231023	1.3075127		
7	0.0304054	0.0299032	0.0114056	0.0003015	0.0001219	0.32857	0	0.0013486	0.0007802	0.0129786	0.0028246	0.0281963	0.0088472	0.052319	0.0578443	0.0016421	0.0051236	0.0040548	0.0400169	0.0059127	0.0074919	0.0049177	0.0031667	0.0019153	0.0067196	0.046113	0.0064114	0.0290108	0.0260009	0.0518384	1.7949822	
8	0.177105	0.0474669	0.0139582	0.001574	0.0012761	0.0111807	0.0013486	0	0.0977244	0.0214692	0.0032383	0.0037187	0.0052979	0.0367145	0.0854095	0.005357	0.044687	0.0146838	0.0285081	0.0179725	0.0106373	0.0041935	0.0023677	0.0007956	0.046113	0.0056489	0.0034939	0.0286538	0.0151834	1.7949822		
9	0.0755402	0.032037	0.0746413	0.0298032	0.0177059	0.0077163	0.0115742	0.012973	0.0346034	0.0620887	0.0645492	0.0114062	0.0134802	0.0073237	0.01010107	0.0100504	0.0062581	0.0066812	0.0430074	0.0392433	0.050252	0.0819407	0.050252	0.1444753	0.0235959	0.034401	0.0262309	0.057697	0.0498163	1.9169073		
10	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	0.050252	1.9169073	
11	0.028682	0.0277064	0.0103326	0.079897	0.0542836	0.0119490	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483												
12	0.0277064	0.0103326	0.079897	0.0542836	0.0119490	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483													
13	0.0103326	0.079897	0.0542836	0.0119490	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483														
14	0.0542836	0.0103326	0.079897	0.0542836	0.0119490	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483													
15	0.0542836	0.0103326	0.079897	0.0542836	0.0119490	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483													
16	0.0119490	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																	
17	0.0115641	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																		
18	0.0118658	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																			
19	0.0139512	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																				
20	0.0155865	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																					
21	0.0454867	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																						
22	0.0101003	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																							
23	0.0142552	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																								
24	0.0286445	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																									
25	0.0337764	0.067271	0.071122	0.0337869	0.0479245	1.4257483																										
26	0.067271	0.071122	0.0337869	0.0479245	1.4257483																											
27	0.071122	0.0337869	0.0479245	1.4257483																												
28	0.0337869	0.0479245	1.4257483																													
29	0.0479245	1.4257483																														
SUM	1.4257483	2.4913169	0.9169073	0.5940225	0.5353682	1.3075127	0.734402	0.794882	0.4403771	1.7392599	1.0668127	0.6653028	0.9354673	1.526685	3.3648109	0.9711753	1.762389	1.298882	0.8647461	1.0589063	1.0546066	0.687647	0.7142083	1.9081328	1.6331898	0.4764983	1.633732	0.8663147	0.9079463	34.4047913		

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	0.050882	0.1450693	0.0153718	0.0139237	0.0138082	0.0346271	0.0242436	0.0201159	0.0101045	0.050883	0.0250743	0.027091	0.0385368	0.0074094	0.0031979	0.0019335	0.0030408	0.0022337	-0.029425	-0.000696	0.0369655	0.0049954	0.0019965	0.0046766	0.0005389	0.0035593	0.0044065	0.021677	0.4722506	
2	0.0950882	0	0.006547	0.0104936	0.002217	0.0054776	0.096577	0.051223	0.017612	0.0097466	0.0116251	0.0196433	0.0258964	0.0215835	0.224092	0.027653	0.001408	0.0245411	0.0171176	-0.199151	-0.055221	0.0522462	0.0127551	0.0054515	0.0416263	0.0046557	0.0212052	0.0015591	0.0153875	0.3776955	
3	0.1450693	0.006547	0	0.0314722	0.000718	0.0034057	0.0264855	0.0025044	0.0072863	0.0047723	0.0042444	0.0446524	0.0025756	0.0282441	0.0082621	0.0025753	0.0025158	0.0059468	0.0024657	-0.034554	-0.001262	0.0084674	0.0017169	0.0056264	0.0074138	-0.000519	0.0063176	0.0284837	0.1294877	0.7379095	
4	0.0153718	0.006547	0.0314722	0	9.69E-05	0	0.0009017	0.0017554	0.0003325	0.0061865	0.0018631	0.0071455	0.0005805	0.0104984	0.0179388	0.0013758	0.0151599	0.0109783	0.0013758	-0.037071	0.0005322	0.0024586	0.0006547	0.0020316	0.0015664	0.0055203	0.0119297	0.0119297	0.1611251		
5	0.0319327	0.002217	0.001718	9.69E-05	0	0.0004635	0.0011296	0.0009842	0.0001638	0.0215393	0.0013012	0.0004334	0.0006754	0.0047065	0.0001678	0.0002451	0.0005129	0.0003359	0.0003359	-0.002976	7.87E-05	0.0005404	0.000241	0.012755	0.0016006	0.0008809	0.0024402	0.0032108	0.0033769	0.0811372	
6	0.0138082	0.0054776	0.0034057	0.0009017	0.0004635	0	1.9700344	0.0083765	0.0174573	0.0034307	0.0064447	0.1702708	0.0230225	0.0256406	0.0112967	0.0035508	0.0010871	0.0023361	0.0021484	-0.001802	0.0008024	0.0471286	0.0014632	0.0206088	0.0006973	0.0069701	0.0067339	0.0066978	0.011865	2.4151903	
7	0.046271	0.096577	0.0264855	0.0017554	0.0011296	1.9700344	0	0.0060235	0.0059453	0.0038574	0.0025175	0.1389957	0.0140854	0.140652	0.219554	0.0016823	-0.003354	0.013375	0.0170718	-0.007826	0.0157483	0.0213371	0.0108093	0.0456566	0.0333641	0.048398	0.0077149	0.0291019	0.0106004	3.3268881	
8	0.042436	0.054223	0.0025044	0.0010631	0.0009842	0.0083765	0.0068235	0	0.1853064	0.0054598	0.0015786	0.0073157	0.0122539	0.0099144	0.0094545	0.0265253	0.0009028	0.0025966	-0.003386	-0.000343	0.0182763	0.0085295	0.0276737	0.0089856	0.0095778	0.004442	0.0065234	0.0053018	0.3763393		
9	0.0201159	0.017612	0.0072863	0.0002325	0.0001538	0.0034573	0.0059453	0.1853064	0	0.0094817	0.001085	0.1827442	0.0840884	0.2488336	0.001666	0.0135359	0.0089064	0.005328	-0.017825	0.0004049	0.0038343	0.0013947	0.058436	0.0086161	0.0242473	0.0215797	0.017022	0.004727	0.7598975		
10	0.0101045	0.0097466	0.0047723	0.0061865	0.0021593	0.0034307	0.0399574	0.0054598	0.0094817	0	0.1546771	0.0188634	0.0041738	0.0271293	0.0193476	0.0111689	0.002742	0.0038221	-0.004163	-0.049446	-0.003202	0.0407489	0.003495	0.0013459	0.0061001	0.0017057	0.0164856	0.0094946	0.0144717	0.4020177	
11	0.0050883	0.0116251	0.0042444	0.0011807	0.0013012	0.0068447	0.0025175	0.005786	0.001085	0.1546771	0	0.0012287	0.0593944	0.0189405	0.0012725	0.0024413	0.0103021	0.011611	-0.00999	0.0003301	0.0041998	0.0010785	0.0204176	0.0040366	0.0050282	0.0267732	0.0186493	0.0156446	0.3755089		
12	0.0250743	0.0196433	0.0446524	0.0007455	0.0004334	0.1702708	0.1389957	0.0073157	0.1827442	0.0188634	0.0012287	0	0.0033296	0.2714069	0.0412543	0.0018907	7.36E-05	0.0063761	0.003373	-0.020745	0.0011599	0.0191077	0.000623	0.1735902	0.0127485	0.0157692	0.0140729	0.0116178	0.0047552	1.1789024	
13	0.027091	0.0258964	0.0025756	0.0005805	0.0002854	0.0302025	0.0140854	0.0012403	0.0013432	0.0041738	0.0059377	0.0033296	0	0.0388831	0.064219	0.0022832	0.0007166	0.0020329	0.0019274	-0.011472	0.0129851	0.0092311	0.0111223	0.0227076	0.0145024	0.0106442	0.0064871	0.007032	0.0076535	0.3019968	
14	0.0085368	0.0215835	0.0282441	0.0104894	0.006754	0.0264046	0.140652	0.0222559	0.0840884	0.0271293	0.0593944	0.2714069	0.0388831	0	0.0401094	0.0213983	0.0408913	0.011941	0.0087868	-0.155975	-0.009409	0.0949668	0.0058297	0.0188121	0.0097122	-0.00147	0.0129467	0.0147204	0.023243	0.86807	
15	0.0074094	0.2241092	0.0082621	0.0073988	0.0047065	0.0112967	0.218554	0.0098144	0.0248336	0.0034576	0.0194045	0.0412543	0.064219	0.0401094	0	0.0151573	0.0051596	0.0191045	0.0055419	-0.237145	-0.044094	0.087465	0.0118795	0.0227072	0.0177797	0.0234853	0.1334084	0.024023	0.0234569	0.9673988	
16	0.0031979	0.027653	0.0025753	0.0126107	0.0001578	0.0035508	0.0016823	0.0069445	0.001666	0.011689	0.0012725	0.0018907	0.0022832	0.0213983	0.0715173	0	0.0047454	0.0040136	-0.001719	-0.04902	-0.000907	0.0219907	0.0196481	0.0203985	0.0025903	-0.001352	0.00277548	0.008712	0.2801027		
17	0.0019305	0.001408	0.002518	0.0015199	0.0002451	0.0010872	-0.003354	0.0026523	0.0155539	0.002742	0.0024413	7.36E-05	0.0007166	0.0040813	0.0265196	0.0047454	0	0.138395	0.1071893	-0.324742	0.0167387	0.0587938	0.0182637	0.0363412	0.0064884	-0.001096	0.0252217	0.0068158	0.0055697	0.2557749	
18	0.0030438	0.0245411	0.0059468	0.0019783	0.0005129	0.0023361	0.013375	0.0080928	0.0080654	0.0038221	0.0103021	0.0063761	0.0020329	0.011941	0	0.0191053	0.0040136	0.138395	0	0.0696804	-0.17463	-0.0956	0.0552455	0.0126154	0.027962	0.0066122	0.0320345	0.0269756	0.008515	0.0081894	0.337811
19	0.0022337	0.0171176	0.0024457	0.0013758	0.0003359	0.0021404	0.0170118	0.0025966	0.005328	-0.004163	0.0011611	0.003373	0.0019274	0.0087868	0.0095419	-0.001719	0.0171893	0.0696804	0	-0.350562	-0.012868	0.0070899	0.0007803	0.0342493	0.0229231	0.0867579	0.0009062	0.0063892	-0.002742	0.047465	
20	-0.029425	-0.199151	-0.045454	-0.013071	-0.002976	-0.018802	-0.078926	-0.018386	-0.017825	-0.048446	-0.00999	-0.020745	-0.011472	-0.155975	-0.237145	-0.04902	-0.324742	-0.17463	-0.350562	0	-0.22511	-0.055767	-0.01216	-1.025663	-0.153955	-0.287859	-0.167186	-0.068708	-0.078615	-3.86806	
21	-0.000696	-0.005321	-0.001262	0.0005322	7.87E-05	0.0008024	0.0157483	-0.001343	0.0004849	-0.003202	0.0003501	0.0011539	0.01239651	-0.009409	-0.014094	-0.000977	0.0167387	-0.00956	-0.02368	-0.25211	0	0.0028075	0.0008365	-0.068931	0.0111069	-0.00465	-0.006818	0.007551	0.0001175	-0.294046	
22	0.0369655	0.052462	0.0084674	0.0024586	0.0006044	0.0471286	0.0233371	0.182763	0.0038343	0.0407489	0.0041998	0.0191077	0.0094668	0.037465	0.0219097	0.0387938	0.0524545	0.0070899	0.055767	0.0028075	0	0.0031892	0.0062284	0.0095933	0.0281096	0.0243369	0.0447106	0.0311619	0.097178		
23	0.0494954	0.0217551	0.0011769	0.0006547	0.000241	0.0014612	0.0010893	0.0085295	0.0013947	0.003495	0.0010785	0.000623	0.0011223	0.0058297	0.0119395	0.0196481	0.0182637	0.0126154	0.0007603	-0.01216	0.0008365	0.0031892	0	0.0061944	0.0143365	0.0039906	0.0028721	0.0114004	0.0110379	0.1473149	
24	0.009965	0.0054515	0.025621	0.0086681	0.012755	0.0206088	0.4565696	0.0227637	0.056496	0.0134595	0.0209176	0.1735902	0.0220702	0.0203985	0.0363412	0.027962	0.0342493	-0.102363	-0.688391	0.0862284	0.0061944	0	0.0107609	-0.12109	0.0150028	0.087078	0.0133065	-0.048512			
25	0.046766	0.0416263	0.0074138	0.0023256	0.0016006	0.0069973	0.0333641	0.0089856	0.006161	0.0061001	0.0040366	0.0127485	0.0145024	0.0097122	0.0177977	0.0025903	0.0064884	0.0066122	0.0229231	-0.153955	0.0111069	0.0059333	0.0143365	0.0017609	0	0.0012863	0.0033389	0.0265895	0.0191172	0.2483738	
26	0.0051389	0.0046657	-0.000519	0.0020316	0.0008809	0.0069701	0.0136398	0.0069778	0.0017057	0.0050282	0.0157692	0.0106442	-0.00147	0.0234052	-0.001352	-0.001096	0.0320345	0.0867579	-0.004065	0.0281096	0.0019906	-0.012109	0.0012863	0	0.0001091	0.0131562	0.0272965	-0.071947			
27	0.0055393	0.1202052	0.0055952	0.0052664	0.00724902	0.0067339	0.077149	0.0044442	0.0215797	0.0164856	0.0267732	0.0140729	0.0084871	0.0129467	0.1334084	0.0275217	0.0269756	0.0099962	-0.068708	0.017186	-0.006818	0.0023369	0.0028721	0.0150028	0.0033389	0.0001091	0	0.0112987	0.0256016	0.466277	
28	0.0044065	0.0015591	0.0063176	0.0053203	0.0032108	0.0066978	0.0291019	0.0065234	0.0171022	0.0094946	0.0136943	0.0116178	0.007032	0.0147204	0.024023	0.0087406	0.0068158	0.008515	0.0063892	-0.068708	0.0072551	0.0447106	0.0114004	0.0187078	0.0245895	0.031562	0.012987	0	0.042108	0.3195987	
29	0.021677	0.0153875	0.0284837	0.0119297	0.0033769	0.0111865	0.0106004	0.0053018	0.004727	0.0144717	0.0156446	0.0047552	0.0036535	0.023243	0.0234569	0.0088712	0.0055497	0.0081894	-0.002742	-0.078615	0.000175	0.0311619	0.0110379	0.0133065	0.0191172	0.0222965	0.0256016	0.042108	0	0.2895612	
SUM	0.4722506	0.736955	0.3774009	0.1611251	0.08																										

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM			
1	0.024869	0.033046	0.055247	0.1352674	0.0219799	0.05478	0.0878436	0.0485484	0.0321665	0.0195427	0.0180073	0.0152886	0.0831061	0.0331622	0.0126861	0.0101515	0.0125347	0.0110461	0.0228357	0.0170619	0.0509735	0.013905	0.0586534	0.0193522	0.0091083	0.0086889	0.0084762	0.0145324	1.379032				
2	0.024869	0.0253323	0.0425383	0.0272024	0.0528261	0.0359522	0.053674	0.0431463	0.0461892	0.0461892	0.0510537	0.0176791	0.1293949	0.4560845	0.1751415	0.2020156	0.2743321	0.1702452	0.0604727	0.0757575	0.0798349	0.065394	0.065394	0.0158594	0.0106535	0.0113478	0.0162834	0.0429778	0.621213				
3	0.310946	0.025323	0.0288081	0.0135938	0.0066624	0.0161399	0.0079566	0.0063135	0.017738	0.0066556	0.019267	0.014545	0.0440543	0.0324221	0.0025246	0.0559991	0.0080539	0.0045408	0.015337	0.0584554	0.0074477	0.0027187	0.0292864	0.0158594	0.0106535	0.0113478	0.0162834	0.0429778	0.621213				
4	0.055247	0.0425383	0.0288081	0.0015399	0.0060397	0.009396	0.0064224	0.0631381	0.024589	0.0085409	0.0014055	0.0020783	0.0838328	0.0573949	0.0483118	0.040545	0.0100838	0.025403	0.0266566	0.0023616	0.0031176	0.0007578	0.1187308	0.0122881	0.0183617	0.0219403	0.0196749	0.0213884	0.6389449				
5	0.1535264	0.0272024	0.0135938	0.0015399	0.0078952	0.0002811	0.0049612	0.0019819	0.01764	0.0104151	0.0001256	0.00010394	0.0596657	0.0375595	0.0071795	0.0031051	0.007151	0.0010547	0.0313654	0.0007311	0.003394	0.0007704	0.1591984	0.0107544	0.0274741	0.0159086	0.0144983	0.0078218	0.6617993				
6	0.0219799	0.0528261	0.0060397	0.0078952	0.0015399	0.0002811	0.0051847	0.0174711	0.0395484	0.0379043	0.0222924	0.34407	0.0406641	0.0540198	0.0871578	0.0260669	0.0052961	0.0104788	0.0074828	0.0231322	0.0041896	0.0545165	0.0041138	0.1336975	0.0157107	0.0154017	0.0183786	0.0170821	0.7826163				
7	0.05478	0.0359522	0.016399	0.009396	0.0002811	0.0051847	0.0228187	0.0327043	0.010585	0.0065024	0.0034509	0.0142814	0.0069337	0.035169	0.048059	0.0197858	0.0030541	0.0061967	0.0096878	0.017529	0.0028706	0.007529	0.0434379	0.24849	0.0271882	0.0180689	0.0159241	0.0151192	0.0096928	0.744482			
8	0.0878436	0.0431463	0.063135	0.0063284	0.0049612	0.0051847	0.2281877	0.0202961	0.0084499	0.0151656	0.0023923	0.0625904	0.0509858	0.0090204	0.0170537	0.016692	0.0050176	0.0277365	0.0038074	0.0091457	0.0019857	0.0048351	0.0167681	0.1458924	0.0164202	0.0130268	0.0204289	0.0297181	0.0087986	0.3788362			
9	0.0485484	0.0321665	0.0195427	0.0180073	0.0152886	0.0831061	0.0331622	0.0126861	0.0101515	0.0125347	0.0110461	0.0228357	0.0170619	0.0509735	0.013905	0.0586534	0.0193522	0.0091083	0.0086889	0.0084762	0.0145324	1.379032	0.024869	0.033046	0.055247	0.0135938	0.0066624	0.0161399	0.0079566	0.0063135			
10	0.025323	0.0425383	0.0288081	0.0015399	0.0060397	0.009396	0.0064224	0.0631381	0.024589	0.0085409																							
11	0.0195427	0.0461892	0.008656	0.0065409	0.0104515	0.01272924	0.0101515	0.010585	0.0084499	0.0142814	0.0139926	0.0638156	0.058447	0.0079048	0.0138833	0.003976	0.017508	0.0027365	0.0013934	0.0015585	0.0009506	0.0005455	0.0009506	0.0005455	0.0009506	0.0005455	0.0009506	0.0005455	0.0009506				
12	0.0180713	0.0510537	0.0109267	0.0014055	0.0010256	0.0001256	0.00010394	0.0596657	0.0375595	0.0071795	0.0031051	0.007151	0.0010547	0.0313654	0.0007311	0.003394	0.0007704	0.01591984	0.0107544	0.0274741	0.0159086	0.0144983	0.0078218	0.6617993									
13	0.152206	0.0176594	0.0143455	0.0048328	0.0037331	0.0010496	0.0069337	0.0354509	0.0029123	0.016504	0.0052149	0.012829	0.0158537	0.1196511	0.056935	0.0136469	0.0094438	0.0063366	0.0156045	0.0159445	0.0055885	0.0005455	0.0009506	0.0005455	0.0009506	0.0005455	0.0009506	0.0005455	0.0009506				
14	0.0831061	0.0295389	0.0440543	0.00831061	0.0052886	0.055247	0.0135938	0.0015399	0.0060397	0.009396	0.0064224	0.0631381	0.024589	0.0085409	0.0014055	0.0020783	0.0838328	0.0573949	0.0483118	0.040545	0.0100838	0.025403	0.0266566	0.0023616	0.0031176	0.0007578	0.01187308	0.0122881	0.0183617	0.0219403			
15	0.0331022	0.0560845	0.0324221	0.0073949	0.0375595	0.0174711	0.048059	0.074892	0.0529058	0.0080442	0.0638156	0.0178033	0.1196511	0.185716	0.1812934	0.2036587	0.1682363	0.1592022	0.0670042	0.036095	0.0451586	0.0621768	0.0477212	0.1763328	0.0509163	0.027551	0.170951	0.098838	0.1962709	0.0806947	0.023705	0.013605	1.542445
16	0.0128661	0.1751145	0.0062546	0.048318	0.0077095	0.0260669	0.0197858	0.0116889	0.0090204	0.027112	0.0086947	0.0544112	0.0056935	0.0128463	0.1812934	0.0172623	0.0183566	0.0088836	0.0368055	0.001385	0.0145075	0.0725216	0.082728	0.0841327	0.1665523	0.0270031	0.0167914	0.0454505	0.043458	0.0488217	1.2735301		
17	0.010515	0.2020156	0.0055091	0.00405	0.031051	0.0052961	0.030354	0.0061919	0.0170537	0.0195427	0.0079048	0.0093418	0.0326085	0.2036587	0.1812934	0.0172623	0.0183566	0.0088836	0.0368055	0.001385	0.0145075	0.0725216	0.082728	0.0841327	0.1665523	0.0270031	0.0167914	0.0454505	0.043458	0.0488217	1.2735301		
18	0.0125347	0.2743321	0.0425383	0.0272024	0.0528261	0.0359522	0.053674	0.0431463	0.0461892	0.0461892	0.0510537	0.0176791	0.1293949	0.4560845	0.1751415	0.2020156	0.2743321	0.1702452	0.0604727	0.0757575	0.0798349	0.065394	0.065394	0.0158594	0.0106535	0.0113478	0.0162834	0.0429778	0.621213				
19	0.010461	0.1376621	0.0045408	0.0025403	0.0010547	0.0007578	0.0027187	0.0044929	0.0080539	0.0045408	0.0014055	0.0020783	0.0838328	0.0573949	0.0483118	0.040545	0.0100838	0.025403	0.0266566	0.0023616	0.0031176	0.0007578	0.1187308	0.0122881	0.0183617	0.0219403	0.0196749	0.0213884	0.6389449				
20	0.023517	0.070452	0.015137	0.006656	0.0133654	0.0023132	0.0029254	0.0244736	0.0277965	0.0338974	0.0175938	0.0178281	0.0156045	0.0427027	0.0670042	0.036095	0.0451586	0.0621768	0.0477212	0.1763328	0.0509163	0.027551	0.170951	0.098838	0.1962709	0.0806947	0.023705	0.013605	1.542445				
21	0.070619	0.0604727	0.0038154	0.0023616	0.0007311	0.003394	0.0007704	0.01591984	0.0107544	0.0274741	0.0159086	0.0144983	0.0078218	0.6617993																			
22	0.0509735	0.017517	0.0031176	0.0007578	0.0027187	0.0044929	0.0080539	0.0045408	0.0014055	0.0020783	0.0838328	0.0573949	0.0483118	0.040545	0.0100838	0.025403	0.0266566	0.0023616	0.0031176	0.0007578	0.0027187	0.0044929	0.0080539	0.0045408	0.0014055	0.0020783	0.0838328	0.0573949	0.0483118	0.040545			
23	0.013605	0.0798349	0.0271882	0.0087986	0.037861	0.00041139	0.0044379	0.016781	0.0094824	0.0012767	0.0122954	0.0128677	0.0054535	0.0183533	0.0841327	0.0440009	0.007362	0.0170581	0.2870966	0.1733272	0.012656	0.0031301	0.0133208	0.0076165	0.0154647	0.0119064	0.023184	0.0161437					
24	0.0586534	0.065394	0.0192864	0.0187308	0.1591984	0.1336975	0.1110259	0.24849	0.1458924	0.304573	0.192751	0.1226767	0.075666	0.1263109	0.165523	0.1129741	0.1609735	0.170951	0.2870966	0.1733272	0.012656	0.0031301	0.0133208	0.0076165	0.0154647	0.0119064	0.023184	0.0161437					
25	0.0193522	0.123776	0.0158594	0.0113478	0.007544	0.0157707	0.0114813	0.021822	0.0164002	0.0231372	0.0144002	0.009273	0.027326	0.0295744	0.1879208	0.0331615	0.0321955	0.098838	0.0204166	0.0144007	0.0183617	0.023759	0.018367	0.0076165	0.0154647	0.0119064	0.023184	0.0161437					
26	0.0091083	0.0086889	0.0083617	0.0081867	0.0127471	0.0154007	0.0136767	0.0190689	0.0130268	0.0146889	0.007066	0.0166829	0.0240083	0.024488	0.054281	0.0167914	0.0316165	0.0254037	0.016663	0.1962709	0.018367	0.0076165	0.0154647	0.0119064	0.023184	0.0161437							
27	0.008689	0.0452	0.0113478	0.0087986	0.037861	0.00041139	0.0044379	0.016781	0.0094824	0.0012767	0.0122954	0.0128677	0.0054535	0.0183533	0.0841327	0.0440009	0.007362	0.0170581	0.2870966	0.1733272	0.012656	0.0031301	0.0133208	0.0076165	0.0154647	0.0119064	0.023184	0.0161437					
28	0.0184762	0.02562	0.0162834	0.0196749	0.0144983	0.0078218	0.0170821	0.0161611	0.0151192	0.0204106	0.0294781	0.0319631	0.0273683	0.0133919	0.0178796	0.0240209	0.0329357	0.017429	0.043458	0.046058	0.019593	0.008617	0.017429	0.043458	0.046058	0.019593	0.008617	0.017429	0.043458	0.046058			
29	0.0354234	0.029286	0.0429778	0.0213884	0.0078218	0.0162788	0.0094824	0.0102651	0.0087986	0.020462	0.0238816	0.0077372	0.0127167	0.0288496	0.0386676	0.0172658	0.0148827	0.0178775	0.0313609	0.0313605	0.0128251	0.0132925	0.0123384	0.0372107	0.0300726	0.0385863	0.0282172	0.0704564	0.0650873				
SUM	1.379032	2.582019	0.862313	6.6389449	0.6617993	1.2826163	7.44482	1.0766231	0.8786262	1.4472085	0.9456564	0.8464028	0.760521	1.7652135	2.8623093	1.039537	1.2735301	1.3155461	0.9168595	1.5421945	0.9053301	0.8351003	0.614367	3.982262	0.996074	0.708552	0.8426089	0.6779004	0.6500873	34.734346			

Appendix 10
Anti-Symmetric Matrix, Philippines
1969

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0.0000	-0.0059	0.2094	0.0565	0.0633	0.0368	0.0229	0.2248	0.1128	0.0084	0.0669	0.0603	0.0690	-0.0143	-0.0134	0.0047	0.0005	0.0014	0.0036	0.0069	0.0046	0.0310	0.0215	-0.0281	0.0027	0.0016	0.0014	-0.0021	0.0228	0.9099
2	0.0059	0.0000	0.0145	0.0242	0.0137	0.0239	0.0157	0.0237	0.0213	0.0476	0.0267	0.0204	0.0283	0.0155	0.2340	0.1067	0.0863	0.0552	0.0450	0.0365	0.0219	0.0220	0.0388	-0.0166	0.0502	0.0077	0.1295	-0.0042	-0.0076	1.0866
3	-0.2094	-0.0145	0.0000	0.1343	0.0091	0.0109	0.0446	0.0179	0.0124	0.0093	0.0072	0.1417	0.0189	0.0285	-0.0271	0.0048	-0.0055	-0.0020	0.0035	0.0060	0.0028	0.0204	0.0053	-0.0699	-0.0037	0.0014	-0.0039	-0.0095	0.0339	0.1583
4	-0.0565	-0.0242	-0.1343	0.0000	0.0001	-0.0013	0.0001	-0.0010	-0.0001	-0.0091	-0.0024	0.0000	-0.0008	-0.0157	-0.0398	-0.0247	-0.0101	-0.0104	-0.0015	-0.0006	-0.0043	-0.0013	-0.0010	-0.0647	-0.0129	-0.0017	-0.0092	-0.0155	-0.0278	-0.4703
5	-0.0633	-0.0137	-0.0091	-0.0001	0.0000	-0.0019	0.0000	-0.0012	-0.0001	-0.0545	-0.0020	0.0000	-0.0007	-0.0181	-0.0245	-0.0005	-0.0027	-0.0018	-0.0005	-0.0007	-0.0023	-0.0015	-0.0009	-0.0931	-0.0112	-0.0015	-0.0083	-0.0157	-0.0240	-0.3538
6	-0.0368	-0.0239	-0.0109	0.0013	0.0019	0.0000	0.0497	0.0021	0.0326	0.0027	0.0048	0.0144	0.0483	-0.0869	-0.0423	0.0008	-0.0035	-0.0017	0.0004	0.0011	0.0012	0.0072	0.0005	-0.0708	-0.0140	-0.0016	-0.0120	-0.0167	-0.0123	-0.1641
7	-0.0229	-0.0157	-0.0446	-0.0001	0.0000	-0.0497	0.0000	-0.0012	-0.0003	-0.0129	-0.0026	-0.1529	-0.0049	-0.0455	-0.0271	-0.0007	-0.0051	-0.0052	-0.0004	-0.0006	-0.0009	-0.0201	-0.0008	-0.0869	-0.0136	-0.0022	-0.0092	-0.0159	-0.0148	-0.5567
8	-0.2248	-0.0237	-0.0179	0.0010	0.0012	-0.0021	0.0012	0.0012	0.0000	-0.0025	0.0001	0.0006	-0.0004	-0.0421	-0.0425	0.0013	-0.0088	-0.0018	0.0007	0.0056	-0.0002	0.0014	0.0344	-0.0849	-0.0180	-0.0017	-0.0084	-0.0124	-0.0151	-0.2538
9	-0.1128	-0.0213	-0.0124	0.0001	0.0001	-0.0326	0.0003	-0.2059	0.0000	-0.0064	-0.0013	-0.0004	-0.0091	-0.0523	-0.0314	-0.0006	-0.0414	-0.0017	0.0008	0.0043	-0.0010	-0.0027	0.0000	-0.0863	-0.0153	-0.0026	-0.0087	-0.0187	-0.0154	-0.6866
10	-0.0084	-0.0476	-0.0003	0.0091	0.0545	-0.0027	0.0129	0.0025	0.0064	0.0000	0.2559	0.0068	0.0080	-0.0282	-0.0855	0.0231	-0.0099	-0.0050	0.0031	0.0097	-0.0015	0.0157	0.0046	-0.0647	-0.0210	0.0140	-0.0323	-0.0193	-0.0161	0.0840
11	-0.0069	-0.0267	-0.0072	0.0024	0.0020	-0.0048	0.0026	-0.0001	0.0013	-0.2559	0.0000	0.0006	0.0015	-0.0628	-0.0470	0.0004	-0.0070	-0.0052	-0.0013	0.0006	-0.0013	0.0015	-0.0004	-0.0662	-0.0125	0.0023	0.0230	-0.0207	-0.0249	-0.5618
12	-0.0603	-0.0204	-0.1417	0.0000	0.0000	-0.0144	0.1529	-0.0006	0.0004	-0.0068	-0.0006	0.0000	-0.0020	-0.0664	-0.0353	-0.0009	-0.0054	-0.0043	-0.0006	-0.0006	-0.0010	-0.0086	-0.0008	-0.1150	-0.0120	-0.0024	-0.0120	-0.0171	-0.0125	-0.3886
13	-0.0690	-0.0283	-0.0189	0.0008	0.0007	-0.0483	0.0049	0.0004	0.0091	-0.0080	-0.0015	0.0020	0.0000	-0.1751	-0.0470	-0.0003	-0.0063	-0.0066	0.0065	0.0014	0.0204	-0.0050	0.0015	-0.0869	-0.0072	-0.0015	-0.0144	-0.0227	-0.0228	-0.5220
14	0.0143	-0.0155	-0.0285	0.0157	0.0181	0.0869	0.0455	0.0421	0.0523	0.0282	0.0628	0.0664	0.1751	0.0000	-0.0339	0.0230	0.0141	0.0194	0.0280	0.0374	0.0224	0.2048	0.0313	-0.0845	-0.0057	0.0064	0.0013	-0.0250	-0.0118	0.7907
15	0.0134	-0.2340	0.0271	0.0398	0.0245	0.0423	0.0271	0.0425	0.0314	0.0855	0.0470	0.0353	0.0470	0.0339	0.0000	0.1303	0.0558	0.0533	0.0471	0.0484	0.0259	0.0359	0.0389	-0.0247	0.0932	0.0136	0.2422	-0.0046	-0.0072	1.0108
16	-0.0047	-0.1067	-0.0048	0.0000	0.0005	-0.0008	0.0007	-0.0013	0.0006	-0.0231	-0.0004	0.0009	0.0003	-0.0230	-0.1303	0.0000	-0.0172	-0.0034	-0.0004	0.0040	-0.0004	-0.0042	0.0386	-0.0676	-0.0208	-0.0016	-0.0173	-0.0157	-0.0340	-0.4073
17	-0.0005	-0.0863	0.0055	0.0101	0.0027	0.0035	0.0051	0.0088	0.0414	0.0099	0.0070	0.0054	0.0063	-0.0141	-0.0558	0.0172	0.0000	0.3391	0.2420	0.0926	0.0865	0.0232	0.0951	-0.0782	-0.0097	0.0033	-0.0062	-0.0188	-0.0162	0.7187
18	-0.0014	-0.0552	0.0020	0.0104	0.0018	0.0017	0.0052	0.0018	0.0117	0.0050	0.0052	0.0043	0.0066	-0.0194	-0.0533	0.0034	-0.3391	0.0000	0.0274	0.0835	0.0076	0.0216	0.0360	-0.0782	-0.0152	0.0035	-0.0100	-0.0222	-0.0183	-0.3737
19	-0.0036	-0.0450	-0.0035	0.0015	0.0005	-0.0004	0.0004	-0.0007	0.0009	-0.0031	0.0013	0.0006	-0.0065	-0.0280	-0.0471	0.0004	-0.2420	-0.0274	0.0000	-0.0106	-0.0004	-0.0029	-0.0004	-0.0750	-0.0271	-0.0033	-0.0130	-0.0246	-0.0188	-0.5778
20	-0.0069	-0.0365	-0.0060	0.0006	0.0007	-0.0011	0.0006	-0.0056	-0.0043	-0.0097	-0.0006	0.0006	-0.0014	-0.0374	-0.0484	-0.0040	-0.0926	-0.0835	0.0106	0.0000	-0.0006	-0.0036	0.0075	-0.7577	-0.0214	0.0096	-0.0119	-0.0357	-0.0365	-0.4933
21	-0.0046	-0.0219	-0.0028	0.0043	0.0023	-0.0012	0.0009	0.0002	0.0010	0.0015	0.0013	0.0010	-0.0204	-0.0224	-0.0259	0.0004	-0.0865	-0.0076	0.0004	0.0006	0.0000	-0.0011	0.0002	-0.0622	0.0001	-0.0010	-0.0071	-0.0146	-0.0199	-0.2853
22	-0.0310	-0.0220	-0.0204	0.0013	0.0015	-0.0072	0.0201	-0.0014	0.0027	-0.0157	0.0015	0.0086	0.0050	-0.2048	-0.0359	0.0042	-0.0232	-0.0216	0.0029	0.0036	0.0011	0.0000	0.0009	-0.0806	-0.0226	-0.0032	-0.0145	-0.0279	-0.0239	-0.5023
23	-0.0215	-0.0388	-0.0053	0.0010	0.0009	-0.0005	0.0008	-0.0344	0.0000	-0.0046	0.0004	0.0008	-0.0015	-0.0313	-0.0389	-0.0386	-0.0951	-0.0360	0.0004	-0.0075	-0.0002	-0.0009	0.0000	-0.0505	-0.0156	-0.0015	-0.0064	-0.0125	-0.0243	-0.4618
24	0.0281	0.0166	0.0699	0.0647	0.0931	0.0708	0.0869	0.0849	0.0863	0.0647	0.0662	0.1150	0.0869	0.0845	0.0845	0.0676	0.0782	0.0750	0.0757	0.0622	0.0806	0.0505	0.0000	0.0468	0.0155	0.0000	0.0049	-0.0237	0.0032	1.6981
25	-0.0027	-0.0032	0.0037	0.0129	0.0015	0.0112	0.0140	0.0136	0.0180	0.0153	0.0210	0.0125	0.0120	0.0072	0.0057	0.0208	0.0097	0.0152	0.0271	0.0214	-0.0001	0.0026	0.0156	-0.0468	0.0000	0.0028	0.0002	0.0042	-0.0147	0.0675
26	-0.0016	-0.0077	-0.0014	0.0017	0.0015	0.0016	0.0022	0.0017	0.0026	-0.0140	-0.0023	0.0024	0.0015	-0.0064	-0.0136	0.0016	-0.0033	-0.0035	0.0033	-0.0096	0.0010	0.0032	0.0015	-0.0155	-0.0028	0.0000	-0.0064	-0.0147	-0.0212	-0.0980
27	-0.0014	-0.1295	0.0039	0.0092	0.0083	0.0120	0.0092	0.0084	0.0087	0.0323	0.0230	0.0120	0.0144	-0.0013	-0.2422	0.0173	0.0062	0.0100	0.0130	0.0119	0.0071	0.0145	0.0064	-0.0449	-0.0072	0.0064	0.0000	-0.0038	-0.0044	-0.2004
28	0.0021	0.0042	0.0095	0.0155	0.0157	0.0167	0.0159	0.0124	0.0187	0.0193	0.0207	0.0171	0.0227	0.0250	0.0046	0.0157	0.0188	0.0222	0.0246	0.0357	0.0146	0.0279	0.0125	0.0237	0.0142	0.0147	0.0038	0.0000	0.0586	0.5073
29	-0.0228	0.0076	-0.0339	0.0278	0.0240	0.0123	0.0148	0.0151	0.0154	0.0161	0.0249	0.0125	0.0228	0.0118	0.0072	0.0340	0.0162	0.0183	0.0188	0.0365	0.0199	0.0239	0.0243	-0.0032	0.0147	0.0212	0.0044	-0.0586	0.0000	0.3257
SUM	-0.9099	-1.0866	-0.1583	0.4703	0.3538	0.1641	0.5567	0.2538	0.6866	-0.0840	0.5618	0.3886	0.5220	-0.7907	-1.0108	0.4073	-0.7187	0.3737	0.5778	0.4933	0.2853	0.5023	0.4618	-1.6981	-0.0675	0.0980	0.2004	-0.5073	-0.3257	0

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0	-0.0037	0.21681	0.0543	0.06344	0.03465	0.0238	0.21635	0.1029	0.00814	0.06687	0.06139	0.06557	0.00198	-0.0112	0.00559	0.0004	0.00182	0.00385	0.00729	0.00462	0.02762	0.02152	-0.025	0.00331	0.00185	0.00169	-0.0018	0.02286	0.97685
2	0.00367	0	0.01338	0.02244	0.01274	0.02139	0.01405	0.02145	0.01934	0.04355	0.02458	0.01854	0.02576	0.01201	0.23412	0.10296	0.07277	0.04733	0.04033	0.03387	0.01964	0.02032	0.0367	-0.0185	0.04377	0.0067	0.11431	-0.0053	-0.0098	1.23909
3	-0.2168	-0.0134	0	0.12443	0.00881	0.00899	0.04435	0.0166	0.01152	0.00093	0.06685	0.13791	0.01724	0.02246	-0.0243	0.0042	-0.005	-0.0025	0.00336	0.00556	0.00257	0.01892	0.00502	-0.0671	-0.0039	0.00135	-0.0035	-0.0101	0.03123	0.221621
4	-0.0543	-0.0224	-0.1244	0	9.7E-05	-0.0012	0.00017	-0.0015	-2E-05	-0.0098	-0.0025	9.7E-05	-0.0009	-0.0176	-0.0361	-0.0257	-0.0094	-0.0103	-0.0013	-0.0005	-0.0036	-0.0017	-0.0008	-0.0608	-0.0122	-0.0015	-0.0086	-0.0154	-0.0275	-0.5494
5	-0.0624	-0.0127	-0.0088	-1E-04	0	-0.0019	-1E-06	-0.0015	-5E-05	-0.0502	-0.0022	-1E-05	-0.0008	-0.0178	-0.0226	-0.0004	-0.0026	-0.0017	-0.0005	-0.0006	-0.0021	-0.0014	-0.0009	-0.0856	-0.0106	-0.0015	-0.0078	-0.0151	-0.0226	-0.38833
6	-0.0347	-0.0214	-0.009	0.00117	0.00187	0	0.04627	0.0018	0.03063	0.00156	0.00581	0.01655	0.05021	-0.0843	-0.038	0.00078	-0.0032	-0.0006	0.00057	0.00122	0.00119	0.00713	0.00059	-0.0686	-0.013	-0.0015	-0.012	-0.0172	-0.014	-0.20738
7	-0.0238	-0.0141	-0.0443	-0.0002	1.1E-06	-0.0463	0	-0.0015	-0.0003	-0.0131	-0.0032	-0.1572	-0.0075	-0.0438	-0.0238	-0.0008	-0.0049	-0.0054	-0.0005	-0.0007	-0.0011	-0.0196	-0.0008	-0.0813	-0.0134	-0.0024	-0.0093	-0.0162	-0.017	-0.59179
8	-0.2164	-0.0214	-0.0166	0.0015	0.0015	-0.0018	0.00153	0	0.18352	-0.0026	-5E-05	0.00133	-0.0007	-0.0399	-0.0388	0.0018	-0.0075	-0.0011	0.00299	0.00501	-0.0002	0.00175	0.03304	-0.0813	-0.0192	-0.0017	-0.0081	-0.0128	-0.0162	-0.24828
9	-0.1029	-0.0193	-0.0115	1.6E-05	5.3E-05	-0.0306	0.00027	-0.1835	0	-0.0062	-0.0014	-0.0004	-0.0084	-0.051	-0.0287	-0.0008	-0.0419	-0.0131	-0.001	0.00484	-0.0011	-0.0034	-0.0001	-0.0814	-0.0147	-0.0026	-0.009	-0.0182	-0.0153	-0.80057
10	-0.0081	-0.0436	-0.0009	0.00979	0.05017	-0.0016	0.01313	0.00261	0.00619	0	0.24044	0.00698	0.00809	-0.024	-0.0775	0.02525	-0.0086	-0.0036	0.00336	0.01021	-0.001	0.0142	0.00541	-0.0645	-0.0198	0.01277	-0.0283	-0.0195	-0.0195	0.081045
11	-0.0069	-0.0246	-0.0069	0.0025	0.00216	-0.0058	0.00318	5.4E-05	0.00145	-0.2404	0	0.00083	0.00187	-0.0577	-0.043	0.00061	-0.0063	-0.0047	-0.0009	0.00068	-0.0012	-0.0005	-0.0002	-0.0642	-0.0129	0.00196	-0.0207	-0.0201	-0.0294	-0.63488
12	-0.0614	-0.0185	-0.1379	-1E-04	1.1E-05	-0.0166	0.15719	-0.0013	0.00035	-0.007	-0.0008	0	-0.0026	-0.0653	-0.0315	-0.0011	-0.0052	-0.005	-0.0006	-0.0007	-0.0011	-0.0106	-0.0008	-0.106	-0.0118	-0.0023	-0.0112	-0.0164	-0.0131	-0.45183
13	-0.0656	-0.0258	-0.0172	0.00089	0.00078	-0.0502	0.00748	0.00072	0.00842	-0.0081	-0.0019	0.00262	0	-0.1653	-0.0421	-0.0003	-0.0057	-0.0058	0.00605	0.00258	0.01904	-0.0046	0.00127	-0.0816	-0.005	-0.0013	-0.0138	-0.0218	-0.0232	-0.59992
14	-0.002	-0.012	-0.0225	0.01764	0.01778	0.08428	0.04385	0.03992	0.05104	0.02401	0.05774	0.0653	0.16527	0	-0.0287	0.02318	0.01191	0.01795	0.02545	0.03663	0.02117	0.18767	0.02993	-0.0787	-0.0061	0.00621	0.00113	-0.0237	-0.014	0.399568
15	0.01121	-0.2341	0.0243	0.03613	0.02257	0.03803	0.02383	0.03883	0.02874	0.07749	0.04298	0.03149	0.04208	0.02872	0	0.12015	0.05032	0.04654	0.04265	0.04366	0.02293	0.03238	0.03539	-0.0241	0.08215	0.01176	0.21353	-0.0059	-0.0093	1.369378
16	-0.0056	-0.103	-0.0042	0.02572	0.00044	-0.0008	0.00083	-0.0018	0.00076	-0.0252	-0.0006	0.00113	0.00028	-0.0232	-0.1201	0	-0.0162	-0.0037	-0.0002	0.00471	-0.0003	-0.0029	0.03969	-0.0659	-0.0201	-0.0015	-0.0172	-0.0163	-0.0343	-0.47377
17	-0.0004	-0.0728	0.00503	0.00945	0.00256	0.00316	0.00489	0.00747	0.04193	0.00856	0.00631	0.0052	0.00568	-0.0119	-0.0503	0.01622	0	0.31901	0.22897	0.08654	0.0768	0.01805	0.09116	-0.0773	-0.0105	0.00289	-0.0052	-0.0187	-0.0171	0.80505
18	-0.0018	-0.0473	0.00254	0.01029	0.0017	0.00062	0.00538	0.00115	0.01309	0.00362	0.00471	0.00497	0.00584	-0.018	-0.0465	0.00369	-0.319	0	0.03347	0.07933	0.00729	0.0197	0.03742	-0.0775	-0.0156	0.00331	-0.0094	-0.0224	-0.0193	-0.43172
19	-0.0039	-0.0403	-0.0034	0.00126	0.00049	-0.0006	0.00048	-0.003	0.001	-0.0034	0.00094	0.00058	-0.0061	-0.0255	-0.0427	0.00015	-0.229	-0.0335	0	-0.0094	-0.0008	-0.0042	-0.0009	-0.0728	-0.0259	0.0032	-0.0128	-0.0243	-0.0199	-0.61661
20	-0.0073	-0.0339	-0.0056	0.00051	0.00064	-0.0012	0.00068	-0.005	-0.0048	-0.0102	-0.0007	0.00068	-0.0026	-0.0366	-0.0437	-0.0047	-0.0865	-0.0793	0.00942	0	-9E-05	-0.0029	0.00784	-0.0725	-0.0293	0.0115	-0.0111	-0.0336	-0.0369	-0.56008
21	-0.0046	-0.0196	-0.0026	0.00365	0.00208	-0.0012	0.0011	0.00023	0.00112	0.00104	0.00123	0.00107	-0.019	-0.0212	-0.0229	0.0003	-0.0768	-0.0773	0.00077	8.8E-05	0	-0.0005	-3E-05	-0.0634	0.00215	-0.001	-0.0067	-0.0163	-0.0213	-0.3167
22	-0.0276	-0.0203	-0.0189	0.00166	0.00145	-0.0071	0.01965	-0.0018	0.0034	-0.0142	0.00047	0.01064	0.00457	-0.1877	-0.0324	0.00287	-0.0181	-0.0197	0.00424	0.00291	0.00048	0	0.00051	-0.0765	-0.0213	-0.003	-0.0134	-0.0266	-0.0236	-0.60058
23	-0.0215	-0.0367	-0.005	0.00084	0.00091	-0.0006	0.00083	-0.033	0.00013	-0.0054	0.00025	0.0008	-0.0013	-0.0299	-0.0354	-0.0397	-0.0912	-0.0374	0.00086	-0.0078	2.8E-05	-0.0015	0	-0.0507	-0.0156	-0.0014	-0.0061	-0.0111	-0.0277	-0.47817
24	0.025	0.01851	0.06705	0.06084	0.08558	0.0686	0.08133	0.08127	0.08143	0.0645	0.06417	0.10596	0.08159	0.07875	0.02413	0.06587	0.07727	0.07752	0.07282	0.07248	0.06338	0.07645	0.05072	0	0.04083	0.01466	0.04301	-0.0288	-0.0004	1.897601
25	-0.0033	-0.0438	0.00392	0.01224	0.01063	0.01303	0.01339	0.01925	0.01473	0.01983	0.01292	0.01178	0.00498	0.00614	-0.0822	0.02009	0.01053	0.01558	0.02586	0.02027	-0.0022	0.02127	0.01561	-0.0408	0	0.00436	0.00759	-0.0136	-0.016	0.031896
26	-0.0019	-0.0067	-0.0013	0.00152	0.00148	0.00154	0.00243	0.00171	0.00257	-0.0128	-0.002	0.00226	0.00135	-0.0062	-0.0118	0.00154	-0.0029	-0.0033	0.00317	-0.0115	0.00099	0.00298	0.00137	-0.0147	-0.0044	0	-0.0062	-0.0139	-0.0239	-0.10161
27	-0.0017	-0.1143	0.00435	0.00857	0.0078	0.00197	0.00933	0.00814	0.009	0.02827	0.02072	0.01124	0.0138	-0.0011	-0.2135	0.01723	0.00517	0.00941	0.01278	0.01107	0.00666	0.01341	0.00608	-0.043	-0.0076	0.00615	0	-0.0055	-0.0086	-0.32313
28	0.00178	0.00534	0.01011	0.01537	0.01511	0.01721	0.01618	0.01283	0.01816	0.01946	0.02013	0.01639	0.02177	0.0237	0.00595	0.01627	0.01874	0.02242	0.02427	0.0336	0.01627	0.02664	0.01107	0.02879	0.01357	0.01386	0.00547	0	0.04523	0.656835
29	-0.0229	0.00977	-0.0312	0.02751	0.02261	0.014	0.01699	0.01616	0.01534	0.01953	0.02943	0.01309	0.02324	0.01396	0.00933	0.03433	0.01713	0.01927	0.01987	0.0369	0.02135	0.02363	0.02769	0.00037	0.01603	0.02385	0.00856	-0.0452	0	0.170902
SUM	-0.9766	-1.2394	-0.2216	0.54394	0.38833	0.20738	0.59179	0.24828	0.80057	-0.081	0.63488	0.45183	0.59992	-0.9396	-1.3694	0.47377	-0.805	0.43172	0.61663	0.56008	0.3167	0.60058	0.47817	-1.8976	-0.0319	0.10161	0.02313	-0.6368	-0.1703	0

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0	0.001921	0.073453	0.040158	0.006208	-0.004491	0.003574	0.055402	0.057124	0.004452	0.007724	-0.004881	0.017289	-0.006495	-0.05142	-0.00314	-0.000225	0.001055	-0.001402	-0.000231	-0.000833	0.0021818	0.0025497	-0.000386	-0.00015	0.0004289	0.0101943	-0.000317	0.0034945	0.2198131
2	-0.000192	0	-0.000716	0.001101	0.000152	-0.000643	0.002747	-0.002563	0.0011858	-0.0004783	-0.000198	-0.000644	-0.007857	0.0328783	0.0151421	0.028622	-0.000415	-0.001018	-0.000719	0.0003238	0.0149793	-0.000794	-0.004298	0.0025454	0.0014538	0.0073056	-0.000708	-0.005589	0.003388	
3	-0.067365	0.0003761	0	0.027093	0.000391	-0.000721	0.002052	0.000548	0.0027401	0.0005837	0.0004963	-0.004916	0.0004701	-0.003932	-0.000519	-0.000243	-0.000692	-0.000352	2.745E-05	-0.000248	0.0005391	-0.000498	-0.008245	-0.001624	2.194E-05	-0.003426	-0.000757	0.0073505	-0.004558	
4	-0.004016	-0.00111	-0.002709	0	0.0002852	-0.00016	-7.3E-05	0.0001178	-2.08E-05	0.0006316	-0.0006316	-4.72E-05	6.85E-05	-0.00034	-0.011297	-0.000888	-0.001388	-0.010922	-0.000174	-0.000231	-0.000148	0.0001478	-0.000801	-0.007844	-0.000825	-0.000618	-0.0006459	-0.000991	-0.00492	-0.09195
5	-0.006202	-0.000156	-0.000391	-0.000205	0	-4.8E-05	7.23E-05	0.0001484	2.154E-06	-0.0022716	-0.0004689	-8.19E-06	1.86E-05	-0.001391	-0.002446	-0.000154	-0.000239	-0.00012	-5.67E-05	-0.00034	-1.1E-05	-0.000231	-0.000174	-0.000907	-0.00161	-0.000246	-0.000179	-0.000679	-0.001645	-0.05361
6	0.000491	0.000432	0.0007208	0.0001598	4.797E-05	0	0.6804928	0.0001224	0.019479	0.0004092	0.0004428	0.0008085	0.0477157	-0.00363	-0.001934	0.0003645	0.0004076	-9.4E-05	-2.1E-05	0.0042073	0.0004813	0.0237677	-0.000621	0.0039546	0.0005116	0.0004466	4.75E-05	0.001584	0.005672	0.2709232
7	-0.003572	-0.002745	0.0029521	7.305E-05	7.226E-05	-0.680493	0	-0.000143	0.0001453	-0.001426	-0.002569	-0.013365	2E-05	-0.045988	-0.018836	-0.000557	-0.000833	-0.000538	-0.000123	-0.0001173	-0.000901	-0.001816	-0.002869	-0.054193	-0.09637	-0.005396	-0.09166	-0.03042	-0.00475	-0.893103
8	-0.055404	0.0026032	-0.000655	-0.000118	-0.000148	-0.000122	0.0001426	0	0.035352	0.0001989	-2.59E-05	-0.000331	7.045E-05	-0.000382	-0.007736	-0.000198	-3.46E-05	0.0002021	-0.002307	-0.00088	-0.000133	3.972E-05	0.005393	-0.000947	-0.005504	-0.000248	-0.000387	-9.4E-05	-0.000366	-0.021651
9	-0.057122	-0.011186	-0.00214	2.094E-05	-2.15E-06	-0.019479	-0.000145	-0.053552	0	-0.0009	-0.000123	-0.00112	1.459E-05	-0.006084	-0.008196	-0.002204	-0.002727	-0.00991	-0.000385	-0.000816	-0.000178	-0.000703	-0.001376	-0.002372	-0.007861	-0.001364	-0.006464	-0.004086	-0.002676	-0.21325
10	-0.004445	0.0002553	-0.001584	0.0004938	0.0277163	-0.000409	0.0014263	-0.000199	0.0009899	0	0.0855955	-0.000466	-0.000268	-0.002629	-0.04672	0.0032508	-0.002418	-0.000471	-0.001403	0.0005727	-0.000248	0.0002907	-0.001174	-0.006106	-0.000763	0.000499	-0.000765	0.0014213	0.0025603	0.0924726
11	-0.000723	-0.000478	-0.000496	0.0006356	0.0046886	-0.000443	0.0025891	2.592E-05	0.0001229	-0.085595	0	-0.000155	-0.000391	-0.002045	-0.004679	0.000641	-0.00131	-2.62E-05	-0.0005	-0.000107	-0.000244	-0.000224	-0.001782	-0.018783	-0.005003	5.551E-05	-0.009488	-0.001559	-0.00419	-0.14785
12	0.0048806	0.0001979	0.0009759	4.719E-05	8.187E-06	-0.008009	0.0130652	0.0002313	0.0011204	0.0004962	0.0001547	0	0.001624	-0.008865	-0.000488	9.615E-05	0.000333	0.0005791	6.365E-05	-0.000109	0.0001107	0.0009254	-0.000116	-0.003866	-0.000727	-0.000304	-0.000792	-0.000975	-5.95E-05	0.0035958
13	-0.01729	0.000437	-0.000441	6.851E-05	-0.047776	-2E-05	-7.15E-05	-1.46E-05	0.0002677	0.0003908	-0.001624	0	-0.041719	-0.006208	-0.000107	-8.21E-06	8.785E-07	-0.000245	-0.0001129	-0.000615	0.004905	0.0001106	-0.012223	0.0065008	0.0001231	-0.008239	-0.000831	2.737E-05	-0.098066	
14	0.0064948	-0.007857	-0.007871	0.0006344	0.0018911	0.0036301	0.0458976	0.0003818	0.0068041	0.0026288	0.0202448	0.0088647	0.041791	0	0.0064408	0.0004696	0.005364	0.000428	-0.00026	0.013824	0.0082465	0.00033	-0.005628	-0.000236	0.0009405	-0.001126	0.0009534	0.0074455	0.1438455	
15	0.0051425	-0.032678	0.0039221	0.0112972	0.0024661	0.0019338	0.0188155	0.007358	0.0091957	0.0046724	0.0046791	0.0004877	0.0062077	-0.006441	0	0.047393	0.0132153	0.0001728	-9.25E-05	0.0004083	0.0005568	0.051214	0.0051325	0.0007126	0.0459869	0.0131078	0.0846869	0.0038732	0.0100126	0.2770389
16	0.0003136	-0.015142	0.0005191	0.0088876	0.0001543	-0.0008764	0.0005566	0.0001982	0.0022036	-0.003251	-0.000641	-9.05E-05	0.000107	-0.00047	-0.047393	0	-2.14E-05	0.0001682	-0.000455	0.0014621	1.873E-05	0.0028119	0.0083865	-0.04571	-0.002733	1.224E-06	-0.012092	0.000282	-0.001329	-0.063282
17	0.0002254	-0.029622	0.0002434	0.0013885	0.0002386	-0.000408	0.0008334	3.463E-05	0.0027866	0.0024181	0.00131	-0.000333	8.211E-06	-0.001536	-0.013215	2.144E-05	0	0.0409937	-0.002821	0.0270184	0.0071895	0.0123791	0.0034025	-0.00518	-0.002619	0.0013954	-0.004765	0.0005381	0.0042061	0.0456319
18	0.0010553	0.0004152	0.0006023	0.0109224	0.00012	9.404E-05	0.0005383	0.0020214	0.0095102	0.0004709	2.627E-05	-0.000579	-8.78E-07	-0.000428	-0.001728	-0.000168	-0.040994	0	-0.002266	0.0078551	0.0012896	0.0014664	0.0034365	-0.001845	0.0004907	0.0016662	1.578E-05	0.0013717	0.0019776	-0.002213
19	0.0014021	0.0010175	0.0003525	0.0001743	5.688E-05	2.1E-05	0.0002246	0.002307	0.0003851	0.0014026	0.0004997	-6.37E-05	0.0002448	0.0002805	9.292E-05	0.0004548	0.0028213	0.0002266	0	-0.002601	0.0002525	0.0014037	0.003317	0.0013409	0.0019322	-0.00004	9.214E-05	0.0011662	0.0025567	0.002163
20	0.0002312	0.00079	-2.74E-05	0.0002311	0.0003402	-0.004207	0.0011729	0.0008799	0.0008164	-0.000573	0.000107	0.0001094	0.0011294	-0.013882	-0.004048	-0.001462	-0.027018	-0.007855	0.002601	0	0.0018772	0.0002934	0.001227	-0.02175	-0.004891	0.0254506	-0.002637	-0.001923	-0.002958	-0.054855
21	0.0008333	-0.000234	0.000248	0.000476	1.103E-05	-0.000481	0.0009011	0.0001333	0.0001782	0.000248	0.0002436	-0.000111	0.0006153	0.0002942	-0.000557	-1.87E-05	-0.007169	-0.00127	-0.000253	-0.001877	0	0.0006599	6.611E-05	0.0002101	0.0100405	0.0009386	0.0027725	0.001394	0.0044629	0.012882
22	-0.002182	-0.014079	-0.00053	-0.000148	-3.19E-05	-0.023768	0.0018156	-3.97E-05	0.0007027	-0.000291	0.0002243	-0.000925	-0.004901	-0.008246	-0.005121	-0.002812	-0.002379	-0.001446	-0.001404	-0.000293	-0.00066	0	-0.002364	-0.0010395	-0.000493	-0.000318	-0.006809	-0.00303	-0.000347	-0.105608
23	-0.00205	0.0007938	0.0004979	0.0008008	0.0002314	0.0006206	0.0028888	-0.005368	0.0013757	0.001736	0.0017822	0.0001157	-0.000111	-0.00033	-0.005132	-0.008387	-0.003943	-0.003436	-0.000317	-0.001227	-6.61E-05	0.002369	0	0.0006355	-0.001875	0.0017593	0.0037681	0.007628	0.0026912	0.0002985
24	0.0003863	0.0042979	0.0082447	0.0078445	0.0079966	-0.003055	0.0541926	0.050475	0.0023716	0.0051062	0.0187828	0.0038655	0.012235	0.0056282	-0.000713	0.0045707	0.0031942	-0.001341	0.0027496	-0.00021	0.0103948	-0.000635	0	0.0010456	0.0028736	0.0022233	-0.002088	0.0053754	0.265142	
25	0.0001504	-0.002645	0.0016241	0.0036251	0.0016103	-0.000512	0.0396366	0.0078607	0.0007628	0.0050029	0.0007727	-0.000501	0.0002361	-0.045697	0.0027331	0.0026188	-0.000491	-0.001932	0.0004905	-0.010041	0.0049296	0.0003177	-0.001759	-0.002874	-0.005773	0	-0.019243	-0.006158	-0.013077	-0.086707
26	-0.000429	-0.001436	-2.19E-05	0.0006182	0.0002464	-0.000447	0.0053957	0.0002482	0.001364	-0.000499	-5.39E-05	0.0003937	-0.000123	-0.000941	-0.013108	-1.272E-06	-0.001395	-0.001666	0.0001037	-0.000939	0.0003177	-0.001759	-0.002874	-0.005773	0	-0.019243	-0.006158	-0.013077	-0.086707	
27	-0.016194	-0.007306	0.003426	0.0064593	0.001799	6.755E-05	0.009166	0.0019703	0.0064637	0.0007648	0.0094882	0.0017919	0.0001129	-0.084687	0.0129233	0.0047651	-1.58E-05	-9.21E-05	0.0026175	-0.002722	0.0068094	-0.003768	-0.003223	0.0007662	0.0192435	0	0.001361	0.0076199	0.018794	
28	0.0003169	0.0007076	0.0005572	0.0009907	0.0006788	-0.001584	0.0309447	9.401E-05	0.0040885	-0.001421	0.0015588	0.0009745	0.0008007	-0.000553	-0.003873	-0.000282	-0.000388	-0.001372	-0.001106	0.001923	-0.001394	0.0030303	-0.001763	-0.0020878	0.0004218	0.0061582	-0.001286	0	0.0018891	0.0346249
29	-0.000395	0.0055892	-0.007351	0.0046203	0.0016445	-0.005672	0.0204754	0.0003664	0.0026757	-0.00256	0.0041593	5.92E-05	-2.74E-05	-0.007446	-0.010013	0.0013285	-0.004206	-0.001978	-0.002557	0.0020579	-0.004463	0.0003474	-0.002691	-0.005375	0.0020358	0.0130773	-0.007162	-0.001889	0	0.0089714
SUM	-0.219813	-0.883388	0.0465583	0.0916953	0.0536813	-0.728923	0.8931026	0.0216509	0.213225	-0.002473	0.1478652	-0.003596	0.0980057	-0.143846	-0.271089	0.0632815	-0.045632	0.0022133	-0.0020216	0.0546554	-0.001288	0.1056076	-0.000298	-0.205114	0.0027673	0.0867066	-0.0187			

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0	-0.01306	-0.2636631	0.0404543	0.0402924	0.055794	0.0302174	0.1733717	0.0755305	0.0405366	0.0296536	0.0274072	0.098385	-0.03492	0.0303951	0.0314436	0.0044035	0.0073899	0.0086626	0.051991	0.0714023	0.0106891	-0.006928	0.0001269	0.0018438	-0.004128	-0.006379	0.0292154	0.9648291	
2	0.013057	0	0.0245799	0.0463393	0.0299576	0.034906	0.0298383	0.036125	0.0319409	0.0406342	0.0406349	0.0302896	0.039102	0.0188733	0.1960859	0.183859	0.2002994	0.1129494	0.0945125	0.0345307	0.0568072	0.0623835	0.0569132	0.0057169	0.0915112	0.0162239	0.1136608	-0.006666	0.002213	1.5752356
3	-0.263663	-0.02458	0	0.0771396	0.0059083	0.0072867	0.011458	0.0094487	0.0072191	-0.004247	0.0094548	0.0113027	0.0087895	0.0076109	-0.050117	0.0028966	-0.003495	-0.003134	8.813E-05	0.0008639	-0.001422	0.0043239	0.0020469	-0.035498	-0.014199	-0.000285	-0.0102146	-0.012229	0.057081	-0.246749
4	-0.040454	-0.046339	-0.07714	0	7.504E-05	-0.002159	-2.11E-05	-0.001332	7.10E-05	-0.001332	-0.002591	-3.79E-05	-0.002251	-0.002351	-0.081304	-0.002016	-0.023887	-0.032299	-0.003737	-0.005523	-0.007108	-0.001238	-0.002746	-0.007189	-0.003601	-0.003834	-0.021418	-0.021795	-0.023103	-0.578009
5	-0.049929	-0.029958	-0.005908	-7.5E-05	0	-0.002053	-0.000114	-0.001267	-1.58E-05	-0.208127	-0.007194	-0.000116	-0.002045	-0.028581	-0.059721	-0.000838	-0.005783	-0.004237	-0.002635	-0.004163	-0.006521	-0.006521	-0.002721	-0.004599	-0.021261	-0.003494	-0.02358	-0.044087	-0.010643	-0.35481
6	-0.055794	-0.034906	-0.007287	0.0021597	0.0020529	0	0.3138419	0.0082553	0.0595554	0.014633	0.0043342	0.1246959	0.1233608	-0.096601	-0.07362	0.0019861	-0.00305	-0.00045	0.0025708	-0.003339	0.016787	0.078292	-0.001227	-0.051861	-0.02234	-0.003153	-0.043882	-0.024183	-0.01821	0.2802728
7	0.030217	-0.029538	-0.011146	2.14E-05	0.000114	-0.133942	0	-0.000885	0.0000708	-0.012355	-0.001852	-0.024059	0.0070932	-0.051939	-0.057403	-0.001267	-0.00468	-0.00364	-0.003492	-0.005466	-0.005522	-0.002459	-0.002859	-0.053022	0.00166	-0.005107	-0.035516	-0.027351	-0.014791	0.727172
8	-0.173272	-0.036125	-0.009419	0.0013317	0.0012672	-0.000255	0.0008854	0	0.0953219	-0.009455	-0.001057	-0.001262	-0.00231	-0.030855	-0.07826	0.0028212	-0.00207	-0.007828	-0.001224	0.0035222	-0.005671	0.0023336	0.0177713	-0.05836	-0.04183	-0.004538	-0.024781	-0.019233	-0.012746	-0.409074
9	-0.07553	-0.031942	-0.007219	-7.11E-05	1.53E-05	-0.059955	-0.006671	-0.055332	0	-0.015603	-0.002003	-0.01565	-0.003963	-0.047092	-0.060981	-0.001473	-0.014159	-0.031333	-0.012971	-0.005505	-0.006529	-0.001088	-0.003535	-0.052182	-0.005547	-0.00362	-0.02762	-0.012937	-0.636068	
10	-0.040459	-0.046634	0.0042469	0.0203822	0.2081273	0.0146334	0.0125504	0.0094549	0.0158033	0	0.4831381	0.0163019	0.0105105	-0.018489	-0.10603	0.0790318	-0.00176	0.0036301	0.0145314	0.0245009	0.0033476	0.062285	0.0116771	-0.067268	-0.0021657	0.0049616	-0.043829	-0.013681	0.007217	0.6127423
11	-0.026964	-0.046646	-0.049544	0.0025913	0.0074944	-0.040434	0.0018517	0.0010566	0.0020832	-0.483158	0	0.0015602	-0.001713	-0.0551	-0.02066	0.0024083	-0.011371	-0.006539	-0.002773	-0.004592	-0.007229	0.0006313	-0.001761	-0.068977	-0.032104	-0.005081	-0.037771	-0.021395	-0.010974	-0.9075904
12	-0.027497	-0.03029	-0.013303	3.92E-05	0.0001159	-0.124066	0.0240588	0.001262	0.0154907	-0.016302	0.00156	0	0.0136962	-0.059409	-0.038505	-0.001374	-0.005065	-0.004213	-0.000826	-0.004526	-0.003128	0.0002343	-0.002818	-0.080789	-0.003694	-0.006521	-0.031156	-0.032407	-0.01305	-0.480764
13	-0.098305	-0.039102	-0.008799	0.0027512	0.002045	-0.12137	-0.007093	0.0023101	0.003063	-0.01051	0.001713	-0.013696	0	-0.03594	0.071602	0.0015525	-0.004501	-0.02722	-0.001666	-0.004347	0.0745327	0.0093016	-0.000201	-0.061089	-0.001161	-0.002754	-0.032123	-0.023493	-0.010994	-4.510899
14	-0.016889	-0.018873	-0.007511	0.0232781	0.0258311	0.0966008	0.051939	0.038855	0.047092	0.0194893	0.0550995	0.054093	0.0035837	0	-0.01063	0.0339024	0.016788	0.0235387	0.0232367	0.0510299	0.0261942	0.0675101	0.0229389	-0.045536	0.0068912	0.0048875	0.0040401	-0.014993	0.0093775	0.677945
15	0.03492	-0.196086	0.0510165	0.0813944	0.0597208	0.0732624	0.0574028	0.0782602	0.060981	0.1063901	0.0920659	0.0585051	0.0716019	0.01063	0	0.2336298	0.1183485	0.0935782	0.057031	0.0522698	0.0680919	0.0675747	0.0752408	0.0054823	0.1980557	0.0313268	0.285053	-0.002457	0.0326202	1.954708
16	-0.010305	-0.168386	-0.00287	0.020016	0.0008378	-0.001986	-0.001267	-0.002821	0.0014727	-0.079032	-0.002418	0.001374	-0.001525	-0.033902	-0.23363	0	-0.01171	-0.006433	-0.005551	-0.006657	-0.007298	0.0045931	0.056435	-0.055788	-0.032339	-0.003593	-0.044354	-0.016022	-0.020102	-0.661717
17	-0.003144	-0.200299	0.0034946	0.0238874	0.005783	0.0030497	0.0046805	0.0082072	0.014519	0.0077603	0.0131373	0.0050647	0.0045008	-0.016788	-0.118348	0.01171	0	0.3137201	0.0854455	0.0949292	0.1306946	0.042761	0.0448154	-0.069753	-0.011086	0.0043186	-0.040005	-0.019238	-0.016013	0.317682
18	-0.004004	-0.112949	0.0031335	0.0322988	0.0042386	0.0004449	0.00564	0.0079276	0.0133327	-0.00363	0.0065366	0.0042135	0.0027728	-0.025338	-0.093578	0.0064236	-0.31172	0	0.0251406	0.019045	-0.001702	0.0081075	0.0304497	-0.071592	-0.021165	0.0004438	-0.035933	-0.026512	-0.014991	-4.552221
19	-0.00739	-0.034513	-8.41E-05	0.0037369	0.0026346	-0.002571	0.0034918	0.0012244	0.0129705	-0.014531	0.002774	0.0008264	0.0016665	-0.023237	-0.057031	0.0055306	-0.085445	-0.025141	0	0.093919	-0.000999	0.0044772	0.0014362	-0.078464	-0.014508	-0.019146	-0.022832	-0.034348	-0.018652	-0.486007
20	-0.008063	-0.034531	-0.000864	0.0052525	0.0041631	0.0033394	0.005466	-0.003522	0.0053052	-0.024501	0.0049519	0.0043556	0.0043468	-0.05103	-0.05227	0.006657	-0.004029	-0.019045	0.0393192	0	0.038555	0.0130492	0.0090437	-0.069593	-0.000718	0.0275024	-0.020752	-0.027091	-0.014032	-0.259164
21	-0.015991	-0.056807	0.0014245	0.0070881	0.0046209	-0.016787	0.0055216	0.0056714	0.0065295	-0.003348	0.0072289	0.0031279	0.074533	-0.029194	-0.060892	0.0072984	-0.130695	0.0017015	0.0009988	-0.038566	0	0.023602	0.0040103	-0.06697	0.0195613	0.0066187	-0.010816	-0.017946	-0.001892	-0.425203
22	-0.017402	-0.062283	-0.04324	0.0012383	0.0005212	-0.078239	0.0024594	-0.002934	0.0100876	-0.026229	-0.006631	-0.000234	-0.009302	-0.05511	-0.067575	-0.004593	-0.042761	-0.08101	-0.004177	-0.013409	-0.01236	0	-0.001992	-0.05671	-0.029762	-0.003314	-0.035182	-0.025556	-0.013834	-0.570649
23	-0.010689	-0.056913	-0.002047	0.0027319	0.0022712	0.0012265	0.0028594	-0.017721	0.0035353	-0.011677	0.0017609	0.0028178	0.000201	-0.027959	-0.075241	-0.056435	-0.044815	-0.03045	-0.001436	-0.009044	-0.004001	0.0019022	0	-0.03157	-0.02993	-0.001168	-0.012949	-0.007024	-0.026723	-0.434313
24	0.006927	-0.005377	-0.0354982	0.047095	0.0455087	0.0518611	0.0530218	0.0583358	0.0521819	0.0672683	0.0089769	0.0017893	0.0161086	0.045359	-0.005482	0.0557881	0.0697526	0.0759198	0.0784642	0.0695924	0.0606966	0.0567103	0.0315066	0	0.0017717	-0.004577	0.02988	-0.039577	0.00162	1.154604
25	-0.00027	-0.091511	0.0149494	0.0260041	0.022609	0.0223398	0.0301661	0.0418303	0.0331284	0.0216569	0.0321038	0.0303839	0.001161	-0.000891	-0.198056	0.0232393	0.0110858	0.0216416	0.0145884	0.0170185	-0.019561	0.029762	0.0299302	-0.001772	0	0.0156977	0.0060441	-0.015076	-0.017123	0.0954156
26	-0.001284	-0.016224	0.000285	0.0083339	0.0024944	0.0031533	0.0043578	0.0055468	-0.004962	0.0058089	0.0065122	0.0027545	-0.004887	-0.031327	0.0035206	0.0035206	-0.004444	-0.000444	0.0191456	0.027502	-0.000619	0.0033141	0.0016803	0.0045775	-0.015698	0	-0.012353	-0.025004	-0.02483	-0.096639
27	0.004124	-0.113661	0.0201465	0.0235805	0.0438821	0.0235805	0.0247805	0.0303623	0.0418286	0.037712	0.031561	0.023228	-0.00404	-0.285053	0.043563	0.0400055	0.0350334	0.0040055	0.0350334	0.0207516	0.010816	0.035182	0.0122942	-0.02988	-0.006614	0.0123527	0	-0.00818	0.0095035	0.155467
28	0.0068786	0.0066664	0.0122287	0.0178949	0.014487	0.0241833	0.0273508	0.0192334	0.0227619	0.013681	0.0213953	0.0324068	0.023045	0.0149926	0.0024573	0.0169222	0.0192379	0.0205116	0.0344761	0.0270911	0.0179461	0.0255558	0.00174237	0.0395788	0.0156764	0.0256036	0.0081798	0	-0.00318	0.1534963
29	-0.029215	-0.002213	-0.025708	0.0231033	0.0106427	0.0118209	0.0147915	0.0127461	0.0129372	0.0109738	0.0129372	0.0109738	0.0139503	-0.009377	-0.03262	0.0201022	0.0106135	0.0143911	0.010852	0.0140323	0.0018917	0.0138335	0.0267229	-0.001662	0.0171227	0.0234834	-0.009503	0.0031378	0	0.171134
SUM	-0.364329	-1.575236	-0.2467494	0.5780087	0.5348104	-0.289273	0.7271717	0.4090737	0.3806078	-0.612742	0.9075005	0.4907643	0.5108942	-0.677942	-1.953471	0.6617715	-0.317678	0.5522209	0.336065	0.2591637	0.432303	0.5706488	0.4							

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM
1	0	-0.00255	0.128275	0.0512397	0.0139016	0.003137	0.0346179	0.0418363	0.0208011	0.0908439	0.0046727	0.0259406	0.027601	0.0222728	-0.00308	0.0030026	0.001751	0.001512	0.006705	-0.025482	-0.001366	0.0365289	0.00044109	0.0065991	0.0022215	-0.000517	-0.000259	-0.000301	0.046302	0.318263
2	-0.000255	0	0.0056934	0.0102352	0.0022225	0.00408	0.0956589	0.003345	0.0128654	0.0086564	0.0110289	0.01904	0.0245181	0.0095643	0.1901678	0.0071046	0.0881234	0.0181789	0.0159306	-0.184981	-0.008124	0.0499006	0.0103793	0.0098282	0.0379724	0.0027717	0.114228	0.0029135	0.0015607	0.033905
3	-0.128276	-0.005693	0	0.0312321	0.0016692	-0.00069	0.0262935	0.0014883	0.0072949	-0.000151	0.0032404	0.0045521	0.0017637	0.013027	-0.006889	0.0004437	-0.004044	0.0055468	-0.0028371	-0.003029	0.0068972	0.0002487	-0.003975	0.0010977	-0.00307	-0.002804	-0.002894	0.0059488	0.0193486	
4	-0.01524	-0.002025	-0.01232	0	8.248E-05	0.006632	0.0016724	-0.000767	0.0001404	-0.00584	-0.00064	0.0003394	-0.000239	-0.000658	-0.007177	-0.022232	-0.001144	-0.010657	-0.000101	0.0054556	-0.000943	-0.001667	-0.000394	-0.00635	-0.001589	-0.002651	-0.004914	-0.000884	-0.005762	-0.14758
5	-0.013902	-0.002232	-0.001669	-8.25E-05	0	-0.000419	0.0010998	-0.000912	7.029E-05	-0.02153	-0.001233	0.0003584	-0.000216	-0.000632	-0.004708	-0.000107	-0.000111	-0.000437	-0.000104	-0.001078	-0.000361	-0.000241	-0.000247	-0.001634	-0.00167	-0.00141	-0.002391	-0.003208	-0.003234	-0.097239
6	-0.010314	-0.00408	0.0069094	0.0006158	0.0004192	0	1.9700139	0.0070459	0.0173985	-0.001553	0.0054293	0.0189383	0.0184162	-0.02317	-0.008678	0.0028994	0.0002403	0.0008431	0.0006664	-0.001486	-0.000142	0.0452458	0.0057596	-0.008847	0.0009384	0.0045969	-0.005057	-0.004787	-0.001415	2.2185114
7	-0.034618	-0.095658	-0.026294	-0.001672	-0.0011	-1.970014	0	-0.002677	0.0001319	-0.038958	-0.002437	-0.12066	-0.013016	-0.140445	-0.218552	-0.000393	0.0035199	-0.013308	-0.010575	0.0732187	-0.01016	-0.020328	-0.000008	-0.450777	0.032602	-0.08711	-0.077618	-0.028939	-0.008149	-3.296083
8	-0.041836	-0.003345	-0.001488	0.0007669	0.0009123	-0.007042	0.0026766	0	0.1852172	0.0021769	0.0006967	-0.003085	-0.00029	-0.009575	-0.007007	0.0064254	-0.000915	-0.0055598	0.0011855	-0.012642	-0.001532	0.0168684	0.0078598	-0.03878	-4.85E-05	0.0072134	-0.03037	-0.004067	0.0167678	
9	-0.020881	-0.012865	-0.007205	-0.000174	-7.01E-05	-0.007398	-0.000132	-0.185217	0	-0.094923	-0.000805	-0.180919	-0.001112	-0.003899	-0.024365	-0.001227	-0.013076	-0.008740	-0.004555	0.0068262	-0.001381	-0.002274	-0.000498	-0.005354	-0.000851	0.0108771	-0.02064	-0.014759	-0.003933	-0.707705
10	-0.009844	-0.008669	0.0001506	0.0058398	0.0215297	0.0015531	0.0398578	-0.001277	0.0069427	0	0.1385814	0.0187888	0.0039552	-0.0047	-0.016137	0.0103761	0.0010674	-0.000324	-0.055072	-0.042777	-0.004193	0.0357904	0.0024683	-0.008224	0.0011485	-0.00222	-0.013871	-0.002243	-0.001163	1.1880151
11	-0.004673	-0.011029	-0.003241	0.0006397	0.0012235	-0.005429	0.0024968	-0.000697	0.0008053	-0.138581	0	0.0009005	-0.001503	-0.05383	-0.01789	0.0003612	-0.001272	-0.008953	-0.001424	-0.001401	-0.000863	0.0003988	-3.87E-05	-0.019192	-0.002261	-0.002317	-0.004527	-0.00447	-0.004459	-0.36126
12	-0.025042	-0.011904	-0.004452	-0.000584	-0.000358	-0.16993	0.12866	0.0030853	0.1809194	-0.018789	-0.000901	0	-0.001241	-0.270979	-0.040897	-0.001295	-0.0001804	-0.006258	-0.002576	0.0120876	-0.001596	0.0054991	-0.000147	-0.170825	-0.009159	5.885E-05	-0.013502	-0.0010475	-0.003634	-0.489292
13	-0.02676	-0.024518	-0.001764	0.0002393	0.0002163	-0.00416	0.0130162	0.0002901	-0.0011119	-0.003055	0.0035026	0.0012413	0	-0.36508	-0.063229	0.0012563	0.0003342	-0.000893	0.0006538	-0.005689	0.011866	0.0063121	0.0002179	-0.018804	0.0082259	0.0062329	-0.006439	-0.005679	-0.004465	-0.161293
14	-0.022273	-0.009656	-0.013013	0.0100535	0.0086319	0.0231698	0.1404453	0.005754	0.0838993	0.0047004	0.05583	0.2709792	0.065078	0	-0.022847	0.015382	0.0030467	0.0013618	0.0076105	-0.14518	-0.00458	0.090767	0.0048755	-0.009169	0.0025758	-0.005513	-0.000279	-0.000834	0.003818	0.5343131
15	0.0038085	-0.199168	0.0068887	0.0177167	0.004708	0.0086775	0.2185524	0.0070071	0.0243652	0.0161372	0.0178899	0.0408968	0.0631294	0.0228468	0	0.0704537	0.0181416	0.0097869	0.0079545	-0.226514	-0.016247	0.0357123	0.0092592	0.0159437	0.0355386	0.0093148	0.1280716	0.0081573	0.0110759	0.4074762
16	-0.003003	-0.0171075	-0.000444	0.0122317	0.0001068	-0.002989	0.0003933	-0.006425	0.0012268	-0.003376	-0.000361	0.0012951	-0.001256	-0.015882	-0.070452	0	-0.002181	-0.002397	-0.006377	-0.029121	-0.002624	0.0134493	0.017607	-0.017794	-0.00391	-0.006821	-0.025806	-0.00342	-0.006404	-0.242718
17	-0.001275	-0.088123	0.0002671	0.001443	0.0001109	-0.00024	-0.00352	0.0009154	0.0130756	-0.001067	0.0012716	-0.00018	-0.000334	-0.003047	-0.018142	0.0021813	0	0.0931626	0.105827	-0.310528	0.013117	0.043202	0.0163307	-0.033337	0.002913	-0.006344	-0.020744	-0.040253	-0.005293	-0.212704
18	-0.001512	-0.018179	0.0040418	0.0105656	0.004375	-0.000843	0.0133082	0.0055981	0.0087489	0.0003237	0.0089525	0.0062581	0.0008926	-0.001362	-0.009787	0.0023965	-0.093163	0	0.0624985	-0.157318	-0.011186	0.0492773	0.0111062	-0.022684	-0.002101	0.0294873	-0.02145	-0.00457	-0.003114	-0.139632
19	-0.00667	-0.015931	-0.000547	0.0010108	0.0001043	-0.006666	0.0167505	-0.001186	0.0045351	0.0050719	0.0014237	0.0025757	-0.000864	-0.007811	-0.007955	0.0063769	-0.105683	-0.062498	0	0.136768	-0.01306	0.005892	0.0002431	-0.025012	0.007378	0.072413	-0.00223	-0.003166	0.0058894	0.0045981
20	0.0264821	0.184981	0.0283712	-0.005646	0.0010778	0.0148859	-0.073219	0.02126416	-0.006826	0.0427773	0.0014013	-0.012088	0.0056893	0.1451804	0.2265136	0.29121	0.3105277	0.1573181	-0.156768	0	-0.174029	-0.008192	-0.004142	0.996379	0.0682523	-0.180419	0.1484908	0.0567985	0.0570906	1.9136512
21	0.002358	0.0081237	0.0030293	0.0009432	0.0003607	0.0004418	0.0161604	0.0015316	0.0015807	0.0004925	0.0008624	0.0015957	-0.011866	0.0104576	0.0162467	0.0026241	-0.011312	0.0111862	0.0130602	0.174029	0	0.0053484	0.0005782	0.074059	0.0327115	0.000248	0.0105735	-0.005679	0.0074651	0.3897676
22	-0.036629	-0.049991	-0.006897	0.0016669	0.000241	-0.045246	0.0203277	-0.016686	0.0022744	-0.03579	-0.000399	-0.005499	-0.006312	-0.000761	-0.035712	-0.013449	-0.043202	-0.043927	-0.005892	0.0081918	-0.005348	0	0.0016803	-0.006952	0.0093921	-0.021932	-0.037335	-0.007144	-0.551006	
23	-0.004411	-0.010379	-0.000429	0.0003044	0.0002466	-0.00058	0.0008079	-0.007086	0.0004976	0.002468	3.888E-05	0.000147	-0.000218	-0.004876	-0.000259	-0.017607	-0.010311	-0.011106	-0.000243	0.004422	-0.00578	-0.00168	0	-0.004585	-0.013221	0.000411	1.731E-05	-0.002196	-0.006998	-0.08392
24	-0.006269	-0.009628	0.0039147	0.0053496	0.0106319	0.0089469	0.4540768	0.0087799	0.0536539	0.008224	0.0191923	0.1708251	0.0188036	0.0093692	-0.015944	0.00717939	0.0353367	0.022836	0.0250116	-0.996379	-0.074306	0.0796803	0.0045854	0	-0.042842	-0.139603	0.0100216	-0.018986	-0.003389	-0.330702
25	-0.002221	-0.017972	-0.001098	0.0015983	0.0016698	-0.000996	0.0326023	4.851E-05	0.0008512	-0.001149	0.0027613	0.0091594	-0.000826	-0.002576	-0.103559	0.0091004	0.002915	0.0021005	0.0073783	-0.068252	-0.032711	0.0069521	0.0132307	0.0429417	0	-0.003671	0.0020948	-0.005822	-0.004621	-0.141819
26	0.005472	-0.002272	0.00307	0.0026507	0.0014099	-0.004937	0.0367142	-0.007213	-0.010877	0.0022149	0.0029172	-5.8E-05	-0.006263	0.0055128	-0.019315	0.0068215	0.0063436	-0.029487	-0.072443	0.1804192	-0.009492	-0.009392	-0.000411	0.139603	0.0036707	0	0.0154168	-0.016715	-0.014821	0.2137319
27	0.0002593	-0.011423	0.0032093	0.014914	0.0012307	0.003074	0.0076183	0.0030704	0.0206395	0.0138714	0.0246271	0.0135016	0.0056794	0.0002792	-0.128072	0.0258058	0.0207441	0.0214489	0.0022383	-0.005708	-0.000573	0.0219321	-1.71E-05	-0.000272	0.009857	0.002359	0.00189857	0.0029337	-0.015417	-0.00094
28	0.000304	-0.002913	0.002804	0.0048829	0.0032077	0.0045873	0.0289392	0.002917	0.0145786	0.0022433	0.0047195	0.0104753	0.0056794	0.0008339	-0.008157	0.0034196	0.0042528	0.00457	0.0031659	-0.056798	0.005679	0.0073496	0.0012559	0.00189857	0.005822	0.0167155	5.416E-05	0	-0.00803	0.0128458
29	-0.01463	-0.001561	-0.01935	0.0057618	0.0032316	0.0014153	0.0081491	0.0040672	0.0039325	-0.001453	0.0044589	0.0098339	0.0046469	-0.003818	-0.011076	0.00404035	0.0052926	0.0031138	-0.005889	-0.057091	-0.007465	0.0071439	0.0006998	0.0033988	0.0046213	0.0148205	0.0009401	0.0180297	0	-0.009847
SUM	-0.391828	-0.633905	0.0312462	0.1475804	0.0792386	-2.218511	2.960029	-0.107678	0.7077049	-0.188015	0.3081258	0.4892917	0.161293	-0.534313	-0.447476	0.2427775	0.2127073	0.1396318	-0.004598	-1.913651	-0.369768									

2006

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	SUM	
1	0	-0.02395	0.247363	0.0534867	0.1351608	0.0330666	0.0547104	0.084721	0.0474653	0.027531	0.017749	0.0174715	0.1512317	1.807E-05	-0.022344	0.0075138	0.0074643	0.0035367	0.009734	-0.006533	0.016793	0.04092	0.017798	-0.016208	-0.00013	-0.001255	-0.003956	-0.0161	0.021397	0.0036866	
2	0.022952	0	0.021803	0.0417595	0.0270334	0.0542368	0.0349934	0.0434598	0.0358345	0.083822	0.0437669	0.0549326	0.0696743	0.0553564	0.2860798	0.1665483	0.167878	0.240641	0.134003	0.056422	0.0591124	0.0780363	0.0796476	-0.019169	0.0917626	0.0073428	0.030195	0.0036263	0.002822	1.866427	
3	-0.247336	-0.02168	0	0.0669486	0.0132345	-0.0023239	0.0151581	0.0070752	0.0046569	-0.003942	0.0028214	0.0101878	0.0121688	-0.044387	0.028815	0.0002291	0.0014479	-0.002312	-0.0035225	-0.009754	0.0052389	0.0552929	0.0037563	-0.074622	-0.003787	-0.005799	-0.009309	0.011184	0.028218	-0.280719	
4	-0.053407	-0.041759	-0.066948	0	0.0007039	-0.00403	0.0008208	-0.002641	-0.004139	-0.020201	-0.003853	0.0001906	0.0001249	-0.046328	-0.056302	0.0023859	-0.001931	-0.008323	-6.31E-05	-0.02426	0.0019835	-0.000417	0.0006636	-0.011029	-0.009718	-0.017231	-0.021439	-0.018846	-0.01164	-0.551174	
5	-0.135107	-0.027033	-0.01255	-0.001074	0	0.0077385	0.000167	-0.003944	-0.001407	-0.006528	-0.006636	-0.000531	-0.000547	-0.05916	-0.037335	-0.00122	-0.002439	-0.006711	-0.000402	-0.012734	0.0004608	-0.00269	0.0001601	-0.158672	-0.010475	-0.012555	-0.01387	-0.014439	-0.007638	0.230794	
6	-0.013907	-0.054237	0.0032392	0.0040297	0.0073652	0	0.1853392	0.0105233	0.0313809	0.00829	0.0181586	0.272166	0.0241081	-0.043883	-0.083834	-0.011034	-0.006648	-0.007444	-0.004095	0.016554	0.0037344	0.0514037	-0.004042	-0.1276676	-0.003805	-0.008432	-0.016932	-0.013905	-0.001529	-0.72858	
7	-0.054718	-0.034993	-0.015158	-0.000821	-0.000167	-0.18535	0	-0.001147	0.0001861	-0.013391	-0.001731	-0.032291	-0.006818	-0.04982	-0.047969	-0.002394	-0.006648	-0.007444	-0.004095	0.016554	0.0037344	0.0514037	-0.004042	-0.1276676	-0.003805	-0.008432	-0.016932	-0.013905	-0.001529	-0.72858	
8	-0.084721	-0.04346	-0.007075	0.0026409	0.0039438	-0.010523	0.001147	0	0.222006	-0.005305	0.0071128	0.0045616	7.88E-05	-0.061263	-0.067095	0.0022985	0.0002598	-0.003858	0.0062336	-0.01917	0.002158	0.002158	0.002158	0.002158	0.002158	0.002158	0.002158	0.002158	0.002158	0.002158	-0.292729
9	-0.047485	-0.035834	-0.004367	0.0041392	0.0014066	-0.01381	0.001861	-0.222006	0	-0.010294	0.004696	-0.018006	-0.000751	-0.0569	-0.053781	-0.000725	-0.009883	-0.007303	0.0022597	-0.02325	0.0015027	-0.000145	0.0015866	-0.143132	-0.007427	-0.009995	-0.018251	-0.027455	-0.005882	-0.716776	
10	-0.022531	-0.038832	0.0039424	0.0200214	0.1065279	-0.002901	0.0133908	0.0053052	0.0102941	0	0.1873468	0.0130743	0.0093492	-0.024942	-0.057338	0.0208129	0.0033871	-0.002117	0.0203626	-0.002981	0.0087101	0.0256265	0.0094334	-0.294901	-0.004466	-0.014103	-0.02037	-0.012736	-0.003164	-0.002941	
11	-0.017749	-0.043767	-0.002821	0.0038532	0.0096361	-0.018159	0.007311	-0.007113	-0.004696	-0.187347	0	-0.000284	-0.002139	-0.151579	-0.061193	-0.00454	-0.004244	-0.010538	5.00E-05	-0.014648	0.000748	-0.007159	0.001105	-0.191593	-0.010016	-0.012655	-0.0311	-0.009494	-0.011792	-0.745001	
12	-0.017472	-0.050363	-0.010188	-0.000191	0.0005315	-0.272727	0.0322908	-0.004652	0.0180056	-0.013074	0.0002836	0	-0.009431	-0.040776	-0.06727	-0.05234	-0.003253	-0.009864	-0.000691	-0.017272	0.0001309	0.0035349	0.0004966	-0.122193	-0.007998	-0.010103	-0.027152	-0.01301	-0.006041	-0.699735	
13	-0.151214	-0.066674	-0.027169	-0.000125	0.0005469	-0.024108	0.0068177	-7.89E-05	0.000751	-0.009934	0.002139	0.0094315	0	-0.033036	-0.114669	0.0004572	-0.00831	-0.003731	0.0030335	-0.012488	0.0187023	-0.000971	0.0034624	-0.120656	0.0022259	-0.008129	-0.017189	-0.011163	-0.010184	-0.554662	
14	-7.69E-05	-0.065356	0.0346566	0.0463282	0.0591601	0.0430834	0.0348821	0.0612632	0.0559005	0.0249423	0.1151787	0.0407164	0.0330362	0	-0.130181	0.054156	0.0248409	0.047335	0.0303605	-0.006618	0.0262555	0.0696161	0.0248994	-0.115998	0.0044953	6.84E-05	-0.010183	-0.001479	0.0064687	0.541294	
15	0.0223444	-0.28608	0.0288146	0.0563017	0.0373352	0.0838335	0.0479605	0.0670953	0.0537808	0.0573358	0.0611932	0.0677699	0.1146699	0.1310313	0	0.175691	0.1812206	0.1385823	0.1571635	0.0173911	0.0657966	0.090651	0.082608	-0.034181	0.1609259	0.0131145	0.040342	0.0119404	0.0110012	1.6546678	
16	-0.010752	-0.166548	-0.000229	0.0326592	0.0012201	0.0110343	0.0196191	-0.007269	0.0007747	-0.028813	0.0045398	0.0523404	-0.004957	-0.093416	-0.175699	0	-0.00573	-0.01131	0.0070119	-0.025538	0.0027433	0.0078183	0.0380079	-0.118896	-0.012751	-0.011772	-0.040429	-0.010994	-0.010884	-0.548777	
17	-0.007464	-0.167788	-0.001448	0.0019927	0.0024994	-0.000715	0.020942	-0.00026	0.0098828	-0.003387	0.0042441	0.0032529	0.0083099	-0.024941	-0.181221	0.0057302	0	-0.004275	0.0530859	-0.008124	0.0719561	0.008454	0.0838053	-0.16089	-0.002239	-0.008209	-0.035909	-0.011976	-0.01121	-0.332432	
18	-0.009537	-0.240441	0.0023115	0.0083233	0.0067106	0.0023862	0.0066484	0.0038583	0.007303	0.002172	0.0105876	0.009864	0.0037311	-0.034733	-0.139582	0.0113104	0.004275	0	0.1128088	-0.012119	0.0302978	0.0174968	-0.047423	-0.002316	-0.002617	-0.030714	-0.012013	-0.011326	-0.310874		
19	-0.009734	-0.134903	-0.002522	6.33E-05	0.0040024	-0.004069	0.0007441	-0.006234	-0.00226	-0.020363	-5.01E-05	0.0069095	-0.003833	-0.039361	-0.157163	-0.007042	-0.039306	-0.11289	0	-0.045628	0.0245181	-0.00227	0.0004203	-0.159174	-0.027194	-0.015428	-0.038871	-0.018578	-0.011756	-0.861887	
20	0.0065333	-0.005642	0.0087541	0.022599	0.0127335	0.0165538	0.0791324	0.0191697	0.0232253	0.0029811	0.0146482	0.0106181	-0.017391	0.0253376	0.0081242	0.0171914	0.0456279	0	0.1356141	0.04772	0.0270226	-0.14465	0.0490657	0.1294915	0.0382612	-0.006373	0.000905	0.6129431			
21	-0.016793	-0.059112	-0.005289	-0.001984	-0.000461	-0.003734	0.0002106	-0.002158	0.005103	-0.00871	-0.000748	-0.000131	-0.018702	-0.026225	-0.065797	-0.002743	-0.01956	-0.030298	-0.024518	-0.175674	0	-0.000768	0.0002555	-0.286285	-0.01095	-0.023081	-0.017834	-0.012601	-0.021239	-0.879918	
22	-0.00992	-0.078936	-0.055239	0.000447	0.000269	-0.051404	0.0035128	-0.01245	0.0001448	-0.026563	0.0071585	-0.033385	0.0009712	-0.068616	-0.090651	-0.007818	-0.008454	-0.017497	0.0022266	-0.00402	-0.027023	-0.000257	0.0019366	-0.172263	-0.010876	-0.015393	-0.020134	-0.017163	-0.00645	-0.645522	
23	-0.03717	-0.079648	-0.026536	-0.000664	-0.00016	-0.004043	-0.000616	-0.043455	-0.005187	-0.009933	-0.011105	-0.000497	-0.003462	-0.02489	-0.082608	-0.033808	-0.083905	-0.045887	-0.00042	-0.027023	-0.000257	0.0019366	-0.172263	-0.010876	-0.015393	-0.020134	-0.017163	-0.00645	-0.645522		
24	0.0162076	0.0191694	0.046223	0.1102095	0.1566711	0.1276358	0.1108411	0.245965	0.1431321	0.195027	0.1221628	0.1020652	0.1159881	0.034181	0.1189863	0.16089	0.047233	0.159174	0.1445974	0.2862851	0.1722634	0.0824613	0	0.0514709	0.0132001	0.0143941	-0.000285	0.010247	0.010012	3.2860686	
25	0.00013	-0.091763	0.007188	0.007181	0.0004754	0.0039049	0.0106763	0.0119917	0.0074267	0.0044662	0.0100162	0.0019919	-0.002226	-0.040495	-0.160926	0.0177508	0.0022391	0.0023165	0.0271842	-0.049096	0.0109495	0.0187631	0.0122897	-0.01471	0	0.001882	0	-0.004239	-0.03247	-0.014517	
26	0.0012554	-0.007343	0.0057992	0.0172307	0.0125458	0.0084322	0.0225159	0.0146179	0.0099946	0.0141032	0.0216551	0.0101032	0.0081289	-6.84E-05	-0.011115	0.0117718	0.0082095	0.002637	0.0154283	-0.129491	0.0230814	0.0153925	0.0075777	-0.03201	-0.001882	0	-0.004239	-0.03247	-0.014517		
27	0.009562	-0.030196	0.0039091	0.0214391	0.0158314	0.0168323	0.033589	0.0136008	0.018251	0.0210366	0.0311	0.021752	0.0121887	0.0101831	-0.040341	0.0404291	0.0359094	0.0307144	0.0380707	-0.016261	0.0178342	0.0201344	0.0148733	-0.014384	0.0067713	0.0042391	0	-0.001593	0.008466	0.3337225	
28	0.0116098	-0.003626	0.011838	0.0188465	0.0144389	0.0139047	0.0161089	0.0110554	0.0274546	0.0127359	0.0334344	0.0130096	0.011631	0.0071494	-0.01194	0.0109939	0.011976	0.0120127	0.0185783	0.0063726	0.0126014	0.0171627	0.0091799	0.0002946	0.0313408	0.0327474	0.0013931	0	0.0042368	0.3265477	
29	-0.021399	-0.02082	-0.02852	0.011637	0.0076381	0.0015294	0.0092774	0.0062512	0.0058823	0.0031656	0.0117392	0.0060442	0.0101845	-0.006469	-0.01001	0.010804	0.0112104	0.0113259	0.0117556	-0.010045	0.0123292	0.0064755	0.012107	-0.025927	0.0141567	0.0092632	-0.008447	0.004237	0	0.054247	
SUM	-0.90387	-1.866423	0.2807194	0.5511738	0.6459464	-0.220794	0.7328579	0.2927286	0.7167758	0.0429413	0.7450012	0.6997352	0.541229	-1.654668	0.5488775	0.324234	0.3108745	0.6518869	-0.612943	0.8799182	0.684522	0.6037483	-3.286068	0.2550775	0.0186314</						

Appendix 11
Basic Transactions Table for Malaysia at Constant Prices
1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1	62301	3414	125648	1592	30701	134	357633	991	58	5004	61	660597	5455	10689	85	590	79	549	132	11331	283	800	22	518	157612	18533	258571
2	1478	6445	48	5	8	11	33	4	8	1604	219405	110	18387	750633	4	33	6	2	5	100524	146	428	2	22	75	136	1099562
3	217101	394	621452	15829	97	2039	598	30	185	8825	69	828	216	170	106	650	79	506	233	1124	4526	1440	19	265	101920	27230	1006022
4	29	17	659	287	4	11	5	1	7	9	3	12	8	8	5	32	7	4	12	54	32	177	1	17	18321	1134	20855
5	1075	64	149	14	6297	78	27	8	51	259	21	88	159	67	35	227	21	25	59	247	61	172	2	11	112	112	9499
6	3845	465	8384	363	205	204178	274	196	1831	516	31	5040	1745	247	472	2060	366	3723	628	313	297	3034	347	62	2251	18833	257707
7	5670	3351	1561	725	179	700	90547	23666	370	2134	45	1658	2073	1533	539	1092	2261	1799	140	210168	1070	1520	431	300	2834	2553	338917
8	137	91	83	18	7	37	52	1464	870	37	4	64	38	43	65	1618	56	13	16	1590	127	101	9	41	951	431	7961
9	3410	8134	14792	2604	13158	3618	2183	441	37295	8752	611	3041	5938	1383	2525	7323	1125	2050	1202	8929	125296	5991	1077	9906	14559	35397	320538
10	120204	2991	4158	560	515	5437	11180	2747	5422	36535	1751	13446	18924	5371	2900	13956	5578	1091	337	44459	568	995	240	267	17091	11677	340291
11	74094	61847	22193	1196	331	5626	10318	233	2121	8305	27506	8384	26914	6449	1339	3346	1443	216	151035	38844	41929	83601	913	153	11674	3125	621239
12	10857	4929	1271	35	62	1754	824	686	269	531	56	42104	993	1293	245	2037	20720	106	608	9097	10202	28455	323	296	8844	3380	150177
13	12862	2813	26003	14338	2442	4540	2113	2380	2871	11890	641	3646	2141	2304	899	10955	1579	2356	63	265216	39066	1061	858	113	1291	2063	435605
14	6018	9993	2767	210	110	358	1499	917	394	848	410	715	1229	63355	44247	47193	9640	4631	1462	197454	1131	1795	222	464	4767	4443	408072
15	15683	2091	57719	2677	185	205	1326	126	400	5304	5070	936	931	2386	8318	3049	2175	208	828	79735	9651	799	583	678	1440	3222	205723
16	27854	18562	7502	984	387	2012	6494	134	1635	1991	2508	4599	3242	6847	2697	124386	6814	4989	5485	86945	5080	5652	2460	3884	14251	21286	368672
17	8669	2029	899	63	86	208	815	22	117	196	56	294	555	221	89	482	2740	45	210	715	387	33439	26	24	16690	6382	75468
18	689	606	807	163	336	4273	187	92	1025	417	41	372	307	216	120	998	119	34212	190	759	1604	744	200	1030	2368	8305	60180
19	11792	57976	23939	2435	895	20018	13263	1369	5857	12570	4056	14101	25117	12023	2791	14224	2560	2190	2778	13593	43397	7538	3817	11407	80292	52812	446810
20	10966	16950	3829	338	123	1018	2332	145	978	878	229	2324	1528	905	445	1271	165	265	8942	25335	42000	5506	2750	76455	9507	180895	395881
21	122400	46764	117972	7766	10447	45447	18025	4630	29279	33825	11374	46850	31109	34196	21370	143738	13876	19433	50451	198305	24732	56690	1935	2527	78703	51071	1222913
22	21995	25191	75158	2283	8883	7260	51099	1761	4144	5616	4183	14184	6896	10327	2891	15473	7188	1433	7330	54057	81888	107221	2045	1982	21004	54029	595320
23	3837	2042	3371	382	343	2142	2187	264	2456	1364	128	1657	1413	1162	705	4916	699	914	2828	5213	51444	12343	4033	16404	30425	30569	183239
24	7669	15698	10332	1075	812	6886	8478	1204	4251	3648	740	4093	5086	4650	2317	6746	2349	1670	2546	45192	128182	44623	274	86978	54556	25209	472562
25	17869	40584	34540	7276	10013	8751	12829	1955	10066	19114	2710	8776	11285	7810	5371	15811	4759	3912	8683	63016	158759	83423	2449	22186	74194	159407	795126
26	468	1504	3062	166	189	1068	886	176	783	655	42	1192	884	1333	478	1296	452	177	105	6896	31319	6767	43	2974	7695	3757	74367
27	780860	334048	229295	63384	86614	331808	595206	45640	112882	170829	281750	839101	191633	925621	101058	418111	86858	86521	246309	1469110	803177	494315	25082	239963	733427	751619	1251921
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	20553	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	37833	16726	27888	4554	84022	23457	35080	1639	10057	12654	1521	10226	10578	300972	7238	60455	20587	3257	8553	67269	17017	28743	625	858	48632	29918	870540
32	340531	125118	543478	31241	63537	223061	38371	6253	105999	175814	571393	84842	133110	258640	95997	668381	487163	29204	30471	546116	122288	269976	20168	32975	158691	499553	567208
33	4853428	1924553	685070	75408	73887	258736	369007	27593	155708	169359	104548	236332	212209	182429	92786	400630	141281	52719	311881	923235	2187184	876849	220071	1617989	837881	2412887	19402227
34	6042205	2401344	3555731	174587	308040	837063	1071664	81034	384446	528555	959213	1170141	547530	1607663	297078	1547576	735888	171161	597213	3005729	3130666	1650882	265946	1890785	1778431	3694994	38480665

1983

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	412308	2084	3074031	3546	47174	24005	654793	2208	286	13692	277	1127603	18724	23668	74	1065	150	1834	360	376	1152	1349	58	1900	320376	59032	5707126
2	3633	35559	3202	360	581	319	575	64	371	10473	1402637	444	73578	772666	347	696	266	99	425	242794	4397	3756	213	921	2890	4003	2565269
3	606285	1193	2750715	53745	257	3345	803	87	583	11800	331	1659	867	915	371	2588	381	851	1134	4128	13279	3399	104	897	241671	66630	3768019
4	250	114	1971	2457	44	73	58	9	60	207	35	60	75	75	43	294	37	123	134	559	220	680	14	73	48379	3727	59571
5	2141	308	1075	68	13350	399	248	35	264	1364	197	378	514	404	221	1710	168	100	738	2150	339	1155	17	61	712	365	28481
6	3077	930	11688	724	1293	333704	833	3771	3782	3302	182	3764	2833	1490	539	48376	6869	4007	1587	2202	1922	4151	272	364	9974	30397	482212
7	10666	5243	3126	2099	734	1679	203014	58736	2891	10570	204	8013	7231	3005	3775	8986	5483	3321	643	680072	3049	4715	101	594	7222	3835	1056996
8	370	274	292	111	44	213	157	1149	71	465	22	430	351	171	109	10245	129	79	74	7231	410	191	140	141	1852	585	25308
9	16239	13294	36127	13911	25069	10281	5056	1157	92139	19986	1942	6301	21463	3008	5681	21453	3068	6091	4204	45134	225874	18699	8628	47560	77367	74153	804083
10	301365	24242	23912	2811	1241	21095	33624	2747	23149	272964	10000	36454	64142	9529	9142	43966	22771	4699	6354	97168	18336	13830	1034	1013	47228	37703	1131057
11	265723	143049	65913	3493	1324	24538	32965	514	4965	31963	103458	18826	50927	16985	3942	10134	4901	694	489062	148552	149841	243375	735	578	34088	62013	1847657
12	25257	9532	1047	73	81	3292	527	3471	281	6984	227	87384	1881	813	201	10771	56930	603	369	34132	16335	43027	198	229	13659	10176	326879
13	18863	1729	52432	23814	2713	8889	6126	3791	6053	36804	2126	12466	117738	4940	7920	71123	11149	5106	821	82671	56932	2125	74	781	5078	4203	1280371
14	12243	23830	24810	2521	392	1149	3621	2971	6189	5526	9324	4170	7568	184800	126335	95916	28619	7865	5677	564212	7002	4392	220	1058	10228	8223	1148862
15	16914	9517	86110	8023	444	869	1789	1022	1457	13038	9753	10423	5525	24009	43792	20647	13700	2249	4445	256526	13305	1883	440	914	4393	4788	555977
16	22001	31286	22586	1990	1345	4887	5685	984	3824	7602	6287	9037	14983	13055	8250	240615	13274	3077	9360	279133	16014	8236	7048	4781	87934	29551	852706
17	11227	8021	10592	555	483	2444	3663	249	993	2453	1035	3164	5809	2985	2843	7671	277555	1520	723	13136	3157	73148	222	789	53979	8140	496263
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19	45476	86916	92510	8619	4789	74635	41850	2916	21401	40387	12880	43928	106947	54221	12436	73797	15989	8138	36144	22772	130125	21763	2743	42030	225901	158214	1412524
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5	14852	35488	26471	77705	473869	4210	2606	559	10338	20026	43704	6213	9952	3457	11355	193458	14171	2279	3895	15748	33387	12208	5395	25427	12723	32288	1086883
6	33585	59420	43800	1996	4307	1541306	8692	1102	309102	37893	74873	45418	31707	6113	24305	402489	134891	8410	7402	38556	53905	12797	5813	27501	14042	207020	3135735
7	18741	35226	28323	1378	3223	5704	564149	339025	124845	21301	47396	6863	16105	3938	22180	261496	37974	12711	4540	854164	33033	10311	3177	16135	7760	37803	2519492
8	2728	6356	5133	279	585	956	9831	6488	103138	4557	8512	1245	2294	717	3891	40691	3164	1789	888	416950	5915	1706	557	3044	1194	11988	644574
9	41638	93529	301807	34078	185642	53386	36618	16428	4319621	210295	131615	88941	254839	43158	197392	1195770	110484	59918	28386	67143	109861	229721	39212	193001	237380	644486	8917150
10	1029912	326155	326973	21870	23065	218313	45472	7785	337816	4601589	1277361	155075	1564992	9757	546124	3953963	550077	87618	53364	298993	296784	134178	28012	133727	53475	527405	16695175
11	398811	2330212	1075017	31469	30694	198095	342596	43710	205801	5239340	4946768	600714	169796	700909	582740	1307651	581660	47559	3757199	1110382	140949	518675	174651	327775	1784680	539571	33295653
12	57784	1001065	75195	3444	7039	106372	7452	1455	58928	107548	129484	515698	107427	10089	228114	720713	255658	8639	11208	43879	87063	208217	12121	39011	9416	85676	7633995
13	85608	121629	275239	72308	12596	152527	17760	23537	334205	407162	270145	61948	3047874	33094	173398	3509693	123393	44512	26809	3998072	102804	107740	14251	57062	21230	113440	13201814
14	14060	36107	24668	1127	1286	4203	3933	2928	138880	84758	43635	6635	162650	2440804	2781859	801012	1422159	20409	3344	413337	28220	5911	2012	12469	2781	22753	8482940
15	102289	157480	202062	60506	13730	26373	15256	7838	136048	271681	203117	45604	286390	517042	4146447	4443526	1446434	287347	251634	1146581	123706	30037	9416	59422	21005	194033	14205154
16	833893	1411460	982136	44796	98232	164051	101016	20288	471445	761266	1709569	251744	513201	148825	488836	43394356	3006342	181757	150681	1655818	1130759	269017	89624	526966	143906	102328	59552215
17	259100	214635	152954	7048	15604	29567	15575	3158	83021	116521	263054	47465	64498	25271	101845	1389868	3919090	30524	24440	160231	247017	169887	24089	85239	127933	324575	7908690
18	182333	36531	25160	1367	2412	55669	2658	523	54095	42707	38234	5726	17140	4352	39502	343436	87482	228880	21992	19013	33159	79610	9146	19611	26193	238859	1615980
19	300173	188563	409313	21001	17983	325789	224064	38477	333394	980522	377071	237493	741439	1021535	1480277	1286994	577184	104570	5341687	181436	53087	406050	480135	710622	1698514	1226510	19042954
20	3431	627274	10738	458	930	2601	2466	379	5432	13171	12008	2813	7786	2135	5294	2654807	6909	1177	177961	167492	145307	116844	36216	2133756	56587	3067153	10812974
21	758193	1792483	1340554	60206	126172	209662	132518	27530	537045	1073559	2287260	325696	494374	180854	579525	10399249	707125	116760	191415	839004	1661311	496173	198340	1014003	406100	147435	27367287
22	455763	664741	830981	22568	39204	213598	308097	54093	426717	885922	843783	193986	717036	191451	564366	3859792	556157	65693	172042	1221911	1324928	1397406	368130	2492796	926342	187347	33263962
23	75630	135006	205788	5822	22374	51049	24175	6085	79412	163337	186426	40470	103167	33887	119513	1052536	155120	17763	110089	403413	776730	4139181	1342664	1028714	1254689	677349	12300490
24	278326	41553	117837	4892	37956	105294	64802	14258	176527	862382	36831	59517	134283	736743	183733	250478	146366	34768	56193	626185	1007198	2751044	2697418	9298786	1598814	738347	22061530
25	122373	459296	132105	6994	28225	53424	26300	8313	91774	290136	292943	45410	140678	22757	17792	570100	279007	21943	1533149	2300723	970025	1109449	1952112	9767882	2660311	23394322	5112795
26	3453	35659	11712	518	22744	2750	1780	682	11763	18975	7078	2458	10466	1686	7877	64547	29990	2131	75771	140261	197574	244028	757755	314205	339664	1982836	5327295
27	995407	9433636	32660254	995671	1459282	4057820	4208385	781576	8966968	18816741	21966019	7815668	10425410	6291559	12625211	85445793	14363858	1428273	1138963	16035174	11370223	30711678	7443607	20681250	18553873	29155885	386601483
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	60217	41325	128679	22739	44535	13474	15141	1578	40788	196594	60640	98741	43393	15315	27232	59533	2655672	5647	77767	99302	51582	108182	3452	5946	269147	10903	4157622
31	391289	1441	19994	12158	5595	16775	3202	1099	36365	71313	382020	10260	57125	10481	52983	119725	331622	4629	833	77147	29643	3094	60960	5568	3081	1707370	
32	2187570	2243188	5710408	442702	551616	1800372	685630	214818	2896556	8285313	10005758	1415992	4961911	2988802	7559575	85640873	7370463	1456177	7384679	1797906	3450799	892620	684531	4432610	4442022	170203966	
33	17438437	35316963	6080318	345126	616146	2064108	1995329	271045	4613446	9400507	2292579	1913332	4826280	1664241	3715119	28703498	2267081	1423314	7866737	7625332	25645761	11363501	8211022	28099257	15125278	17029344	245628844
34	29672919	47036553	44599653	1818396	2677174	7952549	6907688	1270115	16554123	36670526	34707015	11255993	20314120	10970399	23977421	199969343	26848696	3522062	20769976	31216433	38869820	45663822	16553794	49531704	38393076	40635836	80835286

Appendix 12
The Leontief inverse matrices for Malaysia
1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	1.029648	0.006723	0.444593	0.05995	0.11119	0.007624	0.393458	0.141646	0.007708	0.028025	0.002528	0.606364	0.019303	0.012212	0.007792	0.005834	0.020358	0.018792	0.005712	0.041391	0.011695	0.020773	0.003735	0.004083	0.128623	0.017895	3.157656	
2	0.005267	1.013856	0.008132	0.010981	0.003081	0.006766	0.008212	0.013503	0.005535	0.013662	0.23999	0.007408	0.053996	0.076568	0.076427	0.017213	0.008234	0.021541	0.06469	0.078493	0.007851	0.01573	0.00338	0.0042	0.009011	0.008687	2.182915	
3	0.045919	0.002174	1.233155	0.116944	0.008508	0.0063	0.020184	0.011088	0.00438	0.026778	0.001056	0.029291	0.004776	0.002242	0.003389	0.002781	0.002065	0.009187	0.002809	0.005751	0.006812	0.00659	0.001238	0.001548	0.080528	0.013653	1.649116	
4	8.91E-05	0.000233	0.000456	1.002235	0.000452	0.000254	0.000259	0.000463	0.000427	0.000539	0.000107	0.000203	0.000358	0.000195	0.000325	0.00024	0.00012	0.000495	0.000284	0.00041	0.00064	0.000748	0.000134	0.000171	0.010893	0.000839	1.02157	
5	0.000208	4.17E-05	0.000159	0.000145	1.020912	0.00015	0.00013	0.000186	0.000178	0.000571	3.74E-05	0.000218	0.000354	7.13E-05	0.000156	0.000185	4.84E-05	0.000233	0.000125	0.000161	4.96E-05	0.000132	2.08E-05	1.75E-05	0.000122	5.79E-05	1.024671	
6	0.001165	0.000499	0.004608	0.004028	0.001652	1.323227	0.001172	0.004246	0.00745	0.002083	0.000238	0.006818	0.004905	0.000565	0.002582	0.002266	0.001015	0.036623	0.001704	0.001144	0.000915	0.003032	0.001964	0.000241	0.002626	0.006534	1.423301	
7	0.001507	0.002388	0.001713	0.005828	0.001315	0.001957	1.096774	0.327182	0.002839	0.005629	0.000733	0.002991	0.005365	0.002385	0.003048	0.001825	0.003738	0.015525	0.001977	0.078823	0.002195	0.002	0.002821	0.003657	0.00335	0.005081	1.582636	
8	4.86E-05	8.37E-05	9.51E-05	0.000223	0.00018	0.000115	0.000116	1.018499	0.002607	0.000185	3.64E-05	0.000121	0.000159	8.58E-05	0.00031	0.001211	0.000111	0.000246	9.34E-05	0.000662	0.000206	0.000136	7.57E-05	7.86E-05	0.000643	0.000222	1.026549	
9	0.002841	0.005635	0.0098	0.022468	0.051466	0.011101	0.005859	0.013136	1.113036	0.024979	0.002928	0.007508	0.017741	0.005047	0.014996	0.011514	0.003526	0.025668	0.007702	0.010803	0.04699	0.00762	0.005645	0.006999	0.014221	0.013143	1.462372	
10	0.024781	0.002386	0.013404	0.009853	0.006287	0.010588	0.022933	0.046785	0.018411	1.077414	0.002385	0.028094	0.040507	0.005296	0.012781	0.011189	0.009625	0.011979	0.002467	0.023352	0.003042	0.002891	0.001922	0.001548	0.015206	0.006029	1.412317	
11	0.016088	0.035641	0.021031	0.022744	0.008458	0.023502	0.026109	0.02307	0.016024	0.309553	1.039974	0.023431	0.071998	0.024378	0.015005	0.010359	0.005866	0.014913	0.268181	0.039533	0.023372	0.060411	0.009351	0.00377	0.026068	0.017395	1.868626	
12	0.002317	0.002755	0.002377	0.001631	0.001565	0.003754	0.003207	0.011132	0.001861	0.00228	0.000919	1.039321	0.003132	0.002467	0.002074	0.002456	0.02982	0.002384	0.002177	0.00498	0.004615	0.02025	0.00169	0.000548	0.006806	0.002115	1.158634	
13	0.003965	0.002712	0.012202	0.088705	0.010313	0.009657	0.005159	0.035431	0.011299	0.027521	0.001743	0.007186	1.043472	0.003454	0.005843	0.010412	0.003283	0.021996	0.003668	0.055846	0.015712	0.002565	0.00491	0.004407	0.005191	0.006408	1.443058	
14	0.002259	0.005743	0.005716	0.005589	0.001385	0.001847	0.003663	0.014509	0.002631	0.004816	0.002898	0.002825	0.004407	1.042823	1.150782	0.031665	0.01481	0.037852	0.005378	0.07577	0.002878	0.002803	0.002595	0.003788	0.00529	0.005969	1.450689	
15	0.004083	0.00163	0.02248	0.018844	0.001575	0.001265	0.003631	0.00395	0.002201	0.012459	0.006125	0.003853	0.003435	0.002595	0.029557	0.003069	0.003513	0.003052	0.003958	0.029198	0.004309	0.001631	0.00284	0.001764	0.00302	1.178209	1.354266	
16	0.005888	0.009694	0.006428	0.009095	0.003262	0.005211	0.010834	0.007044	0.006808	0.0066	0.005498	0.008745	0.009251	0.009663	0.012749	1.088825	0.010969	0.042101	0.012764	0.035729	0.004248	0.00597	0.011174	0.004294	0.012029	0.009392	1.354266	
17	0.00173	0.00138	0.001874	0.001591	0.001584	0.000952	0.002955	0.002191	0.001133	0.001367	0.000553	0.000729	0.001915	0.001054	0.001071	0.000948	1.004162	0.000317	1.250462	0.000635	0.000743	0.001061	0.000865	0.001054	0.000847	0.002051	0.003089	1.286565
18	0.000257	0.000447	0.000634	0.00159	0.001747	0.008654	0.000506	0.0019	0.003979	0.001396	0.000201	0.000729	0.001063	0.000447	0.000815	0.001108	0.000317	1.250462	0.000635	0.000743	0.001061	0.000865	0.001054	0.000847	0.002051	0.003089	1.286565	
19	0.004342	0.02684	0.013145	0.024236	0.007807	0.042091	0.018494	0.02935	0.022223	0.032215	0.014146	0.017687	0.054308	0.021354	0.01678	0.014645	0.005877	0.025166	1.010911	0.01756	0.020021	0.010313	0.016307	0.008197	0.051983	0.019167	1.542456	
20	0.002741	0.008701	0.004104	0.005045	0.002393	0.004628	0.005245	0.006516	0.005985	0.004917	0.002746	0.005211	0.00649	0.005515	0.004793	0.003675	0.001291	0.006555	0.017988	1.012884	0.017549	0.006727	0.011365	0.004344	0.010011	0.051229	1.257754	
21	0.027178	0.027034	0.059444	0.066631	0.00738	0.082683	0.037462	0.083024	0.094688	0.008126	0.020768	0.063629	0.075386	0.037334	0.087613	1.09286	0.025366	0.16118	0.096706	0.091311	1.027198	0.045861	0.013312	0.007867	0.064176	0.02707	2.557569	
22	0.006797	0.013578	0.032996	0.022469	0.034527	0.016676	0.062354	0.047054	0.017624	0.018108	0.008792	0.019991	0.019874	0.014645	0.016825	0.016492	0.012755	0.020149	0.019333	0.0313	0.03187	1.077331	0.009976	0.003223	0.020002	0.019854	1.610043	
23	0.001542	0.002158	0.003497	0.005401	0.003557	0.00594	0.004542	0.007464	0.010109	0.005903	0.001103	0.003841	0.005523	0.00252	0.005228	0.006226	0.001947	0.011356	0.007431	0.005435	0.0194	0.010486	1.016163	0.00991	0.020616	0.010436	1.187733	
24	0.003572	0.009725	0.009359	0.013969	0.008299	0.016993	0.014752	0.026545	0.015491	0.014752	0.004211	0.009345	0.016541	0.009376	0.01525	0.011597	0.005711	0.023545	0.01129	0.02527	0.048098	0.034771	0.002912	1.050156	0.038779	0.012064	1.456363	
25	0.007113	0.021516	0.021175	0.054282	0.041875	0.022372	0.023151	0.042054	0.038728	0.049447	0.009642	0.017297	0.032593	0.017684	0.029201	0.020585	0.010379	0.044036	0.024832	0.036769	0.06001	0.060911	0.012286	0.015341	1.053391	0.05073	1.81731	
26	0.00053	0.001141	0.002066	0.00236	0.001605	0.002815	0.001834	0.003975	0.003592	0.002673	0.00053	0.002052	0.002877	0.00172	0.003027	0.002304	0.001077	0.003504	0.001502	0.00405	0.010905	0.005243	0.000477	0.001957	0.005579	1.001835	1.07123	
SUM	1.204873	1.204812	1.934643	1.576856	1.382367	1.617125	1.772993	1.921945	1.420946	1.478517	1.367643	1.91592	1.499588	1.701697	1.528818	1.388612	1.185985	1.809867	1.575409	1.739944	1.367607	1.423414	1.138299	1.182287	1.601579	1.314752	98.2535	

1983

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	1.065242	0.00379	0.505865	0.078424	0.079794	0.026645	0.35418	0.133398	0.006687	0.019523	0.002575	0.571023	0.018987	0.015588	0.007755	0.005761	0.015731	0.016585	0.004377	0.035072	0.007877	0.011725	0.002747	0.004438	0.09161	0.019183	3.104582	
2	0.012076	1.01981	0.017706	0.018453	0.006613	0.019482	0.018026	0.018941	0.011125	0.022218	0.458477	0.016453	0.072619	0.365946	0.066001	0.013953	0.008225	0.017604	0.117521	0.065684	0.01604	0.030387	0.005934	0.004952	0.013519	0.011193	2.448958	
3	0.077539	0.001844	1.460839	0.180935	0.010773	0.008027	0.028434	0.01399	0.004472	0.013993	0.001439	0.040437	0.004841	0.003498	0.003564	0.002829	0.002278	0.007687	0.003255	0.007098	0.00629	0.005151	0.001927	0.002445	0.073811	0.016567	1.986664	
4	0.000158	0.000185	0.000572	1.006165	0.000661	0.000336	0.000333	0.000484	0.000433	0.000436	0.000139	0.00026	0.000342	0.000241	0.000316	0.000236	0.000116	0.006697	0.000313	0.000534	0.00047	0.00057	0.000219	0.000259	0.009229	0.000986	1.024688	
5	0.000242	8.08E-05	0.000326	0.000275	1.019398	0.000389	0.000257	0.000333	0.000811	0.000112	0.000355	0.000419	0.000419	0.000252	0.000369	0.000408	0.000106	0.000381	0.000437	0.000354	0.000105	0.000316	5.23E-05	4.47E-05	0.000224	0.000101	1.026476	
6	0.000684	0.000421	0.002892	0.003091	0.002918	1.256801	0.001072	0.024981	0.005255	0.002713	0.000347	0.002896	0.002783	0.00127	0.001488	0.012844	0.003384	0.015642	0.001361	0.001427	0.000837	0.001609	0.000724	0.000367	0.003121	0.004893	1.562277	
7	0.001771	0.001542	0.002027	0.006668	0.00194	0.002524	1.103631	0.331758	0.004263	0.007233	0.000926	0.005813	0.006186	0.002591	0.006414	0.00341	0.002978	0.012072	0.019176	0.080342	0.002275	0.001999	0.001007	0.003831	0.003007	0.004462	1.602646	
8	6.28E-05	7.03E-05	0.000108	0.000333	0.000112	0.000214	0.000139	1.005862	0.000124	0.000301	4.92E-05	0.000272	0.000283	0.000136	0.000211	0.00215	8.65E-05	0.000305	9.2E-05	0.000885	0.000107	8.61E-05	0.000209	8.72E-05	0.000427	0.000149	1.012962	
9	0.003809	0.003507	0.010574	0.039522	0.043414	0.013004	0.006598	0.012296	1.097926	0.015996	0.002988	0.007608	0.018394	0.005217	0.012347	0.009041	0.002959	0.024702	0.007065	0.011454	0.033543	0.007555	0.01249	0.012683	0.019799	0.012115	1.446607	
10	0.031786	0.005207	0.021047	0.015432	0.006961	0.02163	0.031351	0.029372	0.02904	1.151222	0.006576	0.038224	0.047727	0.008375	0.016582	0.012795	0.01254	0.019922	0.006695	0.020644	0.005629	0.005999	0.002625	0.002011	0.015164	0.007985	1.572539	
11	0.02389	0.029197	0.03081	0.024885	0.010659	0.040223	0.035469	0.024067	0.016592	0.030772	1.048225	0.031013	0.056463	0.028007	0.018619	0.012257	0.007083	0.015991	0.263137	0.031764	0.030723	0.065074	0.011172	0.005064	0.024714	0.017433	1.933303	
12	0.002786	0.002151	0.002227	0.001207	0.001	0.003405	0.001962	0.019755	0.001019	0.004759	0.001185	1.043404	0.002232	0.001597	0.001179	0.002999	0.024457	0.002755	0.001119	0.005014	0.003162	0.011485	0.000498	0.000421	0.003614	0.001995	1.473388	
13	0.003724	0.001314	0.011664	0.060148	0.005748	0.009539	0.006308	0.024668	0.008759	0.023956	0.001708	0.009688	1.074186	0.004078	0.013057	0.017381	0.005915	0.018779	0.003328	0.093405	0.009994	0.001906	0.001321	0.004585	0.004407	0.005538	1.424204	
14	0.002626	0.00498	0.008561	0.011912	0.00195	0.002943	0.004314	0.019995	0.008424	0.005349	0.006221	0.005298	0.007759	1.088183	0.174279	0.02309	0.014249	0.028301	0.006514	0.069739	0.00339	0.002624	0.001544	0.003696	0.00475	0.005058	1.516247	
15	0.002954	0.002022	0.015941	0.02183	0.001433	0.001859	0.002732	0.07417	0.00252	0.008392	0.004367	0.007414	0.004984	0.01272	1.057862	0.005379	0.00651	0.00837	0.004267	0.029804	0.002822	0.001357	0.001096	0.001696	0.002905	0.002499	1.221155	
16	0.003107	0.005756	0.006361	0.008273	0.004062	0.005868	0.005416	0.008858	0.005879	0.00619	0.004975	0.00719	0.011863	0.009243	0.013643	1.050882	0.006531	0.011781	0.007457	0.03375	0.004414	0.003797	0.009927	0.003302	0.019289	0.006694	1.264508	
17	0.001744	0.002466	0.00382	0.003394	0.00229	0.003099	0.003769	0.003616	0.002148	0.002776	0.001674	0.003227	0.00518	0.002973	0.00524	0.002574	1.1134	0.00618	0.001618	0.003914	0.002376	0.020145	0.000745	0.000734	0.012218	0.00236	1.21368	
18	0.000309	0.000143	0.000561	0.001042	0.001113	0.01391	0.000602	0.001612	0.002618	0.000642	0.000144	0.000597	0.00102	0.000365	0.000737	0.001009	0.000352	1.025107	0.000517	0.000521	0.000778	0.000481	0.000719	0.002129	0.00153	0.002431	1.060988	
19	0.007653	0.015247	0.022033	0.032412	0.013346	0.063981	0.027677	0.031123	0.02806	0.028733	0.011958	0.02867	0.072557	0.033344	0.025971	0.021395	0.009851	0.032859	1.025056	0.018608	0.022426	0.010137	0.036145	0.012238	0.04903	0.024116	1.704624	
20	0.004708	0.006039	0.006017	0.005511	0.003173	0.005905	0.01058	0.008526	0.006938	0.004845	0.003599	0.006249	0.007835	0.005462	0.005487	0.003443	0.001879	0.005777	0.015475	1.006827	0.01778	0.005263	0.008168	0.044436	0.010469	0.04554	1.255934	
21	0.032968	0.016738	0.065304	0.061363	0.05125	0.081027	0.050086	0.074091	0.078599	0.079007	0.02306	0.055945	0.067822	0.058424	0.088101	0.095889	0.023092	0.091213	0.10683	0.081499	1.021361	0.036545	0.012219	0.009721	0.049627	0.020735	2.435568	
22	0.014608	0.047903	0.04916	0.022208	0.029341	0.020119	0.043605	0.02985	0.019477	0.033342	0.027009	0.023445	0.02997	0.031563	0.022956	0.019075	0.012248	0.019618	0.029095	0.047674	0.066307	0.080695	0.005708	0.004834	0.024867	0.021746	1.777424	
23	0.002382	0.001694	0.004368	0.005494	0.003316	0.005553	0.005222	0.007083	0.009615	0.004932	0.001318	0.004079	0.00409	0.003558	0.00537	0.005036	0.00274	0.008104	0.004405	0.008306	0.004405	0.018185	0.00811	1.017725	0.013582	0.017165	0.009119	1.180852
24	0.006083	0.007638	0.014263	0.014038	0.012372	0.021102	0.019032	0.027803	0.024326	0.017776	0.005429	0.012605	0.020129	0.012842	0.018969	0.010521	0.010836	0.022824	0.010523	0.022759	0.043069	0.028275	0.006499	1.047472	0.043273	0.016462	1.496923	
25	0.013026	0.018468	0.027268	0.074706	0.068316	0.030131	0.03184	0.047634	0.041801	0.035916	0.013199	0.022887	0.032047	0.021939	0.028325	0.018988	0.0108	0.036208	0.026812	0.05244	0.049519	0.046949	0.023064	0.027663	1.083699	0.06314	1.946485	
26	0.00056	0.000676	0.002021	0.002316	0.001607	0.003605	0.002062	0.003841	0.003426	0.002149	0.000494	0.002365	0.002892	0.002966	0.003296	0.001734	0.001343	0.00271	0.001363	0.008758	0.005328	0.002312	0.000723	0.002352	0.0057	1.003936	1.070538	
SUM	1.3165	1.198889	2.292337	1.701038	1.38356	1.661319	1.794695	1.914451	1.41986	1.52682	1.628194	1.954216	1.574511	1.720377	1.598141	1.355078	1.299547	1.452176	1.65046	1.737976	1.378006	1.39055	1.165208	1.215043	1.587168	1.326438	40.23222	

1991

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	1.066708	0.00303	0.434959	0.049982	0.074145	0.003914	0.565376	0.186976	0.067722	0.020631	0.003386	0.452588	0.012751	0.004576	0.005503	0.002541	0.013276	0.0054	0.0048	0.022535	0.005781	0.013064	0.003613	0.003945	0.069844	0.013379	3.04943
2	0.010445	1.071745	0.015243	0.014185	0.00692	0.007379	0.016308	0.013093	0.009752	0.09562	0.704523	0.017805	0.050295	0.045535	0.052235	0.005135	0.005625	0.008114	0.085797	0.042589	0.010446	0.030571	0.005126	0.003043	0.008969	0.011713	2.29361
3	0.089635	0.002303	1.455568	0.140415	0.009256	0.003517	0.051165	0.023062	0.004525	0.035947	0.002869	0.040802	0.007854	0.003506	0.003392	0.00224	0.003363	0.004115	0.004003	0.005475	0.004892	0.007762	0.003116	0.003055	0.059651	0.015398	1.98751
4	0.000383	0.000197	0.000426	1.00416	0.000268	0.000185	0.000415	0.000365	0.000292	0.000409	0.000215	0.000336	0.000323	0.000226	0.000227	0.000136	0.00016	0.000233	0.000315	0.000262	0.000376	0.001201	0.000316	0.000268	0.005682	0.000727	1.0181
5	0.000119	0.000113	0.000478	0.000991	1.091418	0.000317	0.000317	0.000782	0.004906	0.000431	0.000137	0.000533	0.000875	0.000165	0.000395	0.000315	0.000154	0.000658	0.000102	0.000213	0.000551	0.000825	6.91E-05	9.44E-05	0.000182	0.000187	1.0533
6	0.000519	0.00034	0.002064	0.001159	0.002296	1.142799	0.00175	0.009174	0.002246	0.000803	0.000456	0.013823	0.001932	0.000995	0.001319	0.0011	0.002788	0.006414	0.000515	0.000749	0.000915	0.001827	0.001991	0.000409	0.001654	0.003942	1.20388
7	0.002045	0.00062	0.00164	0.001846	0.00096	0.000795	1.093736	0.183079	0.001733	0.00274	0.000728	0.00364	0.002442	0.001439	0.001641	0.000557	0.001434	0.002419	0.001402	0.035332	0.00115	0.001515	0.000679	0.00128	0.001605	0.003461	1.35092
8	0.000124	0.000106	0.000175	0.000182	0.000336	0.00126	0.001069	1.022774	0.000335	0.000159	0.00012	0.000283	0.000236	0.000154	0.000187	0.000162	0.000173	0.000293	0.000148	0.000605	0.000276	0.000285	0.000189	0.000125	0.001601	0.000628	1.03184
9	0.006611	0.00538	0.01433	0.022186	0.009359	0.011819	0.013017	0.021794	1.104299	0.01289	0.00721	0.014941	0.021751	0.008556	0.012447	0.009564	0.006897	0.018689	0.00856	0.01164	0.033849	0.009008	0.00801	0.01567	0.051332	0.016144	1.53036
10	0.026667	0.002643	0.023456	0.016254	0.007707	0.010414	0.027232	0.036489	0.021981	1.082026	0.006986	0.022008	0.072174	0.005367	0.023883	0.007387	0.011525	0.021375	0.006732	0.016135	0.00251	0.004068	0.001381	0.00153	0.012107	0.006837	1.47737
11	0.011592	0.008104	0.016302	0.010691	0.007478	0.008976	0.019485	0.012804	0.010864	0.012238	1.07257	0.019637	0.024281	0.017544	0.01125	0.004691	0.00487	0.006823	0.128203	0.019946	0.01461	0.004725	0.00686	0.003007	0.01089	0.013333	1.52101
12	0.001247	0.001054	0.001481	0.00096	0.000942	0.001717	0.001702	0.017191	0.000982	0.00065	0.001138	1.087073	0.002674	0.00106	0.001616	0.001202	0.025404	0.002245	0.00075	0.001391	0.001448	0.0013691	0.000712	0.000334	0.00247	0.003216	1.74935
13	0.003523	0.001528	0.016405	0.1052	0.03474	0.01181	0.020413	0.034107	0.014404	0.013574	0.005085	0.013192	1.099457	0.023819	0.025955	0.013052	0.025859	0.036093	0.00428	0.106313	0.002832	0.004428	0.002336	0.003723	0.004462	0.010536	1.63713
14	0.001195	0.001231	0.003975	0.010256	0.002494	0.00116	0.002616	0.006954	0.001767	0.00198	0.003096	0.002774	0.009439	1.15688	0.121245	0.011567	0.013788	0.004542	0.003329	0.065427	0.001435	0.002208	0.001152	0.002124	0.002267	0.005999	1.44085
15	0.004816	0.002203	0.024012	0.075942	0.006107	0.00211	0.007571	0.023739	0.00532	0.009332	0.018362	0.008409	0.007697	0.045696	1.121321	0.019423	0.008606	0.009176	0.008788	0.04429	0.002965	0.00375	0.00174	0.001916	0.004095	0.007322	1.47471
16	0.010136	0.010581	0.016089	0.014479	0.022361	0.010545	0.020588	0.02952	0.013189	0.010697	0.011053	0.015694	0.022023	0.020746	0.028014	1.10869	0.027622	0.021178	0.006332	0.041898	0.006374	0.013937	0.011544	0.003634	0.011631	0.008521	1.59708
17	0.006361	0.005576	0.009179	0.006827	0.004853	0.004297	0.011872	0.009225	0.005133	0.004609	0.006342	0.008586	0.009522	0.006824	0.00809	0.007566	1.153383	0.004833	0.003176	0.011944	0.005168	0.007135	0.003416	0.002553	0.008939	0.028929	1.40434
18	0.002262	0.002433	0.002581	0.002355	0.001391	0.005593	0.003825	0.003525	0.002825	0.001827	0.002308	0.002864	0.003821	0.001803	0.002213	0.001444	0.001071	1.025694	0.001461	0.002488	0.001799	0.003045	0.00295	0.001385	0.008021	0.006366	1.0977
19	0.008815	0.007458	0.025529	0.030064	0.016036	0.032121	0.02773	0.034018	0.024109	0.040121	0.016045	0.032902	0.062463	0.061496	0.027791	0.017684	0.012924	0.026212	1.049883	0.019095	0.050844	0.013641	0.031568	0.011774	0.031524	0.032774	1.74832
20	0.003063	0.002866	0.005493	0.005303	0.003887	0.004309	0.008215	0.007801	0.005896	0.004906	0.003708	0.005679	0.007832	0.006071	0.005191	0.00341	0.002741	0.005235	0.027654	1.007168	0.011968	0.009333	0.010866	0.028692	0.008968	0.057921	1.25379
21	0.06786	0.019013	0.072934	0.083903	0.073802	0.068853	0.061491	0.086514	0.084514	0.058113	0.063288	0.070385	0.083326	0.147951	1.111159	1.118028	0.078842	0.153412	0.071139	0.089055	1.030929	0.048183	0.017385	0.012662	0.052945	0.048273	2.84288
22	0.013508	0.021046	0.053556	0.022898	0.04852	0.017187	0.051989	0.030308	0.020252	0.018033	0.026096	0.033397	0.033854	0.030047	0.029059	0.015382	0.04874	0.024651	0.019671	0.032853	0.051305	1.114901	0.016164	0.007802	0.022838	0.048936	1.80546
23	0.002642	0.002532	0.00539	0.005036	0.005575	0.006206	0.006752	0.009102	0.010044	0.004861	0.003576	0.006506	0.007321	0.005782	0.006545	0.005406	0.003415	0.007315	0.006307	0.008499	0.017879	0.01133	0.019123	0.024783	0.022024	0.015795	1.31254
24	0.006895	0.010138	0.016088	0.017004	0.02966	0.018803	0.02129	0.025043	0.025225	0.013976	0.013794	0.01937	0.021799	0.019672	0.019497	0.012391	0.01055	0.019447	0.015808	0.01732	0.058184	0.050785	0.021848	1.051149	0.032539	0.024851	1.59293
25	0.029169	0.030462	0.03682	0.02601	0.036094	0.026443	0.044415	0.049108	0.043778	0.039339	0.031158	0.036115	0.04394	0.029507	0.039403	0.017025	0.022061	0.030259	0.049604	0.036447	0.054771	0.066275	0.041076	0.04423	1.059554	0.082511	2.02827
26	0.001143	0.001306	0.002495	0.001725	0.002121	0.001901	0.002257	0.002821	0.002519	0.001749	0.001521	0.003623	0.002704	0.002209	0.002063	0.001158	0.001255	0.001971	0.008892	0.003063	0.005101	0.002867	0.001816	0.002126	0.00305	1.003347	1.06683
SUM	1.346411	1.159731	2.56472	1.670012	1.57506	1.404379	2.082596	1.878554	1.427611	1.479051	2.005772	1.932915	1.612784	1.648427	1.654169	1.387357	1.45266	1.446707	1.577681	1.64273	1.738359	1.540361	1.297845	1.231311	1.462644	1.550946	41.0425

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	1.195579	0.002239	0.383802	0.051303	0.145292	0.018376	0.521532	0.144051	0.045288	0.091825	0.003379	0.1936	0.013738	0.00646	0.010245	0.006159	0.009254	0.011382	0.0078	0.020361	0.006698	0.012967	0.003855	0.002914	0.084011	0.012861	2.904951
2	0.020726	1.012098	0.024998	0.009625	0.007168	0.008982	0.017241	0.009962	0.012248	0.037867	0.303028	0.017754	0.041065	0.017901	0.009073	0.002771	0.004842	0.006354	0.0315	0.033274	0.004173	0.029545	0.003909	0.003114	0.010499	0.008866	1.687681
3	0.090441	0.00252	1.588741	0.156419	0.016647	0.010633	0.048216	0.019086	0.011129	0.12113	0.004194	0.022653	0.010437	0.007123	0.005598	0.003713	0.004974	0.007148	0.009992	0.00856	0.007811	0.014829	0.004682	0.003464	0.113455	0.025943	2.320436
4	0.000295	0.000148	0.001266	1.08687	0.000264	0.000344	0.000346	0.000276	0.000398	0.002599	0.000168	0.000342	0.000345	0.0003	0.000241	0.00015	0.000208	0.000272	0.000617	0.000357	0.000524	0.000928	0.000308	0.000264	0.007361	0.000734	1.105925
5	4.07E-06	4.75E-06	1.18E-05	7.97E-06	1.049897	7.29E-06	7.54E-06	6.96E-06	1.54E-05	8.95E-06	4.37E-06	8.8E-06	7.63E-06	9E-06	7.06E-06	4.53E-06	6.28E-06	8.13E-06	2.37E-05	1.11E-05	1.05E-05	1.53E-05	8.75E-06	1.22E-05	3.66E-05	1.62E-05	1.050162
6	0.001322	0.000273	0.001292	0.000958	0.000474	1.187056	0.001137	0.022963	0.002669	0.000973	0.000276	0.005255	0.001807	0.000831	0.001557	0.00165	0.023253	0.002905	0.000897	0.002081	0.000628	0.002047	0.001016	0.000695	0.002384	0.004961	1.27156
7	0.00294	0.000285	0.001672	0.001357	0.000687	0.000637	1.058733	0.092849	0.014446	0.00087	0.000261	0.001228	0.00128	0.001601	0.002137	0.004553	0.005239	0.003154	0.000637	0.021613	0.000546	0.000643	0.000636	0.000455	0.00132	0.001676	1.221453
8	0.000154	8.91E-05	0.00017	0.000243	0.000103	0.000347	0.000235	1.073885	0.001161	0.00014	8.51E-05	0.001049	0.000514	0.00024	0.000278	0.001173	0.000992	0.000731	0.000295	0.000575	0.000107	0.000278	0.000233	0.000104	0.000496	0.000189	1.083775
9	0.003324	0.002518	0.023882	0.041323	0.007594	0.012885	0.013186	0.018226	1.206927	0.014649	0.002428	0.012605	0.018904	0.006549	0.014589	0.005467	0.007032	0.018451	0.006859	0.005354	0.01814	0.004156	0.003271	0.010337	0.016412	0.016536	1.505279
10	0.035811	0.002965	0.02778	0.039106	0.005906	0.059537	0.03297	0.024487	0.033382	1.175717	0.022737	0.034602	0.059711	0.024073	0.017116	0.013883	0.017617	0.023398	0.005832	0.017739	0.001773	0.006871	0.002232	0.001289	0.001948	0.005771	1.695678
11	0.07028	0.009425	0.082002	0.022864	0.018569	0.021478	0.054913	0.02582	0.034329	0.081403	1.091835	0.048124	0.046905	0.026739	0.017298	0.006542	0.010424	0.012994	0.091952	0.022001	0.008918	0.094514	0.006043	0.00544	0.024457	0.017358	1.552626
12	0.005067	0.000534	0.002412	0.001444	0.001153	0.00556	0.003321	0.005625	0.001025	0.001549	0.00354	1.203656	0.002871	0.00285	0.007882	0.000987	0.009572	0.003008	0.001095	0.00388	0.00043	0.010698	0.000514	0.000287	0.002413	0.00157	1.279758
13	0.007331	0.001125	0.011871	0.063688	0.001937	0.042726	0.006134	0.054377	0.005013	0.008404	0.001416	0.009992	1.112273	0.017202	0.005949	0.005898	0.023516	0.022632	0.004141	0.129258	0.001985	0.003392	0.001377	0.001499	0.005348	0.002815	1.551299
14	0.001647	0.001001	0.002261	0.00846	0.000819	0.001886	0.002093	0.009709	0.002324	0.003108	0.000787	0.004202	0.003562	1.175592	0.095505	0.006127	0.015835	0.056029	0.002635	0.087837	0.001166	0.00169	0.00116	0.00091	0.002712	0.001802	1.490859
15	0.002427	0.001703	0.011726	0.084053	0.001137	0.003939	0.009496	0.027051	0.006012	0.011599	0.00246	0.008327	0.009816	0.022835	1.094116	0.019394	0.009709	0.025821	0.006971	0.038482	0.001123	0.002819	0.003263	0.000943	0.004876	0.002242	1.41234
16	0.009237	0.011569	0.012529	0.038429	0.009644	0.015468	0.012182	0.016508	0.011496	0.013344	0.017094	0.017937	0.077937	0.079014	0.047301	0.017714	0.026773	0.032968	1.081657	0.029715	0.039465	0.026055	0.026516	0.027956	0.049959	0.038696	2.084678
17	0.007073	0.004141	0.004357	0.002192	0.002603	0.001752	0.005838	0.014248	0.002097	0.002733	0.001847	0.002961	0.001979	0.001981	0.001906	0.002224	1.248071	0.004171	0.004895	0.003931	0.003602	0.041969	0.002616	0.001064	0.006744	0.019044	1.396039
18	0.000593	0.002338	0.001298	0.00184	0.000911	0.013042	0.001127	0.00496	0.002119	0.001928	0.001013	0.001559	0.002527	0.001727	0.002259	0.001496	0.001407	1.046548	0.004221	0.001924	0.000939	0.00183	0.003574	0.004246	0.006355	0.008698	1.120478
19	0.013726	0.005503	0.079293	0.037436	0.022388	0.060768	0.044871	0.035637	0.054709	0.059241	0.021124	0.057251	0.077937	0.079014	0.047301	0.017714	0.026773	0.032968	1.081657	0.029715	0.039465	0.026055	0.026516	0.027956	0.049959	0.038696	2.084678
20	0.003142	0.002325	0.006121	0.007931	0.00449	0.006377	0.005529	0.004937	0.011885	0.009184	0.002556	0.011981	0.016758	0.00456	0.004648	0.001907	0.006297	0.006013	0.006363	1.007535	0.009566	0.004883	0.002312	0.005148	0.009291	0.00772	1.169557
21	0.051203	0.012083	0.07552	0.079127	0.060155	0.078737	0.064267	0.082698	0.092443	0.080332	0.056844	0.070531	0.070008	0.096203	0.078437	0.093772	0.091518	0.096905	0.04045	0.083761	0.012141	0.046607	0.026074	0.010339	0.051016	0.023648	2.624765
22	0.014587	0.018463	0.035264	0.016745	0.03411	0.016621	0.069065	0.046105	0.024614	0.025331	0.011483	0.022017	0.020897	0.018011	0.016207	0.010616	0.014168	0.019431	0.012438	0.032049	0.014385	1.151772	0.024313	0.007523	0.027654	0.023143	1.719951
23	0.003373	0.002159	0.006716	0.007208	0.010389	0.012052	0.006783	0.016414	0.012699	0.008769	0.003031	0.006644	0.011631	0.005418	0.009053	0.005117	0.006211	0.009993	0.012211	0.023102	0.020212	0.027615	0.040661	0.02991	0.001580	1.316494	
24	0.004045	0.003981	0.006797	0.005756	0.005187	0.009615	0.007701	0.009302	0.009855	0.009151	0.003792	0.007151	0.007183	0.008038	0.00635	0.004545	0.005616	0.006721	0.01647	0.024911	0.037683	0.019012	0.028788	1.074549	0.023994	0.017849	1.361444
25	0.016182	0.019266	0.030687	0.023533	0.031284	0.028724	0.030914	0.027286	0.038696	0.031217	0.015452	0.031723	0.028302	0.027986	0.005233	0.013948	0.021197	0.027377	0.082943	0.039423	0.069813	0.130815	0.038546	0.027505	1.083472	0.081576	2.02492
26	0.000693	0.000741	0.00141	0.000656	0.000891	0.000698	0.000928	0.000697	0.001017	0.000914	0.000475	0.002268	0.000762	0.000756	0.0006	0.000346	0.000516	0.000648	0.004381	0.001679	0.002108	0.001551	0.001692	0.003632	0.002646	1.014637	1.047343
SUM	1.461303	1.119497	2.423875	1.780395	1.439699	1.618249	2.010663	1.787255	1.637977	1.793986	1.568124	1.792138	1.576175	1.579819	1.509896	1.301797	1.598843	1.506252	1.461344	1.66975	1.256221	1.652199	1.305253	1.240971	1.598689	1.37151	41.06188

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	1.147975	0.010297	0.438573	0.079614	0.10185	0.097971	0.394795	0.248708	0.06339	0.056959	0.022958	0.080063	0.026132	0.010681	0.013702	0.018825	0.015076	0.016171	0.010459	0.026709	0.026419	0.010516	0.005655	0.007501	0.005591	0.018397	2.954985
2	0.012962	1.020715	0.023422	0.019974	0.016441	0.023465	0.02916	0.028284	0.01895	0.057579	0.288409	0.04173	0.04822	0.042448	0.03076	0.014295	0.022305	0.01874	0.084072	0.038834	0.011125	0.055835	0.013937	0.013231	0.027589	0.020069	2.02548
3	0.080434	0.015504	1.526707	0.150374	0.133205	0.024063	0.038652	0.03073	0.026557	0.105143	0.035775	0.03111	0.025614	0.016135	0.018499	0.026295	0.019954	0.019427	0.015327	0.018847	0.017072	0.014085	0.007634	0.009489	0.007443	0.025801	2.439875
4	0.000488	0.000501	0.001648	1.238887	0.00102	0.000549	0.000523	0.000543	0.00072	0.001012	0.001136	0.000828	0.000594	0.000482	0.000534	0.000816	0.000592	0.000563	0.00047	0.000541	0.000557	0.000479	0.000304	0.000375	0.000388	0.000836	1.25539
5	0.001095	0.001291	0.001922	0.060835	1.215807	0.001389	0.001273	0.001376	0.001605	0.001631	0.002634	0.001994	0.001445	0.001192	0.001319	0.001925	0.001484	0.001404	0.001155	0.001383	0.00145	0.001335	0.00095	0.001159	0.001016	0.001664	1.311732
6	0.002517	0.002389	0.003861	0.004082	0.006442	1.242016	0.003507	0.00345	0.032573	0.003355	0.004936	0.011178	0.004232	0.002407	0.003156	0.004329	0.00905	0.004948	0.002325	0.003384	0.002629	0.002467	0.001749	0.00182	0.001821	0.008586	1.37321
7	0.001442	0.001828	0.002332	0.002479	0.003759	0.002069	1.090606	0.293541	0.014481	0.002045	0.003091	0.002556	0.002332	0.001841	0.002413	0.003152	0.00308	0.005326	0.002881	0.035104	0.001783	0.00297	0.00149	0.002919	0.00132	0.005055	1.491894
8	0.000265	0.000448	0.000501	0.000658	0.001216	0.000457	0.001872	1.005935	0.008716	0.000481	0.000625	0.000587	0.000527	0.000469	0.000546	0.000698	0.000465	0.000927	0.000892	0.013857	0.000405	0.000943	0.000461	0.001005	0.000378	0.001799	1.045133
9	0.005649	0.00523	0.018639	0.043128	0.119236	0.016094	0.012659	0.024612	1.358264	0.014543	0.011413	0.024695	0.025269	0.011167	0.01859	0.014079	0.012923	0.029698	0.007326	0.011221	0.007543	0.015748	0.008957	0.010196	0.014667	0.028491	1.870638
10	0.05224	0.015393	0.040163	0.036767	0.28313	0.053875	0.033845	0.031025	0.046242	1.163055	0.062015	0.046526	0.118136	0.02763	0.044575	0.038595	0.043267	0.043766	0.023323	0.037456	0.05671	0.021633	0.009264	0.010883	0.010827	0.027936	2.082418
11	0.045114	0.074366	0.0822	0.067268	0.050834	0.085743	0.112139	0.107073	0.064247	2.230569	1.219426	0.158958	0.168303	0.159194	0.102745	0.040547	0.091717	0.059256	0.308751	0.101576	0.033945	0.0226923	0.051038	0.045776	0.109967	0.067569	3.852699
12	0.006669	0.006122	0.009723	0.009688	0.01048	0.034368	0.007168	0.007478	0.013432	0.010757	0.012916	1.850242	0.016287	0.007035	0.025008	0.011748	0.026121	0.009986	0.006014	0.008788	0.0066	0.016365	0.003996	0.004434	0.003318	0.008257	2.133002
13	0.008328	0.008428	0.018038	0.065402	0.015801	0.03407	0.010272	0.029555	0.03862	0.022255	0.018357	0.019408	1.184548	0.01193	0.016994	0.032674	0.015627	0.022824	0.014879	0.158797	0.007657	0.016621	0.006999	0.013274	0.005873	0.021844	1.819075
14	0.004189	0.003786	0.006135	0.013641	0.007177	0.005026	0.004507	0.007893	0.02016	0.008419	0.007304	0.006673	0.018729	1.300191	0.185095	0.014792	0.095608	0.027315	0.007001	0.029193	0.0038	0.00462	0.002372	0.003636	0.002529	0.007157	1.796149
15	0.010618	0.008641	0.016804	0.058612	0.016127	0.013092	0.010844	0.016192	0.021845	0.018476	0.017191	0.017512	0.02883	0.08186	1.226897	0.040274	0.091181	0.114051	0.027858	0.053658	0.00863	0.009953	0.005677	0.007948	0.006086	0.017244	1.94838
16	0.054956	0.051171	0.075342	0.066857	0.082804	0.054821	0.0528	0.053958	0.069437	0.061715	0.102256	0.07984	0.064564	0.047225	0.054011	1.29395	0.187527	0.089618	0.04599	0.094595	0.049763	0.042301	0.023345	0.031372	0.023264	0.058443	2.91926
17	0.014161	0.007754	0.013826	0.010791	0.013542	0.009785	0.010324	0.009801	0.011984	0.009803	0.015662	0.014316	0.009191	0.007433	0.009999	0.013171	1.175864	0.014623	0.007212	0.011523	0.010282	0.011509	0.005178	0.00537	0.008151	0.014425	1.445681
18	0.008125	0.001398	0.004613	0.002592	0.003118	0.010767	0.003908	0.003136	0.006217	0.002833	0.002648	0.002614	0.002361	0.007104	0.003201	0.003138	0.005394	1.070648	0.002553	0.002047	0.001766	0.003874	0.001709	0.001314	0.001811	0.007948	1.61434
19	0.025945	0.013243	0.037824	0.041591	0.03065	0.083896	0.065022	0.071432	0.056146	0.058399	0.034057	0.068055	0.077615	1.180021	0.134214	0.026647	0.065862	0.066292	1.346487	0.041453	0.033201	0.044238	0.062001	0.038012	0.090634	0.064887	2.857824
20	0.004384	0.016603	0.006574	0.005825	0.007571	0.008349	0.008752	0.009161	0.007723	0.008612	0.010261	0.008284	0.008794	0.014937	0.010015	0.021144	0.009029	0.007236	0.048945	1.014551	0.010917	0.04955	0.021829	0.060456	0.012982	0.090565	1.48305
21	0.044806	0.052727	0.076802	0.070669	0.085557	0.055974	0.051826	0.055336	0.066259	0.065925	0.109836	0.083276	0.058409	0.048795	0.053952	0.082208	0.060401	0.057732	0.047033	0.057099	1.057717	0.049335	0.031688	0.039827	0.032426	0.06235	2.557963
22	0.040394	0.034314	0.069188	0.050708	0.055067	0.0711	0.113916	0.111593	0.074579	0.068934	0.068479	0.072092	0.086193	0.062613	0.06681	0.053558	0.062724	0.052223	0.043682	0.093941	0.068092	1.478827	0.069293	0.107692	0.067798	0.100905	3.243615
23	0.011152	0.010266	0.020921	0.016213	0.024075	0.021781	0.021641	0.02373	0.02049	0.019731	0.020976	0.021186	0.021555	0.018956	0.019698	0.017555	0.020563	0.016658	0.019332	0.035973	0.035921	0.157009	1.108237	0.045284	0.060194	0.040039	1.849133
24	0.023851	0.010555	0.026228	0.021618	0.040783	0.038181	0.035719	0.03998	0.037086	0.049931	0.020741	0.030643	0.030949	0.122485	0.04214	0.017717	0.032253	0.029718	0.019821	0.052875	0.053245	0.150963	0.238046	1.257051	0.090358	0.053337	2.566232
25	0.016734	0.023332	0.024242	0.022957	0.036408	0.028281	0.024447	0.029366	0.027056	0.031388	0.035191	0.029343	0.029553	0.027223	0.02615	0.020165	0.033095	0.024012	0.051455	0.087175	0.095893	0.078886	0.126152	0.084266	1.36289	0.119373	2.494836
26	0.001753	0.002332	0.00308	0.003204	0.014093	0.003329	0.003274	0.003842	0.003788	0.003504	0.003347	0.003361	0.003611	0.003823	0.003378	0.002732	0.004176	0.003064	0.007829	0.009466	0.009485	0.018867	0.058298	0.012966	0.017615	1.07922	1.28344
SUM	1.626145	1.397735	2.54939	2.163436	2.121377	2.02051	2.143449	2.247629	2.110566	2.077054	2.131641	2.707069	2.061994	2.210475	2.114399	1.815027	2.092792	1.806286	2.153072	2.042247	1.571568	2.485652	1.866257	1.817254	1.966936	1.952298	53.25226

Appendix 13
The Direct Field of Influence for Malaysia 1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	1.37551087	3.80438293	6.10895593	4.97917033	4.3650829	5.1063251	5.99502	6.06804075	4.46865805	4.66864754	4.31854688	6.04881705	4.73518332	5.37337442	4.82748125	4.38475802	3.74493408	5.71493866	4.97459935	5.40414322	4.31843203	4.49465032	3.94355313	3.73325671	5.05724491	4.15153336	123.948038
2	2.62358723	2.63003311	4.22316102	3.44214415	3.01758028	3.53004626	3.87029557	4.19544287	3.31010045	3.22747702	2.98544835	3.83292162	3.27473719	3.71466089	3.33728015	3.03122177	2.5880638	3.95078583	3.43890419	3.79814943	2.98536996	3.10719121	2.40480924	2.58083312	3.49611087	2.86999144	85.6870576
3	1.98189528	1.98687854	3.18963852	2.59440708	2.27891824	2.66636955	2.92371363	3.16755291	2.34244421	2.43621289	2.25533572	3.24269	2.38823812	2.88621629	2.28949441	2.28934078	1.95786433	2.983110056	2.59791167	2.86205125	2.25444944	2.34879792	1.87826275	1.949418	2.641319	2.1678202	46.7106571
4	1.22779814	1.2308013	1.9763734	1.6187245	1.41218464	1.65200883	1.81193833	1.96285796	1.45159538	1.51041153	1.39714338	1.95724797	1.53193714	1.78404384	1.56179592	1.48165406	1.21516917	1.94891488	1.60391925	1.77752374	1.39710705	1.45411739	1.16285396	1.20779125	1.63612616	1.34313358	40.1005398
5	1.23152395	1.2453569	1.98237127	1.61573834	1.41647033	1.65702	1.81673365	1.96936024	1.45600127	1.5148926	1.4013837	1.96318698	1.5365837	1.74367896	1.5665347	1.42286945	1.25144432	1.85451709	1.61427594	1.78286886	1.40134643	1.45852889	1.16638092	1.21145487	1.64100657	1.34738772	40.2219002
6	1.71062759	1.714811	2.75357941	2.24434191	1.96752425	2.3016571	2.52350328	2.73550666	2.02243404	2.10437495	1.94656842	2.7289318	2.1343657	2.42027788	2.17596863	1.97641284	1.68801466	2.57598572	2.24281555	2.47464396	1.94651665	2.02544637	1.62041777	1.68275112	2.27952921	1.87128772	55.8695528
7	1.90272814	1.90677987	3.06388585	2.48559046	2.18778375	2.55932041	2.8000326	3.047399	2.4884055	2.3395455	2.16448196	3.03228511	2.7330269	2.69316795	2.45956297	2.19766739	1.87698374	2.86436099	2.49329446	2.753698	2.164424	2.2574608	1.80151265	1.87113897	2.5347169	2.0807377	62.1240118
8	1.23378197	1.23679923	1.9660598	1.61872086	1.41906745	1.6605817	1.82064667	1.97297109	1.45867087	1.5177037	1.40195316	1.96678652	1.53940015	1.74687803	1.56940697	1.4547831	1.214725	1.85791738	1.61723485	1.78631778	1.40391582	1.46120413	1.1685195	1.213672	1.64409954	1.34965732	40.2956477
9	1.75643742	1.76102249	2.82656697	2.30385699	2.01942046	2.36171027	2.59126162	2.8070035	2.07378336	2.15846109	1.99515647	2.79940322	2.18871841	2.487701938	2.23180906	2.05770432	1.73322072	2.63943335	2.24097655	2.45735163	1.93140424	2.01831095	1.60763818	1.66976434	2.26193674	1.85684589	55.4883745
10	1.69742567	1.70157679	2.73232842	2.227021	1.9523397	2.28380248	2.50402791	2.71439514	2.00682572	2.08813425	1.9315456	2.70588646	2.11789354	2.40233357	2.1591754	1.9611597	1.67488725	2.5550533	2.22497655	2.5735163	1.93140424	2.01831095	1.60763818	1.66976434	2.26193674	1.85684589	55.4883745
11	2.24584471	2.25335576	3.61514235	3.0070934	2.52473937	3.02380829	3.31306441	3.59143172	2.6552319	2.76279372	2.55501849	3.98013828	2.80217017	3.71984388	2.85679889	2.59479985	2.21616812	3.38198066	2.94388028	3.25131953	2.55558203	2.6586534	2.12706153	2.20926262	2.99440318	2.45682683	73.4093333
12	1.39253059	1.39593607	2.24514198	1.82698891	1.60165644	1.87365302	2.05424028	2.26822992	1.64655556	1.71385929	1.58459742	2.21984958	1.73747315	1.97164538	1.77133888	1.60889217	1.3741226	2.08697244	1.82532169	2.01595708	1.58455528	1.64021477	1.31887091	1.3683784	1.85564302	1.52331542	45.4804199
13	1.73248902	1.73709989	2.80855176	2.28566824	1.99307517	2.32948703	2.55101594	2.77024996	2.04570048	2.1386693	1.97424302	2.75968001	2.15792339	2.44827229	2.36701611	0.87089266	1.70366653	2.57089791	2.26421856	2.59402505	1.9736004	2.04954138	1.63393501	1.70346969	2.3025761	1.89061468	56.4613778
14	1.74354378	1.74780768	2.80656425	2.28752791	2.00538368	2.34594456	2.5706095	2.7884374	2.06135005	2.14486769	1.98402462	2.77940389	2.1743552	2.46863296	2.21783899	2.01444331	1.72049572	2.62553328	2.28542792	2.5241165	1.98397186	2.06492997	1.65131681	1.75133091	2.3233823	1.90729535	56.4446042
15	1.41614603	1.41957778	2.2795265	1.83805613	1.6287716	1.90559462	2.08894828	2.26460891	1.67450261	1.74228189	1.61142059	2.57545169	1.6706675	2.00505201	1.80157148	1.65647406	1.39739257	2.13308825	1.85649388	2.05027501	1.61592026	1.6705293	1.34116744	1.39400108	1.88718402	1.54908332	46.2588887
16	1.62765584	1.63163633	2.62002064	2.13548304	1.87209206	2.19001691	2.40110405	2.60282449	1.92433852	2.00230499	1.85215266	2.59466554	2.03084108	2.30450959	2.07042612	1.88049852	1.60613971	2.45104091	2.13352262	2.35634631	1.85210341	1.92788049	1.54155891	1.60113148	2.16806363	1.78052395	53.1586732
17	1.2858687	1.28901334	2.06984944	1.68705361	1.4789764	1.73041016	1.88940257	2.05626426	1.5205177	1.58184627	1.46322403	2.04981859	1.60439014	1.82062411	1.6356282	1.4856579	1.26887069	1.93635331	1.68550985	1.86154339	1.46318552	1.52289197	1.21785104	1.26491412	1.7135087	1.40663597	41.9968141
18	1.54629097	1.55007565	2.48905911	2.02877155	1.77852069	2.08054204	2.28110063	2.47727271	1.82843445	1.9072147	1.7595663	2.46404477	1.92932534	2.18935081	1.9669301	1.78654488	1.5285326	2.385163	2.02887252	2.23866419	1.75952389	1.83185209	1.46398626	1.52108654	2.06053548	1.69153865	50.5024019
19	1.8386409	1.8388735	2.98412402	2.43221016	2.13223595	2.49419532	2.73480882	2.9465201	2.1916912	2.28054593	2.10953564	2.95521652	2.3130628	2.62480393	2.3813866	2.14818873	1.8485709	2.71696612	2.4300699	2.68380157	2.10947985	2.1956047	1.7557633	1.82361505	2.47052817	2.02793847	60.426196
20	1.51166091	1.5153573	2.43330481	1.9832378	1.7367737	2.03394531	2.2998931	2.41733414	1.78720049	1.85961068	1.72013896	2.40975664	1.88611314	1.9278715	1.74653211	1.4857813	2.27636742	1.98447708	2.18842274	1.78011321	1.7903043	1.4316998	1.48702681	2.0434928	1.65363432	46.3712478	
21	3.07387375	3.08139102	4.94798254	4.03291967	3.53549841	4.13590843	4.53455241	4.91550712	3.63467732	3.7814002	3.48748231	4.90005873	3.8353004	4.53228049	3.9105766	3.55147057	3.03323994	4.62889557	4.02921737	4.45002617	3.4974629	3.64477973	2.91127729	3.02378176	4.06614871	3.36256835	100.393535
22	1.93506799	1.93880027	3.11483878	2.53880751	2.22567019	2.60364019	2.85459584	3.09441482	2.28778454	2.38047639	2.29196509	3.08474491	2.41440203	2.73980652	2.46146342	2.235752	1.9948815	2.91394617	2.53647683	2.8013848	2.20190633	2.2915771	1.8327101	1.90353403	2.57861151	2.11680729	63.1998359
23	1.42754007	1.43095908	2.29183843	1.87284049	1.64188213	1.92071197	2.10584186	2.28275887	1.68770387	1.75808286	1.62439467	2.27580122	1.78110889	2.02116152	1.8158718	1.64029958	1.40863377	2.14863802	1.87116475	2.06539795	1.62435347	1.69063489	1.35199442	1.40404139	1.902476	1.56157357	46.6226631
24	1.7503631	1.75464388	2.81754157	2.29647513	2.01327734	2.35512206	2.58212106	2.79904902	2.06941262	2.15325691	1.99178474	2.79027497	2.18394431	2.4728852	2.2653163	2.02232241	1.727251	2.63832861	2.29436691	1.99173377	2.07306554	1.65777561	1.7218393	2.33247979	1.91475536	57.1673318	
25	2.1843113	2.18978786	3.51599359	2.85388108	2.51246334	2.93895547	3.22233447	3.49292752	2.5824836	2.68709362	2.4859257	3.4824081	2.72545302	3.0679131	2.71871589	2.55889373	2.123025	3.2904477	2.86338577	1.6312704	2.48545738	2.58625554	2.06898988	2.4487137	2.91061139	2.39852889	71.450177
26	1.28748312	1.29063171	2.07244817	1.68917673	1.48083328	1.73231327	1.89928415	2.05884593	1.52216046	1.5388323	1.45506113	2.05239217	1.60640447	1.82729093	1.63771642	1.48723237	1.72046377	1.93878443	1.68762603	1.86388058	1.46502216	1.52480398	1.21938006	1.2650224	1.71566003	1.40840202	42.0495417
SUM	47.748044	47.2841885	75.5551647	61.5583804	54.19662	61.4698248	68.5879217	75.4341873	55.7678362	58.0378125	53.6847469	75.2827715	58.7714967	66.7890195	61.0693996	53.40507	46.534327	70.9720279	61.8280379	68.2395028	53.6397398	55.8650477	44.6729999	46.407809	62.8575906	51.603029	1540.57883

Appendix 14
Changes in Linkage Intensities (First Order Effects), Unweighted Malaysia
1983

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1	0.0382046	-0.007379	0.05245798	0.01564845	-0.0285235	0.01980224	-0.0377346	-0.0077123	-0.0007513	-0.0075258	0.0007246	-0.0340473	-0.0001223	0.00398474	1.9745E-05	-0.0001408	-0.0044894	-0.0023941	-0.0010549	-0.005428	-0.0038615	-0.0093585	-0.0007106	0.0008189	-0.0345905	0.0012784	
2	0.0508659	0.00713015	0.00734833	0.00818168	0.00339197	0.00960833	0.00800402	0.00604852	0.00622403	0.00875442	0.01565495	0.00234836	0.02789804	-0.056845	-0.0098589	-0.0047338	-0.0004727	-0.059991	0.05381512	-0.0132594	0.00881074	0.0135546	0.0015958	0.00049523	0.00485381	0.00235792	
3	0.0254022	-0.0001838	0.1926349	0.0543385	0.00301014	0.01042415	-0.00801973	0.00274001	-0.00028423	-0.0010649	0.00050509	0.01331927	0.00034957	0.00077239	0.00017017	2.5549E-05	0.0002987	-0.007356	0.0052895	0.00154907	-0.0004567	-0.0002249	0.0001008	0.0001062	-0.0009829	0.0029566	
4	7.3138E-05	-4.774E-05	0.0001015	0.00393811	0.0002509	9.493E-05	1.307E-05	2.748E-05	9.7425E-06	-0.0001183	4.2778E-05	6.243E-05	-1.562E-05	4.8015E-05	1.307E-05	-8.495E-06	-6.031E-06	0.0002432	3.5477E-05	0.00014758	-0.0001807	-0.0002249	0.0001008	0.0001062	-0.0016073	0.001657	
5	2.6648E-05	3.8819E-05	0.00013945	0.00011613	-0.0015179	0.00023812	0.00012401	0.00014319	0.00015293	0.0002836	6.538E-05	0.00012856	5.838E-05	0.0001786	0.00020317	0.0002761	5.2844E-05	0.00018131	0.00036611	0.00019159	5.142E-05	0.00018449	2.6645E-05	2.8865E-05	0.00010136	4.429E-05	
6	-0.00043	-1.501E-05	-0.0015763	-0.0009659	0.00125571	-0.069827	9.316E-05	0.0276681	-0.0023192	0.00057983	0.00014233	-0.0004084	-0.0021961	0.0007327	-0.0011363	0.01153941	0.0027676	-0.0262128	-0.0003016	0.0003299	-9.22E-05	-0.0015005	-0.001305	0.00017915	0.00039267	-0.0071722	
7	0.0002535	-0.0008247	0.0003009	0.00082096	0.00064963	0.00055574	0.00682583	0.00456847	0.00142989	0.00151968	0.00037938	0.00276748	0.00082299	5.9478E-05	0.0024426	0.0165962	-0.0006632	-0.0042038	5.0833E-05	0.00125912	0.00010997	2.5595E-05	-0.0007879	0.00018452	-0.0003294	-0.0006014	
8	1.7835E-05	-1.133E-05	8.9854E-06	0.00015578	-8.224E-05	0.00010896	2.844E-05	-0.0126955	-0.0025483	8.6689E-05	1.5328E-05	0.00015269	0.00012014	4.9595E-05	-0.0001074	0.00097914	-1.936E-05	0.00010863	4.047E-06	0.00023467	-0.0001311	4.946E-05	-0.00015453	2.3937E-05	-0.0002058	-6.92E-05	
9	0.00097807	-0.0022102	0.0006469	0.01765202	-0.0082341	0.01293229	0.00093907	-0.0011561	-0.015468	-0.0085384	0.000499	3.627E-05	0.00066272	0.00013786	-0.0026882	-0.0027407	-0.0005951	-0.0071247	-0.0003716	0.0005044	-0.0135842	-3.829E-06	0.00683911	0.00070438	0.00053924	-0.001857	
10	0.00627731	0.00263791	0.00625295	0.004944015	0.00086096	0.01057138	0.00799606	-0.0166737	0.0104455	0.05920328	0.00294774	0.00946886	0.0667894	0.0092327	0.0345789	0.00076965	0.00256712	0.00888739	0.00378159	-0.0025078	0.0024644	0.0029366	0.0006069	0.00038348	0.00019183	0.0012649	
11	0.007388	-0.0065253	0.00862457	0.00312227	0.00307123	0.01765219	0.00961326	0.0012772	0.00091943	0.00042802	0.0073871	-0.0154609	0.007183	0.0024924	0.00357493	0.00278916	0.00051619	0.0024323	-0.0050754	0.00338181	0.00739178	0.00432305	0.0020704	0.0014069	-0.0009989	0.0002423	
12	0.0051531	-0.0009481	-5.29E-05	-0.0003777	-0.0005135	-0.003265	-0.0013411	0.00863378	-0.008257	0.00236642	0.00044959	0.00409687	-0.0007613	-0.0006911	-0.0008068	0.0057804	-0.0048214	0.00046943	-0.0002346	-0.00024949	-0.0055528	-0.006761	-0.005572	0.00021492	-0.0009774	-0.0009194	
13	-0.0001248	-0.0014283	-0.0001994	-0.0274966	-0.0044348	-7.474E-05	0.0012837	-0.0108042	-0.0026931	-0.0040726	0.00030097	0.00235879	0.02980897	0.00493115	0.0140483	-0.008278	0.0027678	-0.0043201	-0.0002346	-0.00024949	-0.0055528	-0.006761	-0.005572	0.00021492	-0.0009774	-0.0009194	
14	0.0002759	-0.0007368	0.00239789	0.00592389	0.00661232	0.01111281	0.00057885	0.05338934	0.05635564	0.0104469	0.00337928	0.00022696	0.00325549	0.04327214	0.01275551	-0.0060696	-0.0004734	-0.0118228	-0.00017952	-0.0058361	0.0057197	-0.0001985	-0.0010633	-9.489E-05	-0.0004065	-0.0008379	
15	-0.0008853	0.0003866	-0.005296	-0.0008555	0.0005626	0.00105742	-0.0057247	0.0073938	0.00327413	-0.003783	-0.0018021	0.00337418	0.00055701	0.00955701	0.02708773	0.00236097	0.0026889	0.0654773	0.00028595	0.00065701	-0.0014534	-0.0002345	-0.0016841	-5.179E-05	-0.0009084	-0.0004785	
16	-0.0028118	-0.0040286	-6.698E-05	-0.000855	0.0005626	0.00105742	-0.0057247	0.0073938	0.00327413	-0.003783	-0.0018021	0.00337418	0.00055701	0.00955701	0.02708773	0.00236097	0.0026889	0.0654773	0.00028595	0.00065701	-0.0014534	-0.0002345	-0.0016841	-5.179E-05	-0.0009084	-0.0004785	
17	-2.786E-06	0.0113281	0.0156378	0.0153854	0.0066401	0.0198124	0.0060028	0.00720233	0.00093545	0.00130331	0.00086609	0.00125375	0.00290201	0.00779173	0.00366827	0.00150391	0.0985149	0.0053946	0.0046089	0.00221223	0.00019319	-0.00018316	0.00026196	0.00041389	0.00146557	-0.0002822	
18	6.9581E-05	-0.0003568	-7.894E-05	-0.0006353	-0.0007852	0.00065286	0.00011981	-0.0005042	-0.0016597	-0.0008908	-7.79E-06	-0.0001329	-3.383E-05	-0.0001353	-0.0001011	-0.0001915	7.8651E-06	-0.2747831	-0.0001194	-0.0002624	-0.0003347	-0.0004463	-0.0003976	0.00161242	-0.0006307	-0.0007964	
19	0.0031178	-0.0112057	0.00767862	0.00822341	0.00576679	0.02269447	0.00918246	0.00138104	0.00596531	-0.0028932	0.00383177	0.00646767	0.0288804	0.00973965	0.008441	0.0066629	0.00338954	0.0945886	0.0470907	0.00102387	0.00268165	0.00016988	0.01969276	0.00395094	-0.0025184	0.00594578	
20	0.0019813	-0.0026167	0.00169448	0.00044108	0.0008449	0.00137706	0.0053953	0.00199673	0.00099827	1.0571E-06	0.00147452	0.00015995	0.00150717	-0.0003486	0.00064215	-0.0002539	0.00054179	-0.0009094	-0.0023476	-0.0006547	0.00029949	-0.0014206	-0.0031607	0.00010186	0.00052399	-0.0057008	
21	0.00563423	-0.0099177	0.00503268	-0.0035961	0.00019657	-0.0053212	0.00276667	-0.0149382	-0.0168809	0.00270122	0.0044893	0.0008462	0.00970037	0.01955606	0.00653735	0.00384455	-0.00032	0.0007524	0.00761816	0.00722158	0.0046502	-0.0005425	-0.0094658	-0.0011297	0.0015051	-0.003644	
22	0.0084654	0.00422694	0.01353961	0.00012379	-0.0001411	-0.0003129	0.00070014	-0.0004335	-0.0005089	0.00031852	0.00027271	-0.00044803	0.00038642	0.00970037	0.01955606	0.00653735	0.00384455	-0.00032	0.0007524	0.00761816	0.00722158	0.0046502	-0.0005425	-0.0094658	-0.0011297	0.0015051	-0.003644
23	0.00083667	-0.0004247	0.0007776	0.00022379	-0.0001411	-0.0003129	0.00070014	-0.0004335	-0.0005089	0.00031852	0.00027271	-0.00044803	0.00038642	0.00970037	0.01955606	0.00653735	0.00384455	-0.00032	0.0007524	0.00761816	0.00722158	0.0046502	-0.0005425	-0.0094658	-0.0011297	0.0015051	-0.003644
24	0.00238388	-0.0018921	0.0042444	-0.0002625	0.0048924	0.00423316	0.0042337	0.0006821	0.00388116	0.00168835	0.00312509	0.00320478	0.00355987	-0.0011925	0.00461159	-0.0011452	-0.0005638	-0.002564	-0.0006568	-0.002564	-0.0006568	-0.002564	-0.0006568	-0.002564	-0.0006568	-0.002564	
25	0.00564	-0.0023946	0.00525783	0.01946924	0.02585022	0.00788473	0.00842007	0.0047039	0.00291436	-0.0120209	0.00431193	0.00540402	-8.147E-06	0.00400277	-0.0008654	-0.0016616	0.00026743	-0.0099412	0.00245968	-0.005231	-0.0133944	0.00137959	-0.0159847	0.02963722	0.01206914		
26	5.731E-05	-0.0004057	-3.795E-05	-9.933E-05	2.8077E-06	0.00082932	0.00021752	-0.0002702	-0.0002536	-0.0004867	7.7663E-05	0.00027802	-5.993E-06	0.001128467	0.00023944	-0.0006418	0.00021041	-0.0012261	-1.537E-05	0.00471837	-0.0054696	-0.0029302	0.00023747	5.5496E-05	0.00209357		

1991

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
1	0.03745	-0.00304	-0.00472	-0.0101	-0.03351	-0.00382	0.167525	0.065459	-0.00042	-0.00773	0.00293	-0.13944	-0.0045	-0.00662	-0.00214	-0.00343	-0.00596	-0.01447	0.001014	-0.01271	-0.00645	-0.00776	0.001456	0.001484	-0.05693	-0.00171	
2	0.006762	0.012576	0.008143	0.009865	0.005113	0.005944	0.010866	0.002521	0.005913	0.008696	0.442348	0.00321	0.027002	-0.38375	-0.03892	-0.01683	-0.00235	-0.02646	0.080999	-0.0341	0.006649	0.021085	0.002377	-0.00151	0.004845	0.0061	
3	0.036939	0.000544	0.190909	0.019428	0.00157	-0.00259	0.022049	0.01028	0.00255	0.007467	0.001808	0.015634	0.002597	0.001757	0.000495	-0.00033	0.001526	-0.00546	0.001871	0.000608	-0.00167	0.001168	0.002237	0.002115	-0.01585	0.002528	
4	0.000381	4.52E-06	2.45E-05	0.00177	-0.00023	-5E-05	0.000156	-8.3E-05	-0.00012	-0.00023	0.000144	0.00025	5.58E-06	9.29E-05	-0.00011	-0.00013	7.44E-05	-0.00036	0.00015	-0.00015	-0.00015	-0.00032	-0.00022	0.000279	0.00023	-0.00515	9.78E-06
5	-0.00011	6.25E-05	0.000229	0.000771	0.065769	0.000168	0.000016	0.000547	0.004461	-7.3E-05	4.04E-05	0.000217	0.000452	3.53E-05	0.000207	0.000124	5.8E-05	0.000477	-1.2E-05	4.2E-05	0.000515	0.000618	3.39E-05	2.96E-05	5.06E-05	8.47E-05	
6	-0.00059	-0.00011	-0.00254	-0.00319	0.000886	-0.20894	0.000926	0.005922	-0.00606	-0.0015	0.000328	0.007769	-0.00315	0.000581	-0.00126	-0.0013	0.00191	-0.04131	-0.00121	-0.00029	-1.1E-05	-0.00131	8.27E-05	0.000257	-0.00098	-0.00295	
7	0.000611	-0.00193	0.000105	-0.00391	-0.00012	-0.0011	-0.00276	-0.14381	-0.00141	-0.0028	0.000786	0.000838	-0.00252	-0.00141	-0.00036	-0.00142	-0.00187	-0.01598	4.64E-05	-0.04384	-0.00127	-0.00017	-0.00197	-0.00295	-0.00153	-0.00107	
8	6.19E-05	1.89E-05	7.54E-05	-5.5E-08	0.000256	0.001326	0.000943	0.004356	-0.00227	-2.3E-05	6.47E-05	0.000157	9.09E-05	6.69E-05	-0.0001	-0.00102	6.06E-05	-2.8E-05	3.67E-05	-9.2E-06	4.97E-05	0.000151	8.43E-05	3.56E-05	0.00096	0.000454	
9	0.003646	0.00031	0.004182	-1E-05	0.045277	0.000547	0.006689	0.009168	-0.00917	-0.01231	0.004375	0.007476	0.004423	0.004778	-0.00198	-0.00179	0.0035	-0.00791	0.00102	0.001597	-0.01356	0.001185	0.002078	0.00877	0.001203	0.003105	
10	0.001635	0.000383	0.008569	0.005201	0.000638	-0.00018	0.003548	-0.00994	0.003482	0.004941	0.003654	-0.00597	0.030227	-0.00025	0.009663	-0.00465	0.001132	0.010656	0.0046	-0.00754	-0.00029	0.001052	-0.00041	-9.7E-05	-0.0028	0.001082	
11	-0.0036	-0.02975	-0.0025	-0.00794	0.001273	-0.01703	-0.00449	-0.00968	-0.00453	-0.01521	0.010408	-0.04308	-0.00162	-0.01221	-0.00211	-0.00524	-0.00055	-0.00784	-0.13547	-0.00779	-0.00461	-0.01615	-0.00035	1.79E-05	-0.0182	-0.00137	
12	-0.00081	-0.00155	-0.00059	-0.00067	-0.00052	-0.0022	-0.00116	0.005742	-0.00079	-0.00153	0.001106	0.0457	-0.00012	-0.00141	-0.00032	-0.00118	-0.00335	-0.00015	-0.00104	-0.00347	-0.00286	-0.00574	-0.00071	-7.7E-05	-0.00419	0.001595	
13	-0.00047	-0.0011	0.003563	0.014838	0.021691	0.002267	0.014583	0.000176	0.002716	-0.01323	0.003806	0.005005	0.053477	0.01738	0.021072	-0.00022	0.019208	0.017074	0.000734	0.010104	-0.01203	0.000908	-0.00219	-0.00051	-0.00068	0.003391	
14	-0.00064	-0.00392	-0.00109	0.006859	0.001388	-0.00055	-0.00026	-0.00529	-0.00053	-0.00217	0.00269	0.000193	0.005159	0.103083	-0.03119	-0.017	-0.00019	-0.03737	-0.00091	-0.00868	-0.0012	6.59E-06	-0.00109	-0.0016	-0.00249	0.002017	
15	0.0007	0.001007	0.00151	0.052476	0.003557	0.00092	0.003526	0.018509	0.002905	-0.00265	0.010685	0.003672	0.004227	0.035919	0.085453	0.015561	0.004106	0.008268	0.005709	0.014384	-0.0011	0.001819	-0.00084	0.000351	0.000812	0.002824	
16	0.003808	0.000867	0.008287	0.004381	0.017158	0.005962	0.008745	0.022669	0.006295	0.004445	0.004549	0.006574	0.012159	0.009436	0.014082	0.019595	0.014102	-0.02506	-0.00606	0.006274	0.002937	0.007293	0.000456	-0.00062	0.000189	0.077252	
17	0.003658	0.003573	0.005243	0.004112	0.002473	0.003274	0.007433	0.006867	0.003433	0.002717	0.003952	0.005679	0.005974	0.004997	0.005404	0.005777	0.129792	0.003551	0.001929	0.009282	0.002859	0.037779	0.002317	0.002024	-0.0018	0.021556	
18	0.002153	0.00239	0.002028	0.001013	-0.00035	-0.00359	0.003479	0.002173	-0.00147	0.000546	0.001285	0.002625	0.003137	0.00221	0.001592	0.000462	0.000689	-0.274	0.000839	0.002321	0.000955	0.002504	0.00193	0.000487	0.001414	0.003629	
19	0.004336	-0.0167	0.010477	0.004175	0.006683	-0.01088	0.008243	0.005458	0.002269	0.009921	0.011694	0.014553	0.008349	0.02379	0.01019	0.003042	0.004962	0.00055	0.041267	0.001527	0.02567	0.003574	0.014174	0.003762	-0.01856	0.013146	
20	0.000356	-0.00575	0.001224	0.000306	0.001701	-0.00021	0.003109	0.001682	-4.3E-05	0.000149	0.00367	0.000432	0.001574	-0.00181	0.000236	-0.00028	0.001463	-0.00159	0.010031	-0.00594	-0.00566	0.002803	-0.00031	-0.01482	-0.00085	0.006785	
21	0.009487	-0.00691	0.012849	0.016185	0.024837	-0.01557	0.022714	0.006144	-0.01005	-0.002305	0.004325	0.007419	0.01059	0.095901	0.026107	0.010091	0.046571	-0.00638	-0.01748	-0.00098	0.010367	0.001337	0.004545	0.005177	-0.00984	0.020229	
22	0.005742	0.007445	0.017376	-0.00052	-6.7E-05	0.000666	-0.01157	-0.0185	0.002692	0.000216	0.012395	0.012511	0.013653	0.014233	0.01127	-0.00094	0.00106	0.004781	0.001889	0.001253	0.01913	0.040747	0.005463	0.004211	0.003554	0.027863	
23	0.000985	0.000379	0.001604	-0.00035	0.001646	0.00017	0.001905	0.001684	-0.00016	-0.00097	0.002167	0.002394	0.001765	0.003081	0.001337	-0.00066	0.001338	-0.00454	-0.00087	0.003032	-0.00136	0.000633	0.078942	0.013792	0.00145	0.004957	
24	0.003099	0.000712	0.00581	0.002553	0.019567	0.002006	0.006072	-0.0009	0.005809	-0.00039	0.008613	0.009606	0.005408	0.008145	0.003965	0.000886	0.003909	-0.00508	0.005955	-0.00776	0.009859	0.01551	0.017536	0.006671	-0.00566	0.012352	
25	0.020978	0.009704	0.014737	-0.02787	-0.00538	0.004842	0.017381	0.007171	0.004959	-0.01875	0.016809	0.020179	0.012413	0.014171	0.001813	-0.00254	0.009949	-0.01569	0.025239	0.000809	-0.00548	0.004765	0.025818	0.028334	0.008111	0.031216	
26	0.000663	0.000332	0.000436	-0.0006	0.000592	-0.00099	0.000397	-0.00115	-0.00113	-0.00117	0.001094	0.001595	-3.2E-05	0.000963	-0.00078	-0.00109	0.00042	-0.00172	0.007175	-0.00095	-0.00594	-0.00228	0.001224	0.00028	-0.00234	0.001692	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	0.064708	-0.00484	-0.03959	-0.00843	0.032275	0.00983	0.124281	0.023244	0.030522	0.058851	6.17E-05	-0.32827	-0.00529	-0.00683	0.003158	-0.00096	-0.01586	-0.00817	0.003679	-0.01418	-0.00479	-0.00743	0.000597	-0.00131	-0.04004	-0.00358
2	0.011018	-0.0032	0.011626	0.001701	0.003581	0.002641	0.005993	-0.00376	0.005445	0.018196	0.050175	0.005122	-0.00342	-0.40559	-0.09023	-0.0239	-0.00263	-0.00547	-0.02401	-0.03829	-0.00315	0.010696	-0.00034	-0.00211	0.000526	-0.00148
3	0.032778	0.000398	0.27838	0.030026	0.005706	0.00203	0.018771	0.008563	0.003372	0.066991	0.001262	0.004264	0.004383	0.002309	0.001535	0.000646	0.001619	-0.00309	0.004801	0.003175	0.000949	0.005577	0.002492	0.001305	0.026674	0.010174
4	0.000169	-7.3E-05	0.000581	0.077892	-0.00022	2.62E-05	5.59E-05	-0.00018	-7.5E-05	0.001606	3.46E-05	0.000184	-6.1E-05	4.55E-05	-0.00011	-0.00011	8.1E-05	-0.00032	0.000506	-3.1E-05	-5.9E-05	0.000508	0.000249	0.00011	-0.00314	7.3E-06
5	-0.00018	-3.9E-05	-0.00013	-0.00011	0.028184	-0.00011	-8.8E-05	-0.00017	-0.00013	-0.00049	-1.9E-05	-0.00024	-0.00031	-4.8E-05	-0.00013	-0.00018	-2.4E-05	-0.00025	-9.1E-05	-0.00014	-4.9E-05	-0.0001	2.26E-06	-1.3E-05	-8.8E-05	-4E-05
6	0.000168	-0.00025	-0.00291	-0.00308	-0.00149	-0.15146	-1.4E-05	0.019726	-0.00502	-0.00108	6.67E-05	-0.00145	-0.0032	0.000307	-0.00101	-0.00072	0.019982	-0.04412	-0.0008	0.001347	-0.00053	-0.00136	-0.00098	0.006694	4E-05	-0.00178
7	0.001506	-0.00252	0.000197	-0.00444	-0.00015	-0.00102	-0.03961	-0.23119	0.010946	-0.00439	-0.00032	-0.00037	-0.00336	-0.0015	-0.00112	0.002764	0.001632	-0.01516	-0.00191	-0.05951	-0.00187	-0.00136	-0.00279	-0.00528	-0.00211	-0.00589
8	8.69E-05	2.4E-06	7.34E-05	4.88E-05	-0.00013	0.000232	0.000111	0.052535	-0.00126	-6.2E-05	4.54E-05	0.000798	0.000318	0.00013	-2.9E-05	-4.2E-05	0.000691	0.00054	0.000106	-1E-04	-0.00013	0.000125	0.000153	1.59E-05	-0.00013	-4.2E-05
9	0.000791	-0.00329	0.010445	0.016471	-0.03874	0.002322	0.007612	0.005815	0.086286	-0.0096	0.000982	0.004603	0.00108	0.001799	-0.00059	-0.00609	0.004485	-0.00964	-0.00265	-0.00528	-0.03249	-0.00306	-0.00157	0.003024	0.001479	0.002668
10	0.008603	0.001014	0.010738	0.016417	-0.00017	0.049405	0.007921	-0.01959	0.012481	0.088855	0.017361	0.009617	0.017458	0.015277	0.004667	0.002277	0.005442	0.012972	0.005994	-0.00539	-0.0004	0.003297	0.000425	-0.00061	-0.0027	-0.00055
11	0.047712	-0.02973	0.059109	0.001654	0.01118	-0.00113	0.024317	0.005538	0.018023	0.042115	0.012668	0.007097	0.009895	-0.00262	0.00493	-0.00353	0.006314	-0.00138	-0.16608	-0.00383	-0.01129	0.003036	-0.00206	0.004381	-0.00195	0.002027
12	0.002541	-0.0019	0.000545	-0.00048	-0.00039	0.001779	-5.3E-05	-0.00459	-0.00069	-0.00067	-0.00018	0.142968	-0.00022	-0.00035	0.004605	-0.00149	-0.01306	0.000379	-0.00089	-0.00103	-0.0037	-0.00692	-0.00062	-0.00012	-0.0036	-6.4E-05
13	0.00334	-0.00145	0.000643	-0.02063	-0.00777	0.035349	0.000968	0.015989	-0.00543	-0.01664	0.000528	0.003792	0.064609	0.011745	-0.0022	-0.00101	0.015634	0.000675	0.00017	0.03106	-0.01299	0.000623	-0.00252	-0.00153	0.000161	-0.00232
14	-0.00038	-0.00422	-0.00298	0.006995	-0.00033	0.00047	-0.00083	-0.00251	0.000125	-0.00119	-0.0016	0.001266	-0.00025	0.11741	-0.05314	-0.02198	0.001839	0.020943	-0.00193	0.011226	-0.00168	-0.00036	0.000774	-0.00228	-0.00202	-0.00325
15	-0.00105	2.78E-05	-0.00772	0.056723	-0.00015	0.002317	0.006147	0.021837	0.003331	3.04E-05	-0.00351	0.002828	0.005596	0.016642	0.061076	0.016003	0.004561	0.024525	0.001623	0.008572	-0.00294	0.000897	-0.00067	-0.00061	0.00122	-0.00067
16	0.002213	0.002324	0.004226	0.026315	0.005571	0.010195	7.54E-05	0.007321	0.003689	0.005267	0.010692	0.002772	0.005101	0.013969	0.022901	-0.01725	0.019618	0.027282	0.014367	0.004333	0.002526	0.013666	0.080561	-0.00033	0.007232	0.006473
17	0.003952	0.00227	0.002056	0.000359	0.000582	0.00063	0.001794	0.009052	0.000516	0.000589	0.00081	0.002309	7.88E-05	0.00136	0.000713	0.001128	0.196219	0.002687	0.003384	0.002041	0.002104	0.015443	0.001612	0.000577	-0.00283	0.013129
18	0.000253	0.002372	0.000472	0.00039	-0.00105	0.005838	0.000609	0.003518	-0.00215	0.000535	0.000765	0.000744	0.001661	0.00213	0.001779	0.000559	0.000872	-0.24347	0.003786	0.001393	-0.00015	0.000742	0.002699	0.003829	0.005056	0.006407
19	0.006124	-0.0192	0.048749	0.00912	0.01385	0.017573	0.023362	0.009132	0.027692	0.020725	0.008914	0.033282	0.021109	0.036716	0.028476	0.003747	0.015441	0.007085	0.068394	0.010504	0.011754	0.014533	0.009209	0.018044	-0.00205	0.017962
20	0.000419	-0.00684	0.001878	0.002548	0.002504	0.001306	0.000225	-0.00218	0.00522	0.003958	0.000214	0.006158	0.009393	-0.00319	-0.00076	-0.0022	0.00443	-0.0016	-0.01095	-0.00587	-0.00833	-0.00234	-0.00777	-0.03713	-0.00138	-0.04335
21	0.021095	-0.01493	0.016637	0.012813	0.012061	-0.00247	0.025451	-0.003624	-0.00205	-0.00474	0.035292	0.015427	-0.00221	0.04916	-0.00426	-0.01443	0.055173	-0.0773	-0.04587	-0.00654	-0.00859	0.000758	0.01472	0.003101	-0.01153	-0.00283
22	0.007101	0.004139	0.003267	-0.00433	3.3E-05	-0.00042	-0.00195	-0.00224	0.005919	0.005981	0.002502	0.004473	0.001248	0.005758	4.01E-05	-0.00555	0.00235	-0.00166	-0.00698	0.000468	-0.01611	0.017323	0.013673	0.00362	0.006976	0.002861
23	0.001442	0.00027	0.002712	0.002125	0.006791	0.006545	0.002119	0.009001	0.002571	0.007789	0.001765	0.002755	0.006005	0.002221	0.003979	-0.0008	0.002394	-0.0056	0.00225	0.006577	0.002428	0.008997	0.010516	0.029827	0.009432	0.005077
24	0.000947	-0.00557	-0.0021	-0.00741	-0.00366	-0.00754	-0.00697	-0.01752	-0.00896	-0.0057	0.000159	-0.00141	-0.0088	-0.00284	-0.00887	-0.00729	0.000734	-0.02016	0.004962	-0.00081	-0.01077	-0.01369	0.026045	0.023285	-0.0141	0.005922
25	0.007362	-0.00107	0.006177	-0.02512	-0.01131	0.006985	0.005478	-0.01416	-0.00157	-0.01818	0.004942	0.013389	-0.00385	0.005077	-0.00458	-0.0056	0.007751	-0.01927	0.054538	0.002008	0.010116	0.063172	0.024446	0.009724	0.029468	0.028526
26	0.000338	-0.00044	-0.00059	-0.00148	-0.00076	-0.00221	-0.0008	-0.0032	-0.00251	-0.00185	0.000239	0.000353	-0.00204	-0.00058	-0.00247	-0.00211	3.87E-05	-0.00375	0.002327	-0.00241	-0.00889	-0.00328	0.001389	0.001525	-0.00285	0.012565

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	0.106957	0.002852	0.004153	0.012897	-0.00515	0.09428	-0.00029	0.092738	0.040399	0.023846	0.017373	-0.23862	0.006092	-0.00166	0.008476	0.012203	-0.00875	-0.00154	0.006908	-0.01188	0.017021	-0.01232	0.008811	0.007254	-0.08615	0.005186
2	0.004156	0.003408	0.008917	0.005826	0.009079	0.012034	0.015415	0.007676	0.011822	0.032674	0.022111	0.013789	-0.00116	-0.35371	-0.04544	-0.01143	0.030008	-0.01091	0.011047	-0.05992	0.00094	0.024683	0.003591	0.003181	0.010784	0.006216
3	0.024028	0.008602	0.235482	0.018168	0.081797	0.009938	0.011654	0.012181	0.010899	0.053738	0.020411	0.007804	0.010915	0.008536	0.007473	0.01439	0.007886	0.004931	0.008391	0.010975	0.0087	0.00029	0.007537	0.006622	-0.04202	0.009915
4	0.000279	0.000161	0.000739	0.191103	0.000165	0.000175	9.16E-05	-0.00013	1.22E-05	-1.1E-05	0.000754	0.000376	3.82E-05	0.000159	2.17E-05	0.000342	0.000315	-0.00013	0.000258	0.000422	0.000171	-5.6E-06	0.000764	0.000508	-0.00069	0.000362
5	0.000513	0.000891	0.001051	0.041151	0.163374	0.00083	0.000704	0.000781	0.000829	0.000437	0.001593	0.000915	0.00063	0.000799	0.000709	0.001166	0.000664	0.01002	0.000689	0.000855	0.001064	0.000489	0.000415	0.000431	0.001008	0.001005
6	0.001263	0.001786	-0.00091	-0.00062	0.003102	-0.08698	0.002095	-0.00142	0.021678	0.000787	0.003919	0.002681	-0.001	0.001787	0.000382	0.001827	0.006873	-0.03936	0.000707	0.002496	0.002493	-0.00086	-0.0006	0.001327	-0.00072	0.001618
7	-8.3E-05	-0.0003	0.000355	-0.00316	0.001576	0.000103	-0.00642	-0.03477	0.009577	-0.0038	0.002197	-0.00058	-0.00279	-0.00077	-0.00074	0.001714	-0.00066	-0.01215	0.00162	-0.04362	-0.0004	0.001659	-0.00139	-0.00048	-0.00188	0.001154
8	0.000179	0.000275	0.000312	0.000297	0.000612	0.000268	0.001694	-0.01279	0.005045	0.000234	0.000433	0.000307	0.00029	0.000231	0.00014	-0.00064	0.00026	0.000769	0.000401	0.013437	0.000497	0.000156	0.000228	0.000699	-0.00019	0.001014
9	0.002188	7.44E-05	0.005908	0.011797	0.048004	0.002888	0.005024	0.006818	0.198289	-0.01094	0.008403	0.008384	0.00434	0.003558	0.000424	7.88E-06	0.006095	-0.00133	-0.00224	-0.00041	-0.03279	0.003783	0.001992	0.002794	-0.0008	0.012462
10	0.020544	0.009105	0.018856	0.018758	0.01299	0.035799	0.004701	-0.02183	0.016552	0.070007	0.043522	0.016209	0.059986	0.012973	0.021253	0.018694	0.019463	0.029864	0.015575	0.006833	0.01085	0.007456	0.003357	0.004793	-0.00277	0.015069
11	0.013996	0.02622	0.037641	0.027789	0.023467	0.038755	0.065633	0.070085	0.022833	0.153713	0.064765	0.050318	0.086417	0.093549	0.05705	0.014712	0.036746	0.030893	0.009776	0.053967	0.001618	0.097755	0.018937	0.018688	0.055766	0.024714
12	0.002253	0.001669	0.003542	0.003261	0.003536	0.017825	0.001968	-0.00238	0.004959	0.003595	0.005791	0.455777	0.006288	0.001344	0.010772	0.00432	-0.0012	0.003773	0.001923	0.001905	0.001555	-0.00031	0.001301	0.002498	-0.00078	0.003569
13	0.002598	0.003901	0.003525	-0.01598	0.002063	0.02049	0.002426	-0.0084	0.017808	-0.00747	0.011743	0.005832	0.122616	0.004553	0.017519	0.003455	0.005866	-0.00288	0.006107	0.053592	-0.00672	0.006273	-0.00024	0.005506	-0.00089	0.009965
14	0.001452	-0.00102	0.000565	0.005131	0.004032	0.002489	0.000619	-0.00546	0.011587	0.002725	0.003455	0.002364	0.010418	0.205876	0.021058	-0.01022	0.058627	-0.0099	0.002554	-0.03746	0.001047	0.003347	-0.00033	0.00027	-0.00131	0.002435
15	0.002608	0.004641	-0.00548	0.026085	0.008129	0.007152	0.003503	0.008329	0.010568	0.002785	0.004469	0.005713	0.016871	0.052538	0.162947	0.026482	0.055928	0.107434	0.014346	0.021765	0.002346	0.00424	0.000447	0.003103	0.001261	0.00801
16	0.032506	0.030216	0.045185	0.034765	0.04837	0.034009	0.027399	0.031638	0.037836	0.029828	0.062361	0.045146	0.034989	0.02739	0.025544	0.168915	0.120532	0.040946	0.023206	0.045021	0.036249	0.016522	0.002047	0.014682	0.010934	0.03076
17	0.008931	0.00463	0.008263	0.00542	0.006976	0.006405	0.005285	0.005296	0.006805	0.004667	0.009838	0.009928	0.004818	0.004558	0.006048	0.008697	0.14455	0.012605	0.00436	0.008375	0.007447	-0.00763	0.002922	0.003883	-0.00017	0.00874
18	0.007961	0.000851	0.004152	0.000575	0.001006	0.001492	0.003511	0.000177	0.001304	0.000771	0.001875	0.005208	0.000869	0.000927	0.001937	0.001674	0.004435	-0.21057	0.001573	0.001225	0.000558	0.002317	0.000173	8.59E-05	0.000498	0.004788
19	0.012713	-0.01164	0.015705	0.008608	0.011529	0.028261	0.032513	0.029388	0.017895	0.015277	0.011295	0.027352	0.012533	0.081743	0.0723	0.00659	0.027657	0.027326	0.250458	0.017308	0.008448	0.01522	0.026208	0.016415	0.025637	0.02945
20	-0.00038	0.007256	1.94E-06	-0.00109	0.002403	0.000137	0.000198	-0.0013	-0.00144	-0.00018	0.004108	-0.00054	-0.00072	0.005317	0.000478	0.013442	0.002376	-0.00331	0.02197	-0.00172	-0.00819	0.028583	0.003511	0.011092	-0.00039	0.03312
21	0.016328	0.02282	0.013956	0.000901	0.031076	-0.02873	0.011224	-0.03203	-0.02194	-0.02901	0.076413	0.016564	-0.0149	0.01874	-0.02482	-0.02068	0.033851	-0.11381	-0.03072	-0.03062	0.035302	-0.00459	0.011715	0.02718	-0.02559	0.034804
22	0.018919	0.011608	0.021236	0.016745	0.008379	0.034706	0.032712	0.043164	0.030933	0.027511	0.031962	0.029023	0.039114	0.021464	0.028008	0.021433	0.023516	0.022054	0.014016	0.039513	0.02506	0.284377	0.023357	0.061038	0.027105	0.048501
23	0.004393	0.004964	0.010615	0.006373	0.01361	0.0086	0.009905	0.008481	0.003574	0.005851	0.009678	0.008274	0.007349	0.0074	0.007091	0.005945	0.008882	0.001489	0.006912	0.02085	0.010995	0.096591	0.073236	0.018217	0.025768	0.016101
24	0.012246	-0.0016	0.009117	0.002428	0.019716	0.010645	0.012191	0.004801	0.007575	0.023274	0.006184	0.013775	0.00383	0.070579	0.014781	0.001932	0.010118	0.000963	0.00256	0.016714	-0.00048	0.05413	0.177604	0.163302	0.029992	0.023515
25	0.006466	0.000736	0.002187	-0.0169	-0.0032	0.003674	-0.00127	-0.01288	-0.00531	-0.0161	0.016635	0.008352	-0.00038	-0.00056	-0.00274	0.00067	0.015109	-0.01807	0.017585	0.037082	0.026665	0.002293	0.017743	0.043762	0.235749	0.047362
26	0.000438	0.000793	9.15E-07	-5.3E-05	0.009048	-0.0009	0.000139	-0.00149	-0.00042	-0.00044	0.001483	0.00027	-0.00029	0.000158	-0.00092	-0.00033	0.001538	-0.00146	0.00375	0.002859	-0.0023	0.003823	0.047352	0.0068	0.006978	0.006937

Appendix 15
Synergetic or Second Round Effects, Malaysia
1983

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	28	29	SUM	
1	0.041932	-0.00342	0.06504	0.020642	-0.0366	0.024552	-0.04679	-0.00956	-0.00093	0.000897	-0.04221	-0.00015	0.003837	2.45E-05	-0.00017	-0.00557	-0.00297	-0.00131	-0.00673	-0.00479	-0.01188	-0.00088	0.001007	-0.04289	0.002018	-0.06624		
2	0.006307	0.00884	0.009111	0.010144	0.004094	0.011914	0.009924	0.007499	0.007717	0.010854	0.28508	0.002906	0.034589	-0.13215	-0.01222	-0.00587	-0.00059	-0.00744	0.066723	-0.01644	0.008444	0.016808	0.001972	0.000614	0.006018	0.002923	0.321205	
3	0.032735	-0.00023	0.238838	0.067372	0.03732	0.001766	0.009943	0.003067	0.000352	-0.01326	0.006626	0.016514	0.000422	0.00133	0.000211	3.17E-05	0.000363	-0.00217	0.000656	0.001911	-0.00057	-0.00156	0.000973	0.001219	-0.00545	0.003343	0.362168	
4	9.07E-05	-5.9E-05	0.000126	0.004883	0.000311	0.000117	9.16E-05	3.41E-05	1.21E-05	-0.00015	5.3E-05	7.73E-05	-1.9E-05	5.95E-05	-1.6E-05	-1.1E-05	-7.5E-06	0.000299	4.4E-05	0.000183	-0.00022	-0.00028	0.000124	0.000132	-0.00199	0.000205	0.004088	
5	3.3E-05	4.81E-05	0.000173	0.000144	-0.00188	0.000295	0.000154	0.000178	0.000199	0.000283	8.11E-05	0.000159	6.99E-05	0.000208	0.000252	0.000282	6.55E-05	0.000225	0.00038	0.000238	6.38E-05	0.000229	3.3E-05	3.48E-05	0.000126	5.26E-05	0.002114	
6	-0.00053	-1.9E-05	-0.00195	-0.0012	0.00157	-0.08658	-0.00012	0.02736	-0.00288	0.000719	0.000176	-0.00509	-0.00272	0.000909	-0.00141	0.014307	0.003356	-0.0325	-0.00037	0.000409	-0.00011	-0.00186	-0.00162	0.000222	0.000487	-0.00212	-0.09158	
7	0.000314	-0.00102	0.000372	0.001018	0.000805	0.000739	0.008463	0.005664	0.001773	0.001884	0.00047	0.003431	0.00102	7.37E-05	0.004019	0.001996	-0.00082	-0.00521	6.3E-05	0.001896	0.000136	-0.00011	-0.00162	0.000222	0.000229	-0.00041	-0.00075	0.023966
8	2.21E-05	-1.7E-05	1.11E-05	0.000193	-0.0001	0.000135	3.53E-05	-0.01574	-0.00316	0.000107	1.9E-05	0.000189	0.000149	6.19E-05	-0.00013	0.001214	-2.4E-05	0.000135	5.09E-06	0.000291	-0.00016	-6.1E-05	0.000192	2.97E-05	-0.00026	-8.7E-05	-0.01695	
9	0.001213	-0.00274	0.00075	0.021142	-0.01021	0.00252	0.001154	-0.00143	-0.0192	-0.01059	0.000619	4.53E-05	0.000822	0.000171	-0.00333	-0.0034	-0.00074	-0.00214	-0.00046	0.000624	-0.01684	-4.7E-06	0.008479	0.007073	0.006686	-0.00147	-0.02126	
10	0.007783	0.003271	0.007753	0.006125	0.001067	0.013107	0.009914	-0.02067	0.012454	0.085802	0.003655	0.01174	0.00828	0.003624	0.004287	0.000954	0.003183	0.011143	0.004689	-0.00311	0.003833	0.003641	0.000745	0.000475	0.000238	0.002265	0.185445	
11	0.00916	-0.00809	0.010693	0.003871	0.003808	0.021861	0.011919	0.001522	0.00114	0.000531	0.009405	-0.01917	0.013289	0.003012	0.004432	0.002739	0.000764	0.003015	-0.00629	0.004193	0.009165	0.00536	0.002567	0.001744	-0.00123	0.0003	0.089711	
12	0.000636	-0.00043	-6.5E-05	-0.00047	-0.00064	-0.0004	-0.00166	0.010705	-0.00102	0.002934	0.000557	0.00508	-0.00094	-0.00086	-0.001	0.000717	-0.00598	0.000582	-0.00117	0.000276	-0.00015	-0.01082	-0.00146	-8.6E-05	-0.00378	-9.3E-05	-0.01089	
13	-0.00015	-0.00177	-0.00025	-0.03409	-0.0055	-9.3E-05	0.001535	-0.0134	-0.00323	-0.00498	0.000373	0.002925	0.036959	0.000535	0.017416	-0.00103	0.002823	-0.00536	-0.00029	-0.00308	-0.00688	-0.00084	-0.00436	0.000266	-0.00121	-0.00114	-0.02481	
14	0.000342	-0.00091	0.002973	0.007344	0.000759	0.00138	0.000718	0.006609	0.006987	0.001295	0.00419	0.002761	0.004086	0.053651	0.015815	-0.01067	-0.00059	-0.01466	0.001338	-0.00724	0.000709	-0.00025	-0.00132	-0.00012	-0.0005	-0.00116	0.073539	
15	-0.0011	0.000482	-0.00657	0.003977	-0.00015	0.000803	-0.00098	0.004059	0.00037	-0.00469	-0.00223	0.004183	0.001906	0.011849	0.033385	0.002927	0.003334	0.00787	0.000355	0.000815	-0.0018	-0.00027	-0.00209	-6.4E-05	-0.00113	-0.00059	0.054852	
16	-0.00349	-0.00499	-8.3E-05	-0.00106	0.000698	0.001311	-0.0071	0.002312	-0.00118	-0.00033	0.000307	-0.00222	0.003668	-0.00104	0.00112	-0.04873	-0.00521	-0.04693	-0.0005	-0.00267	0.000418	-0.00264	-0.00158	-0.00131	0.008938	-0.00355	-0.12184	
17	-3.5E-06	0.001405	0.001939	0.001971	0.000749	0.002456	0.000744	0.001491	0.00116	0.001616	0.001074	0.001554	0.003598	0.002222	0.004548	0.001865	0.122144	0.006688	0.000571	0.002743	0.001244	-0.00227	0.000325	0.000513	0.001817	-0.00035	0.161812	
18	8.63E-05	-0.00044	-9.8E-05	-0.00079	-0.00097	0.008497	0.000149	-0.00063	-0.00206	-0.0011	9.7E-06	-0.00016	-4.2E-05	-0.00017	-0.00013	-0.00024	9.75E-06	-0.34069	-0.00015	-0.00033	-0.00041	-0.00055	-0.00049	0.001999	-0.00078	-0.00099	-0.34049	
19	0.003866	-0.01389	0.00952	0.010196	0.00715	0.028137	0.011385	0.001712	0.007396	-0.00359	0.003759	0.013202	0.022426	0.012072	0.010466	0.008269	0.00445	0.011976	0.018237	0.001269	0.0033	0.000211	0.024416	0.004899	-0.00312	0.006256	0.203967	
20	0.002366	-0.00324	0.002101	0.000547	0.001048	0.001707	0.006689	0.002476	0.001238	1.31E-06	0.001758	0.001314	0.001869	-0.00043	0.000796	-0.00031	0.000672	-0.00113	-0.00291	-0.00751	0.000371	-0.00176	-0.00392	0.001263	0.00065	-0.00707	-0.00142	
21	0.006986	-0.0123	0.00624	-0.0066	0.005126	-0.00182	0.015681	-0.01149	-0.02046	-0.00509	0.005511	-0.00592	-0.00028	0.02356	6.5E-05	-0.01706	-0.00266	-0.10611	0.012829	-0.01175	-0.00067	-0.01166	-0.0014	0.002694	-0.01694	-0.00799	-0.16951	
22	0.008488	0.042436	0.016787	0.000246	-0.0066	0.00343	-0.02393	-0.02091	0.0025	0.017964	0.013443	0.003799	0.012027	0.024247	0.007882	0.003824	-0.00041	0.000933	0.009445	0.021352	0.042217	0.00962	-0.00533	0.001867	0.006615	0.002459	0.194402	
23	0.00103	-0.00053	0.000958	0.000153	-0.00017	-0.00039	0.000868	-0.00054	-0.00063	-0.00118	0.000395	0.000338	-0.00054	0.001285	0.000173	-0.00149	0.000197	-0.00496	-0.00362	0.003695	-0.00143	-0.00295	0.002034	0.004628	-0.00413	-0.00156	-0.00838	
24	0.002956	-0.00235	0.005262	-0.00033	0.00507	0.005248	0.005236	0.001317	0.005964	0.00382	0.002093	0.003875	0.004535	0.003973	0.004414	-0.00148	0.005718	-0.00142	-0.0007	-0.00318	-0.00579	-0.0070	0.004359	-0.00343	0.005518	0.003368	0.048156	
25	0.006993	-0.00297	0.006519	0.024139	0.03205	0.009776	0.01044	0.005832	0.003613	-0.0149	0.005371	0.0067	-1E-05	0.004963	-0.00107	-0.00206	0.000332	-0.01233	0.00305	0.018713	-0.01181	-0.0165	0.012869	0.014865	0.03746	0.014964	0.15629	
26	7.11E-05	-0.0005	-4.7E-05	-0.00012	3.48E-06	0.001028	0.00027	-0.00033	-0.00032	-0.0006	9.63E-05	0.000337	-7.4E-06	0.001593	0.000297	-0.0008	0.000261	-0.00152	4.4E-05	0.00585	-0.00678	-0.00363	0.000294	0.000492	6.92E-05	0.002596	-0.00146	
SUM	0.128134	-0.00344	0.376105	0.139451	0.005198	0.0515	0.024734	-0.01286	-0.0022	0.058026	0.321193	0.006347	0.136991	0.018389	0.090489	-0.0542	0.125084	-0.54466	0.094568	0.002431	0.009311	-0.04179	0.032714	0.041264	-0.00991	0.013824	1.006882	

1991

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0.065385	-0.0053	-0.00825	-0.01764	-0.05851	-0.00667	0.292484	0.114285	-0.00073	-0.01349	0.005115	-0.24346	-0.00786	-0.01156	-0.00374	-0.00598	-0.01041	-0.02527	0.00177	-0.02219	-0.01127	-0.01354	0.002541	0.002591	-0.09339	-0.00298	-0.08408	
2	0.011806	0.021957	0.014217	0.017223	0.008927	0.010377	0.018197	0.004402	0.010323	0.154855	0.772302	0.005605	0.047143	-0.67	-0.06796	-0.02938	-0.00411	-0.04619	0.139846	-0.05953	0.011608	0.036812	0.00415	-0.00264	0.008459	0.010649	0.429813	
3	0.064493	0.00095	0.333311	0.033919	0.00274	-0.00452	0.039495	0.017947	0.000445	0.013037	0.003157	0.02795	0.004535	0.030368	0.000865	-0.00538	0.002563	-0.00952	0.003267	-0.001062	-0.00292	0.00204	0.003906	0.003492	-0.02767	0.004414	0.520087	
4	0.000665	7.89E-06	4.28E-05	0.003991	-0.00039	-8.7E-05	0.000273	-0.00015	-0.00021	-0.00041	0.000252	0.000437	9.75E-06	0.001162	-0.00018	-0.00022	0.00013	-0.00063	0.000262	-0.00027	-0.00057	-0.00038	0.000487	0.000402	-0.00899	1.71E-05	-0.00625	
5	-0.00018	0.000109	0.0004	0.0001345	0.114827	0.000294	0.00028	0.000954	0.007789	-0.00013	7.05E-05	0.000378	0.000789	6.17E-05	0.000362	0.000216	0.000101	0.000833	-2E-05	7.34E-05	0.000899	0.001079	5.97E-05	5.17E-05	8.83E-05	0.000148	0.130878	
6	-0.00103	-0.0002	-0.00443	-0.00556	0.001546	-0.36479	0.001616	0.010339	-0.01058	-0.00263	0.000572	0.013565	-0.0055	0.001014	-0.0002	-0.00027	0.003334	-0.07212	-0.00212	-0.00051	-2E-05	-0.00228	0.000144	0.000448	-0.00171	-0.00516	-0.45052	
7	0.001067	-0.00338	0.000183	-0.00683	-0.00021	-0.00192	-0.00482	-0.25108	-0.00246	-0.00488	0.001372	0.001464	-0.0044	-0.00246	-0.00063	-0.00248	-0.00326	-0.02791	8.1E-05	-0.07653	-0.00222	-0.0003	-0.00344	-0.00514	-0.00268	-0.00187	-0.40473	
8	0.000108	3.3E-05	0.000132	-9.5E-08	0.000447	0.002315	0.001647	0.007606	-0.00397	-4E-05	0.000113	0.000274	0.000159	0.000117	-0.00018	-0.00178	0.000106	-5E-05	6.4E-05	-1.6E-05	8.67E-05	0.000264	0.000147	6.21E-05	0.001676	0.000793	0.010106	
9	0.006366	0.000541	0.007301	-1.8E-05	0.7905	0.000955	0.011679	0.016007	-0.016	-0.0215	0.007638	0.013052	0.007721	0.008342	-0.00345	-0.00312	0.006111	-0.01382	0.001782	0.002788	-0.02367	0.002068	0.003628	0.015311	0.002101	0.00542	0.116281	
10	0.002854	0.000668	0.014961	0.00908	0.001114	-0.00032	0.006195	-0.01736	0.00608	0.008626	0.006379	-0.01041	0.052774	-0.00044	0.016872	-0.00811	0.001976	0.018604	0.008032	-0.01317	-0.00051	0.001836	-0.00072	-0.00017	-0.00489	0.001889	0.101841	
11	-0.00629	-0.05194	-0.00437	-0.01386	0.002222	-0.02973	-0.00783	-0.0169	-0.00791	-0.02656	0.018172	-0.07522	-0.00282	-0.02133	-0.00369	-0.00915	-0.00097	-0.01369	-0.23652	-0.0136	-0.00805	-0.02819	-0.00662	3.12E-05	-0.03177	-0.0024	-0.59299	
12	-0.00141	-0.0027	-0.00103	-0.00116	-0.00091	-0.00385	-0.00202	0.010025	-0.00137	-0.00267	0.001931	0.079787	-0.00022	-0.00246	-0.00056	-0.00205	-0.00585	-0.00026	-0.00182	-0.00606	-0.00499	-0.01093	-0.00123	-0.00013	-0.00731	0.002785	0.034434	
13	-0.00082	-0.00193	0.00622	0.025906	0.037871	0.003958	0.025461	0.000308	0.004743	-0.02309	0.006645	0.008738	0.093367	0.030345	0.3679	-0.00039	0.033536	0.029809	0.001281	0.017641	-0.021	0.001585	-0.00382	-0.00088	-0.00119	0.0005021	0.317005	
14	-0.00112	-0.00685	-0.00189	0.011975	0.002423	-0.00096	-0.00045	-0.00924	-0.00093	-0.00379	0.004696	0.000337	0.090907	0.179975	-0.05445	-0.02967	-0.00033	-0.06525	-0.00158	-0.01516	-0.0021	1.15E-05	-0.00189	-0.0028	-0.00435	0.000522	0.009139	
15	0.001221	0.001759	0.002636	0.091618	0.06621	0.001606	0.006156	0.032315	0.005072	-0.00463	0.018655	0.006411	0.00738	0.062712	0.149193	0.027168	0.007169	0.014435	0.009967	0.025114	-0.00193	0.003176	-0.00147	0.000612	0.001418	0.00493	0.478896	
16	0.006648	0.001514	0.014469	0.007648	0.029956	0.010409	0.015269	0.039578	0.01099	0.007761	0.007943	0.011478	0.021229	0.016474	0.024585	0.034211	0.024621	-0.04375	-0.01057	0.010954	0.005128	0.012734	0.000797	-0.00109	0.00033	0.134876	0.394191	
17	0.006386	0.006239	0.009155	0.007179	0.004318	0.005716	0.012977	0.01199	0.005993	0.004743	0.005329	0.009916	0.01043	0.008725	0.009435	0.010087	0.26606	0.006199	0.003367	0.016205	0.004991	0.06596	0.004045	0.003534	-0.00205	0.037635	0.495102	
18	0.003759	0.004173	0.00354	0.001769	-0.00061	-0.00627	0.006073	0.003794	-0.00256	0.000953	0.002243	0.004583	0.005476	0.003859	0.00278	0.000807	0.001203	-0.47838	0.001465	0.004052	0.001667	0.004371	0.003369	0.00085	0.012944	0.006335	-0.40775	
19	0.00757	-0.03085	0.018293	0.007729	0.011667	-0.01899	0.014392	0.009528	-0.003962	0.017321	0.020417	-0.02548	0.014577	0.041535	0.017791	0.005312	0.008663	0.00096	0.072049	0.002666	0.0518	0.00624	0.024746	0.006568	-0.0324	0.022952	0.329469	
20	0.000622	-0.01005	0.002137	0.000535	0.00297	-0.00096	0.005428	0.002936	-7.5E-05	0.000261	0.006408	0.000754	-0.00316	0.000412	-0.00049	0.002555	-0.00277	0.07513	-0.01037	-0.00988	0.004894	-0.00055	-0.02587	-0.00148	0.011846	-0.00304		
21	0.016564	-0.01206	0.022434	0.028258	0.043363	-0.02718	0.039657	0.010728	-0.01755	-0.04024	0.076514	0.012953	0.01849	0.167435	0.045581	0.017618	0.081309	-0.001851	0.008348	0.003299	0.002188	0.0181	0.002334	0.007935	0.009038	-0.01718	0.035318	0.496061
22	0.010025	0.012999	0.030337	-0.00092	-0.00012	0.001163	-0.0202	-0.0323	0.0047	0.000377	0.021641	0.021844	0.023836	0.02485	0.019676	-0.00164	0.001851	0.008348	0.003299	0.002188	0.0334	0.07114	0.009538	0.007352	0.006206	0.048646	0.308243	
23	0.001719	0.000661	0.002801	-0.00062	0.002874	0.000297	0.003326	0.002941	-0.00027	-0.0017	0.003783	0.00418	0.003082	0.005379	0.002335	-0.00116	0.002336	-0.00793	-0.00151	0.005293	-0.00237	0.001105	0.137826	0.02408	0.002531	0.008654	0.19965	
24	0.005411	0.001242	0.010145	0.004458	0.034163	0.003502	0.010601	-0.00157	0.010142	-0.00069	0.015037	0.016772	0.009443	0.014221	0.006922	0.001547	0.006825	-0.00888	0.010398	-0.01355	0.017213	0.027079	0.030617	0.001172	-0.00988	0.021566	0.22392	
25	0.036626	0.016942	0.02573	-0.04866	-0.00939	0.008454	0.030345	0.012519	0.008658	-0.03274	0.029347	0.03523	0.021673	0.02474	0.003165	-0.00443	0.01737	-0.0274	0.040466	0.001412	-0.00958	0.008318	0.045076	0.049469	0.014161	0.054501	0.35561	
26	0.001158	0.00058	0.00076	-0.00105	0.001034	-0.00773	0.000693	-0.00201	-0.00197	-0.00205	0.001909	0.002784	-5.5E-05	0.001681	-0.00137	-0.00019	0.000733	-0.00301	0.012527	-0.00165	-0.01037	-0.00398	0.002136	0.000398	-0.00408	0.002954	-0.00588	
SUM	0.239605	-0.05487	0.499231	0.154985	0.317575	-0.41834	0.506702	-0.0224	0.012295	0.026712	1.03764	-0.02595	0.333024	-0.11671	0.198357	-0.00785	0.404262	-0.77878	0.046368	-0.14488	0.033468	0.19434	0.267406	0.086938	-0.20713	0.413374	2.99549	

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	28	29	SUM
1	0.206498	-0.01544	-0.12314	-0.02689	0.102995	0.031368	0.396609	0.074175	0.097401	0.187807	0.000197	-1.04759	-0.01688	-0.02719	0.010079	-0.00307	-0.0506	-0.02606	0.017141	-0.04524	-0.01529	-0.02372	0.00318	-0.00418	-0.12777	-0.00141	-0.43703
2	0.03516	-0.0102	0.0371	0.005428	0.014429	0.008428	0.019125	-0.012	0.017282	0.058066	0.160118	0.016344	-0.01091	-1.29432	-0.28794	-0.07629	-0.00841	-0.01746	-0.07662	-0.12219	-0.01006	0.034134	-0.00108	-0.00673	0.001679	-0.00474	-1.53466
3	0.104601	0.00127	0.888371	0.09582	0.01821	0.006649	0.059903	0.027326	0.010761	0.213781	0.004026	0.013607	0.013986	0.007367	0.004897	0.002061	0.005166	-0.00986	0.015319	0.010132	0.003028	0.017796	0.007953	0.004164	0.085122	0.032469	1.637926
4	0.000538	-0.00023	0.001853	0.248572	-0.00072	8.37E-05	0.000178	-0.00059	-0.00024	0.005126	0.00011	0.000588	-0.00019	0.000146	-0.00034	-0.00034	0.000258	-0.00102	0.001614	-1E-04	-0.00019	0.001622	0.000796	0.000351	-0.01002	2.34E-05	0.247893
5	-0.00056	-0.00013	-0.0004	-0.00036	0.089943	-0.00035	-0.00028	-0.00054	-0.00043	-0.00157	-6.1E-05	-0.00077	-0.00098	-0.00015	-0.00042	-0.00057	-7.5E-05	-0.0008	-0.00029	-0.00046	-0.00016	-0.00032	7.2E-06	-4.2E-05	-0.00028	-0.00013	0.079822
6	0.000536	-0.00079	-0.00927	-0.00984	-0.00474	-0.48335	-4.6E-05	0.062949	-0.01602	-0.00346	0.000213	-0.00462	-0.0102	0.00098	-0.00323	-0.00229	0.063768	-0.14081	-0.00256	0.004298	-0.00171	-0.00433	-0.00313	0.002216	0.000128	-0.00566	-0.57098
7	0.004804	-0.00805	0.00063	-0.01447	-0.00048	-0.00325	-0.1264	-0.73777	0.03493	-0.014	-0.00103	-0.0117	-0.01071	-0.0048	-0.00359	0.008822	0.005208	-0.04838	-0.0061	-0.18992	-0.00598	-0.00433	-0.0089	-0.01686	-0.00673	-0.0188	-1.17702
8	0.000277	7.65E-06	0.000234	0.000156	-0.00041	0.00074	0.000353	0.167652	-0.00401	-0.0002	0.000145	0.002547	0.001014	0.000415	-9.3E-05	-0.00013	0.01944	0.014313	-0.03077	-0.00846	-0.01685	-0.10368	-0.00977	-0.005	0.009651	-0.00041	0.172617
9	0.002523	-0.01049	0.033332	0.052561	-0.12362	0.007409	0.024291	0.018558	0.039831	0.283557	0.055404	0.030691	0.055713	0.048752	0.014894	0.007267	0.017367	0.041396	0.019129	-0.01721	-0.00128	0.010522	0.001356	-0.00194	-0.0086	-0.00176	0.832307
10	0.027456	0.003237	0.034266	0.05239	-0.00056	0.157663	0.025279	-0.06252	0.039831	0.283557	0.055404	0.030691	0.055713	0.048752	0.014894	0.007267	0.017367	0.041396	0.019129	-0.01721	-0.00128	0.010522	0.001356	-0.00194	-0.0086	-0.00176	0.832307
11	0.152258	-0.09489	0.18863	0.005277	0.035677	-0.00359	0.077601	0.017674	0.057516	0.1344	0.03851	0.022648	0.031576	-0.00836	0.015734	-0.01126	0.020148	-0.00439	-0.53001	-0.0222	-0.03601	0.096746	-0.00658	0.013982	-0.00623	0.006468	0.201306
12	0.008109	-0.00605	0.001739	-0.00154	-0.00125	0.005677	-0.00017	-0.01466	-0.00221	-0.00213	-0.00056	0.456243	-0.00669	-0.00112	0.014697	-0.00476	-0.04167	0.001211	-0.00285	-0.00329	-0.0118	-0.02207	-0.00198	-0.00039	-0.0115	-0.00021	0.356764
13	0.010658	-0.00462	0.002051	-0.06584	-0.0248	0.112806	0.003888	0.051023	-0.01734	-0.05309	0.001685	0.012101	0.20618	0.03748	-0.00703	-0.00323	0.049891	0.002155	0.0095118	-0.04145	0.001989	-0.00803	-0.00489	0.000514	-0.00741	0.355554	
14	-0.00122	-0.01348	-0.0095	0.023233	-0.00104	0.001499	-0.00264	-0.00802	0.000399	-0.0038	-0.00512	0.004039	-0.00079	0.374681	-0.16958	-0.07013	0.00587	0.066833	-0.00616	0.035826	-0.00535	-0.00116	0.00247	-0.00728	-0.00646	-0.01037	0.191857
15	-0.00336	8.88E-05	-0.02464	0.181047	-0.00047	0.007393	0.019616	0.069685	0.01063	9.7E-05	-0.01119	0.009025	0.017859	0.053108	0.194907	0.05107	0.014557	0.078264	0.005181	0.027355	-0.00938	0.002864	-0.00214	-0.00194	0.003892	-0.00215	0.691344
16	0.007061	0.007417	0.013485	0.083976	0.018097	0.032533	0.000241	0.023362	0.011774	0.016808	0.034121	0.008846	0.016278	0.044578	0.073081	-0.05505	0.062604	0.087062	0.045847	0.013829	0.008061	0.043613	0.257088	-0.00104	0.023078	0.020655	0.897403
17	0.012611	0.007243	0.006562	0.001146	0.001858	0.00201	0.005724	0.028886	0.001647	0.001881	0.002586	0.007369	0.000245	0.004338	0.002276	0.0036	0.626177	0.008575	0.010799	0.006514	0.006713	0.049282	0.005143	0.00184	-0.00902	0.041898	0.837909
18	0.000808	0.007571	0.001507	0.001245	-0.00334	0.018631	0.001944	0.011227	-0.00686	0.001707	0.002443	0.002374	0.005301	0.006798	0.005679	0.001783	0.002784	-0.77698	0.012081	0.004445	-0.00049	0.002367	0.008613	0.01222	0.016136	0.020447	-0.63956
19	0.019542	-0.06127	0.155568	0.029104	0.044198	0.05608	0.074553	0.029141	0.08837	0.066137	0.028446	0.106211	0.067363	0.117169	0.090874	0.011957	0.049276	0.022611	-0.00511	-0.03494	-0.02658	-0.00748	0.029388	0.057583	-0.00655	0.057319	1.468749
20	0.001339	-0.02183	0.005992	0.008117	0.007991	0.004167	0.000718	-0.00695	0.016659	0.012631	0.000684	0.019653	0.029974	-0.01018	-0.00243	-0.00702	0.013817	-0.00511	-0.04605	0.176069	-0.24667	-0.02478	0.029388	0.057583	-0.00655	0.057319	1.468749
21	0.067317	-0.04765	0.053091	0.040888	0.03849	-0.00789	0.081221	0.01566	-0.00655	-0.01512	0.112625	0.049231	-0.00705	0.156879	-0.01361	-0.04605	0.176069	-0.24667	-0.02478	0.029388	0.057583	-0.00655	0.057319	1.468749	-0.00655	0.057319	1.468749
22	0.02266	0.013209	0.010427	-0.01382	0.000105	-0.00134	-0.00623	-0.00715	0.018888	0.019086	0.007984	0.014274	0.003986	0.018375	0.000128	-0.01772	0.007498	-0.00528	-0.02229	0.001492	-0.05142	0.233701	0.043613	0.011551	0.022263	0.009129	0.333134
23	0.004603	0.000863	0.00854	0.006782	0.021671	0.020951	0.006762	0.028724	0.008204	0.008999	0.005632	0.008791	0.019164	0.007088	0.012699	-0.00256	0.007641	-0.01788	0.007181	0.029989	0.007748	0.028711	0.03356	0.095183	0.0301	0.016203	0.96358
24	0.003021	-0.01778	-0.0067	-0.02364	-0.01169	-0.02405	-0.02225	-0.0559	-0.0286	-0.0182	0.000509	-0.00448	-0.02807	-0.00908	-0.0283	-0.02327	0.002342	-0.06434	0.015835	-0.0026	-0.03438	-0.04367	0.083114	0.074306	-0.04499	0.018898	-0.29396
25	0.023492	-0.00341	0.019713	-0.08016	-0.03611	0.022292	0.017481	-0.04519	-0.00501	-0.05803	0.015772	0.042727	-0.01227	0.016203	-0.01462	-0.01788	0.024753	-0.0615	0.174042	0.006402	0.032283	0.201597	0.078011	0.031032	0.094039	0.091033	0.556701
26	0.00108	-0.00139	-0.0019	-0.00472	-0.00243	-0.00705	-0.00254	-0.0102	-0.008	-0.0059	0.000762	0.001128	-0.0065	-0.00184	-0.0079	-0.00672	0.000123	-0.01196	0.007426	-0.0077	-0.02836	-0.01048	0.004434	0.004867	-0.0091	0.040098	-0.07476
SUM	0.711815	-0.2768	1.287641	0.593826	0.179017	-0.0405	0.654134	-0.33953	0.59438	0.803864	0.457149	-0.2155	0.360834	-0.45154	-0.10101	-0.28123	1.071081	-1.15945	-0.29134	-0.19379	-0.31065	0.64679	0.544585	0.165128	-0.00718	0.153035	4.555369

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	28	29	SUM	
1	3.461541	0.092314	0.134403	0.417388	-0.16654	3.051272	-0.00931	3.001374	1.307474	0.771761	0.562253	-7.72262	0.197155	-0.0538	0.2743	0.39495	-0.28315	-0.04998	0.223568	-0.38436	0.550855	-0.39864	0.285171	0.234752	-2.78822	0.167024	3.271729	
2	0.134405	0.110308	0.288588	0.188561	0.293843	0.390477	0.498877	0.24841	0.382611	1.057467	0.715807	0.446273	-0.0375	-11.4476	-1.47077	-0.37	0.971176	-0.35305	0.357508	-1.9937	0.030435	0.798832	0.116209	0.102948	0.340026	0.204412	-7.93319	
3	0.777627	0.278408	1.621118	0.58798	2.647282	0.321617	0.377174	0.394235	0.352728	1.739176	0.660584	0.252578	0.353239	0.76248	0.241842	0.465726	0.255216	0.15959	0.27155	0.355184	0.281556	0.009377	0.243916	0.214299	-1.35978	0.296135	18.07461	
4	0.009031	0.095212	0.023903	0.184849	0.00533	0.095657	0.002963	-0.00407	0.000394	-0.00036	0.024399	0.012176	0.001235	0.005148	0.000703	0.011053	0.010198	-0.00428	0.008242	0.013666	0.005546	-0.00018	0.024731	0.016442	-0.19694	0.011714	6.176869	
5	0.016613	0.028852	0.034027	0.331821	5.287427	0.026855	0.022797	0.025266	0.026825	0.01413	0.05155	0.029605	0.020375	0.025949	0.027297	0.037733	0.021478	0.032413	0.022309	0.027682	0.034422	0.015811	0.01344	0.013942	0.032634	0.03252	7.249331	
6	0.040863	0.057816	-0.02935	-0.02004	0.100408	-2.81491	0.067794	-0.04596	0.701599	0.02548	0.12683	0.086776	-0.03238	0.057941	0.012373	0.059117	0.22245	-1.27398	0.022872	0.080782	0.080692	-0.02772	-0.01954	0.042957	-0.0233	0.052367	-2.44815	
7	-0.00268	-0.00976	0.01148	-0.10216	0.050991	0.003326	-0.20774	-1.12541	0.309961	-0.12299	0.077102	-0.01865	-0.09016	-0.02501	-0.02403	0.055456	-0.02143	-0.39306	0.052416	-1.41187	-0.01309	0.053707	-0.04404	-0.01548	-0.06088	0.037335	-3.04346	
8	0.005804	0.008905	0.010113	0.009597	0.019804	0.008689	0.054816	-0.41394	0.163273	0.007567	0.014016	0.009393	0.007483	0.004525	-0.02084	0.008402	0.024872	0.012962	0.0434865	0.016082	0.005039	0.007388	0.02263	0.06448	0.090435	-0.00615	0.032808	0.458043
9	0.070821	0.002408	0.19122	0.381807	1.553611	0.067578	0.1626	0.220659	6.471402	-0.35414	0.271962	0.271342	0.140457	0.115147	0.017375	0.000255	0.216678	-0.04296	-0.07258	-0.01332	-1.06123	0.12244	0.06448	0.090435	-0.026	0.403313	9.208121	
10	0.664868	0.294683	0.610251	0.607079	0.420405	1.158591	0.152152	-0.70638	0.535703	2.265688	1.408526	0.524572	1.941375	0.419857	0.687823	0.605026	0.629885	0.966519	0.504066	0.221143	0.351133	0.241307	0.10866	0.155136	-0.08973	0.487697	15.16604	
11	0.452965	0.848593	2.181207	0.89935	0.759488	1.25427	2.124136	2.268218	0.73895	4.974767	2.096044	1.628482	2.796778	3.027612	1.846361	0.476134	1.189255	0.99983	0.316388	1.746582	0.052365	3.163724	0.612881	0.604822	1.804812	0.799837	38.70085	
12	0.072911	0.054023	0.11462	0.105532	0.114444	0.576902	0.063704	-0.07692	0.160507	0.116363	0.187407	14.75073	0.203499	0.043482	0.348617	0.1398	-0.03896	0.12211	0.062227	0.061654	0.050324	-0.01007	0.042108	0.080835	-0.0251	0.115501	17.43625	
13	0.084083	0.126268	0.114089	-0.51705	0.066769	0.663141	0.078506	-0.27181	0.576341	-0.24182	0.380037	0.188753	3.968334	0.147366	0.56698	0.11181	0.189841	-0.09325	0.19764	1.734442	-0.21737	0.203003	-0.00767	0.178206	-0.02885	0.322305	8.520297	
14	0.046998	-0.03297	0.018291	0.166069	0.130476	0.080543	0.02004	-0.1768	0.374999	0.088177	0.111822	0.076506	0.337159	6.662959	0.681531	-0.33063	1.897401	-0.32034	0.082661	-1.21277	0.033877	0.108307	-0.01081	0.008754	-0.04247	0.078803	8.879084	
15	0.084413	0.15019	-0.17742	0.844226	0.263086	0.231453	0.113367	0.269556	0.342016	0.090128	0.144633	0.184889	0.545998	1.70832	5.273608	0.857048	1.810059	3.476975	0.464277	0.704397	0.075934	0.137224	0.014469	0.100416	0.040825	0.259232	18.00132	
16	1.052032	0.977901	1.462373	1.125117	1.565427	1.100674	0.886725	1.023922	1.224535	0.965347	2.018231	1.461105	1.132381	0.886455	0.826699	5.466739	3.900879	1.325188	0.751052	1.457043	1.173148	0.534716	0.066245	0.475163	0.353863	0.995521	34.20848	
17	0.28904	0.149855	0.267429	0.175425	0.225758	0.207282	0.171041	0.171394	0.220222	0.151053	0.138397	0.321325	0.155922	0.147515	0.195735	0.281484	4.67821	0.407934	0.14111	0.271047	0.241022	-0.24684	0.094561	0.125667	-0.00546	0.282862	9.438986	
18	0.25764	0.027557	0.134378	0.018601	0.032573	0.04828	0.113636	0.005723	0.042215	0.024867	0.060671	0.168554	0.028121	0.030005	0.062675	0.054167	0.143547	-6.81474	0.050906	0.039637	0.018046	0.074978	0.005585	0.002779	0.016101	0.154952	-5.19845	
19	0.411449	-0.37675	0.082664	0.278593	0.371313	0.914622	1.052259	0.951125	0.578825	0.494428	0.365536	0.88521	0.405603	2.645515	2.339909	0.213294	0.895077	0.884368	0.805799	0.560143	0.734	0.492586	0.848182	0.531265	0.829713	0.920749	26.3823	
20	-0.01245	0.234825	6.29E-05	-0.03524	0.077782	0.004445	0.006407	-0.04208	-0.04657	-0.00588	0.132955	-0.01759	-0.02342	0.172081	0.015458	0.435027	0.076899	-0.10727	0.711046	-0.0556	-0.26515	0.925033	0.113624	0.359881	-0.01272	0.177892	3.712578	
21	0.528443	0.738545	0.45168	0.029174	1.005751	-0.9299	0.363237	-1.0366	-0.70997	-0.93872	0.47304	0.536085	-0.48235	0.064847	-0.80322	-0.66936	1.095559	-3.6834	-0.99437	-0.99097	1.14251	-0.14942	0.379143	0.879647	-0.82823	1.126383	-0.85982	
22	0.6123	0.375694	0.687281	0.519493	0.271185	1.12323	1.058692	1.39696	1.001113	0.980358	1.034417	0.939298	0.278836	0.944652	0.906446	0.69365	0.761065	0.71374	0.453613	1.27878	0.811046	0.20355	0.755923	1.974524	0.877211	1.569602	31.89315	
23	0.142188	0.160666	0.234358	0.206252	0.440464	0.788435	0.320549	0.274489	0.115668	0.18937	0.31323	0.267765	0.273836	0.23949	0.229477	0.192419	0.287444	0.0482	0.223714	0.674792	0.355832	1.26061	2.370194	0.589582	0.833965	0.521087	12.98262	
24	0.39633	-0.05194	0.29507	0.078593	0.638075	0.34451	0.394541	0.155391	0.24515	0.72411	0.200128	0.445828	0.123956	0.284225	0.478362	0.062525	0.327468	0.031156	0.086087	0.54094	0.05584	1.751573	5.747953	5.28508	0.970643	0.761026	22.30168	
25	0.209253	0.023819	0.070766	-0.54689	-0.10344	0.118907	-0.04096	-0.41688	-0.17182	-0.52105	0.538364	0.270288	-0.01221	-0.01811	-0.08868	0.021687	0.488992	-0.58474	0.568477	1.200133	0.862973	0.074201	2.321885	1.416301	7.629752	1.532817	14.84382	
26	0.014184	0.02565	2.96E-05	-0.0017	0.292841	-0.02926	0.004492	-0.0482	-0.01346	-0.01417	0.047993	0.008749	-0.0093	0.005099	-0.02983	-0.01058	0.04978	-0.04733	0.121356	0.092527	-0.07437	0.123716	1.532485	0.220083	0.253837	2.60197	4.746824	
SUM	9.820761	4.301071	14.40441	12.95488	16.36637	8.205605	7.852493	6.041674	14.87669	12.39122	14.32974	16.00798	13.17737	8.656532	12.61357	9.233689	19.78342	-4.57549	12.74499	5.87676	4.794598	20.33363	15.86637	13.71107	8.470562	14.49918	292.1699	

Appendix 16
First Round Effects of Changes in Technical Coefficients Weighted by Global Intensity, Malaysia
 1983

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.04164702	-0.0034	0.064595	0.020501	-0.03635	0.024384	-0.04647	-0.00949673	-0.00093	-0.00927	0.000891	-0.04193	-0.00015	0.003810786	2.43E-05	-0.00017	-0.00553	-0.00295	-0.0013	-0.00668	-0.00475	-0.0118	-0.00088	0.001	-0.04259	0.002004	-0.06578392
2	0.00626502	0.00878	0.009049	0.010075	0.004066	0.011833	0.009856	0.007448006	0.007664	0.01078	0.266673	0.002886	0.034353	-0.1312456	-0.01214	-0.00583	-0.00058	-0.00739	0.066267	0.01633	0.008387	0.016693	0.001959	0.00061	0.005977	0.002903	0.31909236
3	0.032511033	-0.00023	0.237205	0.066911	0.003707	0.001754	0.009875	0.003046433	0.00035	-0.01317	0.000622	0.016401	0.000419	0.001312052	0.00021	3.15E-05	0.000361	-0.00216	0.000651	0.001898	-0.00056	-0.00155	0.000967	0.00121	-0.00541	0.003321	0.359602444
4	9.0061E-05	-5.8E-05	0.000125	0.004849	0.000309	0.000116	9.1E-05	3.38391E-05	1.2E-05	-0.00015	5.27E-05	7.68E-05	-1.9E-05	5.91244E-05	-1.6E-05	-1E-05	-7.4E-06	0.000297	4.37E-05	0.000182	-0.00022	-0.00028	0.000123	0.000132	-0.000198	0.000204	0.00400257
5	3.28134E-05	4.78E-05	0.000172	0.000143	-0.00187	0.000293	0.000153	0.000176325	0.000188	0.000281	8.05E-05	0.000158	6.94E-05	0.000206697	0.00025	0.00028	6.51E-05	0.000223	0.000377	0.000236	6.33E-05	0.000227	3.28E-05	3.46E-05	0.000125	5.22E-05	0.002099543
6	-0.00052947	-1.9E-05	-0.00194	-0.00119	0.001546	-0.08598	-0.00011	0.027172536	-0.00286	0.000714	0.000175	-0.00506	-0.0027	0.000902936	-0.0014	0.014209	0.003333	-0.03228	-0.00037	0.004046	-0.00011	-0.00185	-0.00161	0.000221	0.000484	-0.00211	-0.08995671
7	0.000312755	-0.00102	0.00037	0.001011	0.0008	0.000734	0.008405	0.005625504	0.001761	0.001871	0.000467	0.003408	0.000103	7.32396E-05	0.003991	0.001982	-0.00082	-0.00518	6.26E-05	0.001883	0.000135	2.66E-05	-0.0022	0.000227	-0.00041	-0.00074	0.023802411
8	2.19612E-05	-1.6E-05	1.11E-05	0.000192	-0.0001	0.000134	3.5E-05	-0.01563297	-0.00314	0.000107	1.89E-05	0.000188	0.000148	6.15186E-05	-0.00013	0.001286	-2.4E-05	0.000134	5.05E-06	0.000289	-0.00016	-6.1E-05	0.00019	2.95E-05	-0.00025	-8.6E-05	-0.0188361
9	0.001204369	-0.00272	0.000745	0.029997	-0.01014	0.002503	0.001146	-0.00142356	-0.01907	-0.01051	0.000614	4.5E-05	0.000816	0.000169756	-0.00331	-0.00337	-0.00073	-0.00022	-0.00046	0.00062	-0.01673	-4.7E-06	0.008422	0.007024	0.00664	-0.00146	-0.02111326
10	0.00729733	0.003248	0.0077	0.006083	0.00106	0.013017	0.009846	-0.02053164	0.012369	0.085215	0.00363	0.01166	0.008224	0.00359894	0.004258	0.000948	0.003161	0.01067	0.004657	-0.00309	0.003012	0.003616	0.00074	0.000472	0.000236	0.002249	0.184177053
11	0.009097404	-0.00804	0.01062	0.003845	0.03782	0.021712	0.01838	0.00511166	0.001132	0.000527	0.009341	-0.01904	0.013198	0.002991309	0.004402	0.00272	0.000759	0.002995	-0.00625	0.004164	0.009102	0.003233	0.002549	0.001732	-0.00122	0.000298	0.089697833
12	0.000632073	-0.00043	-6.4E-05	-0.00047	-0.00663	-0.0004	-0.00165	0.010631433	-0.00102	0.002914	0.000554	0.005045	-0.00094	-0.00085098	-0.00099	0.000712	-0.00594	0.000578	-0.00116	0.000274	-0.00149	-0.01075	-0.00145	-8.5E-05	-0.00375	-9.3E-05	-0.0081922
13	-0.00015367	-0.00176	-0.00025	-0.03386	-0.00546	-9.2E-05	0.001525	-0.01330403	-0.00321	-0.00494	0.000371	0.002905	0.0036706	0.000539002	0.017297	-0.00102	0.002804	-0.00532	-0.00029	-0.00306	-0.00684	-0.00083	-0.00433	0.000265	-0.0012	-0.00113	-0.02464252
14	0.000339738	-0.00091	0.002953	0.007294	0.000754	0.00137	0.000713	0.006563654	0.00694	0.001286	0.004161	0.002742	0.004058	0.05328427	0.015707	-0.0106	-0.00058	-0.01456	0.001329	-0.00719	0.000704	-0.00024	-0.00131	-0.00012	-0.0005	-0.00115	0.073036065
15	-0.001901	0.000479	-0.00652	0.00395	-0.00015	0.000797	-0.00098	0.004031683	0.000368	-0.00466	-0.00222	0.004155	0.001893	0.011768268	0.033355	0.002907	0.003311	0.007816	0.000352	0.000809	-0.00179	-0.00026	-0.00207	-6.4E-05	-0.00112	-0.00059	0.054477078
16	-0.00346234	-0.00496	-8.2E-05	-0.00105	0.000693	0.001302	-0.00705	0.00296584	-0.00118	-0.00032	0.000305	-0.00221	0.003643	-0.001033319	0.001113	-0.04839	-0.00517	-0.04661	-0.00645	-0.00265	0.000415	-0.00262	-0.00157	-0.0013	0.008876	-0.00353	-0.12101022
17	-3.43E-06	0.001395	0.001926	0.001957	0.000744	0.00244	0.000739	0.001480523	0.001152	0.001605	0.001066	0.001544	0.003573	0.002206364	0.004517	0.001852	0.121399	0.006643	0.000568	0.002724	0.001235	-0.00226	0.000323	0.00051	0.001805	-0.00095	0.160705793
18	8.56829E-05	-0.00044	-9.7E-05	-0.00078	-0.00097	0.008438	0.000148	-0.00062088	-0.00204	-0.0011	-9.6E-06	-0.00016	-4.2E-05	-0.00016663	-0.00012	-0.00024	9.68E-06	-0.33836	-0.00015	-0.00032	-0.00041	-0.00055	-0.00049	0.001985	-0.00078	-0.00098	-0.33816214
19	0.003839185	-0.0138	0.009455	0.010126	0.007101	0.027945	0.011307	0.001700582	0.007346	-0.00356	0.003733	0.013111	0.022273	0.01198985	0.010394	0.008212	0.00442	0.011894	0.001812	0.001261	0.003277	0.000209	0.024249	0.004865	-0.0031	0.006231	0.202572705
20	0.002248625	-0.00322	0.002087	0.000543	0.00104	0.001696	0.006644	0.00245872	0.0011229	1.3E-06	0.001746	0.001305	0.001856	-0.00042923	0.000791	-0.00031	0.000667	-0.00112	-0.00289	-0.00746	0.000369	-0.00175	-0.00389	0.001254	0.000645	-0.00702	-0.00141041
21	0.00693786	-0.01221	0.006197	-0.00655	0.005091	-0.00181	0.015574	-0.01140992	-0.02032	-0.00506	0.005473	-0.00588	-0.00823	0.023398987	6.46E-05	-0.01695	-0.00264	-4.10538	0.012741	-0.01167	-0.00667	-0.01158	-0.00139	0.002676	-0.01683	-0.00793	-0.16835221
22	0.008439413	0.042146	0.016672	0.000245	-0.00655	0.003407	-0.02377	-0.02076213	0.002483	0.0017841	0.013351	0.003773	0.011945	0.024800858	0.007828	0.003798	-0.00041	0.000926	0.009381	0.021206	0.004929	0.009554	-0.0053	0.0001854	0.00657	0.002442	0.193073413
23	0.010102265	-0.00052	0.000952	0.000152	-0.00017	-0.00039	0.000862	-0.0005338	-0.00063	-0.00174	0.000392	0.000336	-0.00054	0.001276604	0.000172	-0.00148	0.000196	-0.00493	-0.00359	0.00367	-0.00142	-0.00293	0.00202	0.004937	-0.00411	-0.00155	-0.00831953
24	0.00293545	-0.00233	0.005226	-0.00032	0.005035	0.005213	0.005201	0.001307845	0.005923	0.003794	0.002079	0.003848	0.0049504	0.003946293	0.004384	-0.00147	0.005679	-0.00141	-0.00069	-0.00316	-0.00575	-0.00785	0.004329	-0.0034	0.00548	0.005331	0.047826626
25	0.006944961	-0.00295	0.006474	0.023974	0.031831	0.009709	0.010368	0.005792269	0.003589	-0.0148	0.005334	0.006654	-1E-05	0.004928913	-0.01007	-0.00205	0.000329	-0.01224	0.003029	0.018586	-0.01173	-0.01638	0.012781	0.014764	0.036495	0.014862	0.155221745
26	7.05705E-05	-0.0005	-4.7E-05	-0.00012	3.46E-06	0.001021	0.000268	-0.00033269	-0.00032	-0.0006	9.56E-05	0.000335	-7.4E-06	0.001581913	0.000295	-0.00079	0.000259	-0.00151	-4.4E-05	0.00581	-0.00674	-0.00361	0.000292	0.000489	6.88E-05	0.002578	-0.0014596
SUM	0.127258152	-0.00342	0.373534	0.138498	0.005163	0.051148	0.024565	-0.01277125	-0.00219	0.051629	0.318997	0.006303	0.136055	0.0184624	0.08987	-0.05383	0.124229	-0.54094	0.093922	0.002414	0.009247	-0.04151	0.032491	0.040982	-0.00984	0.013729	1

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.021828	-0.00177	-0.00275	-0.00589	-0.01953	-0.00223	0.097641	0.038152	-0.00024	-0.00495	0.001707	-0.08128	-0.00262	-0.00386	-0.00125	-0.002	-0.00348	-0.00844	0.000591	-0.00741	-0.00376	-0.00452	0.000848	0.000865	-0.03318	-0.00099	-0.02807
2	0.003941	0.00733	0.004746	0.00575	0.00298	0.003464	0.006333	0.00147	0.003446	0.051696	0.257822	0.001871	0.015738	-0.22367	-0.02269	-0.00981	-0.00137	-0.01542	0.046695	-0.01987	0.003875	0.012289	0.001385	-0.00088	0.002824	0.003555	0.143487
3	0.02153	0.000317	0.111271	0.011323	0.000915	-0.00151	0.012851	0.005991	0.000148	0.004352	0.001054	0.009112	0.001514	0.001024	0.000289	-0.00019	0.000889	-0.00318	0.001091	0.000355	-0.00097	0.000681	0.001304	0.001232	-0.00924	0.001473	0.173623
4	0.000222	2.65E-06	1.45E-05	0.001032	-0.00013	-2.9E-05	9.12E-05	4.9E-05	-7.1E-05	-0.00014	8.4E-05	0.000146	3.26E-06	5.42E-05	-6.2E-05	-7.3E-05	4.34E-05	-0.00021	8.74E-05	-8.9E-05	-0.00019	-0.00013	0.000162	0.000134	-0.003	5.7E-06	-0.00209
5	-6.1E-05	3.64E-05	0.000134	0.000449	0.038333	9.81E-05	9.34E-05	0.000319	0.0026	-4.3E-05	2.35E-05	0.000126	0.000264	2.06E-05	0.000121	7.23E-05	3.38E-05	0.000278	-0.00071	-6.7E-06	0.00036	1.98E-05	1.72E-05	2.95E-05	4.94E-05	0.043692	
6	-0.00034	-6.5E-05	-0.00148	-0.00186	-0.000516	-0.12178	0.000539	0.003451	-0.00353	-0.00088	0.000191	0.004528	-0.00183	0.000338	-0.00074	-0.00076	0.001113	-0.02408	-0.00071	-6.6E-06	-0.00076	4.82E-05	0.00015	-0.00057	-0.00172	-0.1504	
7	0.000356	-0.00113	6.1E-05	-0.00228	-7.1E-05	-0.00064	-0.00161	-0.08382	-0.00082	-0.00163	0.000458	0.000489	-0.00147	-0.00082	-0.00021	-0.00083	-0.00109	-0.00932	2.7E-05	-0.02555	-0.00074	-0.0001	-0.00115	-0.00172	-0.00089	-0.00062	-0.13511
8	3.61E-05	1.1E-05	4.39E-05	-3.2E-08	0.000149	0.000773	0.00055	0.002539	-0.00133	-1.3E-05	3.77E-05	9.15E-05	5.3E-05	3.9E-05	-6.1E-05	-0.0006	3.33E-05	-1.7E-05	2.14E-05	-5.3E-06	2.89E-05	8.8E-05	4.91E-05	2.07E-05	0.000559	0.000265	0.003374
9	0.002125	0.000181	0.002437	-5.9E-06	0.02639	0.000319	0.003899	0.005344	-0.00534	-0.00718	0.00255	0.004357	0.002578	0.002785	-0.00115	-0.00104	0.00204	-0.00461	0.000595	0.000931	-0.0079	0.00069	0.001211	0.005111	0.000701	0.001809	0.038819
10	0.000953	0.000223	0.004994	0.003031	0.000372	-0.00011	0.002068	-0.0058	0.00203	0.00288	0.00213	-0.00348	0.017618	-0.00015	0.005632	-0.00271	0.00066	0.006211	0.002681	-0.0044	-0.00017	0.000613	-0.00024	-5.7E-05	-0.00163	0.000631	0.03998
11	-0.0021	-0.01734	-0.00146	-0.00463	0.000742	-0.00993	-0.00261	-0.00564	-0.00264	-0.00887	0.006066	-0.02511	-0.00094	-0.00712	-0.00123	-0.00306	-0.00032	-0.00457	-0.07896	-0.00454	-0.00269	-0.00941	-0.00021	1.04E-05	-0.01061	-0.0008	-0.19796
12	-0.00047	-0.0009	-0.00034	-0.00039	-0.0003	-0.00128	-0.00067	0.003347	-0.00046	-0.00089	0.000645	0.026636	-7.3E-05	-0.00082	-0.00019	-0.00069	-0.00195	-8.6E-05	-0.00061	-0.00202	-0.00167	-0.00335	-0.00041	-4.5E-05	-0.00244	0.00093	0.011495
13	-0.00027	-0.00064	0.002076	0.008648	0.012643	0.001321	0.0085	0.000103	0.001583	-0.00771	0.002218	0.002917	0.031169	0.01013	0.012282	-0.00013	0.011196	0.009951	0.000428	0.005889	-0.00701	0.000529	-0.00127	-0.0003	-0.0004	0.001977	0.105827
14	-0.00037	-0.00229	-0.00063	0.003998	0.000809	-0.00032	-0.00015	-0.00308	-0.00031	-0.00126	0.001568	0.000113	0.003007	0.060082	-0.01818	-0.00991	-0.00011	-0.02178	-0.00053	-0.00506	-0.0007	3.84E-06	-0.00063	-0.00093	-0.00145	0.001176	0.003051
15	0.000408	0.000587	0.00088	0.030585	0.002073	0.000536	0.002055	0.010788	0.001693	-0.00155	0.006228	0.00214	0.002464	0.020935	0.049806	0.00907	0.002393	0.004819	0.003327	0.008384	-0.00064	0.00106	-0.00049	0.000204	0.000473	0.001646	0.159872
16	0.002219	0.000505	0.00483	0.002553	0.01	0.003475	0.005097	0.013213	0.003669	0.002591	0.002652	0.003832	0.007087	0.005499	0.008207	0.011421	0.008219	-0.01461	0.003353	0.003657	0.001712	0.004251	0.000266	-0.00036	0.00011	0.045026	0.131595
17	0.002132	0.002083	0.003056	0.002397	0.001441	0.001908	0.004332	0.004003	0.002001	0.001583	0.001779	0.003331	0.003482	0.002913	0.00315	0.003367	0.075649	0.00207	0.001124	0.00541	0.001666	0.02202	0.00135	0.00118	-0.00069	0.012564	0.165282
18	0.001255	0.001393	0.001182	0.00059	-0.0002	-0.00209	0.002027	0.001267	-0.00086	0.000318	0.000749	0.00153	0.001828	0.001288	0.000928	0.000269	0.000402	-0.1597	0.000489	0.001353	0.000557	0.001459	0.001125	0.000284	0.004321	0.002115	-0.13612
19	0.002527	-0.0103	0.006107	0.002454	0.003895	-0.00634	0.004804	0.003181	0.001323	0.005782	0.006816	0.008482	0.004866	0.013866	0.005939	0.001773	0.002892	0.00032	0.024053	0.00089	0.017293	0.002083	0.008261	0.002193	-0.01082	0.007662	0.109988
20	0.000208	-0.00335	0.000713	0.000179	0.000992	-0.00012	0.001812	0.00098	-2.5E-05	8.71E-05	0.002139	0.000252	0.000917	-0.00106	0.000137	-0.00016	0.000853	-0.00093	0.005846	-0.00346	-0.0033	0.001634	-0.00018	-0.00864	-0.0005	0.003955	-0.00101
21	0.00553	-0.00403	0.007489	0.009434	0.014476	-0.00907	0.013239	0.003581	-0.00586	-0.01343	0.025543	0.004324	0.006173	0.055896	0.015217	0.005882	0.027144	-0.00372	-0.01019	-0.00057	0.006042	0.000779	0.002649	0.003017	-0.00574	0.01179	0.165603
22	0.003347	0.00434	0.010128	-0.00031	-3.9E-05	0.000388	-0.00674	-0.01078	0.001569	0.000126	0.007224	0.007292	0.007957	0.008296	0.006569	-0.00055	0.000618	0.002787	0.001101	0.00073	0.01115	0.023749	0.003184	0.002454	0.002072	0.01624	0.102902
23	0.000574	0.000221	0.000935	-0.00021	0.000959	9.9E-05	0.00111	0.000982	-9.1E-05	-0.00057	0.001263	0.001396	0.001029	0.001796	0.000779	-0.00039	0.00078	-0.00265	-0.00051	0.001767	-0.00079	0.000369	0.046011	0.008039	0.000895	0.002889	0.06665
24	0.001806	0.000415	0.003387	0.001488	0.011405	0.001169	0.003539	-0.00052	0.003386	-0.00023	0.00502	0.005599	0.003152	0.004747	0.002311	0.000516	0.002278	-0.00296	0.003471	-0.00452	0.005746	0.00904	0.010221	0.000391	-0.0033	0.007199	0.074752
25	0.012227	0.005656	0.00859	-0.01624	-0.00314	0.002822	0.01013	0.004179	0.00289	-0.01093	0.009797	0.011761	0.007235	0.008259	0.001057	-0.00148	0.005799	-0.00915	0.014711	0.000471	-0.0032	0.002777	0.015048	0.016515	0.004728	0.018194	0.118715
26	0.000387	0.000194	0.000254	-0.00035	0.000345	-0.00058	0.000231	-0.00067	-0.00066	-0.00068	0.006637	0.000929	-1.8E-05	0.000561	-0.00046	-0.00063	0.000245	-0.001	0.004182	-0.00055	-0.00346	-0.00133	0.000713	0.000133	0.000136	0.000986	-0.00196
SUM	0.079989	-0.01832	0.166661	0.05174	0.106018	-0.13966	0.169155	-0.00748	0.004104	0.008918	0.346401	-0.00863	0.111175	-0.03896	0.066219	-0.00262	0.134957	-0.25998	0.015479	-0.04836	0.011173	0.064878	0.08927	0.029023	-0.06915	0.137999	1

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.045388	-0.00339	-0.02702	-0.00593	0.0226096	0.066886	0.087064	0.0162831	0.0213816	0.0412275	4.32E-05	-0.229968	-0.003705	-0.004784	0.0022226	-0.006074	-0.011108	-0.005721	0.0025773	-0.009332	-0.003356	-0.005208	0.0006981	-0.000917	-0.028048	-0.002506	-0.05994
2	0.0077184	-0.00224	0.0081442	0.0011915	0.0025089	0.0018501	0.0041982	-0.002635	0.0037937	0.0127468	0.0351894	0.0035879	-0.002395	-0.284131	-0.06321	-0.016746	-0.001845	-0.003832	-0.01682	-0.026824	0.0074832	-0.000237	-0.001478	0.0003686	-0.00104	-0.33689	
3	0.0229621	0.002788	0.1950162	0.0210346	0.0039976	0.0001425	0.01315	0.0059987	0.0023623	0.0469295	0.0008839	0.0028871	0.0030702	0.0016173	0.0010751	0.0004525	0.0011341	-0.002165	0.003363	0.0022243	0.0006648	0.0039066	0.0017459	0.0009141	0.018686	0.0071275	0.39559
4	0.0001181	-5.11E-05	0.0004067	0.0545668	-0.000157	1.838E-05	3.918E-05	-0.000129	-5.25E-05	0.0011252	2.421E-05	0.000129	-4.24E-05	3.195E-05	-7.37E-05	5.671E-05	5.671E-05	-0.000224	0.0003543	-2.19E-05	-4.11E-05	0.0003561	0.0001748	7.709E-05	-0.002	5.129E-06	0.054418
5	-0.000124	-2.76E-05	-8.88E-05	-7.96E-05	0.0197443	-7.77E-05	-6.19E-05	-0.000118	-9.37E-05	-0.000345	-1.33E-05	-0.000168	-0.000215	-3.36E-05	-9.29E-05	-0.000126	-1.65E-05	-0.000175	-6.37E-05	-3.94E-05	-7.07E-05	1.581E-06	-9.26E-06	-6.14E-05	-2.82E-05	0.017523	
6	0.0001177	-0.000173	-0.002036	-0.002016	-0.001042	-0.06106	-1E-05	0.0138187	-0.003516	-0.000759	4.67E-05	-0.010105	-0.00224	0.000215	-0.000709	-0.000502	0.0139985	-0.038911	-0.000563	0.0009435	-0.000374	-0.000951	-0.000687	0.0004865	2.803E-05	-0.001243	-0.12534
7	0.0010547	-0.001767	0.0001382	-0.00311	-0.000106	-0.000714	-0.027747	-0.161956	0.0076679	-0.003073	-0.000225	-0.002352	-0.001054	-0.000787	0.0019365	0.0011432	-0.01062	-0.00134	-0.041691	-0.001312	-0.000951	-0.001954	-0.003702	-0.001478	-0.004126	-0.25388	
8	0.006E-05	1.679E-06	5.14E-05	3.42E-05	-8.95E-05	0.0001625	7.747E-05	0.0368031	-0.000881	-4.36E-05	3.179E-05	0.0005592	0.0002225	9.106E-05	-2.04E-05	0.0004839	0.0003781	7.455E-05	-6.99E-05	-3.17E-05	8.743E-05	0.0001069	1.115E-05	-8.93E-05	-2.97E-05	0.037893	
9	0.0005539	-0.002303	0.007317	0.0115383	-0.027136	0.0016265	0.0053324	0.0040738	0.0604668	-0.006725	0.0006878	0.0032244	0.0007563	0.00126	-0.000412	-0.004267	0.0031421	-0.006755	-0.001857	-0.003699	-0.02276	-0.002146	-0.001097	0.0021185	0.0010361	0.0018688	0.025825
10	0.0060271	0.0007105	0.0075222	0.0115006	-0.000122	0.0346103	0.0055483	-0.013724	0.0087437	0.0622468	0.0121624	0.0067373	0.0122301	0.0107022	0.0032696	0.0015553	0.0038125	0.0090873	0.0041953	-0.003779	-0.000281	0.0023999	0.0002976	-0.000426	-0.001888	-0.000386	0.182709
11	0.0334239	-0.02083	0.0414082	0.0011584	0.0078319	-0.000788	0.0170351	0.0038799	0.0126259	0.0295035	0.0084538	0.0049718	0.0068315	-0.001834	0.0034539	-0.002471	0.0044229	-0.000964	-0.116349	-0.002682	-0.007906	0.0212378	-0.001445	0.0030693	-0.001367	0.0014198	0.044191
12	0.0017801	-0.001328	0.0003817	-0.000339	-0.000275	0.0012463	-3.69E-05	-0.003218	-0.000485	-0.000468	-0.000124	0.1001551	-0.000152	-0.000246	0.0032262	-0.001044	-0.009148	0.0002657	-0.000625	-0.000722	-0.002591	-0.004846	-0.000434	-8.46E-05	-0.002525	-4.51E-05	0.078317
13	0.0023397	-0.001015	0.0004501	-0.014453	-0.05443	0.0247634	0.0066779	0.0112006	-0.003806	-0.011655	0.0003699	0.0025655	0.045261	0.0082276	-0.001543	-0.000709	0.0109521	0.000473	0.0001188	0.0217585	-0.009099	0.0004365	-0.001763	-0.001074	0.0001128	-0.001627	0.077613
14	-0.000268	-0.002858	-0.002086	0.0049003	-0.000228	0.000329	-0.000579	-0.00176	8.763E-05	-0.000834	-0.001123	0.0008866	-0.000173	0.0827504	-0.037227	-0.015395	0.0012886	0.0146712	-0.001352	0.0007846	-0.001175	-0.000254	0.0005423	-0.001599	-0.001418	-0.002276	0.042117
15	-0.000737	1.95E-05	-0.005408	0.009737	-0.000104	0.00163	0.0043061	0.0152973	0.0023336	2.13E-05	-0.002456	0.0019811	0.0039205	0.011583	0.0427861	0.011211	0.0031955	0.0171807	0.0011372	0.006005	-0.00206	0.0006287	-0.00047	-0.000425	0.0008543	-0.000471	0.151765
16	0.0015501	0.0016281	0.0029602	0.0184345	0.0039277	0.0071418	5.285E-05	0.0051285	0.0025845	0.0056898	0.0074904	0.0019419	0.0035733	0.0097858	0.0160429	-0.012085	0.0137429	0.0191119	0.0100645	0.0030357	0.0017696	0.0095739	0.0564563	-0.000229	0.005066	0.0045343	0.196999
17	0.0027684	0.0015901	0.0014405	0.0002516	0.0004078	0.0004412	0.0012566	0.006341	0.0003616	0.0004129	0.0005676	0.0016177	5.383E-05	0.0009524	0.0004996	0.0007904	0.1374592	0.0018825	0.0023707	0.00143	0.014737	0.0108184	0.001129	0.000404	-0.001979	0.0091975	0.183939
18	0.0001773	0.0016619	0.0003308	0.0002733	-0.000732	0.00409	0.0004268	0.0024646	-0.001507	0.0003747	0.0005362	0.001637	0.0014923	0.0012466	0.0003915	0.0006112	-0.170563	0.002352	0.0009757	-0.00107	0.0005195	0.0018907	0.0026826	0.0035422	0.0044885	-0.1404	
19	0.0042389	-0.013449	0.0341506	0.0063889	0.0097023	0.0123106	0.0165659	0.006397	0.0193992	0.0145185	0.0062446	0.0233156	0.047877	0.05721	0.0194888	0.0026249	0.0108171	0.0049635	0.0479427	0.0073586	0.0082341	0.0101811	0.0064514	0.0126406	-0.001437	0.0125828	0.322422
20	0.0002399	-0.004793	0.0013153	0.0017818	0.0007543	0.0009148	0.0001577	-0.001525	0.0036569	0.0027729	0.0001502	0.0043142	0.0065798	-0.002734	-0.000533	-0.001542	0.0030332	-0.001123	-0.007669	-0.004113	-0.005836	-0.001642	-0.00544	-0.026088	-0.000968	-0.034938	-0.06707
21	0.0147775	-0.010461	0.0116545	0.0089759	0.0084044	-0.001733	0.0178298	0.002539	-0.001439	-0.003191	0.0247236	0.0108072	-0.001547	0.0344383	-0.002387	-0.010109	0.0386599	-0.05415	-0.032337	-0.04583	-0.006019	0.0005311	0.0103118	0.0021726	-0.008077	-0.00198	0.047323
22	0.0049745	0.002896	0.0072889	-0.001803	2.308E-05	-0.000294	-0.001369	-0.00157	0.0041464	0.0041898	0.0017526	0.0031335	0.0008751	0.0040338	2.809E-05	-0.003389	0.0016459	-0.00116	-0.004093	0.003275	-0.011288	0.0513023	0.0095785	0.0025358	0.0048872	0.0020041	0.07313
23	0.0010104	0.001894	0.001898	0.0014888	0.0047573	0.0005993	0.0014845	0.0063855	0.0018009	0.0019535	0.0012364	0.0019299	0.0042069	0.0015559	0.0027876	-0.000562	0.0016773	-0.003926	0.0015764	0.0046076	0.0017009	0.0063027	0.0073672	0.0208498	0.0066075	0.003557	0.087009
24	0.0066632	-0.003902	-0.001472	-0.005189	-0.002565	-0.005729	-0.044885	-0.012271	-0.006277	-0.003995	0.0001117	-0.000984	-0.006163	-0.001993	-0.006213	-0.005109	0.0005141	-0.014125	0.0034762	-0.000571	-0.007546	-0.0009587	0.0182453	0.0163118	-0.009876	0.0041486	-0.06453
25	0.0051571	-0.000749	0.0043274	-0.017596	-0.007926	0.0048936	0.0038376	-0.00992	-0.0011	-0.012738	0.0034623	0.0037394	0.002694	0.003557	-0.003209	-0.003926	0.0054339	-0.0135	0.038206	0.0014064	0.0070868	0.0042547	0.0171251	0.0008812	0.0206435	0.0198837	0.122208
26	0.000237	-0.000306	-0.000447	-0.001036	-0.000534	-0.001548	-0.000557	-0.002239	-0.001755	-0.001294	0.0001673	0.0002476	-0.001428	-0.000403	-0.001734	-0.001476	2.71E-05	-0.002625	0.0016303	-0.001691	-0.006625	-0.002301	0.0009733	0.0010683	-0.001597	0.0088023	-0.01641
SUM	0.1562588	-0.060763	0.2826646	0.1305373	0.0392981	-0.008891	0.1455962	-0.074534	0.1304791	0.1764653	0.100354	-0.047308	0.0805278	-0.099123	-0.022174	-0.061735	0.2351249	-0.254524	-0.063954	-0.042541	-0.06938	0.1419842	-0.1195479	0.036249	-0.001576	0.0335945	1

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.0118477	0.003516	0.00046	0.0014286	-0.00057	0.0104435	-3.19E-05	0.0102727	0.004735	0.0026445	0.0019244	-0.026432	0.0066748	-0.000184	0.0009388	0.0033518	-0.000969	-0.000171	0.0007652	-0.001316	0.0018854	-0.001364	0.000976	0.0008035	-0.009543	0.0005744	0.011198
2	0.0004603	0.0003775	0.0009877	0.0006454	0.0010057	0.0013331	0.0017075	0.0008502	0.0013095	0.0036104	0.0024493	0.0015274	-0.000128	-0.039181	-0.005034	-0.001266	0.003324	-0.002208	0.0012236	-0.006638	0.0001042	0.0027341	0.0003977	0.0003524	0.0011946	0.0006906	-0.027153
3	0.0026616	0.0009529	0.0260845	0.0020125	0.0009608	0.0011008	0.0012909	0.0013493	0.0012073	0.0059526	0.002261	0.0008645	0.001209	0.0009455	0.0008277	0.001594	0.0008735	0.0005462	0.0009294	0.0012157	0.0009637	3.21E-05	0.0008348	0.0007335	-0.004854	0.0010136	0.0618633
4	3.091E-05	1.794E-05	8.181E-05	0.0211807	1.824E-05	1.936E-05	1.014E-05	-1.39E-05	1.348E-06	-1.22E-06	8.351E-05	4.167E-05	4.277E-06	1.762E-05	2.407E-06	3.783E-05	3.40E-05	-1.46E-05	2.855E-05	4.678E-05	1.998E-05	6.22E-07	8.465E-05	5.627E-05	-0.000674	4.009E-05	0.0214144
5	5.686E-05	9.875E-05	0.0001165	0.0004584	0.0189071	9.192E-05	7.802E-05	8.648E-05	9.181E-05	4.836E-05	0.0001764	0.0001013	6.974E-05	8.847E-05	7.857E-05	0.0001291	7.351E-05	0.0001109	7.635E-05	9.975E-05	0.0001178	5.411E-05	4.6E-05	4.772E-05	0.0001117	0.0001113	0.024812
6	0.0001399	0.0001979	-0.0001	-6.8E-05	0.0004347	-0.000634	0.000232	-0.000157	0.0024013	8.721E-05	0.0004341	0.000297	-0.000111	0.000198	4.235E-05	0.0002023	0.0007614	-0.00436	7.829E-05	0.0002765	0.0002762	-9.49E-05	-6.69E-05	0.000147	-7.97E-05	0.0001792	-0.008379
7	-9.18E-06	-3.34E-05	3.029E-05	-0.00005	0.0001745	1.138E-05	-0.000711	-0.003853	0.0010609	-0.000421	0.0002434	-6.38E-05	-0.000309	-8.56E-05	-8.22E-05	0.0001898	-7.33E-05	-0.001345	0.0001794	-0.0004832	-4.48E-05	0.0001838	-0.000153	-5.3E-05	-0.000208	0.0001278	-0.010447
8	1.986E-05	3.048E-05	3.461E-05	3.285E-05	6.778E-05	2.974E-05	0.0001876	-0.001417	0.0005538	2.59E-05	4.797E-05	3.402E-05	3.215E-05	1.549E-05	1.549E-05	-7.13E-05	2.876E-05	8.531E-05	4.437E-05	0.0014884	5.94E-05	1.725E-05	2.529E-05	7.746E-05	-2.1E-05	0.0001123	0.0015677
9	0.0002424	8.42E-06	0.0005845	0.0013068	0.053175	0.0002313	0.0005565	0.0007552	0.0219646	-0.001242	0.0009308	0.0009287	0.0004807	0.0003941	4.701E-05	8.729E-07	0.0007416	-0.000147	-0.000248	-4.56E-05	-0.003632	0.0004091	0.0002207	0.0003995	-8.9E-05	0.0013804	0.0315163
10	0.0022756	0.0010086	0.0028897	0.0020778	0.0014389	0.0039655	0.0005288	-0.002418	0.0018335	0.0077547	0.0484829	0.0017954	0.0066447	0.001437	0.0023542	0.0028708	0.0021559	0.0033081	0.0017252	0.0007569	0.0012018	0.0008259	0.0003719	0.000531	-0.000307	0.0016692	0.0519083
11	0.0015503	0.0029045	0.0041695	0.0030782	0.0025995	0.0042929	0.0072702	0.0077634	0.0025292	0.017027	0.0071741	0.0055731	0.0095724	0.0193625	0.0063195	0.0016296	0.0040704	0.0034221	0.0010829	0.005978	0.0001792	0.0108284	0.0020977	0.0020701	0.0061773	0.0027376	0.1324601
12	0.0002495	0.0001849	0.0003923	0.0003612	0.0003917	0.0019145	0.000218	-0.000263	0.0005494	0.0003983	0.0006414	0.0504688	0.0006965	0.0001488	0.0011932	0.0004785	-0.000133	0.0004179	0.000213	0.000211	0.0001722	-3.45E-05	0.0001441	0.0002767	-8.59E-05	0.0003953	0.0596784
13	0.0002878	0.0004322	0.0003905	-0.00077	0.0002285	0.0022697	0.0002687	-0.00093	0.0019726	-0.000828	0.0013007	0.000646	0.0135823	0.0005044	0.0019406	0.0003827	0.0006498	-0.000319	0.0006765	0.00059364	-0.000744	0.0006548	-2.63E-05	0.0006099	-9.87E-05	0.0011038	0.0291621
14	0.0001609	-0.000113	6.26E-05	0.0005684	0.0004466	0.0002751	6.834E-05	-0.000605	0.0012835	0.0003018	0.0003827	0.0002619	0.001154	0.0228051	0.0023327	-0.001132	0.0006492	-0.001096	0.0002829	-0.004149	0.000116	0.0003707	-3.7E-05	2.996E-05	-0.000145	0.0002697	0.0303901
15	0.0002889	0.0005141	-0.000607	0.0028895	0.0009005	0.0007922	0.000388	0.0009226	0.0011706	0.0003085	0.000495	0.0006328	0.0018688	0.0038196	0.0180498	0.0029334	0.0061952	0.0119005	0.0015891	0.0024109	0.0002598	0.0004697	4.952E-05	0.0003437	0.0001397	0.0008873	0.0616125
16	0.0036008	0.003347	0.0050652	0.0038509	0.0053579	0.0037672	0.003035	0.0035045	0.0041912	0.0033041	0.0069077	0.0050009	0.0038758	0.003034	0.0028295	0.0187108	0.0133514	0.0045357	0.0025706	0.004987	0.0040153	0.0018302	0.0002267	0.0016263	0.0012112	0.0034073	0.1170842
17	0.0009893	0.0005129	0.0009153	0.0006004	0.0007721	0.0007095	0.0005854	0.0005866	0.0007537	0.0005147	0.0010898	0.0010998	0.0005337	0.0005049	0.0006699	0.0009634	0.016012	0.0013962	0.0004883	0.0009277	0.0008249	-0.000845	0.0003237	0.0004301	-1.87E-05	0.0009681	0.0323065
18	0.0008818	9.432E-05	0.0004599	6.367E-05	0.0001115	0.0001652	0.0003889	1.959E-05	0.0001445	8.545E-05	0.0002077	0.0005769	6.625E-05	0.0001027	0.0002145	0.0001854	0.0004913	-0.023325	0.0001742	0.0001357	6.177E-05	0.0002566	1.912E-05	9.511E-06	5.511E-05	0.0005303	-0.017793
19	0.0014083	-0.001289	0.001796	0.0009535	0.0012771	0.0031304	0.0036015	0.0032554	0.0015911	0.0016923	0.0012511	0.0030298	0.0013882	0.0009547	0.0080087	0.00073	0.0003635	0.0030269	0.0027454	0.0019172	0.0009358	0.001686	0.002993	0.0018193	0.0028398	0.0031514	0.0902978
20	-4.26E-05	0.0008037	2.154E-07	-0.000121	0.0002662	1.527E-05	2.193E-05	-0.000144	-0.000159	-2.01E-05	0.0004551	-6.02E-05	-8.02E-05	0.000589	5.291E-05	0.001489	0.0002632	-0.000367	0.0002437	-0.00019	-0.000908	0.0031661	0.0003889	0.0012287	-4.35E-05	0.0036687	0.0127069
21	0.0018887	0.0025278	0.0015459	3.985E-05	0.0034482	-0.003183	0.0012432	-0.003348	-0.00243	-0.003213	0.0084644	0.0018348	-0.001651	0.0020758	-0.002749	-0.002291	0.0037497	-0.012607	-0.003403	-0.003392	0.0039304	-0.000508	0.0012977	0.0030107	-0.002835	0.0038552	-0.002943
22	0.0020957	0.0012859	0.0025253	0.0018549	0.0009282	0.0038444	0.0036235	0.0047813	0.0034265	0.0034074	0.0035405	0.0032149	0.0043327	0.0023776	0.0031025	0.0023741	0.0026049	0.0024429	0.0015526	0.0002759	0.0315007	0.0025873	0.0067612	0.0030024	0.0053725	0.0019596	
23	0.0004867	0.0005499	0.001758	0.0007059	0.0015076	0.0009527	0.0010971	0.0009395	0.0003959	0.0006481	0.0007721	0.0009165	0.000814	0.0008154	0.0007854	0.0006586	0.0009838	0.000165	0.0007657	0.0023096	0.0012179	0.016995	0.0081124	0.0020719	0.0028544	0.0017835	0.044352
24	0.0013565	-0.000778	0.0002009	0.000269	0.0021839	0.0011791	0.0013504	0.0005319	0.0008391	0.0024784	0.0006685	0.0015259	0.0004343	0.0078181	0.0016373	0.000214	0.0011208	0.0001066	0.0002946	0.0018515	-5.27E-05	0.0059861	0.0196733	0.0180891	0.0032222	0.0026047	0.076332
25	0.0007162	8.153E-05	0.0002422	-0.001872	-0.000354	0.000407	-0.00014	-0.001427	-0.000588	-0.001783	0.0018426	0.0009251	-4.18E-05	-6.2E-05	-0.000304	7.423E-05	0.00161737	-0.002001	0.0019457	0.0041077	0.0029537	0.000254	0.007947	0.0048475	0.0261141	0.0053463	0.0580854
26	4.855E-05	8.779E-05	1.013E-07	-5.82E-06	0.0010023	-0.0001	1.537E-05	-0.000165	-4.61E-05	-4.85E-05	0.0001643	2.946E-05	-3.18E-05	-0.000102	-3.62E-05	0.0001704	-0.000162	0.0004154	0.0003167	-0.000255	0.0004234	0.052452	0.0007533	0.000773	0.0077359	0.0162468	
SUM	0.0336132	0.0147211	0.0493015	0.0443402	0.0560166	0.028085	0.0280765	0.0206786	0.0509179	0.042411	0.0494059	0.05479	0.0451007	0.0296278	0.0431721	0.0310038	0.067712	-0.01556	0.0436219	0.0187825	0.0164013	0.0695952	0.0538892	0.0469284	0.0289919	0.0466259	1

Appendix 17
N Matrix, Malaysia
1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-0.93297	0.990196	-0.28906	0.666897	1.09E-05	0.122462	-0.25083	0.01296	0.106596	0.990911	0.107488	-0.45224	0.101327	0.124677	0.11519	0.10587	0.075046	0.126798	0.121019	0.098574	0.098319	0.09373	0.087832	0.091023	0.000213	0.087867
2	0.06157	-0.94686	0.099455	0.076709	0.073794	0.083163	0.090385	0.093378	0.073484	0.068559	-0.16393	0.099138	0.029397	-0.38194	0.008591	0.060009	0.05772	0.079107	0.02292	0.018266	0.068203	0.063427	0.059421	0.061548	0.080054	0.064427
3	0.004571	0.048442	-1.1519	-0.0509	0.04955	0.061627	0.054299	0.069607	0.055298	0.035285	0.0564	0.053318	0.056141	0.069247	0.060832	0.055541	0.047815	0.066809	0.063374	0.067161	0.050621	0.053247	0.046577	0.048114	-0.01324	0.041573
4	0.031119	0.031122	0.049893	-0.9612	0.035524	0.041831	0.045901	0.049544	0.036553	0.037939	0.035486	0.049659	0.038669	0.044091	0.039463	0.035898	0.030745	0.046607	0.040716	0.044874	0.034951	0.036297	0.02949	0.039598	0.030788	0.033377
5	0.031166	0.031409	0.050343	0.041017	-0.98483	0.042064	0.046152	0.049984	0.036914	0.038024	0.035663	0.049795	0.038791	0.04435	0.039752	0.036063	0.03091	0.047011	0.040999	0.045258	0.03565	0.037024	0.029693	0.030845	0.041686	0.034262
6	0.042414	0.043187	0.065541	0.053148	0.048472	-1.26459	0.063115	0.065442	0.044073	0.051527	0.049352	0.062652	0.049469	0.061137	0.052852	0.048084	0.041987	0.029001	0.055419	0.061945	0.048673	0.04858	0.03931	0.042627	0.055446	0.041137
7	0.04695	0.046188	0.076289	0.057748	0.05442	0.063243	-1.02529	-0.24969	0.054452	0.035983	0.054408	0.074256	0.055096	0.066224	0.058591	0.054161	0.044079	0.057446	0.061541	-0.00867	0.052955	0.05539	0.043074	0.044011	0.061223	0.047927
8	0.031383	0.031424	0.050498	0.041015	0.035972	0.042175	0.046251	-0.96824	0.034553	0.038481	0.03573	0.049984	0.039058	0.044417	0.039671	0.035104	0.039905	0.047085	0.041106	0.044841	0.035559	0.037089	0.029693	0.03084	0.041241	0.034161
9	0.041905	0.039228	0.062209	0.036203	-2E-05	0.049051	0.060155	0.058374	-1.06021	0.030008	0.048001	0.063799	0.038043	0.058311	0.04186	0.040092	0.040628	0.041572	0.050895	0.055121	0.002758	0.045362	0.03676	0.03709	0.04538	0.035866
10	0.018462	0.040963	0.056203	0.046882	0.04345	0.047595	0.040859	0.022365	0.032714	-1.02422	0.046357	0.04084	0.013448	0.05593	0.042225	0.038072	0.033046	0.053139	0.054215	0.03925	0.046164	0.048323	0.039034	0.04099	0.042418	0.041275
11	0.041126	0.021713	0.071067	0.053863	0.055778	0.05348	0.058293	0.068423	0.051619	0.03943	-0.97487	0.067774	-0.00061	0.05663	0.057773	0.055745	0.050592	0.071244	-0.19318	0.052295	0.041732	0.00735	0.044837	0.052532	0.05019	0.045193
12	0.033158	0.032807	0.054728	0.044912	0.039238	0.043979	0.049126	0.045598	0.04008	0.041361	0.03945	-0.98277	0.041131	0.047761	0.043051	0.038531	0.005186	0.051037	0.044324	0.046377	0.035752	0.021765	0.031909	0.034349	0.040467	0.036692
13	0.040171	0.041366	0.059347	-0.03048	0.040462	0.049688	0.059829	0.035142	0.040816	0.026989	0.048552	0.063119	-0.9885	0.058817	0.0774	0.011774	0.040118	0.043501	0.054014	-0.03205	0.034566	0.049648	0.036715	0.03899	0.053468	0.041757
14	0.042159	0.038783	0.065783	0.052687	0.049703	0.057916	0.061862	0.056521	0.049883	0.049826	0.047646	0.067982	0.051013	-0.97993	-1.0428	0.019654	0.029021	0.029035	0.052844	-0.01147	0.047665	0.049802	0.039474	0.039905	0.0539	0.04262
15	0.031994	0.034635	0.035592	0.028491	0.039919	0.047281	0.049584	0.053742	0.040457	0.031927	0.034927	0.053659	0.041582	0.048485	-0.98406	0.03862	0.032086	0.051287	0.043337	0.023034	0.036849	0.04098	0.031326	0.033723	0.044303	0.036444
16	0.035577	0.031873	0.060318	0.045307	0.04443	0.05058	0.050335	0.059264	0.042215	0.04441	0.041686	0.057355	0.042485	0.049047	0.039996	-1.04092	0.029948	0.020341	0.041589	0.0243	0.042935	0.043138	0.028098	0.036495	0.043226	0.035968
17	0.031028	0.031458	0.050856	0.041387	0.036093	0.043124	0.04537	0.050193	0.037596	0.038931	0.036723	0.050457	0.038958	0.045327	0.040599	0.036899	-0.97184	0.048015	0.041845	0.045847	0.035846	0.016574	0.030574	0.03196	0.033041	0.033135
18	0.039136	0.039042	0.062776	0.050093	0.043561	0.044348	0.057606	0.061094	0.042594	0.047064	0.044624	0.062067	0.048087	0.055327	0.049294	0.044405	0.038555	-1.19114	0.051001	0.056286	0.043764	0.045802	0.036242	0.037933	0.050442	0.040003
19	0.042886	0.020503	0.062877	0.037727	0.046513	0.021449	0.051177	0.046172	0.033611	0.025883	0.042305	0.057599	0.004618	0.045514	0.043294	0.03992	0.041216	0.045342	-0.94901	0.050811	0.033719	0.04563	0.028422	0.038261	0.010955	0.032495
20	0.035769	0.029903	0.057886	0.045481	0.041901	0.047187	0.051565	0.055066	0.039545	0.042458	0.041076	0.056179	0.041559	0.04901	0.044193	0.040819	0.03671	0.051426	0.032491	-0.95713	0.026272	0.038882	0.025108	-0.00556	0.041307	-0.0091
21	0.051113	0.051465	0.066608	0.036109	0.042888	0.022681	0.078058	0.042201	-0.00211	0.013987	0.068341	0.061203	0.02732	0.073541	0.011998	-0.01881	0.051907	-0.04326	0.00594	0.022056	-0.93269	0.046882	0.060854	0.069165	0.040176	0.058456
22	0.042499	0.03574	0.046357	0.042208	0.022713	0.049653	0.010368	0.031777	0.040658	0.042535	0.047304	0.058594	0.041634	0.055152	0.045882	0.040464	0.03589	0.054086	0.045285	0.040066	0.024277	-1.01435	0.036713	0.04527	0.045689	0.034073
23	0.034824	0.034297	0.055042	0.042311	0.038271	0.042991	0.049106	0.05069	0.032886	0.038834	0.040279	0.054131	0.039852	0.04987	0.041031	0.035791	0.033938	0.043407	0.040238	0.047212	0.021981	0.032584	-0.98172	0.025864	0.027844	0.029346
24	0.041019	0.034676	0.06242	0.044534	0.042995	0.043005	0.051029	0.044762	0.033229	0.040104	0.046531	0.061739	0.039096	0.05576	0.041471	0.039923	0.038291	0.043604	0.04716	0.039285	0.002642	0.018039	0.039321	-1.00629	0.020642	0.036716
25	0.048534	0.03427	0.068397	0.018727	0.022126	0.052499	0.058939	0.046929	0.027062	0.019008	0.05368	0.07141	0.036929	0.061106	0.041588	0.044604	0.043705	0.039788	0.048114	0.043813	0.003308	0.004975	0.040422	0.039399	-0.97924	0.010144
26	0.032269	0.031739	0.05073	0.040672	0.036312	0.041316	0.046551	0.048475	0.035186	0.037676	0.036793	0.050233	0.038047	0.044719	0.038695	0.035591	0.031289	0.045887	0.041491	0.043433	0.026417	0.033602	0.030587	0.030307	0.038128	-0.965596

1983

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.023559	-0.0071858	-0.4412696	-0.0579232	-0.1161482	-0.0022606	-0.4006455	-0.1428949	-0.0076126	-0.0287902	-0.0016841	-0.4129478	-0.0193374	-0.0117168	-0.0077311	-0.0093947	-0.0232359	-0.0193335	-0.0565757	-0.0471561	-0.0126321	-0.0235281	-0.0036224	-0.0034383	-0.1342038	-0.0071783
2	-0.0058126	-1.010297	-0.0086579	-0.008378	-0.0025469	-0.0076493	-0.0081697	-0.014931	-0.0034608	-0.014393	-0.0139043	-0.0135671	-0.0382659	-0.4971937	-0.0781409	-0.0197816	-0.0080072	-0.024991	-0.0512548	-0.002011	-0.0076536	-0.0136936	-0.0039753	-0.0043422	-0.007542	-0.0082898
3	-0.0450284	-0.0020705	-1.2234339	-0.1140243	-0.0071668	-0.0062738	-0.0185591	-0.010944	-0.0041223	-0.026245	-0.0081656	-0.027657	-0.0404216	-0.0021779	-0.0033346	-0.0027979	-0.0019169	-0.0098466	-0.0026032	-0.0052006	-0.0068527	-0.0066993	-0.0009605	-0.0012343	-0.0079219	-0.0132464
4	-6.821E-05	-0.0002436	-0.0004473	-1.0013154	-0.0003517	-0.0002204	-0.0002392	-0.0004505	-0.0004207	-0.0005813	-8.643E-05	-0.0001829	-0.0003614	-0.0001919	-0.0003224	-0.0002463	-0.0001233	-0.0004002	-0.0002692	-0.0003518	-0.0006925	-0.000471	-9.605E-05	-0.0001278	-0.0112079	-0.0007822
5	-0.0002088	-3.301E-05	-0.0001542	-0.0001318	-1.0212672	-9.54E-05	-0.0001044	-0.0001333	-0.0001448	-0.0002995	-3.107E-05	-0.0001972	-0.0003491	-4.538E-05	-0.000119	-0.0001278	-4.117E-05	-0.0001578	-5.566E-05	-0.0001179	-1.467E-05	-8.838E-05	-1.953E-05	-1.008E-05	-9.595E-05	-4.84E-05
6	-0.0012137	-0.0004394	-0.0048329	-0.0042807	-0.0013715	-1.3427839	-0.0011866	0.0021935	-0.0081108	-0.0019985	-0.0001717	-0.0079547	-0.05487	-0.003367	0.0013644	0.0015694	-0.005071	-0.0479201	-0.0077327	-0.0010211	-0.000951	-0.0034564	-0.0023312	-0.0001467	-0.0026371	-0.0070014
7	-0.0014583	-0.0025576	-0.001657	-0.0056575	-0.001403	-0.0071906	-1.0952759	-0.3261329	-0.0025919	-0.053615	-0.0004591	-0.0024956	0.0051278	-0.002318	-0.0024228	-0.0042736	-0.0037947	-0.0172482	-0.0019133	0.0078586	-0.0021394	-0.0019725	-0.0032884	-0.0036042	-0.0034123	-0.0052022
8	-4.089E-05	-8.675E-05	-9.743E-05	-0.0001408	-0.0002132	-8.018E-05	-0.0001037	-1.0275953	-0.0032618	-0.0001947	-3.034E-05	-0.0001349	-7.441E-05	-0.0003432	-0.0009443	-0.0001103	-0.0001709	-8.69E-05	-0.0005958	-0.0002589	-0.000147	-1.807E-05	-5.777E-05	-0.0006802	-0.0002353	
9	-0.0026947	-0.006229	-0.0098292	-0.0185249	-0.0535536	-0.0105015	-0.0054521	-0.0137196	-1.116963	-0.0265096	-0.0023733	-0.0075628	-0.0157582	-0.0059475	-0.0156549	-0.0124163	-0.003692	-0.0268261	-0.007527	-0.0108338	-0.0502706	-0.0075597	-0.0040685	-0.0056584	-0.0131584	-0.0135746
10	-0.0240543	-0.0019588	-0.0133473	-0.0093487	-0.0059007	-0.0066128	-0.0275945	-0.049905	-0.0156719	-1.666068	-0.0022467	-0.0265638	-0.0395034	-0.0047751	-0.012324	-0.0118472	-0.0093786	-0.0088554	-0.0020381	-0.0237321	-0.0026161	-0.0023822	-0.0018849	-0.0015386	-0.0149278	-0.0057364
11	-0.0147923	-0.037224	-0.0201902	-0.0210406	-0.006877	-0.005111	-0.0236314	-0.0225538	-0.0154596	-0.0302451	-1.038845	-0.0506513	-0.043265	-0.0250158	-0.0142772	-0.0095365	-0.006324	-0.0129963	-0.0259964	-0.0275997	-0.0216205	-0.0597506	-0.0066722	-0.0033312	-0.0259332	-0.0171348
12	-0.0021544	-0.0025799	-0.0022917	-0.0016719	-0.0016322	-0.0038067	-0.0036139	-0.0091236	-0.0020362	-0.0018454	-0.0006311	-1.038592	-0.003169	-0.0024482	-0.0021728	-0.0022868	-0.0303943	-0.0021769	-0.0022829	-0.0047391	-0.004655	-0.0222302	-0.0019445	-0.0005959	-0.0073676	-0.0020878
13	-0.0038776	-0.003073	-0.011993	-0.0940066	-0.0112091	-0.006311	-0.0047834	-0.0379722	-0.0119648	-0.027997	-0.0013379	-0.067832	-1.03748	-0.0035467	0.0042383	-0.0394006	-0.0031114	-0.0240985	-0.0036165	-0.0064649	-0.0168315	-0.0027382	-0.005652	-0.0043199	-0.0056107	-0.0066706
14	-0.0022861	-0.0058069	-0.0056081	-0.0046186	-0.0010556	-0.0015729	-0.0036009	-0.0134309	-0.0014842	-0.0045628	-0.0020597	-0.0025563	0.0037014	-1.0348807	-0.1585725	-0.0336933	-0.0148319	-0.0428589	-0.0051844	-0.0076929	-0.0026852	-0.0028685	-0.002853	-0.0038131	-0.0052504	-0.0062129
15	-0.0040444	-0.0015438	-0.0224624	-0.01788	-0.001583	-0.0016622	-0.0037098	-0.0033849	-0.0021527	-0.0139507	-0.0065857	-0.0032593	-0.0038917	-0.0009516	-1.0245068	-0.0024716	-0.0031993	-0.0005533	-0.0039146	-0.0289954	-0.0046114	-0.0016212	-0.00317	-0.00176	-0.004024	-0.0030882
16	-0.0056893	-0.0107163	-0.0064434	-0.0093281	-0.0033693	-0.0045661	-0.0124653	-0.0065615	-0.0070541	-0.0065136	-0.0046706	-0.0093972	-0.0022201	-0.0102766	-0.0125305	-1.0992742	-0.0117026	-0.0583903	-0.0139111	-0.0364047	-0.0039991	-0.0064188	-0.0114996	-0.0046009	-0.0104124	-0.0102227
17	-0.0147079	-0.0107076	-0.0018949	-0.0014371	-0.0015462	-0.0006591	-0.0030299	-0.0021351	-0.0009962	-0.0017712	-0.0006074	-0.0016835	-0.0016063	-0.0007668	-0.0007231	-0.0007722	-0.00046256	-0.0010502	-0.0011896	-0.0011403	-0.0224093	-0.0004227	-0.0002242	-0.0104137	-0.002707	
18	-0.0002238	-0.0005822	-0.0006581	-0.0018248	-0.0020796	-0.0054713	-0.0004543	-0.0022325	-0.0046612	-0.0077389	-0.0001554	-0.0007601	-0.0010616	-0.0005312	-0.0008612	-0.0022452	-0.0003427	-1.3634679	-0.0006645	-0.0008446	-0.0011993	-0.0010395	-0.0012087	-0.0001431	-0.0023968	-0.0034114
19	-0.0038135	-0.0290455	-0.0225716	-0.0222858	-0.0062446	-0.0060357	-0.0163702	-0.0294221	-0.0207143	-0.0272957	-0.0082248	-0.0053585	-0.0050241	-0.0233537	-0.0155765	-0.0131824	-0.0054305	-0.0209657	-1.0694937	-0.017471	-0.0191488	-0.0099275	-0.0118963	-0.0073728	-0.052331	-0.0179028
20	-0.0023282	-0.0092632	-0.0039302	-0.004968	-0.0021326	-0.0042091	-0.0039364	-0.0066078	-0.0077089	-0.0084438	-0.0018538	-0.004944	-0.0059791	-0.0058914	-0.0044667	-0.0037553	-0.0012121	-0.006897	-0.0038655	-0.0140289	-0.0174009	-0.0070723	-0.0126004	-0.0431824	-0.0098241	-0.0525602
21	-0.0260297	-0.0299504	-0.0591069	-0.0679169	-0.046159	-0.0028331	-0.0345121	-0.0855005	-0.0099169	-0.004063	-0.0175665	-0.065025	0.0706499	-0.0350249	-0.0080369	-0.1128361	-0.0257341	-0.1965961	-0.0039417	-0.0031667	-0.0120293	-0.0481267	-0.01361	-0.0070448	-0.0664533	-0.0266698
22	-0.0061781	-0.0057571	-0.0324878	-0.0223639	-0.0558939	-0.0167118	-0.0673744	-0.050612	-0.0169943	-0.0155903	-0.0136575	-0.0196713	-0.0100254	-0.0074818	-0.0151279	-0.0152765	-0.0126571	-0.0186921	-0.0197144	-0.0264681	-0.024378	-1.071408	-0.0110052	-0.002098	-0.0182968	-0.0193937
23	-0.0013596	-0.0022165	-0.0034167	-0.0053415	-0.0034897	-0.0059381	-0.0043597	-0.0071638	-0.0102447	-0.0061013	-0.000262	-0.003743	-0.0055296	-0.0022811	-0.0051989	-0.0065207	-0.0019436	-0.0139318	-0.0079981	-0.0046338	-0.01061	-0.0110382	-1.0157044	-0.002699	-0.0106732	
24	-0.003148	-0.0099678	-0.009037	-0.0145608	-0.0073364	-0.0158898	-0.0138317	-0.0264053	-0.0194032	-0.0139823	-0.0033593	-0.0087566	-0.0156248	-0.0088956	-0.0145857	-0.011989	-0.0051577	-0.0242343	-0.0112177	-0.0259165	-0.0488214	-0.0361256	-0.0021694	-0.0377932	-0.0111309	
25	-0.0060809	-0.0241469	-0.0207937	-0.0507318	-0.034985	-0.0204216	-0.0214715	-0.0418417	-0.0382123	-0.0507183	-0.007865	-0.0163224	-0.0202572	-0.0170098	-0.0239308	-0.0210336	-0.010471	-0.0484495	-0.023783	-0.0335545	-0.0612462	-0.0633319	-0.0102824	-0.0129	-1.0472042	-0.0482787
26	-0.0040489	-0.0011755	-0.0026777	-0.0024382	-0.0016036	-0.0025833	-0.0017946	-0.0047138	-0.0037443	-0.0074489	-0.0003983	-0.0020299	-0.0028991	-0.0013844	-0.0030014	-0.0025344	-0.0010841	-0.04022	-0.0014065	-0.0029481	-0.0128634	-0.0059203	-0.0004306	-0.0038633	-0.0056316	-1.0013584

1991

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.04488	-0.0048	-0.43771	-0.05587	-0.09368	-0.00614	-0.46773	-0.14882	-0.06697	-0.02513	-0.00168	-0.53386	-0.01537	-0.00844	-0.00675	-0.00454	-0.01675	-0.01384	-0.00421	-0.02994	-0.00954	-0.01759	-0.00276	-0.00308	-0.10302	-0.01437
2	-0.0065	-1.00981	-0.0105	-0.00844	-0.00394	-0.00391	-0.00998	-0.01162	-0.00631	-0.04392	-0.4467	-0.01593	-0.03456	-0.2692	-0.07492	-0.01494	-0.007	-0.02353	-0.03911	-0.06246	-0.00657	-0.01828	-0.00374	-0.00393	-0.00614	-0.00816
3	-0.0681	-0.00199	-1.3443	-0.12909	-0.00834	-0.00503	-0.03831	-0.01707	-0.00438	-0.03159	-0.00182	-0.03169	-0.00634	-0.00248	-0.00363	-0.00253	-0.00247	-0.00729	-0.00291	-0.00512	-0.00587	-0.00708	-0.00181	-0.00182	-0.00689	-0.01392
4	-0.00016	-0.00019	-0.00041	-1.00313	-0.0004	-0.00021	-0.00032	-0.00041	-0.00036	-0.00055	-0.00013	-0.00019	-0.00032	-0.00017	-0.00029	-0.00021	-0.00012	-0.00044	-0.00023	-0.00035	-0.00056	-0.00133	-0.00015	-0.00013	-0.00688	-0.00072
5	-0.00018	-7.7E-05	-0.00034	-0.00054	-1.05309	-0.00022	-0.00022	-0.00046	-0.00231	-0.00047	-0.00011	-0.00041	-0.00061	-0.00014	-0.00027	-0.00024	-0.00012	-0.00038	-0.00011	-0.00019	-0.00025	-0.00047	-4.9E-05	-7.7E-05	-0.00015	-0.00014
6	-0.00086	-0.00041	-0.00354	-0.00302	-0.00178	-1.26458	-0.00121	-0.00572	-0.00578	-0.00168	-0.00027	-0.00029	-0.00377	-0.00066	-0.00205	-0.00186	-0.00168	-0.03049	-0.00122	-0.00092	-0.00092	-0.00259	-0.00194	-0.00026	-0.00223	-0.00556
7	-0.00169	-0.00175	-0.00158	-0.00413	-0.00103	-0.00144	-1.09535	-0.2669	-0.00255	-0.00437	-0.00027	-0.00315	-0.00391	-0.00226	-0.00285	-0.00139	-0.00252	-0.01174	-0.00137	-0.00688	-0.00189	-0.00162	-0.00183	-0.003	-0.0025	-0.00408
8	-8.8E-05	-9.5E-05	-0.00013	-0.00018	-0.00019	-0.00049	-0.00052	-1.02018	-0.00166	-0.00017	-8.2E-05	-0.00019	-0.00018	-0.00012	-0.00025	-0.00076	-0.00014	-0.00022	-0.00013	-0.00061	-0.00025	-0.0002	-0.00014	-0.0001	-0.00104	-0.00036
9	-0.00449	-0.0057	-0.01189	-0.02219	-0.07297	-0.0113	-0.00912	-0.01645	-1.10964	-0.02007	-0.00466	-0.01058	-0.01917	-0.00607	-0.0136	-0.01061	-0.00486	-0.0233	-0.00797	-0.01071	-0.04175	-0.00832	-0.0068	-0.01056	-0.01443	-0.01433
10	-0.02571	-0.00242	-0.01846	-0.01322	-0.00734	-0.01052	-0.02516	-0.04228	-0.01995	-1.07915	-0.00486	-0.02549	-0.05456	-0.00601	-0.01825	-0.0101	-0.01087	-0.01516	-0.00405	-0.02053	-0.00268	-0.00346	-0.00162	-0.00159	-0.01374	-0.00621
11	-0.01369	-0.02544	-0.01776	-0.01532	-0.00674	-0.0189	-0.0221	-0.01768	-0.01351	-0.0211	-1.0665	-0.04475	-0.02522	-0.02466	-0.01248	-0.00775	-0.00519	-0.01139	-0.20716	-0.02449	-0.0173	-0.05414	-0.00707	-0.003	-0.0215	-0.01413
12	-0.00172	-0.00195	-0.00182	-0.00135	-0.00125	-0.003	-0.00238	-0.01384	-0.00144	-0.00154	-0.00049	-1.06044	-0.00275	-0.00188	-0.0018	-0.00189	-0.02736	-0.00233	-0.00136	-0.00341	-0.00311	-0.01704	-0.00112	-0.00038	-0.00491	-0.00229
13	-0.0038	-0.00217	-0.01433	-0.09455	-0.0221	-0.01049	-0.01191	-0.034	-0.01282	-0.02128	-0.00287	-0.01028	-1.06829	-0.01369	-0.01367	-0.01318	-0.01466	-0.02614	-0.00385	-0.10042	-0.00984	-0.0039	-0.00361	-0.00402	-0.00486	-0.00856
14	-0.00157	-0.00352	-0.00461	-0.00626	-0.00169	-0.00148	-0.00277	-0.01004	-0.00208	-0.00324	-0.00153	-0.00261	-0.00643	-1.0968	-0.13942	-0.02147	-0.0139	-0.02632	-0.00386	-0.07049	-0.00214	-0.0022	-0.00178	-0.00306	-0.00372	-0.00482
15	-0.00441	-0.00162	-0.02313	-0.04536	-0.00403	-0.00157	-0.00552	-0.01295	-0.00363	-0.01088	-0.01213	-0.00627	-0.00523	-0.02476	-1.07151	-0.01035	-0.00621	-0.00436	-0.00546	-0.03591	-0.00361	-0.00269	-0.00223	-0.00171	-0.00362	-0.00568
16	-0.00792	-0.01008	-0.01126	-0.01193	-0.01236	-0.00707	-0.01549	-0.01631	-0.00952	-0.00811	-0.0084	-0.01186	-0.01494	-0.01525	-0.01981	-1.09727	-0.0194	-0.03578	-0.00986	-0.03824	-0.00466	-0.00969	-0.01128	-0.004	-0.01152	-0.0435
17	-0.00423	-0.00349	-0.00612	-0.00443	-0.00341	-0.00239	-0.00754	-0.00522	-0.00313	-0.00303	-0.00456	-0.00528	-0.00604	-0.00391	-0.00494	-0.0042	-1.07773	-0.00276	-0.00205	-0.00653	-0.0035	-0.04512	-0.00207	-0.00137	-0.00962	-0.01637
18	-0.00101	-0.00104	-0.0014	-0.00176	-0.0016	-0.00803	-0.0018	-0.00226	-0.00368	-0.00151	-0.00156	-0.00133	-0.00199	-0.00051	-0.00129	-0.00117	-0.00067	-1.18539	-0.00097	-0.00114	-0.00124	-0.00159	-0.00183	-0.0011	-0.0037	-0.00425
19	-0.00629	-0.01776	-0.01912	-0.02763	-0.01214	-0.03846	-0.02293	-0.03084	-0.02279	-0.03434	-0.00923	-0.02442	-0.0576	-0.04763	-0.02185	-0.01591	-0.01003	-0.02599	-1.02583	-0.0182	-0.03355	-0.01156	-0.02331	-0.00958	-0.04234	-0.02511
20	-0.00286	-0.00604	-0.00478	-0.00512	-0.0029	-0.00443	-0.0064	-0.00682	-0.00592	-0.00461	-0.00157	-0.00543	-0.00691	-0.00713	-0.00505	-0.00357	-0.00189	-0.00616	-0.02181	-1.01063	-0.01527	-0.0077	-0.01105	-0.03733	-0.00946	-0.05397
21	-0.03126	-0.02304	-0.06544	-0.07447	-0.05933	-0.07793	-0.04825	-0.08293	-0.09037	-0.07155	-0.03775	-0.06606	-0.07715	-0.09206	-0.09594	-0.11215	-0.0517	-0.15713	-0.08133	-0.08962	-1.02489	-0.0474	-0.01474	-0.00964	-0.05868	-0.03648
22	-0.01016	-0.01671	-0.04343	-0.0232	-0.03489	-0.0168	-0.05873	-0.04109	-0.01868	-0.01791	-0.01887	-0.0261	-0.0259	-0.02175	-0.02249	-0.01593	-0.01426	-0.02186	-0.01857	-0.03212	-0.04015	-1.09115	-0.01298	-0.00535	-0.02077	-0.0327
23	-0.00207	-0.00231	-0.00445	-0.00524	-0.00462	-0.00611	-0.00564	-0.00812	-0.01013	-0.00543	-0.00231	-0.00511	-0.00629	-0.00399	-0.00577	-0.00579	-0.00263	-0.00996	-0.00681	-0.00673	-0.01867	-0.01096	-1.05591	-0.01674	-0.02118	-0.01291
24	-0.00509	-0.00972	-0.0127	-0.01552	-0.01826	-0.01743	-0.01775	-0.02557	-0.02184	-0.01421	-0.00877	-0.01377	-0.01865	-0.01492	-0.01719	-0.01188	-0.00827	-0.02241	-0.01234	-0.02184	-0.05244	-0.04174	-0.01163	-1.05076	-0.03584	-0.01765
25	-0.01694	-0.02481	-0.02833	-0.04225	-0.03923	-0.02362	-0.03428	-0.04493	-0.04089	-0.04187	-0.02136	-0.02435	-0.0367	-0.02125	-0.02935	-0.01851	-0.01626	-0.0394	-0.03489	-0.03598	-0.05797	-0.0635	-0.02603	-0.02772	-1.05483	-0.06432
26	-0.00076	-0.00111	-0.00224	-0.00208	-0.00178	-0.00248	-0.00203	-0.00349	-0.00318	-0.00243	-0.00088	-0.00269	-0.00272	-0.00165	-0.00252	-0.00179	-0.00101	-0.00298	-0.00474	-0.00362	-0.00856	-0.0042	-0.0011	-0.00199	-0.00441	-1.00236

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.050248	-0.005629	-0.410834	-0.057206	-0.122683	-0.011489	-0.434468	-1.277168	-0.023886	-0.093336	-0.423567	-0.071743	-0.011244	-0.008032	-0.006834	-0.020362	-0.071703	-0.005222	-0.030293	-0.010054	-0.018174	-0.003157	-0.003831	-0.112059	-0.015367	
2	-0.013008	-1.041338	-0.016854	-0.008434	-0.004659	-0.007131	-0.013043	-0.012597	-0.008454	-0.02512	-0.267878	-0.014166	-0.043032	-0.027283	-0.019517	-0.006687	-0.010187	-0.04832	-0.060998	-0.006381	-0.022051	-0.003246	-0.004592	-0.010131	-0.009906	
3	-0.067479	-0.002241	-1.393724	-0.135384	-0.012649	-0.01049	-0.035066	-0.013087	-0.008766	-0.0742	-0.00331	-0.019565	-0.007367	-0.005505	-0.004523	-0.003261	-0.00384	-0.009313	-0.006529	-0.006336	-0.007146	-0.010922	-0.002936	-0.007255	-0.094769	-0.019815
4	-0.000177	-0.000199	-0.000859	-1.032303	-0.000422	-0.000325	-0.000307	-0.000404	-0.00045	-0.000474	-0.000144	-0.000213	-0.000387	-0.000268	-0.000314	-0.000224	-0.000152	-0.000495	-0.000262	-0.000379	-0.000565	-0.000572	-0.000133	-0.000187	-0.00956	-0.000729
5	-0.000128	-3.24E-05	-0.000101	-8.75E-05	-1.030153	-8.5E-05	-6.94E-05	-0.000125	-0.000109	-0.000354	-1.77E-05	-0.000177	-0.000222	-4.26E-05	-0.00013	-0.000138	-2.28E-05	-0.000183	-8.74E-05	-0.000111	-4.48E-05	-8.6E-05	-7.17E-06	-2.15E-05	-9.8E-05	-4.44E-05
6	-0.001205	-0.000447	-0.003328	-0.003118	-0.001516	-1.293163	-0.001147	-0.009144	-0.006186	-0.001732	-0.000229	-0.00627	-0.004047	-0.000616	-0.002055	-0.002152	-0.009254	-0.033816	-0.00146	-0.001337	-0.001002	-0.002997	-0.001703	-0.000208	-0.0002356	-0.006205
7	-0.001895	-0.002052	-0.001534	-0.004466	-0.000793	-0.001352	-1.086479	-0.254805	-0.006779	-0.003943	-0.000486	-0.001484	-0.003632	-0.002054	-0.002024	-0.002616	-0.004096	-0.013774	-0.001977	-0.063304	-0.001857	-0.001594	-0.002591	-0.004156	-0.002797	-0.005802
8	-9.33E-05	-8.75E-05	-0.000118	-0.000208	-0.000193	-0.000184	-0.000157	-1.037082	-0.002042	-0.000183	-5.34E-05	-0.00049	-0.000291	-0.000149	-0.000298	-0.001202	-0.000508	-0.000353	-0.00013	-0.000644	-0.000199	-0.000191	-0.000127	-9.24E-05	-0.000585	-0.000219
9	-0.00277	-0.004821	-0.016564	-0.029785	-0.034731	-0.011259	-0.007854	-0.014152	-1.14648	-0.023374	-0.001741	-0.009381	-0.018147	-0.005288	-0.015902	-0.009734	-0.00389	-0.025206	-0.008716	-0.009053	-0.034574	-0.006302	-0.004368	-0.008218	-0.015376	-0.014667
10	-0.029783	-0.002255	-0.020258	-0.017605	-0.006029	-0.024927	-0.027421	-0.038211	-0.024638	-1.13471	-0.03019	-0.047481	-0.013371	-0.013846	-0.012288	-0.013804	-0.014311	-0.001632	-0.021517	-0.002053	-0.004561	-0.001934	-0.001715	-0.013836	-0.006157	
11	-0.036856	-0.030256	-0.040594	-0.021706	-0.010737	-0.022267	-0.037878	-0.02194	-0.021704	-0.0519	-1.083381	-0.043152	-0.039974	-0.028573	-0.013844	-0.009013	-0.006001	-0.013958	-0.2083	-0.024683	-0.016824	-0.073276	-0.007487	-0.002237	-0.025824	-0.015938
12	-0.003287	-0.001862	-0.00203	-0.001783	-0.001428	-0.004314	-0.003358	-0.008844	-0.00151	-0.002018	-0.000478	-1.103501	-0.003023	-0.003096	-0.004656	-0.002031	-0.018721	-0.002742	-0.00172	-0.004602	-0.003021	-0.015544	-0.000948	-0.000372	-0.005235	-0.001615
13	-0.004991	-0.002139	-0.011421	-0.078141	-0.00738	-0.017963	-0.005456	-0.043176	-0.00882	-0.020058	-0.001046	-0.007336	-1.067012	-0.008974	-0.007492	-0.006607	-0.012564	-0.022159	-0.004023	-0.107499	-0.011084	-0.002955	-0.00314	-0.002573	-0.005235	-0.004441
14	-0.001915	-0.003959	-0.004346	-0.00356	-0.001046	-0.001557	-0.002671	-0.011469	-0.002236	-0.003942	-0.00191	-0.003316	-0.003735	-1.093341	-0.132732	-0.021523	-0.014546	-0.041358	-0.003987	-0.079973	-0.00234	-0.001944	-0.000618	-0.002509	-0.00413	-0.004077
15	-0.003163	-0.001683	-0.017134	-0.044316	-0.001241	-0.002316	-0.005319	-0.011754	-0.003679	-0.01578	-0.004917	-0.006346	-0.005895	-0.011777	-1.05133	-0.008183	-0.006514	-0.00864	-0.005834	-0.032477	-0.003183	-0.00219	-0.003733	-0.001368	-0.004022	-0.002714
16	-0.007687	-0.009941	-0.009569	-0.019995	-0.005672	-0.008326	-0.012129	-0.011379	-0.008911	-0.009654	-0.009604	-0.01038	-0.011382	-0.016036	-0.020771	-1.083776	-0.021948	-0.045858	-0.016413	-0.031991	-0.004742	-0.012581	-0.05163	-0.006851	-0.014855	-0.012319
17	-0.004305	-0.002551	-0.002917	-0.00194	-0.002195	-0.001311	-0.004581	-0.007907	-0.001736	-0.00232	-0.001279	-0.001343	-0.001925	-0.001028	-0.001407	-0.001434	-1.110612	-0.002289	-0.002524	-0.002501	-0.002128	-0.031151	-0.001487	-0.00066	-0.008723	-0.009846
18	-0.000416	-0.000676	-0.000967	-0.001566	-0.001643	-0.008952	-0.0007	-0.002895	-0.003626	-0.001554	-0.000476	-0.00038	-0.001363	-0.000235	-0.001012	-0.001105	-0.000796	-1.271712	-0.001569	-0.000948	-0.001047	-0.001131	-0.001683	-0.001563	-0.002813	-0.004209
19	-0.009436	-0.018953	-0.045142	-0.031047	-0.012685	-0.048457	-0.028505	-0.02924	-0.03531	-0.044722	-0.01488	-0.003942	-0.063149	-0.053293	-0.027352	-0.01509	-0.015956	-0.028005	-1.033744	-0.022356	-0.022231	-0.015874	-0.020665	-0.015315	-0.051396	-0.026113
20	-0.002848	-0.007118	-0.004805	-0.006149	-0.002735	-0.005462	-0.005371	-0.006461	-0.008229	-0.006411	-0.002406	-0.007667	-0.010178	-0.006793	-0.005181	-0.003449	-0.003264	-0.007136	-0.014032	-1.011648	-0.015402	-0.006524	-0.007752	-0.031155	-0.010259	-0.037588
21	-0.036425	-0.022544	-0.063865	-0.070151	-0.051705	-0.08047	-0.046437	-0.080159	-0.093882	-0.08345	-0.03212	-0.059724	-0.071555	-0.061765	-0.081425	-0.103828	-0.052868	-0.151054	-0.072587	-0.088344	-1.01816	-0.046075	-0.015762	-0.008166	-0.059093	-0.025627
22	-0.009613	-0.015564	-0.032975	-0.019779	-0.034087	-0.016915	-0.062333	-0.047764	-0.020468	-0.021441	-0.009731	-0.018883	-0.020022	-0.013977	-0.016178	-0.014506	-0.012522	-0.020591	-0.017331	-0.031722	-0.025673	-1.100419	-0.014735	-0.004987	-0.022767	-0.021139
23	-0.002363	-0.00197	-0.004816	-0.005719	-0.005631	-0.007452	-0.005299	-0.010108	-0.010898	-0.006815	-0.001795	-0.004714	-0.007424	-0.003862	-0.006265	-0.005979	-0.00344	-0.010137	-0.008416	-0.007603	-0.019601	-0.013909	-1.020248	-0.019766	-0.023302	-0.01225
24	-0.003482	-0.007883	-0.008269	-0.010945	-0.007753	-0.014894	-0.012536	-0.021573	-0.016133	-0.013146	-0.003681	-0.008135	-0.003346	-0.010031	-0.012563	-0.009654	-0.005102	-0.020846	-0.012994	-0.025482	-0.045229	-0.028599	-0.010543	-1.058237	-0.03387	-0.013701
25	-0.011025	-0.020014	-0.026536	-0.042949	-0.03921	-0.023831	-0.027077	-0.037206	-0.039797	-0.043956	-0.011989	-0.022344	-0.030996	-0.024429	-0.028442	-0.017875	-0.015763	-0.040877	-0.044737	-0.038016	-0.062726	-0.08656	-0.021421	-0.020693	-1.062828	-0.061592
26	-0.000456	-0.001047	-0.001826	-0.001693	-0.001425	-0.002246	-0.001484	-0.002936	-0.002773	-0.002208	-0.000307	-0.002021	-0.00219	-0.001159	-0.002333	-0.001823	-0.000489	-0.003273	-0.00275	-0.00337	-0.008333	-0.003852	-0.000719	-0.002564	-0.004642	-1.005834

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.136127	-0.009981	-0.438113	-0.078186	-0.10242	-0.087528	-0.394827	-0.238435	-0.058915	-0.054317	-0.021034	-0.106495	-0.025457	-0.010865	-0.012763	-0.017473	-0.016045	-0.016342	-0.009594	-0.028025	-0.024533	-0.011881	-0.004679	-0.006697	-0.015134	-0.017822
2	-0.012501	-1.020337	-0.022435	-0.019329	-0.015435	-0.022131	-0.027453	-0.027433	-0.01764	-0.053959	-0.28596	-0.040202	-0.048349	-0.081629	-0.035794	-0.015561	-0.019948	-0.019948	-0.082949	-0.045471	-0.01102	-0.053101	-0.013539	-0.012879	-0.026394	-0.019369
3	-0.077773	-0.014551	-1.500622	-0.48361	-0.12445	-0.022962	-0.037361	-0.029381	-0.02535	-0.099191	-0.033514	-0.030245	-0.024495	-0.015189	-0.017671	-0.024701	-0.019108	-0.01888	-0.014397	-0.017631	-0.016109	-0.014053	-0.006799	-0.008755	-0.022097	-0.024787
4	-0.000457	-0.000484	-0.001567	-1.227719	-0.001002	-0.00053	-0.000533	-0.000557	-0.000719	-0.001013	-0.001053	-0.000787	-0.00069	-0.000445	-0.000531	-0.000778	-0.000557	-0.000578	-0.000442	-0.000495	-0.000538	-0.00048	-0.00022	-0.000318	-0.001062	-0.000796
5	-0.001039	-0.001192	-0.001806	-0.056276	-1.19771	-0.001297	-0.001195	-0.00129	-0.001513	-0.001583	-0.002457	-0.001893	-0.001375	-0.001104	-0.00124	-0.001796	-0.00141	-0.001293	-0.001078	-0.001288	-0.001333	-0.001281	-0.000904	-0.001111	-0.000904	-0.001552
6	-0.002377	-0.002191	-0.003962	-0.00415	-0.006098	-1.25165	-0.003275	-0.003608	-0.030772	-0.003268	-0.004502	-0.010881	-0.004343	-0.002209	-0.003114	-0.004127	-0.008288	-0.009309	-0.002247	-0.003107	-0.002353	-0.002562	-0.001816	-0.001673	-0.001901	-0.008406
7	-0.001451	-0.001861	-0.002293	-0.002828	-0.003385	-0.002051	-1.091317	-0.297393	-0.013421	-0.007466	-0.002848	-0.00262	-0.002641	-0.001926	-0.002495	-0.002963	-0.003153	-0.006671	-0.002701	-0.039936	-0.001828	-0.002786	-0.001644	-0.002972	-0.001528	-0.004927
8	-0.000245	-0.000418	-0.000466	-0.000626	-0.001148	-0.000427	-0.001685	-1.007352	-0.008157	-0.000455	-0.000577	-0.000553	-0.000494	-0.000443	-0.00053	-0.00077	-0.000437	-0.000841	-0.000848	-0.012369	-0.00035	-0.000926	-0.000436	-0.000928	-0.000399	-0.001687
9	-0.005406	-0.005222	-0.017985	-0.041821	-0.113918	-0.015863	-0.012103	-0.023857	-1.3363	-0.015755	-0.010482	-0.023766	-0.024788	-0.011373	-0.018543	-0.014078	-0.012181	-0.029845	-0.007575	-0.011267	-0.011176	-0.015329	-0.008736	-0.009887	-0.014756	-0.027111
10	-0.049654	-0.016384	-0.038074	-0.04689	-0.026874	-0.04991	-0.033324	-0.033442	-0.044408	-1.1553	-0.057194	-0.044731	-0.111491	-0.026193	-0.04222	-0.036524	-0.041111	-0.040458	-0.021597	-0.036699	-0.014469	-0.020807	-0.008892	-0.010352	-0.011134	-0.026267
11	-0.043564	-0.071461	-0.078031	-0.06419	-0.048234	-0.08145	-0.104869	-0.09931	-0.061718	-0.213542	-1.21252	-0.153385	-0.158731	-0.148831	-0.096425	-0.038918	-0.075101	-0.053834	-0.307668	-0.095598	-0.033766	-0.216095	-0.04894	-0.043706	-0.10379	-0.064831
12	-0.00642	-0.005937	-0.00933	-0.009327	-0.010088	-0.032394	-0.06695	-0.007741	-0.012883	-0.010359	-0.012275	-1.799755	-0.01559	-0.006886	-0.023815	-0.011289	-0.026254	-0.009568	-0.005801	-0.008577	-0.006427	-0.0164	-0.003852	-0.004157	-0.003404	-0.007862
13	-0.00804	-0.007996	-0.017648	-0.067172	-0.015572	-0.0318	-0.010003	-0.030485	-0.036647	-0.023983	-0.017056	-0.018762	-1.170966	-0.011426	-0.015054	-0.032292	-0.014978	-0.023143	-0.014203	-0.15266	-0.008401	-0.015927	-0.007025	-0.012664	-0.005972	-0.02074
14	-0.004028	-0.003999	-0.006073	-0.012073	-0.006731	-0.00475	-0.004439	-0.008498	-0.018877	-0.008117	-0.006921	-0.006411	-0.017575	-1.277386	-0.182762	-0.015924	-0.089114	-0.028612	-0.006718	-0.033343	-0.003684	-0.00425	-0.002409	-0.003606	-0.002674	-0.006887
15	-0.01033	-0.008127	-0.017491	-0.055723	-0.015227	-0.0123	-0.010456	-0.015269	-0.020674	-0.018167	-0.016596	-0.01688	-0.026962	-0.07604	-1.208847	-0.03734	-0.084986	-0.102151	-0.026269	-0.053447	-0.00837	-0.009483	-0.005628	-0.007604	-0.005946	-0.016357
16	-0.051355	-0.047824	-0.070337	-0.063006	-0.077446	-0.051054	-0.049765	-0.050454	-0.054411	-0.095348	-0.07484	-0.060688	-0.044191	-0.051182	-1.275239	-0.174176	-0.085082	-0.043419	-0.089608	-0.045747	-0.04047	-0.023118	-0.029746	-0.022053	-0.050306	
17	-0.013172	-0.007242	-0.012911	-0.010191	-0.012769	-0.009076	-0.009738	-0.009215	-0.011231	-0.009286	-0.014572	-0.032316	-0.008658	-0.006928	-0.009329	-0.012207	-1.159852	-0.013227	-0.006729	-0.010595	-0.009457	-0.012354	-0.004854	-0.00494	-0.00817	-0.013457
18	-0.007243	-0.001303	-0.004153	-0.002528	-0.003007	-0.010602	-0.003519	-0.003116	-0.006073	-0.002747	-0.002441	-0.002037	-0.002365	-0.001601	-0.002986	-0.002952	-0.004902	-0.039372	-0.002379	-0.001911	-0.001704	-0.003617	-0.001169	-0.001304	-0.001755	-0.007418
19	-0.024437	-0.014533	-0.016085	-0.040637	-0.029373	-0.080765	-0.061421	-0.068177	-0.054165	-0.056707	-0.032306	-0.050205	-0.076227	-1.70966	-0.126206	-0.025917	-0.062799	-0.063266	-1.318743	-0.039535	-0.032265	-0.042552	-0.05908	-0.036194	-0.087794	-0.061836
20	-0.004427	-0.015799	-0.006574	-0.005946	-0.007305	-0.008334	-0.00873	-0.009305	-0.007882	-0.008633	-0.009806	-0.008344	-0.008874	-0.014348	-0.009962	-0.019655	-0.008766	-0.007603	-0.046511	-1.014741	-0.011825	-0.046384	-0.02144	-0.059227	-0.013026	-0.086896
21	-0.04297	-0.050199	-0.075256	-0.07057	-0.082115	-0.059156	-0.050582	-0.058894	-0.068689	-0.069138	-0.01371	-0.081441	-0.06006	-0.046719	-0.056701	-0.084499	-0.056651	-0.070339	-0.050436	-0.06049	-1.053806	-0.049843	-0.03039	-0.036817	-0.035261	-0.058495
22	-0.038298	-0.032128	-0.066835	-0.054139	-0.067355	-0.110292	-0.106812	-0.071152	-0.056387	-0.064938	-0.088877	-0.081861	-0.080236	-0.063707	-0.051184	-0.060119	-0.04958	-0.04213	-0.089564	-0.065316	-1.447326	-0.066705	-0.100931	-0.064796	-0.059532	
23	-0.010665	-0.009716	-0.019745	-0.015507	-0.022568	-0.020828	-0.020544	-0.02279	-0.020094	-0.019082	-0.019904	-0.020269	-0.020741	-0.018136	-0.018912	-0.016896	-0.019579	-0.016493	-0.018567	-0.033663	-0.034703	-1.4631	-1.000124	-0.043266	-0.05734	-0.038255
24	-0.022494	-0.010733	-0.025218	-0.021340	-0.038399	-0.037001	-0.034369	-0.039348	-0.036247	-0.047453	-0.020056	-0.029117	-0.030525	-0.114667	-0.040503	-0.017503	-0.031132	-0.029671	-0.019527	-0.051024	-0.053297	-1.449466	-0.218373	-1.238961	-0.087035	-0.050733
25	-0.016018	-0.022251	-0.024	-0.024829	-0.036762	-0.027874	-0.024587	-0.030793	-0.033171	-0.033348	-0.028418	-0.029595	-0.027285	-0.026454	-0.02009	-0.031422	-0.026014	-0.049509	-0.083608	-0.09294	-0.078432	-0.118205	-0.079408	-1.336776	-0.114127	
26	-0.001705	-0.002244	-0.00308	-0.00321	-0.013091	-0.003429	-0.003259	-0.004007	-0.003834	-0.003552	-0.003183	-0.003331	-0.003643	-0.003806	-0.003481	-0.002768	-0.004006	-0.003226	-0.007413	-0.009915	-0.009974	-0.018443	-0.053052	-0.012213	-0.016942	-1.07486

Appendix 18

Residual Matrix, Malaysia

1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.0902	0.280905	-0.0669	-1.1E-05	-0.12246	0.250834	-0.01296	-0.1066	-0.09091	-0.10749	0.452242	-0.10133	-0.12468	-0.11519	-0.10587	-0.07505	-0.1268	-0.12102	-0.09857	-0.09832	-0.09373	-0.08783	-0.09102	-0.00021	-0.08787	-0.93297
2	-0.06157	0	-0.09946	-0.07671	-0.07379	-0.08316	-0.09039	-0.09338	-0.07348	-0.06856	0.163935	-0.09914	-0.0294	0.381935	-0.08959	-0.06001	-0.05772	-0.07911	-0.02292	-0.01827	-0.0682	-0.06343	-0.05942	-0.06155	-0.08005	-0.06443	-0.94686
3	-0.00457	-0.04844	0	0.050895	-0.04955	-0.06163	-0.0543	-0.06961	-0.0553	-0.03529	-0.0564	-0.05332	-0.05614	-0.06925	-0.06083	-0.05534	-0.04781	-0.06681	-0.06337	-0.06716	-0.05062	-0.05325	-0.04658	-0.04811	0.013239	-0.04157	-1.15131
4	-0.03119	-0.03112	-0.04989	0	-0.03552	-0.04183	-0.0459	-0.04954	-0.03655	-0.03794	-0.03549	-0.04966	-0.03867	-0.04409	-0.03946	-0.0359	-0.03074	-0.04661	-0.04072	-0.04487	-0.03495	-0.0363	-0.02949	-0.0306	-0.03079	-0.03338	-0.96121
5	-0.03117	-0.03141	-0.05034	-0.04102	0	-0.04206	-0.04615	-0.04998	-0.03691	-0.03802	-0.03566	-0.04979	-0.03879	-0.04435	-0.03975	-0.0306	-0.03091	-0.04701	-0.041	-0.04526	-0.03565	-0.03702	-0.02969	-0.03084	-0.04169	-0.03426	-0.98483
6	-0.04241	-0.04319	-0.06534	-0.05315	-0.04847	0	-0.06312	-0.06544	-0.04407	-0.05153	-0.04935	-0.06265	-0.04947	-0.06114	-0.05285	-0.04088	-0.04199	-0.029	-0.05542	-0.06194	-0.04867	-0.04858	-0.03931	-0.04263	-0.05545	-0.04114	-1.26459
7	-0.04695	-0.04619	-0.07629	-0.05775	-0.05442	-0.06324	0	0.249693	-0.05445	-0.05398	-0.05441	-0.07426	-0.0551	-0.06622	-0.05859	-0.05416	-0.04408	-0.05745	-0.06154	0.008671	-0.05295	-0.05539	-0.04307	-0.04401	-0.06122	-0.04793	-1.05229
8	-0.03138	-0.03142	-0.0505	-0.04102	-0.03597	-0.04218	-0.04625	0	-0.03455	-0.03948	-0.03573	-0.04998	-0.03906	-0.04442	-0.03967	-0.0351	-0.0309	-0.04709	-0.04111	-0.04484	-0.03556	-0.03709	-0.02969	-0.03084	-0.04124	-0.03416	-0.96824
9	-0.0419	-0.03923	-0.06221	-0.0362	2E-05	-0.04905	-0.06015	-0.05837	0	-0.03001	-0.048	-0.0638	-0.03804	-0.05831	-0.04186	-0.04009	-0.04063	-0.04157	-0.05089	-0.05512	-0.00276	-0.04536	-0.03676	-0.03709	-0.04538	-0.03587	-1.05865
10	-0.01846	-0.04096	-0.0562	-0.04688	-0.04345	-0.0476	-0.04086	-0.02327	-0.03271	0	-0.04636	-0.04084	-0.01345	-0.05593	-0.05777	-0.05574	-0.05059	-0.07124	0.193185	-0.0523	-0.04616	-0.04832	-0.03903	-0.04099	-0.04242	-0.04519	-0.97866
11	-0.04113	-0.02171	-0.07107	-0.05386	-0.05578	-0.05348	-0.05829	-0.06842	-0.05162	-0.03943	0	-0.06777	0.000611	-0.05663	-0.05777	-0.05574	-0.05059	-0.07124	0.193185	-0.0523	-0.04616	-0.04832	-0.03903	-0.04099	-0.04242	-0.04519	-0.97866
12	-0.03316	-0.03281	-0.05473	-0.04491	-0.03924	-0.04398	-0.04913	-0.0456	-0.04008	-0.04136	-0.03945	0	-0.05892	-0.0774	-0.01177	-0.04012	-0.0435	-0.05401	-0.04432	-0.04638	-0.03575	-0.02176	-0.03191	-0.03435	-0.04047	-0.03669	-0.98277
13	-0.04017	-0.04137	-0.05935	0.030477	-0.04046	-0.04969	-0.05983	-0.03514	-0.04082	-0.02699	-0.04855	-0.06312	0	-0.05892	-0.0774	-0.01177	-0.04012	-0.0435	-0.05401	0.032055	-0.03457	-0.04965	-0.03672	-0.03899	-0.05347	-0.04176	-0.98382
14	-0.04216	-0.03878	-0.06578	-0.05269	-0.0497	-0.05792	-0.06186	-0.05652	-0.04988	-0.04983	-0.04765	-0.06798	-0.05101	0	0.104281	-0.01965	-0.02902	-0.02903	-0.05284	0.011467	-0.04766	-0.0498	-0.03947	-0.03991	-0.0539	-0.04262	-0.97993
15	-0.03199	-0.03453	-0.03559	-0.02849	-0.03992	-0.04728	-0.04958	-0.05374	-0.04046	-0.03193	-0.03493	-0.05366	-0.04158	-0.04848	0	-0.03862	-0.03209	-0.05129	-0.04334	-0.02303	-0.03685	-0.04098	-0.03133	-0.03372	-0.0443	-0.03644	-0.98417
16	-0.03558	-0.03187	-0.06032	-0.04531	-0.04443	-0.05058	-0.05034	-0.05926	-0.04221	-0.04441	-0.04169	-0.05736	-0.04249	-0.04905	-0.04	0	-0.02995	-0.02034	-0.04159	-0.0243	-0.04293	-0.04314	-0.0281	-0.0365	-0.04323	-0.03597	-1.04092
17	-0.03103	-0.03146	-0.05086	-0.04139	-0.03609	-0.04312	-0.04537	-0.05019	-0.0376	-0.03893	-0.03672	-0.05046	-0.03896	-0.04533	-0.0406	-0.0369	0	-0.04802	-0.04184	-0.04585	-0.03585	-0.01657	-0.03057	-0.03196	-0.03304	-0.03313	-0.97184
18	-0.03914	-0.03904	-0.06278	-0.05009	-0.04356	-0.04435	-0.05761	-0.06109	-0.04259	-0.04706	-0.04462	-0.06207	-0.04809	-0.05533	-0.04929	-0.0444	-0.03855	0	-0.051	-0.05629	-0.04376	-0.0458	-0.03624	-0.03793	-0.05044	-0.04	-1.19115
19	-0.04289	-0.0205	-0.06288	-0.03773	-0.04651	-0.02145	-0.05118	-0.04617	-0.03361	-0.02588	-0.04231	-0.0576	-0.00462	-0.04551	-0.04329	-0.03992	-0.04122	-0.04534	0	-0.05081	-0.03372	-0.04563	-0.02842	-0.03826	-0.01095	-0.0325	-0.9489
20	-0.03577	-0.0299	-0.05789	-0.04548	-0.0419	-0.04719	-0.05157	-0.05507	-0.03954	-0.04246	-0.04108	-0.05618	-0.04156	-0.04901	-0.04419	-0.04082	-0.03671	-0.05143	-0.03249	0	-0.02627	-0.03888	-0.02511	0.005558	-0.04131	0.009102	-0.95713
21	-0.05113	-0.05147	-0.06661	-0.03611	-0.04269	-0.02268	-0.07806	-0.0422	0.002106	-0.01309	0.06834	-0.0612	-0.02232	-0.07354	-0.012	0.018811	-0.05191	0.043258	-0.00594	-0.02206	0	-0.04688	-0.06085	-0.06917	-0.04018	-0.05846	-0.93269
22	-0.0425	-0.03574	-0.04636	-0.04221	-0.02717	-0.04965	-0.01037	-0.03178	-0.04066	-0.04254	-0.0473	-0.05859	-0.04163	-0.05515	-0.04588	-0.04046	-0.03589	-0.05409	-0.04529	-0.04007	-0.02428	0	-0.03671	-0.04527	-0.04569	-0.03407	-1.01495
23	-0.03482	-0.0343	-0.05504	-0.04231	-0.03827	-0.04299	-0.04911	-0.05069	-0.03289	-0.03883	-0.04028	-0.05413	-0.03985	-0.04897	-0.04103	-0.03579	-0.03394	-0.04341	-0.04024	-0.04721	-0.02198	-0.03258	0	-0.02596	-0.02784	-0.02935	-0.98172
24	-0.04102	-0.03498	-0.06242	-0.04453	-0.043	-0.043	-0.05103	-0.04476	-0.03323	-0.0401	-0.04653	-0.06174	-0.0391	-0.05376	-0.0447	-0.03992	-0.03829	-0.0436	-0.04716	-0.03928	-0.00264	-0.01804	-0.03932	0	-0.02064	-0.03672	-1.06229
25	-0.04853	-0.03427	-0.0684	-0.01873	-0.02213	-0.0525	-0.05894	-0.04693	-0.02706	-0.01901	-0.05368	-0.07141	-0.03693	-0.06111	-0.04159	-0.0446	-0.04371	-0.03979	-0.04811	-0.04381	-0.00331	-0.00498	-0.04042	-0.0394	0	-0.01014	-0.97948
26	-0.03227	-0.03174	-0.05073	-0.04067	-0.03612	-0.04132	-0.04655	-0.04848	-0.03519	-0.03768	-0.03679	-0.05023	-0.03805	-0.04472	-0.03869	-0.03559	-0.03129	-0.04589	-0.04149	-0.04343	-0.02642	-0.0336	-0.03059	-0.03031	-0.03813	0	-0.96596
SUM	-0.93289	-0.94663	-1.15225	-0.96276	-0.98314	-1.26439	-1.02508	-0.96801	-1.05997	-1.02424	-0.97487	-0.9847	-0.98614	-0.97972	-1.01101	-1.01282	-0.97133	-1.18932	-0.94869	-0.95791	-0.93158	-1.01412	-0.98149	-1.00626	-0.97899	-0.96581	-26.2141

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.0071877	0.44126642	0.05792317	0.1161482	0.00226664	0.40064549	0.14289488	0.07612528	0.02819024	0.00168407	0.61284783	0.01913143	0.01176717	0.00773106	0.00593468	0.02125903	0.09533531	0.00567572	0.04715609	0.01263205	0.02352809	0.00362239	0.00343834	0.1342038	0.01777829	2.14676973
2	0.05381262	0	0.00865792	0.00831798	0.00254689	0.00764935	0.00816972	0.01149314	0.00346984	0.01143834	0.19190429	0.01356707	0.03826595	0.49719165	0.07814409	0.0197816	0.00880718	0.02499105	0.05125476	0.08201104	0.00715363	0.01369461	0.00397529	0.00494216	0.00754204	0.0082898	1.11891081
3	0.04502837	0.002705	0	0.1140245	0.00706881	0.00627377	0.01855912	0.0194401	0.00412229	0.02636447	0.00816158	0.00753569	0.0044216	0.00271789	0.00335457	0.00279794	0.00391692	0.0094656	0.00260318	0.00520056	0.00685268	0.00696928	0.00096051	0.00123429	0.07921981	0.01324643	0.40333909
4	6.821E-05	0.00024361	0.00044733	0	0.0035172	0.00022697	0.00023918	0.00045051	0.00042074	0.005813	8.643E-05	0.00018293	0.00036136	0.00018191	0.0003324	0.00042629	0.00012325	0.00404024	0.00026921	0.00035178	0.00069246	0.0004709	9.605E-05	0.00021781	0.01120788	0.0007823	0.0193123
5	0.00028985	3.301E-05	0.00015421	0.00013179	0	9.5338E-05	0.00010439	0.00015326	0.0001448	0.00052948	3.107E-05	0.00019718	0.0003491	4.536E-05	0.00011896	0.0002178	4.117E-05	0.00013783	9.567E-05	0.00011794	4.1688E-05	8.8381E-05	1.953E-05	1.009E-05	4.890E-05	0.0031094	0.0031094
6	0.00121273	0.00043943	0.04083295	0.00420669	0.0013749	0	0.00118658	-0.0021919	0.00811085	0.00198652	0.00071714	0.0075456	0.00548705	0.00036673	0.00288727	-0.0013649	0.0050706	0.04792006	0.00712721	0.00102109	0.00095908	0.00436538	0.0023322	0.00014675	0.00263714	0.00700139	0.1044957
7	0.00145331	0.00235763	0.0015689	0.00565749	0.00114028	0.0017962	0	0.3261329	0.0025919	0.0056146	0.00045907	0.00249561	0.0051728	0.00253802	0.0024278	0.00142759	0.0037947	0.01724827	0.00091329	0.00745859	0.00213943	0.00193753	0.00232835	0.00360424	0.00342135	0.00520218	0.4861734
8	4.088E-05	8.674E-05	9.1431E-05	0.00014802	0.00021317	8.018E-05	0.00019366	0	0.0032618	0.00019472	3.0339E-05	8.3789E-05	0.00013495	7.441E-05	0.00034322	0.0009443	0.00011033	0.00017066	8.6393E-05	0.0055598	0.00028905	0.00014702	1.8971E-05	5.7774E-05	0.00068015	0.00023528	0.00029236
9	0.00260474	0.00622897	0.0098292	0.01852489	0.05355356	0.01050154	0.00545209	0.0371961	0	0.02659857	0.00237331	0.00756281	0.01757819	0.00504077	0.01565694	0.02145633	0.00369203	0.0262613	0.00752737	0.003338	0.05027064	0.00755967	0.00404946	0.00565835	0.01315942	0.01357457	0.3072403
10	0.02495629	0.0019588	0.0133475	0.00934873	0.0059068	0.00861282	0.02159447	0.04991033	0.01667187	0	0.00294669	0.02563379	0.03959335	0.0047573	0.01232403	0.01194717	0.00937861	0.00885544	0.0028381	0.027324	0.00261612	0.00238223	0.00189491	0.00153959	0.01492783	0.00573639	0.32325558
11	0.01479231	0.03723236	0.02019024	0.0210406	0.00687095	0.01851111	0.02363136	0.02255581	0.01545964	0.03024514	0	0.050065134	0.04265	0.02501578	0.01421722	0.0095365	0.00632401	0.01296268	0.2693844	0.02759866	0.0216205	0.05975058	0.00662222	0.00333118	0.02593318	0.01733478	0.8052302
12	0.0215438	0.00257985	0.00229166	0.0167191	0.00162216	0.00380666	0.00361386	0.00912359	0.00203618	0.00184536	0.006311	0	0.00316905	0.0024482	0.00217279	0.00226885	0.03839433	0.00217065	0.00228288	0.00473907	0.00465502	0.02223017	0.00194454	0.00050588	0.00736764	0.00208781	1.1194791
13	0.00387156	0.00307394	0.0115993	0.0940066	0.1112091	0.00963113	0.0047834	0.03797221	0.01196482	0.02799699	0.00133796	0.00678321	0	0.00354669	-0.0042398	0.01840061	0.00311145	0.02409847	0.00361649	0.09646495	0.00361649	0.00273816	0.005652	0.00431994	0.00561068	0.00667056	0.41136685
14	0.00228699	0.00588687	0.00560809	0.00461055	0.00119562	0.00157291	0.0036009	0.01343081	0.00148423	0.00456278	0.00205966	0.0025627	0.00370142	0	0.1585747	0.03389129	0.0148319	0.04285394	0.00518438	0.07692593	0.00286851	0.00286851	0.00285303	0.0038131	0.00525937	0.00621291	0.40831233
15	0.00044444	0.00154376	0.02246242	0.01787997	0.00158298	0.00106247	0.00370981	0.00339495	0.00215268	0.01395668	0.00658575	0.00325927	0.00399122	0.00095163	0	0.00247161	0.00319926	0.0055329	0.00391459	0.02899535	0.0046114	0.00162117	0.00331704	0.00716001	0.00402401	0.00308825	0.14217071
16	0.0056928	0.0071626	0.00644339	0.00932811	0.00336025	0.00456608	0.01246526	0.0065615	0.00705414	0.00651356	0.00467056	0.00397118	0.00822011	0.01027664	0.01253045	0	0.01170258	0.05339028	0.01391114	0.03640472	0.00399912	0.00641875	0.01149959	0.00460088	0.0104124	0.01022268	0.28624392
17	0.00174787	0.00107059	0.00394967	0.0014371	0.00154618	0.00055906	0.00302987	0.0021351	0.00098621	0.00117118	0.00060737	0.00183247	0.00160635	0.00075684	0.0007731	0.00072722	0	-0.0004626	0.00059017	0.00118861	0.0014031	0.02240031	0.0004227	0.00022423	0.01041368	0.00270703	0.00808285
18	0.00022381	0.00058221	0.0005808	0.00182482	0.00207965	0.0054713	0.00045483	0.0022325	0.0046132	0.00173986	0.001154	0.00076014	0.00086159	0.00053116	0.00086124	0.0014523	0.0034271	0	0.00066447	0.00044456	0.00119032	0.00019046	0.00120874	0.00014314	0.00236884	0.00341138	0.03568274
19	0.00381352	0.02904546	0.02512576	0.02228378	0.00624458	0.03603573	0.01637016	0.02402214	0.02071427	0.0329574	0.00822476	0.00553853	0.03029411	0.02133573	0.01537649	0.01318245	0.0543052	0.0096574	0	0.01734713	0.0191488	0.00992754	0.01189628	0.00737375	0.05213101	0.01790278	0.49510758
20	0.00235817	0.00936123	0.009393023	0.00949607	0.00213262	0.00429895	0.00393642	0.00606777	0.00971091	0.00484385	0.00185384	0.00494404	0.0059143	0.0068167	0.0049687	0.0037553	0.007121	0.00689702	0.01836549	0	0.04812667	0.0136097	0.00318236	0.00982408	0.05256023	0.2491615	0.18180663
21	0.02629273	0.02895943	0.05910089	0.06791697	0.04051904	0.08233109	0.04531242	0.08550049	0.08981689	0.04065303	0.0158652	0.00502496	0.07049897	0.03504967	0.08801891	0.11283614	0.02573406	0.19655608	0.09394714	0.09316615	0	0.04812667	0.0136097	0.00740084	0.06645331	0.012864983	1.50180663
22	0.00617807	0.00575709	0.0034878	0.02296394	0.03589387	0.01671183	0.06737438	0.05601198	0.01694831	0.01550032	0.01365733	0.01967129	0.00102543	0.00748181	0.01512795	0.01527652	0.01265706	0.01865209	0.01971439	0.02648807	0.02437804	0	0.01100516	0.00297998	0.01829676	0.01939367	0.51320934
23	0.00135963	0.00216151	0.00445674	0.00534446	0.00348914	0.00593811	0.04435971	0.00761677	0.01024169	0.00610128	0.00296264	0.00374302	0.00552959	0.00228407	0.00519888	0.00652067	0.00194463	0.01303183	0.00799815	0.00463577	0.00969997	0.01013819	0	0.0089863	0.02126993	0.01067321	0.1746708
24	0.00314801	0.00966777	0.00903701	0.0145608	0.00733637	0.0158898	0.01383167	0.02649534	0.01940323	0.01390234	0.00335028	0.0075661	0.01562481	0.00889562	0.01458569	0.01198901	0.00515774	0.02423428	0.01121768	0.02591653	0.0482144	0.0061256	0.00216946	0	0.03779318	0.01113086	0.39822101
25	0.00060888	0.02141885	0.0029375	0.05073183	0.03496501	0.02042163	0.02147148	0.04184174	0.03827228	0.05071825	0.001786501	0.00262342	0.0302675	0.0170882	0.02390078	0.02103361	0.010471	0.0494495	0.02278303	0.0135545	0.00614524	0.00333189	0.01028238	0.0128995	0	0.04827868	0.74405875
26	0.00049896	0.0011755	0.0020677	0.00243819	0.0016806	0.00258331	0.00179456	0.00417376	0.00374028	0.00274886	0.00039832	0.00202994	0.00289909	0.00113842	0.0030014	0.00252445	0.00108408	0.00422004	0.00140649	0.00294942	0.02206337	0.0059203	0.00043063	0.00186334	0.00563161	0	0.07062522
SUM	0.1654664	0.01928025	0.69516894	0.56122441	0.35713951	0.26738759	0.674904	0.90262645	0.30505265	0.39904634	0.27013237	0.49955305	0.60701575	0.48376438	0.39861322	0.1832267	0.62964817	0.54959376	0.72127996	0.4452972	0.3609149	0.11701255	0.12218528	0.5498077	0.3115001	1.14505658	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.0048	0.437712	0.055871	0.093677	0.006143	0.467734	0.148823	0.006965	0.025133	0.001679	0.533863	0.015375	0.008436	0.006752	0.004538	0.016752	0.013835	0.004209	0.029944	0.009543	0.017585	0.002765	0.00308	0.03024	0.014373	2.032613
2	0.006503	0	0.010497	0.008435	0.00394	0.003915	0.009975	0.011624	0.006306	0.043924	0.446702	0.015934	0.04557	0.269205	0.074922	0.014943	0.006998	0.023534	0.039112	0.062464	0.006571	0.018282	0.003741	0.003925	0.006145	0.008158	1.440311
3	0.068105	0.001986	0	0.129092	0.008341	0.005026	0.038314	0.017071	0.004377	0.031595	0.001815	0.03169	0.00634	0.002482	0.003631	0.002533	0.002474	0.007295	0.002942	0.00512	0.005865	0.007081	0.001812	0.001822	0.006889	0.013925	0.469594
4	0.000161	0.000194	0.00042	0	0.0004	0.000214	0.000324	0.000413	0.000364	0.000545	0.000131	0.00019	0.00032	0.000172	0.000289	0.000209	0.000117	0.000445	0.000227	0.000351	0.000565	0.001327	0.000153	0.000134	0.008685	0.000721	0.017062
5	0.000181	7.68E-05	0.000344	0.000541	0	0.000219	0.000224	0.000464	0.002305	0.000474	0.000114	0.000407	0.000612	0.000145	0.000274	0.000243	0.00012	0.000379	0.000108	0.000189	0.000251	0.000465	4.94E-05	7.71E-05	0.000153	0.000138	0.008552
6	0.000861	0.000405	0.003545	0.003016	0.000178	0	0.00121	0.005722	0.005778	0.00168	0.000265	0.009294	0.003766	0.000657	0.002054	0.001858	0.001675	0.030491	0.001222	0.000921	0.000922	0.002587	0.001943	0.000259	0.002226	0.005563	0.089701
7	0.001689	0.001748	0.001579	0.004125	0.001031	0.001438	0	0.266897	0.002553	0.00437	0.00027	0.003151	0.00391	0.00226	0.00285	0.001387	0.002523	0.011736	0.001375	0.060881	0.001893	0.001616	0.001827	0.002997	0.002499	0.004084	0.390686
8	8.79E-05	9.51E-05	0.000131	0.000182	0.000187	0.000487	0.000519	0	0.00166	0.000172	8.23E-05	0.000191	0.000183	0.000115	0.000248	0.000757	0.000137	0.00022	0.000127	0.00061	0.000247	0.000197	0.00014	0.000104	0.001041	0.000363	0.008284
9	0.004486	0.005699	0.011893	0.027192	0.07297	0.0113	0.009118	0.01645	0	0.020068	0.00466	0.010584	0.019174	0.006071	0.013599	0.010606	0.004857	0.023302	0.007965	0.010709	0.04175	0.008318	0.006799	0.010559	0.01443	0.014335	0.381895
10	0.025714	0.00242	0.018461	0.013222	0.007336	0.01052	0.025163	0.042284	0.019952	0	0.004857	0.025485	0.054556	0.006012	0.018251	0.010096	0.010865	0.015164	0.004051	0.020531	0.002679	0.003456	0.00162	0.001587	0.01374	0.006207	0.364229
11	0.013692	0.025442	0.01776	0.015318	0.006736	0.018902	0.022099	0.017682	0.013505	0.021103	0	0.044747	0.025223	0.024663	0.012481	0.007747	0.005193	0.011394	0.207163	0.024487	0.017298	0.054336	0.007066	0.002997	0.021498	0.014132	0.652464
12	0.001719	0.001955	0.001824	0.001348	0.001246	0.003001	0.002376	0.013844	0.001441	0.001541	0.000493	0	0.002746	0.00188	0.001801	0.001887	0.027358	0.002331	0.001359	0.003413	0.003114	0.017038	0.001123	0.000379	0.004911	0.002286	0.102416
13	0.003798	0.002172	0.04328	0.096552	0.022097	0.010489	0.011914	0.034005	0.012821	0.021284	0.002867	0.010275	0	0.013689	0.013673	0.013181	0.014664	0.026141	0.003852	0.00423	0.009841	0.003899	0.003611	0.004018	0.004859	0.008559	0.463012
14	0.001568	0.003517	0.004608	0.006258	0.001685	0.00148	0.002766	0.010038	0.002078	0.003244	0.001528	0.002612	0.006432	0	0.139423	0.021474	0.013899	0.026323	0.003857	0.070489	0.002136	0.002204	0.001784	0.003958	0.003718	0.004823	0.341002
15	0.004409	0.001616	0.023133	0.045357	0.004034	0.001574	0.005516	0.012951	0.003626	0.010879	0.012134	0.006269	0.005233	0.02476	0	0.010354	0.006213	0.004358	0.005461	0.035906	0.003609	0.002369	0.002232	0.001712	0.003622	0.005676	0.243323
16	0.007917	0.010075	0.011259	0.011925	0.01236	0.00707	0.01549	0.016307	0.00952	0.008106	0.008401	0.011862	0.014936	0.015246	0.019807	0	0.019402	0.035785	0.009862	0.038241	0.004662	0.009866	0.011278	0.003997	0.01152	0.0043495	0.368212
17	0.00423	0.003494	0.006123	0.004431	0.003412	0.002389	0.00754	0.005223	0.003133	0.003026	0.004563	0.005276	0.006041	0.003912	0.004941	0.004199	0	0.002764	0.002052	0.006534	0.003502	0.045115	0.002065	0.001374	0.009625	0.016365	0.161326
18	0.001007	0.00104	0.0014	0.001764	0.001596	0.008035	0.001797	0.002258	0.003681	0.001509	0.001559	0.001335	0.001992	0.000515	0.001285	0.001175	0.000669	0	0.000972	0.001136	0.001243	0.001385	0.001825	0.001101	0.0037	0.004251	0.048428
19	0.006288	0.017756	0.019122	0.027631	0.012141	0.038461	0.022925	0.030837	0.022786	0.034338	0.009229	0.02442	0.057597	0.04763	0.021852	0.015911	0.010032	0.025892	0	0.018205	0.033551	0.011558	0.023307	0.009581	0.04234	0.025112	0.608501
20	0.002855	0.00604	0.004779	0.005125	0.002896	0.00443	0.006403	0.006821	0.005921	0.004609	0.001569	0.005428	0.006915	0.007126	0.005053	0.003573	0.001888	0.006161	0.021808	0	0.015266	0.0077	0.011049	0.037327	0.009464	0.053867	0.244172
21	0.031256	0.02394	0.065445	0.074469	0.059325	0.077925	0.048252	0.082933	0.090372	0.071546	0.037745	0.066061	0.077153	0.092056	0.095942	0.112146	0.051698	0.157132	0.081325	0.089623	0	0.047404	0.014736	0.009644	0.058681	0.036482	1.652394
22	0.010161	0.016707	0.043432	0.022203	0.034891	0.016799	0.058731	0.041092	0.018683	0.017907	0.018871	0.026105	0.025896	0.021751	0.022491	0.015929	0.014256	0.021865	0.01857	0.032122	0.040155	0	0.01298	0.005347	0.020766	0.032696	0.611406
23	0.002068	0.002311	0.004455	0.005242	0.004616	0.006106	0.005642	0.00812	0.010134	0.005428	0.002313	0.005111	0.006292	0.003987	0.005765	0.005792	0.002635	0.009963	0.006813	0.006732	0.018669	0.010961	0	0.016744	0.021179	0.012906	0.189982
24	0.005089	0.009724	0.012702	0.015516	0.018255	0.017494	0.017751	0.025568	0.021839	0.014206	0.008774	0.013771	0.018646	0.014925	0.017186	0.011875	0.008271	0.02241	0.012337	0.027842	0.052437	0.041745	0.011627	0	0.035836	0.017651	0.467416
25	0.016942	0.024806	0.02833	0.042254	0.039229	0.023621	0.034295	0.044928	0.040887	0.041869	0.021361	0.024354	0.036705	0.021248	0.023946	0.018505	0.016263	0.039405	0.034893	0.035976	0.057968	0.063498	0.026028	0.027715	0	0.064317	0.854733
26	0.000756	0.001113	0.002241	0.002077	0.001776	0.002479	0.002026	0.003491	0.003178	0.002432	0.000894	0.002694	0.002722	0.001648	0.002519	0.001791	0.00101	0.002976	0.004738	0.003615	0.008562	0.004198	0.001103	0.001993	0.004413	0	0.066454
SUM	0.221542	0.168233	7.45514	0.615144	0.415957	0.279457	0.818096	0.865847	0.313865	0.390987	0.592868	0.881106	0.433321	0.590592	0.516435	0.292708	0.239969	0.521299	0.476371	0.680464	0.342299	0.384331	0.152663	0.151531	0.476964	0.410586	11.97815

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	0.0056288	0.4108338	0.0572063	0.1226826	0.0114895	0.4344678	0.1277168	0.0238661	0.0059579	0.003336	0.4235673	0.0174483	0.0112436	0.008032	0.0068337	0.0203617	0.0171005	0.0052224	0.0302927	0.0100537	0.0181743	0.003157	0.0038314	0.1120592	0.0153666	1.950639	
2	0.0130077	0	0.0168537	0.008434	0.0046589	0.0071315	0.0130432	0.0125972	0.008454	0.0251203	0.267883	0.0141657	0.0434596	0.3020324	0.072827	0.019517	0.0066871	0.0101868	0.0483202	0.0600983	0.0063808	0.0220515	0.0032459	0.0045921	0.0101306	0.0099057	1.010235	
3	0.0674767	0.0022409	0	0.1353843	0.012649	0.0104902	0.0359661	0.0130875	0.0087662	0.01742007	0.0033105	0.0194655	0.0073669	0.0059594	0.004523	0.0032609	0.0038402	0.0093131	0.0065295	0.0063361	0.0071461	0.010922	0.0029361	0.0025497	0.0047167	0.0198152	0.567152	
4	0.0001773	0.0001994	0.000859	0	0.0004238	0.0003253	0.0003067	0.0004041	0.00045	0.0014739	0.0001441	0.0002129	0.0003873	0.0002685	0.0003145	0.0002245	0.0001515	0.0004953	0.0002622	0.0003792	0.0005651	0.0005719	0.0001332	0.0001868	0.0095605	0.0007293	0.019204	
5	0.0001277	3.237E-05	0.0001007	8.754E-05	0	8.502E-05	6.944E-05	0.0001254	0.0001019	0.0003536	1.796E-05	0.0001771	0.0002222	4.256E-05	9.939E-05	0.0001303	2.778E-05	0.0001829	8.741E-05	0.000111	4.485E-05	6.598E-05	7.169E-06	2.146E-05	9.8E-05	4.444E-05	0.002487	
6	0.0012046	0.0004467	0.0033276	0.0031181	0.0015159	0	0.0011474	0.0091441	0.0061856	0.007318	0.000229	0.0062701	0.004047	0.000616	0.0022653	0.0021517	0.009254	0.0138159	0.00146	0.0013372	0.0021022	0.0029075	0.0077032	0.0002084	0.0002356	0.0062946	0.103739	
7	0.001885	0.0020519	0.0015236	0.0044664	0.0007932	0.0013516	0	0.2548053	0.067786	0.0039427	0.0004864	0.0014845	0.0036319	0.0026542	0.0029239	0.0026163	0.0040955	0.0137743	0.001977	0.063304	0.0018574	0.0015938	0.0025906	0.0041564	0.0027977	0.0058021	0.393354	
8	9.334E-05	8.745E-05	0.0001183	0.0002084	0.000193	0.0001844	0.0001574	0	0.0020421	0.0001833	5.336E-05	0.00049	0.0002912	0.0001492	0.000298	0.0012019	0.000508	0.0003533	0.0003405	0.0006445	0.000199	0.0001906	0.0001265	9.239E-05	0.0005948	0.0002187	0.008799	
9	0.0027701	0.0048209	0.0165945	0.027849	0.0347308	0.0112586	0.0078538	0.0145121	0	0.021374	0.0007406	0.0093807	0.0181473	0.0052885	0.0150019	0.0097341	0.0038897	0.0252064	0.0087162	0.0090526	0.0345744	0.0063018	0.0043684	0.0082184	0.0153762	0.0146668	0.332973	
10	0.0297834	0.0022546	0.020259	0.0176051	0.0060286	0.0249271	0.0274207	0.0382105	0.0246382	0	0.015742	0.0301897	0.0474813	0.0133706	0.013846	0.0127877	0.0138043	0.0143107	0.0016322	0.0215173	0.0020532	0.0045612	0.0009344	0.0017153	0.0138365	0.0061571	0.400988	
11	0.0368559	0.0302557	0.0405937	0.0217058	0.0107369	0.0222667	0.037878	0.02194	0.0217035	0.0518997	0	0.0431523	0.0399739	0.0265729	0.0138439	0.00940128	0.0060006	0.0139582	0.2083003	0.0246833	0.0168236	0.0732759	0.0074875	0.0023705	0.0258239	0.0159384	0.825054	
12	0.003287	0.0018617	0.0020305	0.001783	0.0014276	0.004314	0.0033582	0.0088439	0.0015101	0.0020176	0.004776	0	0.0030231	0.0030963	0.0046562	0.0020307	0.0187207	0.0027419	0.00172	0.0446023	0.0030209	0.015544	0.000948	0.000372	0.0049375	0.0016149	0.087994	
13	0.004991	0.0021394	0.0114207	0.0781414	0.0073799	0.017963	0.0054559	0.0431762	0.0088197	0.0200584	0.001046	0.0073359	0	0.0089745	0.0074923	0.0066073	0.0125636	0.0221519	0.0040225	0.074994	0.0110837	0.0029552	0.0031398	0.0025725	0.005235	0.0044415	0.406674	
14	0.0019148	0.0039595	0.0043465	0.0035601	0.0010464	0.001557	0.0026714	0.0114689	0.0022362	0.0039419	0.0019103	0.0033158	0.0037747	0	0.1327317	0.0215228	0.014546	0.0413579	0.0039872	0.0799729	0.0022404	0.0019444	0.0006176	0.0025088	0.0041301	0.0040775	0.355401	
15	0.0031633	0.0016832	0.0171339	0.0443157	0.0012412	0.0023164	0.0051898	0.0117538	0.0036789	0.0115782	0.0049167	0.0062461	0.0058954	0.0111769	0	0.0081828	0.0065135	0.0086401	0.0058336	0.0324768	0.0031834	0.0021902	0.0037327	0.0013884	0.0040216	0.0027136	0.209246	
16	0.0076868	0.0099405	0.0095693	0.0199947	0.0056716	0.0083262	0.012129	0.0113791	0.008911	0.0096543	0.0096036	0.0103796	0.0103796	0.0113816	0.0160365	0.0202709	0	0.0219478	0.0458578	0.0164129	0.0379914	0.0047421	0.0125805	0.0351635	0.0068507	0.014855	0.379655	
17	0.0043051	0.0025514	0.0029168	0.0019403	0.0021955	0.0013107	0.004581	0.0079071	0.0017356	0.00232	0.0012789	0.0013432	0.001925	0.0010282	0.0014066	0.0014338	0	0.0022888	0.0025242	0.0025013	0.0021283	0.0311508	0.0014866	0.0006598	0.0087232	0.009846	0.101488	
18	0.0004159	0.0006756	0.000967	0.0015664	0.0016435	0.0089525	0.0007001	0.0024951	0.0036257	0.0015538	0.0004764	0.0010382	0.0013631	0.0002345	0.0010724	0.0011046	0.0007958	0	0.0015688	0.000948	0.0010469	0.00131	0.0016829	0.0015631	0.0028131	0.0042092	0.043763	
19	0.0094362	0.0189525	0.051423	0.0310474	0.0126855	0.0484571	0.0285046	0.0292402	0.0353098	0.0447223	0.0148797	0.0339416	0.0631495	0.053293	0.0273518	0.0150896	0.0159557	0.0280049	0	0.0223561	0.0222307	0.0158716	0.0200647	0.0153153	0.051396	0.0261129	0.728513	
20	0.0029478	0.0071182	0.0048053	0.006149	0.0027352	0.0054621	0.0053709	0.0064613	0.0082285	0.0064107	0.0024063	0.0071673	0.0101782	0.0067935	0.0051807	0.0034495	0.0034495	0.0032638	0.0071359	0.0140321	0	0.0154016	0.0065492	0.0077521	0.0311555	0.0102591	0.0375804	0.243777
21	0.0364235	0.0225439	0.0038653	0.0070515	0.00517052	0.00804701	0.0464367	0.0801589	0.0938818	0.0836505	0.0321202	0.0597236	0.0175552	0.0671645	0.0814249	0.038282	0.528676	0.1510544	0.0725966	0.0884349	0	0.0460755	0.0157619	0.0081661	0.0590929	0.0256273	1.559282	
22	0.0096127	0.0155638	0.0329748	0.0197789	0.0340868	0.0169149	0.0623333	0.0477644	0.0204677	0.021407	0.0097305	0.0188834	0.0200219	0.0139772	0.0161784	0.0145065	0.0125221	0.0205507	0.0773307	0.0377219	0.0250726	0	0.0147345	0.0049871	0.0227671	0.0213192	0.545402	
23	0.0023628	0.0019696	0.0048158	0.0057189	0.0056314	0.0074524	0.0052986	0.0101083	0.0108977	0.0068151	0.0077349	0.0047143	0.0074243	0.003362	0.0062652	0.005679	0.0034398	0.0101373	0.0084164	0.0076033	0.0196012	0.013909	0	0.0197664	0.0233023	0.0122504	0.208236	
24	0.0034821	0.0078834	0.0082694	0.0109449	0.0077528	0.014894	0.012586	0.0215729	0.0161327	0.0131457	0.0038808	0.0081352	0.0103345	0.0100308	0.0125629	0.009654	0.0051018	0.0208457	0.0129939	0.0254823	0.0452288	0.028599	0.0105426	0	0.0338703	0.0137008	0.370438	
25	0.0110254	0.0200141	0.0263597	0.0429487	0.0392099	0.0238306	0.0270768	0.0372062	0.0397966	0.0439557	0.0119893	0.0223437	0.0300959	0.0244292	0.0284416	0.0178746	0.0157634	0.0408075	0.0447369	0.0380164	0.0627262	0.0865603	0.0242414	0.0206926	0	0.061592	0.839885	
26	0.0004561	0.0010467	0.0018262	0.0016929	0.001425	0.0022462	0.0014845	0.0029362	0.0027775	0.0022081	0.0003073	0.0002028	0.0021902	0.00111592	0.0023333	0.0018225	0.0004892	0.0032125	0.0027504	0.0033701	0.008333	0.003823	0.0007189	0.0025641	0.0046425	0	0.057921	
SUM	0.2547961	0.1659222	0.7478663	0.6177344	3.70248	0.3339771	0.7805875	0.8247066	0.3610178	0.5040503	0.3843866	0.7359445	0.286354	0.5855998	0.4807399	0.2797566	0.2531062	0.5436467	0.4915543	0.7006424	0.3074401	0.4097956	0.165457	0.1464853	0.5374365	0.3320812	11.74325	

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.009807	0.438132	0.078158	0.1024196	0.087528	0.3948267	0.2384352	0.0589146	0.0543174	0.0210341	0.1064946	0.0254569	0.0108647	0.0127634	0.0174731	0.0160447	0.0163421	0.099694	0.0280247	0.0245333	0.0118807	0.0046795	0.0066973	0.0151344	0.0178225	1.8076602
2	0.0225014	0	0.0224947	0.0193285	0.0154351	0.0223315	0.0274526	0.0274834	0.0176404	0.0539594	0.2859597	0.0402022	0.0483487	0.0816288	0.0357937	0.0155615	0.0189809	0.0199483	0.0828487	0.0547714	0.0110204	0.0531013	0.0135388	0.0128789	0.0263939	0.0193691	1.0293636
3	0.077776	0.0145513	0	0.1483615	0.1214447	0.0229622	0.037361	0.0239805	0.0253495	0.0991907	0.0335142	0.0302454	0.0244046	0.0151894	0.0176713	0.0247007	0.01908	0.0188803	0.0143972	0.0161087	0.0140533	0.0067993	0.0087554	0.0120973	0.0247869	0.8773894	
4	0.0004569	0.0004835	0.001567	0	0.0010021	0.0005296	0.0005131	0.0005566	0.0007188	0.0010132	0.001053	0.0007868	0.0005901	0.0004646	0.0005314	0.0007779	0.0005367	0.0005781	0.0004447	0.0004945	0.0005383	0.0004795	0.0002195	0.0003184	0.0010622	0.0007961	0.0165294
5	0.0010386	0.0011923	0.001806	0.0562762	0	0.001297	0.0011945	0.0012896	0.0015131	0.0015829	0.0024573	0.0018932	0.0013754	0.0011037	0.0012402	0.0017958	0.0014104	0.0012929	0.0010782	0.0012881	0.0013327	0.0012808	0.0009941	0.0011109	0.0009043	0.0015524	0.0892107
6	0.0023775	0.0021915	0.0039619	0.0041503	0.0060983	0	0.003275	0.0036077	0.0307176	0.0032678	0.004502	0.0108806	0.0043426	0.0022808	0.0031136	0.0041266	0.0082884	0.0093885	0.0022472	0.0031073	0.0023529	0.0025621	0.0018159	0.001673	0.001901	0.0084065	0.1299387
7	0.0014512	0.001861	0.0022928	0.0028283	0.0035845	0.0020575	0	0.2973929	0.0134206	0.0024659	0.0029479	0.026195	0.002841	0.0019161	0.0024953	0.0028626	0.0031533	0.0066711	0.0027014	0.0399363	0.0018281	0.0027858	0.0016435	0.0029721	0.0015279	0.0049269	0.4109935
8	0.000245	0.0004178	0.0004661	0.0006256	0.0011481	0.0004272	0.0016845	0	0.0081572	0.0004555	0.0005766	0.0005325	0.0004944	0.0004432	0.0005305	0.0007197	0.0004366	0.0008414	0.0008479	0.002369	0.0003499	0.0009255	0.0004356	0.0009277	0.0003988	0.0016872	0.0362336
9	0.0054062	0.0052222	0.017985	0.0438214	0.1139182	0.0158625	0.0212025	0.0238567	0	0.0157552	0.0104817	0.023766	0.024788	0.0113733	0.0185425	0.0140781	0.0121817	0.0298452	0.0075747	0.01267	0.0111757	0.0153285	0.008736	0.0098868	0.0147561	0.0271109	0.0508216
10	0.0499645	0.0143842	0.0380742	0.0346893	0.0268736	0.04991	0.0333242	0.0334423	0.044082	0	0.0571942	0.0447306	0.111491	0.0261926	0.0422203	0.0365241	0.0411113	0.0404579	0.0215975	0.0366993	0.0444687	0.0208071	0.0088917	0.0103518	0.0113441	0.026267	0.8752096
11	0.045564	0.0714615	0.0780309	0.0641896	0.0402344	0.0814502	0.1040685	0.0993997	0.0617182	0.213542	0	0.1533845	0.1587308	0.1488314	0.0964251	0.0389177	0.0751005	0.0538342	0.3076681	0.095598	0.0337657	0.2160947	0.0489401	0.0437059	0.037895	0.064831	1.5079863
12	0.0664199	0.0593714	0.0093304	0.0093266	0.0100883	0.0323939	0.0069503	0.0077412	0.0128829	0.0103595	0.012746	0	0.0155905	0.006886	0.0238152	0.0112694	0.0262541	0.0095804	0.0085773	0.0064274	0.0163996	0.003852	0.004157	0.0034039	0.0078616	0.2735678	
13	0.0080398	0.0079955	0.0176477	0.0671719	0.0155725	0.0318002	0.010003	0.0394851	0.0366469	0.023083	0.0170564	0.0187618	0	0.0114259	0.0159538	0.0322918	0.0149776	0.0231431	0.0142028	0.1528604	0.0084006	0.0159265	0.0070251	0.0126636	0.0059721	0.02074	0.618947
14	0.04040277	0.0038988	0.0060728	0.0120729	0.0067307	0.0047502	0.0044385	0.008498	0.0118877	0.0081172	0.0069212	0.0064413	0.0175746	0	0.182762	0.0159238	0.0891143	0.0067184	0.0333427	0.0036845	0.0042498	0.002409	0.0036058	0.0026739	0.0068868	0.4883736	
15	0.0102395	0.008127	0.0174909	0.055728	0.0152267	0.0122999	0.0104555	0.0152692	0.0206744	0.0181671	0.0166964	0.0168795	0.0206617	0.07604	0	0.037401	0.0849857	0.1021508	0.0262688	0.0534467	0.00837	0.0094834	0.0056275	0.0076039	0.0059462	0.0163567	0.6779205
16	0.0513553	0.0478239	0.0703366	0.063063	0.0774457	0.0510539	0.0497649	0.0504537	0.0652459	0.058411	0.0953479	0.0748396	0.0606883	0.0441912	0.0511815	0	0.1741756	0.085082	0.0434191	0.0896085	0.0457474	0.0404705	0.0231184	0.0297461	0.022053	0.0550358	1.5196021
17	0.0131715	0.0077415	0.0129107	0.0101907	0.0127693	0.0090758	0.0097384	0.0092145	0.0112307	0.009296	0.0045723	0.013216	0.0086577	0.0069276	0.0093289	0.0122071	0	0.0132269	0.0067287	0.0105955	0.0094566	0.0123538	0.0048543	0.0009403	0.00817	0.0134572	0.253522
18	0.0072428	0.0013034	0.0041526	0.0025283	0.0039066	0.0106022	0.0035191	0.0031159	0.0060725	0.0027475	0.0024407	0.0020371	0.0022848	0.0016012	0.0029861	0.0029522	0.0049024	0	0.0023795	0.0019114	0.0017041	0.0091675	0.0016896	0.0013044	0.0017554	0.0074176	0.0852539
19	0.0204365	0.0145327	0.0360497	0.0406371	0.0293732	0.0807654	0.0614206	0.0681768	0.0541649	0.0567088	0.0328057	0.0650248	0.0762269	0.1709661	0.1262055	0.0259168	0.0627988	0.0632655	0	0.0395354	0.0322653	0.0425518	0.0590977	0.0361935	0.0877945	0.0618357	1.4487829
20	0.004427	0.0157988	0.0065739	0.0059461	0.0073046	0.0083337	0.0087303	0.0093905	0.0077821	0.0086326	0.0090861	0.0083439	0.0088742	0.0143478	0.0099622	0.0196553	0.0087658	0.0076029	0.0465111	0	0.0118248	0.0463843	0.0214405	0.0592274	0.0130256	0.0668964	0.4558024
21	0.0022973	0.0501994	0.0752562	0.0705696	0.082115	0.0591565	0.0505824	0.0588836	0.0686895	0.069138	0.0113715	0.0814412	0.0600603	0.0467192	0.0567007	0.0844987	0.0665515	0.0703388	0.0504362	0.0069093	0	0.0498428	0.03039	0.0388166	0.0352612	0.0584948	1.5071
22	0.0382983	0.0321278	0.0668352	0.0488333	0.054139	0.0672551	0.1102924	0.1068122	0.0711521	0.065887	0.0649383	0.0888773	0.0818870	0.0602359	0.0637075	0.0511838	0.0801193	0.0495799	0.0421298	0.03955643	0.0653164	0	0.0667055	0.1009308	0.0647956	0.095352	1.6871294
23	0.0106652	0.009716	0.0197449	0.0155075	0.0225678	0.0208281	0.0205435	0.0227901	0.0200937	0.0190824	0.0199042	0.0202691	0.0207405	0.0183163	0.0189123	0.016896	0.0195787	0.0164934	0.0185666	0.0336631	0.0347032	0.1463097	0	0.042656	0.05734	0.0382554	0.7405733
24	0.0224041	0.0107331	0.0252179	0.0213491	0.0385992	0.0370014	0.0343685	0.0393478	0.0362471	0.0474529	0.0200557	0.0291172	0.0305249	0.1146665	0.0405026	0.0175028	0.031132	0.029671	0.0195266	0.0510238	0.0363631	0.0347032	0.1463097	0	0.0870354	0.0507327	1.2509389
25	0.0160177	0.0232507	0.024	0.0248287	0.0367623	0.027874	0.0245869	0.0307931	0.0276439	0.0331712	0.0333484	0.0284181	0.0235952	0.0272854	0.0265438	0.0209004	0.0314216	0.0260138	0.0495089	0.0330677	0.0929397	0.0784325	0.1182053	0.0794081	0	0.114127	1.027544
26	0.0017048	0.0022441	0.00308	0.0022102	0.0139911	0.0034291	0.0032587	0.0040072	0.0038336	0.003552	0.0031832	0.0033311	0.0036427	0.0038058	0.0034805	0.0027677	0.0040057	0.0032263	0.0074132	0.0091406	0.0097395	0.0184431	0.0530525	0.0122132	0.0168447	0	0.1957067
SUM	0.4564052	0.3626761	0.999466	0.9013773	0.8676507	0.740775	1.0252556	1.2195982	0.723486	0.8793483	0.8703433	0.8535238	0.8459266	0.9046616	0.8623799	0.581838	0.8652274	0.7729745	0.7907066	1.0087237	0.5013511	0.9687311	0.7124435	0.5313644	0.6011681	0.8311862	20.357591

Appendix 19
Symmetric Matrix, Malaysia
1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.07588	0.142197	-0.04904	-0.01559	-0.08244	0.101942	-0.02217	-0.07425	-0.05469	-0.07431	0.209542	-0.07075	-0.08342	-0.07359	-0.07072	-0.05304	-0.08297	-0.08195	-0.06717	-0.07472	-0.06811	-0.06133	-0.06602	-0.02437	-0.06007	-0.93293
2	-0.07588	0	-0.07395	-0.05392	-0.0526	-0.06318	-0.06829	-0.0624	-0.05636	-0.05476	0.071111	-0.06597	-0.03538	0.171576	-0.02156	-0.04594	-0.04459	-0.05907	-0.0271	-0.02408	-0.05983	-0.04958	-0.04686	-0.04826	-0.05716	-0.04808	-0.94674
3	0.142197	-0.07395	0	0.000501	-0.04995	-0.06358	-0.06529	-0.06005	-0.05875	-0.04574	-0.06373	-0.05402	-0.05774	-0.06751	-0.04821	-0.05793	-0.04934	-0.06479	-0.06313	-0.06252	-0.05861	-0.0498	-0.05081	-0.05527	-0.02758	-0.04615	-1.15178
4	-0.04904	-0.05392	0.000501	0	-0.03827	-0.04749	-0.05182	-0.04528	-0.03638	-0.04241	-0.04467	-0.04779	-0.0041	-0.04839	-0.03398	-0.0406	-0.03607	-0.04835	-0.03922	-0.04518	-0.03553	-0.03925	-0.0359	-0.03751	-0.02476	-0.03702	-0.96198
5	-0.01559	-0.0526	-0.04995	-0.03827	0	-0.04527	-0.05029	-0.04298	-0.01845	-0.04074	-0.04572	-0.04452	-0.03963	-0.04703	-0.03984	-0.04025	-0.0335	-0.04529	-0.04376	-0.04358	-0.03917	-0.0296	-0.03398	-0.03692	-0.03191	-0.03519	-0.98398
6	-0.08244	-0.06318	-0.06358	-0.04749	-0.04527	0	-0.06318	-0.05381	-0.04656	-0.04956	-0.05142	-0.05332	-0.04958	-0.05953	-0.05007	-0.04933	-0.04256	-0.03667	-0.03843	-0.05457	-0.03568	-0.04912	-0.04115	-0.04282	-0.05397	-0.04123	-1.26449
7	0.101942	-0.06829	-0.06529	-0.05182	-0.05029	-0.06318	0	0.101721	-0.0573	-0.04742	-0.05635	-0.06169	-0.05746	-0.06044	-0.05409	-0.05225	-0.04472	-0.05753	-0.05636	-0.02145	-0.05551	-0.03288	-0.04609	-0.04752	-0.06008	-0.04724	-1.02519
8	-0.02217	-0.0624	-0.06005	-0.04528	-0.04298	-0.05381	0.101721	0	-0.04646	-0.03042	-0.05208	-0.04779	-0.0371	-0.05047	-0.04671	-0.04718	-0.04055	-0.05409	-0.04364	-0.04995	-0.03888	-0.03443	-0.04019	-0.0378	-0.04409	-0.04132	-0.96812
9	-0.07425	-0.05636	-0.05875	-0.03638	-0.01845	-0.04656	-0.0573	-0.04646	0	-0.03136	-0.04981	-0.05194	-0.03943	-0.0541	-0.04116	-0.04115	-0.03911	-0.04208	-0.04225	-0.04733	-0.00333	-0.04301	-0.03482	-0.03516	-0.03622	-0.03553	-1.05931
10	-0.05469	-0.05476	-0.04574	-0.04241	-0.04074	-0.04956	-0.04742	-0.03042	-0.03136	0	-0.04289	-0.0411	-0.02022	-0.05288	-0.03708	-0.04124	-0.03599	-0.0501	-0.04005	-0.02963	-0.04543	-0.03893	-0.04055	-0.03071	-0.03948	-1.02423	
11	-0.07431	0.071111	-0.06373	-0.04467	-0.04572	-0.05142	-0.05635	-0.05208	-0.04981	-0.04289	0	-0.05361	-0.02397	-0.05212	-0.04635	-0.04872	-0.04366	-0.05793	0.07544	-0.04669	-0.05504	-0.02733	-0.04256	-0.04952	-0.05194	-0.04099	-0.97487
12	0.209542	-0.06597	-0.05402	-0.04729	-0.04452	-0.05332	-0.06169	-0.04779	-0.05194	-0.0411	-0.05361	0	-0.05212	-0.05787	-0.04836	-0.04794	-0.02782	-0.05655	-0.05096	-0.05128	-0.04848	-0.04018	-0.04302	-0.04804	-0.05594	-0.04346	-0.98373
13	-0.07075	-0.03538	-0.05774	-0.0041	-0.03963	-0.04958	-0.05746	-0.0371	-0.03943	-0.02022	-0.02397	-0.05212	0	-0.05496	-0.05949	-0.02713	-0.03954	-0.04579	-0.02932	-0.00475	-0.02844	-0.04564	-0.03828	-0.03904	-0.0452	-0.0399	-0.98498
14	-0.08342	0.171576	-0.06751	-0.04839	-0.04703	-0.05953	-0.06404	-0.05047	-0.0541	-0.05288	-0.05214	-0.05787	-0.05496	0	0.027898	-0.03435	-0.03717	-0.04218	-0.04918	-0.01877	-0.0606	-0.05248	-0.04422	-0.04683	-0.0575	-0.04367	-0.97983
15	-0.07359	-0.02156	-0.04821	-0.03398	-0.03984	-0.05007	-0.05409	-0.04671	-0.04116	-0.03708	-0.04635	-0.04836	-0.05949	0.027898	0	-0.03931	-0.03634	-0.05029	-0.04332	-0.03361	-0.02442	-0.04343	-0.03618	-0.0376	-0.04295	-0.03757	-0.99759
16	-0.07072	-0.04594	-0.04934	-0.0406	-0.04025	-0.04933	-0.05225	-0.04718	-0.04115	-0.04124	-0.04872	-0.04794	-0.02713	-0.03435	-0.03931	0	-0.03342	-0.03237	-0.04075	-0.03256	-0.01206	-0.0418	-0.03194	-0.03821	-0.04392	-0.03578	-1.02687
17	-0.05304	-0.04459	-0.04934	-0.03607	-0.0335	-0.04256	-0.04472	-0.04055	-0.03911	-0.03599	-0.04366	-0.02782	-0.03954	-0.03717	-0.03634	-0.03342	0	-0.04328	-0.03237	-0.04153	-0.04128	-0.04388	-0.02623	-0.03226	-0.03513	-0.03837	-0.03221
18	-0.08297	-0.05907	-0.06479	-0.04835	-0.04529	-0.03667	-0.05753	-0.05409	-0.04208	-0.0501	-0.05793	-0.05655	-0.04579	-0.04218	-0.05029	-0.03237	-0.04328	0	-0.04817	-0.05386	-0.00025	-0.04994	-0.03982	-0.04077	-0.04512	-0.04295	-1.19023
19	-0.08195	-0.02171	-0.06313	-0.03922	-0.04376	-0.03843	-0.05636	-0.04364	-0.04225	-0.04005	-0.07544	-0.05096	-0.02932	-0.04918	-0.04332	-0.04075	-0.04153	-0.04817	0	-0.04165	-0.01983	-0.04546	-0.03433	-0.04271	-0.02953	-0.03699	-0.9488
20	-0.06717	-0.02408	-0.06252	-0.04518	-0.04358	-0.05457	-0.02145	-0.04995	-0.04733	-0.04085	-0.04669	-0.05128	-0.00475	-0.01877	-0.03361	-0.03256	-0.04128	-0.05386	-0.04165	0	-0.02416	-0.03947	-0.03616	-0.01686	-0.04256	-0.01717	-0.95752
21	-0.07472	-0.05983	-0.05861	-0.03553	-0.03917	-0.03568	-0.06551	-0.03888	-0.00033	-0.02963	-0.05504	-0.04848	-0.02844	-0.0066	-0.02442	-0.01206	-0.04388	-0.00025	-0.01983	-0.02416	0	-0.03558	-0.04142	-0.0359	-0.02174	-0.04244	-0.93214
22	-0.06811	-0.04958	-0.0498	-0.03925	-0.0296	-0.04912	-0.03288	-0.03443	-0.04301	-0.04543	-0.02733	-0.04018	-0.04564	-0.05248	-0.04343	-0.0418	-0.02623	-0.04994	-0.04546	-0.03947	-0.03558	0	-0.03465	-0.03165	-0.02533	-0.03384	-1.01423
23	-0.06133	-0.04686	-0.05081	-0.0359	-0.03398	-0.04115	-0.04609	-0.04019	-0.03482	-0.03893	-0.04256	-0.04302	-0.03828	-0.04422	-0.03618	-0.03194	-0.03226	-0.03982	-0.03433	-0.03616	-0.04142	-0.03465	0	-0.03259	-0.03413	-0.02997	-0.9816
24	-0.06602	-0.04826	-0.05527	-0.03757	-0.03692	-0.04282	-0.04752	-0.0378	-0.03516	-0.04055	-0.04952	-0.04804	-0.03904	-0.04683	-0.0376	-0.03821	-0.03513	-0.04077	-0.04271	-0.01686	-0.0359	-0.03165	-0.03259	0	-0.03002	-0.03351	-1.00628
25	-0.02437	-0.05716	-0.02758	-0.02476	-0.03191	-0.05397	-0.06008	-0.04409	-0.03622	-0.03071	-0.05194	-0.05594	-0.0452	-0.0575	-0.04295	-0.04392	-0.03837	-0.04512	-0.02953	-0.04256	-0.02174	-0.03533	-0.03413	-0.03002	0	-0.02414	-0.97923
26	-0.06007	-0.04808	-0.04615	-0.03702	-0.03519	-0.04123	-0.04724	-0.04132	-0.03553	-0.03948	-0.04099	-0.04346	-0.0399	-0.04367	-0.03578	-0.03221	-0.04295	-0.03699	-0.01717	-0.04244	-0.03884	-0.02997	-0.03351	-0.02414	0	-0.96588	-26.2141
SUM	-0.93293	-0.94674	-1.15178	-0.96198	-0.98398	-1.26449	-1.02519	-0.96812	-1.05931	-1.02423	-0.97487	-0.98373	-0.98498	-0.97983	-0.99759	-1.02687	-0.97159	-1.19023	-0.9488	-0.95752	-0.93214	-1.01423	-0.9816	-1.00628	-0.97923	-0.96588	-26.2141

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	0.00649919	0.243149	0.0289959	0.5817852	0.00173719	0.2010519	0.0714678	0.00510866	0.02482327	0.00823819	0.3075511	0.01150749	0.00703143	0.00588775	0.00625198	0.01150749	0.00887866	0.00474462	0.02285713	0.01933089	0.00485308	0.00249101	0.00329317	0.07014234	0.00883408	1.15620788	
2	0.00649919	0	0.00536421	0.00431079	0.00238995	0.00404439	0.00536368	0.00578994	0.00484491	0.00668857	0.11451833	0.00073466	0.0206565	0.25153926	0.03984233	0.01524893	0.00493889	0.01278663	0.00415901	0.04653614	0.01830203	0.00972535	0.0039959	0.00715497	0.01447944	0.00473265	0.0509953	
3	0.243149	0.00536421	0	0.0572379	0.00361051	0.00555336	0.01010805	0.00552072	0.00697575	0.01980586	0.01693941	0.01496367	0.00815545	0.00389299	0.01290849	0.04620666	0.0019369	0.00525232	0.00759037	0.0046554	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.34925336	
4	0.0289959	0.00431079	0.0572379	0	0.00024175	0.00229653	0.00294834	0.00029567	0.00947281	0.00496502	0.00565632	0.00927242	0.04718398	0.00240023	0.00916619	0.0047872	0.00708169	0.0011253	0.0127749	0.002599	0.01348469	0.0196552	0.00271876	0.00724931	0.01939685	0.00161021	0.2902835	
5	0.5817852	0.00431079	0.00361051	0.00024175	0	0.00073341	0.00062234	0.00018322	0.00264918	0.00321508	0.00345401	0.0091467	0.00606205	0.00085997	0.0074853	0.00118974	0.00315232	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.1801946	
6	0.00173719	0.00536368	0.00578994	0.00484491	0.00668857	0.00073466	0	0.0014866	-0.0010559	0.0093962	0.00530567	0.00934142	0.00580066	0.00755906	0.00191472	0.0160057	0.00453306	0.00269568	0.00188422	0.00261507	0.04184203	0.0100841	0.00413466	0.00800182	0.00152939	0.00479235	0.18591858	
7	0.2010519	0.00536368	0.00578994	0.00484491	0.00668857	0.00073466	0.0014866	0	0.16311828	0.003977	0.01343297	0.01204521	0.00300974	0.0049781	0.00305946	0.0030663	0.00694642	0.00341229	0.0085128	0.0041473	0.0141975	0.0183257	0.0346746	0.0087195	0.0224492	0.00349837	0.57950667	
8	0.0714678	0.00510866	0.0024834	0.00029567	0.00018322	-0.0010559	0.16311828	0	0.0084907	0.02504913	0.01129308	0.04640369	0.01965358	0.00575266	0.00186408	0.0037529	0.00112271	0.00210168	0.0147542	0.00333179	0.0428847	0.0253195	0.00381782	0.01327656	0.02226094	0.00220452	0.4554144	
9	0.00510866	0.00431079	0.00361051	0.00024175	0.00073341	0.00062234	0.00018322	0.00264918	0.00321508	0.00345401	0.0091467	0.00606205	0.00085997	0.0074853	0.00118974	0.00315232	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.0012528	0.36708834	
10	0.02482327	0.00668857	0.01980586	0.00496502	0.00229653	0.00294834	0.00029567	0.00947281	0.00496502	0.00565632	0.00927242	0.04718398	0.00240023	0.00916619	0.0047872	0.00708169	0.0011253	0.0127749	0.002599	0.01348469	0.0196552	0.00271876	0.00724931	0.01939685	0.00161021	0.2006835	0.36708834	
11	0.00823819	0.11451833	0.00431079	0.00238995	0.00404439	0.00536368	0.00578994	0.00484491	0.00668857	0.01980586	0.01693941	0.01496367	0.00815545	0.00389299	0.01290849	0.04620666	0.0019369	0.00525232	0.00759037	0.0046554	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.53786528	
12	0.3075511	0.00073466	0.0206565	0.00815545	0.00389299	0.01290849	0.04620666	0.0019369	0.00525232	0.00759037	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.53786528	
13	0.01150749	0.0206565	0.00815545	0.00389299	0.01290849	0.04620666	0.0019369	0.00525232	0.00759037	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.53786528	0.4063713	
14	0.00703143	0.25153926	0.00389299	0.01290849	0.04620666	0.0019369	0.00525232	0.00759037	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.53786528	0.111301	0.00379667	
15	0.00588775	0.03984233	0.01290849	0.04620666	0.0019369	0.00525232	0.00759037	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.00765706	0.01293979	0.01959354	0.00218862	0.00515665	0.00500678	0.53786528	0.00817285	0.00379667	0.53764004	
16	0.00625198	0.01524893	0.00462066	0.0047872	0.00174853	0.00160057	0.0064462	0.0037529	0.00973524	0.00918837	0.00710353	0.00584201	0.01331038	0.02198396	0.0075003	0	0.062224	0.02981776	0.00974554	0.01684603	0.04632416	0.00837456	0.00418446	0.00817285	0.0167074	0.0034482	0.3286754	
17	0.01150749	0.00493889	0.0019059	0.00078018	0.00079367	0.00058306	0.0341229	0.0112271	0.0024412	0.0052749	0.00346569	0.0160389	0.0023589	0.00779937	0.00196118	0.0062124	0	-5.99E-05	0.00324034	0.00120086	0.01348718	0.01752868	0.00118316	0.00269098	0.01044234	0.00189555	0.12205477	
18	0.00887866	0.01278663	0.00525232	0.0112753	0.0031522	0.01888422	0.00914173	0.0147542	0.0041185	0.0071682	0.1380856	0.0080207	0.0269508	0.01326906	0.00974554	0.01354679	0.02981776	-5.99E-05	0	0.00185111	0.00387079	0.008832	0.00966127	0.00712028	0.0121887	0.00381571	0.3326543	
19	0.00474462	0.00403011	0.00759037	0.0036599	0.0012528	0.00261507	0.0411975	0.00333179	0.00827136	0.00428799	0.0472675	0.0494155	0.0512202	0.0440868	0.01646603	0.0208001	0.00120086	0.00387079	0.01785631	0	0.01785631	0.05654527	0.0482096	0.0094721	0.00929521	0.00395702	0.0095463	0.2225067
20	0.02285713	0.04653614	0.0494564	0.0292979	0.01304049	0.02310035	0.04180293	0.0192357	0.04288472	0.01459377	0.04333957	0.01960351	0.04838999	0.04644067	0.0185305	0.04632416	0.0584763	0.01343718	0.0088932	0.05654527	0.05528852	0	0.03625236	0.01660997	0.02793314	0.00834828	0.0203866	
21	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	0.01830203	0.01933089	
22	0.01485308	0.00972535	0.01959354	0.0196552	0.01799113	0.0100841	0.0346746	0.0253795	0.01227699	0.0084427	0.0074066	0.0074066	0.00381782	0.00510739	0.00517516	0.00837456	0.01084764	0.01752868	0.0047454	0.01752868	0.0086127	0.0482096	0.01674019	0.03625236	0	0.0102168	0.01955279	
23	0.00249101	0.003959	0.00218862	0.0071876	0.0015464	0.00413466	0.00378403	0.00381782	0.00715507	0.0039931	0.00477423	0.00284378	0.0055079	0.00256705	0.00438466	0.0091013	0.00118316	0.00712028	0.0094721	0.00834806	0.01660997	0.0102168	0	0.00557733	0.01577614	0.00555592	0.04523981	
24	0.00329317	0.00715497	0.00513565	0.00724491	0.0067323	0.00801827	0.00871795	0.01327656	0.01293979	0.00776047	0.0034073	0.004653125	0.0093723	0.00635456	0.00817285	0.00829494	0.00299098	0.0121887	0.00929521	0.03454945	0.02793314	0.01955279	0.00557733	0	0.02534657	0.0064971	0.36708315	
25	0.0704234	0.01447944	0.0050678	0.0396895	0.0182933	0.01152939	0.01244192	0.02126094	0.0256855	0.03282304	0.01689909	0.0118003	0.0183397	0.0111301	0.0167074	0.01572801	0.01044234	0.02537467	0.01795702	0.02168929	0.06384828	0.04081433	0.01577614	0.02534657	0	0.02895534	0.46483323	
26	0.0083408	0.0047265	0.00765706	0.01651021	0.0082625	0.00479235	0.00349837	0.00220452	0.00665942	0.00424262	0.0076655	0.00295888	0.00478482	0.00379867	0.00394482	0.00637356	0.00185555	0.00381571	0.0065463	0.027547	0.02035666	0.0126109	0.00555192	0.0064971	0.02895534	0	0.19088767	
SUM	1.15620788	0.6550953	0.54825316	0.2902835	0.18011946	0.18591858	0.5792667	0.4554144	0.32788834	0.3607096	0.53786528	0.53764004	0.4063713	0.5376604	0.3126754	0.2979375	0.12205477	0.3326543	0.5225067	0.48271023	0.9627107	0.43706212	0.1452981	0.28070315	0.64693323	0.19088767	11.402658	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26 SUM	
1	0	0.005652	0.252908	0.028016	0.046929	0.003502	0.234712	0.074456	0.005726	0.025424	0.007685	0.267791	0.009586	0.005002	0.005538	0.006227	0.010491	0.007421	0.005249	0.0164	0.0204	0.013873	0.002416	0.004084	0.059883	0.007565	1.127078
2	0.005652	0	0.006242	0.004315	0.002008	0.00216	0.005861	0.00586	0.006002	0.023172	0.236072	0.008944	0.018364	0.136361	0.038269	0.012509	0.005246	0.012287	0.028434	0.034252	0.014806	0.017494	0.003026	0.006825	0.015476	0.004635	0.654272
3	0.252908	0.006242	0	0.064752	0.004343	0.004285	0.019946	0.008601	0.008135	0.025028	0.009788	0.016757	0.010334	0.003545	0.013382	0.006896	0.004299	0.004347	0.011017	0.00495	0.035655	0.025257	0.003134	0.007262	0.04861	0.008083	0.607554
4	0.028016	0.004315	0.064752	0	0.004471	0.001615	0.002225	0.000298	0.011278	0.006884	0.007724	0.000769	0.048436	0.003215	0.022823	0.006667	0.002274	0.001104	0.013929	0.002738	0.037517	0.012265	0.002698	0.007825	0.025469	0.001399	0.316103
5	0.046929	0.002008	0.004343	0.004471	0	0.000999	0.000627	0.000326	0.037638	0.003905	0.003425	0.000826	0.011354	0.000915	0.002154	0.006302	0.001766	0.000987	0.006125	0.001542	0.029788	0.017678	0.002332	0.009166	0.019691	0.000957	0.212254
6	0.003502	0.00216	0.004285	0.001615	0.000999	0	0.001324	0.003105	0.008539	0.0061	0.009583	0.006148	0.007127	0.001069	0.001814	0.004464	0.002032	0.019263	0.019842	0.002676	0.039424	0.009693	0.004025	0.008846	0.012923	0.004021	0.184579
7	0.234712	0.005861	0.019946	0.002225	0.000627	0.001324	0	0.133708	0.005835	0.014767	0.011184	0.002763	0.007912	0.002513	0.004183	0.008439	0.005032	0.006767	0.012125	0.033642	0.025072	0.030173	0.003734	0.010374	0.018392	0.003055	0.604391
8	0.074456	0.00586	0.008601	0.000298	0.000326	0.003105	0.133708	0	0.009055	0.021228	0.008882	0.007018	0.017094	0.005076	0.006599	0.008532	0.00268	0.001239	0.015482	0.003715	0.04159	0.020644	0.00413	0.012836	0.022985	0.001927	0.347865
9	0.005726	0.006002	0.008135	0.01278	0.003763	0.008539	0.005835	0.009055	0	0.02001	0.009083	0.006013	0.015997	0.004075	0.008613	0.010063	0.003995	0.013491	0.015376	0.008315	0.066061	0.013501	0.008466	0.016199	0.027659	0.008757	0.34788
10	0.025424	0.023172	0.025028	0.006884	0.003905	0.0061	0.014767	0.021228	0.02001	0	0.01298	0.013513	0.03792	0.004628	0.014565	0.009101	0.006946	0.008336	0.019195	0.01257	0.037113	0.010681	0.003524	0.007896	0.027804	0.004319	0.377608
11	0.007685	0.236072	0.009788	0.007724	0.003425	0.009583	0.011184	0.008882	0.009083	0.01298	0	0.02262	0.014045	0.013096	0.012308	0.008074	0.004878	0.006477	0.08196	0.013028	0.027522	0.036504	0.004689	0.005885	0.021429	0.007508	0.622666
12	0.267791	0.008944	0.016757	0.000769	0.000826	0.006148	0.002763	0.007018	0.006013	0.013513	0.02262	0	0.006511	0.002246	0.004035	0.006874	0.016317	0.01833	0.012889	0.00442	0.034588	0.021572	0.003117	0.007075	0.014632	0.00249	0.491761
13	0.00586	0.018364	0.010334	0.048436	0.011354	0.007127	0.007912	0.017094	0.015997	0.03792	0.014045	0.006511	0	0.01006	0.009453	0.014059	0.010352	0.014067	0.030724	0.053669	0.043497	0.014898	0.004951	0.011332	0.020782	0.005641	0.448166
14	0.005002	0.136361	0.003545	0.003215	0.000915	0.001069	0.002513	0.005076	0.004075	0.004628	0.013096	0.002246	0.01006	0	0.082092	0.01836	0.008905	0.013419	0.025744	0.038807	0.047096	0.011978	0.002885	0.008991	0.012483	0.003236	0.462797
15	0.00558	0.038269	0.013382	0.022823	0.002154	0.001814	0.004183	0.006599	0.008613	0.014565	0.012308	0.004035	0.009453	0.082092	0	0.01508	0.005577	0.002821	0.013656	0.020479	0.049775	0.01259	0.003998	0.009449	0.016484	0.004097	0.379879
16	0.006227	0.012509	0.006896	0.006067	0.006302	0.004464	0.008439	0.008532	0.010063	0.009101	0.008074	0.006874	0.014059	0.01836	0.01508	0	0.0118	0.01848	0.012887	0.029907	0.058404	0.012807	0.008535	0.007936	0.015013	0.022643	0.33046
17	0.010491	0.005246	0.004239	0.002274	0.001766	0.002032	0.005032	0.00268	0.003995	0.005946	0.004878	0.016317	0.010352	0.008905	0.005577	0.0118	0	0.001716	0.006042	0.004211	0.0276	0.029685	0.00235	0.004823	0.012944	0.008688	0.200647
18	0.007421	0.012287	0.004347	0.001104	0.000987	0.019263	0.006767	0.001239	0.013491	0.008336	0.006477	0.001833	0.014067	0.013419	0.002821	0.01848	0.001716	0	0.013432	0.003648	0.079187	0.011725	0.005894	0.011756	0.021552	0.003613	0.284863
19	0.005249	0.028434	0.010107	0.013929	0.006125	0.019942	0.01215	0.015482	0.015376	0.019195	0.08196	0.012889	0.00724	0.025744	0.013656	0.012887	0.006042	0.013432	0	0.020006	0.057438	0.015064	0.01506	0.010959	0.038617	0.014925	0.542436
20	0.0164	0.034252	0.00495	0.002738	0.001542	0.002676	0.033642	0.003715	0.008315	0.01257	0.013028	0.00442	0.053669	0.038807	0.020479	0.020907	0.004211	0.003648	0.020006	0	0.052445	0.019911	0.00889	0.029585	0.02772	0.028791	0.462318
21	0.0204	0.014806	0.035655	0.027517	0.029788	0.039424	0.025072	0.04159	0.066061	0.037113	0.027522	0.034588	0.043497	0.047096	0.049775	0.058404	0.0276	0.079187	0.057438	0.052445	0	0.043779	0.016703	0.031041	0.058325	0.022522	0.997347
22	0.013873	0.017494	0.025257	0.012265	0.017678	0.009693	0.030173	0.020644	0.013501	0.010681	0.036504	0.021572	0.014898	0.011978	0.01259	0.012807	0.029685	0.011725	0.015064	0.019911	0.043779	0	0.011971	0.023546	0.042132	0.018447	0.497869
23	0.002416	0.003026	0.003134	0.002698	0.002332	0.004025	0.003734	0.00413	0.008466	0.003524	0.004689	0.003117	0.004951	0.002885	0.003998	0.008535	0.00235	0.005894	0.01506	0.00889	0.016703	0.011971	0	0.014186	0.023603	0.007004	0.171323
24	0.004084	0.006825	0.007262	0.007825	0.009166	0.008846	0.010374	0.012836	0.016199	0.007896	0.005885	0.007075	0.011332	0.008991	0.009449	0.007936	0.004823	0.011756	0.010959	0.029585	0.031041	0.023546	0.014186	0	0.031776	0.009822	0.304773
25	0.059883	0.015476	0.04861	0.025469	0.019691	0.012923	0.018392	0.022985	0.027659	0.027804	0.021429	0.014632	0.020782	0.012483	0.016484	0.015013	0.012944	0.021552	0.038617	0.02272	0.058325	0.042132	0.023603	0.031776	0	0.034365	0.665849
26	0.007565	0.004635	0.008083	0.001399	0.000957	0.004021	0.003055	0.001927	0.008757	0.004319	0.007508	0.00249	0.005641	0.003236	0.004097	0.022643	0.008688	0.003613	0.014925	0.028791	0.022522	0.018447	0.007004	0.009822	0.034365	0	0.23851
SUM	1.127078	0.654272	0.607554	0.316103	0.212254	0.184579	0.604391	0.437065	0.34788	0.377608	0.622666	0.491761	0.481166	0.465797	0.379879	0.33046	0.200647	0.284863	0.542436	0.462318	0.997347	0.497869	0.171323	0.304773	0.665849	0.23851	11.97815

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	0.0093182	0.2391563	0.0286918	0.0614051	0.006347	0.2181764	0.0639307	0.0133281	0.0401907	0.020096	0.2134272	0.0112172	0.0065792	0.0055977	0.0072603	0.0123334	0.0087597	0.0073293	0.0165703	0.0232396	0.0138935	0.0027599	0.0036568	0.0615423	0.0079113	1.102718	
2	0.0093182	0	0.0095473	0.0043167	0.023456	0.0037891	0.0075475	0.0063423	0.0066374	0.0136875	0.149067	0.0080137	0.0227995	0.152996	0.036983	0.0147287	0.0046193	0.0054312	0.0336363	0.0336082	0.0144624	0.0188076	0.0026077	0.0062377	0.0150773	0.0054762	0.588079	
3	0.2391563	0.0095473	0	0.0681216	0.0063740	0.0069498	0.0182998	0.0066029	0.0126653	0.0477291	0.0219521	0.010848	0.0093938	0.0049259	0.0108284	0.0064151	0.0033785	0.00514	0.0258359	0.0055707	0.0355957	0.0219484	0.0039376	0.0054095	0.0605642	0.0108207	0.657319	
4	0.0286918	0.0043167	0.0681216	0	0.0002547	0.0017217	0.0023865	0.0003062	0.0151175	0.0095395	0.0109240	0.000998	0.0392643	0.0019143	0.0233151	0.0101096	0.0010459	0.0010308	0.0155648	0.0032641	0.0353583	0.0107754	0.002926	0.0055658	0.0262546	0.0021111	0.318469	
5	0.0614051	0.0023456	0.0063740	0.0002547	0	0.0008005	0.0004313	0.0001592	0.0174199	0.0031911	0.0053773	0.0008023	0.0038011	0.0005445	0.0006705	0.0029009	0.0011091	0.0009132	0.0063864	0.0014231	0.025875	0.0170864	0.0028193	0.0038871	0.019654	0.0007747	0.186367	
6	0.006347	0.0037891	0.0069498	0.0017217	0.0008005	0	0.0012495	0.0046642	0.0087221	0.0133295	0.012478	0.052921	0.011005	0.0010865	0.0023909	0.0052389	0.0052824	0.0213842	0.0249585	0.0033996	0.0407361	0.0099562	0.0045778	0.0075512	0.0130931	0.0042254	0.218858	
7	0.2181764	0.0075475	0.0182998	0.0023865	0.0004313	0.0012495	0	0.1274813	0.0073162	0.0158817	0.0191822	0.0042423	0.0045439	0.0026628	0.0040459	0.0073727	0.0043383	0.0072377	0.0152408	0.0343375	0.0241471	0.0319636	0.0039446	0.0083712	0.014937	0.0036433	0.586971	
8	0.0639307	0.0063423	0.0066029	0.0003062	0.0001592	0.0004642	0.1274813	0	0.0080971	0.0191969	0.0109967	0.0046669	0.0217337	0.005809	0.0062959	0.0062905	0.0042076	0.0014242	0.0144651	0.022013	0.0086405	0.0642281	0.0133947	0.007633	0.0121756	0.0275864	0.0087197	0.346996
9	0.0133281	0.0066374	0.0126653	0.0151175	0.0174199	0.0087221	0.073162	0.0191969	0.0230661	0	0.0230661	0.0117221	0.054454	0.0037623	0.0093404	0.0093226	0.0028126	0.0144161	0.022013	0.0086405	0.0642281	0.0133947	0.007633	0.0121756	0.0275864	0.0087197	0.346996	
10	0.0401907	0.0136875	0.0477291	0.0095395	0.0031911	0.0133295	0.0158817	0.0191969	0.0230661	0.0230661	0	0.031269	0.0161037	0.0337698	0.0086562	0.0127121	0.0093983	0.0093082	0.0036398	0.0072173	0.01159	0.0135448	0.0061348	0.0083888	0.0413194	0.0033159	0.417655	
11	0.020096	0.149067	0.0219521	0.010848	0.0093938	0.0049259	0.0182998	0.0066029	0.0126653	0.0477291	0.0219521	0.010848	0.0093938	0.0049259	0.0108284	0.0064151	0.0033785	0.00514	0.0258359	0.0055707	0.0355957	0.0219484	0.0039376	0.0054095	0.0605642	0.0108207	0.657319	
12	0.2134272	0.0080137	0.0093182	0.0043167	0.023456	0.0037891	0.0075475	0.0063423	0.0066374	0.0136875	0.149067	0.0080137	0.0227995	0.152996	0.036983	0.0147287	0.0046193	0.0054312	0.0336363	0.0336082	0.0144624	0.0188076	0.0026077	0.0062377	0.0150773	0.0054762	0.588079	
13	0.0112172	0.0227995	0.0093938	0.0092643	0.0038011	0.011005	0.0045439	0.0217337	0.0134835	0.0337698	0.02051	0.053795	0	0.0063546	0.0066939	0.0089945	0.0072443	0.011761	0.033356	0.0583388	0.0413194	0.014886	0.005282	0.007959	0.0181154	0.0033159	0.417655	
14	0.065792	0.152996	0.049259	0.0019143	0.005445	0.0010865	0.0026628	0.005809	0.0037623	0.0086562	0.0152416	0.003206	0.0063546	0	0.0719543	0.0187796	0.0077871	0.0207962	0.0286401	0.0433832	0.0320525	0.0079608	0.0022398	0.0062698	0.0142796	0.0026183	0.4705	
15	0.0055977	0.036983	0.0108284	0.0233151	0.006705	0.0022909	0.0040569	0.0060259	0.0093404	0.0127121	0.0093983	0.0055011	0.0066939	0.0719543	0	0.0142268	0.00396	0.0048262	0.0165927	0.0188287	0.0423041	0.0091843	0.0049989	0.0069556	0.0162316	0.0025235	0.344983	
16	0.0072603	0.0147287	0.0064151	0.0101096	0.0029009	0.0052389	0.0073727	0.0062905	0.0093226	0.010971	0.0093982	0.0062052	0.0089945	0.0187796	0.0142268	0	0.0116908	0.0234812	0.0157512	0.0207204	0.0542851	0.0135435	0.0204212	0.0082523	0.0163648	0.0070706	0.329706	
17	0.0123334	0.0054312	0.00514	0.0010308	0.009132	0.0213842	0.0072372	0.0014242	0.0144161	0.0079323	0.0072173	0.00189	0.0178308	0.003586	0.0268401	0.0165927	0.024812	0.0015423	0	0.005423	0.00924	0.020826	0.0274979	0.0218365	0.0024632	0.0028808	0.012433	0.177297
18	0.0087597	0.0054312	0.00514	0.0010308	0.009132	0.0213842	0.0072372	0.0014242	0.0144161	0.0079323	0.0072173	0.00189	0.0178308	0.003586	0.0268401	0.0165927	0.024812	0.0015423	0	0.005423	0.00924	0.020826	0.0274979	0.0218365	0.0024632	0.0028808	0.012433	0.177297
19	0.007293	0.0336363	0.0258359	0.0155648	0.0063864	0.0249585	0.0152408	0.0146853	0.022013	0.0231772	0.11159	0.0178308	0.003586	0.0268401	0.0165927	0.024812	0.0015423	0	0.005423	0.00924	0.020826	0.0274979	0.0218365	0.0024632	0.0028808	0.012433	0.177297	
20	0.0165703	0.0336082	0.0055707	0.0032641	0.0014231	0.0033996	0.0343375	0.0035529	0.0086405	0.013964	0.0135448	0.0061348	0.0083888	0.0433832	0.0188287	0.0207204	0.0028826	0.004042	0.0181941	0.0474086	0.0518727	0	0.0358741	0.076816	0.0266974	0.016793	0.46251	
21	0.0232396	0.0144624	0.0355957	0.035583	0.025875	0.0407361	0.0241471	0.040179	0.064281	0.0428518	0.0244719	0.0313723	0.013194	0.0320525	0.0423041	0.0542851	0.0274979	0.016507	0.0474086	0.0518727	0	0.0358741	0.076816	0.0266974	0.016793	0.46251		
22	0.0138935	0.0188076	0.0219484	0.010754	0.0170864	0.0099562	0.0319636	0.0239775	0.0133847	0.012851	0.0415032	0.0172137	0.0114886	0.0079608	0.0091843	0.0135435	0.0218365	0.0109503	0.0166021	0.0191231	0.0358741	0	0.0358741	0.076816	0.0266974	0.016793	0.46251	
23	0.0027599	0.0026077	0.003876	0.002926	0.0028193	0.0045778	0.0039446	0.0051174	0.007633	0.0043747	0.0046412	0.0028312	0.00282	0.0022398	0.0049989	0.0204212	0.0024632	0.0059101	0.0142406	0.0076777	0.0176816	0.0143218	0	0.0151545	0.0223619	0.0064846	0.183747	
24	0.0036568	0.0062377	0.0054095	0.0055658	0.0038871	0.0075512	0.0083712	0.0108327	0.0121756	0.0074305	0.030256	0.0042536	0.007959	0.0062698	0.0069556	0.0082523	0.0028808	0.0112044	0.0141546	0.0283189	0.0266974	0.016793	0.0151545	0	0.0227814	0.0081325	0.258462	
25	0.0615423	0.0150773	0.005642	0.0262546	0.019654	0.0130931	0.014937	0.0188955	0.0275864	0.018966	0.018966	0.0136406	0.007959	0.0062698	0.0069556	0.0082523	0.0028808	0.0112044	0.0141546	0.0283189	0.0266974	0.016793	0.0151545	0	0.0227814	0.0081325	0.258462	
26	0.0079113	0.0054762	0.0108207	0.0012111	0.0007747	0.0042254	0.0036433	0.0015774	0.0087197	0.0041826	0.0081228	0.0018179	0.0033159	0.0026183	0.0025235	0.0070706	0.0051676	0.0037408	0.0144317	0.0204793	0.0169801	0.0124957	0.0064846	0.0081325	0.0331172	0	0.195001	
SUM	1.1027177	0.5880786	0.6573191	0.3184692	0.1863673	0.2188582	0.5869707	0.416753	0.3469956	0.4522242	0.6047712	0.4169422	0.4176546	0.4705002	0.3499929	0.3297058	0.1772973	0.2371138	0.6100335	0.4625098	0.933361	0.4775987	0.1873467	0.2584617	0.6886605	0.195001	11.74325	

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.0112411	0.2579429	0.0393214	0.0517291	0.0449527	0.198139	0.1193401	0.0321604	0.0524409	0.0322991	0.0564573	0.0167483	0.0074462	0.0115465	0.0344142	0.0146081	0.0117924	0.0170653	0.0161258	0.0337653	0.0250895	0.0076719	0.0145957	0.015576	0.0097637	1.1320327	
2	0.012411	0	0.016943	0.009906	0.0083137	0.0172165	0.0146568	0.0139256	0.0143313	0.0341718	0.1787106	0.0230698	0.0281721	0.0427638	0.0219604	0.0316927	0.0131112	0.0106258	0.0486907	0.0306951	0.0390699	0.0426146	0.0116274	0.011806	0.0248223	0.0108066	0.6960198
3	0.2579429	0.016943	0	0.0749441	0.0629753	0.0134621	0.0198269	0.0149233	0.0216672	0.0686325	0.0557726	0.0197879	0.0210261	0.0106311	0.0175811	0.0475187	0.0159853	0.0115165	0.0252409	0.0121025	0.0456824	0.0404443	0.0132721	0.0165967	0.0180487	0.0139335	0.9394277
4	0.0393214	0.009906	0.0749441	0	0.0286392	0.0023399	0.0016707	0.0095911	0.0212701	0.0178512	0.0326213	0.0055657	0.033881	0.0062687	0.0281271	0.0318921	0.0053737	0.0015532	0.0205394	0.0032203	0.0355539	0.0246664	0.0078635	0.0108338	0.0129454	0.0020031	0.4589533
5	0.0517291	0.0083137	0.0629753	0.0286392	0	0.0036976	0.0023895	0.0012189	0.0577157	0.0142283	0.0253458	0.0055907	0.0094739	0.0039172	0.0082335	0.0396207	0.0070899	0.0021498	0.0125257	0.0042964	0.0417239	0.0277099	0.011736	0.0198551	0.0138333	0.0073271	0.4794307
6	0.0449527	0.0216651	0.0134621	0.0023399	0.0036976	0	0.0026662	0.0020175	0.023071	0.0255889	0.0429761	0.0216372	0.0180714	0.0034795	0.0077067	0.0275903	0.0086821	0.009554	0.0415063	0.0572805	0.0307547	0.0349086	0.011322	0.0193372	0.0148875	0.0093178	0.4353568
7	0.198139	0.0146568	0.0198269	0.0016707	0.0023895	0.0026662	0	0.1495387	0.0127616	0.017895	0.0358562	0.0047949	0.006322	0.0031823	0.0064754	0.0263638	0.0064459	0.0050951	0.032061	0.0424333	0.0263052	0.0565391	0.010935	0.0186703	0.0130574	0.0400928	0.7181246
8	0.0193401	0.0139256	0.0149233	0.0095911	0.0021289	0.0020175	0.1495387	0	0.016007	0.0169409	0.049431	0.0041469	0.0154897	0.0044706	0.0078998	0.0256117	0.0048255	0.0019787	0.0451524	0.010837	0.0296167	0.0538689	0.0116128	0.0203177	0.015596	0.0028472	0.679059
9	0.0321604	0.0143413	0.0216672	0.0212701	0.0577157	0.023071	0.0127616	0.016007	0	0.0300817	0.0360999	0.0183244	0.0307175	0.0151521	0.0196085	0.039662	0.011706	0.0179588	0.008698	0.005746	0.0399321	0.0432403	0.0144149	0.023067	0.0215473	0.6130851	
10	0.0524409	0.0341718	0.0686325	0.0178512	0.0142283	0.0265889	0.017895	0.0169409	0.0300817	0	0.1353681	0.0275446	0.067287	0.0171549	0.0301937	0.0474676	0.0251986	0.0216027	0.0391522	0.022666	0.0418034	0.043347	0.013987	0.0289023	0.0221527	0.0149095	0.8772764
11	0.0322991	0.1787106	0.0557726	0.0326213	0.0253458	0.0429761	0.0538582	0.0499431	0.0360999	0.1353681	0	0.0828295	0.0878936	0.0778763	0.0565608	0.0671328	0.0448364	0.0291374	0.1702369	0.0527021	0.0675886	0.1405165	0.0344222	0.0318808	0.068569	0.0340071	1.6891648
12	0.0564573	0.0230698	0.0197879	0.0050567	0.0059907	0.0216372	0.0047949	0.0041469	0.0183244	0.0360999	0.0828295	0	0.0171762	0.0066486	0.0203473	0.0430545	0.019735	0.0058027	0.0354131	0.0084606	0.0439343	0.0426395	0.0120606	0.0166371	0.015911	0.0055963	0.5630458
13	0.0167483	0.0281721	0.0210261	0.033881	0.0084739	0.0180714	0.006322	0.0154897	0.0307175	0.067287	0.0878936	0.0171762	0	0.0145002	0.0210077	0.04669	0.0118177	0.012704	0.0452148	0.0080673	0.0423304	0.0488936	0.0138828	0.0215942	0.0177837	0.0121913	0.7324368
14	0.0074462	0.0427638	0.0106311	0.0062687	0.0039172	0.0034795	0.0031823	0.0044706	0.0151521	0.0171549	0.0778763	0.0066486	0.0145002	0	0.129401	0.0300575	0.048021	0.0151065	0.0889423	0.0239452	0.0252018	0.0322428	0.0102726	0.0591362	0.0149796	0.0053463	0.6959176
15	0.0115465	0.0219604	0.015811	0.0281271	0.0082335	0.0077067	0.0064754	0.0078998	0.0196085	0.0301937	0.0565608	0.0203473	0.0210077	0.129401	0	0.0442608	0.0471573	0.0525684	0.0762372	0.0317045	0.0325353	0.0365954	0.0122699	0.0240532	0.0162	0.0099186	0.7701502
16	0.0344142	0.0316927	0.0457387	0.0318921	0.0396207	0.0275903	0.0263638	0.0256117	0.039662	0.0474676	0.0671328	0.0430545	0.04649	0.030575	0.0442608	0	0.0931913	0.0440171	0.034668	0.0546319	0.0651231	0.0458271	0.0200072	0.0236245	0.0210717	0.0289018	1.0138929
17	0.0146081	0.0131112	0.0159853	0.0053737	0.0070899	0.0086821	0.0064459	0.0048255	0.011706	0.0251986	0.0448364	0.019735	0.0118177	0.048021	0.0471573	0.0931913	0	0.0090647	0.0347638	0.0096807	0.0330541	0.0362366	0.0122165	0.0180361	0.0197958	0.0087314	0.5593747
18	0.017924	0.006258	0.0115165	0.0015532	0.0021498	0.0099554	0.0050951	0.0019787	0.0179588	0.0216027	0.0291374	0.0058027	0.021704	0.0151065	0.0525684	0.0440171	0.0090647	0	0.032822	0.0047572	0.0360214	0.0265587	0.0090915	0.0154877	0.0138846	0.005322	0.4065142
19	0.0170653	0.0486907	0.0252409	0.0205394	0.0152527	0.0415063	0.032061	0.0345124	0.0308698	0.0391522	0.1702369	0.0354131	0.0452148	0.0889423	0.0762372	0.034668	0.0347638	0.032822	0	0.0430232	0.0413507	0.0423408	0.0388322	0.0278601	0.0686517	0.0346245	1.1197447
20	0.0162258	0.0306351	0.0121025	0.0032203	0.0042964	0.0572805	0.0243333	0.010837	0.0095746	0.027666	0.0527021	0.0084606	0.008698	0.0238452	0.0317045	0.0546319	0.0096807	0.0047572	0.0430232	0	0.0361575	0.0679143	0.0275518	0.0551256	0.0480467	0.048023	0.732163
21	0.0337653	0.0306959	0.0456824	0.0355539	0.0417239	0.0307547	0.0263052	0.0296167	0.0399321	0.0418034	0.0675886	0.0439343	0.0342304	0.0252018	0.0325353	0.0651231	0.0330541	0.0360214	0.0413507	0.0361575	0	0.0575796	0.0325466	0.0450569	0.0641004	0.0341172	1.0042255
22	0.0250895	0.0426146	0.0404443	0.0246664	0.0277099	0.0349086	0.0565391	0.0538689	0.0432403	0.043347	0.1405165	0.0426395	0.0488936	0.0322428	0.0365954	0.0458271	0.0362366	0.0265887	0.0423408	0.0679143	0.0575796	0	0.1065076	0.1229486	0.0716141	0.0569876	1.3279303
23	0.0076719	0.0116274	0.0132721	0.0078635	0.011736	0.011322	0.0110935	0.0116128	0.0144149	0.013987	0.0344222	0.0120606	0.0138828	0.0102726	0.0122699	0.0200072	0.0122165	0.0090915	0.0388322	0.0275518	0.0325466	0.1065076	0	0.1308193	0.0877726	0.0456539	0.7085084
24	0.0145957	0.011806	0.0169667	0.0108338	0.0198551	0.0193372	0.0186703	0.0201377	0.023067	0.0289023	0.0318808	0.0166371	0.0215942	0.0591362	0.0240532	0.0236245	0.0180361	0.0154877	0.0278601	0.0551256	0.0450569	0.1229486	0.1308193	0	0.0832267	0.0314729	0.8911516
25	0.015576	0.0248223	0.0180487	0.0129454	0.0188333	0.0148875	0.0130574	0.015596	0.0212	0.0221527	0.068569	0.015911	0.0177837	0.0149796	0.0162	0.0210717	0.0197958	0.0138946	0.0686517	0.0480467	0.0641004	0.0716141	0.0877726	0.0832267	0	0.0654843	0.8542113
26	0.0097637	0.0108066	0.0139335	0.0020031	0.0073271	0.0059178	0.0049028	0.0028472	0.0154723	0.0149095	0.0340071	0.0055963	0.0121913	0.0053463	0.0099186	0.0289018	0.0087314	0.005322	0.0346245	0.048023	0.0341172	0.0569876	0.0456539	0.0314729	0.0654843	0	0.5134464
SUM	1.1320327	0.6960198	0.9384277	0.4589533	0.4794307	0.4353568	0.7181246	0.679059	0.6130851	0.8772764	1.6891648	0.5630458	0.7324368	0.6959176	0.7701502	1.0138929	0.5593747	0.4065142	1.1197447	0.732163	1.0042255	1.3279303	0.7085084	0.8911516	0.8542113	0.5134464	20.557591

Appendix 20
Anti-Symmetric Matrix, Malaysia
1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.0431	0.146768	-0.01785	0.015577	-0.04002	0.148892	0.009211	-0.03235	-0.03622	-0.03318	0.2427	-0.03958	-0.04126	-0.0416	-0.03515	-0.02201	-0.04383	-0.03907	-0.0314	-0.02359	-0.02562	-0.0265	-0.025	0.02416	-0.0278	-3.7E-05
2	0.04313	0	-0.02551	-0.02279	-0.02119	-0.01999	-0.0221	-0.03998	-0.01713	-0.0138	0.092824	-0.03317	0.005984	0.210359	0.012972	-0.01407	-0.01313	-0.02003	-0.00121	0.005818	-0.00837	-0.01384	-0.01256	-0.01329	-0.02289	-0.01634	-0.00011
3	-0.14677	0.025506	0	0.050394	0.000397	0.007157	0.010995	-0.00955	0.003455	0.010459	0.007334	0.000705	0.001603	-0.00173	-0.01262	0.007388	0.001521	-0.00202	-0.00025	-0.00464	0.007993	-0.00345	0.004232	0.007153	0.040818	0.004579	0.000466
4	0.07853	0.027393	-0.05439	0	0.002747	0.005658	0.005924	-0.00426	-0.00018	0.004471	0.009188	-0.00237	-0.03457	0.004298	-0.00549	0.004705	0.005321	0.001743	-0.00149	0.000304	0.000579	0.002956	0.006411	0.006968	-0.00603	0.003568	0.000776
5	-0.01558	0.021192	-0.0004	-0.00275	0	0.003204	0.004134	-0.00701	-0.01947	0.002713	0.010057	-0.00528	0.000835	0.002677	8.34E-05	0.004184	0.002591	-0.00173	0.002757	-0.00168	0.003519	-0.00743	0.004289	0.006075	-0.00978	0.000929	-0.00084
6	0.040024	0.019988	-0.00196	-0.00592	-0.00413	6.4E-05	0	0.147972	0.002851	-0.01163	0.002489	-0.00197	0.000109	-0.00161	-0.00279	0.001248	0.000568	0.007674	-0.01698	-0.00738	-0.013	0.000536	0.00184	0.000189	-0.00147	8.94E-05	-0.0001
7	-0.14889	0.030977	0.009554	0.004264	0.007006	0.011633	-0.14797	0	0.01191	-0.00806	0.016347	-0.00219	-0.00196	0.006052	0.007035	-0.01208	0.009644	0.007004	0.002533	0.005113	0.003321	-0.00251	0.003016	0.003509	-0.00114	-0.00069	-0.00011
8	-0.00921	0.030977	0.009554	0.004264	0.007006	0.011633	-0.14797	0	0.01191	-0.00806	0.016347	-0.00219	-0.00196	0.006052	0.007035	-0.01208	0.009644	0.007004	0.002533	0.005113	0.003321	-0.00251	0.003016	0.003509	-0.00114	-0.00069	-0.00011
9	0.032246	0.017128	-0.00346	0.000175	0.018467	-0.00240	-0.00285	-0.01191	0	0.001353	0.001809	-0.00136	-0.00421	-0.007	0.001061	-0.00152	0.000511	-0.00864	-0.00779	-0.00243	-0.00235	-0.00194	-0.00093	0.002844	0.007157	-0.00034	0.00066
10	0.036225	0.013798	-0.01046	-0.00447	-0.00271	0.001966	0.006562	0.008058	-0.00135	0	-0.00346	0.000261	0.006771	-0.00305	-0.00515	0.003169	0.002943	-0.00304	-0.01437	-0.001604	-0.01654	-0.00289	-1E-04	-0.00044	-0.0117	-0.0018	1.09E-05
11	0.033181	-0.0282	-0.00733	-0.00919	-0.01006	-0.00206	-0.00194	-0.01635	-0.00181	0.003463	0	-0.01416	0.024582	-0.00449	-0.01142	-0.00703	-0.00693	-0.01331	0.117745	-0.00561	0.013304	0.019977	-0.00228	-0.00299	0.001745	-0.0042	1.98E-06
12	-0.2427	0.033165	-0.0007	0.002373	0.005279	0.009337	0.012565	0.002193	0.011859	-0.00026	0.014162	0	0.010994	0.01011	0.005304	0.009412	0.022635	0.005515	0.006638	0.004901	0.012725	0.018415	0.011111	0.013695	0.015471	0.006771	0.000964
13	0.039578	-0.00598	-0.0016	0.034573	-0.00084	-0.00011	-0.00237	0.001958	-0.00139	-0.00677	-0.02458	-0.01099	0	-0.00395	-0.01791	0.015355	-0.00058	0.002293	-0.0247	0.036807	-0.06612	-0.00401	0.001568	5.29E-05	-0.00827	-0.00185	0.001161
14	0.041259	-0.21036	0.001732	-0.0043	-0.00268	0.00161	0.002181	-0.00605	0.004214	0.003052	0.004492	-0.01011	0.003952	0	0.076383	0.014696	0.008153	0.013146	-0.00367	0.030239	0.012938	0.002675	0.004748	0.006927	0.003603	0.00105	-0.00011
15	0.039578	-0.00598	-0.0016	0.034573	-0.00084	-0.00011	-0.00237	0.001958	-0.00139	-0.00677	-0.02458	-0.01099	0	-0.00395	-0.01791	0.015355	-0.00058	0.002293	-0.0247	0.036807	-0.06612	-0.00401	0.001568	5.29E-05	-0.00827	-0.00185	0.001161
16	0.035146	0.014068	-0.00239	-0.0047	-0.00418	-0.00125	0.001913	-0.01208	-0.00106	-0.00317	0.007029	-0.00941	-0.01536	-0.0147	-0.00069	0	0.003475	0.012032	-0.00083	0.00826	-0.03087	-0.01243	0.002451	0.004852	0.003874	-0.00136	0.001125
17	0.022009	0.013131	-0.00152	-0.00532	-0.00259	-0.00057	-0.00065	-0.00964	0.001516	-0.00294	0.006934	-0.02264	0.00058	-0.00815	-0.00426	-0.00348	0	-0.00473	-0.00031	-0.00457	0.00803	0.009658	0.001682	0.003165	0.005332	-0.00092	-0.00025
18	0.043831	0.020033	0.002017	-0.00174	0.001725	-0.00767	-8E-05	-0.007	-0.00051	0.003038	0.01331	-0.00552	-0.00229	-0.01315	0.000997	-0.01203	0.00473	0	-0.00283	-0.00243	-0.04351	0.004142	0.003583	0.002835	-0.00533	0.002942	-0.00091
19	0.039666	0.001208	0.000249	0.001495	-0.00276	0.016985	0.005182	-0.00253	0.008642	0.014166	-0.11774	-0.00664	0.024698	0.003865	2.13E-05	0.000834	0.000314	0.002829	0	-0.00916	-0.01389	-0.00017	0.005908	0.00445	0.01858	0.004498	-0.0001
20	0.031403	-0.00582	0.004638	-0.0003	0.001679	0.007379	-0.03012	-0.00511	0.007788	-0.0016	0.00561	-0.0049	-0.03681	-0.03024	-0.01058	-0.00826	0.004568	0.00243	0.00916	0	-0.00211	0.000592	0.011052	0.022422	0.001253	0.026267	0.00039
21	0.023595	0.008369	-0.00799	-0.00058	-0.00352	0.012996	-0.01255	-0.00332	0.002432	0.002894	-0.01998	-0.01841	0.004007	-0.00268	-0.00245	0.030873	-0.00803	0.043511	0.013899	0.002108	0	-0.0113	-0.01944	-0.03326	-0.01843	-0.01602	-0.00056
22	0.025615	0.013844	-0.003445	-0.00296	0.007426	-0.00054	0.022511	0.002656	0.002352	0.002894	-0.01998	-0.01841	0.004007	-0.00268	-0.00245	0.030873	-0.00803	0.043511	0.013899	0.002108	0	-0.0113	-0.01944	-0.03326	-0.01843	-0.01602	-0.00056
23	0.026504	0.012562	-0.00423	-0.00641	-0.00429	-0.00184	-0.00302	-0.0105	0.001937	1E-04	0.002279	-0.01111	-0.00157	-0.00475	-0.00485	-0.00385	-0.00168	-0.00358	-0.00591	-0.01105	0.019436	0.002065	0	0.006729	0.006289	0.00062	-0.00012
24	0.025002	0.013286	-0.00715	-0.00697	-0.00608	-0.00019	-0.00351	-0.00696	0.001931	0.000443	0.002991	-0.01369	-5.3E-05	-0.00693	-0.00387	-0.00171	-0.00317	-0.00284	-0.00445	-0.02242	0.032261	0.013616	-0.00673	0	0.009378	-0.0032	-1.4E-05
25	-0.02416	0.022892	-0.04082	0.00603	0.00978	0.01474	0.001142	-0.00284	0.009159	0.011705	-0.00174	-0.01547	0.008269	-0.0036	0.001358	-0.00069	-0.00533	0.005327	-0.01858	-0.00125	0.018434	0.020357	-0.00629	-0.00938	0	0.013992	-0.00024
26	0.027799	0.016344	-0.00458	-0.00365	-0.00093	-8.9E-05	0.000688	-0.00716	0.00034	0.001799	0.0042	-0.00677	0.001855	-0.00105	-0.00113	0.000189	0.000923	-0.00294	-0.0045	-0.02627	0.01602	0.000236	-0.00062	0.003204	-0.01399	0	-7.1E-05
SUM	3.72E-05	0.000113	-0.00047	-0.00078	0.000842	0.000102	0.000105	0.000113	-0.00066	-1.1E-05	-2E-06	-0.00096	-0.00116	0.000109	-0.01342	0.014047	0.000252	0.000914	0.000103	-0.00039	0.000556	0.000113	0.000117	1.44E-05	0.000245	7.09E-05	0

1983

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.0066858	0.1981262	0.02882748	0.0579467	0.0052346	0.1959359	0.071427	0.00250392	0.00236897	-0.0065541	0.30539673	0.00762995	0.00474534	0.00184331	-0.0003173	0.00975538	0.00956405	0.0009311	0.01968096	-0.0066888	0.00867501	0.00113138	0.00014517	0.06406146	0.00834421	0.99056205
2	-0.0006866	0	0.00239371	0.00466794	0.00125694	0.00380406	0.00280494	0.00570319	-0.0013841	0.00472877	0.00728597	0.00549816	0.01759465	0.24565239	0.03829657	0.00388239	0.01220442	0.01110465	0.03637497	-0.0106484	0.00394826	0.00087959	-0.0028128	0.0009374	0.00355715	0.46381928	
3	-0.1981206	-0.0032937	0	0.05078846	0.00345603	0.00072041	0.00845106	0.09543229	-0.0020535	0.00645861	-0.0068688	0.02627802	-0.0037438	-0.0007151	-0.0095539	-0.0018277	1.1025E-05	0.00459424	-0.049872	0.00063516	-0.0261271	-0.0128943	-0.0012281	-0.0039014	0.02921303	0.00558936	-0.4505153
4	-0.0289275	-0.004672	-0.0507885	0	0.00010996	-0.0020302	-0.0027092	0.00015485	-0.0090521	-0.0043837	-0.0104771	-0.0007145	-0.0468226	-0.0022383	-0.0087738	-0.0045409	-0.0006359	-0.0007123	-0.0110883	-0.0023081	-0.0336122	-0.010594	-0.0026227	-0.0071165	-0.019762	-0.000828	-0.7095601
5	-0.0579467	-0.0012569	-0.0043653	-0.00011	0	-0.0006381	-0.0005179	-2.995E-05	-0.0267044	-0.0028656	-0.0034329	-0.0007175	-0.0048226	-0.0005751	-0.000732	-0.0016207	-0.000735	-0.0009609	-0.0030925	-0.0010073	-0.0230587	-0.0179027	-0.0017351	-0.0036631	-0.0181927	-0.0007774	-0.1770001
6	-0.0005235	-0.003605	-0.0007204	0.00203016	0.00063807	0	-0.000302	-0.0011361	-0.0011953	-0.0033072	-0.0091097	0.002074	-0.002072	-0.0006031	0.00091255	-0.0029655	-7.1E-05	0.02122438	-0.0171535	-0.001594	0.0490411	-0.006277	-0.0018034	-0.0008752	0.00209004	-0.081469	
7	-0.1959356	-0.002806	-0.0084511	0.00270915	0.00051794	0.0030202	0	0.16301462	-0.0014751	-0.0007175	-0.0015861	-0.0006041	0.0001947	-0.0005444	-0.0006435	-0.0051588	0.00038241	-0.0039305	-0.0072284	0.03726108	-0.0161863	-0.0372709	-0.0005757	-0.0051337	-0.0090296	0.00170381	-0.0954333
8	-0.071427	-0.0057032	-0.0045233	-0.0001548	2.995E-05	0.00113606	0.1630146	0	-0.0052289	-0.0024644	-0.012827	-0.0045199	-0.0189186	-0.0066782	-0.0015209	-0.0023086	-0.000124	-0.0010308	-0.0146676	-0.007336	-0.0426159	-0.0232325	-0.007399	-0.0132388	-0.0025808	-0.0019692	-0.447122
9	-0.0025039	0.00138406	0.000528346	0.00905208	0.02670438	0.00119535	0.00147509	0.05522891	0	-0.00491885	-0.0065432	0.00276331	0.00280668	0.00178162	0.0067523	-0.0025811	0.00134791	-0.0108247	-0.0065958	0.00250245	-0.0243231	-0.0047173	-0.0038066	-0.0063724	-0.0175269	0.00491514	0.02285569
10	-0.002367	-0.0047998	-0.0046586	0.00488372	0.0023656	0.00330715	0.00070715	0.02485441	-0.0049189	0	-0.0136492	0.01235921	0.00573518	0.00010647	-0.0003633	0.00266801	0.0040371	-0.0055829	-0.0151288	0.0094415	-0.0407255	-0.006559	-0.0021082	-0.0062729	-0.0178952	0.00148377	-0.083454
11	0.0065542	-0.077286	0.0096883	0.0047709	0.00342294	0.00916949	0.01138614	0.01126274	0.0054317	0.01346823	0	0.02471012	0.02068537	0.01147806	0.03815174	0.00243297	0.0285832	0.0064214	0.13058084	0.0238791	0.00201699	0.02304653	0.00384799	-9.548E-06	0.00903409	0.00835823	0.26750932
12	-0.3053967	-0.0054936	-0.01267	-0.0077449	0.00071749	-0.002074	0.00060413	0.0045199	-0.0027633	-0.0123592	-0.0247101	0	-0.0018071	-5.400E-05	-0.0005432	-0.0035552	0.01435548	0.0007084	-0.006378	-0.0001025	-0.030105	0.00127944	-0.0008992	-0.0041254	2.8831E-05	-0.3496526	
13	-0.0076299	-0.0175965	0.00374385	0.0468262	0.00543	0.00207204	-0.0001947	0.01891863	-0.0028067	-0.0057532	-0.0209636	0.00180708	0	-7.736E-05	-0.0036655	0.00590025	0.0007255	0.01151844	-0.0233338	0.0452249	-0.0294992	-0.0076436	6.1206E-05	-0.0056524	-0.0013223	0.00188574	0.00515555
14	-0.0047453	-0.2456524	0.007151	0.0222382	0.00057512	0.00066309	0.00054144	0.00667825	-0.0017816	-0.0001065	-0.014781	5.4034E-05	7.736E-05	0	0.07881042	0.01170733	0.00703253	0.02116399	-0.0080847	0.03551725	-0.0161699	-0.0023067	0.00028598	-0.0053413	-0.0058797	0.0024425	-0.235517
15	-0.0018433	-0.0382986	0.00955302	0.00873738	0.00073201	-0.0009126	0.00064351	0.00152087	-0.0067521	0.00036333	-0.0038157	0.00054324	0.00366553	-0.0780104	0	-0.0050294	0.00123808	-0.000154	-0.005831	0.07124933	-0.047128	-0.0067534	-0.0010144	-0.0064728	-0.0126834	4.3424E-05	-0.1707968
16	0.0003173	-0.0045327	0.00182272	0.00454091	0.0012073	0.00296553	0.00515883	0.0028086	-0.0023811	-0.0026568	-0.002433	0.00355537	-0.0050902	-0.0117073	0.00502942	0	0.00549018	0.02857353	0.00036434	0.01632471	-0.054405	-0.0044299	0.0028046	-0.0036941	-0.0053106	0.00384912	-0.0116937
17	-0.0097556	-0.0038683	-1.102E-05	0.00065692	0.0007525	7.1E-05	-0.0003824	0.00101238	-0.0013479	-0.0041037	-0.0028383	-0.0143554	-0.0007536	-0.0007025	-0.0012381	-0.0054902	0	-0.004026	-0.0021902	-1.125E-05	-0.0122969	0.0487163	-0.0007605	-0.0024668	-2.864E-05	-0.0008147	-0.0611719
18	-0.0096548	-0.012944	-0.0045942	0.00071229	0.00086091	-0.021244	-0.0083969	0.00193082	-0.0110825	-0.0035383	-0.0064211	-0.0007084	-0.0151384	-0.0211639	0.00013397	-0.0285725	0.00040264	0	-0.001506	-0.0030262	-0.077029	-0.0088308	-0.0059115	-0.0120456	-0.0230713	-0.0004043	-0.2968827
19	-0.0009311	-0.011046	-0.0048979	0.0100828	0.00389246	-0.07715151	0.00772944	0.01466762	0.00659577	0.01512882	-0.1395808	0.06657382	0.02333381	0.00808469	0.00583095	-0.0003643	0.00729018	0.0015063	0	-0.005093	-0.0373965	-0.0094907	-0.0019225	-0.0147399	0.0024815	-0.027431	
20	-0.019699	-0.0063749	-0.006352	0.00238812	0.00100734	0.00159398	-0.0372611	0.00277598	-0.0025624	-0.0094441	-0.0128729	0.00010248	-0.0052429	-0.0355173	-0.0121493	-0.0163247	1.1247E-05	0.00302623	0.00050918	0	-0.0378776	-0.0097129	0.0086329	-0.0118652	0.0246606	-0.291087	
21	-0.0066984	0.006484	0.02612711	0.03361223	0.02385869	0.04904105	0.01638634	0.04261577	-0.002047	0.0018497	0.0296892	0.01636886	0.04171275	0.0544051	0.01229807	0.0077028	0.0379647	0.0379647	0.0379647	0	-0.0378776	0.00871729	-0.0086329	-0.0118652	0.0246606	-0.291087	
22	-0.006675	-0.0039683	0.01289426	0.01105842	0.01790275	0.00662773	0.03270093	0.0471732	0.00655904	-0.0230465	-0.0027294	0.00764363	0.00230665	0.00675339	0.0442888	-0.048716	0.00883081	0.00883081	0.00883081	0.00883081	0	-0.0378776	0.00871729	-0.0086329	-0.0118652	0.0246606	-0.291087
23	-0.0011314	-0.0008794	0.00122811	0.0026227	0.0071511	0.00180344	0.00057548	0.00379895	0.00388662	0.00210819	-0.001848	0.0008924	-6.121E-05	-0.00026	0.00101442	-0.0024895	0.0007647	0.00591155	-0.0019491	-0.0031723	0.003	1.6512E-05	0	0.00340797	0.0054378	0.00512129	0.0282776
24	-0.0001452	0.0028128	0.00390136	0.0071165	0.00386314	0.00787153	0.00511372	0.01321878	0.00637244	0.00627248	9.549E-06	0.0412536	0.00656244	0.00254626	0.00641294	0.00369406	0.00246676	0.001294556	0.00192246	0.0008329	0.0208883	0.0165781	-0.003408	0	0.0244662	0.00463376	0.13751786
25	-0.0640615	0.00693741	-0.029213	0.01976197	0.01819271	0.00880225	0.00902957	0.02058079	0.01252693	0.01789521	-0.0090341	0.00443239	0.01322238	0.00587973	0.02188338	0.0053106	2.861E-05	0.02307133	-0.014174	0.01186521	-0.002804	0.0225157	-0.0054938	-0.0124666	0	0.02123253	0.09712553
26	-0.0083442	-0.0035571	-0.0055894	0.00082798	0.00077735	-0.002209	-0.0017038	0.00196924	-0.0049151	-0.001938	-0.0083882	-2.893E-05	-0.0018857	-0.0020442	-4.342E-05	-0.0039491	-0.0008115	-0.00040433	-0.0002481	-0.028061	-0.0083032	-0.006897	-0.0051213	-0.0046338	-0.0213235	0	-0.202624
SUM	-0.990562	-0.4638193	0.14591527	0.27095605	0.1700006	0.08146901	0.09564333	0.44712304	-0.0228357	0.0384538	-0.2675039	0.3948537	-0.0051955	0.12935171	0.17079684	0.0116965	0.06117193	0.29686209	0.0274309	0.23910873	-0.6191805	-0.0761472	-0.0282273	-0.1375179	-0.0971255	0.12036245	0

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.00085	-0.184804	0.027855	0.046748	0.002641	0.233023	0.074368	0.00124	-0.00029	-0.06601	0.266072	0.005788	0.003434	0.001172	-0.00169	0.006261	0.006414	-0.00104	0.013545	-0.01086	0.003712	0.000348	-0.001	0.043041	0.006809	0.905536
2	0.000851	0	0.004256	0.00412	0.001932	0.001755	0.004114	0.005764	0.000303	0.020752	0.21063	0.00699	0.016192	0.132844	0.036653	0.002434	0.001752	0.011247	0.010678	0.028212	-0.00823	0.000788	0.000715	-0.0029	-0.00933	0.003523	0.486039
3	-0.1848	-0.00426	0	0.06434	0.003999	0.000741	0.018368	0.00847	-0.00376	0.005657	-0.00797	0.014933	-0.00399	-0.00106	-0.00975	-0.004936	-0.00182	0.002948	-0.0081	0.00017	-0.02979	-0.01818	-0.00132	-0.00544	0.02028	0.005842	-0.13796
4	-0.02785	-0.00412	-0.06434	0	-7.1E-05	-0.0014	-0.0019	0.000116	-0.01091	-0.00634	-0.00759	-0.00058	-0.04812	-0.00394	-0.02253	-0.00586	-0.00216	-0.00066	-0.0137	-0.00239	-0.03095	-0.01094	-0.00254	-0.00769	-0.01678	-0.00068	-0.29904
5	-0.04675	-0.00193	-0.004	7.07E-05	0	-0.00078	-0.0004	0.000138	-0.03533	-0.00343	-0.00331	-0.00042	-0.01074	-0.00077	-0.00188	-0.00606	-0.00165	-0.00061	-0.06602	-0.00135	-0.02954	-0.01721	-0.00228	-0.00999	-0.01954	-0.00082	-0.2037
6	-0.00264	-0.00175	-0.00074	0.001401	0.000781	0	-0.00011	0.002618	-0.00276	-0.00442	-0.00932	0.003147	-0.00336	-0.00041	0.00024	-0.00261	-0.00036	0.011228	-0.01862	-0.00175	-0.0395	-0.00711	-0.00208	-0.00859	-0.0107	0.001542	-0.09488
7	-0.23302	-0.00411	-0.01837	0.0019	0.000403	0.000114	0	0.133189	-0.00328	-0.0104	-0.01091	0.000388	-0.004	-0.00025	-0.00133	-0.00705	-0.00251	0.004969	-0.01078	0.027239	-0.02318	-0.02856	-0.00191	-0.00738	-0.01589	0.001029	-0.2137
8	-0.07437	-0.00576	-0.00847	-0.00012	-0.00014	-0.00262	-0.13319	0	-0.00739	-0.02106	-0.0088	-0.06683	-0.01691	-0.00496	-0.00635	-0.00777	-0.00254	-0.00102	-0.01536	-0.0311	-0.04134	-0.02045	-0.00399	-0.01273	-0.02194	-0.00156	-0.42878
9	-0.00124	-0.0003	0.003758	0.010914	0.035332	0.002761	0.003283	0.007395	0	5.81E-05	-0.00442	0.004571	0.003176	0.001597	0.004987	0.000543	0.000862	0.009811	-0.00741	0.002394	-0.02431	-0.00518	-0.00167	-0.00564	-0.01323	0.005578	0.034015
10	0.00029	-0.02075	-0.00657	0.006338	0.003431	0.00442	0.010397	0.021056	-5.8E-05	0	-0.08812	0.011972	0.016536	0.001384	0.003686	0.000995	0.00392	0.006828	-0.01514	0.007961	-0.03443	-0.00723	-0.0019	-0.00631	-0.01406	0.001887	-0.01338
11	0.006006	-0.21063	0.007972	0.007593	0.003311	0.009318	0.010914	0.0088	0.004422	0.008123	0	0.022127	0.011178	0.011567	0.000174	-0.00033	0.000315	0.004918	0.09967	0.011459	-0.01022	0.017632	0.002377	-0.00289	6.84E-05	0.006624	0.029798
12	-0.26607	-0.00699	-0.01493	0.000579	0.00042	-0.00315	-0.00039	0.006826	-0.00457	-0.01197	-0.02213	0	-0.00376	-0.00037	-0.00223	-0.00499	0.011041	0.004098	-0.01153	-0.00101	-0.03147	-0.00453	-0.00199	-0.0067	-0.00972	-0.0002	-0.38934
13	-0.00579	-0.01619	0.003994	0.048116	0.010743	0.003361	0.004002	0.016911	-0.00318	-0.01664	-0.01118	0.003765	0	0.003628	0.00422	-0.00088	0.004312	0.012074	-0.02687	0.046754	-0.03366	-0.011	-0.00134	-0.00731	-0.01592	0.002919	0.014845
14	-0.00343	-0.13284	0.010163	0.003043	0.00077	0.000411	0.000253	0.004961	-0.002	-0.00138	-0.01157	0.000366	-0.00363	0	0.057331	0.003114	0.004993	0.012904	-0.02189	0.031681	-0.04496	0.00977	-0.0011	-0.00593	-0.00877	0.001588	-0.1248
15	-0.00117	-0.03665	0.009751	0.022534	0.00188	-0.00024	0.001333	0.006352	-0.00499	-0.00369	-0.00017	0.002234	-0.00422	-0.05733	0	-0.00473	0.000636	0.001536	-0.0082	0.015426	-0.04617	-0.0099	-0.00177	-0.00774	-0.01286	0.001579	-0.13656
16	0.001689	-0.00243	0.04363	0.005858	0.006059	0.002606	0.007052	0.007775	-0.00054	-0.00099	0.000327	0.004987	0.000878	-0.00311	0.004726	0	0.007602	0.017305	-0.00302	0.017334	-0.05374	-0.00312	0.002743	-0.00394	-0.00349	0.020852	0.037752
17	-0.00626	-0.00175	0.001825	0.002157	0.001646	0.000357	0.002508	0.002543	-0.00086	-0.00392	-0.00031	-0.01104	-0.00431	-0.00499	-0.00064	-0.0076	0	0.001047	-0.00399	0.002323	-0.0241	0.01543	-0.00028	-0.00345	-0.00332	0.007677	-0.03932
18	-0.00641	-0.01125	-0.00295	0.00066	0.000608	-0.01123	-0.00497	0.001019	-0.00981	-0.00683	-0.00492	-0.0005	-0.01207	-0.0129	-0.00154	-0.01731	-0.00105	0	-0.01246	-0.00251	-0.07794	-0.01014	-0.00407	-0.01065	-0.01785	0.000638	-0.23644
19	0.001039	-0.01068	0.08105	0.013702	0.006016	0.01862	0.010775	0.015355	0.00741	0.015144	-0.09897	0.011531	0.026872	0.021887	0.008196	0.003024	0.00399	0.01246	0	-0.0018	-0.02389	-0.00351	0.008247	-0.00138	0.003723	0.010187	0.066065
20	-0.01354	-0.02821	-0.00017	0.007287	0.001353	0.001755	-0.02724	0.003105	-0.00239	-0.00796	-0.01146	0.001008	-0.04675	-0.03168	-0.01543	-0.01733	-0.00232	0.002513	0.001802	0	-0.03718	-0.01221	0.002159	0.007743	-0.01326	0.025176	-0.21815
21	0.010857	0.008235	0.02979	0.036952	0.029537	0.038502	0.02318	0.041343	0.024311	0.034433	0.010223	0.031473	0.033656	0.00496	0.046167	0.053742	0.024098	0.077945	0.023887	0.037179	0	0.003625	-0.00197	-0.0214	0.000356	0.01396	0.055047
22	-0.00371	-0.00079	0.018175	0.010938	0.017213	0.007106	0.028558	0.020447	0.005183	0.007726	-0.01763	0.004533	0.010999	0.00974	0.0099	0.003121	-0.01543	0.01014	0.003506	0.012211	-0.00362	0	0.00101	-0.0182	-0.02137	0.014249	0.113537
23	-0.00035	-0.00071	0.001321	0.002544	0.002283	0.002082	0.001907	0.00399	0.001668	0.001904	-0.00238	0.001994	0.001341	0.001101	0.001767	-0.00274	0.000285	0.004069	-0.00825	-0.00216	0.001966	-0.00101	0	0.002559	-0.00242	0.005902	0.01866
24	0.001004	0.002999	0.00544	0.007691	0.009089	0.008587	0.007377	0.012732	0.00564	0.00631	0.002889	0.006696	0.007314	0.005934	0.007737	0.003939	0.003449	0.010654	0.001378	-0.00774	0.021397	0.018199	-0.00256	0	0.00406	0.007829	0.157943
25	-0.04304	0.009331	-0.02028	0.016785	0.019538	0.010698	0.015893	0.021944	0.013228	0.014064	-6.8E-05	0.009721	0.015923	0.008765	0.012862	0.003493	0.003319	0.017852	-0.00372	0.013256	-0.00036	0.021366	0.002424	-0.00406	0	0.029952	0.188885
26	-0.00681	-0.00352	-0.00584	0.000678	0.000819	-0.00154	-0.01013	0.001564	-0.00558	-0.00189	-0.00662	0.000204	-0.00292	-0.00159	-0.00158	-0.02085	-0.00768	-0.00064	-0.01019	-0.02518	-0.01396	-0.01425	-0.0059	-0.00783	-0.02995	0	-0.17208
SUM	-0.90554	-0.48604	0.13796	0.299041	0.203703	0.094878	0.213705	0.428781	-0.03401	0.013379	-0.0298	0.389345	-0.01485	0.124795	0.136556	-0.03775	0.039322	0.236436	-0.06607	0.218146	-0.65505	-0.11354	-0.01866	-0.15794	-0.18888	0.172076	0

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.003680	0.171676	0.0285145	0.0612775	0.0051425	0.2162914	0.0638373	0.010558	0.0204072	-0.01676	0.2104401	0.0062261	0.0046644	0.0024344	-0.000427	0.0080283	0.0083438	-0.002107	0.0137224	-0.013186	0.0042808	0.0003971	0.0001746	0.0505169	0.0074552	0.847922
2	0.0036804	0	0.0073064	0.0041173	0.0023133	0.0033424	0.0054957	0.0062549	0.0019166	0.0114328	0.1188113	0.006152	0.0266001	0.1490365	0.0352998	0.0047882	0.0020679	0.0047556	0.0146838	0.0264901	-0.008082	0.0032439	0.0006381	-0.001646	-0.004942	0.0044295	0.422156
3	-0.171678	-0.007306	0	0.0672627	0.0062742	0.0035813	0.0167663	0.0064846	-0.003989	0.0269711	-0.018642	0.0088175	-0.002027	0.0005794	-0.006305	-0.003154	0.0004617	0.0044173	0.0193906	0.0007654	-0.028316	-0.011026	-0.00094	-0.002286	0.0342045	0.0089945	-0.09017
4	-0.028515	-0.004117	-0.067263	0	0.0001671	-0.001396	-0.002008	9.794E-05	-0.014667	-0.008066	-0.010781	-0.000785	-0.038877	-0.001646	-0.022001	-0.009885	-0.000894	-0.000536	-0.015393	0.002885	-0.034793	-0.009604	-0.002793	-0.005379	-0.016594	-0.000482	-0.29927
5	-0.061277	-0.002313	-0.006274	-0.000167	0	-0.000715	-0.000362	-3.30E-05	-0.017311	-0.002838	-0.00536	-0.006625	-0.003579	-0.000502	-0.000571	-0.002771	-0.001086	-0.00073	-0.006299	-0.001312	-0.02583	-0.017	-0.002812	-0.003866	-0.019556	-0.00069	-0.18388
6	-0.05142	-0.003342	-0.003381	0.0013964	0.0007155	0	-0.000102	0.0047399	-0.002536	-0.011598	-0.011019	0.000978	-0.000958	-0.000471	-2.55E-05	-0.003087	0.0039716	0.0124317	0.023499	-0.002062	-0.039734	-0.006959	-0.002875	-0.007343	-0.010738	0.0019792	-0.11512
7	-0.216291	-0.005496	-0.016766	0.0020798	0.0003619	0.0001021	0	0.127324	-0.000538	-0.011739	-0.018096	-0.000937	-0.000912	-8.95E-06	-0.001133	-0.004756	-0.000243	0.0065371	0.013264	0.029666	-0.02229	-0.03837	-0.001354	-0.004215	-0.01214	0.0021588	-0.19362
8	-0.063837	-0.006255	-0.006485	-9.79E-05	3.378E-05	-0.00448	-0.127324	0	-0.000655	-0.019014	-0.010943	-0.004177	-0.021443	-0.00566	-0.005728	-0.005089	-0.0037	-0.001071	-0.014555	-0.002908	-0.03998	-0.023787	-0.004991	-0.01074	-0.018311	-0.001359	-0.40795
9	-0.010558	-0.001817	0.003892	0.0146674	0.0173109	0.0025365	0.0005376	0.006055	0	-0.001632	-0.009981	0.0039353	0.0046638	0.0015262	0.0056015	0.0004116	0.0010771	0.0107903	-0.013297	0.000442	-0.029654	-0.007083	-0.003265	-0.003957	-0.01221	0.0059471	-0.01402
10	-0.010407	-0.011433	-0.026971	0.0080656	0.0028375	0.0115976	0.011739	0.0190136	0.0016321	0	-0.020663	0.014906	0.0137114	0.004743	0.0011339	0.0013167	0.0057421	0.0063785	-0.021545	-0.0075533	-0.040799	-0.00829	-0.00244	-0.005715	-0.01506	0.0019745	-0.05183
11	0.016799	-0.118811	0.0186416	0.0107808	0.0053596	0.0110189	0.018658	0.0109433	0.0099815	0.0206627	0	0.0213373	0.0194639	0.0133313	0.0044636	-0.000295	0.0023609	0.0067409	0.0967103	0.0111385	-0.007648	0.0317727	0.0028463	-0.000655	0.0069173	0.0078156	0.220333
12	-0.21014	-0.006152	-0.008818	0.0007851	0.0006252	-0.000978	0.000369	0.0041769	-0.003935	-0.014086	-0.021337	0	-0.002156	-0.00011	-0.000845	-0.004174	0.0086887	0.0008518	-0.016111	-0.001532	-0.028351	-0.00167	-0.001883	-0.003882	-0.008703	-0.000203	-0.319
13	-0.006226	-0.02066	0.0020269	0.038877	0.0035789	0.006958	0.000912	0.0214425	-0.004664	-0.013711	-0.019464	0.0021564	0	0.0026199	0.0007985	-0.002387	0.0053193	0.0103979	0.029563	0.0486606	-0.030236	-0.008533	-0.002142	-0.005396	-0.01288	0.0011256	-0.01098
14	-0.004664	-0.149036	-0.00579	0.0016458	0.0005019	0.0004705	8.588E-06	0.0056599	-0.001526	-0.004714	-0.013331	0.0001098	-0.00262	0	0.060774	0.0027432	0.0067589	0.0205617	-0.024653	0.0355897	-0.029712	-0.006016	-0.001622	-0.003761	-0.01015	0.0004591	-0.1151
15	-0.002434	-0.0353	0.0063055	0.0220006	0.005706	2.554E-05	0.001133	0.0057279	-0.005661	-0.001134	-0.004464	0.0008449	-0.000798	-0.060777	0	-0.006044	0.0025535	0.0038138	-0.010759	0.0136481	-0.039121	-0.006994	-0.001266	-0.005597	-0.01221	0.0001902	-0.13575
16	0.0004265	-0.004788	0.0031542	0.0098851	0.0027706	0.0030873	0.0047564	0.0050886	-0.000412	-0.001317	0.0002954	0.0041744	0.0023871	-0.002743	0.0060441	0	0.010257	0.0232766	0.0066617	0.0172771	-0.049543	-0.000963	0.0147422	-0.001402	-0.00352	0.00046784	-0.07581
17	-0.008028	-0.002068	-0.000462	0.0008944	0.0010864	-0.003972	0.0002427	0.0034996	-0.001077	-0.005742	-0.002361	-0.008680	-0.005319	-0.006759	-0.002553	-0.010257	0	0.0007465	-0.006716	-0.003981	-0.02537	0.0093143	-0.000977	-0.002221	-0.00352	0.00046784	-0.07581
18	-0.008344	-0.004756	-0.004173	0.0005355	0.0007303	-0.012432	-0.006537	0.0010709	-0.01079	-0.006378	-0.006741	-0.008852	-0.010398	-0.026562	-0.003814	-0.022377	-0.000746	0	-0.013218	-0.003904	-0.075004	-0.00964	-0.004227	-0.009641	-0.019032	0.0004683	-0.24995
19	0.0021069	-0.014684	0.0193064	0.0153926	0.006299	0.0234985	0.0132638	0.0145549	0.0132968	0.021545	-0.09671	0.0161108	0.0295635	0.0246529	0.001791	-0.006662	0.067157	0.0132181	0	0.004162	-0.025178	0.000729	0.0058241	0.001607	0.0033295	0.0116812	0.118479
20	-0.013722	-0.02649	-0.000765	0.0023849	0.0013121	0.0020625	-0.028967	0.0029084	-0.000412	-0.007553	-0.011139	0.0015325	-0.048661	-0.039659	-0.013648	-0.017271	0.0003812	0.0039839	-0.004162	0	-0.036471	-0.012599	7.44E-05	0.0028366	-0.013879	0.0171091	-0.23843
21	0.0131859	0.0080816	0.0283596	0.0347932	0.0258302	0.039714	0.0222897	0.0399799	0.0296537	0.0407986	0.0076483	0.0283513	0.0302358	0.029712	0.0391207	0.049543	0.0253696	0.01750038	0.025178	0.0364711	0	0.0102014	-0.00192	-0.018531	-0.001817	0.0086472	0.625921
22	-0.004281	-0.003244	0.0110264	0.0096035	0.0170004	0.0069587	0.0303697	0.0237869	0.007083	0.0082987	-0.031773	0.0016697	0.0085334	0.0060164	0.006941	0.000963	-0.009314	0.0096403	0.0007285	0.0125988	-0.010201	0	0.0004127	-0.011806	-0.031897	0.0086434	0.067803
23	-0.000397	-0.000638	0.0003998	0.0027929	0.0028121	0.0028746	0.001354	0.0049909	0.0032646	0.0024404	-0.002846	0.0018831	0.0027422	0.0016122	0.0012662	-0.014742	0.0009766	0.0042272	-0.005824	-7.44E-05	0.0019197	-0.000413	0	0.0046119	0.0009405	0.0057658	0.02189
24	-0.000175	0.0016457	0.0028598	0.0053791	0.0038656	0.0073428	0.0042148	0.0107403	0.0039571	0.0057152	0.0066551	0.0038816	0.0053865	0.003761	0.0055973	0.0014017	0.002221	0.0096413	-0.001161	0.002837	0.0185313	0.0118059	-0.004612	0	0.0065888	0.0055683	0.111976
25	-0.050517	0.0049417	-0.042005	0.0166941	0.019556	0.0107375	0.0121398	0.0183107	0.0122102	0.0150596	-0.006917	0.0087031	0.0128804	0.0101496	0.01221	0.0015988	0.0033201	0.0193022	-0.00333	0.0138787	0.0018167	0.0318966	-0.00094	-0.0094	0	0.0284788	0.151224
26	-0.007455	-0.004429	-0.008994	0.0004818	0.0006903	-0.001979	-0.002159	0.0013588	-0.005947	-0.001974	-0.007816	0.000203	-0.001126	-0.001459	-0.00019	-0.005248	-0.004678	-0.000468	-0.011881	-0.007109	-0.008647	-0.008643	-0.005766	-0.005588	-0.028475	0	-0.13708
SUM	-0.847922	-0.422156	0.0901671	0.2992652	0.1838807	0.1151189	0.1936168	0.4079536	0.0140222	0.0518262	-0.20333	0.3190024	0.0109808	0.1159097	0.135747	-0.049949	0.0758089	0.249951	-0.118479	0.2381326	-0.625921	-0.067803	-0.02189	-0.111976	-0.151224	0.1370802	0

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.00126	0.1801703	0.0388645	0.0505695	0.0425752	0.1566877	0.1190951	0.0267542	0.0021765	-0.011265	0.0500373	0.0087086	0.0034185	0.0012169	-0.016941	0.0014366	0.0045497	-0.007371	0.0117989	-0.009232	-0.013209	-0.002993	-0.007898	-0.000442	0.0009588	0.0562675
2	0.0012604	0	0.0039417	0.0094225	0.0071234	0.00997	0.0127958	0.0135078	0.0062091	0.0197876	0.1072491	0.0713124	0.0201766	0.038865	0.0138334	-0.016131	0.0058697	0.0093225	0.0345158	0.0148363	-0.019589	0.0104987	0.0019114	0.0010729	0.0015716	0.0085625	0.3333437
3	-0.18017	-0.003942	0	0.0733974	0.0611693	0.0095002	0.0175341	0.0144572	0.0035823	0.0305583	-0.002258	0.0104575	0.0033784	0.0045583	9.022E-05	-0.022818	0.0030847	0.0073638	-0.010844	0.0055287	-0.029574	-0.026391	-0.006473	-0.008231	-0.005951	0.0108534	-0.061038
4	-0.038864	-0.009423	0.073397	0	-0.027637	-0.00181	-0.001158	-3.45E-05	-0.020551	-0.016838	-0.031568	-0.00427	-0.033291	-0.005804	-0.027596	-0.031114	-0.004817	-0.000975	-0.020098	-0.002726	-0.035016	-0.024187	-0.007644	-0.010515	-0.011883	-0.001207	-0.442424
5	-0.050691	-0.007121	-0.061169	0.027637	0	-0.002401	-0.001195	7.074E-05	-0.056203	-0.012645	-0.022889	-0.004098	-0.007099	-0.002814	-0.006993	-0.037825	-0.005679	-0.000857	-0.014147	-0.003008	-0.040391	-0.026429	-0.010832	-0.018744	-0.017929	-0.005769	-0.38922
6	-0.042575	-0.00997	-0.0095	0.0018104	0.0024007	0	0.0060687	0.0015903	0.0071545	-0.023321	-0.038474	-0.010757	-0.013729	-0.002171	-0.004593	-0.023464	-0.000394	-0.006647	-0.039259	-0.002613	-0.028402	-0.032346	-0.009506	-0.017664	-0.012887	0.0024887	-0.305418
7	-0.196608	-0.012796	0.017534	0.0011576	0.001195	0	0.1478542	0.006659	-0.015429	-0.05101	-0.002165	-0.003681	-0.001256	-0.00398	-0.023401	-0.003293	-0.001576	-0.001576	-0.02936	0.015603	-0.024377	-0.053753	-0.00945	-0.054698	-0.011529	0.0008341	-0.307131
8	-0.119095	-0.013508	-0.044457	3.446E-05	-7.07E-05	-0.00159	-0.147854	0	-0.00785	-0.016493	-0.049367	-0.003394	-0.004027	-0.007369	-0.024942	-0.004389	-0.001137	-0.033664	0.001532	-0.029267	-0.052943	-0.011177	-0.01921	-0.05197	-0.00116	-0.591692	
9	-0.026754	-0.006209	-0.003682	0.0205513	0.0562025	-0.007155	-0.000659	0.0078497	0	-0.014326	-0.025618	0.0054415	-0.005929	-0.003752	-0.001066	-0.025384	0.0004753	0.018863	-0.02295	0.0016924	-0.028756	-0.027942	-0.005679	-0.01318	-0.006444	0.016386	-0.110263
10	-0.002176	-0.019788	-0.03058	0.016838	0.0126453	0.0233211	0.0154292	0.0164934	0.0143265	0	-0.078474	0.07136	0.042404	0.009377	0.0120266	-0.010943	0.0159127	0.0188552	-0.017555	0.0140334	-0.027335	-0.02254	-0.005695	-0.018551	-0.011019	0.013575	-0.002067
11	0.011265	-0.107249	0.0222583	0.0315683	0.0228895	0.0384741	0.0510103	0.0493665	0.0256183	0.0781739	0	0.070555	0.0708372	0.0709551	0.0398643	-0.028215	0.0302641	0.0264967	0.1374312	0.042896	-0.033803	0.0755782	0.0145179	0.0118251	0.035206	0.0308239	0.8188215
12	-0.050037	-0.017132	-0.010458	0.0042699	0.0040976	0.0107567	0.0021654	0.0035943	-0.005442	-0.017186	-0.070555	0	-0.001586	0.0002373	0.0034678	-0.031785	0.0065191	0.037656	-0.029612	0.0001167	-0.037307	-0.026239	-0.008209	-0.01248	-0.012507	0.0022653	-0.289478
13	-0.008709	-0.020177	-0.003378	0.0322909	0.0070985	0.0137288	0.003681	0.0149953	0.0059295	-0.044204	-0.070837	0.0015857	0	-0.003074	-0.005954	-0.041498	0.0031599	0.0104391	-0.031012	0.0719831	-0.02583	-0.032967	-0.006858	-0.008931	-0.011812	0.0085486	-0.11349
14	-0.003419	-0.038865	-0.004558	0.0058041	0.0028135	0.0012706	0.0012562	0.0040274	0.0037518	-0.009038	-0.070955	-0.00237	0.0030744	0	0.053361	-0.041434	0.0410933	0.0135053	-0.082124	0.0094974	-0.021517	-0.027993	-0.007864	-0.05553	-0.012366	0.0015405	-0.207544
15	-0.002127	-0.013833	-9.02E-05	0.0275957	0.0069933	0.0045932	0.0039801	0.0073693	0.001066	-0.012027	-0.039864	-0.003468	0.005954	-0.053361	0	-0.006921	0.0378284	0.0495823	-0.049968	0.0217423	-0.024165	-0.027112	-0.006642	-0.016449	-0.010254	0.0064381	-0.09223
16	0.0169411	0.0161312	0.022818	0.0311142	0.0378249	0.0234636	0.0224012	0.024842	0.0255389	0.0108435	0.0282153	0.0317851	0.0141982	0.0141337	0.0069207	0	0.0089842	0.0410649	0.0087512	0.0349766	-0.019376	-0.006537	0.0031112	0.0061217	0.0009813	0.026134	0.5057092
17	-0.00437	-0.00587	-0.003085	0.004817	0.0056794	0.0003937	0.0032926	0.004389	-0.004475	-0.015913	-0.030264	-0.006519	-0.00316	-0.041093	-0.037828	-0.000984	0	0.0041623	-0.028035	0.0009148	-0.023597	-0.023883	-0.007362	-0.013906	-0.011626	0.0047251	-0.305853
18	-0.00455	-0.009322	-0.007364	0.0009751	0.0008568	0.0006468	-0.001576	0.0011373	-0.011886	-0.019855	-0.026697	-0.003766	-0.010439	-0.013505	-0.049582	-0.041065	-0.004162	0	-0.030444	-0.002846	-0.034317	-0.022981	-0.007402	-0.014183	-0.012129	0.0020956	-0.32136
19	0.0073712	-0.034518	0.0108437	0.0200977	0.0141475	0.0392591	0.0293596	0.0336645	0.0232951	0.0175547	-0.137431	0.0296117	0.0310121	0.0821239	0.0499684	-0.008751	0.0280351	0.0304445	0	-0.003488	-0.009085	0.000211	0.0202655	0.0083335	0.0191428	0.0127113	0.3290382
20	-0.011799	-0.014836	-0.005529	0.0027258	0.0030082	0.0026132	-0.015603	-0.001532	-0.001692	-0.014033	-0.042896	-0.000117	-0.071993	-0.009497	-0.021742	-0.034077	0.000915	0.0029458	0.034878	0	-0.024333	-0.02159	-0.006111	0.0041018	-0.035021	0.0088734	-0.276561
21	0.006232	0.0195895	0.0295737	0.0350156	0.0403912	0.0284018	0.0243771	0.0292668	0.0287564	0.0273346	0.0338029	0.0375069	0.0258298	0.0215174	0.0241654	0.0193756	0.0235974	0.0343174	0.0090855	0.0243327	0	-0.007737	-0.002157	-0.00824	-0.028839	0.0037476	0.5028745
22	0.0132088	-0.010487	0.026391	0.0241869	0.0264291	0.0324465	0.0537353	0.0179118	0.0225399	-0.0279118	0.0225399	0.026391	0.0329671	0.0279931	0.027112	0.0053566	0.0238828	0.0229812	-0.000211	0.02359	0.0077368	0	-0.039802	-0.022018	-0.006818	0.0395444	0.3591991
23	0.0023933	-0.001911	0.0064728	0.007664	0.0108318	0.0095061	0.00945	0.0111773	0.0056788	0.0050954	-0.014518	0.0082085	0.006877	0.0078636	0.0066424	-0.003111	0.0073622	0.0074019	-0.002066	0.0061113	0.0021566	0.0398021	0	-0.087554	-0.03043	-0.007399	-0.009395
24	0.0078984	-0.001073	0.0082312	0.0105153	0.0187442	0.0176642	0.0156882	0.01921	0.0131801	0.0185505	-0.011825	0.0124801	0.0089306	0.0553094	0.0164493	-0.006122	0.0130959	0.0141833	-0.008333	-0.004102	0.0082403	0.0220178	0.0875538	0	0.0038087	0.0192598	0.3597872
25	0.0004416	-0.001572	0.0059514	0.0118832	0.017929	0.0128665	0.0115295	0.0151972	0.0064439	0.0101886	-0.035221	0.0125071	0.0118115	0.0123958	0.0102538	-0.000981	0.0116258	0.0121282	-0.019143	0.0350211	0.0288392	0.0081894	0.0304327	-0.003809	0	0.0406426	0.2530432
26	-0.008059	-0.008563	-0.010853	0.0012071	0.0057694	-0.002489	-0.000834	0.00116	-0.011639	-0.011357	-0.030824	-0.002365	-0.008549	-0.001541	-0.006438	-0.026134	-0.004726	-0.002096	-0.027211	-0.038873	-0.024378	-0.038544	0.0073985	-0.01926	-0.048643	0	-0.31774
SUM	-0.675628	-0.333344	0.0610383	0.442424	0.38922	0.3054181	0.3071311	0.5916923	0.1102635	0.0020669	-0.818821	0.289478	0.1154898	0.207544	0.0922297	-0.345709	0.305827	0.3213603	-0.29038	0.2765606	-0.502874	-0.359109	0.0039351	-0.359787	-0.253043	0.317797	0

Appendix 21
Basic Transactions Table for Thailand at Constant Prices
1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	835140	102540	200191	194	0	70463286	3310766	4608172	76354	153109	0	3122664	2382	0	0	0	52446	0	18783	4434	1291778	3567	405	1420	74584	562314	93823629
2	0	31566	0	0	0	13501231	0	55232	0	11511	0	0	0	0	0	0	11063	0	0	0	54865	1619	0	0	46359	15289	14316475
3	117174	63500	862386	5358	86603	46652	0	0	5750	166616	0	3002	111129	2187	17210	1156	8615630	0	93903	0	743027	37592	3462	107140	17667	7562	11969164
4	0	694946	0	70668	0	8678239	0	0	0	1428	0	0	0	0	0	0	6699	0	0	0	1548833	2473	0	0	55390	5985	11062861
5	33	334	0	0	0	64114	6389	1612	10399	436703	11519343	1902	650265	2427680	223	2522	67895	25120	2200497	0	6191	0	0	0	170	12235	17433536
6	656	12756091	0	1270882	0	1124256	177346	0	117868	396635	40088	0	4896	0	0	0	861539	0	0	485733	8698423	71893	0	1472	330133	1873451	39910959
7	110	0	0	0	0	95311	4722882	0	0	1467	0	0	0	0	0	0	0	0	0	15371	7841333	102385	11321	3333	11382	49303	12852998
8	365456	13711	17821	118260	9576	1026379	55766	31298624	109108	188042	25534	1061844	126752	5329	8423	314487	1288877	22843	89843	1315990	628502	763056	126587	14229	619116	692231	40306383
9	491	7752	7	64	9890	183332	387245	271763	4338147	493848	12645	51975	210483	57682	16058	122800	254611	7974	281618	2448831	171477	351096	502593	37916	1463226	156911	11846656
10	5055077	241106	26882	2001	92834	740316	687298	4108804	963635	1093226	338797	2548786	121205	443509	155089	964651	940130	384420	1466554	210878	316500	7967	19751	16503	1692106	149084	28540940
11	2001509	164796	160805	1900924	705520	693833	203853	1161786	287488	457414	1299977	362962	135270	446586	82820	819159	340986	5304159	1906853	755125	385042	15222792	88605	79001	566055	212444	37386053
12	85875	14383	2249	149785	5111	255555	39197	208056	111049	385385	32119	1069818	24444	24828	64501	4495196	382209	20647	380658	785651	177766	472803	26719	13739	361933	13901	9547507
13	81774	13074	38342	37707	5251	78547	508605	596	0	332576	1192	3874	592170	0	15407	573515	145540	14002	8537904	195954	250744	29857	13051	19843	255466	70147	11815138
14	17016	779	19551	13150	18834	42690	4007	0	4905	9654	16549	25607	255878	852547	4293642	4831648	1184129	9485	11598023	5208	17046	2872	0	5031	93983	69702	31068846
15	738001	85894	176969	28266	63495	850737	25976	106407	51595	71167	129431	62086	5279	3924	326591	651835	163125	31530	4518396	481096	317462	47116	81779	55301	300317	158619	9532333
16	1152794	55555	72533	130472	458837	543967	428456	548199	295206	196683	256600	150681	459282	406153	89501	18215900	433753	1132995	4186568	616899	64071	6222786	89810	71476	1450166	565206	30295550
17	464613	16597	22394	126183	8648	117045	23194	136239	80924	103377	21337	39307	70662	42044	60566	590868	3795881	12831	5718788	1748273	110971	33171	324421	111844	676365	219338	14675681
18	30035	111942	0	9713	16958	1933504	401545	1355599	48253	615450	862255	152310	357783	831659	110627	655445	482160	1007366	430407	707309	902598	488979	243846	131883	895873	317287	12962878
19	246492	268184	57053	0	122702	815765	130880	368312	219039	289548	108944	84325	155690	92055	24445	216073	165185	72864	27850	670857	166574	398778	197689	2334878	823416	112433	8173183
20	1689499	1493058	76386	618547	105098	10297063	1038653	3415743	869329	1233788	134236	1092110	605556	615701	562236	4238478	2015527	939474	5967438	1653725	4959556	2776448	232908	73023	1994408	577157	49235526
21	15464	0	30	0	94157	635420	206301	296937	121464	339389	172173	89761	116724	88969	19387	241901	188333	54187	460763	1777890	424513	346336	497755	210002	924230	1231271	2121271
22	11648383	491795	30146	185062	315586	3344568	357700	704986	352817	566183	185654	261553	895884	376956	132235	1417169	698887	334881	6906168	3004486	1227184	3278986	831393	68552	891073	367557	28780643
23	2081580	296493	25566	125567	127007	495004	226247	479983	92241	272302	283627	75365	191509	125688	15048	162720	224676	204503	735369	293305	592333	1110642	500421	171576	300356	107504	11953743
24	22398	35	141	0	303	64562	0	0	0	18491	12631	2526	25011	0	4006	60111	5532	45804	19489	0	183181	417804	13649	13252	0	657929	0
25	71026	3087	14599	0	59040	273071	211651	466192	43964	537641	114832	25941	80962	41918	30994	227256	79141	65871	660831	2428389	562723	644669	353442	328272	2914061	5004	10281089
26	282742	14867	72815	34991	135871	237362	143070	67114	161861	178511	108959	38734	167716	17741	73962	2620408	251147	76248	132959	2018233	158319	557902	227090	14602	374988	0	5989373
27	2452031	1784824	1873986	4827993	2433222	126717810	14966226	49661356	8749396	1356925	1567824	10330322	6936814	14573897	6102773	39064008	22734010	3348843	5737951	28603177	32098660	33334367	4598762	3884684	16776029	7290124	57437826
28	12443493	110673	872165	2467719	1683275	13217941	2819582	7439999	1291607	2040637	3077754	2497456	1110427	1448239	718899	3853514	3359992	1117673	8450151	40536619	13963486	4540181	207875	5543758	0	19402227	0
29	11268714	13037062	10070471	11741104	619576	28138948	772915	10710654	2632378	3851840	3263798	3383656	2276735	312121	1888026	7384838	9650653	4061817	18137390	17698220	1496547	10325980	6701973	10621619	0	396553633	0
30	4308968	487198	280283	1458324	817042	3396808	1026453	2610582	516717	889836	1210044	576763	713302	688245	236221	1860839	928716	1401563	3339053	6596623	1468072	6098824	990549	22054871	12172544	0	76130301
31	847684	25732	605434	208365	2007724	2442570	7737930	2439701	487295	670127	953005	860817	563044	904953	210456	2168936	1105591	113766	1599706	9335070	3257166	2224472	956177	2039957	158201	0	45354177
32	15909661	3253856	13775155	20718177	13270258	174197239	34862955	72929407	13839253	21200576	24204464	11687659	11815988	20806196	9128338	54548204	38029370	16533911	89212310	164387120	62887850	7075598	21647778	36775962	96970420	7290124	129420037

1985

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1	2218477	1695414	166524	11416	0	10164904	2031817	10293877	239056	140351	0	11333194	26	0	0	0	78500	0	12317	1192	5673178	9733	24535	509	512053	1030483	157087556
2	0	725186	0	0	0	33875193	0	534981	0	20465	0	0	0	0	0	0	185738	0	0	0	561235	0	0	0	104454	2796	38010049
3	99485	73316	587576	73608	19105	825518	64959	887	31197	46463	0	169202	169882	14807	36478	0	6435176	0	341144	0	456549	12854	134	300	31516	19967	9508123
4	0	680468	0	501287	0	10055885	0	0	0	25690	0	363	0	0	0	0	15777	0	0	0	1859964	0	0	0	283573	18181	13441188
5	3290	729	0	7057	3824381	76294	82996	794	17821	451458	35027053	137	2451315	4374865	5630	819	825614	8045408	296854	0	110	0	0	0	2679	36002	58202558
6	4229	1482138	93	1705724	0	24079569	3185153	14698	60535	18877214	14604	18039	34606	0	0	5602	1749573	0	0	411429	22238824	149172	8324	937	1249562	2874049	75016405
7	123	0	0	67	0	33288	4663957	0	0	13384	0	0	0	0	0	0	0	0	0	61484	11246679	675555	56110	26796	16550	728644	17520636
8	390887	24808	51425	947125	6148	2179574	65159	71004318	205055	555270	11057	785443	258024	15302	43571	514285	2636327	101161	200414	2401191	906668	1937025	288029	135537	947100	598665	87197900
9	124	13125	2933	292	17406	1084743	1295760	612259	7047393	911588	51322	233388	606696	53562	47746	511301	589466	18487	142180	806880	163108	964404	993110	80699	4585438	190133	21023541
10	9316495	786420	26264	24456	139752	1366591	1155204	10468883	1500325	4259893	195459	4490792	917022	532259	262874	2900513	2047610	577964	1122106	297481	425901	294572	63623	3222859	684398	51539850	
11	3622802	274994	284865	4919336	2700087	2372465	804075	2456997	657957	428210	4136355	396107	4947070	1196474	253221	1956843	598392	4649294	2409460	1559305	2595147	58061034	475983	542013	1679416	101844	103990246
12	207159	73543	7279	207526	21463	652556	135073	298934	120256	595592	1779	2229558	39834	11814	51515	3260825	732429	21964	355855	1147300	171235	3660927	16556	23820	471783	201966	14663928
13	113579	10740	67614	39339	1001	158331	1157815	54	6500	138818	235	155	360073	12667	6936	1372407	170375	64953	29366232	151766	529971	12149	13326	83881	60261	49068	37188248
14	10361	3574	13372	50925	19676	119650	128958	0	51119	25772	916	7163	1144221	14048578	6821326	12110134	1832221	14044	18432070	9108	5331	96631	0	10787	21423	57766	5627125
15	895580	180716	165168	86263	49254	2232577	107861	139664	185228	137261	28023	50404	38340	14209	360608	2490184	393930	35526	4554915	96781	99458	52781	11627	170341	356599	168541	13063798
16	1649257	213823	191594	618297	1615081	1374151	618275	885779	286978	467978	111651	172110	540023	264051	186458	3249652	969870	1044698	5474786	884694	265022	19451081	240562	266183	2048930	279437	72580821
17	260789	79977	54392	49364	47137	205407	39543	1234659	80041	117547	5078	17071	143033	27970	104871	1489565	1275948	9828	7170701	1459800	87665	238704	174478	21575	1751489	483013	28113746
18	110553	477276	4429	75957	435366	3651748	399250	4209112	612021	672426	3743835	713466	1968803	1304531	175252	1834391	1231359	11888875	715626	2754981	2966249	952400	975815	1007211	3108528	310889	46272250
19	101308	154700	32271	9112	103452	309323	73902	140981	177661	92636	35129	69118	81921	29590	22323	127192	78654	41682	86983	380734	295608	180833	189755	1967676	834839	13940	5631882
20	2307197	3388515	85953	776168	153116	14377659	1115555	8633962	907782	1600293	133619	2027318	956171	597523	731437	5347994	3424383	347111	7756610	1120496	7666209	4517259	378945	146832	3622038	722336	72842382
21	83716	1178	35285	1029	75650	434070	123161	325937	38093	183397	250088	21177	201163	47987	44455	481320	543155	150193	540144	6111238	297344	2129008	515500	320413	468777	632398	14054997
22	1205686	916614	44506	352321	1083162	6845136	1445024	2463052	749598	935100	203928	895357	2183162	392865	406571	3703336	1993495	820447	17205831	5272739	2958380	9327170	1651395	244349	1696930	665181	65604043
23	2128599	454076	117807	250717	201702	2599982	431914	1365067	342902	433429	537718	433704	921628	463558	251818	1720088	900908	137036	2748692	14654327	1402197	3006521	1094484	449001	493957	260194	37820206
24	4703	103	227	0	34339	70274	9572	19498	10947	38093	20910	16026	13525	5813	17877	146775	22971	19483	15878	16740	149408	487197	66625	814458	92133	24767	2118860
25	83827	12335	42467	29271	2351275	746788	785909	275383	92313	693491	304902	177869	229680	48813	80938	1289909	400743	325097	1825719	282842	379028	136207	873024	520005	642455	115596	22299501
26	25244	3913	122687	4536	9770	29497	36620	4107	159353	10850	5112	4170	15576	8582	55082	113912	198665	19922	81671	11525	11441	511454	70551	5490	85399	0	1685129
27	44777269	2467542	2104730	10740296	1290773	214290013	19955874	115383881	13579728	18852729	44814284	20431109	21462957	24261911	10071648	73988147	40815279	28333171	10352688	42393941	63311921	108237251	8403141	6802233	34288333	10270028	1122486787
28	18371806	287025	1239094	3018241	6564020	21036469	4838809	1874943	2384055	2566863	1664772	3000145	395804	3236911	1676286	11937408	8425810	10047215	18865536	47796048	13421137	34870036	17283564	4282560	115375663	0	376940683
29	97505042	1240583	670870	7596269	13535470	40324061	9049701	33760782	4670271	4647972	4607387	2528371	8162556	4063967	3865995	19352646	17092258	16463767	3705479	3976399	10349590	2323898	13925466	16443558	18801249	0	575671662
30	3602792	916097	339962	1714424	4740425	50064084	1539230	5523423	864215	3276158	3276152	801407	2028310	888272	371587	3650186	4514262	4054079	3769399	10349590	2323898	13925466	2198324	27644925	6838952	0	108409040
31	1381205	515754	389471	36413	4555069	3206688	23045619	5262171	692171	1061109	12031770	1333292	1944178	1140364	454844	3834465	2448341	-90236	3257157	2919490	4794540	4250874	4340183	1170329	6839529	0	84302710
32	165663357	40924813	10905814	22570179	42334076	281988113	59463654	178723107	23229793	28094562	66395787	31910494	31572183	33780007	16495443	12256705	7045615	58819318	157191108	221819155	115178176	199860154	51153170	56449135	173861625	10270028	228497311

1995

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1	21236437	2430304	127730	21673	0	103940576	1525388	13226042	316087	444049	0	26281296	37	0	0	0	395641	118	122033	2532	11108221	25311	68637	38636	983919	1349398	183456094
2	0	1248242	0	0	0	52038818	0	798994	0	289229	0	0	0	0	0	0	1160111	0	0	1007152	0	0	0	0	198683	146044	56885453
3	26255	47269	26343	1288	66481	588585	101	30953	117503	144	421840	492815	15573	147458	5795	13881666	0	3007328	0	703435	1774	334	106	34556	112095	19989394	
4	0	1024220	0	773932	0	28464906	0	0	64207	0	0	0	0	0	0	0	84167	0	0	6841088	0	0	0	0	374944	10847	37592930
5	9392	1934	0	18133	1026246	218238	34440	114365	715302	1914689	73015533	72627	1790247	1914148	55330	610084	648183	28226165	24038308	0	0	434	0	0	12251	457385	151002035
6	8351	26969407	50	7327079	0	59181324	7625987	626883	989902	2502915	37798	42244	230183	27	0	16572	8382146	0	0	737001	51850309	276622	67562	949	2599427	2524447	177224185
7	84	0	0	113	0	24442	11731068	0	0	28811	0	0	0	0	0	0	0	26	0	169542	25924100	886607	219187	7818	46870	903967	3940635
8	39627	22585	26680	30035	6737	581628	135940	182464104	433642	3643225	32351	2967164	252669	20413	188902	2420574	14751086	190561	618496	3864636	2871255	245427	1346698	44538	2355758	176060	223855880
9	89	11875	9925	492	30268	3021148	2283762	3057288	32120096	1871266	21373	418350	2078937	212060	338902	3452589	4706703	306200	402210	3658941	477990	2738428	5155842	42960	14384567	537139	81347820
10	1566496	1092663	34345	125743	351820	349624	3999295	38877551	4328662	38725300	1382509	2927157	4177166	1542603	1659836	19646439	19496877	1049175	4932278	1069516	1129701	890881	2145540	28431	1201675	294063	210545105
11	4224084	380366	43979	10952776	4090008	3070669	1035795	3164530	577963	2244821	11544987	1157878	5274000	1833059	548852	4697016	1613377	15903301	5501351	3294047	2924591	65910198	994583	152911	3072181	219570	153805199
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13	15322	12533	59736	62316	2889	788825	1905208	0	9367	660293	82	250	12534417	408057	165232	7471402	1801382	69071	101850923	376964	642681	28122	55493	51355	93745	502461	129707829
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2000

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2005

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24	58381	163	341	0	344363	1075376	124076	1116076	146321	971322	127390	247007	210946	175962	376797	2959469	1232017	244844	1257465	6729546	2985353	4908618	2581392	4791637	3394822	1052524	3264589
25	634724	44297	49607	12670	12288145	441999	3810254	3931310	2050918	390042	597507	1619324	3354184	777822	648225	3821933	3708538	1890202	3821933	5441948	3945993	1333797	7298984	2308895	51004025	123793	14132688
26	379155	177614	2352	152363	61139	1267639	686328	1696835	112517	267129	92884	1089540	396784	176175	91294	3441022	66278	2226549	224673	8109902	419423	2532971	1070788	81184	1044910	226830	25672938
27	14136642	6044725	2446624	39006218	5420089	494982084	89538999	32944836	78332133	238194917	300467055	171294252	107155337	152415550	102823169	1400221107	379407358	277502150	293338999	238849865	22953425	453145935	78482285	78482285	26070399	59353881	608280837
28	74831046	9245041	4074419	8985611	27138073	42873523	12445540	45838150	9066668	35380041	9734835	15553767	15367814	1377992	13142687	11342687	55906520	64202163	3127111	30043156	99454870	11074555	6143804	11074555	60939210	1728296	190088830
29	18632466	3027815	369937	2631065	50819936	1768966	64274680	19903201	60378992	17189794	20165193	39401220	21057950	12117794	181890190	76469134	52934068	30881871	69256019	7057147	11159459	9050897	4273744	6613578	233047	199048100	
30	1520910	1584593	250614	553767	1879726	1760658	7757184	1904205	4357567	1228947	7982737	7522010	11344373	6278814	3821261	14747834	17388208	49354073	17038065	7832850	18756701	5085046	18667459	4721644	4251470	1123407	54693483
31	5313	33877	174662	7952	15708463	2850788	3711468	64002548	3711468	5366735	598173	752010	11344373	6278814	3821261	14747834	17388208	49354073	17038065	7832850	18756701	5085046	18667459	4721644	4251470	1123407	54693483
32	47728977	10383251	11646457	79851463	16674708	624958825	201455238	462083328	112145118	347383130	388934076	21514556	164708397	19394774	138076807	1841340405	532923457	406540083	374986551	120737547	373619339	724821627	26280700	134130669	75900704	66496058	1030158719

Appendix 22
The Leontief inverse matrices for Thailand
1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	1.060321	0.226715	0.018874	0.034436	0.006403	0.486102	0.153329	0.127088	0.032718	0.041386	0.008454	0.216993	0.015908	0.008185	0.010664	0.036304	0.032566	0.010023	0.01305	0.012701	0.11641	0.012964	0.009451	0.002325	0.008096	0.240719	2.946805	
2	0.000318	1.035239	0.000248	0.005599	0.000655	0.086538	0.005828	0.002374	0.002751	0.004513	0.000959	0.0013	0.001526	0.000811	0.00098	0.00121	0.00635	0.000912	0.001323	0.001678	0.02257	0.000995	0.00117	0.000286	0.001365	0.028308	1.215493	
3	0.002771	0.004407	1.067892	0.003028	0.008673	0.00312	0.002315	0.004326	0.007345	0.017105	0.005649	0.005214	0.016654	0.005021	0.007590	0.007986	0.27084	0.003962	0.033096	0.004356	0.015064	0.003806	0.005938	0.006287	0.003502	0.015633	1.533381	
4	0.000246	0.004386	0.000192	1.007217	0.000644	0.577783	0.004102	0.00099	0.002242	0.003212	0.00093	0.001044	0.001403	0.000822	0.000906	0.001112	0.00254	0.000873	0.010709	0.001888	0.034161	0.00094	0.001274	0.00032	0.001344	0.020869	1.192519	
5	0.013551	0.01786	0.01144	0.053828	1.037966	0.207724	0.018753	0.036584	0.048202	0.073276	0.532772	0.035226	0.156794	0.24912	0.134053	0.06882	0.033135	0.19588	0.110755	0.010809	0.019998	0.133083	0.015791	0.01018	0.012762	0.063717	3.115078	
6	0.002985	0.440213	0.002556	0.007995	0.006392	1.113433	0.072738	0.009718	0.029609	0.042656	0.009564	0.011309	0.014667	0.007406	0.009266	0.01088	0.037148	0.008779	0.010958	0.015569	0.17825	0.09614	0.0103	0.002313	0.009083	0.317353	2.448319	
7	0.000545	0.001471	0.000364	0.000771	0.001888	0.002332	1.16137	0.002636	0.004206	0.005352	0.00258	0.002623	0.003882	0.002606	0.002538	0.003247	0.002138	0.002499	0.003028	0.006427	0.146823	0.004157	0.004951	0.001251	0.001746	0.02904	1.400472	
8	0.007764	0.011462	0.004821	0.001314	0.007144	0.019618	0.010918	1.762027	0.035979	0.0369	0.009294	0.12344	0.034347	0.009646	0.012737	0.040879	0.075757	0.013354	0.020353	0.021188	0.026878	0.030479	0.018082	0.003069	0.016765	1.89164	2.557347	
9	0.003484	0.005607	0.000374	0.00268	0.000420	0.006695	0.024793	0.019738	1.468805	0.056609	0.005651	0.18001	0.036321	0.013632	0.013267	0.016376	0.017514	0.008211	0.017234	0.025252	0.012266	0.013566	0.03831	0.003398	0.025918	0.045197	1.904113	
10	0.052831	0.030026	0.007295	0.010659	0.018705	0.037594	0.050494	0.157246	0.164235	1.434773	0.036502	0.245258	0.102093	0.06779	0.064738	0.089943	0.060229	0.058047	0.060594	0.012345	0.027661	0.02583	0.024924	0.006344	0.035254	0.085132	2.965542	
11	0.023512	0.03163	0.01852	0.110329	0.07287	0.036559	0.030885	0.06477	0.081996	0.081038	1.147733	0.057088	0.185438	0.098666	0.072874	0.074977	0.042252	0.397415	0.09327	0.019134	0.05752	0.269836	0.027823	0.011569	0.020541	0.104189	3.177664	
12	0.003752	0.004986	0.0019	0.010632	0.007298	0.006511	0.006908	0.013602	0.02461	0.034932	0.00863	1.074233	0.015945	0.012559	0.017486	0.139295	0.018289	0.016833	0.02016	0.007563	0.007442	0.023815	0.005311	0.002389	0.008572	0.022806	1.516459	
13	0.002712	0.003109	0.01822	0.008588	0.021613	0.015013	0.012137	0.015771	0.030049	0.025085	0.023829	0.00322	0.006527	1.058649	0.004038	0.005432	0.020648	0.008226	0.005263	0.105084	0.009135	0.033395	0.033383	0.012711	0.021622	0.014197	0.075861	3.670562
14	0.009263	0.013109	0.01022	0.003743	0.007815	0.010303	0.004147	0.006749	0.01145	0.010255	0.011273	0.008604	0.007042	0.005239	1.040954	0.023087	0.011616	0.008998	0.057929	0.00501	0.009039	0.006812	0.006413	0.005619	0.005315	0.032868	1.330101	
15	0.006391	0.00821	0.01522	0.003743	0.007815	0.010303	0.004147	0.006749	0.01145	0.010255	0.011273	0.008604	0.007042	0.005239	1.040954	0.023087	0.011616	0.008998	0.057929	0.00501	0.009039	0.006812	0.006413	0.005619	0.005315	0.032868	1.330101	
16	0.018192	0.018912	0.013215	0.020148	0.06476	0.023774	0.036586	0.040714	0.076975	0.050951	0.059621	0.036005	0.02757	0.085225	0.065977	1.537037	0.040158	0.140677	0.118733	0.016406	0.020609	0.162395	0.022406	0.012538	0.032546	0.16053	2.977817	
17	0.005135	0.005095	0.003242	0.008624	0.003775	0.005917	0.004525	0.008941	0.016985	0.014318	0.004854	0.008564	0.013985	0.008473	0.014095	0.024452	1.115553	0.006739	0.078303	0.01432	0.006149	0.006195	0.019927	0.00088	0.01055	0.043715	1.461232	
18	0.004626	0.012911	0.002965	0.007884	0.008568	0.016589	0.022137	0.046559	0.064738	0.057049	0.048268	0.02633	0.054364	0.083198	0.058043	0.042821	0.027183	1.088003	0.033911	0.010288	0.025064	0.026064	0.019097	0.007048	0.014681	0.073542	1.881954	
19	0.003428	0.013027	0.005312	0.002481	0.011582	0.000909	0.007939	0.014098	0.029458	0.025229	0.01224	0.011997	0.021636	0.013571	0.011308	0.013034	0.0101	0.0118	1.008861	0.006345	0.00712	0.011579	0.012226	0.06454	0.011002	0.025793	1.374794	
20	0.02052	0.088556	0.01188	0.043353	0.022884	0.090062	0.05748	0.109947	0.131004	0.116833	0.028965	0.103228	0.097591	0.078445	0.112721	0.160416	0.068826	0.091219	0.118808	1.025569	0.111302	0.071383	0.028935	0.012372	0.03446	0.16664	3.021399	
21	0.003252	0.007448	0.002056	0.004517	0.011896	0.010372	0.013076	0.017178	0.026763	0.034183	0.016644	0.016958	0.024196	0.016804	0.01602	0.0207	0.01339	0.015876	0.018725	0.042507	1.015609	0.015318	0.028593	0.007665	0.010478	0.143588	1.553812	
22	0.016892	0.03553	0.006033	0.01737	0.033207	0.037551	0.025453	0.034174	0.060283	0.035987	0.031119	0.036507	0.098397	0.051346	0.046947	0.064544	0.035726	0.043888	0.112397	0.026586	0.0362	1.067325	0.049405	0.010536	0.017242	0.091541	2.145899	
23	0.016813	0.018283	0.00341	0.010668	0.013443	0.015457	0.014376	0.021066	0.020358	0.027818	0.021915	0.016595	0.029252	0.019642	0.014843	0.016195	0.013894	0.025735	0.021497	0.02142	0.018084	0.025776	1.027661	0.006738	0.006359	0.0335	1.48034	
24	0.000341	0.000451	9.71E-05	0.000227	0.000316	0.000763	0.000374	0.00055	0.000722	0.001883	0.000989	0.000716	0.003058	0.000653	0.000978	0.002245	0.000541	0.003644	0.00118	0.000229	0.000396	0.003303	0.002562	1.000509	0.001611	0.001071	1.029407	
25	0.003134	0.004463	0.002145	0.002579	0.006652	0.005929	0.011319	0.019515	0.014405	0.04305	0.010657	0.01232	0.016458	0.010072	0.01146	0.014874	0.008007	0.01222	0.016359	0.017745	0.041618	0.015768	0.02013	0.01072	1.033637	0.019427	1.357665	
26	0.003528	0.004205	0.006527	0.004169	0.017542	0.005388	0.008115	0.006775	0.023204	0.017866	0.017625	0.008205	0.022421	0.007945	0.014383	0.013713	0.012468	0.012275	0.012227	0.010266	0.006929	0.013964	0.013212	0.001615	0.006021	1.009357	1.273943	
SUM	1.285768	2.087396	1.229837	1.462577	1.394873	2.12633	1.790687	2.548224	2.416518	2.344123	2.021936	2.103464	2.201448	2.576711	2.594896	2.698643	2.060232	2.216152	2.383447	1.35166	1.930617	1.99316	1.429742	1.227568	1.349058	3.061026	51.8761	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	1.162076	0.232033	0.025466	0.051443	0.004078	0.495029	0.079502	0.124531	0.040101	0.080377	0.003964	0.46199	0.009915	0.006259	0.009336	0.028696	0.040071	0.004447	0.011402	0.011137	0.166838	0.018648	0.006397	0.002711	0.013361	0.29913	3.39844
2	0.001259	1.072728	0.000972	0.012292	0.000494	0.149997	0.009688	0.007577	0.00334	0.016693	0.000587	0.003585	0.001399	0.000943	0.001122	0.001771	0.009903	0.000605	0.001504	0.001622	0.035838	0.001336	0.000847	0.000391	0.002574	0.04783	1.386994
3	0.001419	0.004477	1.058037	0.004744	0.001105	0.005109	0.002276	0.002275	0.00396	0.004724	0.000744	0.007167	0.006565	0.001669	0.004237	0.003527	0.118949	0.000525	0.009739	0.001201	0.005953	0.001187	0.000775	0.000542	0.001891	0.010883	1.264182
4	0.00049	0.033775	0.000403	0.026425	0.000319	0.044925	0.003031	0.001083	0.00126	0.006288	0.000358	0.001355	0.000656	0.000452	0.000554	0.00079	0.002555	0.000318	0.000656	0.000943	0.025958	0.000685	0.000467	0.000237	0.002393	0.017117	1.173483
5	0.028001	0.038754	0.029703	0.166938	1.163167	0.044456	0.035936	0.046614	0.07211	0.081771	0.672854	0.050598	0.231836	0.340901	0.171441	0.104106	0.065427	0.274683	0.155442	0.019255	0.048441	0.221445	0.023899	0.020557	0.022794	0.079276	4.210405
6	0.00877	0.424063	0.006739	0.093232	0.003097	1.164863	0.074475	0.017677	0.023544	0.11897	0.00394	0.024402	0.009354	0.006396	0.008219	0.01159	0.048301	0.003997	0.009202	0.010614	0.238668	0.00879	0.005501	0.002483	0.014071	0.361666	2.702723
7	0.000486	0.001057	0.001614	0.00073	0.000656	0.001181	1.087562	0.001247	0.002232	0.002892	0.000929	0.001301	0.001692	0.001014	0.001518	0.001869	0.002315	0.000817	0.002019	0.003695	0.107263	0.005966	0.002804	0.001339	0.000817	0.085447	1.320462
8	0.009839	0.016574	0.012069	0.07747	0.003735	0.026382	0.008672	1.670354	0.034747	0.058494	0.0060121	0.01999	0.006801	0.012032	0.022593	0.085745	0.006763	0.16671	0.021828	0.024076	0.023487	0.012931	0.005721	0.014163	0.122537	2.377294	
9	0.006283	0.00868	0.003203	0.005494	0.005532	0.012415	0.040812	0.018792	1.473155	0.075355	0.005476	0.028043	0.033168	0.010719	0.012299	0.019414	0.02287	0.004316	0.01471	0.009539	0.011424	0.013556	0.031654	0.003955	0.04282	0.046751	1.959495
10	0.097475	0.058353	0.012495	0.022917	0.0138	0.060702	0.047702	0.156889	1.57338	1.49416	0.14734	0.265511	0.054546	0.05024	0.051155	0.081429	0.074385	0.025207	0.040023	0.01019	0.032477	0.026187	0.016084	0.005915	0.037624	0.15747	3.020253
11	0.039359	0.05089	0.041067	0.271133	0.09744	0.059812	0.044327	0.055323	0.089415	0.071538	1.1321	0.060909	0.215347	0.116908	0.084183	0.082228	0.05146	0.139259	0.124032	0.024936	0.06489	0.359181	0.030513	0.021866	0.026062	0.089062	3.443241
12	0.005242	0.079993	0.002985	0.014273	0.00434	0.008465	0.00655	0.005444	0.016387	0.038401	0.003123	1.085223	0.006905	0.004939	0.008333	0.049612	0.019262	0.003815	0.011174	0.007372	0.006302	0.027648	0.002602	0.001588	0.005465	0.033812	1.391155
13	0.002148	0.002972	0.008742	0.00359	0.001967	0.002898	0.025289	0.007268	0.00522	0.010749	0.00157	0.003601	1.108332	0.002633	0.002753	0.021137	0.006186	0.002962	0.209331	0.001888	0.009395	0.003415	0.001787	0.009403	0.002348	0.011505	1.464086
14	0.01126	0.016483	0.023845	0.022166	0.018638	0.019327	0.016133	0.01086	0.031855	0.02547	0.012795	0.015211	0.075685	1.797811	0.778453	0.305454	0.076091	0.013971	0.267417	0.005087	0.011308	0.037901	0.005925	0.014702	0.012334	0.050942	3.677125
15	0.007541	0.01114	0.017902	0.007262	0.003569	0.014384	0.004748	0.004252	0.015916	0.011545	0.002816	0.007413	0.003997	0.003126	1.025291	0.034319	0.011664	0.002795	0.03362	0.00139	0.005456	0.005254	0.001424	0.004743	0.003904	0.026009	1.27148
16	0.023983	0.028983	0.032512	0.058966	0.071066	0.031491	0.029925	0.029298	0.050417	0.057634	0.046995	0.03613	0.054629	0.049575	0.046494	1.434385	0.04541	0.0531	0.091727	0.014074	0.03743	0.163751	0.016786	0.01329	0.025131	0.079402	2.608917
17	0.00389	0.006316	0.006681	0.006022	0.004246	0.005101	0.003282	0.017216	0.011359	0.01206	0.002961	0.006049	0.008478	0.004655	0.011753	0.026615	1.25724	0.002479	0.061108	0.009508	0.004125	0.006271	0.005783	0.003228	0.014443	0.064696	1.536058
18	0.010492	0.035076	0.009292	0.035786	0.027835	0.034667	0.022772	0.064724	0.071782	0.065589	0.09342	0.052438	0.102984	0.105957	0.066867	0.063215	0.047087	1.271535	0.053786	0.023666	0.050186	0.045709	0.031505	0.028012	0.03138	0.077603	2.523313
19	0.00146	0.005665	0.00363	0.001823	0.003618	0.003171	0.00259	0.002822	0.013291	0.006955	0.002882	0.004644	0.00426	0.003127	0.003398	0.0035	0.003205	0.002134	1.002895	0.00254	0.004178	0.002744	0.004534	0.035744	0.00578	0.004881	1.135537
20	0.026648	0.125651	0.016478	0.05522	0.013388	0.091623	0.037086	0.100312	0.083693	1.10076	0.012223	0.102813	0.045389	0.043763	0.077794	0.093053	0.083538	0.016341	0.080383	1.013883	0.09626	0.043399	0.015326	0.008441	0.031621	0.137533	2.555955
21	0.002863	0.006256	0.005669	0.004543	0.004135	0.006627	0.005258	0.008539	0.009016	0.015522	0.007065	0.007576	0.011111	0.00667	0.008632	0.012341	0.015038	0.005768	0.011609	0.029657	1.007809	0.016216	0.012001	0.006854	0.004903	0.071404	1.303163
22	0.017204	0.049834	0.011942	0.03388	0.037927	0.048637	0.04106	0.040609	0.071953	0.072322	0.028007	0.058496	0.08676	0.040846	0.051086	0.071115	0.054146	0.031609	0.149442	0.032374	0.048656	1.069798	0.040713	0.0127	0.019111	0.111352	2.329578
23	0.020561	0.022092	0.016218	0.023693	0.010398	0.030193	0.017053	0.027273	0.03743	0.039573	0.015956	0.035936	0.039714	0.034126	0.037016	0.040239	0.030796	0.009181	0.041119	0.071156	0.028688	0.0289	1.025875	0.011197	0.008738	0.056251	1.769373
24	0.00034	0.000514	0.000254	0.00054	0.00128	0.000719	0.00055	0.000717	0.001463	0.002595	0.001169	0.001349	0.001195	0.000994	0.001819	0.002573	0.000953	0.000932	0.001129	0.000387	0.001762	0.00334	0.0016	1.014782	0.000789	0.000356	1.047301
25	0.006332	0.009139	0.008081	0.015902	0.009739	0.011022	0.021034	0.01297	0.019076	0.047417	0.046501	0.020218	0.026575	0.027128	0.021297	0.02995	0.017393	0.025882	0.029504	0.017135	0.012706	0.026692	0.021406	0.012509	1.042064	0.029735	1.627409
26	0.000433	0.000627	0.012137	0.000639	0.000595	0.000697	0.001271	0.000571	0.011083	0.001649	0.000518	0.000937	0.001309	0.000938	0.00443	0.002267	0.005342	0.000737	0.001812	0.000401	0.000666	0.003235	0.001838	0.000273	0.001021	1.001482	1.566001
SUM	1.495853	2.280122	1.370125	2.016722	1.566163	2.373893	1.688534	2.434338	2.351144	2.484076	2.117084	2.401518	2.161855	2.668	2.495313	2.547787	2.163817	1.904179	2.431455	1.345477	2.073261	2.164742	1.320977	1.243184	1.388103	3.077551	53.54097

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	1.110158	0.189165	0.0200	0.047154	0.00362	0.345875	0.046479	0.06501	0.025988	0.035395	0.002723	0.272931	0.006664	0.004627	0.007463	0.017355	0.030114	0.003195	0.008775	0.0074	0.118392	0.0123	0.004365	0.001449	0.009888	0.109356	2.495847
2	0.000945	1.08571	0.006061	0.017024	0.000574	0.155618	0.011966	0.005917	0.005194	0.011265	0.000523	0.003685	0.001402	0.000986	0.001208	0.001488	0.010231	0.00048	0.001384	0.001306	0.035165	0.001179	0.000835	0.000205	0.002455	0.01731	1.374675
3	0.00053	0.00274	1.032534	0.000706	0.001641	0.002498	0.001225	0.002026	0.001703	0.002837	0.000961	0.005079	0.005314	0.001199	0.001428	0.001416	0.047715	0.000645	0.000846	0.000693	0.003515	0.00087	0.000405	0.000157	0.001033	0.007383	1.134131
4	0.000464	0.053157	0.000534	1.020713	0.000425	0.068894	0.006679	0.001549	0.00287	0.005002	0.00035	0.001721	0.000864	0.000956	0.000735	0.000882	0.003949	0.000333	0.000847	0.00117	0.042773	0.000821	0.000646	0.000168	0.002046	0.007962	1.243526
5	0.0217179	0.031984	0.012392	0.105916	1.078267	0.039518	0.027935	0.044868	0.058539	0.08901	0.598889	0.050716	2.40344	0.150824	0.088902	0.056798	0.0429	0.302811	0.122875	0.016152	0.041023	0.128274	0.015463	0.008298	0.021806	0.069202	3.465544
6	0.040726	0.531053	0.003706	0.135921	0.003259	1.250614	0.093785	0.016428	0.036719	0.053413	0.002987	0.017826	0.008571	0.005237	0.006534	0.007968	0.046105	0.002728	0.0076	0.008695	0.251401	0.007209	0.005239	0.001279	0.013475	0.099664	2.622141
7	0.000369	0.000868	0.001153	0.000456	0.00071	0.000973	1.109515	0.001086	0.001208	0.001876	0.000503	0.001146	0.001103	0.00078	0.001147	0.00132	0.001604	0.000616	0.001459	0.002907	0.105025	0.004308	0.002256	0.000545	0.000816	0.02784	1.271589
8	0.011704	0.010948	0.008752	0.0071	0.00583	0.031307	0.011271	1.686028	0.032392	0.09726	0.0503	0.07635	0.013733	0.010563	0.016733	0.024576	0.095136	0.006899	0.015455	0.014881	0.024996	0.020721	0.013047	0.003022	0.017016	0.107511	2.350063
9	0.006899	0.051283	0.040674	0.007169	0.010711	0.024569	0.045552	0.035551	1.742806	0.095911	0.00751	0.029249	0.045936	0.021938	0.026283	0.029046	0.04481	0.011383	0.020734	0.016919	0.017121	0.023529	0.038803	0.006943	0.066203	0.053994	2.407797
10	0.121015	0.07065	0.019614	0.035452	0.02971	0.076583	0.085445	0.258007	1.801119	1.603311	0.034298	0.464455	0.087188	0.094813	0.100024	0.12466	0.151349	0.029575	0.063483	0.018358	0.045007	0.045836	0.025982	0.005962	0.064558	0.24263	4.077966
11	0.031476	0.042441	0.014101	0.195179	0.100997	0.053321	0.031215	0.043113	0.046216	0.07261	1.145946	0.051486	0.1035	0.103853	0.070429	0.052745	0.038674	0.157154	0.067121	0.019633	0.046839	0.229819	0.019152	0.00747	0.022825	0.0	
12	0.006538	0.014872	0.004245	0.039009	0.007846	0.020405	0.016882	0.020894	0.020031	0.039573	0.005314	1.112647	0.011278	0.00802	0.016823	0.055139	0.044753	0.007133	0.020057	0.027976	0.011759	0.035008	0.004893	0.001284	0.008747	0.164007	1.709965
13	0.002397	0.003888	0.009876	0.0027	0.003297	0.005221	0.021827	0.003503	0.004622	0.013148	0.002093	0.004949	1.113497	0.016655	0.012061	0.024459	0.010864	0.002744	0.139418	0.001854	0.007008	0.004511	0.001761	0.002213	0.002607	0.022651	1.489721
14	0.18852	0.030886	0.048477	0.017256	0.038645	0.044219	0.045909	0.025745	0.040477	0.033742	0.023325	0.024731	0.19213	0.274903	1.093219	0.363527	0.214671	0.021339	0.355659	0.010104	0.022647	0.058272	0.011345	0.005915	0.02162	0.185385	3.320040
15	0.011359	0.017961	0.031381	0.005339	0.009256	0.028774	0.027497	0.007616	0.0164	0.011661	0.005807	0.008794	0.007957	0.017462	1.041546	0.040014	0.015471	0.004833	0.043113	0.002084	0.011538	0.008333	0.002243	0.001532	0.005963	0.038102	1.416986
16	0.034261	0.051982	0.066395	0.063702	0.162372	0.063514	0.056393	0.062845	0.088664	0.083317	0.096107	0.058299	0.11538	0.105213	0.090009	2.018806	0.07049	0.084872	0.040781	0.06363	0.014046	0.005994	0.011804	0.020305	0.089564	0.002116	0.020305
17	0.005223	0.008848	0.009622	0.003975	0.006879	0.007831	0.005372	0.043316	0.013435	0.016332	0.004334	0.011363	0.00907	0.007566	0.015872	0.021316	1.358979	0.004781	0.098487	0.182903	0.028243	0.043015	0.286641	0.039578	0.011134	0.048246	2.74049
18	0.012174	0.035997	0.009929	0.016011	0.031614	0.040723	0.026646	0.085115	0.067853	0.103191	0.026504	0.071894	0.109108	0.17208	0.105672	0.067178	0.055683	1.186999	0.055945	0.025739	0.074692	0.031523	0.021194	0.018936	0.037444	0.066509	2.556953
19	0.001037	0.004785	0.002557	0.001262	0.005265	0.002864	0.001491	0.002117	0.008486	0.003873	0.003151	0.002647	0.005566	0.002776	0.003228	0.002646	0.002891	0.004438	1.003619	0.002193	0.004175	0.002277	0.003372	0.000961	0.00554	0.008028	1.097440
20	0.035911	0.161401	0.020907	0.05072	0.026082	0.132765	0.053245	0.133615	0.148946	0.148951	0.02294	0.142993	0.060866	0.057871	0.095517	0.132275	0.145083	0.022624	0.103487	1.019354	0.122082	0.05355	0.022164	0.008576	0.052003	0.197231	3.179161
21	0.002078	0.005221	0.010173	0.002095	0.004317	0.005629	0.003958	0.006586	0.007545	0.009566	0.003116	0.006612	0.006951	0.004619	0.007726	0.008867	0.01179	0.0039	0.00952	0.021446	1.005559	0.01039	0.009007	0.002615	0.005046	0.020094	1.195355
22	0.016044	0.040483	0.01226	0.02353	0.062699	0.043104	0.036561	0.085318	0.058206	0.061186	0.03911	0.047145	0.073326	0.037278	0.04559	0.09599	0.046793	0.034444	0.101275	0.040206	0.040483	1.117016	0.048156	0.009631	0.024017	0.099019	2.255799
23	0.047627	0.073772	0.024084	0.059156	0.039759	0.081456	0.047756	0.091666	0.099893	0.118906	0.031875	0.104916	0.093981	0.091773	0.105392	0.093055	0.055214	0.063123	0.080162	0.138957	0.070793	0.07037	0.112131	0.052568	0.250028	0.367050	4.117403
24	0.001131	0.002644	0.000759	0.005173	0.003051	0.002913	0.002407	0.004848	0.004011	0.006208	0.002293	0.004578	0.004065	0.002884	0.004552	0.006504	0.00517	0.001765	0.003936	0.009438	0.005527	0.007326	0.007961	0.013723	0.002086	0.016054	1.174032
25	0.005379	0.00971	0.006197	0.015939	0.077492	0.01353	0.02208	0.022936	0.01625	0.029157	0.045634	0.018813	0.03429	0.019142	0.021234	0.022296	0.019205	0.028055	0.027413	0.02161	0.014036	0.026547	0.027256	0.01019	1.043245	0.037969	1.618799
26	0.001044	0.002312	0.001174	0.001402	0.001599	0.002677	0.006919	0.004446	0.003696	0.00539	0.001138	0.003065	0.002561	0.003184	0.003121	0.003589	0.003495	0.001937	0.003548	0.006524	0.002039	0.010209	0.006651	0.001107	0.001825	1.004561	1.089566
SUM	1.501991	2.498166	1.376193	1.886511	1.715917	2.546146	1.846003	2.713193	2.731377	2.715643	2.11222	2.598122	2.352308	3.311805	2.982497	3.237516	2.609809	1.988804	2.558697	1.45353	2.172903	2.208646	1.446811	1.274652	1.526425	3.27699	58.64282

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	1.13835	0.229062	0.024172	0.075315	0.004654	0.426683	0.065236	0.081173	0.035054	0.0442	0.00378	0.269304	0.012933	0.00584	0.010949	0.028216	0.039158	0.003469	0.014191	0.012758	0.201535	0.018512	0.008665	0.003394	0.018482	0.151391	2.92642
2	0.002753	1.118157	0.000863	0.027837	0.000789	0.182806	0.015407	0.010122	0.007086	0.017168	0.00068	0.007507	0.003588	0.004429	0.00195	0.002781	0.013914	0.000567	0.002546	0.002035	0.046914	0.002013	0.001457	0.000281	0.004086	0.022633	1.497465
3	0.001479	0.0026	1.032487	0.000952	0.001198	0.002781	0.001601	0.002809	0.008576	0.006715	0.000877	0.004193	0.005787	0.001054	0.001504	0.001888	0.033327	0.000506	0.006653	0.000675	0.005266	0.001004	0.000818	0.000148	0.001752	0.005106	1.131755
4	0.001602	0.063799	0.000642	1.031754	0.000564	0.104058	0.00879	0.002825	0.004065	0.009857	0.000478	0.004226	0.002135	0.00087	0.00115	0.001642	0.005184	0.000394	0.001519	0.001681	0.059128	0.001335	0.000997	0.0002	0.003099	0.009892	1.321887
5	0.055893	0.050966	0.022663	0.16002	1.114228	0.066929	0.049567	0.077579	0.065145	0.150292	0.756574	0.098686	0.251959	0.183106	0.123282	0.091422	0.077813	0.294871	0.21012	0.027909	0.069968	0.2304	0.028143	0.013521	0.041778	0.102661	4.415493
6	0.008056	0.578575	0.003628	0.201449	0.003226	1.348288	0.105322	0.018037	0.035414	0.047138	0.002756	0.020973	0.013856	0.00467	0.006208	0.008954	0.042853	0.002319	0.00933	0.011497	0.30936	0.009434	0.006937	0.001304	0.017616	0.100279	2.917481
7	0.00045	0.000514	0.000794	0.000575	0.0005	0.000797	1.130923	0.000778	0.000693	0.000923	0.000421	0.000648	0.00069	0.000493	0.000557	0.00083	0.001098	0.00048	0.001138	0.003353	0.112119	0.005008	0.003414	0.000537	0.001014	0.029285	1.297939
8	0.019426	0.013366	0.013953	0.016205	0.005496	0.016004	0.01492	1.84015	0.030339	0.096821	0.004636	0.102408	0.026436	0.009506	0.014695	0.030431	0.112766	0.004859	0.020694	0.018209	0.036893	0.02373	0.021376	0.002968	0.021121	0.11392	2.504028
9	0.013963	0.020757	0.006017	0.012485	0.013347	0.032718	0.068475	0.051565	1.95003	0.06556	0.011131	0.041865	0.056321	0.017544	0.025952	0.037106	0.049252	0.011492	0.028606	0.021992	0.025053	0.028446	0.071577	0.006331	0.100566	0.078061	2.847213
10	0.280886	0.165484	0.039523	0.096449	0.04383	0.171348	0.193636	0.367131	0.38708	1.897195	0.039776	0.775582	0.278857	0.126977	0.171496	0.237589	0.276797	0.032299	0.165694	0.038504	0.120007	0.09122	0.051403	0.009895	0.18244	0.415788	6.556886
11	0.070307	0.06065	0.025233	0.245284	0.141344	0.080675	0.04831	0.071527	0.060054	0.135661	1.216107	0.096082	0.137874	0.099251	0.085863	0.077909	0.063027	0.144351	0.118236	0.032236	0.076155	0.349395	0.033509	0.011162	0.043344	0.094537	3.618084
12	0.016849	0.022068	0.007196	0.039053	0.009587	0.032249	0.021951	0.032871	0.031215	0.035541	0.007476	1.163121	0.018017	0.009954	0.028274	0.097107	0.073259	0.007398	0.033318	0.024658	0.00926	0.051469	0.009942	0.002618	0.015561	0.225734	2.036415
13	0.002773	0.003172	0.011614	0.003332	0.002087	0.004434	0.023712	0.003356	0.002818	0.007261	0.001587	0.003986	1.118979	0.007216	0.007648	0.024558	0.017672	0.001645	0.264136	0.002152	0.008799	0.005429	0.002212	0.001868	0.002551	0.035365	1.570365
14	0.028174	0.033222	0.050208	0.026684	0.028622	0.052695	0.099464	0.031798	0.031549	0.030595	0.021993	0.032201	0.076071	1.822673	0.929178	0.338339	0.26653	0.018645	0.292403	0.012258	0.035334	0.070533	0.015377	0.005092	0.027143	0.158579	4.535163
15	0.022102	0.027137	0.042471	0.012146	0.011201	0.046053	0.100658	0.014796	0.022369	0.018465	0.009155	0.021866	0.013473	0.011823	1.051599	0.057418	0.028267	0.007027	0.052218	0.004121	0.027366	0.017668	0.004805	0.002119	0.010395	0.057587	1.694303
16	0.065957	0.064134	0.080105	0.130395	0.156876	0.084956	0.06982	0.078212	0.06849	0.093526	0.115945	0.080918	0.123975	0.102106	0.090518	2.637395	0.091223	0.103401	0.310466	0.05119	0.082737	0.480644	0.071466	0.018326	0.105639	0.447481	5.8059
17	0.008095	0.008259	0.018478	0.005977	0.008569	0.008615	0.007345	0.059164	0.01047	0.016635	0.006669	0.018184	0.013333	0.007556	0.028077	0.02858	1.437846	0.005437	0.059057	0.014269	0.007961	0.013755	0.013427	0.002273	0.027997	0.088354	1.916382
18	0.029035	0.041023	0.013653	0.029333	0.028492	0.051296	0.042873	0.1424	0.075381	0.145895	0.041078	0.123003	0.161898	0.158405	0.111752	0.102206	0.080029	1.26773	0.083586	0.037767	0.105451	0.054272	0.030227	0.035269	0.055727	0.091795	3.139777
19	0.000411	0.001742	0.000565	0.001212	0.00095	0.001039	0.000464	0.000855	0.000864	0.001125	0.000723	0.000975	0.001207	0.001811	0.001221	0.001053	0.000854	0.000989	1.001195	0.000651	0.001092	0.00093	0.001987	0.003063	0.000814	0.001759	1.029551
20	1.45E-07	1.37E-07	8.04E-08	1.23E-07	3.75E-07	1.82E-07	1.54E-07	2.37E-07	1.82E-07	3.26E-07	2.06E-07	2.4E-07	2.83E-07	2.06E-07	2.6E-07	3.8E-07	3.36E-07	1.89E-07	8.94E-07	1.000	2.84E-07	1.14E-05	5.5E-07	6.16E-08	3.05E-07	8.74E-07	1.000019
21	0.00192	0.001379	0.006304	0.001189	0.002558	0.002216	0.001779	0.003031	0.002313	0.003236	0.002144	0.002617	0.003329	0.002203	0.002594	0.004332	0.006874	0.002336	0.005822	0.018694	1.002467	0.007485	0.001783	0.001519	0.004935	0.010304	1.110663
22	0.014687	0.013899	0.008156	0.012499	0.038658	0.018424	0.015601	0.024094	0.018515	0.033093	0.0308	0.024374	0.028704	0.0209	0.026563	0.038527	0.034097	0.019166	0.090677	0.046098	0.028813	1.157408	0.055826	0.006255	0.03091	0.088731	1.924674
23	0.023969	0.023846	0.010991	0.018484	0.011447	0.025883	0.01813	0.036131	0.023835	0.037283	0.010799	0.031138	0.034026	0.0027469	0.02879	0.028855	0.030032	0.038387	0.029203	0.039197	0.023519	0.032242	1.055157	0.044118	0.010784	0.074299	1.772363
24	0.002651	0.002345	0.000613	0.001594	0.002282	0.004138	0.002198	0.005163	0.002453	0.00637	0.002046	0.004428	0.003094	0.003375	0.003667	0.005254	0.004165	0.001543	0.030321	0.005756	0.004104	0.005521	0.008747	1.002657	0.00232	0.011731	1.01051
25	0.009745	0.010366	0.006824	0.018468	0.087679	0.015458	0.022086	0.027366	0.017546	0.023921	0.064099	0.023807	0.036552	0.02363	0.021733	0.024571	0.020949	0.029354	0.033208	0.010277	0.01731	0.041088	0.0031247	0.01372	1.050724	0.034665	1.721795
26	0.003853	0.006232	0.001332	0.012013	0.001706	0.008616	0.009783	0.008878	0.006478	0.005152	0.001596	0.004248	0.004291	0.003908	0.003668	0.004821	0.004371	0.002673	0.003943	0.012287	0.004479	0.010311	0.012275	0.003276	0.00504	1.033128	1.178359
SUM	1.823385	2.562755	1.427586	2.180702	1.719294	2.789162	2.138052	2.991911	2.902493	2.935026	2.353326	2.565343	2.473385	2.65377	2.770688	3.911531	2.811358	2.001337	2.840982	1.450225	2.432757	2.709261	1.548176	1.191914	1.785648	3.483062	62.79813

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	1.0727003	0.1587123	0.0281989	0.0573024	0.0030127	0.3307344	0.0488999	0.0547754	0.0195654	0.0265021	0.0027915	0.2326607	0.0085651	0.005245	0.0073908	0.010664	0.024902	0.0032788	0.010664	0.0077891	0.1267354	0.0090966	0.0048744	0.0015568	0.0303809	0.0751379	2.3508	
2	0.001082	1.1053825	0.0005974	0.0190624	0.0004465	0.1350111	0.0109658	0.040456	0.0028607	0.0074953	0.0004637	0.0030131	0.001738	0.0008632	0.0009664	0.0011733	0.0072245	0.0004555	0.0013077	0.0010408	0.0301291	0.0009393	0.0007016	0.0001721	0.002472	0.0153363	1.3561732	
3	0.001233	0.001133	1.0163881	0.0007178	0.000952	0.0016099	0.0011227	0.0029580	0.0209684	0.0056918	0.0007649	0.003177	0.0053868	0.0014174	0.0015325	0.0017607	0.0404306	0.0008202	0.005904	0.0006688	0.0029111	0.000834	0.0012122	0.0002198	0.0021373	0.0054937	1.1474145	
4	0.001539	0.0516162	0.0008136	1.0455077	0.0004985	0.0072897	0.0065204	0.0020762	0.0023933	0.0114168	0.0005064	0.0034245	0.0019873	0.0011098	0.001237	0.0014374	0.0033758	0.0004801	0.0014807	0.0011783	0.0455615	0.0010078	0.0007668	0.0001909	0.0025075	0.00073	1.2712506	
5	0.0594007	0.0610939	0.0326513	0.1670301	1.14612	0.0823621	0.0611465	0.0917032	0.0801382	0.1439507	0.3783512	0.1110929	0.2739102	0.2499941	0.1686136	0.1164449	0.1021309	0.3756001	0.2014333	0.0357364	0.088118	0.2540345	0.0425356	0.024334	0.0585814	0.1323644	4.986568	
6	0.0055766	0.4941464	0.0043167	0.191817	0.002973	1.3316929	0.1194042	0.0107835	0.0212557	0.034732	0.0031813	0.0147667	0.0118347	0.0051073	0.0055406	0.0068857	0.0358493	0.0031835	0.0083824	0.0082514	0.2494063	0.0077762	0.0051169	0.0017326	0.0168232	0.122517	2.707568	
7	0.0006162	0.0007974	0.0012768	0.000629	0.0005195	0.0010308	1.0902995	0.0011834	0.0014837	0.0021715	0.0004659	0.0011755	0.0010924	0.0009167	0.000959	0.0012607	0.0014824	0.000818	0.0017817	0.0024681	0.0862144	0.0051765	0.0022295	0.0003653	0.0010004	0.0409225	1.24761	
8	0.0095365	0.0073909	0.0074322	0.0140452	0.003113	0.0095795	0.0071319	1.6778838	0.0139697	0.0413252	0.0028498	0.0050599	0.0147424	0.008266	0.009324	0.0161616	0.0790294	0.0088548	0.0161996	0.0131363	0.0131542	0.045542	0.0609436	0.0060442	0.0648449	0.0556834	2.0452007	
9	0.0074432	0.0103944	0.0046092	0.007223	0.0085501	0.0164533	0.0238403	0.0224338	1.5407551	0.0245221	0.0071678	0.0177314	0.0237389	0.0167082	0.0168821	0.0195099	0.0238135	0.0088548	0.0276974	0.1156207	0.0219906	0.0691061	0.0453623	0.0281353	0.0073614	0.108758	0.1884131	4.692471
10	0.1955385	0.0975728	0.0283873	0.06618	0.0299931	0.0460665	0.1219421	0.2110081	0.2502091	1.628812	0.0344769	0.5739425	0.1973655	0.1106011	0.1290747	0.1418882	0.1605148	0.02716974	0.1156207	0.0219906	0.0691061	0.0453623	0.0281353	0.0073614	0.108758	0.1884131	3.940439	
11	0.0699914	0.0677559	0.0345554	0.2303569	0.1613715	0.0890611	0.0594002	0.0759164	0.0748277	0.1192613	1.2145961	0.036171	0.1502968	0.1583698	0.1236722	0.0965681	0.080755	0.166349	0.1416943	0.0377729	0.083144	0.3490039	0.0473553	0.0178027	0.0611182	0.1222818	1.727678	
12	0.0151847	0.0173268	0.0084824	0.0310079	0.0063061	0.0271121	0.0229046	0.0360735	0.0327407	0.0296365	0.0055529	1.082036	0.0150183	0.0112662	0.0238608	0.000466	0.0509796	0.0063555	0.02752	0.036613	0.0515684	0.0240598	0.0066655	0.0019494	0.0115063	0.0469664	1.655569	
13	0.0022747	0.0023407	0.0041188	0.0029576	0.0016135	0.0031378	0.0286555	0.0029606	0.0030756	0.0070203	0.0013301	0.003842	1.1115586	0.0047955	0.006336	0.0201133	0.0152441	0.0019422	0.232557	0.0016394	0.0070312	0.0035441	0.0018813	0.0020046	0.0022803	0.0418175	1.516162	
14	0.0451506	0.0421625	0.0935088	0.0376363	0.0384842	0.0687136	0.1148835	0.0461096	0.0507092	0.0451	0.0308524	0.0508762	0.0908551	2.2032325	1.228143	0.5149364	0.3856631	0.0360384	0.047228	0.0165775	0.0436328	0.0797033	0.0224151	0.0088598	0.041131	0.2599746	6.0025655	
15	0.0242466	0.0218308	0.0593334	0.0104428	0.0093205	0.0384208	0.085119	0.0121067	0.0203437	0.0172286	0.007854	0.021316	0.0271611	0.0153871	1.0551939	0.0545054	0.0276875	0.0083383	0.0644714	0.0034977	0.0204796	0.0128348	0.004496	0.0022891	0.0096336	0.0705362	1.6888745	
16	0.0535998	0.0593592	0.0998938	0.106697	0.1184066	0.0808136	0.0630948	0.0757606	0.087713	0.0888725	0.0926083	0.0844884	0.1153001	0.083126	0.0925631	2.1055516	0.09333	0.1111091	0.2615417	0.039802	0.052793	0.287544	0.0639993	0.0196117	0.094877	0.2829493	4.7817525	
17	0.007247	0.0071727	0.0064639	0.0055398	0.0080298	0.0079085	0.0062121	0.0563965	0.0111838	0.0149189	0.006421	0.0143078	0.0135034	0.0107241	0.0181043	0.0250797	1.3208919	0.0064573	0.007266	0.019365	0.007727	0.0102395	0.0089345	0.0027907	0.0285297	0.089723	1.7538711	
18	0.0278668	0.0485709	0.020129	0.0238317	0.0289111	0.0736234	0.0471032	0.1562909	0.0845772	0.141364	0.0289237	0.1238403	0.1571022	0.2807078	0.143347	0.1087052	0.0919589	1.2386761	0.0998699	0.0404277	0.1288918	0.0536586	0.039212	0.0533386	0.0591427	0.0977727	3.3132173	
19	0.000531	0.0017631	0.0009541	0.0015676	0.0008833	0.0011612	0.0007597	0.0014178	0.001891	0.0017882	0.0007492	0.0016873	0.0020509	0.0018003	0.0014459	0.0019548	0.0014298	0.0015241	1.001757	0.0006871	0.0021402	0.0010666	0.0022566	0.0045789	0.0016627	0.0021964	1.042153	
20	0.0165714	0.1219411	0.0377666	0.0688482	0.0326277	0.1313057	0.0759336	0.1325192	0.0850691	0.1270222	0.292331	0.152578	0.076296	0.0761199	0.0921712	0.1538211	0.1580887	0.0345079	0.1333995	1.0217031	0.1186456	0.0788008	0.0410534	0.0090425	0.0597921	0.1769133	3.413615	
21	0.0033984	0.00395	0.0129568	0.0029521	0.0031247	0.0051695	0.0035613	0.0059115	0.010131	0.0064267	0.0027226	0.006815	0.0054942	0.0054047	0.0054359	0.0070812	0.0105302	0.00386	0.010276	0.0187443	1.0050702	0.0944276	0.0093176	0.0020429	0.0069694	0.011685	1.1781788	
22	0.04675	0.058206	0.028794	0.0462584	0.0488164	0.0781206	0.0557862	0.0664273	0.0955269	0.0798203	0.0417108	0.082628	0.0961515	0.0734012	0.0725911	0.0851587	0.0845178	0.0423063	0.1881498	0.0647895	0.0814293	0.0950702	0.0094276	0.0093176	0.0055838	0.0657207	2.123629	
23	0.0402428	0.0418363	0.0172082	0.0026608	0.0039594	0.0033739	0.0075902	0.0058557	0.0075542	0.03432	0.0061671	0.0051379	0.0051354	0.0069254	0.0067997	0.0070363	0.0032845	0.0085483	0.0073387	0.010004	0.0111833	0.0125545	0.0069303	0.0218226	1.173266			
24	0.0037478	0.0034398	0.0014277	0.0026608	0.0039594	0.0033739	0.0075902	0.0058557	0.0075542	0.03432	0.0061671	0.0051379	0.0051354	0.0069254	0.0067997	0.0070363	0.0032845	0.0085483	0.0073387	0.010004	0.0111833	0.0125545	0.0069303	0.0218226	1.173266			
25	0.0127903	0.0152767	0.0109882	0.021778	0.0942033	0.024724	0.0349613	0.0320318	0.0464289	0.038338	0.0709177	0.0318749	0.0550048	0.067965	0.0316866	0.031354	0.0296007	0.0405059	0.0449397	0.0127201	0.0290977	0.0511128	0.041335	0.0236313	1.0843489	0.050315	1.9972805	
26	0.0024199	0.0050086	0.001227	0.0040752	0.0015473	0.0056523	0.0057119	0.0089542	0.0045451	0.0040455	0.0015418	0.0004332	0.0054617	0.0047343	0.0042574	0.0070361	0.0050272	0.0079128	0.0408436	0.0078453	0.0046211	0.0065849	0.0057523	0.0014146	0.0031229	1.0085171	1.256935	
SUM	1.7820362	2.5031949	1.5824795	2.2263927	1.7693889	2.7146963	2.1150007	2.8447951	2.7412767	2.6956711	2.4399083	2.8599537	2.5323238	3.3723779	3.3007405	3.6482903	2.9095171	2.8183339	3.0292175	1.4605374	2.405904	2.6122948	1.6650826	1.2776785	1.8387708	3.3214143	61.935557	

Appendix 23
The Direct Field of Influence for Thailand 1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	3.79510187	3.80438293	6.10835938	4.97917033	4.36503829	5.10632351	5.598502	6.06884075	4.46863805	4.68647554	4.31854688	6.04881705	4.73518232	5.73737442	4.82748125	4.39475802	3.74493408	5.71469366	4.97459395	5.40414222	4.31848203	4.49465032	3.59435553	3.73235671	3.05723491	4.15135336	123.940038
2	2.62358723	2.63003331	4.22316102	4.44214415	3.01758028	3.53040626	3.87029357	4.19544287	3.10180435	3.27247702	2.98544935	4.82192612	3.27247739	3.71466089	3.33728015	3.0312217	2.58806538	3.95078583	3.43988449	3.79014943	2.98536996	3.10719121	2.49480924	2.59883312	1.49611087	2.86999494	85.6870576
3	3.98188258	3.98687854	3.19658552	2.5940708	2.7897824	2.66535055	2.92371363	3.1675291	3.24524421	2.43632189	2.52533572	3.24269	2.38921802	2.88621629	2.52084941	2.28934078	1.95794633	2.98310565	2.59791167	2.86305125	2.2544884	2.34879792	1.87692675	1.940458	2.641319	2.21678202	64.7106571
4	4.12279804	4.2380013	1.9767734	1.6180745	1.41218464	1.65200683	1.8193833	1.96285736	1.64519538	1.51041153	1.39714338	1.95724797	1.53193714	1.73843804	1.56719592	1.41855406	1.21515917	1.84891489	1.68939325	1.77752374	1.39710705	1.45441739	1.16285306	1.20779125	1.63612616	1.34111558	40.1005398
5	1.23512295	1.23453569	1.98237127	1.6157834	1.41647033	1.65702	1.81673365	1.98936024	1.45600127	1.5448926	1.4013837	1.96318698	1.5365837	1.74967896	1.568347	1.42286945	1.21524432	1.85451709	1.61427504	1.78288886	1.40134643	1.45852989	1.16638802	1.21145497	1.64018957	1.34718172	40.2219002
6	1.71062719	1.714811	2.75357941	2.44434191	1.96752405	2.30165571	2.52393028	2.73550666	2.02424404	2.10437495	1.94658842	2.7269318	2.1343657	2.42202788	2.17598683	1.97641284	1.68801466	2.5759857	2.2428155	2.47646396	1.94651665	2.02594637	1.62014177	1.68275112	2.27952921	1.87128172	55.8895528
7	1.90272814	1.90677987	3.06383585	2.49559046	2.18778375	2.55932041	2.8060326	3.0473999	2.24884055	2.33995455	2.16480196	3.03220511	2.7330269	2.69316795	2.41956297	2.19766739	1.87688374	2.86438099	2.4932946	2.733698	2.164424	2.25274608	1.80151265	1.87113907	2.5347169	2.0807737	62.1240118
8	1.3378197	1.32679923	1.9660598	1.61872086	1.4196745	1.6605847	1.82064667	1.97297109	1.45867087	1.51777037	1.40395316	1.96678652	1.53940105	1.74687683	1.55940697	1.40547831	1.2714725	1.85791738	1.61724985	1.78633778	1.40395382	1.46120413	1.16851595	1.2136762	1.64409954	1.34665732	40.2956477
9	1.75683742	1.76102249	2.8056697	2.3030599	2.01942046	2.36117027	2.59126162	2.8070035	2.07378336	2.15346109	1.99951547	2.7994322	2.18971841	2.48701938	2.23180946	2.02570432	1.73322072	2.63943335	2.3001351	2.58714627	1.95276886	2.07972136	1.66452446	1.77061562	2.33955897	1.92378487	57.3421396
10	1.69742567	1.70157679	2.73232842	2.227021	1.9523397	2.2839248	2.50402791	2.71439514	2.0682572	2.08813425	1.9315456	2.70588466	2.11789354	2.40333567	2.1591754	1.9611597	1.6749875	2.55610533	2.22497655	2.45735163	1.93140424	2.01031095	1.60763818	1.66976434	2.26193674	1.85884589	58.4383745
11	2.24584471	2.25135576	3.61514235	3.007894	2.5247897	3.02788829	3.31306941	3.5943172	2.6552319	2.76279372	2.5561849	3.58013828	2.80271007	3.17984388	2.85679989	2.59479985	2.2616812	3.8198066	2.94386028	3.25313953	2.55558203	2.65986534	1.27206153	2.20926262	2.99440318	2.45826883	73.3499333
12	1.39253059	1.39593607	2.24514908	1.82698891	1.60165644	1.87365502	2.05424928	2.22682992	1.64635556	1.71306929	1.58459742	2.21984958	1.73747315	1.97164358	1.77133988	1.60889217	1.3741226	2.09697244	1.82523169	2.01957708	1.58455528	1.64924177	1.31887091	1.39887884	1.85564802	1.52315142	45.4804409
13	1.73248902	1.73019989	2.80855176	2.28568824	1.99307517	2.32948703	2.55101594	2.77024996	2.04570048	2.1396993	1.97424302	2.75968001	2.15792359	2.46277329	3.26780161	0.87089266	1.70686653	2.57099791	2.26421865	2.59402305	1.9736004	2.04954138	1.63393501	1.70348669	2.3025761	1.89661468	56.4631778
14	1.74354378	1.7490768	2.80656425	2.2875791	2.0538368	2.34944656	2.57206095	2.7814374	2.06135005	2.14480769	1.98401467	2.77940389	2.17543552	2.46863296	2.27838809	2.01444331	1.72045772	2.62555328	2.28542792	2.5241105	1.98397186	2.04649297	1.6531681	1.71513091	2.3233923	1.90729355	56.9446042
15	1.41614593	1.41957778	2.7795265	1.85805613	1.6287716	1.9059462	2.08848028	2.26466691	1.67450261	1.742828189	1.6142059	2.57545169	1.7676675	2.00505301	1.80157148	1.63647406	1.3973957	2.13308825	1.85649388	2.05027501	1.61559226	1.67265293	1.34116744	1.39380108	1.88718427	1.54908332	46.2528887
16	1.62765594	1.63163633	2.62002664	2.13548304	1.87269206	2.19001691	2.40110405	2.60282449	1.92433852	2.00230499	1.85215266	2.59466554	2.03884108	2.30455059	2.07042612	1.88054952	1.60613971	2.45104091	2.13352262	2.35634631	1.85210341	1.92788049	1.54515881	1.60113148	2.18096363	1.78052335	53.1596732
17	1.2858687	1.28901334	2.06984944	1.68710361	1.47891764	1.73041406	1.89649257	2.05626426	1.52025177	1.58184627	1.46322403	2.04881859	1.60439014	1.82062411	1.63566282	1.4855579	1.26887069	1.93635331	1.68550985	1.86154339	1.46318512	1.52289197	1.27185104	1.26491412	1.7133807	1.40663397	41.9988141
18	1.54629097	1.55007565	2.48005911	2.02873755	1.77852069	2.08054204	2.28110063	2.47271771	1.82814345	1.9022147	1.7595663	2.46496477	1.82932534	2.18935881	1.9684901	1.78654488	1.52385326	2.3285163	2.02887252	2.3856419	1.75952189	1.83185209	1.46398626	1.52108654	2.0603548	1.69151865	50.5024019
19	1.85386409	1.85888735	2.94412402	2.43221015	2.13223595	2.49419532	2.71480982	2.96452001	2.1916912	2.28954593	2.10953564	2.9524162	2.31396428	2.62480193	2.33813866	2.14816873	1.4485709	2.76769612	2.4300699	2.68380157	2.10947895	2.19596147	1.7557633	1.82361595	2.47052817	2.0729847	60.5426196
20	1.51166091	1.51535773	2.45330481	1.9823979	1.7386773	2.03394531	2.22988831	2.4173344	1.78720049	1.85961068	1.72015896	2.40975664	1.88611314	1.9287715	1.74653211	1.49167813	2.27638742	1.98147708	2.18842224	1.72011321	1.7903943	1.43169968	1.48703681	2.0349328	1.65363432	49.3727478	
21	3.07387375	3.08339102	4.9798254	4.03291967	3.53549841	4.13590843	4.53455241	4.91550712	3.63416732	3.7814092	4.07784231	4.90098973	3.83535084	4.35220849	3.91005786	3.55147057	3.0323994	4.6288957	4.02921737	4.45026817	3.49774929	3.60407873	2.91177729	3.02378176	4.09614871	3.3625355	100.393535
22	1.93506799	1.93800827	3.11483878	2.53880751	2.22567039	2.60364109	2.85459584	3.09441482	2.28719454	2.38047639	2.20196589	3.08471491	2.41440303	2.73986562	2.46146342	2.232752	1.9948815	2.91396417	2.5947683	2.8013848	2.20190653	2.29175771	1.8327001	1.90354903	2.57661151	2.11808729	63.1988359
23	1.42740407	1.40995908	2.29783043	1.87288409	1.6488213	1.92071197	2.01594186	2.28275687	1.88770387	1.7608286	1.63434967	2.27560222	1.78110889	2.02116152	1.85822718	1.6493958	1.40863377	2.14963802	1.87116455	2.06587595	1.62495147	1.69063489	1.35194942	1.40424319	1.9022476	1.5615377	46.6226631
24	1.71936313	1.73464388	2.81754157	2.29647513	2.03222774	2.35512026	2.58212106	2.79904902	2.06941262	2.15253691	1.99178474	2.79027487	2.47839443	2.68251363	2.02232241	1.727251	2.6383261	2.29446861	2.36738577	2.48545738	2.35625554	2.06898988	1.99173377	2.07300654	1.6577561	1.728389	57.1673318
25	2.1843113	2.18978786	3.51593959	2.86588108	2.5124234	2.93895547	3.22233447	3.489292752	2.5824836	2.68709362	2.48659257	3.4820481	2.79745502	3.09719131	2.78715589	2.55889733	2.1230215	2.9044477	2.86338577	3.16312704	2.48545738	2.35625554	2.06898988	2.1487317	2.91616139	1.94755536	57.1673318
26	1.28748312	1.29663171	2.07244817	1.68917673	1.48083328	1.73231327	1.89928415	2.05884593	1.52216046	1.53838323	1.45610613	2.05239217	1.6040447	1.82249093	1.63771642	1.48752317	1.27046377	1.93878443	1.68762603	1.86388058	1.46502216	1.54803398	1.23938006	1.26650224	1.71566083	1.40480202	42.0095417
SUM	47.1748004	47.2841885	75.9551647	61.9583804	54.19662	63.4688248	69.5879217	75.4341873	55.7678362	58.0378125	53.8847469	75.2822775	58.7714967	66.7890195	61.0693906	53.40507	46.534327	70.9728279	61.8280379	68.3295026	53.6397398	55.8650477	44.6729999	46.4077809	62.8575906	51.630929	1540.57883

Appendix 24
Changes in Linkage Intensities (First Order Effects), Unweighted Thailand
 1985

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	0.092366	0.004207	0.00612	0.017184	-0.00061	0.009944	-0.07222	-0.00183	0.008981	0.038135	-0.00205	0.022268	-0.00197	0.000439	0.001076	0.009144	0.007688	-0.00287	0.001492	-0.00034	0.046344	0.004943	-0.00126	0.00076	0.005516	0.054308
2	0.000449	0.037752	0.000494	0.005335	5.75E-05	0.059815	0.003728	0.004908	0.000914	0.007898	4.12E-05	0.001656	0.000392	0.000277	0.000328	0.00055	0.002862	-2.8E-06	0.000423	0.000227	0.009937	0.000375	-2.8E-05	0.000104	0.000939	0.016784
3	-0.00114	0.000618	-0.00098	0.002062	-0.00701	0.00204	-0.00013	-0.00108	-0.00425	-0.01327	-0.00474	0.002446	-0.01062	-0.00355	-0.0035	-0.00366	-0.13936	-0.00392	-0.02488	-0.00362	-0.00937	-0.00211	-0.00713	-0.00668	-0.00117	-0.00261
4	3.16E-05	-0.01069	0.000236	0.019029	-0.00069	-0.01202	-0.00136	1.16E-05	-0.00162	0.003291	-0.00089	7.54E-05	-0.00152	-0.0008	-0.00077	-0.00091	-0.00015	-0.00101	-0.0013	-0.00124	-0.00759	-0.00922	-0.00133	-0.00016	0.000916	-0.0045
5	0.01118	0.016803	0.014156	0.087683	0.109742	0.019151	0.014563	0.008396	0.002035	0.006949	0.113994	0.025588	0.058501	0.078611	0.033539	0.03105	0.027165	0.078607	0.033518	0.00684	0.022637	0.070657	0.007411	0.00805	0.00792	0.014737
6	0.003513	-0.01461	0.003776	0.021817	-0.00195	0.051048	0.002503	0.008349	-0.00433	0.073869	-0.00341	0.012588	-0.00125	0.00081	0.000161	0.001507	0.010325	-0.00309	0.000642	-0.00347	0.064079	-0.00081	-0.00307	0.000412	0.005245	0.043229
7	0.000204	-0.00014	0.001164	0.000462	-0.00065	-0.00094	-0.07861	-0.00142	-0.00195	-0.0021	-0.0012	-0.00119	-0.0013	-0.00145	-0.0007	-0.00107	0.000815	-0.00149	-0.00059	-0.00238	-0.04201	0.002752	-0.00208	0.000182	-0.0008	0.058392
8	0.00125	0.005753	0.008396	0.005418	-0.00382	0.007382	-0.00261	-0.09765	-0.00232	0.021206	-0.00647	-0.067	-0.01547	-0.00337	-0.00152	-0.02579	0.01015	-0.00855	-0.00296	0.000241	-0.00293	-0.00733	-0.0059	0.002953	-0.00341	-0.07271
9	0.002086	0.003332	0.001851	0.002267	0.000245	0.00515	0.016713	-0.00105	0.003851	0.017893	-0.00068	0.009352	-0.00297	-0.00363	-0.00142	0.002983	0.004774	-0.00427	-0.00238	-0.01546	-0.00073	-0.00063	-0.00666	0.000558	0.016685	-0.00129
10	0.040918	0.028475	0.005387	0.015081	-0.00324	0.022673	0.000498	-0.00031	-0.00621	0.013049	-0.01999	0.01238	-0.04223	-0.01537	-0.0129	-0.00541	0.014106	-0.03205	-0.01507	-0.00057	0.003931	0.002512	-0.00761	0.000176	0.002743	0.068331
11	0.014877	0.022766	0.022011	0.155087	0.023463	0.025657	0.012695	-0.06682	0.007136	-0.01014	0.003253	0.035953	0.028164	0.019209	0.012094	0.012787	0.012854	-0.2213	0.026564	0.008141	0.032487	0.084322	0.006209	0.014312	0.008216	-0.01567
12	0.001539	0.003535	0.002278	0.006281	-0.00231	0.002288	-0.00054	-0.00493	-0.0097	0.003631	-0.00591	0.010397	-0.01074	-0.00914	-0.01027	-0.09471	0.001382	-0.01738	-0.01021	-0.0001	-0.00095	0.004126	-0.00268	-0.00064	-0.00337	0.004457
13	0.000634	0.000957	0.004811	0.001171	-9.4E-05	0.000718	0.005274	-0.00173	-0.00076	-0.01441	-0.00088	-0.00199	0.048373	-0.00054	-0.0002	-0.00134	-0.00032	-0.0019	0.099796	-0.00066	0.001302	-0.00034	-0.00075	0.004623	-0.00219	-0.00385
14	0.001755	0.003656	0.00557	0.013866	-0.00302	0.004359	0.004014	-0.00519	0.002072	-0.00094	-0.01069	-0.00378	0.00918	0.079208	-0.05469	0.051684	-0.00035	-0.01681	-0.02792	-0.04003	-0.00208	0.004111	-0.00716	-0.00731	-0.00174	-0.02359
15	0.001028	0.003097	0.002841	0.004449	-0.00397	0.00394	0.000621	-0.00287	0.004337	0.000305	-0.00823	-0.00137	-0.00268	-0.00163	-0.01576	0.012095	0.000456	-0.00649	-0.02409	-0.00348	-0.00364	-0.00121	-0.00522	-0.00137	-0.0015	-0.00744
16	0.005294	0.011662	0.021714	0.042298	0.006071	0.00851	-0.00721	0.007922	-0.00518	-0.00207	-0.00195	-0.0013	0.000434	-0.04803	-0.03628	-0.02215	-0.10815	0.008097	-0.08551	-0.02514	-0.00277	0.003949	0.001357	-0.00587	0.001891	-0.08938
17	-0.00086	0.001377	0.005092	-0.00208	0.000262	-0.00065	-0.00123	0.007922	-0.00518	-0.00207	-0.00195	-0.0013	0.000434	-0.04803	-0.03628	-0.02215	-0.10815	0.008097	-0.08551	-0.02514	-0.00277	0.003949	0.001357	-0.00587	0.001891	-0.08938
18	0.004282	0.017849	0.00438	0.018097	0.014101	0.013873	-0.00021	0.016147	0.006213	0.007067	0.036009	0.022949	0.039212	0.018418	0.007102	0.019052	0.015847	0.163471	0.013617	0.011079	0.019992	0.013741	0.010842	0.017496	0.014209	0.004848
19	-0.00127	-0.00634	-0.00098	0.001525	-0.00711	-0.00474	-0.00526	-0.01169	-0.01623	-0.01781	-0.00902	-0.00661	-0.01722	-0.00992	-0.00813	-0.0097	-0.00607	-0.01054	-0.00482	-0.00376	-0.00235	-0.00813	-0.00811	-0.02815	-0.005	-0.02028
20	0.006001	0.038028	0.006544	0.016223	-0.00832	0.001139	-0.02068	-0.01005	-0.04844	-0.00728	-0.01577	-9.8E-05	-0.05057	-0.03419	-0.04263	-0.06938	-0.00102	-0.07141	-0.03513	-0.01152	-0.01458	-0.0271	-0.01415	-0.00308	-0.00219	-0.03432
21	7.9E-05	-0.00029	0.004671	0.001874	-0.0077	-0.00324	-0.00853	-0.00945	-0.0189	-0.01937	-0.01009	-0.00923	-0.01443	-0.01008	-0.00834	-0.00966	0.002205	-0.01223	-0.00716	-0.01326	-0.008	0.000818	-0.01757	-0.00067	-0.00566	-0.07254
22	0.00014	0.014352	0.005861	0.016226	0.005117	0.010673	0.016995	0.007353	0.013365	0.012772	-0.00269	0.02149	-0.00859	-0.00864	0.005158	0.010132	0.017967	0.01013	0.039807	0.007127	0.012296	0.003083	-0.0075	0.003647	0.002201	0.019176
23	0.003236	0.012308	0.012408	0.012672	-0.00143	0.014417	0.003883	0.007338	0.020428	0.011919	-0.00353	0.019959	0.014919	0.017156	0.025834	0.029836	0.018095	-0.00887	0.022789	0.051261	0.01161	0.005367	-0.00014	0.005433	0.002884	0.025262
24	-6.4E-06	9.63E-05	0.000152	0.000301	0.00098	-2.3E-06	0.000219	0.000238	0.000817	0.000751	0.000233	0.000751	-0.00157	0.000384	0.000923	0.000488	0.000436	-0.00227	0.000259	0.000293	0.00144	5.33E-05	-0.00086	0.014136	-0.00076	0.002566
25	0.002285	0.003643	0.004859	0.007285	0.056014	0.003723	0.009389	-0.00746	0.003592	0.003846	0.028098	0.006646	0.006495	0.01236	0.007929	0.014104	0.007806	0.009888	0.011327	-0.00094	-0.00325	0.006111	0.000936	0.00144	0.007879	0.008604
26	-0.00226	-0.00226	0.006448	-0.00098	-0.01062	-0.00379	-0.00704	-0.00632	-0.01243	-0.01592	-0.01128	-0.00604	-0.02069	-0.00663	-0.01045	-0.01201	-0.00493	-0.01279	-0.00882	-0.01351	-0.00576	-0.00982	-0.0117	-0.00109	-0.00475	-0.00758

1995

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.039359	-0.02582	0.000965	0.018806	-0.00344	-0.12011	-0.10484	-0.06187	-0.00782	-0.00346	-0.00748	0.050441	-0.01105	-0.00296	-0.00387	-0.01163	-0.00283	-0.00523	-0.00424	-0.00644	0.007891	-0.00131	-0.0056	-0.00043	0.001324	-0.16087	-0.43651
2	0.000355	0.040599	0.000195	0.007715	-1E-04	0.060315	0.004855	0.002953	0.001639	0.005394	-0.0003	0.001422	1.68E-05	0.000187	0.000123	0.000279	0.002866	-0.00031	0.000164	-9.9E-05	0.008461	0.000187	-0.00014	2.62E-05	0.000704	0.000234	0.141726
3	-0.00169	-0.00135	-0.03512	-0.00272	-0.00644	4.76E-05	-0.00074	0.004241	-0.00596	-0.01352	-0.00483	0.001753	-0.01127	-0.00404	-0.0056	-0.00609	-0.19002	-0.00359	-0.02696	-0.00347	-0.01167	-0.00187	-0.0077	-0.00759	-0.00071	-0.00046	-0.34745
4	0.000147	0.006839	0.000243	0.011408	-0.00026	0.025971	0.002014	0.000622	0.000294	0.001441	-0.00058	0.000416	-0.0005	-0.00016	-0.00019	-0.00018	0.00112	-0.0006	-0.00014	-0.00053	0.006741	0.000167	-0.00049	-3.8E-05	0.00057	-0.00074	0.04688
5	0.006696	0.010733	0.001604	0.043398	0.035846	0.014817	0.010111	0.005036	0.009788	0.012065	0.04218	-0.02347	0.119944	-0.07116	-0.03588	-0.01052	0.011067	0.096662	0.010568	0.004452	0.015557	-0.00707	-5.2E-05	-0.00215	0.006886	0.01406	0.322074
6	0.000963	0.079809	-0.00046	0.057308	-0.00467	0.119724	0.019369	0.006087	0.002334	0.007506	-0.00801	0.004198	-0.00796	-0.00211	-0.00445	-0.0035	0.005469	-0.00798	-0.00385	-0.00627	0.070654	-0.00302	-0.0047	-0.00028	0.0032	-0.18916	0.129604
7	-9.3E-06	-0.00029	0.001282	-5.9E-05	-0.0013	-0.00116	-0.0544	-0.00166	-0.00332	-0.00397	-0.00267	-0.00149	-0.0031	-0.00191	-0.00141	-0.00209	6.32E-05	-0.00268	-0.00164	-0.00421	-0.04381	-2.5E-05	-0.00333	-0.00065	-0.00098	-0.00508	-0.13991
8	0.001443	-0.00068	0.003977	-0.00689	-0.0015	-0.00638	-0.00022	-0.08389	-0.00483	0.055966	-0.00547	-0.05714	-0.02105	-9.3E-05	0.002468	-0.02016	0.051114	-0.00805	-0.00334	-0.00659	-0.00171	-0.00982	-0.00524	0.000448	-0.00097	-0.08524	-0.24987
9	0.003181	0.007898	0.002489	0.00332	0.003059	0.014081	0.0176	0.014223	0.231222	0.003641	0.000196	0.01043	0.005684	0.005863	0.010583	0.009332	0.017764	0.001293	0.002444	-0.00632	0.004013	0.007249	0.000951	0.003844	0.033769	0.009822	0.417628
10	0.059177	0.035895	0.010412	0.018013	0.009449	0.038434	0.035421	0.095188	0.018058	0.15108	-0.00291	1.903	-0.00608	0.023345	0.03241	0.043563	0.068137	-0.02267	0.006671	0.006803	0.016817	0.015085	0.002841	0.000697	0.026606	0.130088	1.002827
11	0.007051	0.011701	-0.00365	0.082123	0.02262	0.016324	0.001621	-0.01732	-0.03671	-0.00487	-0.02631	-0.07201	0.005636	0.011303	0.001035	-0.02525	-0.00403	-0.2376	-0.01431	0.00345	0.018138	-0.04913	-0.00896	-0.0016	0.005746	-0.04453	-0.35953
12	0.003459	0.009879	0.005219	0.028717	0.005815	0.013644	0.010908	0.007968	-0.00053	0.007104	-0.00086	0.037608	0.00037	-0.00082	0.002881	-0.0582	0.024098	-0.01046	0.004994	0.006938	0.005421	0.015806	0.001782	-0.00045	0.000195	0.143633	0.266116
13	0.001038	0.001645	0.005826	0.000158	0.001129	0.002782	0.001986	0.000543	-0.00048	-0.01052	-0.00037	0.001219	0.053127	0.009855	0.004683	0.006252	0.004104	-0.00181	0.080612	-0.00043	-0.001	0.000937	-0.00045	-0.00055	-0.00165	0.006926	0.165558
14	0.00726	0.012227	0.02427	0.006387	0.012413	0.020739	0.026132	0.005904	0.008124	0.007799	-0.00183	0.00308	0.08949	0.477429	0.187891	0.077792	0.089473	-0.00997	0.039666	0.001801	0.007784	0.016009	7.4E-05	-0.01274	0.00527	0.079716	1.180141
15	0.004771	0.008666	0.016218	0.000939	0.000898	0.01706	0.024278	0.000871	0.00392	0.001247	-0.00613	-0.0008	0.001066	0.005415	-1E-05	0.01288	0.006382	-0.00494	-0.01507	0.053326	0.009378	0.018688	0.091831	0.013641	0.000367	0.007656	0.077581
16	0.011771	0.023904	0.041823	0.03025	0.073317	0.028248	0.014616	0.018282	0.010614	0.020664	0.021004	0.013109	0.016139	0.028844	0.024869	0.370016	0.02951	-0.043	0.053326	0.009378	0.018688	0.091831	0.013641	0.000367	0.007656	1.025932	0.077581
17	0.000559	0.003682	0.005888	-0.00303	0.002899	0.002418	0.00096	0.030202	-0.00097	0.002037	-0.00054	0.004033	-0.00213	0.000843	0.003129	0.000372	0.202022	-0.00178	-0.01031	0.001614	0.008	0.005257	-0.00944	-0.00487	0.008386	0.041911	0.283947
18	0.004866	0.017414	0.004101	0.007054	0.019127	0.018025	0.002043	0.032945	0.002329	0.037779	-0.02234	0.03293	0.04947	0.063203	0.035705	0.019654	0.01677	0.082524	0.015155	0.014635	0.043875	0.001884	0.002438	0.011777	0.019846	-0.01062	0.518062
19	-0.00121	-0.00639	-0.00215	0.000386	-0.00496	-0.00407	-0.00533	-0.01013	-0.01779	-0.0184	-0.00909	-0.00671	-0.01422	-0.00806	-0.00612	-0.00808	-0.00456	-0.00846	-0.0037	-0.00289	-0.00168	-0.00826	-0.00813	-0.05648	-0.0044	-0.01379	-0.23466
20	0.014121	0.069356	0.010326	0.014262	0.005154	0.039272	-0.00441	0.023873	0.015701	0.030697	-0.00796	0.034976	-0.02908	-0.01145	-0.01291	-0.01765	0.050202	-0.06547	-0.00968	-0.00386	0.010944	-0.01652	-0.00513	-0.0045	0.007542	0.033658	0.181459
21	0.000168	0.000436	0.008716	3.65E-05	-0.00734	-0.00228	-0.00819	-0.00826	-0.01819	-0.02202	-0.01498	-0.00746	-0.01711	-0.00983	-0.00723	-0.01071	0.002406	-0.01529	-0.00812	-0.00221	-0.00901	-0.00498	-0.01857	-0.00299	-0.00457	-0.11888	-0.32446
22	-0.00074	0.003817	0.006533	0.00494	0.027707	0.004502	0.011007	0.004062	-0.00174	0.001364	0.004547	0.008273	-0.02081	-0.00437	0.002961	-0.00095	0.010834	-0.01196	-0.00716	0.013652	0.004649	0.047787	-0.00082	-0.00091	0.006454	0.007116	0.120734
23	0.023489	0.038503	0.015862	0.038666	0.021513	0.0502	0.028811	0.059182	0.067513	0.075038	0.010509	0.06669	0.063461	0.054902	0.079867	0.065961	0.056626	0.042121	0.053191	0.110041	0.043935	0.038156	0.080794	0.140369	0.013495	0.192342	1.531237
24	0.000441	0.001255	0.000405	0.000852	0.002551	0.001374	0.001826	0.003783	0.002858	0.003603	0.001247	0.002931	0.001413	0.002258	0.00347	0.003877	0.003245	-0.0012	0.002808	0.008872	0.004924	0.003729	0.005236	0.002721	0.000243	0.013706	0.078426
25	0.002498	0.004676	0.004019	0.009861	0.067693	0.006294	0.010673	0.004074	0.001376	-0.01268	0.030011	0.007319	0.012543	0.015547	0.012931	0.007782	0.010492	0.007513	0.007367	-0.00593	-0.00163	0.010317	0.002426	-0.00051	0.000934	0.018814	0.242832
26	-0.00162	-0.00054	-0.00483	-0.00133	-0.00972	-0.00134	-0.00039	-0.00086	-0.01662	-0.01096	-0.01133	-0.0036	-0.01756	-0.00447	-0.01066	-0.00817	-0.0072	-0.01086	-0.00725	-0.0072	-0.00361	-0.00342	-0.00632	-3.8E-05	-0.00324	-0.0025	-0.15561
SUM	0.18755	0.357863	0.12231	0.370575	0.271462	0.358921	0.046607	0.13604	0.26081	0.329437	-0.02443	0.298444	0.251932	0.577551	0.31649	0.434383	0.419128	-0.24909	0.161208	0.10481	0.217148	0.149055	0.021127	0.05921	0.157482	0.148752	5.484773

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.07285	0.009746	0.004461	0.046807	-0.00221	-0.04244	-0.08162	-0.03959	0.00167	0.00499	-0.00479	0.045514	-0.00211	-0.00118	-1.3E-05	-0.00132	0.004607	-0.00633	0.002305	0.001302	0.086272	0.005672	0.000987	0.001913	0.009532	-0.0942	0.022841
2	0.000909	0.069912	0.000248	0.012478	6.97E-05	0.076361	0.006502	0.005786	0.002487	0.00941	2.15E-05	0.002753	0.001056	0.000445	0.000447	0.000934	0.005066	3.5E-05	0.000747	0.000512	0.014475	0.000703	0.000397	9.73E-05	0.00132	0.007735	0.220611
3	-5.8E-06	-0.00113	-0.03382	-0.00218	-0.00691	0.00037	0.000254	0.006862	-0.00065	-0.00907	-0.00421	0.00109	-0.00984	-0.00459	-0.00512	-0.00495	-0.19148	-0.00349	-0.02892	-0.00384	-0.00972	-0.00126	-0.00656	-0.00819	0.001282	-0.00361	-0.32879
4	0.000744	0.014686	0.000261	0.019998	0.000237	0.038041	0.003522	0.00169	0.00166	0.005958	8.68E-05	0.001805	0.001298	0.00059	0.000489	0.000985	0.002087	0.000184	0.001392	0.000428	0.020293	0.010766	0.000532	0.000131	0.001288	-0.00156	0.12759
5	0.025793	0.021852	0.00872	0.017101	0.059453	0.03988	0.028505	0.028627	0.017625	0.052638	0.164448	0.009237	0.118542	-0.06333	-0.01292	0.013238	0.034789	0.113958	0.080616	0.012189	0.033024	0.068595	0.010105	0.005158	0.018886	0.035684	0.987016
6	0.004471	0.112138	-0.00056	0.108674	-0.00432	0.190717	0.028897	0.008305	0.00201	0.00315	-0.00697	0.007757	-0.00231	-0.00216	-0.00411	-0.00134	0.00334	-0.00714	-0.00196	-0.00182	0.111895	0.000438	-0.00137	8.77E-05	0.007316	-0.16495	0.390185
7	0.000395	-0.0008	0.000765	0.000155	-0.00149	-0.00129	-0.03109	-0.00189	-0.00358	-0.00452	-0.00255	-0.00153	-0.00317	-0.0025	-0.00226	-0.00228	-0.0051	-0.00273	-0.00178	-0.00385	-0.03577	0.000788	-0.00214	-0.0009	-0.00051	-0.00346	-0.10849
8	0.004874	-0.00051	0.007164	0.001865	-0.00221	-0.00428	0.001314	0.069519	-0.00972	0.042701	-0.00518	-0.03357	-0.01266	-0.00197	-0.00158	-0.11139	0.026521	-0.0087	0.000785	-0.00262	0.000497	-0.00537	0.003264	0.000217	0.000719	-0.0714	-0.00407
9	0.007657	0.008961	0.00263	0.004269	0.002742	0.016053	0.03268	0.022153	0.362444	0.008376	0.001052	0.017739	0.0145	0.002103	0.008329	0.01092	0.018978	0.000691	0.006031	-0.00272	0.007958	0.00716	0.023926	0.001607	0.055213	0.023028	0.665085
10	0.159246	0.092557	0.018281	0.047686	0.012628	0.093492	0.110696	0.15451	0.144973	0.359651	-0.0014	0.377537	0.136085	0.04684	0.078865	0.104787	0.122021	-0.01299	0.063243	0.017759	0.055726	0.033373	0.01699	0.005203	0.02988	0.204501	2.54503
11	0.03521	0.023231	0.005135	0.111562	0.057525	0.035501	0.0159	0.015968	-0.02197	0.047934	0.009602	-0.02641	0.032959	0.014118	0.01748	0.002057	0.014558	-0.22795	0.034773	0.015279	0.043205	0.052554	0.00554	0.006922	0.022321	-0.01441	0.328284
12	0.012723	0.015916	0.006641	0.02548	0.005839	0.022795	0.015371	0.018924	0.011615	0.007006	0.001508	0.085824	0.010125	0.001525	0.014902	-0.01248	0.044948	-0.00536	0.020478	0.017199	0.012563	0.039919	0.006064	0.00144	0.007765	0.195142	0.574876
13	0.003291	0.002855	0.008131	0.001184	0.001439	0.00364	0.005645	0.002494	0.002929	-0.0102	0.000525	0.004723	0.06296	0.005582	0.001522	0.010613	0.011512	-0.00113	0.152824	0.000454	0.001956	0.003144	0.001056	0.003826	0.000568	0.022243	0.303783
14	0.015334	0.014561	0.026708	0.012076	0.044225	0.029247	0.080428	0.009405	0.003398	0.005798	-0.00401	0.009185	0.012471	0.101744	0.088788	0.054068	0.144173	-0.01183	-0.00226	0.002667	0.018431	0.024601	0.002225	-0.01627	0.008357	0.06875	0.702473
15	0.013345	0.01453	0.026666	0.009613	0.002408	0.029723	0.097309	0.006515	0.008115	0.006693	-0.00317	0.009378	0.006403	0.006239	0.009873	0.020769	0.017422	-0.00201	-0.008	-0.00106	0.016091	0.005908	-0.00216	-0.00387	0.002971	0.023465	0.307154
16	0.027495	0.028423	0.04112	0.060797	0.053395	0.03647	0.024381	0.029837	0.012416	0.03472	0.025864	0.028828	0.033026	0.02223	0.023678	0.650107	0.040528	-0.00998	0.121996	0.021022	0.039906	0.177119	0.029918	0.008968	0.044747	0.173873	1.78088
17	0.00226	0.002015	0.0121	-0.00234	0.00287	0.001983	0.002005	0.037326	-0.00331	0.001023	9.26E-05	0.00783	9.71E-05	-0.00061	0.004767	0.004471	0.253467	-0.00155	-0.01436	7.35E-05	0.001144	0.005342	-0.00509	-0.00664	0.013542	0.034978	0.352478
18	0.01863	0.018328	0.005267	0.013547	0.014515	0.02262	0.011385	0.073753	0.008836	0.064093	-0.00996	0.061775	0.085973	0.062369	0.041959	0.039823	0.027417	0.151515	0.029461	0.023414	0.06474	0.017545	0.009414	0.025525	0.030076	0.005481	0.910729
19	0.000288	-0.00842	-0.00388	0.001765	-0.0009	-0.00429	-0.00434	-0.00933	-0.02136	-0.0184	-0.01019	-0.00496	-0.01659	-0.01091	-0.00849	-0.00776	-0.00533	-0.01109	-0.00372	-0.00478	-0.0037	-0.00775	-0.00884	-0.00808	-0.00704	-0.01898	-0.26786
20	-0.00324	-0.06791	-0.00287	-0.0225	-0.01642	-0.06056	-0.037	-0.08706	-0.10327	-0.09095	-0.02963	-0.06964	-0.08249	-0.07667	-0.10273	-0.10189	-0.05156	-0.09067	-0.097	-0.02252	-0.09201	-0.04752	-0.02508	-0.01478	-0.01699	-0.14441	-1.55137
21	0.0023	-0.00493	0.004908	0.00304	-0.00945	-0.00529	-0.00833	-0.01138	-0.02218	-0.02699	-0.01559	-0.00898	-0.01979	-0.01509	-0.01432	-0.01405	-0.00278	-0.01722	-0.01126	-0.02346	-0.0129	-0.00652	-0.02062	-0.00554	-0.0029	-0.12805	-0.39968
22	0.002336	-0.01291	0.00425	0.000152	0.004874	-0.00859	-0.00275	-0.00209	-0.02465	-0.01502	-0.00287	-0.00195	-0.0528	-0.02256	-0.01282	-0.00929	0.007228	-0.0204	-0.00538	0.019338	0.000434	0.087296	0.007484	-0.00406	0.017333	0.006188	-0.04123
23	0.005845	0.005165	0.007013	0.007372	-0.00136	0.009339	0.002856	0.013559	0.008285	0.009086	-0.0101	0.011237	0.006142	0.007382	0.014183	0.010351	0.013568	0.010638	0.008703	0.017146	0.004694	0.005832	0.026752	0.036571	0.003412	0.038688	0.272362
24	0.001701	0.001747	0.000359	0.000848	0.002031	0.003077	0.001655	0.004576	0.001975	0.004184	0.000986	0.003006	0.000588	0.00318	0.003066	0.002898	0.002793	-0.00126	0.002313	0.005558	0.003798	0.001999	0.006143	0.00212	0.000286	0.010683	0.07031
25	0.005719	0.003772	0.003814	0.007753	0.074451	0.006126	0.009844	0.006113	0.003172	-0.01363	0.035915	0.011427	0.015537	0.018346	0.011127	0.007383	0.009232	0.008941	0.00911	-0.00893	-0.00145	0.016625	0.009715	0.002533	0.001584	0.012183	0.280876
26	0.002137	0.002731	-0.00442	0.00898	-0.00939	0.003963	0.003975	0.004078	-0.01188	-0.0092	-0.00928	-0.00061	-0.01406	-0.00387	-0.00964	-0.0049	-0.00564	-0.00903	-0.00444	-0.00156	-0.00157	-0.00154	-0.00047	0.001613	0.000895	0.026825	-0.0463
SUM	0.415603	0.367112	0.149087	0.542042	0.235245	0.522657	0.317996	0.388665	0.371033	0.469432	0.120189	0.549876	0.321949	0.093257	0.145478	0.761739	0.545943	-0.16488	0.355702	0.076986	0.387699	0.486516	0.088181	-0.0172	0.339371	0.244081	8.09476

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.013588	-0.05929	0.009427	0.036596	-0.00477	-0.12658	-0.10476	-0.07327	-0.01621	-0.01539	-0.00741	0.014033	-0.00874	-0.00276	-0.00372	-0.01521	-0.00572	-0.0084	-0.00221	-0.00601	0.014833	-0.00431	-0.00499	-0.00032	0.005403	-0.1847	-0.56089
2	0.000543	0.064998	0.000221	0.009346	-0.00027	0.039295	0.003914	0.002302	1.65E-05	0.002601	-0.00044	0.001175	5.97E-06	4.95E-05	-0.00012	5.01E-05	0.000865	-0.00036	-4.7E-05	-0.0005	0.005075	-9.5E-06	-0.00038	-5.7E-05	0.00074	-0.00632	0.122693
3	-0.00027	-0.00252	-0.03154	-0.00022	-0.00711	-0.00061	-0.00028	0.007576	0.012441	-0.01049	-0.00379	0.000859	-0.01016	-0.00347	-0.00512	-0.00547	-0.19976	-0.0026	-0.03294	-0.004	-0.01177	-0.00164	-0.00697	-0.00826	0.001587	-0.0025	-0.33099
4	0.000717	0.006059	0.000426	0.035804	-2.2E-05	0.012685	0.001902	0.001402	0.000637	0.00751	-0.00017	0.001868	0.000713	0.000506	0.000311	0.000619	0.000715	0.000887	-0.00039	0.010466	0.006213	-6.1E-05	2.54E-05	0.000851	-0.00878	0.08093	
5	0.028001	0.028106	0.014432	0.071744	0.07918	0.038821	0.03354	0.036996	0.027605	0.04968	0.244025	0.015962	0.139318	-0.01448	0.024359	0.034317	0.051594	0.155685	0.062714	0.016332	0.041783	0.086131	0.018207	0.008904	0.027249	0.063863	1.427629
6	0.003589	0.048028	0.000492	0.099391	-0.00455	0.18474	0.029109	0.003316	-0.00897	-0.00715	-0.00674	0.004906	-0.00377	-0.00157	-0.00447	-0.00267	-9.6E-05	-0.00539	-0.00234	-0.00625	0.050533	-0.00223	-0.00464	-0.00045	0.006983	-0.15608	0.228046
7	0.000614	-0.00052	0.001878	0.000227	-0.00153	-0.00105	-0.07575	-0.00187	-0.00314	-0.00508	-0.00264	-0.00129	-0.00312	-0.00194	-0.00177	-0.00226	0.000129	-0.00255	-0.00114	-0.00535	-0.06471	0.000809	-0.00366	-0.00107	-0.0006	0.005797	-0.17159
8	0.00262	-0.00243	0.003983	0.001956	-0.00382	-0.00647	-0.00219	-0.08676	-0.02267	0.002357	-0.00704	-0.07632	-0.02085	-0.00164	-0.00395	-0.02671	0.004948	-0.01109	-0.00373	-0.00918	-0.00448	-0.01817	-0.00117	-0.00032	-0.00456	-0.0853	-0.38298
9	0.006534	0.005435	0.003033	0.003706	0.00144	0.009335	-0.00022	0.003269	0.069476	-0.02648	-0.00089	0.005552	-0.01091	0.001669	0.002683	0.002334	0.006571	-0.00248	0.000271	-0.01173	0.000271	-0.00039	0.019963	0.001163	0.036633	0.01237	0.138611
10	0.122282	0.062235	0.013847	0.040111	0.007549	0.06849	0.069387	0.052731	0.073802	0.178911	-0.0042	0.283226	0.087001	0.03478	0.052832	0.060445	0.071165	-0.02302	0.040853	0.009253	0.037446	0.015514	0.003333	0.003829	0.060867	0.099164	1.521925
11	0.037334	0.033497	0.010675	0.096692	0.074986	0.048679	0.024928	0.025719	-0.01343	0.039735	0.026273	-0.01785	0.057723	0.061175	0.046159	0.013675	0.025565	-0.21899	0.053556	0.020726	0.0557	0.053559	0.017464	0.016088	0.037384	0.014801	0.642025
12	0.011941	0.013247	0.009326	0.020389	0.00119	0.020672	0.017639	0.018763	0.009345	-0.00172	-0.00221	0.035671	0.002008	0.000177	0.007992	-0.05323	0.030246	-0.01048	0.013747	0.012367	0.010048	0.0043	0.003103	0.001026	0.004441	0.031763	0.211753
13	0.002447	0.001693	0.000879	0.001093	0.000868	0.002339	0.010244	0.000429	0.00112	-0.01377	0.000177	0.003116	0.055059	0.00281	-9.3E-05	0.006673	0.007892	-0.00151	0.123481	-0.00013	0.000478	0.00156	0.000571	0.002106	-0.00038	0.026946	0.236096
14	0.020918	0.01873	0.04937	0.014917	0.01045	0.034068	0.074831	0.015575	0.018593	0.015455	0.00422	0.019297	0.029197	0.379925	0.302807	0.16513	0.212029	0.00467	0.082908	0.006292	0.022346	0.025613	0.008071	-0.00866	0.014011	0.130233	1.672004
15	0.016859	0.013083	0.043712	0.003491	0.001673	0.025959	0.085582	0.005703	0.008344	0.007695	-0.00322	0.01058	0.006987	0.008549	0.012964	0.023887	0.021916	-0.00058	0.005655	-0.00095	0.014079	0.004384	-0.00155	-0.00271	0.003942	0.039324	0.354461
16	0.023346	0.029027	0.064002	0.056472	0.037442	0.039062	0.019477	0.029959	0.022549	0.031506	0.016447	0.031692	0.019043	0.022474	0.023943	0.420367	0.048109	-0.01798	0.108416	0.018107	0.041586	0.08484	0.029459	0.01057	0.043476	0.095229	1.348617
17	0.002164	0.001673	0.002861	-0.00234	0.002512	0.002013	0.001309	0.041789	-0.00454	0.000378	-0.00018	0.006637	-0.00012	0.001788	0.003509	0.002066	0.179374	-0.0012	-0.03097	-0.00147	0.001584	0.003309	-0.00069	-0.00745	0.014834	0.040192	0.251028
18	0.012462	0.0258	0.00811	0.014446	0.016042	0.039728	0.013224	0.096058	0.012605	0.064065	-0.0201	0.072014	0.085601	0.084957	0.058575	0.046161	0.03609	0.119871	0.042718	0.027206	0.08697	0.019221	0.016802	0.042209	0.033796	0.021783	1.076419
19	0.000193	-0.0085	-0.00316	0.002076	-0.00871	-0.00409	-0.00479	-0.01027	-0.02457	-0.0204	-0.00928	-0.00535	-0.01546	-0.00868	-0.00673	-0.00758	-0.00484	-0.00971	-0.00267	-0.00475	-0.00233	-0.00757	-0.00802	-0.05887	-0.00628	-0.01907	-0.25938
20	0.055159	0.035659	0.027182	0.038818	0.008985	0.046052	0.025401	0.028755	0.052456	0.01466	-0.00392	0.04858	-0.01438	0.002372	-0.01793	0.001524	0.067168	-0.05286	0.023902	-0.0018	0.010446	0.000218	0.012514	-0.00035	0.02362	0.020881	0.453106
21	0.004096	-0.00052	0.012285	0.001727	-0.00841	-0.00101	-0.0071	-0.00835	-0.01589	-0.02546	-0.01389	-0.00479	-0.01695	-0.00891	-0.00919	-0.01087	0.00312	-0.01403	-0.00472	-0.02375	-0.00873	-0.00499	-0.01833	-0.00432	-0.00132	-0.12838	-0.31868
22	0.022033	0.016513	0.018386	0.019741	0.011832	0.032346	0.026734	0.027965	0.029743	0.020129	0.006995	0.003236	0.017698	0.021552	0.019754	0.037668	-3.8E-05	0.06829	0.034182	0.038778	0.148227	0.042373	0.005796	0.039302	0.110377	0.855703	
23	0.017903	0.019179	0.009434	0.015994	0.001173	0.025574	0.01214	0.028535	0.021546	0.019252	-0.00594	0.024607	0.022836	0.032343	0.032028	0.022096	0.024168	-0.025488	0.023798	0.028488	0.016718	0.021118	0.062211	0.054349	0.009719	0.037295	0.602052
24	0.00225	0.002272	0.000617	0.001166	0.003204	0.003757	0.002303	0.006544	0.004535	0.005437	0.001841	0.004067	0.0022	0.003717	0.005287	0.003825	0.004041	-0.00022	0.00654	0.007031	0.009017	0.006581	0.009296	0.004139	0.004083	0.020579	0.124877
25	0.007098	0.007427	0.006448	0.009217	0.076398	0.013514	0.020688	0.008027	0.028276	-0.00639	0.036038	0.015692	0.030153	0.02429	0.015456	0.01147	0.014226	0.012598	0.018451	-0.00699	0.008874	0.022869	0.016977	0.011084	0.044752	0.024604	0.470249
26	0.000972	0.002063	-0.0044	0.001667	-0.00953	0.001897	-0.00051	0.003935	-0.01643	-0.01207	-0.00867	-0.00111	-0.01398	-0.00773	-0.00915	-0.00465	-0.00557	-0.00401	-0.0043	-0.00595	-0.00117	-0.00545	-0.00639	0.000159	-0.00111	0.002667	-0.10381
SUM	0.415392	0.360947	0.271928	0.592245	0.286206	0.548213	0.276755	0.26483	0.267334	0.31498	0.235297	0.528926	0.422638	0.633108	0.548531	0.705744	0.632071	-0.02962	0.594671	0.090796	0.398344	0.4607	0.195481	0.068611	0.399044	0.206729	9.680895

Appendix 25
Synergetic or Second Round Effects, Thailand
1985

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.145028	0.006605	0.009609	0.026981	-0.00095	0.015613	-0.11339	-0.00288	0.014001	0.059877	-0.00322	-0.348992	-0.00309	0.000689	0.00169	0.014358	0.012072	-0.00451	0.002343	-0.00053	0.072767	0.007162	-0.00197	0.001193	0.008661	0.085271	0.703067
2	0.000704	0.059276	0.000716	0.008376	9.02E-05	0.093918	0.005853	0.007706	0.001435	0.0124	6.48E-05	0.0026	0.006615	0.000435	0.000515	0.000864	0.004494	-4.5E-06	0.000664	0.000357	0.015602	0.000589	-4.4E-05	0.000164	0.001474	0.026353	0.245279
3	-0.00178	0.00097	-0.01426	0.003237	-0.011	0.003203	-0.0002	-0.0017	-0.00667	-0.02084	-0.00744	0.00384	-0.01667	-0.00558	-0.00549	-0.00575	-0.21881	-0.00616	-0.03907	-0.00569	-0.01472	-0.00332	-0.01119	-0.01049	-0.00183	-0.0041	-0.40152
4	4.96E-05	-0.01679	0.000371	0.029878	-0.00108	-0.01888	-0.00213	1.82E-05	-0.00255	0.005167	-0.00139	0.000118	-0.00238	-0.00125	-0.0012	-0.00142	-0.00024	-0.00158	-0.00205	-0.00195	-0.01191	-0.01448	-0.00209	-0.00025	0.001437	-0.00707	-0.05386
5	0.017554	0.026383	0.022226	0.137674	0.17231	0.03007	0.022866	0.013183	0.03196	0.000911	0.178986	0.040716	0.091854	0.12343	0.05266	0.048753	0.042653	0.123424	0.052628	0.01074	0.035543	0.110941	0.011637	0.01264	0.012436	0.023139	1.456778
6	0.005516	-0.02294	0.00593	0.034255	-0.00306	0.008052	0.003931	0.013109	-0.00679	0.115985	-0.00536	0.019765	-0.00197	0.001272	0.000253	0.002366	0.016212	-0.00486	0.001009	-0.00545	0.100613	-0.00127	-0.00482	0.000648	0.008236	0.067875	0.420611
7	0.00032	-0.00022	0.001828	0.000726	-0.00102	-0.00147	-0.12342	-0.00222	-0.00306	-0.0033	-0.00189	-0.00187	-0.00204	-0.00227	-0.0011	-0.00169	0.00128	-0.00234	-0.00092	-0.00374	-0.06596	0.004321	-0.00326	0.000286	-0.00126	0.091683	-0.1226
8	0.001963	0.009033	0.013182	0.102716	-0.00599	0.011591	-0.0041	-0.15333	-0.00364	0.033297	-0.01016	-0.10519	-0.02429	-0.00529	-0.00239	-0.0405	0.015937	-0.01342	-0.00464	0.00379	-0.00461	-0.01151	-0.00926	0.004637	-0.00536	-0.11416	-0.32511
9	0.003275	0.005231	0.002906	0.003559	0.000385	0.008087	0.026242	-0.00165	0.006047	0.028095	-0.00106	0.014683	-0.00467	-0.00571	-0.00222	0.004684	0.007495	-0.0067	-0.00374	-0.00247	-0.00114	-0.00098	-0.01046	0.000876	0.026198	-0.00202	0.073137
10	0.064247	0.04471	0.008458	0.023679	-0.00508	0.0356	0.000782	-0.00048	-0.00976	0.020488	-0.03139	0.019438	-0.06631	-0.02413	-0.02026	-0.00849	0.022149	-0.05032	-0.02367	-0.0009	0.006172	0.003944	-0.01195	0.000276	0.004307	0.107289	0.108796
11	0.023336	0.035745	0.034561	0.243509	0.036683	0.040286	0.019932	-0.01071	0.011205	-0.01592	0.005107	0.056451	0.044221	0.030162	0.01899	0.020078	0.020182	-0.34747	0.041709	0.012783	0.051009	0.132397	0.00975	0.022472	0.0129	-0.0246	0.52479
12	0.002417	0.00555	0.009377	0.009863	-0.00363	0.003592	-0.00085	-0.00774	-0.01522	0.005701	-0.00929	0.016325	-0.01686	-0.01435	-0.01612	-0.14871	0.00217	-0.02728	-0.01604	-0.00016	-0.00149	0.006478	-0.00421	-0.001	-0.0053	0.006997	-0.2256
13	0.000996	0.001502	0.007554	0.001838	-0.00015	0.001127	0.008281	-0.00272	-0.0012	-0.02262	-0.00138	-0.00313	0.075952	-0.00085	-0.00032	-0.00221	-0.0005	-0.00298	0.156694	-0.00103	0.002044	-0.00053	-0.00117	0.007259	-0.00343	-0.00604	0.213099
14	0.002756	0.005741	0.008745	0.027172	-0.00474	0.006845	0.006302	-0.00814	0.003254	-0.00147	-0.01678	-0.00594	0.014414	0.124367	-0.08387	0.081151	-0.00055	-0.02639	-0.04383	-0.00633	-0.00326	0.006455	-0.01125	-0.01147	-0.00273	-0.03704	0.015984
15	0.001613	0.004863	0.004461	0.006985	-0.00624	0.006187	0.000976	-0.0045	0.006809	0.000479	-0.01293	-0.00215	-0.00421	-0.00256	-0.02474	0.018991	0.000715	-0.0102	-0.03783	-0.00547	-0.00571	-0.00189	-0.00819	-0.00215	-0.00236	-0.01168	-0.09073
16	0.008313	0.018312	0.034095	0.066414	0.009532	0.013362	-0.01132	-0.01972	-0.04557	0.007943	-0.02147	0.000681	-0.07541	-0.05696	-0.03479	-0.16981	0.012713	-0.13426	-0.03947	-0.00435	0.0062	0.002131	-0.00922	0.00297	-0.0145	-0.14035	-0.59147
17	-0.00135	0.002163	0.007996	-0.00326	0.000411	-0.00102	-0.00193	0.012438	-0.00814	-0.00326	-0.00307	-0.00205	-0.00736	-0.00525	-0.00332	0.003518	0.158828	-0.00684	-0.02352	-0.00566	-0.00248	0.000158	-0.02027	-0.00853	0.005716	0.030414	0.11432
18	0.006723	0.028025	0.006877	0.028416	0.022141	0.021782	-0.00032	0.025353	0.009756	0.011097	0.056538	0.036033	0.061568	0.028918	0.01151	0.029914	0.028883	0.256673	0.02138	0.017301	0.03139	0.021575	0.017024	0.027471	0.02231	0.007612	0.831586
19	-0.00199	-0.00995	-0.00154	0.002394	-0.01117	-0.00745	-0.00827	-0.01836	-0.02548	-0.02797	-0.01416	-0.01038	-0.02703	-0.01557	-0.02716	-0.01523	-0.00953	-0.01655	-0.00757	-0.00591	-0.00368	-0.01276	-0.01274	-0.04421	-0.00785	-0.03183	-0.35754
20	0.009422	0.059709	0.010276	0.025473	-0.01307	0.001788	-0.03246	-0.01578	-0.07606	-0.01144	-0.02476	-0.00015	-0.0794	-0.05368	-0.06693	-0.10893	-0.0016	-0.11212	-0.05515	-0.01809	-0.00289	-0.02455	-0.02222	-0.00484	-0.00344	-0.05389	-0.71279
21	0.000124	-0.00046	0.007334	0.002943	-0.01208	-0.00509	-0.01339	-0.01483	-0.02967	-0.03041	-0.01584	-0.01449	-0.02266	-0.01582	-0.01309	-0.01517	0.003462	-0.0192	-0.01124	-0.02082	-0.01256	0.001285	-0.02759	-0.00104	-0.00888	-0.11389	-0.4031
22	0.00022	0.022535	0.009202	0.025477	0.008034	0.016758	0.026684	0.011545	0.029885	0.020653	-0.00422	0.033743	-0.01348	-0.01356	0.008098	0.015909	0.028211	-0.01591	0.062502	0.01119	0.020876	0.004842	-0.01177	0.005727	0.003456	0.031052	0.328156
23	0.005082	0.019326	0.019482	0.019897	-0.00224	0.022636	0.006096	0.011521	0.032074	0.018715	-0.00555	0.031338	-0.02425	0.026937	0.040563	0.046846	0.028411	-0.01392	0.035782	0.009487	0.018229	0.008427	-0.00022	0.008531	0.004528	0.039665	0.526064
24	-1E-05	0.000151	0.000238	0.000472	0.001539	-3.7E-06	0.000343	0.000374	0.001283	0.001178	0.000366	0.00118	-0.00246	0.000603	0.001449	0.000766	0.000685	-0.00357	0.000407	0.00046	0.002261	8.37E-05	-0.00134	0.022196	-0.00119	0.00403	0.031483
25	0.003588	0.005719	0.007629	0.011439	0.087949	0.005845	0.014743	-0.01171	0.00564	0.006039	0.044117	0.010435	0.010197	0.019407	0.012449	0.022145	0.01256	0.015525	0.017785	-0.00148	-0.0051	0.000955	0.00147	0.002261	0.012371	0.01351	0.333823
26	-0.00355	-0.00355	0.010125	-0.00153	-0.01667	-0.00595	-0.01105	-0.00993	-0.01951	-0.02499	-0.01772	-0.00949	-0.03249	-0.01042	-0.01641	-0.01885	-0.00774	-0.02008	-0.01384	-0.02121	-0.00905	-0.01542	-0.01838	-0.00171	-0.00746	-0.01191	-0.31878
SUM	0.294588	0.307634	0.22164	0.833181	0.240875	0.378574	-0.17981	-0.19117	-0.10876	0.195195	0.076128	0.480974	-0.08055	0.122977	-0.1592	-0.22632	0.175833	-0.45103	0.070329	0.000647	0.98156	0.216258	-0.16374	0.033918	0.061468	-0.02371	2.324077

1995

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	28	29	SUM
1	1.170462	-0.11183	0.004181	0.081448	-0.0149	-0.52018	-0.45407	-0.26793	-0.03385	-0.01498	-0.0324	0.218458	-0.04787	-0.01282	-0.01675	-0.05039	-0.01228	-0.03997	-0.01834	-0.02788	0.034717	-0.00568	-0.02426	-0.00185	0.005734	-0.6567	-1.89048
2	0.001536	0.193154	0.000843	0.033414	-0.00043	0.26122	0.021027	0.012789	0.007098	0.02336	-0.00132	0.006158	7.28E-05	0.000809	0.000534	0.001208	0.012411	-0.00136	0.000708	-0.00043	0.036645	0.000809	-0.00062	0.000113	0.003048	0.001012	0.613806
3	-0.0073	-0.00586	-0.15212	-0.01177	-0.0279	0.000206	-0.0032	0.018368	-0.02581	-0.05856	-0.02137	0.00759	-0.04879	-0.01752	-0.02423	-0.02636	-0.82295	-0.01553	-0.11675	-0.01502	-0.05052	-0.00808	-0.03333	-0.03287	-0.00307	-0.002	-1.50477
4	0.000635	0.029618	0.001051	0.049405	-0.00112	0.112479	0.00872	0.002694	0.001272	0.006241	-0.0025	0.001802	-0.00214	-0.00069	-0.00084	-0.00078	0.004849	-0.00259	-0.00062	-0.00231	0.029194	0.000722	-0.00213	-0.00016	0.002469	-0.03224	0.203032
5	0.029002	0.046486	0.006947	0.187954	0.155246	0.064171	0.047688	0.02181	0.042391	0.052253	0.182678	-0.0164	0.51947	-0.30819	-0.15538	-0.04556	0.047931	0.018634	0.045768	0.019279	0.067378	-0.03063	-0.00022	-0.00929	0.029823	0.060891	1.394878
6	0.004169	0.345646	-0.002	0.248197	-0.02022	0.518517	0.083886	0.026363	0.01011	0.032509	-0.0347	0.018182	-0.03446	-0.00915	-0.01926	-0.01516	0.023685	-0.03458	-0.01667	-0.02715	0.303398	-0.01307	-0.02037	-0.0012	0.013387	-0.81923	0.561305
7	-4E-05	-0.00126	0.005554	-0.00026	-0.00565	-0.00502	-0.2356	-0.00719	-0.01438	-0.01718	-0.01156	-0.00647	-0.01341	-0.00829	-0.00612	-0.00905	0.000274	-0.01159	-0.0071	-0.01825	-0.18974	-0.00011	-0.01444	-0.00282	-0.00424	-0.02202	-0.60594
8	0.006249	-0.00293	0.017226	-0.02984	-0.00647	-0.02764	-0.00095	-0.36334	-0.02092	0.242386	-0.02371	-0.24746	-0.09117	-0.0004	0.010687	-0.08732	0.065459	-0.03486	-0.01448	-0.02855	-0.00741	-0.04255	-0.02271	0.00194	-0.0042	-0.36918	-1.08215
9	0.013778	0.034208	0.01078	0.014379	0.013248	0.060982	0.076225	0.061599	1.001407	0.015767	0.00085	0.045173	0.024619	0.025392	0.045833	0.040417	0.076934	0.005602	0.010584	-0.02739	0.017379	0.031396	0.00412	0.016649	0.146253	0.042538	1.808719
10	0.256292	0.155457	0.045094	0.078015	0.040924	0.166453	0.153405	0.412252	0.07821	0.654317	-0.01262	0.824175	-0.02631	0.01104	0.140366	0.18867	0.295096	-0.09819	0.02889	0.029462	0.072834	0.065331	0.012303	0.003017	0.115228	0.563402	4.343173
11	0.030536	0.050677	-0.01582	0.355671	0.097965	0.070697	0.00702	-0.07502	-0.15898	-0.02108	-0.11396	-0.31186	0.024411	0.048953	0.004484	-0.10936	-0.01744	-1.02903	-0.06197	0.014942	0.078556	-0.21277	-0.03879	-0.00692	0.024885	-0.19288	-1.5571
12	0.014981	0.042787	0.022602	0.124369	0.025185	0.059091	0.047242	0.03451	-0.00231	0.030769	-0.00375	0.162876	0.001601	-0.00356	0.012478	-0.25205	0.104365	-0.04529	0.021629	0.03005	0.023477	0.068453	0.007717	-0.00194	0.005174	0.622064	1.152529
13	0.004497	0.007123	0.025231	0.000685	0.004891	0.012049	0.0086	0.002351	-0.00207	-0.04556	-0.00161	0.005278	0.230087	0.04268	0.020282	0.027075	0.017776	-0.00786	0.349124	-0.00188	-0.00431	0.004058	-0.00196	-0.00237	-0.00714	0.029995	0.71702
14	0.031442	0.052955	0.097132	0.02766	0.053758	0.089819	0.113176	0.025571	0.035186	0.033778	-0.00793	0.013338	0.387573	2.067711	0.812879	0.33691	0.387499	-0.04319	0.17179	0.007799	0.037711	0.069332	0.000321	-0.05518	0.022824	0.345244	5.11111
15	0.020664	0.037533	0.070238	0.004068	0.00389	0.073887	0.105145	0.003771	0.016979	0.0054	-0.02657	0.004616	0.023451	-4.4E-05	0.054917	0.027639	-0.0214	-0.06525	-0.01021	0.011114	0.000295	-0.01721	-0.01851	0.001883	0.033159	0.335999	
16	0.050978	0.103527	0.181132	0.131011	0.317532	0.12234	0.063302	0.07918	0.045968	0.112881	0.090967	0.056775	0.069895	0.124022	0.107707	1.602513	0.127804	-0.19186	0.230953	0.040613	0.080937	0.397712	0.05908	0.00159	0.056192	0.379589	4.44238
17	0.002423	0.015948	0.025501	-0.01311	0.012555	0.010474	0.004157	0.130802	-0.0042	0.008821	-0.00233	0.017466	-0.00924	0.003653	0.013553	0.00161	0.874041	-0.00769	-0.04466	0.006902	0.003465	0.022769	-0.04087	-0.0211	0.036321	0.181513	1.229755
18	0.021072	0.07542	0.017761	0.030552	0.082894	0.078067	0.008849	0.142682	0.010088	0.163617	-0.09675	0.142619	0.194664	0.737727	0.154635	0.085119	0.077631	0.357404	0.065634	0.063383	0.190019	0.00816	0.010557	0.051007	0.085951	-0.04602	2.24691
19	-0.00524	-0.02769	-0.00932	0.001573	-0.0215	-0.01764	-0.02308	-0.04388	-0.07704	-0.07968	-0.03936	-0.02907	-0.0616	-0.03489	-0.02649	-0.03498	-0.01974	-0.03663	0.01601	-0.01252	-0.00727	-0.03575	-0.03522	-0.24461	-0.01904	-0.05071	-1.01629
20	0.061156	0.300377	0.04472	0.061766	0.02232	0.170082	-0.0191	0.103392	0.068	0.132949	-0.0345	0.151476	-0.12593	-0.0496	-0.05592	-0.07644	0.217423	-0.28353	-0.04193	-0.01674	0.0474	-0.07153	-0.0222	-0.0195	0.075973	0.145772	0.785887
21	0.000728	0.001888	0.037749	0.000158	-0.03179	-0.00989	-0.03548	-0.03579	-0.0788	-0.09538	-0.06488	-0.03231	-0.07411	-0.04258	-0.0313	-0.04639	0.010421	-0.06621	-0.03516	-0.08754	-0.03901	-0.02157	-0.08041	-0.01293	-0.01978	-0.51484	-1.40522
22	-0.0032	0.016529	0.028293	0.021395	0.119998	0.019498	0.04767	0.017593	-0.00755	0.005905	0.019604	0.035831	-0.09013	-0.01894	0.012824	-0.0041	0.046923	-0.05181	-0.031	0.059126	0.020133	0.206963	-0.00356	-0.00396	0.027954	0.03082	0.522892
23	0.101729	0.166752	0.068698	0.167458	0.09317	0.217413	0.124779	0.256312	0.292394	0.324984	0.045515	0.288831	0.274846	0.237775	0.345897	0.285674	0.245242	0.182424	0.230366	0.476579	0.190281	0.16525	0.349912	0.607926	0.058448	0.833021	6.631679
24	0.001911	0.005434	0.001754	0.003689	0.011048	0.005949	0.007909	0.016386	0.012379	0.015604	0.005401	0.012692	0.006119	0.009781	0.015028	0.016792	0.014053	-0.00521	0.012161	0.038424	0.021324	0.016152	0.022679	0.011786	0.001053	0.059359	0.339656
25	0.010818	0.02025	0.017406	0.042706	0.293176	0.027758	0.046222	0.017642	0.005961	-0.0549	0.129976	0.031697	0.054325	0.067335	0.056001	0.033703	0.045441	0.032536	0.031905	-0.02567	-0.00707	0.044682	0.010508	-0.00221	0.04051	0.081481	1.051687
26	-0.00701	-0.00233	-0.02092	-0.00576	-0.04208	-0.00582	-0.00168	-0.00373	-0.07197	-0.04745	-0.04907	-0.0156	-0.07604	-0.01934	-0.04617	-0.03538	-0.03117	-0.04702	-0.03139	-0.03118	-0.01564	-0.01479	-0.02738	-0.00017	-0.01405	-0.01081	-0.67395
SUM	0.812267	1.548879	0.529714	1.604933	1.175682	1.554461	0.201852	0.589178	1.129552	1.42677	-0.1058	1.29254	1.091098	2.501332	1.370698	1.881282	1.815212	-1.0788	0.69818	0.453926	0.940455	0.645547	0.091498	0.256433	0.882045	0.644235	23.75447

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	6.60595	0.088377	0.040453	0.424435	-0.02	-0.39481	-0.74009	-0.33896	0.015141	0.045246	-0.04346	0.412712	-0.01914	-0.01017	-0.00012	-0.01198	0.04178	-0.05737	0.020899	0.011802	0.782306	0.051434	0.008954	0.017348	0.086438	-0.85417	0.207117
2	0.008243	0.633949	0.002245	0.113152	0.006632	0.692429	0.058955	0.052469	0.025549	0.085328	0.000195	0.024963	0.009577	0.040436	0.004058	0.008472	0.045934	0.000358	0.00677	0.004646	0.128538	0.006376	0.003603	0.000883	0.01197	0.07014	2.00047
3	-5.3E-05	-0.01026	-0.30671	-0.01981	-0.06263	0.003351	0.002307	0.062224	-0.00593	-0.08221	-0.03817	0.018042	-0.0892	-0.0416	-0.04645	-0.04487	-1.73632	-0.03164	-0.26226	-0.03483	-0.08812	-0.01147	-0.05951	-0.07424	0.011626	-0.03273	-2.98146
4	0.006747	0.133168	0.002368	0.181342	0.002152	0.344947	0.031937	0.015329	0.015051	0.054022	0.000787	0.016363	0.011774	0.00535	0.004437	0.008932	0.018923	0.001659	0.027625	0.003884	0.184014	0.097628	0.004824	0.001186	0.011679	-0.01417	1.156963
5	0.233885	0.198151	0.079072	0.650172	0.530045	0.280016	0.258481	0.259589	0.159818	0.477316	1.491189	0.083759	1.074921	-0.57424	-0.11716	0.120042	0.315457	1.033355	0.731011	0.110524	0.29946	0.622013	0.091628	0.046771	0.171255	0.323581	8.950114
6	0.040543	1.016854	-0.00504	0.98544	-0.0392	1.729389	0.262032	0.075305	0.018226	0.028565	-0.06316	0.070341	-0.02098	-0.01962	-0.03728	-0.01218	0.030286	-0.06473	-0.01775	-0.01651	1.014649	0.003397	-0.01239	0.000795	0.066344	-1.49576	3.58139
7	0.003585	-0.0073	0.006935	0.001403	-0.01356	-0.01171	-0.28191	-0.01712	-0.03245	-0.04101	-0.02317	-0.01385	-0.02263	-0.02045	-0.0207	-0.00463	-0.02478	-0.0161	-0.03489	-0.32432	0.007147	-0.01939	-0.00815	-0.00462	-0.03137	-0.98377	
8	0.044193	-0.00463	0.064964	0.016913	-0.02008	-0.03884	0.011912	0.630385	-0.08816	0.387207	-0.04701	-0.30442	-0.11479	-0.01785	-0.01436	-0.10328	0.240485	-0.07885	0.007114	-0.02375	0.07705	-0.04871	0.029593	0.001965	0.00652	-0.6505	-0.03693
9	0.069435	0.081257	0.023848	0.038712	0.024865	0.145564	0.296336	0.200881	3.286585	0.075953	0.009536	0.160855	0.131488	0.019072	0.07553	0.099017	0.172088	0.006261	0.054686	-0.02462	0.072166	0.070369	0.216961	0.014573	0.050663	0.028815	6.030893
10	1.444015	0.839292	0.165767	0.432411	0.114505	0.847771	1.003772	1.401075	1.314597	3.261265	-0.01273	3.423266	1.234003	0.42474	0.715139	0.950192	1.106472	-0.11776	0.573482	0.161035	0.50532	0.308811	0.154067	0.047181	0.933882	1.854383	23.07796
11	0.319275	0.210651	0.046561	0.011631	0.521624	0.321921	0.144175	0.144799	-0.19927	0.43466	0.087072	-0.23948	0.298688	0.128024	0.158504	0.018651	0.132011	-0.06705	0.315319	0.138552	0.391772	0.473829	0.050232	0.062771	0.020404	-0.13068	2.976827
12	0.115372	0.144326	0.060219	0.231053	0.052951	0.206698	0.139384	0.171596	0.10532	0.063528	0.013676	0.778242	0.091809	0.01383	0.135131	-0.11317	0.407577	-0.04856	0.185693	0.155959	0.113917	0.280365	0.054987	0.013959	0.070413	1.795518	5.212891
13	0.029844	0.025888	0.07373	0.010733	0.013045	0.033011	0.051184	0.022614	0.026562	-0.09252	0.004759	0.04283	0.570909	0.050615	0.013798	0.096235	0.104388	-0.01022	1.38579	0.004117	0.017738	0.028505	0.009574	0.034692	0.005149	0.201695	2.754663
14	0.139049	0.132036	0.24218	0.109503	0.040128	0.265212	0.729307	0.08528	0.03081	0.052578	-0.03633	0.083289	0.113081	0.922604	0.805121	0.49028	1.307341	-0.10731	-0.02046	0.024185	0.167129	0.223075	0.020177	-0.14754	0.075784	0.623414	6.369925
15	0.121014	0.131756	0.241806	0.032765	0.021839	0.28952	0.882387	0.059074	0.073582	0.060688	-0.02877	0.08504	0.058063	0.056577	0.089525	0.188332	0.157977	-0.01823	-0.07254	-0.00963	0.145913	0.053576	-0.01963	-0.03512	0.026937	0.21278	2.785231
16	0.2489321	0.25774	0.372872	0.551298	0.484179	0.330707	0.221082	0.270556	0.112584	0.314839	0.234529	0.261405	0.299476	0.201512	0.214711	5.895076	0.367498	-0.09047	1.106238	0.190624	0.361865	1.606085	0.27129	0.081325	0.405761	1.576659	16.14876
17	0.020494	0.018273	0.109717	-0.02126	0.026028	0.017981	0.018179	0.338468	-0.02998	0.00928	0.00084	0.071001	0.000881	-0.00556	0.043223	0.040538	2.289335	-0.01407	-0.13022	0.000667	0.010375	0.048442	-0.04617	-0.06021	0.122798	0.317177	3.196216
18	0.107574	0.166193	0.047715	0.122846	0.131618	0.205114	0.103239	0.66878	0.080121	0.581182	-0.09031	0.560164	0.779587	0.565556	0.380481	0.361111	0.248616	1.373919	0.267145	0.123215	0.587052	0.159091	0.085362	0.231457	0.272727	0.0497	8.258357
19	0.002616	-0.07633	-0.03515	0.016004	-0.08072	-0.03891	-0.03938	-0.08459	-0.19365	-0.16682	-0.09236	-0.04501	-0.15044	-0.09892	-0.07696	-0.07038	-0.04836	-0.1006	-0.03373	-0.04333	-0.03356	-0.07027	-0.08014	-0.55207	-0.06381	-0.17208	-2.42895
20	-0.02938	-0.61584	-0.02604	-0.20399	-1.4887	-0.54919	-0.33548	-0.78945	-0.93641	-0.82472	-0.2687	-0.63149	-0.74199	-0.64081	-0.93153	-0.92392	-0.46757	-0.82215	-0.87959	-0.20421	-0.83432	-0.43091	-0.22741	-0.13405	-0.15405	-1.3095	-14.0676
21	0.020854	-0.03925	0.044502	0.002755	-0.08568	-0.04793	-0.07557	-0.1032	-0.20113	-0.24473	-0.14135	-0.08139	-0.17945	-0.13683	-0.12984	-0.12744	-0.02518	-0.15615	-0.10207	-0.21453	-0.11697	-0.0591	-0.187	-0.05019	-0.02627	-1.16111	-3.62425
22	0.021187	-0.11703	0.038542	0.001376	0.044201	-0.07787	-0.02491	-0.01895	-0.22357	-0.13624	-0.02605	-0.01767	-0.47875	-0.2046	-0.11621	-0.08428	0.065545	-0.18497	-0.04881	0.17535	0.003931	0.791385	0.067868	-0.03681	0.157169	0.056112	-0.37385
23	0.053005	0.048832	0.063595	0.066846	-0.01231	0.084684	0.025895	0.122949	0.075131	0.082392	-0.09158	0.01892	0.055692	0.066935	0.128609	0.093865	0.12303	0.096464	0.078917	0.155474	0.042567	0.052888	0.242579	0.331625	0.030942	0.350814	2.469736
24	0.015427	0.015843	0.003256	0.007691	0.018414	0.027903	0.015004	0.041491	0.017908	0.037939	0.008938	0.027256	0.005336	0.02884	0.027804	0.026382	0.02533	-0.01143	0.020971	0.0504	0.03444	0.018129	0.055703	0.019223	0.002595	0.098688	0.637558
25	0.052404	0.034203	0.034584	0.070306	0.675111	0.055548	0.089268	0.055429	0.028767	-0.12357	0.23267	0.103619	0.140883	0.166363	0.1009	0.069045	0.083713	0.08108	0.082613	-0.08102	-0.01311	0.150752	0.088092	0.022971	0.144944	0.110476	2.546941
26	0.019376	0.024767	-0.04009	0.081427	-0.08513	0.035939	0.036047	0.036976	-0.10773	-0.08342	-0.08419	-0.00553	-0.12749	-0.03506	-0.08743	-0.04441	-0.05118	-0.08189	-0.0403	-0.01413	-0.01421	-0.01395	-0.00425	0.014622	0.008117	0.243245	-0.41988
SUM	3.786622	3.328915	1.351896	4.915157	2.133171	4.740448	2.883544	3.342996	3.36447	4.267376	1.089855	4.986191	2.919388	0.845642	1.319176	6.907338	4.950533	-1.49513	3.225449	0.698102	3.515599	4.411659	0.799615	-0.15594	3.077364	2.213294	73.40209

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	28	29	SUM
1	0.067395	-0.2941	0.04676	0.181516	-0.02367	-0.62783	-0.5196	-0.36343	-0.0804	-0.07632	-0.03674	0.069603	-0.04334	-0.01367	-0.01844	-0.07545	-0.02838	-0.04164	-0.01097	-0.02979	0.073572	-0.02139	-0.02477	-0.00159	0.026797	-0.91614	-2.782
2	0.002691	0.322391	0.001096	0.046357	-0.00133	0.194903	0.019413	0.011447	8.17E-05	0.0129	-0.00216	0.005826	2.96E-05	0.000246	-0.0006	0.000248	0.004288	-0.00181	-0.00023	-0.00246	0.02517	-4.7E-05	-0.00189	-0.00028	0.003672	-0.03136	0.608557
3	-0.00133	-0.01249	-0.15643	-0.01092	-0.03526	-0.00305	-0.0014	0.037575	0.061707	-0.05201	-0.01882	0.004262	-0.05039	-0.01719	-0.02538	-0.02712	-0.99081	-0.01288	-0.16337	-0.01986	-0.05838	-0.00814	-0.03457	-0.04095	0.007874	-0.01241	-1.64173
4	0.003538	0.03005	0.002111	0.17759	-0.00011	0.062918	0.009432	0.006953	0.003159	0.037251	-0.00085	0.009268	0.003535	0.002509	0.001545	0.003072	0.003548	0.000204	0.004399	-0.00193	0.05191	0.030818	-0.0003	0.000126	0.004223	-0.04357	0.401414
5	0.138886	0.139405	0.071583	0.355849	0.392733	0.192554	0.166359	0.183501	0.13692	0.246412	0.120366	0.079172	0.691016	-0.07182	0.120823	0.170214	0.255907	0.9706	0.328719	0.081007	0.207242	0.427209	0.090309	0.044162	0.131514	0.316759	7.081043
6	0.0178	0.23822	0.00244	0.492981	-0.02256	0.916311	0.144379	0.016449	-0.04451	-0.03544	-0.03342	0.024336	-0.01872	-0.00779	-0.02066	-0.01322	-0.00048	-0.0292	-0.01163	-0.03099	0.322563	-0.01104	-0.02299	-0.00223	0.034638	-0.7743	1.131109
7	0.003046	-0.00256	0.009315	0.001126	-0.0076	-0.00521	-0.3757	-0.00926	-0.01559	-0.02522	-0.01307	-0.00641	-0.0155	-0.00963	-0.00878	-0.01121	0.000639	-0.01364	-0.00564	-0.02855	-0.32096	0.004011	-0.01817	-0.00529	-0.00299	0.028752	-0.8511
8	0.012994	-0.01204	0.019753	0.009702	-0.01894	-0.03208	-0.01085	-0.43032	-0.11244	0.01169	-0.03494	-0.37856	-0.10341	-0.00814	-0.0196	-0.13249	0.024542	-0.05498	-0.01851	-0.04551	-0.02223	-0.09013	-0.00578	-0.0016	-0.02263	-0.42308	-1.8996
9	0.032409	0.026956	0.015043	0.018382	0.007142	0.046303	-0.00107	0.016216	0.344603	-0.13135	-0.00444	0.027538	-0.05413	0.008277	0.013307	0.011578	0.032591	-0.01228	0.001343	-0.05816	0.001346	-0.00194	0.099014	0.005771	0.181699	0.061353	0.68751
10	0.606519	0.308687	0.068681	0.198953	0.037442	0.339712	0.344159	0.261544	0.366506	0.887398	-0.02085	1.404801	0.431526	0.172509	0.262048	0.299805	0.352979	-0.11447	0.202633	0.045896	0.185733	0.076951	0.016533	0.018993	0.3019	0.491854	7.548752
11	0.185174	0.166146	0.052948	0.479595	0.371931	0.24145	0.123641	0.127565	-0.06659	0.197088	0.130312	-0.08851	0.286307	0.303429	0.228948	0.067827	0.126801	-1.08621	0.265635	0.1028	0.276272	0.265651	0.086623	0.079794	0.186447	0.073411	3.184447
12	0.059229	0.065707	0.046256	0.101127	0.005901	0.102532	0.087488	0.093064	0.046352	-0.00855	-0.01097	0.176928	0.00996	0.00088	0.039638	-0.26401	0.150022	-0.052	0.068187	0.061341	0.04984	0.021327	0.015389	0.005087	0.022026	0.157546	1.050294
13	0.012135	0.0084	0.004359	0.005423	0.004305	0.0116	0.050808	0.002126	0.005553	-0.06831	0.000878	0.015453	0.273991	0.013936	-0.00046	0.033097	0.039145	-0.00749	0.612466	-0.00662	0.002372	0.007735	0.002832	0.010444	-0.00189	0.133651	1.171039
14	0.103753	0.092902	0.244876	0.07399	0.051833	0.168979	0.37116	0.077253	0.092223	0.076659	0.020929	0.095713	0.144819	1.884429	1.501924	0.819047	0.051665	0.023164	0.411223	0.031209	0.110836	0.131999	0.040034	-0.04293	0.069497	0.645957	8.293142
15	0.08362	0.064891	0.216811	0.073316	0.008299	0.128757	0.424486	0.028289	0.041388	0.038166	-0.01595	0.052479	0.034656	0.042402	0.064301	0.118478	0.108703	-0.00285	0.028048	-0.00471	0.069833	0.021746	-0.0077	-0.01346	0.015086	0.195045	1.758126
16	0.115795	0.143974	0.317451	0.280101	0.185713	0.193746	0.096604	0.148596	0.111842	0.156268	0.081578	0.15719	0.094455	0.111469	0.118759	0.085022	0.238618	-0.08918	0.537741	0.08981	0.206268	0.420809	0.146116	0.052428	0.215639	0.472334	6.689143
17	0.010735	0.008298	0.01419	-0.01162	0.012461	0.009984	0.006493	0.207273	-0.02253	0.001875	-0.00088	0.03292	-0.00058	0.008868	0.017403	0.010248	0.889696	-0.00594	-0.15363	-0.0073	0.007857	0.016412	-0.0431	-0.03697	0.073575	0.199351	1.245099
18	0.061813	0.127968	0.040224	0.071653	0.079567	0.197053	0.065591	0.476447	0.062522	0.317764	-0.09968	0.357191	0.42458	0.421386	0.299532	0.228958	0.179009	0.59456	0.211883	0.13494	0.43137	0.095338	0.083339	0.209356	0.167627	0.108046	5.339039
19	0.000959	-0.04215	-0.01567	0.010297	-0.0432	-0.0203	-0.02376	-0.05095	-0.12187	-0.10119	-0.04001	-0.02651	-0.07666	-0.04093	-0.03336	-0.03762	-0.02398	-0.04817	-0.01325	-0.02354	-0.01155	-0.03753	-0.03979	-0.29199	-0.03113	-0.09458	-1.28655
20	0.273587	0.176868	0.134824	0.192537	0.044565	0.284416	0.125989	0.142623	0.260184	0.072713	-0.01945	0.240956	-0.07134	0.011765	-0.08892	0.007561	0.333155	-0.26219	0.118555	-0.00893	0.051812	0.001082	0.062068	-0.00174	0.117154	0.10357	2.247408
21	0.020316	-0.0026	0.060933	0.008567	-0.04169	-0.00501	-0.03524	-0.0414	-0.07881	-0.12627	-0.06887	-0.02374	-0.08407	-0.04419	-0.04556	-0.05393	0.015475	-0.06958	-0.02341	-0.11782	-0.0433	-0.02477	-0.09094	-0.02143	-0.00652	-0.63677	-1.58064
22	0.109283	0.081903	0.091194	0.097917	0.058687	0.160438	0.1326	0.138706	0.147524	0.099842	0.034695	0.179014	0.01605	0.088781	0.1069	0.097981	0.186833	-0.00019	0.338717	0.169543	0.192341	0.735206	0.210169	0.028749	0.194936	0.54747	4.44288
23	0.088798	0.09513	0.046795	0.079329	0.005819	0.126848	0.060216	0.141532	0.106868	0.095491	-0.02946	0.122052	0.113266	0.16042	0.158857	0.109596	0.119875	0.126422	0.11804	0.1413	0.082922	0.104744	0.308566	0.269569	0.048204	0.184982	2.986179
24	0.011161	0.011268	0.003059	0.005783	0.015893	0.018636	0.011423	0.032457	0.022494	0.026968	0.009132	0.020712	0.010912	0.018434	0.026222	0.018972	0.022277	-0.0011	0.032438	0.034876	0.044724	0.032643	0.046109	0.020531	0.021837	0.102073	0.619389
25	0.035204	0.036836	0.031894	0.045716	0.378936	0.062071	0.102611	0.039816	0.140248	-0.03168	0.178748	0.077835	0.149557	0.120477	0.076661	0.05689	0.07056	0.062486	0.091519	-0.03468	0.044015	0.11343	0.084208	0.054977	0.221969	0.122035	2.332433
26	0.004821	0.010232	-0.02183	0.008268	-0.04727	0.00941	-0.00253	0.019518	-0.08148	-0.05985	-0.043	-0.0055	-0.06934	-0.01355	-0.0454	-0.02305	-0.0276	-0.01987	-0.02133	-0.02951	-0.0058	-0.02706	-0.03172	0.000788	-0.0055	0.013227	-0.5149
SUM	2.060345	1.790297	1.348765	2.937534	1.419584	2.719137	1.372705	1.313556	1.325975	1.5623	1.167074	2.623471	2.096284	3.140218	2.720712	3.500491	3.135075	-0.14694	2.949569	0.45035	1.975787	2.285072	0.969584	0.34031	1.979256	1.025377	48.06189

Appendix 26
First Round Effects of Changes in Technical Coefficients Weighted by Global Intensity, Thailand
 1985

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.062402	0.002842	0.004134	0.01161	-0.00041	0.006718	-0.04879	-0.00124	0.006067	0.025764	-0.00138	0.150164	-0.00133	0.000296	0.000727	0.006178	0.005194	-0.00194	0.001008	-0.00023	0.03131	0.00334	-0.00085	0.000514	0.003726	0.03669	0.302514
2	0.000303	0.025505	0.000334	0.003604	3.8E-05	0.040411	0.002518	0.003316	0.000617	0.005336	2.78E-05	0.001119	0.000265	0.000187	0.000222	0.000372	0.001934	-1.9E-06	0.000286	0.000154	0.0006713	0.000253	-1.9E-05	7.04E-05	0.000634	0.011339	0.10538
3	-0.00077	0.000417	-0.00614	0.001393	-0.00473	0.001378	-8.7E-05	-0.00073	-0.00287	-0.00897	-0.0032	0.001652	-0.00717	-0.0024	-0.00236	-0.00248	-0.09415	-0.00265	-0.01681	-0.00245	-0.00633	-0.00143	-0.00482	-0.00451	-0.00079	-0.00176	-0.17277
4	2.14E-05	-0.00722	0.00016	0.012856	-0.00047	-0.00812	-0.00092	7.83E-06	-0.0011	0.002223	-0.0006	5.1E-05	-0.00102	-0.00054	-0.00052	-0.00061	-0.0001	-0.00068	-0.00088	-0.00084	-0.00512	-0.00623	-0.0009	-0.00011	0.000619	-0.00304	-0.02309
5	0.007553	0.011352	0.009564	0.059238	0.074141	0.012938	0.009839	0.005672	0.013752	0.004695	0.077014	0.017287	0.039523	0.053109	0.022659	0.020977	0.018353	0.053107	0.022645	0.04621	0.015294	0.047735	0.005007	0.005439	0.005351	0.009956	0.62682
6	0.002373	-0.00987	0.002551	0.014739	-0.00132	0.034488	0.001691	0.005641	-0.00292	0.049906	-0.0023	0.008504	-0.00085	0.000548	0.000109	0.001018	0.006976	-0.00209	0.000434	-0.00235	0.043291	-0.00055	-0.00207	0.000279	0.003544	0.029205	0.18098
7	0.000138	-9.6E-05	0.000786	0.000312	-0.00044	-0.00063	-0.05311	-0.00096	-0.00132	-0.00142	-0.00081	-0.0008	-0.00088	-0.00098	-0.00047	-0.00073	0.000551	-0.00101	-0.0004	-0.00161	-0.02838	0.001859	-0.0014	0.000123	-0.00054	0.039449	-0.05275
8	0.000845	0.003887	0.005672	0.044197	-0.00258	0.004987	-0.00176	-0.06597	-0.00157	0.014327	-0.00437	-0.04526	-0.01045	-0.00228	-0.00103	-0.01743	0.006857	-0.00577	-0.002	0.000163	-0.00198	-0.00495	-0.00398	0.001995	-0.00231	-0.04912	-0.13989
9	0.001409	0.002251	0.00125	0.001531	0.000165	0.00348	0.011292	-0.00071	0.002502	0.012088	-0.00046	0.006318	-0.00201	-0.00246	-0.00096	0.002015	0.003225	-0.00288	-0.00161	-0.01044	-0.00049	-0.00042	-0.0045	0.000377	0.011272	-0.00087	0.031469
10	0.027644	0.019238	0.003639	0.010189	-0.00219	0.015318	0.000337	-0.00021	-0.0042	0.008816	-0.01351	0.008364	-0.02853	-0.01038	-0.00872	-0.00365	0.00953	-0.02165	-0.01018	-0.00039	0.002656	0.001697	-0.00514	0.000119	0.001853	0.046164	0.046813
11	0.010051	0.01538	0.014871	0.04777	0.015784	0.017334	0.008576	-0.00461	0.004821	-0.00085	0.002198	0.02429	0.019027	0.012978	0.008171	0.008639	0.008684	-0.14951	0.017947	0.0055	0.021948	0.056968	0.004195	0.009669	0.005551	-0.01059	0.275806
12	0.00104	0.002388	0.001539	0.004244	-0.00158	0.001546	-0.00037	-0.00333	-0.00655	0.002453	-0.004	0.007024	-0.00725	-0.00618	-0.00694	-0.06399	0.000934	-0.01174	-0.0069	-6.9E-05	-0.00064	0.002787	-0.00181	-0.00043	-0.00228	0.003011	-0.09707
13	0.000428	0.000646	0.00325	0.000791	-6.4E-05	0.000485	0.003563	-0.00117	-0.00052	-0.00973	-0.00059	-0.00135	0.03268	-0.00096	-0.00014	-0.0009	-0.00021	-0.00128	0.067422	-0.00044	0.00088	-0.00023	-0.0005	0.003123	-0.00148	-0.0026	0.091692
14	0.001186	0.00247	0.003763	0.009368	-0.00204	0.002945	0.002712	-0.0035	0.0014	-0.00063	-0.00722	-0.00256	0.06202	0.053512	-0.03695	0.034918	-0.00024	-0.01135	-0.01886	-0.00272	-0.0014	0.002777	-0.00484	-0.00494	-0.00118	-0.01594	0.006878
15	0.000694	0.002093	0.00192	0.003905	-0.00268	0.002662	0.00042	-0.00194	0.00293	0.000206	-0.00556	-0.00092	-0.00181	-0.0011	-0.01065	0.008171	0.000308	-0.00439	-0.01628	-0.00235	-0.00246	-0.00082	-0.00352	-0.00092	-0.00102	-0.00503	-0.03904
16	0.003577	0.007879	0.01467	0.028576	0.004101	0.005749	-0.00487	-0.00848	-0.01961	0.003418	-0.00924	0.000293	-0.03245	-0.02451	-0.01497	-0.07307	0.00547	-0.05777	-0.01698	-0.00187	0.002668	0.000917	-0.00397	0.001278	-0.00493	-0.06039	-2.545
17	-0.00058	0.000931	0.00344	-0.0014	0.000377	-0.00044	-0.00083	0.005352	-0.0035	-0.0014	-0.00132	-0.00088	-0.00317	-0.00226	-0.00143	0.001514	0.06834	-0.00294	-0.01012	-0.00244	-0.00107	6.79E-05	-0.00872	-0.00367	0.00246	0.013086	0.049189
18	0.002893	0.012059	0.002959	0.012227	0.009527	0.009373	-0.00014	0.010909	0.004198	0.004775	0.024327	0.015504	0.026492	0.02443	0.004798	0.012871	0.010706	0.110441	0.009199	0.007444	0.013506	0.009283	0.007325	0.01182	0.009599	0.003275	0.357814
19	-0.00086	-0.00428	-0.00066	0.00103	-0.0048	-0.0032	-0.00356	-0.0079	-0.01096	-0.01203	-0.00609	-0.00446	-0.01163	-0.0067	-0.00549	-0.00556	-0.0041	-0.00712	-0.00326	-0.00254	-0.00158	-0.00549	-0.00548	-0.01902	-0.00338	-0.0137	-0.15384
20	0.004054	0.025691	0.004421	0.01096	-0.00562	0.00077	-0.01397	-0.00679	-0.03273	-0.00492	-0.01065	-5.6E-05	-0.03416	-0.0231	-0.0238	-0.04687	-0.00609	-0.04824	-0.02373	-0.00778	-0.00985	-0.01831	-0.00956	-0.00208	-0.00148	-0.02319	-0.3067
21	5.34E-05	-0.0002	0.003156	0.001266	-0.0052	-0.00219	-0.00576	-0.00638	-0.01277	-0.01309	-0.00682	-0.00623	-0.00975	-0.00681	-0.00563	-0.00563	0.00149	-0.00826	-0.00484	-0.00896	-0.0054	0.000553	-0.01187	-0.00045	-0.00382	-0.049	-0.17345
22	9.45E-05	0.009696	0.00396	0.010962	0.003457	0.007211	0.011482	0.004968	0.009029	0.008629	-0.00182	0.014519	-0.0058	-0.00584	0.003484	0.006845	0.012139	-0.00685	0.026893	0.004815	0.008983	0.002083	-0.00506	0.002464	0.001487	0.013361	0.141198
23	0.002186	0.008316	0.008383	0.008561	-0.00097	0.00974	0.002623	0.004957	0.013801	0.008053	-0.00239	0.013484	0.010079	0.01159	0.017453	0.020157	0.012225	-0.00598	0.015396	0.034632	0.007843	0.036526	-9.5E-05	0.003671	0.001948	0.017067	0.226554
24	-4.4E-06	6.51E-05	0.000102	0.000203	0.000662	-1.6E-06	0.000148	0.000161	0.000552	0.000507	0.000157	0.000508	-0.00106	0.000259	0.000623	0.00033	0.000295	-0.00154	0.000175	0.000198	0.000973	3.6E-05	-0.00058	0.00955	-0.00051	0.001734	0.013546
25	0.001544	0.002461	0.003283	0.004922	0.037843	0.002515	0.006344	-0.00504	0.002427	0.002598	0.018983	0.00449	0.004388	0.00835	0.005357	0.009529	0.005273	0.00668	0.007653	-0.00064	-0.0022	0.004128	0.000633	0.000973	0.005323	0.005813	0.143637
26	-0.00153	-0.00153	0.004356	-0.00066	-0.00717	-0.00256	-0.00475	-0.00427	-0.0084	-0.01075	-0.00762	-0.00408	-0.01398	-0.00448	-0.00706	-0.00811	-0.00333	-0.00864	-0.00596	-0.00913	-0.00389	-0.00663	-0.00791	-0.00073	-0.00321	-0.00512	-0.13716
SUM	0.126755	0.132368	0.095367	0.3585	0.103644	0.162892	-0.07737	-0.08225	-0.0468	0.083988	0.032756	0.206953	-0.03466	0.052914	-0.0685	-0.09738	0.075657	-0.19407	0.030261	0.000278	0.085262	0.039051	-0.07046	0.014594	0.026448	-0.0102	1

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.007176	-0.00471	0.000176	0.003429	-0.00063	-0.0219	-0.01912	-0.01128	-0.00142	-0.00063	-0.00136	0.009197	-0.00202	-0.00054	-0.00071	-0.00212	-0.00052	-0.00168	-0.00077	-0.00117	0.001439	-0.00024	-0.00102	-7.8E-05	0.000241	-0.02933	-0.0796
2	6.47E-05	0.008131	3.55E-05	0.001407	-1.8E-05	0.010997	0.000885	0.000538	0.000299	0.000983	-5.5E-05	0.000259	3.66E-06	3.4E-05	2.25E-05	5.09E-05	0.000522	-5.7E-05	2.98E-05	-1.8E-05	0.001543	3.41E-05	-2.6E-05	4.77E-06	0.000128	4.26E-05	0.02584
3	-0.00031	-0.00025	-0.0064	-0.0005	-0.00117	8.69E-06	-0.00013	0.000773	-0.00109	-0.00247	-0.0009	0.00032	-0.00205	-0.00074	-0.00102	-0.00111	-0.03464	-0.00065	-0.00491	-0.00063	-0.00213	-0.00034	-0.0014	-0.00138	-0.00013	-8.4E-05	-0.0633
4	2.67E-05	0.001247	4.42E-05	0.00208	-4.7E-05	0.004735	0.000367	0.000113	5.35E-05	0.000263	-0.00011	7.59E-05	-9E-05	-2.9E-05	-3.5E-05	-3.3E-05	0.000204	-0.00011	-2.6E-05	9.7E-05	0.001229	3.04E-05	-9E-05	-6.9E-06	0.000104	-0.00136	0.00855
5	0.001221	0.001957	0.000292	0.007912	0.006356	0.002701	0.002008	0.000918	0.001785	0.0022	0.00769	-0.00428	0.002869	-0.01297	-0.00654	-0.00192	0.002018	0.0017624	0.001927	0.000812	0.002836	-0.00129	-9.4E-06	-0.00039	0.001255	0.002563	0.05872
6	0.000176	0.014551	-8.4E-05	0.010449	-0.00085	0.021828	0.003531	0.00111	0.000426	0.001369	-0.00146	0.000765	-0.00145	-0.00039	-0.00081	-0.00064	0.000997	-0.00146	-0.0007	-0.00114	0.012772	-0.00055	-0.00086	-5E-05	0.000583	-0.03449	0.02363
7	-1.7E-06	-5.3E-05	0.000234	-1.1E-05	-0.00024	-0.00021	-0.00992	-0.0003	-0.00061	-0.00072	-0.00049	-0.00027	-0.00056	-0.00035	-0.00026	-0.00038	1.15E-05	-0.00049	-0.0003	-0.00077	-0.00799	-4.6E-06	-0.00061	-0.00012	-0.00018	-0.00093	-0.0255
8	0.000263	-0.00012	0.000725	-0.00126	-0.00027	-0.00116	-4E-05	-0.0153	-0.00088	0.010204	-0.001	-0.01042	-0.00384	-1.7E-05	0.00045	-0.00368	0.002756	-0.00147	-0.00061	-0.0012	-0.00031	-0.00179	-0.00096	8.17E-05	-0.00018	-0.01554	-0.0456
9	0.00058	0.00144	0.000454	0.000605	0.000558	0.002567	0.003209	0.002593	0.042157	0.000664	3.58E-05	0.001902	0.001036	0.001069	0.001929	0.001701	0.003239	0.000236	0.000446	-0.00115	0.000732	0.001322	0.000173	0.000701	0.006157	0.001791	0.07614
10	0.010789	0.006544	0.001898	0.003284	0.001723	0.007707	0.006458	0.017355	0.003292	0.027545	-0.00053	0.034696	-0.00111	0.004256	0.005909	0.007943	0.012423	-0.00413	0.001216	0.00124	0.003066	0.00275	0.000518	0.000127	0.004851	0.023718	0.18284
11	0.001285	0.002133	-0.00067	0.014973	0.004124	0.002976	0.000296	-0.00316	-0.00669	-0.00089	-0.0048	-0.01313	0.001028	0.002061	0.000189	-0.0046	-0.00073	-0.04332	-0.00261	0.000629	0.003307	-0.00896	-0.00163	-0.00029	0.001048	-0.00812	-0.0656
12	0.000631	0.001801	0.000952	0.005236	0.00106	0.002488	0.001989	0.001453	-9.7E-05	0.001295	-0.00016	0.006857	6.74E-05	-0.00015	0.000525	-0.01061	0.004394	-0.00191	0.000911	0.001265	0.000988	0.002882	0.000325	-8.2E-05	0.000218	0.026188	0.04852
13	0.000189	0.003	0.001062	2.88E-05	0.000206	0.000507	0.000362	9.9E-05	-8.7E-05	-0.00192	-6.8E-05	0.000222	0.009686	0.001797	0.000854	0.00114	0.000748	-0.00033	0.014697	-7.9E-05	-0.00018	0.000171	-8.2E-05	-1E-04	-0.0003	0.001263	0.03018
14	0.001324	0.002229	0.004089	0.001164	0.002263	0.003781	0.004764	0.001076	0.001481	0.001422	-0.00033	0.000562	0.016316	0.087046	0.03422	0.014183	0.016313	-0.00182	0.007232	0.000328	0.001419	0.002919	1.35E-05	-0.00232	0.000961	0.014534	0.21517
15	0.00087	0.00158	0.002857	0.000171	0.000164	0.003111	0.004426	0.000159	0.000715	0.000227	-0.00112	-0.00015	0.000194	0.000987	-1.9E-06	0.002312	0.001164	-0.0009	-0.00275	-0.00043	0.000468	1.24E-05	-0.00072	-0.00078	7.9E-05	0.001396	0.01414
16	0.002146	0.004358	0.007625	0.005515	0.013367	0.00515	0.002665	0.003333	0.001935	0.004752	0.00383	0.00239	0.002942	0.005259	0.004534	0.067462	0.00538	-0.00808	0.009723	0.00171	0.003407	0.016743	0.002487	6.69E-05	0.002366	0.01598	0.18705
17	0.000102	0.000671	0.001074	-0.00055	0.000529	0.000441	0.000175	0.005506	-0.00018	0.000371	-9.8E-05	0.000735	-0.00039	0.000154	0.000571	6.78E-05	0.038833	-0.00032	-0.00188	0.000294	0.000146	0.000959	-0.00172	-0.00089	0.001529	0.007641	0.05177
18	0.000887	0.003175	0.000748	0.001286	0.003487	0.003286	0.000373	0.006007	0.000425	0.006888	-0.00407	0.006004	0.008195	0.011523	0.00651	0.003583	0.003058	0.015046	0.002763	0.002668	0.007999	0.003344	0.000444	0.002147	0.003618	-0.00194	0.09445
19	-0.00022	-0.00117	-0.00039	7.04E-05	-0.00091	-0.00074	-0.00097	-0.00185	-0.00324	-0.00335	-0.00166	-0.00122	-0.00259	-0.00147	-0.00112	-0.00147	-0.00083	-0.00154	-0.00067	-0.00053	-0.00031	-0.00151	-0.00148	-0.0103	-0.0008	-0.00251	-0.0428
20	0.002575	0.012645	0.001883	0.0026	0.00094	0.00716	-0.0008	0.004353	0.002863	0.005597	-0.00145	0.006377	-0.0053	-0.00209	-0.00235	-0.00322	0.009153	-0.01194	-0.00177	-0.0007	0.001995	-0.00301	-0.00093	-0.00082	0.003198	0.006137	0.03308
21	3.07E-05	7.95E-05	0.001389	6.55E-06	-0.00134	-0.00042	-0.00149	-0.00151	-0.00332	-0.00402	-0.00273	-0.00136	-0.00312	-0.00179	-0.00132	-0.00195	0.000439	-0.00279	-0.00148	-0.00369	-0.00164	-0.00091	-0.00339	-0.00054	-0.00083	-0.02167	-0.0592
22	-0.00013	0.000696	0.001191	0.000901	0.005052	0.000821	0.002007	0.000741	-0.00032	0.000249	0.000829	0.001508	-0.00379	-0.0008	0.00054	-0.00017	0.001975	-0.00218	-0.00131	0.002489	0.000848	0.008713	-0.00015	-0.00017	0.001177	0.001297	0.02201
23	0.004283	0.00702	0.002892	0.00705	0.003922	0.009153	0.005253	0.01079	0.012309	0.013681	0.001916	0.012159	0.01157	0.01001	0.014562	0.012026	0.010324	0.00768	0.009698	0.020063	0.00801	0.006957	0.014731	0.025592	0.002461	0.035068	0.27918
24	8.05E-05	0.000229	7.38E-05	0.000155	0.000465	0.00025	0.000333	0.00069	0.000521	0.000657	0.000227	0.000534	0.000258	0.000412	0.000633	0.000707	0.000592	-0.00022	0.000512	0.001618	0.000998	0.00068	0.000955	0.000496	4.43E-05	0.002499	0.0143
25	0.000455	0.000853	0.000733	0.001798	0.012342	0.001147	0.001946	0.000743	0.000251	-0.00231	0.005472	0.001334	0.002287	0.002835	0.002358	0.001419	0.001913	0.00137	0.001343	-0.00108	-0.0003	0.001881	0.000442	-9.3E-05	0.001705	0.00343	0.04427
26	-0.0003	-9.8E-05	-0.00088	-0.00024	-0.00177	-0.00025	-7.1E-05	-0.00016	-0.00303	-0.002	-0.00207	-0.00066	-0.0032	-0.00081	-0.00194	-0.00149	-0.00131	-0.00198	-0.00132	-0.00131	-0.00066	-0.00062	-0.00115	-7E-06	-0.00059	-0.00046	-0.0284
SUM	0.034195	0.065247	0.0223	0.067564	0.049494	0.065439	0.008498	0.024803	0.047552	0.060064	-0.00445	0.054413	0.045933	0.105301	0.057703	0.079198	0.076417	-0.04542	0.029392	0.019109	0.039591	0.027176	0.003852	0.010795	0.028713	0.027121	1

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.009	0.001204	0.000551	0.005782	-0.00027	-0.00524	-0.01008	-0.00489	0.000206	0.000616	-0.00059	0.005623	-0.00026	-0.00015	-1.7E-06	-0.00016	0.000569	-0.00078	0.000285	0.000161	0.010658	0.000701	0.000122	0.000236	0.001178	-0.01164	0.00028
2	0.000112	0.008637	3.06E-05	0.001542	8.61E-06	0.009433	0.000803	0.000715	0.000307	0.001162	2.66E-06	0.00034	0.00013	5.5E-05	5.33E-05	0.000115	0.000626	4.88E-06	9.22E-05	0.0001751	8.69E-05	4.91E-05	1.2E-05	0.000163	0.000956	0.0273	
3	-7.2E-07	-0.00014	-0.00418	-0.00027	-0.00085	4.57E-05	3.14E-05	0.000848	-8.1E-05	-0.00112	-0.00052	0.000246	-0.00122	-0.00057	-0.00063	-0.00061	-0.02365	-0.00043	-0.00357	-0.00047	-0.0012	-0.00016	-0.00081	-0.00101	0.000158	-0.00045	-0.041
4	9.19E-05	0.001814	3.23E-05	0.002471	2.93E-05	0.004699	0.000435	0.000209	0.000205	0.000736	1.07E-05	0.000223	0.00016	7.29E-05	6.04E-05	0.000122	0.000258	2.27E-05	0.000172	5.29E-05	0.0002507	0.00133	6.57E-05	1.62E-05	0.000159	-0.00019	0.0158
5	0.003186	0.0027	0.001077	0.008858	0.007221	0.003815	0.003521	0.003537	0.002177	0.006503	0.002315	0.001141	0.014644	-0.00782	-0.0016	0.001635	0.004298	0.014078	0.009959	0.001506	0.004008	0.008474	0.001248	0.000637	0.002333	0.004408	0.1219
6	0.000552	0.013853	-6.9E-05	0.013425	-0.00053	0.02356	0.00357	0.001026	0.000248	0.000389	-0.00086	0.000958	-0.00029	-0.00027	-0.00051	-0.00017	0.000413	-0.00088	-0.00024	-0.00022	0.013823	5.41E-05	-0.00017	1.08E-05	0.000904	-0.02038	0.0482
7	4.88E-05	9.9E-05	9.45E-05	1.91E-05	-0.00018	-0.00016	-0.00384	-0.00023	-0.00044	-0.00056	-0.00032	-0.00019	-0.00039	-0.00031	-0.00028	-0.00028	-6.3E-05	-0.00034	-0.00022	-0.00048	-0.00042	9.74E-05	-0.00026	-0.00011	-6.3E-05	-0.00043	-0.013
8	0.000602	-6.3E-05	0.000885	0.00023	-0.00027	-0.00053	0.000162	0.008588	-0.0012	0.005275	-0.00064	-0.00415	-0.00156	-0.00024	-0.0002	-0.00141	0.003276	-0.00107	9.69E-05	-0.00032	0.00105	-0.00066	0.000403	2.68E-05	8.88E-05	-0.00866	-5E-04
9	0.000946	0.001107	0.000325	0.000527	0.000339	0.001983	0.004037	0.002737	0.004775	0.001035	0.00013	0.002191	0.001791	0.00026	0.001029	0.001349	0.002344	8.53E-05	0.000745	-0.00034	0.000983	0.000959	0.002956	0.000199	0.006821	0.002845	0.0822
10	0.019673	0.01484	0.002258	0.005891	0.00156	0.01155	0.013675	0.019088	0.01791	0.04443	-0.00017	0.046637	0.016812	0.005786	0.009743	0.012945	0.015074	-0.0016	0.007813	0.002194	0.006884	0.004098	0.002999	0.000643	0.012723	0.025263	0.3144
11	0.00435	0.00287	0.000634	0.013782	0.007106	0.004386	0.001964	0.001973	-0.00271	0.005922	0.001186	-0.00326	0.004072	0.001744	0.002159	0.000254	0.001798	-0.02816	0.004296	0.001888	0.005337	0.006455	0.000684	0.000855	0.002757	-0.00178	0.0406
12	0.001572	0.001966	0.00082	0.003148	0.000721	0.002816	0.001899	0.002338	0.001435	0.000865	0.000186	0.010602	0.001251	0.000188	0.001841	-0.00154	0.005553	-0.00066	0.00253	0.002125	0.001552	0.00382	0.000749	0.000178	0.000959	0.024107	0.071
13	0.000407	0.000353	0.001004	0.000146	0.000178	0.00045	0.000697	0.000308	0.000362	-0.00126	6.48E-05	0.000583	0.007778	0.00069	0.000188	0.001311	0.014422	-0.00014	0.018879	5.61E-05	0.000242	0.000388	0.00013	0.000473	7.02E-05	0.002748	0.0375
14	0.001894	0.001799	0.003299	0.001492	0.000547	0.003613	0.009936	0.001162	0.00042	0.000716	-0.00049	0.001135	0.001541	0.012569	0.010969	0.006679	0.017811	-0.00146	-0.00028	0.000329	0.002277	0.003039	0.000275	-0.00201	0.001032	0.008493	0.0868
15	0.001649	0.001795	0.003294	0.000446	0.000298	0.003672	0.012021	0.000805	0.001002	0.000827	-0.00039	0.001159	0.000791	0.000771	0.00122	0.002566	0.002152	-0.00025	-0.00099	-0.00013	0.001988	0.00073	-0.00027	-0.00048	0.000367	0.002899	0.0379
16	0.003397	0.003511	0.00508	0.007511	0.006596	0.004505	0.003012	0.003686	0.001534	0.004289	0.003195	0.003561	0.00408	0.002745	0.002925	0.080312	0.005007	-0.00123	0.015071	0.002597	0.00493	0.021881	0.003696	0.001108	0.005528	0.02148	0.22
17	0.000279	0.000249	0.001495	-0.00029	0.000355	0.000245	0.000248	0.004611	-0.00041	0.000126	1.14E-05	0.000967	1.2E-05	-7.6E-05	0.000589	0.000552	0.031189	-0.00019	-0.00177	9.08E-06	0.000141	0.00066	-0.00063	-0.00082	0.001673	0.004321	0.0435
18	0.001466	0.002264	0.00065	0.001674	0.001793	0.002794	0.001406	0.009111	0.001092	0.007918	-0.00123	0.007631	0.010621	0.007705	0.005184	0.004092	0.003387	0.018718	0.003639	0.002892	0.007998	0.002167	0.001163	0.003153	0.003716	0.000677	0.1125
19	3.56E-05	-0.00104	-0.00048	0.000218	-0.0011	-0.00053	-0.00054	-0.00115	-0.00264	-0.00227	-0.00126	-0.00061	-0.00205	-0.00135	-0.00105	-0.00096	-0.00066	-0.00137	-0.00046	-0.00059	-0.00046	-0.00096	-0.00109	-0.00752	-0.00087	-0.00234	-0.033
20	-0.0004	-0.00839	-0.00035	-0.00278	-0.00293	-0.00748	-0.00467	-0.01076	-0.01276	-0.01124	-0.00366	-0.0086	-0.01019	-0.00873	-0.01269	-0.01259	-0.00637	-0.0112	-0.01198	-0.00278	-0.01137	-0.00587	-0.0031	-0.00183	-0.0021	-0.01784	-0.192
21	0.000284	-0.00053	0.000606	3.75E-05	-0.00117	-0.00065	-0.00103	-0.00141	-0.00274	-0.00333	-0.00193	-0.00111	-0.00244	-0.00186	-0.00177	-0.00174	-0.00034	-0.00213	-0.00139	-0.00292	-0.00159	-0.00081	-0.00255	-0.00068	-0.00036	-0.01582	-0.049
22	0.000289	-0.00159	0.000525	1.87E-05	0.000602	-0.00106	-0.00034	-0.00026	-0.00305	-0.00186	-0.00035	-0.00024	-0.00652	-0.00279	-0.00158	-0.00115	0.000893	-0.00252	-0.00066	0.002389	5.36E-05	0.010784	0.000925	-0.0005	0.002141	0.000764	-0.005
23	0.000722	0.000638	0.000866	0.000911	-0.00017	0.001154	0.000353	0.001675	0.001024	0.001122	-0.00125	0.001388	0.000759	0.000912	0.001752	0.001279	0.001676	0.001314	0.001075	0.002118	0.00058	0.000721	0.003305	0.004518	0.000422	0.004779	0.0336
24	0.00021	0.000216	4.44E-05	0.000105	0.000251	0.00038	0.000204	0.000565	0.000244	0.000517	0.000122	0.000371	7.27E-05	0.000393	0.000379	0.000358	0.000345	-0.00016	0.000286	0.000687	0.000469	0.000247	0.000759	0.000262	3.53E-05	0.00132	0.0087
25	0.000714	0.000466	0.000471	0.000958	0.000919	0.000757	0.001216	0.000755	0.000392	-0.00168	0.004437	0.01442	0.001919	0.002266	0.001375	0.000912	0.00114	0.001105	0.001125	-0.0011	-0.00018	0.002054	0.0012	0.000313	0.001975	0.001505	0.0347
26	0.000264	0.000337	-0.00055	0.001109	-0.00116	0.00049	0.000491	0.000504	-0.00147	-0.00114	-0.00115	-7.5E-05	-0.00174	-0.00048	-0.00119	-0.00061	-0.0007	-0.00112	-0.00055	-0.00019	-0.00019	-0.00019	-5.8E-05	0.000199	0.000111	0.003314	-0.006
SUM	0.051342	0.045352	0.18418	0.066962	0.029061	0.064691	0.039284	0.045544	0.045836	0.057992	0.014848	0.06793	0.039773	0.011521	0.017972	0.094403	0.067444	-0.02037	0.043942	0.009511	0.047895	0.060103	0.010894	-0.00212	0.041925	0.030153	1

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0.0014023	-0.006119	0.0009729	0.0037767	-0.000493	-0.013063	-0.010811	-0.007562	-0.001673	-0.001388	-0.000764	0.001482	-0.000902	-0.000284	-0.000384	-0.000157	-0.000591	-0.000866	-0.000228	-0.000662	0.0015308	-0.000445	-0.000515	-3.3E-05	0.0005576	-0.019062	-0.057884
2	5.59E-05	0.0067078	2.8E-05	0.0009645	-2.77E-05	0.0040552	0.0004039	0.0002375	1.7E-06	0.0002884	-4.49E-05	0.0001212	6.16E-07	5.10E-06	-1.24E-05	5.17E-06	8.92E-05	-3.7E-05	-4.83E-06	-5.12E-05	0.0005237	-9.79E-07	-3.94E-05	-5.85E-06	7.64E-05	-0.000653	0.022662
3	-2.78E-05	-0.00026	-0.003255	-0.000227	-0.000734	-6.34E-05	-2.91E-05	0.0007818	0.0012839	-0.001082	-0.000392	8.86E-05	-0.001048	-0.000358	-0.000528	-0.000564	-0.020615	-0.000268	-0.0003399	-0.000413	-0.001215	-0.000169	-0.000719	-0.000852	0.0001638	-0.000258	-0.034159
4	7.40E-05	0.0006252	4.39E-05	0.003695	-2.25E-06	0.0013091	0.0001962	0.0001447	6.57E-05	0.0007751	-1.77E-05	0.0001928	7.35E-05	5.22E-05	3.21E-05	6.39E-05	7.38E-05	4.25E-06	9.15E-05	-4.02E-05	0.0010801	0.0006412	-6.34E-06	2.617E-06	8.79E-05	-0.000907	0.0008352
5	0.002897	0.0029005	0.0014894	0.007444	0.0081714	0.0040664	0.0034614	0.003818	0.0028488	0.005127	0.0251835	0.0015473	0.0143776	-0.001494	0.0025139	0.0035416	0.0053245	0.0201948	0.0068395	0.0010855	0.004312	0.0088887	0.001879	0.0009189	0.0028121	0.0065906	0.1473318
6	0.0003704	0.0049565	5.07E-05	0.0102572	-0.000469	0.0196562	0.003004	0.003423	-0.000926	-0.000737	0.000695	0.0005063	-0.000389	-0.000162	-0.000443	-0.000275	-9.91E-06	-0.000608	-0.000242	-0.000645	0.0067114	-0.00023	-0.000478	-6.46E-05	0.0007207	-0.016107	0.0235344
7	6.337E-05	-5.32E-05	0.0001938	2.342E-05	-0.000158	-0.000109	-0.007817	-0.000193	-0.000324	-0.000525	-0.000272	-0.000313	-0.000322	-0.0002	-0.000183	-0.000233	1.33E-05	-0.000263	-0.000117	-0.000552	-0.006678	8.34E-05	-0.000378	-0.00011	-6.22E-05	0.0005982	-0.017708
8	0.0002703	-0.00025	0.000441	0.0002019	-0.000394	-0.000667	-0.000226	-0.008953	-0.002339	0.0002482	-0.000727	-0.007877	-0.002352	-0.000169	-0.000408	-0.002757	0.0005106	-0.001144	-0.000385	-0.000947	-0.000462	-0.00375	-0.00012	-3.34E-05	-0.000471	-0.008803	-0.039524
9	0.0006743	0.0005609	0.000313	0.0003825	0.0001486	0.0009634	-2.23E-05	0.0003374	0.00717	-0.002733	-9.23E-05	0.000573	-0.001126	0.0001722	0.0002769	0.0002409	0.0006781	-0.000255	2.79E-05	-0.00121	2.80E-05	-4.03E-05	0.0026601	0.0001201	0.0037805	0.0012766	0.0143047
10	0.0126195	0.0064227	0.001429	0.0041395	0.000779	0.0070882	0.0071608	0.054418	0.0076257	0.0194637	-0.000434	0.029229	0.0089785	0.0035893	0.054523	0.0662379	0.0073443	-0.002375	0.0042161	0.0009549	0.0038645	0.0016011	0.000344	0.0003952	0.0062815	0.0102338	0.1570651
11	0.0038528	0.0034569	0.0011017	0.0099787	0.0077386	0.0050237	0.0025725	0.0026542	-0.001386	0.0041007	0.0027113	-0.001842	0.0059571	0.0063133	0.0047636	0.0014413	0.00026383	-0.0226	0.0055269	0.0021389	0.0057483	0.0055273	0.0018023	0.0016602	0.0038787	0.0015274	0.0662572
12	0.0012323	0.0013671	0.0009624	0.0021041	0.0001228	0.0021333	0.0018203	0.0019563	0.0009644	-0.000178	-0.000228	0.0038813	0.0002072	1.83E-05	0.0008247	-0.05493	0.0031214	-0.001082	0.0014187	0.0012763	0.001037	0.0004437	0.0003202	0.0001058	0.0004583	0.003278	0.021853
13	0.0002525	0.0001748	9.07E-05	0.0001128	8.957E-05	0.0002444	0.0010571	4.424E-05	0.0001155	-0.001421	1.828E-05	0.0003215	0.0058821	0.00029	-9.58E-06	0.0006886	0.0008145	-0.000156	0.0017483	-1.29E-05	4.93E-05	0.0001809	5.893E-05	0.0002173	-3.94E-05	0.0027808	0.0248562
14	0.0021587	0.001933	0.005095	0.0015395	0.0010785	0.0035159	0.0077225	0.0016074	0.0019188	0.001395	0.0004355	0.0019915	0.0030132	0.0392084	0.0312498	0.0170415	0.0218815	0.000482	0.0085561	0.0006493	0.0023061	0.0027464	0.000833	-0.000893	0.001446	0.0134401	0.1725513
15	0.0017398	0.0013502	0.0045111	0.0003603	0.0001727	0.002679	0.0088321	0.0005886	0.0008611	0.0007941	-0.000332	0.0010919	0.0007211	0.0008822	0.0013379	0.0024651	0.0022617	5.94E-05	0.0005836	-9.8E-05	0.001453	0.0004525	-0.00016	-0.00028	0.0003139	0.0040582	0.0365804
16	0.0024093	0.0029956	0.006605	0.0058279	0.003864	0.0040332	0.00201	0.0030918	0.002327	0.0032514	0.0016973	0.0032706	0.0019563	0.0023193	0.002471	0.043382	0.0049648	-0.001556	0.0111895	0.0018686	0.0042917	0.0087556	0.0039402	0.0010909	0.0044867	0.008276	0.1391777
17	0.0002324	0.0007727	0.0002952	-0.000242	0.0002593	0.0002077	0.0001351	0.0043126	-0.000469	3.9E-05	-1.84E-05	0.0006849	-1.2E-05	0.0001845	0.0003621	0.0002132	0.0105115	-0.000124	-0.003197	-0.000152	0.0001635	0.0003415	-0.000897	-0.000769	0.0015308	0.0041478	0.0259062
18	0.0012861	0.0026526	0.0008369	0.0014908	0.0016555	0.0041	0.0013647	0.0099132	0.0013009	0.0066116	-0.002074	0.0074319	0.008834	0.0087676	0.006045	0.0047638	0.0037245	0.0123707	0.0044085	0.0028076	0.0089753	0.0019836	0.001734	0.004356	0.0094877	0.0024881	0.1110867
19	1.99E-05	-0.000877	-0.000326	0.0002142	-0.000899	-0.000422	-0.000494	-0.001006	-0.002538	-0.002105	-0.000957	-0.000552	-0.001595	-0.000895	-0.000694	-0.000783	-0.000499	-0.001002	-0.000276	-0.00049	-0.00024	-0.000781	-0.000828	-0.000675	-0.000648	-0.001568	-0.026769
20	0.0056824	0.00368	0.0028052	0.004006	0.0009277	0.0047525	0.0026214	0.0025675	0.0054135	0.0015129	-0.000405	0.0050135	-0.001484	0.0002448	-0.00105	0.0001573	0.00069318	-0.0005455	0.0024667	-0.000186	0.001078	2.51E-05	0.0012914	-3.62E-05	0.0024376	0.0021549	0.0467607
21	0.0004227	-5.41E-05	0.0012678	-0.0001782	-0.000868	-0.000104	-0.000733	-0.000861	-0.00164	-0.002627	-0.01433	-0.000494	-0.001749	-0.000919	-0.000948	-0.001122	0.000332	-0.001448	-0.000487	-0.002451	-0.000901	-0.000515	-0.001892	-0.000446	-0.000136	-0.013249	-0.032888
22	0.0022738	0.0017041	0.0018974	0.0020373	0.0012211	0.0033381	0.0027589	0.002886	0.0003095	0.0020774	0.0007219	0.0037246	0.0003334	0.0018264	0.0022242	0.0020386	0.0038873	-3.94E-06	0.0070475	0.0035276	0.0040019	0.0152971	0.0043729	0.0005982	0.0013909	0.0083088	
23	0.0018476	0.0019793	0.0009736	0.0016506	0.0001211	0.0026393	0.0012529	0.0029448	0.0022236	0.0019868	-0.000613	0.0025395	0.0023567	0.0033378	0.0033053	0.0022803	0.0024942	0.0026394	0.002456	0.0029399	0.0017253	0.0021794	0.0064202	0.0005688	0.001003	0.0038488	0.0623119
24	0.0002322	0.0002344	6.36E-05	0.0001203	0.0003307	0.0003877	0.0002377	0.0006753	0.000468	0.0005611	0.00019	0.0004197	0.000227	0.0003836	0.0005456	0.0003947	0.0004635	-2.3E-05	0.0006749	0.0007257	0.0009306	0.0006792	0.0009594	0.0004272	0.0004543	0.0021238	0.0128873
25	0.0007325	0.0007664	0.0006655	0.0009512	0.0078943	0.0012915	0.002135	0.0008284	0.0029181	-0.000659	0.0037191	0.0016195	0.0031118	0.0025967	0.0015951	0.0011837	0.0014681	0.0013001	-0.001942	-0.000772	0.0009358	0.0023801	0.0017521	0.0011439	0.0046184	0.0025391	0.0485298
26	0.0001003	0.0002129	-0.000454	0.000072	-0.000983	0.0001958	-5.27E-05	0.0004061	-0.001695	-0.001745	-0.000895	-0.000114	-0.001443	-0.000282	-0.000945	-0.00048	-0.000574	-0.000413	-0.000444	-0.000614	-0.000121	-0.000563	-0.00066	1.639E-05	-0.000114	0.0002752	-0.010713
SUM	0.0428686	0.037288	0.028631	0.0611198	0.0295366	0.0565757	0.0285612	0.0273305	0.0275889	0.032506	0.0242827	0.0545853	0.0436163	0.065337	0.0566085	0.072833	0.0652299	-0.003057	0.0613702	0.0093702	0.0411092	0.0475444	0.0201736	0.0070807	0.0411814	0.0213345	1

Appendix 27
N Matrix, Thailand
1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-0.93297	0.090196	-0.28896	0.066897	1.09E-05	0.122462	-0.25083	0.01296	0.106596	0.090911	0.107488	-0.45224	0.101327	0.124677	0.11519	0.10587	0.075046	0.126798	0.121019	0.098574	0.098319	0.09373	0.087832	0.091023	0.000213	0.087867
2	0.06157	-0.94686	0.099455	0.076709	0.073794	0.083163	0.090385	0.093378	0.073484	0.068559	-0.16393	0.099138	0.029397	-0.38194	0.008591	0.060009	0.05772	0.079107	0.02292	0.018266	0.082093	0.063427	0.059421	0.061548	0.080054	0.064427
3	0.004571	0.048442	-1.1519	-0.0509	0.04955	0.061627	0.054299	0.069607	0.055298	0.035285	0.0564	0.053318	0.056141	0.069247	0.060832	0.055541	0.047815	0.066809	0.063374	0.067161	0.050621	0.053247	0.046577	0.048114	-0.01324	0.041573
4	0.03119	0.031122	0.049893	-0.9612	0.035524	0.041831	0.045901	0.049544	0.036553	0.037939	0.035486	0.049659	0.038669	0.044091	0.039463	0.035898	0.030745	0.045607	0.040716	0.044874	0.034951	0.036297	0.02949	0.039598	0.030788	0.033377
5	0.031166	0.031409	0.050343	0.041017	-0.98483	0.042064	0.046152	0.049984	0.036914	0.038024	0.035663	0.049795	0.038791	0.04435	0.039752	0.036063	0.03091	0.047011	0.040999	0.045258	0.03565	0.037024	0.029693	0.030845	0.041686	0.034262
6	0.042414	0.043187	0.065541	0.053148	0.048472	-1.26459	0.063115	0.065442	0.044073	0.051527	0.049352	0.062652	0.049469	0.061137	0.052852	0.048084	0.041987	0.029001	0.055419	0.061945	0.048673	0.04858	0.03931	0.042627	0.055446	0.041137
7	0.04695	0.046188	0.076289	0.057748	0.05442	0.063243	-1.02529	-0.24969	0.054452	0.053983	0.054408	0.074256	0.055096	0.066224	0.058591	0.054161	0.044079	0.057446	0.061541	-0.00867	0.052955	0.05539	0.043074	0.044011	0.061223	0.047927
8	0.031383	0.031424	0.050498	0.041015	0.035972	0.042175	0.046251	-0.96824	0.034553	0.038481	0.03573	0.049984	0.039058	0.044417	0.039671	0.035104	0.030905	0.047085	0.041106	0.044841	0.035559	0.037089	0.029693	0.03084	0.041241	0.034161
9	0.041905	0.039228	0.062209	0.036203	-2E-05	0.049051	0.060155	0.058374	-1.06021	0.030008	0.048001	0.063799	0.038043	0.058311	0.04186	0.040092	0.040628	0.041572	0.050895	0.055121	0.002758	0.045362	0.03676	0.03709	0.04538	0.035866
10	0.019462	0.040963	0.056203	0.046882	0.04345	0.047595	0.040859	0.027365	0.032714	-1.02422	0.046357	0.04084	0.013448	0.05593	0.042225	0.038072	0.033046	0.053139	0.054215	0.03925	0.046164	0.048323	0.039034	0.04099	0.042418	0.041275
11	0.041126	0.021713	0.071067	0.053863	0.055778	0.05348	0.058293	0.068423	0.051619	0.03943	-0.97487	0.067774	-0.00061	0.05663	0.057773	0.055745	0.050592	0.071244	-0.19318	0.052295	0.041732	0.00735	0.044837	0.052512	0.05019	0.045193
12	0.033158	0.032807	0.054728	0.044912	0.039238	0.043979	0.049126	0.045598	0.04008	0.041361	0.03945	-0.98277	0.041131	0.047761	0.043051	0.038531	0.005186	0.051037	0.044324	0.046377	0.035752	0.021765	0.031909	0.034349	0.040467	0.036692
13	0.040171	0.041366	0.059347	-0.03048	0.040462	0.049688	0.059829	0.035142	0.040816	0.026989	0.048552	0.063119	-0.9805	0.058917	0.0774	0.011774	0.040118	0.043501	0.054014	-0.03205	0.034566	0.049648	0.036715	0.03899	0.053468	0.041757
14	0.042159	0.038783	0.065783	0.052687	0.049703	0.057916	0.061862	0.056521	0.049883	0.049826	0.047646	0.067982	0.051013	-0.97993	-0.10428	0.019654	0.029021	0.029035	0.052844	-0.01147	0.047665	0.049802	0.039474	0.039905	0.0539	0.04262
15	0.031994	0.034535	0.035592	0.028491	0.039919	0.047281	0.049584	0.053742	0.040457	0.031927	0.034927	0.053659	0.041582	0.048485	-0.98406	0.03862	0.032086	0.051287	0.043337	0.023034	0.036849	0.04098	0.031326	0.033723	0.044303	0.036444
16	0.035577	0.031873	0.060318	0.045307	0.04443	0.05058	0.050335	0.059264	0.042215	0.04441	0.041686	0.057355	0.042485	0.049047	0.039996	-1.04092	0.029948	0.020341	0.041589	0.0243	0.042935	0.043138	0.028098	0.036495	0.043226	0.035968
17	0.031028	0.031458	0.050856	0.041387	0.036093	0.043124	0.04537	0.050193	0.037596	0.038931	0.036723	0.050457	0.038958	0.045327	0.040599	0.036899	-0.97184	0.048015	0.041845	0.045847	0.035846	0.016574	0.030574	0.031596	0.033304	0.033135
18	0.039136	0.039042	0.062776	0.050093	0.043561	0.044348	0.057606	0.061094	0.042594	0.047064	0.044624	0.062667	0.048087	0.055327	0.049294	0.044405	0.038555	-1.19114	0.051001	0.056286	0.043764	0.045802	0.036242	0.037933	0.050442	0.040003
19	0.042886	0.020503	0.062877	0.037727	0.046513	0.021449	0.051177	0.046172	0.033611	0.025883	0.042305	0.057599	0.004618	0.045514	0.043294	0.03992	0.041216	0.045342	-0.94901	0.050811	0.033719	0.04563	0.028422	0.038261	0.010955	0.032495
20	0.035769	0.029903	0.057886	0.045481	0.041901	0.047187	0.051565	0.055066	0.039545	0.042458	0.041076	0.056179	0.041559	0.04901	0.044193	0.040819	0.03671	0.051426	0.032491	-0.95713	0.026272	0.038882	0.025108	-0.00556	0.041307	-0.0091
21	0.051113	0.051465	0.066608	0.036109	0.042688	0.022681	0.078058	0.042201	-0.00211	0.013987	0.068341	0.061203	0.02732	0.073541	0.011998	-0.01881	0.051907	-0.04326	0.00594	0.022056	-0.93269	0.046882	0.060854	0.069165	0.040176	0.058456
22	0.042499	0.03574	0.046357	0.042208	0.022173	0.049653	0.010368	0.031777	0.040658	0.042535	0.047304	0.058594	0.041634	0.055152	0.045882	0.040464	0.03589	0.054086	0.045285	0.040066	0.024277	-1.04335	0.036713	0.04527	0.054589	0.034073
23	0.034824	0.034297	0.055042	0.042311	0.038271	0.042991	0.049106	0.05069	0.032886	0.038834	0.040279	0.054131	0.039852	0.04897	0.041031	0.035791	0.033938	0.043407	0.040238	0.047212	0.021981	0.032584	-0.98172	0.025864	0.027844	0.029346
24	0.041019	0.034976	0.06242	0.044534	0.042995	0.043005	0.051029	0.044762	0.033229	0.040104	0.046531	0.061739	0.039096	0.05376	0.041471	0.039923	0.038291	0.043604	0.04716	0.039285	0.002642	0.018039	0.039321	-1.00629	0.020642	0.036716
25	0.048534	0.03427	0.068397	0.018727	0.022126	0.052499	0.058939	0.046929	0.027062	0.019008	0.05368	0.07141	0.036929	0.061106	0.041588	0.044604	0.043705	0.039788	0.048114	0.043813	0.003308	0.004975	0.040422	0.039399	-0.97924	0.010144
26	0.032269	0.031739	0.05073	0.040672	0.036312	0.041316	0.046551	0.048475	0.035186	0.037676	0.036793	0.030233	0.038047	0.044719	0.038695	0.035591	0.031289	0.045887	0.041491	0.043433	0.026417	0.033602	0.030587	0.030307	0.038128	-0.96596

1985

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.09967	-0.22919	-0.02133	-0.03983	-0.00449	-0.48831	-0.12829	-0.12577	-0.03403	-0.05461	-0.00535	-0.31183	-0.01125	-0.00596	-0.00861	-0.02252	-0.03488	-0.00639	-0.01039	-0.01136	-0.13553	-0.01531	-0.00725	-0.00022	-0.01013	-0.26244
2	-0.00096	-1.04722	-0.00064	-0.00869	-0.00046	-0.10959	-0.00717	-0.00426	-0.00272	-0.01136	-0.00056	-0.00247	-0.00113	-0.00076	-0.001	-0.0014	-0.00797	-0.00061	-0.00122	-0.00147	-0.02912	-0.00108	-0.00087	-0.00032	-0.00194	-0.03649
3	-0.00219	-0.00406	-1.06417	-0.00335	-0.00584	-0.00373	-0.00236	-0.00301	-0.00683	-0.01369	-0.00394	-0.00602	-0.01374	-0.00407	-0.0066	-0.006	-0.2131	-0.00318	-0.02655	-0.00365	-0.01229	-0.00262	-0.00559	-0.00505	-0.00268	-0.01265
4	-0.00047	-0.041	-0.00024	-0.10357	-0.00079	-0.05305	-0.00395	-0.00108	-0.00236	-0.00407	-0.00096	-0.0013	-0.00168	-0.00099	-0.00107	-0.0014	-0.00266	-0.001	-0.00154	-0.00178	-0.03108	-0.00692	-0.00137	-0.00034	-0.00177	-0.02016
5	-0.02045	-0.0274	-0.02014	-0.1077	-1.08093	-0.03152	-0.0261	-0.04094	-0.05836	-0.07708	-0.59584	-0.03331	-0.19231	-0.28779	-0.4878	-0.08313	-0.04707	-0.22158	-0.1328	-0.01463	-0.03315	-0.17371	-0.01889	-0.01512	-0.01744	-0.06932
6	-0.0064	-0.43393	-0.00419	-0.07849	-0.00441	-1.13038	-0.07278	-0.01204	-0.02647	-0.06906	-0.06614	-0.0159	-0.0102	-0.00585	-0.00811	-0.01057	-0.04132	-0.00609	-0.00877	-0.01296	-0.19558	-0.00934	-0.00758	-0.00022	-0.01053	-0.33246
7	-0.00035	-0.00115	-0.00083	-0.00042	-0.0011	-0.00181	-1.14067	-0.0022	-0.00355	-0.00431	-0.00174	-0.0021	-0.00257	-0.00199	-0.00199	-0.00259	-0.00176	-0.00182	-0.00241	-0.0053	-0.13564	-0.00411	-0.00421	-0.00122	-0.00136	-0.046
8	-0.00899	-0.01269	-0.0064	-0.03327	-0.00631	-0.02139	-0.01043	-1.73633	-0.03631	-0.04417	-0.00787	-0.10538	-0.03044	-0.00908	-0.01306	-0.04002	-0.07889	-0.01254	-0.01867	-0.02166	-0.02606	-0.02844	-0.01691	-0.00373	-0.01647	-0.17166
9	-0.00487	-0.00643	-0.00195	-0.00356	-0.00537	-0.00894	-0.02952	-0.0195	-1.47055	-0.06327	-0.00593	-0.02173	-0.03518	-0.01257	-0.01326	-0.0174	-0.01964	-0.0072	-0.01632	-0.01998	-0.01192	-0.01398	-0.03615	-0.00358	-0.03155	-0.04762
10	-0.06983	-0.03912	-0.00885	-0.01273	-0.01599	-0.04538	-0.04737	-0.1571	-0.16154	-1.4406	-0.02824	-0.25715	-0.08308	-0.06062	-0.05987	-0.08508	-0.06485	-0.04686	-0.05021	-0.01058	-0.02982	-0.02449	-0.02123	-0.0058	-0.03577	-0.11131
11	-0.02931	-0.03551	-0.0262	-0.16636	-0.08166	-0.04248	-0.03575	-0.05983	-0.08459	-0.07839	-1.1299	-0.03662	-0.19632	-0.10393	-0.07601	-0.07359	-0.04278	-0.28877	-0.10609	-0.01944	-0.04294	-0.30221	-0.02632	-0.0122	-0.02051	-0.09965
12	-0.0042	-0.0056	-0.00145	-0.01003	-0.0059	-0.00692	-0.00692	-0.01288	-0.02294	-0.03595	-0.00712	-1.0782	-0.01416	-0.01111	-0.01527	-0.1136	-0.01833	-0.01556	-0.01807	-0.00744	-0.00694	-0.02486	-0.00441	-0.00202	-0.00775	-0.0306
13	-0.00172	-0.00233	-0.00549	-0.0028	-0.00203	-0.00241	-0.02173	-0.00344	-0.00574	-0.02048	-0.00216	-0.00495	-1.07565	-0.003	-0.00289	-0.02204	-0.0064	-0.00425	-0.14191	-0.00233	-0.00852	-0.00364	-0.00229	-0.00628	-0.00383	-0.0141
14	-0.01007	-0.01401	-0.02008	-0.0128	-0.02068	-0.01638	-0.01342	-0.01436	-0.03045	-0.0261	-0.02002	-0.01777	-0.06948	-1.7443	-0.8154	-0.27054	-0.07633	-0.02533	-0.28628	-0.00781	-0.01271	-0.03512	-0.01077	-0.01964	-0.01351	-0.06688
15	-0.00685	-0.00905	-0.01598	-0.00426	-0.00625	-0.01172	-0.00433	-0.00619	-0.01299	-0.01134	-0.00838	-0.00834	-0.00581	-0.00423	-1.03594	-0.02615	-0.01136	-0.00718	-0.0499	-0.00374	-0.00791	-0.00607	-0.00495	-0.00567	-0.00492	-0.03104
16	-0.02041	-0.0211	-0.01784	-0.03039	-0.06696	-0.02574	-0.03479	-0.03778	-0.07003	-0.05422	-0.05623	-0.03584	-0.08708	-0.07409	-0.06146	-1.50745	-0.03994	-0.11087	-0.10871	-0.01595	-0.02107	-0.16283	-0.02075	-0.01201	-0.03006	-0.13981
17	-0.00447	-0.00538	-0.00524	-0.00742	-0.00407	-0.00554	-0.00411	-0.01186	-0.01486	-0.01346	-0.00428	-0.00693	-0.01165	-0.00692	-0.01318	-0.0251	-1.15738	-0.00542	-0.07123	-0.01194	-0.00519	-0.0062	-0.01451	-0.0069	-0.01198	-0.05161
18	-0.0076	-0.02302	-0.00633	-0.02356	-0.01831	-0.02529	-0.02286	-0.05382	-0.06758	-0.06081	-0.06909	-0.03693	-0.07649	-0.09351	-0.06207	-0.05034	-0.03638	-1.16109	-0.04459	-0.01622	-0.03668	-0.03643	-0.02418	-0.01619	-0.02178	-0.07433
19	-0.00232	-0.00995	-0.00429	-0.00079	-0.00842	-0.00638	-0.00615	-0.01072	-0.02425	-0.01899	-0.00898	-0.00911	-0.01596	-0.00983	-0.00889	-0.01005	-0.00731	-0.00926	-1.00615	-0.00508	-0.00576	-0.00823	-0.01001	-0.05476	-0.00916	-0.01858
20	-0.02259	-0.09996	-0.01206	-0.04426	-0.01901	-0.09085	-0.05105	-0.1071	-0.11642	-0.115	-0.02288	-0.10288	-0.07955	-0.06686	-0.10059	-0.13992	-0.08423	-0.06458	-0.10411	-0.02167	-0.10611	-0.06171	-0.02489	-0.01052	-0.0331	-0.16074
21	-0.00281	-0.00645	-0.00251	-0.00328	-0.00933	-0.00882	-0.01102	-0.01492	-0.02178	-0.02861	-0.01388	-0.01381	-0.02086	-0.01348	-0.01427	-0.01887	-0.01355	-0.01403	-0.01644	-0.03862	-0.10321	-0.01566	-0.02387	-0.0073	-0.00872	-0.12049
22	-0.01711	-0.04014	-0.00798	-0.02292	-0.03447	-0.04143	-0.02958	-0.03564	-0.06292	-0.06369	-0.02982	-0.04198	-0.02956	-0.04668	-0.0476	-0.06427	-0.04201	-0.03845	-0.12255	-0.02756	-0.03967	-0.16772	-0.04578	-0.01024	-0.01762	-0.09799
23	-0.01837	-0.02378	-0.00784	-0.01513	-0.01136	-0.02045	-0.01443	-0.02232	-0.02363	-0.03152	-0.01834	-0.02245	-0.02963	-0.02254	-0.01956	-0.02008	-0.01857	-0.01517	-0.02572	-0.03652	-0.02084	-0.02527	-0.10259	-0.00753	-0.00679	-0.03918
24	-0.00034	-0.00045	-0.00015	-0.00034	-0.00062	-0.00072	-0.0004	-0.00056	-0.00091	-0.00209	-0.0101	-0.00084	-0.00226	-0.00073	-0.0012	-0.00224	-0.00066	-0.00247	-0.00095	-0.00019	-0.00079	-0.0033	-0.00218	-1.00523	-0.0013	-0.00182
25	-0.00479	-0.00668	-0.0048	-0.01098	-0.0319	-0.00851	-0.01469	-0.01801	-0.01665	-0.04482	-0.02752	-0.01573	-0.02219	-0.01878	-0.01594	-0.02042	-0.01212	-0.0192	-0.02185	-0.01777	-0.0149	-0.02256	-0.02077	-0.01154	-1.03674	-0.02392
26	-0.00196	-0.00215	-0.00778	-0.0013	-0.00777	-0.00326	-0.00603	-0.00484	-0.01948	-0.0124	-0.00814	-0.00502	-0.01529	-0.00542	-0.01119	-0.01038	-0.00867	-0.00938	-0.00777	-0.00953	-0.00455	-0.00987	-0.00974	-0.00101	-0.00423	-1.00661

1995

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.09388	-0.19387	-0.01582	-0.04373	-0.00425	-0.36777	-0.06559	-0.07629	-0.02652	-0.03603	-0.00409	-0.26373	-0.00868	-0.00517	-0.00817	-0.01948	-0.03063	-0.00488	-0.00955	-0.00857	-0.11695	-0.01254	-0.00539	-0.00153	-0.00965	-0.13869
2	-0.0009	-1.07758	-0.00057	-0.01562	-0.00059	-0.14462	-0.01108	-0.00538	-0.00489	-0.01028	-0.00058	-0.00343	-0.0014	-0.00095	-0.00119	-0.00144	-0.00971	-0.00054	-0.00135	-0.00132	-0.03362	-0.00115	-0.00086	-0.0002	-0.00233	-0.01727
3	-0.00084	-0.00239	-1.03894	-0.0012	-0.00282	-0.00249	-0.00136	-0.00125	-0.00279	-0.0053	-0.00186	-0.00476	-0.00737	-0.00194	-0.00245	-0.00253	-0.08236	-0.0013	-0.01337	-0.00133	-0.00564	-0.00121	-0.00181	-0.00154	-0.00116	-0.00747
4	-0.00044	-0.05191	-0.00049	-1.01809	-0.00047	-0.08216	-0.00631	-0.00144	-0.00282	-0.00474	-0.00046	-0.00165	-0.00095	-0.00059	-0.00077	-0.00091	-0.00374	-0.00044	-0.00087	-0.00127	-0.04149	-0.00079	-0.00074	-0.00018	-0.00194	-0.00932
5	-0.02051	-0.03003	-0.0121	-0.09806	-1.07173	-0.03682	-0.02593	-0.04395	-0.05675	-0.08681	-0.5912	-0.05505	-0.21848	-0.1638	-0.09544	-0.05872	-0.04088	-0.28519	-0.12095	-0.01534	-0.03819	-0.12956	-0.01547	-0.00869	-0.02055	-0.06664
6	-0.00455	-0.5165	-0.00379	-0.12547	-0.00411	-1.22879	-0.09025	-0.01532	-0.03629	-0.05204	-0.00445	-0.01706	-0.01002	-0.00562	-0.00734	-0.00861	-0.04511	-0.00418	-0.0083	-0.00984	-0.23863	-0.00776	-0.0061	-0.00133	-0.01289	-0.13415
7	-0.00037	-0.00092	-0.00092	-0.00047	-0.00095	-0.00118	-1.11943	-0.00139	-0.00181	-0.0026	-0.00099	-0.00142	-0.00167	-0.00113	-0.0014	-0.0017	-0.00159	-0.0011	-0.00176	-0.00368	-0.11301	-0.00431	-0.00286	-0.00066	-0.00099	-0.02877
8	-0.01144	-0.01107	-0.00803	-0.00836	-0.0061	-0.01427	-0.01131	-1.70132	-0.03327	-0.08706	-0.00603	-0.08677	-0.01757	-0.01058	-0.01628	-0.02825	-0.09238	-0.00837	-0.01606	-0.01608	-0.02531	-0.02251	-0.014	-0.00294	-0.01719	-0.12305
9	-0.00632	-0.01384	-0.00422	-0.00708	-0.01015	-0.022	-0.04234	-0.03296	-1.70065	-0.05885	-0.00747	-0.02735	-0.04256	-0.02087	-0.02435	-0.02734	-0.03824	-0.01115	-0.01969	-0.01807	-0.01639	-0.02221	-0.03863	-0.00624	-0.06005	-0.05522
10	-0.11023	-0.06411	-0.01772	-0.03217	-0.02799	-0.06958	-0.07899	-0.24065	-0.17683	-1.57577	-0.03483	-0.42976	-0.0883	-0.09056	-0.09411	-0.11672	-0.13893	-0.03371	-0.06227	-0.01712	-0.04194	-0.04309	-0.02537	-0.00584	-0.05971	-0.2189
11	-0.03019	-0.04031	-0.01477	-0.18021	-0.09687	-0.05035	-0.03092	-0.04627	-0.05291	-0.07345	-1.15064	-0.06461	-0.10247	-0.10179	-0.07024	-0.05735	-0.03941	-0.20047	-0.06982	-0.019	-0.04353	-0.23878	-0.02078	-0.00776	-0.02178	-0.06901
12	-0.00591	-0.01307	-0.00329	-0.03377	-0.00679	-0.01792	-0.01489	-0.01944	-0.02013	-0.03828	-0.00533	-1.10576	-0.01121	-0.00817	-0.0163	-0.06575	-0.04036	-0.00904	-0.01915	-0.01171	-0.01077	-0.03213	-0.00457	-0.00137	-0.00853	-0.13782
13	-0.00221	-0.00359	-0.00881	-0.00267	-0.00309	-0.00471	-0.02147	-0.0034	-0.00471	-0.01507	-0.00216	-0.00473	-1.10381	-0.01486	-0.01121	-0.02332	-0.01012	-0.00307	-0.01742	-0.00193	-0.00719	-0.00434	-0.00184	-0.00221	-0.00291	-0.02139
14	-0.01753	-0.02866	-0.04439	-0.01609	-0.03638	-0.04044	-0.04114	-0.02467	-0.039	-0.03232	-0.02366	-0.02417	-0.17581	-2.28786	-1.059	-0.34034	-0.19836	-0.02316	-0.34843	-0.00978	-0.02123	-0.05535	-0.01133	-0.00824	-0.02066	-0.17085
15	-0.01049	-0.01638	-0.02842	-0.00517	-0.00909	-0.02561	-0.02307	-0.00746	-0.01569	-0.01143	-0.00693	-0.00894	-0.00776	-0.01147	-1.04155	-0.0377	-0.01431	-0.00573	-0.04586	-0.00251	-0.01107	-0.00832	-0.00297	-0.00231	-0.00588	-0.03671
16	-0.03211	-0.04762	-0.05877	-0.05819	-0.149	-0.05836	-0.05373	-0.05951	-0.08673	-0.07857	-0.09228	-0.05591	-0.11244	-0.09995	-0.08547	-1.95134	-0.06511	-0.09295	-0.17318	-0.02653	-0.03961	-0.2699	-0.03709	-0.01107	-0.04588	-0.25807
17	-0.00512	-0.00818	-0.00855	-0.00443	-0.00635	-0.00739	-0.0052	-0.03765	-0.01361	-0.01596	-0.00443	-0.01063	-0.00946	-0.00741	-0.0153	-0.02125	-1.32215	-0.0051	-0.06551	-0.01375	-0.00585	-0.01085	-0.00863	-0.003	-0.01878	-0.08192
18	-0.01129	-0.03282	-0.00918	-0.01533	-0.02813	-0.03744	-0.02627	-0.07911	-0.06743	-0.0963	-0.03058	-0.06589	-0.10091	-0.16056	-0.09916	-0.06359	-0.05263	-1.17195	-0.05318	-0.02307	-0.06669	-0.03118	-0.02075	-0.01679	-0.03383	-0.06845
19	-0.00126	-0.00595	-0.00295	-0.00119	-0.00617	-0.00361	-0.00246	-0.00396	-0.01173	-0.00723	-0.00481	-0.00387	-0.00816	-0.00424	-0.00434	-0.00412	-0.00372	-0.00598	-1.00429	-0.00272	-0.00448	-0.00378	-0.00485	-0.01726	-0.00634	-0.01054
20	-0.03334	-1.48676	-0.01902	-0.05712	-0.02514	-0.1266	-0.05405	-0.12926	-0.14608	-0.14335	-0.02439	-0.13662	-0.06617	-0.05996	-0.09787	-0.13549	-0.13593	-0.03456	-0.10525	-1.02006	-0.12009	-0.05656	-0.0231	-0.0074	-0.0488	-0.19109
21	-0.00205	-0.00514	-0.00858	-0.0026	-0.00566	-0.00605	-0.00545	-0.00809	-0.01086	-0.01358	-0.00585	-0.00797	-0.01007	-0.00641	-0.00904	-0.01082	-0.01135	-0.00669	-0.011	-0.02513	-1.0072	-0.0113	-0.01299	-0.00316	-0.00588	-0.04177
22	-0.01618	-0.03979	-0.01107	-0.02363	-0.05765	-0.04228	-0.03455	-0.03778	-0.05852	-0.06094	-0.03828	-0.04564	-0.07712	-0.03808	-0.04505	-0.05976	-0.04482	-0.03663	-0.10258	-0.03781	-0.03963	-1.1083	-0.04831	-0.0098	-0.02284	-0.09772
23	-0.04334	-0.06675	-0.02129	-0.05211	-0.03584	-0.0723	-0.0425	-0.08088	-0.08758	-0.10522	-0.02996	-0.09276	-0.08241	-0.08176	-0.09083	-0.08103	-0.08489	-0.05544	-0.07046	-0.11889	-0.06278	-0.06341	-1.09758	-0.12973	-0.02315	-0.21496
24	-0.00105	-0.00242	-0.00069	-0.00142	-0.00259	-0.00266	-0.00207	-0.00416	-0.00349	-0.00555	-0.00207	-0.00404	-0.00381	-0.00247	-0.00392	-0.0058	-0.00458	-0.00198	-0.00342	-0.00782	-0.00463	-0.00665	-0.00701	-1.00323	-0.00204	-0.01356
25	-0.00492	-0.00886	-0.00546	-0.01414	-0.06515	-0.01238	-0.02013	-0.02219	-0.016	-0.03147	-0.04016	-0.01748	-0.032	-0.01631	-0.01888	-0.02088	-0.01729	-0.02669	-0.0234	-0.01324	-0.01433	-0.02467	-0.02212	-0.01028	-1.04154	-0.03454
26	-0.00134	-0.00241	-0.00205	-0.00164	-0.00337	-0.00292	-0.00699	-0.0046	-0.00673	-0.00739	-0.0032	-0.00372	-0.00576	-0.004	-0.00506	-0.00508	-0.00481	-0.00392	-0.00487	-0.00784	-0.00305	-0.01083	-0.0078	-0.00111	-0.00242	-1.00502

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.12935	-0.22786	-0.02362	-0.06953	-0.00493	-0.43193	-0.07532	-0.08606	-0.03485	-0.04358	-0.00437	-0.26368	-0.01319	-0.00599	-0.01095	-0.02832	-0.03859	-0.00425	-0.01391	-0.0126	-0.19088	-0.01781	-0.00854	-0.00316	-0.0173	-0.16303
2	-0.00264	-1.10952	-0.00083	-0.0263	-0.00078	-0.17337	-0.0146	-0.00951	-0.00678	-0.01601	-0.00068	-0.00717	-0.00346	-0.00137	-0.00189	-0.00267	-0.01329	-0.00056	-0.00245	-0.00197	-0.04516	-0.00193	-0.00141	-0.00027	-0.00392	-0.02168
3	-0.00148	-0.00274	-1.03667	-0.00122	-0.00205	-0.00274	-0.00157	-0.00196	-0.00866	-0.00783	-0.0014	-0.00395	-0.007	-0.00162	-0.00214	-0.0025	-0.05698	-0.00094	-0.01023	-0.00115	-0.00647	-0.00116	-0.00163	-0.00116	-0.00159	-0.00555
4	-0.00151	-0.06109	-0.00061	-1.02928	-0.00053	-0.09936	-0.00836	-0.00262	-0.00386	-0.00912	-0.00047	-0.004	-0.00197	-0.0008	-0.00109	-0.00152	-0.00493	-0.00037	-0.00135	-0.00163	-0.05662	-4.8E-06	-0.00093	-0.00018	-0.00294	-0.01008
5	-0.05271	-0.04827	-0.02159	-0.15116	-1.10701	-0.06311	-0.04605	-0.07404	-0.06297	-0.14379	-0.73626	-0.09755	-0.23731	-0.19093	-0.12488	-0.08979	-0.07352	-0.28079	-0.20016	-0.0264	-0.06589	-0.22193	-0.02689	-0.01288	-0.03944	-0.09825
6	-0.0075	-0.56472	-0.0037	-0.18802	-0.00376	-1.32473	-0.10775	-0.01701	-0.03517	-0.04675	-0.00362	-0.02001	-0.01414	-0.00494	-0.00672	-0.00912	-0.04244	-0.0032	-0.00957	-0.01172	-0.29554	-0.00938	-0.00711	-0.00129	-0.01671	-0.12666
7	-0.0004	-0.00061	-0.0007	-0.00056	-0.00068	-0.00096	-1.13476	-0.00101	-0.00104	-0.00148	-0.00074	-0.00084	-0.00108	-0.0008	-0.00084	-0.00111	-0.00116	-0.00082	-0.00136	-0.00383	-0.11654	-0.00491	-0.00368	-0.00065	-0.00108	-0.02971
8	-0.01882	-0.01343	-0.01217	-0.01597	-0.00577	-0.01653	-0.01476	-1.83156	-0.03154	-0.09155	-0.00528	-0.10656	-0.028	-0.00975	-0.01489	-0.03184	-0.10949	-0.00593	-0.0206	-0.01853	-0.03584	-0.02439	-0.02097	-0.00294	-0.02103	-0.12278
9	-0.01302	-0.01965	-0.00569	-0.01196	-0.01301	-0.03074	-0.06444	-0.04883	-1.90526	-0.06453	-0.011	-0.03967	-0.05453	-0.01728	-0.02492	-0.03576	-0.04691	-0.01141	-0.02786	-0.02233	-0.02507	-0.02749	-0.06862	-0.00613	-0.09375	-0.07522
10	-0.26121	-0.15405	-0.03727	-0.09056	-0.04227	-0.1598	-0.17996	-0.34804	-0.36917	-1.85277	-0.03995	-0.72894	-0.26205	-0.12119	-0.16175	-0.22464	-0.26172	-0.0339	-0.15788	-0.03631	-0.11312	-0.08712	-0.0493	-0.00925	-0.16972	-0.39052
11	-0.06596	-0.05778	-0.0246	-0.2315	-0.13424	-0.07629	-0.04635	-0.06955	-0.06277	-0.12974	-1.21492	-0.09934	-0.1338	-0.09751	-0.0837	-0.07766	-0.06123	-0.17251	-0.11394	-0.03035	-0.07082	-0.34294	-0.03282	-0.01031	-0.04059	-0.09632
12	-0.01528	-0.0201	-0.00638	-0.03591	-0.00887	-0.02943	-0.02005	-0.03053	-0.02978	-0.03468	-0.00729	-1.15252	-0.01677	-0.00977	-0.02643	-0.09865	-0.06771	-0.08086	-0.03079	-0.02253	-0.01837	-0.04765	-0.00919	-0.00244	-0.0146	-0.20163
13	-0.00237	-0.00282	-0.01061	-0.00319	-0.00191	-0.00398	-0.02301	-0.00305	-0.00246	-0.00852	-0.00152	-0.0034	-1.1112	-0.00653	-0.00746	-0.02325	-0.01625	-0.00178	-0.24526	-0.0021	-0.00856	-0.00504	-0.00208	-0.0014	-0.00248	-0.03262
14	-0.02628	-0.03142	-0.04691	-0.02519	-0.02808	-0.04908	-0.08953	-0.03064	-0.03113	-0.02988	-0.02249	-0.03107	-0.07453	-1.8101	-0.91821	-0.33166	-0.24872	-0.02011	-0.29268	-0.01193	-0.03306	-0.06749	-0.0149	-0.0071	-0.02611	-0.15909
15	-0.02045	-0.02534	-0.03918	-0.0117	-0.0109	-0.04238	-0.08864	-0.01399	-0.02137	-0.01764	-0.00955	-0.02071	-0.01268	-0.01105	-1.05038	-0.05485	-0.02611	-0.00728	-0.05321	-0.00425	-0.02538	-0.01694	-0.00507	-0.0026	-0.01003	-0.05469
16	-0.06256	-0.06062	-0.07502	-0.12288	-0.15028	-0.08045	-0.06681	-0.07453	-0.06696	-0.08924	-0.11275	-0.07736	-0.1199	-0.09936	-0.08759	-2.55708	-0.08622	-0.10463	-0.2954	-0.04859	-0.07781	-0.45876	-0.06777	-0.01772	-0.10011	-0.426
17	-0.00782	-0.00801	-0.01698	-0.00627	-0.00821	-0.00837	-0.0071	-0.05455	-0.01088	-0.01651	-0.00666	-0.01722	-0.01332	-0.00763	-0.01949	-0.02803	-1.40666	-0.00563	-0.06083	-0.01426	-0.00782	-0.01309	-0.01406	-0.00309	-0.02632	-0.08403
18	-0.02757	-0.03876	-0.013	-0.02766	-0.0267	-0.0485	-0.04147	-0.13329	-0.07449	-0.13798	-0.04231	-0.11537	-0.15128	-0.1507	-0.0657	-0.09729	-0.07664	-1.24901	-0.07995	-0.03487	-0.09745	-0.0521	-0.02906	-0.03212	-0.05201	-0.09112
19	-0.00038	-0.00278	-0.00104	-0.00099	-0.00205	-0.00157	-0.001	-0.00201	-0.0035	-0.0034	-0.00198	-0.00159	-0.00326	-0.00316	-0.00227	-0.00201	-0.00151	-0.00236	-1.00165	-0.00124	-0.00155	-0.00189	-0.00308	-0.01058	-0.00168	-0.0041
20	-0.0004	-0.00839	-0.00035	-0.00278	-0.00203	-0.00748	-0.00457	-0.01076	-0.01276	-0.01124	-0.00366	-0.0086	-0.01019	-0.00873	-0.01269	-0.01259	-0.00637	-0.0112	-0.01198	-1.00278	-0.01137	-0.00588	-0.0031	-0.00183	-0.0021	-0.01784
21	-0.00164	-0.00191	-0.0057	-0.00115	-0.00373	-0.00287	-0.00281	-0.00444	-0.00505	-0.00657	-0.00407	-0.00373	-0.00577	-0.00407	-0.00436	-0.00607	-0.00772	-0.00446	-0.00721	-0.02162	-1.00406	-0.00829	-0.00993	-0.0022	-0.00529	-0.02612
22	-0.0144	-0.01549	-0.00763	-0.01248	-0.03746	-0.01948	-0.01594	-0.02435	-0.02156	-0.03495	-0.03116	-0.02461	-0.03523	-0.02369	-0.02795	-0.03968	-0.0332	-0.02169	-0.09134	-0.04371	-0.02876	-1.14662	-0.0549	-0.00676	-0.02877	-0.08797
23	-0.02325	-0.02321	-0.01012	-0.01757	-0.01162	-0.02473	-0.01778	-0.03446	-0.02736	-0.03616	-0.01205	-0.02975	-0.03327	-0.02656	-0.02704	-0.02738	-0.02836	-0.03707	-0.02813	-0.03708	-0.02294	-0.03152	-1.05185	-0.0396	-0.01036	-0.06952
24	-0.00244	-0.00213	-0.00057	-0.00149	-0.00203	-0.00376	-0.00199	-0.0046	-0.00221	-0.00585	-0.00192	-0.00406	-0.00302	-0.00298	-0.00329	-0.0049	-0.00382	-0.0017	-0.00274	-0.00507	-0.00363	-0.00527	-0.00799	-1.00239	-0.0021	-0.01041
25	-0.00903	-0.0099	-0.00635	-0.01751	-0.07848	-0.0147	-0.02087	-0.02661	-0.01715	-0.031	-0.05966	-0.02239	-0.03463	-0.02136	-0.02036	-0.02366	-0.01981	-0.02825	-0.03208	-0.01138	-0.01749	-0.03903	-0.03005	-0.01341	-1.04875	-0.03316
26	-0.00359	-0.0059	-0.00188	-0.0109	-0.00287	-0.00813	-0.00929	-0.00837	-0.00795	-0.00629	-0.00274	-0.00432	-0.00603	-0.00439	-0.00486	-0.00543	-0.00507	-0.00379	-0.00449	-0.01248	-0.00467	-0.0105	-0.01233	-0.00308	-0.00493	-1.02981

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1	-1.07298	-0.164831	-0.02726	-0.05326	-0.003505	-0.343797	-0.059711	-0.062337	-0.021238	-0.02809	-0.003556	-0.231213	-0.009467	-0.005529	-0.008374	-0.017634	-0.025493	-0.004145	-0.010298	-0.008409	-0.125205	-0.009542	-0.00539	-0.00159	-0.012461	-0.094199
2	-0.001026	-1.098675	-0.000575	-0.018658	-0.000474	-0.130956	-0.010562	-0.004418	-0.002859	-0.007227	-0.000509	-0.002892	-0.001773	-0.000858	-0.000979	-0.001168	-0.007135	-0.000494	-0.001313	-0.001092	-0.029605	-0.00096	-0.000741	-0.000178	-0.002396	-0.015989
3	-0.001261	-0.001393	-1.039643	-0.000945	-0.001886	-0.001673	-0.001152	-0.002177	-0.019684	-0.006774	-0.001156	-0.003088	-0.006335	-0.001775	-0.002111	-0.002325	-0.061046	-0.001088	-0.009303	-0.0011	-0.004126	-0.001003	-0.001932	-0.002072	-0.001973	-0.005752
4	-0.001465	-0.050536	-0.00077	-1.041813	-0.000501	-0.071589	-0.006324	-0.001932	-0.002873	-0.010642	-0.000524	-0.004132	-0.001914	-0.001958	-0.001205	-0.001374	-0.003302	-0.000476	-0.001389	-0.001218	-0.044481	-0.000367	-0.000773	-0.000188	-0.002342	-0.009637
5	-0.050512	-0.058193	-0.031162	-0.159626	-1.137949	-0.078356	-0.057685	-0.007895	-0.017489	-1.038824	-0.008668	-0.09446	-0.259533	-0.245488	-0.1661	-0.112903	-0.096806	-0.355405	-0.194594	-0.034051	-0.083806	-0.245146	-0.040657	-0.023415	-0.055769	-0.125766
6	-0.005206	-0.48919	-0.004266	-0.18156	-0.003442	-1.312628	-0.10192	-0.010441	-0.022182	-0.035469	-0.003877	-0.01426	-0.01224	-0.005269	-0.005971	-0.007161	-0.035854	-0.003791	-0.008624	-0.008896	-0.242695	-0.007506	-0.005595	-0.001279	-0.016102	-0.138624
7	-0.000553	-0.000851	-0.001083	-0.000606	-0.000678	-0.001139	-1.098116	-0.001376	-0.001808	-0.001796	-0.000731	-0.001309	-0.001415	-0.001177	-0.001142	-0.001494	-0.001469	-0.001081	-0.001899	-0.003021	-0.092952	-0.005093	-0.002808	-0.000475	-0.001123	-0.040324
8	-0.009266	-0.007641	-0.007021	-0.013943	-0.003507	-0.010247	-0.007358	-1.686337	-0.016309	-0.041082	-0.003577	-0.057936	-0.016894	-0.008435	-0.009732	-0.018918	-0.078519	-0.00521	-0.013026	-0.012622	-0.021111	-0.012439	-0.016187	-0.002391	-0.011627	-0.113951
9	-0.006769	-0.009834	-0.004296	-0.00684	-0.008402	-0.01549	-0.023863	-0.022096	-1.533585	-0.027255	-0.00726	-0.017158	-0.024865	-0.016536	-0.016605	-0.019269	-0.023135	-0.00911	-0.016172	-0.014346	-0.013126	-0.014594	-0.058883	-0.005924	-0.061064	-0.054417
10	-0.182919	-0.09115	-0.026958	-0.62041	-0.029214	-0.097538	-0.114781	-0.205566	-0.242583	-1.608348	-0.04911	-0.544713	-0.088387	-0.070102	-0.123622	-0.135465	-0.153171	-0.030073	-0.111405	-0.020955	-0.05242	-0.043761	-0.027791	-0.006966	-0.102476	-0.178179
11	-0.066139	-0.064299	-0.033254	-0.220378	-0.153633	-0.084037	-0.056877	-0.073262	-0.076213	-0.115161	-1.211885	-0.05459	-0.15094	-0.152057	-0.118909	-0.095157	-0.077617	-0.188949	-0.136167	-0.035634	-0.077396	-0.344277	-0.045553	-0.016142	-0.057239	-0.120754
12	-0.013952	-0.01596	-0.00752	-0.028904	-0.006183	-0.024979	-0.021084	-0.028737	-0.031776	-0.029814	-0.005791	-1.104522	-0.014811	-0.011248	-0.023036	-0.06554	-0.047858	-0.007438	-0.026103	-0.017385	-0.014531	-0.023616	-0.006345	-0.001844	-0.011048	-0.043688
13	-0.002022	-0.002166	-0.004028	-0.002945	-0.001524	-0.002896	-0.027599	-0.002916	-0.00296	-0.008442	-0.001312	-0.00352	-1.05976	-0.004506	-0.006346	-0.019425	-0.01442	-0.002098	-0.219812	-0.001652	-0.006982	-0.003383	-0.001822	-0.001787	-0.00232	-0.039037
14	-0.039342	-0.04023	-0.088414	-0.036097	-0.037406	-0.065108	-0.107161	-0.044502	-0.05316	-0.043505	-0.039417	-0.048885	-0.096842	-2.163124	-1.192564	-0.497895	-0.363782	-0.035556	-0.394167	-0.015928	-0.041327	-0.076957	-0.021582	-0.009753	-0.039685	-0.246535
15	-0.027507	-0.020481	-0.055022	-0.010083	-0.009148	-0.035742	-0.076287	-0.011518	-0.019483	-0.016434	-0.008186	-0.020224	-0.01204	-0.014505	-1.053856	-0.05204	-0.025426	-0.008398	-0.063888	-0.003596	-0.019027	-0.012382	-0.004656	-0.002569	-0.00932	-0.066478
16	-0.05119	-0.056364	-0.093289	-0.100869	-0.114543	-0.076782	-0.051085	-0.072669	-0.06444	-0.085621	-0.090911	-0.081218	-0.113335	-0.03993	-0.090092	-2.06227	-0.088345	-0.112945	-0.250353	-0.037813	-0.070988	-0.788819	-0.060959	-0.018521	-0.090001	-0.273117
17	-0.007024	-0.006955	-0.006169	-0.005782	-0.007771	-0.007701	-0.006077	-0.052084	-0.011652	-0.01498	-0.006439	-0.013623	-0.013515	-0.01054	-0.017742	-0.024866	-1.30958	-0.006581	-0.049323	-0.012078	-0.007563	-0.009952	-0.009831	-0.00306	-0.028999	-0.085578
18	-0.026581	-0.045908	-0.019292	-0.031323	-0.027256	-0.069523	-0.045738	-0.146378	-0.083276	-0.127525	-0.030998	-0.116408	-0.148268	-0.19194	-0.137302	-0.103941	-0.089859	-1.218305	-0.095461	-0.03762	-0.119956	-0.051675	-0.037478	-0.048883	-0.055655	-0.095479
19	-0.000511	-0.00264	-0.00128	-0.001353	-0.001782	-0.001594	-0.001254	-0.002478	-0.004427	-0.003893	-0.001706	-0.002239	-0.004099	-0.002696	-0.00214	-0.002737	-0.001929	-0.002526	-1.002028	-0.001177	-0.002381	-0.001848	-0.003084	-0.010654	-0.00231	-0.04164
20	-0.070885	-0.118261	-0.034661	-0.082942	-0.0317	-0.126553	-0.073312	-0.129552	-0.179656	-0.125509	-0.029736	-0.147565	-0.07778	-0.075875	-0.094021	-0.153464	-0.151157	-0.039963	-0.132873	-0.021889	-0.117568	-0.070778	-0.039762	-0.009079	-0.057354	-0.147458
21	-0.002976	-0.003904	-0.011689	-0.002774	-0.003992	-0.005274	-0.004294	-0.006773	-0.011771	-0.009054	-0.004156	-0.007309	-0.007243	-0.006324	-0.006384	-0.008203	-0.010208	-0.005108	-0.010763	-0.027196	-1.05971	-0.009943	-0.01123	-0.002489	-0.007105	-0.024934
22	-0.043476	-0.054117	-0.026897	-0.044221	-0.047395	-0.074782	-0.053026	-0.063541	-0.092457	-0.077743	-0.04989	-0.78903	-0.095818	-0.71575	-0.707079	-0.08312	-0.08063	-0.04231	-0.181102	-0.051261	-0.077426	-1.224161	-0.095346	-0.014986	-0.061665	-0.200972
23	-0.038395	-0.039857	-0.016235	-0.031076	-0.015485	-0.045486	-0.029445	-0.051902	-0.044662	-0.040795	-0.051455	-0.048295	-0.052415	-0.061475	-0.053948	-0.044931	-0.048619	-0.052479	-0.050687	-0.049694	-0.039333	-0.050334	-1.089112	-0.058985	-0.020032	-0.072015
24	-0.003516	-0.003205	-0.001364	-0.00254	-0.003828	-0.005281	-0.003136	-0.006834	-0.005388	-0.006993	-0.003242	-0.005747	-0.004911	-0.004752	-0.00638	-0.006405	-0.006573	-0.003307	-0.007873	-0.006633	-0.009073	-0.010504	-0.011595	-1.004383	-0.006476	-0.019699
25	-0.012058	-0.01451	-0.010323	-0.020827	-0.086319	-0.023433	-0.032826	-0.031203	-0.043511	-0.038997	-0.067199	-0.030255	-0.052483	-0.034278	-0.030092	-0.030052	-0.028133	-0.039206	-0.043036	-0.013442	-0.028182	-0.048753	-0.039583	-0.022487	-1.07973	-0.047792
26	-0.00232	-0.004796	-0.001681	-0.003903	-0.002331	-0.005457	-0.005765	-0.008548	-0.00624	-0.005291	-0.002437	-0.004148	-0.006994	-0.005016	-0.005202	-0.007516	-0.005602	-0.008326	-0.005287	-0.008459	-0.004742	-0.006948	-0.006412	-0.001398	-0.003237	-1.008242

Appendix 28
Residual Matrix Thailand
1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.0902	0.288965	-0.0669	-1.1E-05	-0.12246	0.250834	-0.01296	-0.1066	-0.09091	-0.10749	0.452242	-0.10133	-0.12468	-0.11519	-0.10587	-0.07505	-0.12168	-0.12102	-0.09857	-0.09832	-0.09373	-0.08783	-0.09102	-0.00021	-0.08787	-0.93297
2	-0.06157	0	-0.09946	-0.07671	-0.07379	-0.08316	-0.09039	-0.09338	-0.07348	-0.06856	0.163935	-0.09914	-0.0294	0.381935	-0.00859	-0.06001	-0.05772	-0.07911	-0.02292	-0.01827	-0.0682	-0.06343	-0.05942	-0.06155	-0.08005	-0.06443	-0.94686
3	-0.00457	-0.04844	0	0.050895	-0.04955	-0.06163	-0.0543	-0.06961	-0.0553	-0.03529	-0.0564	-0.05332	-0.05614	-0.06925	-0.06083	-0.05554	-0.04781	-0.06681	-0.06337	-0.06716	-0.05062	-0.05325	-0.04658	-0.04811	0.013239	-0.04157	-1.15131
4	-0.03119	-0.03112	-0.04989	0	-0.03552	-0.04183	-0.04659	-0.04954	-0.03655	-0.03794	-0.03549	-0.04966	-0.03867	-0.04409	-0.03946	-0.0359	-0.03074	-0.04661	-0.04072	-0.04487	-0.03495	-0.0363	-0.02949	-0.0306	-0.03079	-0.03338	-0.96121
5	-0.03117	-0.03141	-0.05034	-0.04102	0	-0.04206	-0.04615	-0.04998	-0.03691	-0.03802	-0.03566	-0.04979	-0.03879	-0.04035	-0.03975	-0.03606	-0.03091	-0.04701	-0.041	-0.04526	-0.03565	-0.03702	-0.02969	-0.03084	-0.04169	-0.03426	-0.98483
6	-0.04241	-0.04319	-0.06554	-0.05315	-0.04847	0	-0.06312	-0.06544	-0.04407	-0.05153	-0.04935	-0.06265	-0.04947	-0.06114	-0.05285	-0.04808	-0.04199	-0.029	-0.05542	-0.06194	-0.04067	-0.04858	-0.03931	-0.04263	-0.05545	-0.04114	-1.26459
7	-0.04695	-0.04619	-0.07629	-0.05775	-0.05442	-0.06324	0	0.249693	-0.05445	-0.05398	-0.05441	-0.07426	-0.0551	-0.06622	-0.05859	-0.05416	-0.04408	-0.05745	-0.06154	0.008671	-0.05295	-0.05539	-0.04307	-0.04401	-0.06122	-0.04793	-1.02529
8	-0.03138	-0.03142	-0.0505	-0.04102	-0.03597	-0.04218	-0.04625	0	-0.03455	-0.03848	-0.03573	-0.04998	-0.03906	-0.04442	-0.03967	-0.0351	-0.0309	-0.04709	-0.04111	-0.04484	-0.03556	-0.03709	-0.02969	-0.03084	-0.04124	-0.03416	-0.96824
9	-0.0419	-0.03923	-0.06721	-0.0362	2E-05	-0.04905	-0.06015	-0.05837	0	-0.03001	-0.048	-0.0638	-0.03804	-0.05831	-0.04186	-0.04009	-0.04063	-0.04157	-0.05089	-0.05512	-0.00276	-0.04536	-0.03676	-0.03709	-0.04538	-0.03587	-1.05865
10	-0.01846	-0.04096	-0.0562	-0.04688	-0.04345	-0.0476	-0.04086	-0.02237	-0.03271	0	-0.04636	-0.04084	-0.01345	-0.05593	-0.04223	-0.03807	-0.03305	-0.05314	-0.05422	-0.03925	-0.04616	-0.04832	-0.03903	-0.04099	-0.04242	-0.04128	-1.02422
11	-0.04113	-0.02171	-0.07107	-0.05386	-0.05578	-0.05348	-0.05829	-0.06842	-0.05162	-0.03943	0	-0.06777	0.000611	-0.05663	-0.05777	-0.05574	-0.05059	-0.07124	0.193185	-0.0523	-0.04173	-0.00735	-0.04484	-0.05251	-0.05019	-0.04519	-0.97486
12	-0.03316	-0.03281	-0.05473	-0.04491	-0.03924	-0.04398	-0.04913	-0.0456	-0.04008	-0.04136	-0.03945	0	-0.04113	-0.04776	-0.04305	-0.03853	-0.00519	-0.05104	-0.04432	-0.04638	-0.03575	-0.02176	-0.03191	-0.03435	-0.04047	-0.03669	-0.98277
13	-0.04017	-0.04137	-0.05935	0.030477	-0.04046	-0.04969	-0.05983	-0.03514	-0.04082	-0.02699	-0.04855	-0.06312	0	-0.05892	-0.0774	-0.01177	-0.04012	-0.0435	-0.05401	0.032055	-0.03457	-0.04965	-0.03672	-0.03899	-0.05347	-0.04176	-0.98382
14	-0.04216	-0.03878	-0.06578	-0.05269	-0.0497	-0.05792	-0.06186	-0.05652	-0.04988	-0.04983	-0.04765	-0.06798	-0.05101	0	0.104281	-0.01965	-0.02902	-0.02903	-0.05284	0.011467	-0.04766	-0.04098	-0.03947	-0.03991	-0.0539	-0.04262	-0.97993
15	-0.03199	-0.03453	-0.03559	-0.02849	-0.03992	-0.04728	-0.04958	-0.05374	-0.04046	-0.03193	-0.03493	-0.05366	-0.04158	-0.04848	0	-0.03862	-0.03209	-0.05129	-0.04334	-0.02303	-0.03685	-0.04098	-0.03133	-0.03372	-0.0443	-0.03644	-0.98417
16	-0.03558	-0.03187	-0.06032	-0.04531	-0.04443	-0.05058	-0.05034	-0.05926	-0.04221	-0.04441	-0.04169	-0.05736	-0.04249	-0.04905	-0.04	0	-0.02995	-0.02034	-0.04159	-0.0243	-0.04293	-0.04314	-0.0281	-0.0365	-0.04323	-0.03597	-1.04092
17	-0.03103	-0.03146	-0.05086	-0.04139	-0.03609	-0.04312	-0.04537	-0.05019	-0.0376	-0.03893	-0.03672	-0.05046	-0.03896	-0.04533	-0.0406	-0.0369	0	-0.04802	-0.04184	-0.04585	-0.03585	-0.01657	-0.03957	-0.03196	-0.03304	-0.03313	-0.97184
18	-0.03914	-0.03904	-0.06278	-0.05009	-0.04356	-0.04435	-0.05761	-0.06109	-0.04259	-0.04706	-0.04462	-0.06207	-0.04809	-0.05533	-0.04929	-0.0444	-0.03855	0	-0.051	-0.05629	-0.03376	-0.0458	-0.03624	-0.03793	-0.05044	-0.04	-1.19115
19	-0.04289	-0.0205	-0.06288	-0.03773	-0.04651	-0.02145	-0.05118	-0.04617	-0.03361	-0.02588	-0.04231	-0.0576	-0.04662	-0.04551	-0.04329	-0.03992	-0.04122	-0.04534	0	-0.05081	-0.03772	-0.04563	-0.02842	-0.03826	-0.01095	-0.0325	-0.9489
20	-0.03577	-0.0299	-0.05789	-0.04548	-0.0419	-0.04719	-0.05157	-0.05507	-0.03954	-0.04246	-0.04108	-0.05618	-0.04156	-0.04901	-0.04419	-0.04082	-0.03671	-0.05143	-0.03249	0	-0.02627	-0.03888	-0.02511	0.005558	-0.04131	0.009102	-0.95713
21	-0.05113	-0.05147	-0.06661	-0.03611	-0.04269	-0.02768	-0.07806	-0.0422	0.002106	-0.01309	-0.06834	-0.0612	-0.02232	-0.07354	-0.012	0.018811	-0.05191	0.043258	-0.00594	-0.02206	0	-0.04688	-0.06085	-0.06917	-0.04018	-0.05846	-0.93269
22	-0.0425	-0.03574	-0.04636	-0.04221	-0.02217	-0.04965	-0.01037	-0.03178	-0.04066	-0.04254	-0.0473	-0.05359	-0.04163	-0.05515	-0.04588	-0.04046	-0.03589	-0.05409	-0.04529	-0.04007	-0.02428	0	-0.03671	-0.04527	-0.04569	-0.03407	-1.01435
23	-0.03482	-0.0343	-0.05504	-0.04231	-0.03827	-0.04299	-0.04911	-0.05069	-0.03289	-0.03883	-0.04028	-0.05413	-0.03985	-0.04897	-0.04103	-0.03579	-0.03394	-0.04341	-0.04024	-0.04721	-0.02198	-0.03258	0	-0.02586	-0.02784	-0.02935	-0.98172
24	-0.04102	-0.03498	-0.06242	-0.04453	-0.043	-0.043	-0.05103	-0.04476	-0.03323	-0.04001	-0.04653	-0.06174	-0.0391	-0.05376	-0.04147	-0.03992	-0.03829	-0.0436	-0.04716	-0.03928	-0.00264	-0.01804	-0.03932	0	-0.02064	-0.03672	-1.00629
25	-0.04853	-0.03427	-0.0684	-0.01873	-0.02213	-0.0525	-0.05894	-0.04693	-0.02706	-0.01901	-0.05368	-0.07141	-0.03693	-0.06111	-0.04159	-0.0446	-0.04371	-0.03979	-0.04811	-0.04381	-0.03331	-0.00498	-0.04042	-0.0394	0	-0.01014	-0.97948
26	-0.03227	-0.03174	-0.05073	-0.04067	-0.03612	-0.04132	-0.04655	-0.04848	-0.03519	-0.03768	-0.03679	-0.05023	-0.03805	-0.04472	-0.03869	-0.03559	-0.03129	-0.04589	-0.04149	-0.04343	-0.02642	-0.0336	-0.03959	-0.03031	-0.03813	0	-0.96596
SUM	-0.93289	-0.94663	-1.15225	-0.96276	-0.98314	-1.26439	-1.02508	-0.96801	-1.05997	-1.02424	-0.97487	-0.9847	-0.98614	-0.97972	-1.01101	-1.01282	-0.97133	-1.18932	-0.94869	-0.95791	-0.93158	-1.01412	-0.98149	-1.00626	-0.97899	-0.96581	-26.2141

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.229191	0.021331	0.039833	0.004489	0.488311	0.128291	0.12577	0.034034	0.054613	0.005348	0.311826	0.011246	0.005962	0.008609	0.022519	0.034876	0.006389	0.010394	0.011365	0.135528	0.015308	0.007246	0.002198	0.010135	0.26244	1.987252
2	0.000956	0	0.006638	0.006688	0.000455	0.109586	0.00717	0.004261	0.002723	0.011157	0.000559	0.002466	0.001134	0.000756	0.000998	0.001399	0.007969	0.000606	0.001218	0.001469	0.029125	0.001082	0.000866	0.000321	0.00194	0.03649	0.234234
3	0.002187	0.00406	0	0.003351	0.005839	0.00373	0.002363	0.003008	0.006829	0.01369	0.003944	0.006018	0.013739	0.004068	0.0066	0.006002	0.2131	0.003176	0.026549	0.003649	0.012286	0.002616	0.005592	0.005055	0.002679	0.012646	0.372776
4	0.000468	0.041	0.000243	0	0.000786	0.053946	0.003949	0.001075	0.002357	0.004065	0.000957	0.001304	0.00168	0.00099	0.001072	0.001401	0.002657	0.000998	0.001536	0.001783	0.031083	0.006916	0.001366	0.000344	0.001775	0.020159	0.18301
5	0.020448	0.027402	0.02014	0.1077	0	0.035157	0.026098	0.040942	0.058359	0.077077	0.95984	0.033311	0.192313	0.287792	0.148783	0.083129	0.047074	0.221576	0.132797	0.014633	0.033147	0.173709	0.018892	0.015118	0.017443	0.06932	2.494559
6	0.006397	0.433934	0.004187	0.079492	0.004412	0	0.072784	0.012036	0.026467	0.050604	0.006144	0.015897	0.0102	0.005849	0.008111	0.010572	0.041325	0.006087	0.008768	0.012961	0.195577	0.009335	0.007575	0.002204	0.010527	0.332461	1.391368
7	0.000348	0.001153	0.000827	0.000417	0.001095	0.001814	0	0.002204	0.003547	0.004313	0.00174	0.002104	0.002572	0.001991	0.00199	0.002595	0.001764	0.001823	0.002415	0.005303	0.135642	0.004107	0.004206	0.001216	0.00136	0.045998	0.232547
8	0.008994	0.012687	0.006397	0.033273	0.006314	0.021394	0.010435	0	0.036314	0.044167	0.007868	0.05382	0.030441	0.009077	0.013061	0.040018	0.078888	0.012537	0.038669	0.021665	0.026058	0.028441	0.016915	0.003726	0.01647	0.17166	0.780853
9	0.004874	0.006429	0.001953	0.003563	0.005367	0.008935	0.02952	0.019503	0	0.063267	0.005934	0.021725	0.035176	0.012574	0.013255	0.017399	0.019645	0.007198	0.016347	0.01998	0.011916	0.01398	0.036155	0.003578	0.031548	0.047622	0.457442
10	0.06983	0.039115	0.008846	0.012728	0.015988	0.045384	0.047385	0.157096	0.161536	0	0.02824	0.257147	0.083079	0.060624	0.059873	0.085083	0.064855	0.046856	0.050207	0.010578	0.298821	0.02449	0.021225	0.005796	0.035771	0.111306	1.53284
11	0.029308	0.035509	0.026196	0.166357	0.081656	0.042478	0.03575	0.059931	0.084593	0.07839	0	0.03662	0.196319	0.10393	0.076012	0.073588	0.042777	0.288767	0.106086	0.019436	0.042942	0.302213	0.026318	0.012196	0.020511	0.099647	2.087533
12	0.004202	0.005605	0.001446	0.01003	0.005904	0.00692	0.006917	0.012876	0.022937	0.035947	0.007119	0	0.014159	0.011115	0.015271	0.113598	0.018328	0.015555	0.018075	0.007441	0.006942	0.024861	0.004414	0.002019	0.007745	0.030601	0.410026
13	0.00172	0.002326	0.005491	0.002799	0.002031	0.002413	0.021725	0.003437	0.005736	0.020484	0.002162	0.004947	0	0.002297	0.002889	0.022039	0.0064	0.004246	0.141909	0.002331	0.008516	0.003644	0.002292	0.006628	0.003825	0.014105	0.296743
14	0.010074	0.014013	0.020082	0.012798	0.020679	0.016382	0.013421	0.014364	0.030455	0.026103	0.020017	0.017768	0.069483	0	0.815402	0.270536	0.076328	0.025325	0.286277	0.007811	0.01271	0.035274	0.010765	0.019639	0.01351	0.066881	1.925949
15	0.006847	0.009407	0.015983	0.004257	0.006254	0.011722	0.004329	0.006189	0.012986	0.011139	0.00838	0.008336	0.00581	0.004226	0	0.026148	0.011356	0.007182	0.049897	0.003743	0.007913	0.006069	0.004948	0.005667	0.004921	0.031036	0.274583
16	0.020406	0.021103	0.017841	0.030389	0.066965	0.025742	0.034795	0.037781	0.070026	0.054217	0.056232	0.035837	0.087076	0.074086	0.061461	0	0.03994	0.11087	0.108709	0.015945	0.021075	0.162834	0.020752	0.012013	0.030056	0.13981	1.355962
17	0.004472	0.005385	0.005241	0.007424	0.004069	0.005542	0.004114	0.011864	0.01486	0.01346	0.00428	0.00693	0.011647	0.006922	0.013183	0.025102	0	0.005421	0.07123	0.011944	0.005191	0.006293	0.014507	0.006901	0.011983	0.051609	0.329485
18	0.007599	0.023017	0.006333	0.023559	0.018308	0.025294	0.022862	0.053815	0.067584	0.060815	0.069092	0.036934	0.076492	0.093514	0.062069	0.050343	0.036381	0	0.04536	0.016222	0.03668	0.036426	0.02418	0.016191	0.02278	0.074328	1.004406
19	0.002316	0.009946	0.004292	0.000793	0.008422	0.006376	0.006147	0.010723	0.024254	0.01899	0.008976	0.009108	0.015957	0.009826	0.00889	0.010055	0.007307	0.009256	0	0.005083	0.005763	0.008234	0.010015	0.054764	0.009159	0.018578	0.283228
20	0.022594	0.09996	0.012056	0.004259	0.019011	0.090854	0.051055	0.107103	0.116419	0.114998	0.022875	0.10288	0.079554	0.066661	0.100591	0.139925	0.084227	0.064585	0.104114	0	0.106108	0.061708	0.024885	0.010522	0.033102	0.16074	1.840985
21	0.002809	0.006454	0.002513	0.003277	0.009334	0.008819	0.011022	0.014922	0.021782	0.022608	0.013381	0.013809	0.020862	0.013477	0.014266	0.01887	0.013549	0.014027	0.016445	0.038617	0	0.015664	0.023874	0.007304	0.008724	0.120489	0.463397
22	0.017109	0.040138	0.007983	0.022918	0.03447	0.041427	0.029578	0.035641	0.062924	0.063893	0.29822	0.041977	0.09256	0.046682	0.047601	0.064269	0.042007	0.038455	0.122549	0.027559	0.039673	0	0.045778	0.010236	0.017624	0.097991	1.120665
23	0.018374	0.023777	0.007835	0.011512	0.011364	0.020453	0.014429	0.022316	0.023629	0.031521	0.18344	0.022452	0.029635	0.022536	0.019563	0.020082	0.018572	0.015171	0.025723	0.036524	0.020844	0.025274	0	0.007526	0.00679	0.039184	0.517049
24	0.000345	0.000449	0.001502	0.000337	0.000617	0.000721	0.000402	0.000557	0.000909	0.002888	0.001012	0.000842	0.002255	0.000735	0.001196	0.002243	0.000658	0.002467	0.000954	0.000189	0.000789	0.003304	0.002178	0	0.001302	0.001822	0.028523
25	0.004788	0.006678	0.004798	0.01098	0.031896	0.008507	0.014691	0.018009	0.016649	0.044819	0.027519	0.015729	0.022187	0.018777	0.015941	0.020421	0.01212	0.019302	0.021852	0.017772	0.014902	0.022564	0.020774	0.011537	0	0.023922	0.447031
26	0.001959	0.002154	0.007781	0.001298	0.007769	0.003259	0.006026	0.004842	0.019479	0.012403	0.008141	0.00502	0.01529	0.00542	0.011189	0.010378	0.008673	0.009376	0.007768	0.009527	0.004554	0.00987	0.009745	0.001007	0.004232	0	0.187159
SUM	0.269425	1.100532	0.210587	0.644653	0.373494	1.080625	0.605236	0.780265	0.927389	0.959487	0.954426	1.116367	1.120864	0.870788	1.527878	1.137717	0.930776	0.937153	1.395043	0.235531	0.974785	1.003975	0.365463	0.223358	0.324914	2.080945	22.23957

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.193873	0.01982	0.043725	0.004247	0.367774	0.065594	0.07629	0.026523	0.036026	0.004086	0.263735	0.00868	0.005166	0.008168	0.019476	0.030631	0.004878	0.009547	0.008574	0.116953	0.012539	0.005387	0.001527	0.009647	0.138685	1.48155
2	0.0009	0	0.000566	0.015617	0.000592	0.144621	0.011081	0.005379	0.004895	0.010282	0.000578	0.003426	0.001399	0.000952	0.001185	0.001438	0.009709	0.000537	0.001355	0.001324	0.033822	0.001145	0.000861	0.0002	0.002226	0.017267	0.27126
3	0.000838	0.00239	0	0.001201	0.002815	0.002489	0.001359	0.001252	0.002789	0.005303	0.001861	0.00476	0.007388	0.001937	0.002448	0.002526	0.082359	0.001299	0.013371	0.001325	0.005641	0.00121	0.001808	0.001541	0.001163	0.007468	0.15852
4	0.000437	0.05191	0.000489	0	0.000473	0.082159	0.006312	0.001436	0.002816	0.004739	0.000455	0.001646	0.000954	0.000589	0.000771	0.000915	0.003744	0.000442	0.000873	0.001267	0.041494	0.00079	0.000735	0.000175	0.001942	0.009319	0.21689
5	0.020508	0.030027	0.022099	0.098064	0	0.036817	0.025927	0.043949	0.056755	0.08681	0.591199	0.055055	0.218476	0.163798	0.095443	0.058716	0.040883	0.285188	0.120948	0.01534	0.038187	0.129563	0.015472	0.008689	0.02055	0.066638	2.3351
6	0.004551	0.516502	0.00379	0.125473	0.00411	0	0.090253	0.015318	0.036293	0.052044	0.004448	0.01706	0.010022	0.005622	0.007345	0.008606	0.045107	0.004184	0.008302	0.009838	0.238628	0.00776	0.006096	0.00133	0.012892	0.134152	1.36973
7	0.000371	0.000921	0.00092	0.000467	0.000948	0.001184	0	0.001389	0.001814	0.002599	0.000989	0.001419	0.001667	0.001129	0.001405	0.001701	0.001593	0.001103	0.001758	0.003675	0.113013	0.004313	0.002864	0.000663	0.000994	0.028767	0.17766
8	0.014441	0.011072	0.008026	0.008356	0.006103	0.014271	0.011311	0	0.033273	0.087057	0.006028	0.086767	0.017571	0.01058	0.016283	0.028253	0.09238	0.08367	0.011147	0.019689	0.018072	0.01659	0.022207	0.03863	0.006242	0.007193	0.123053
9	0.006319	0.013843	0.00422	0.007084	0.010153	0.022002	0.042343	0.032958	0	0.058847	0.007475	0.073748	0.04256	0.020869	0.024354	0.027345	0.038243	0.011147	0.019689	0.018072	0.01659	0.022207	0.03863	0.006242	0.007193	0.123053	0.6943
10	0.110225	0.064105	0.017716	0.032167	0.027987	0.069575	0.078987	0.240652	0.176826	0	0.04829	0.429759	0.088296	0.090556	0.094115	0.116717	0.138926	0.033708	0.062267	0.07118	0.041941	0.043086	0.025374	0.005835	0.059707	0.128905	2.31938
11	0.03019	0.040308	0.014767	0.180206	0.096872	0.050345	0.03092	0.046271	0.052909	0.073448	0	0.064614	0.102472	0.101792	0.07024	0.057348	0.039408	0.200474	0.069819	0.019404	0.019147	0.043532	0.238776	0.020785	0.007761	0.021777	0.069014
12	0.005907	0.013071	0.003294	0.033773	0.006786	0.017918	0.014893	0.019442	0.020128	0.038278	0.005332	0	0.011211	0.008817	0.016297	0.065575	0.040359	0.00904	0.019147	0.011711	0.010771	0.032126	0.004568	0.001366	0.008529	0.137819	0.55569
13	0.002208	0.003588	0.008814	0.002671	0.003091	0.004714	0.021465	0.003404	0.004709	0.015066	0.00216	0.004727	0	0.014858	0.011207	0.02332	0.010115	0.003072	0.174721	0.001933	0.007189	0.004341	0.011332	0.008238	0.02066	0.170851	2.81998
14	0.017529	0.028657	0.044388	0.016092	0.036382	0.040438	0.041145	0.024669	0.038996	0.03232	0.023659	0.024169	0.175814	0	0.105998	0.349344	0.198358	0.023157	0.348427	0.009776	0.021228	0.055353	0.011332	0.008238	0.02066	0.170851	2.81998
15	0.010489	0.016381	0.028424	0.005168	0.009093	0.025613	0.023071	0.007458	0.015685	0.011434	0.006926	0.00894	0.007763	0.011475	0	0.037702	0.014308	0.005733	0.04586	0.002513	0.01107	0.008321	0.002967	0.002311	0.005884	0.036706	0.36129
16	0.032115	0.047624	0.058769	0.058187	0.149005	0.058364	0.053728	0.059511	0.086729	0.078565	0.092278	0.055909	0.112438	0.099954	0.085474	0	0.06511	0.092949	0.173181	0.026533	0.039608	0.269898	0.037091	0.011067	0.045881	0.258069	2.14804
17	0.005121	0.008177	0.008549	0.004427	0.00635	0.00739	0.005197	0.037654	0.013612	0.01596	0.004432	0.010627	0.009459	0.007412	0.015301	0.027248	0	0.005105	0.053182	0.023071	0.066693	0.03118	0.02075	0.016788	0.033825	0.068446	1.29055
18	0.011287	0.032822	0.009181	0.015325	0.028126	0.037437	0.026273	0.079108	0.067428	0.096304	0.030577	0.06589	0.100913	0.160557	0.099163	0.063594	0.052625	0	0.053182	0.023071	0.066693	0.03118	0.02075	0.016788	0.033825	0.068446	1.29055
19	0.001258	0.005951	0.002949	0.001192	0.006171	0.003606	0.002462	0.003964	0.011729	0.007228	0.004808	0.003871	0.008159	0.004245	0.004343	0.004118	0.037722	0.00598	0	0.0272	0.004481	0.003782	0.004855	0.017259	0.006342	0.010541	0.13573
20	0.033337	0.148755	0.019025	0.05712	0.025143	0.126604	0.054049	0.129263	0.146084	0.143355	0.024392	0.136616	0.066168	0.059959	0.097871	0.135493	0.133593	0.034561	0.105252	0	0.120086	0.056562	0.023098	0.007396	0.008804	0.191095	2.12602
21	0.002048	0.005142	0.008583	0.002598	0.005655	0.006045	0.005451	0.008092	0.010862	0.013581	0.005948	0.007973	0.010071	0.006411	0.009044	0.01082	0.011351	0.006687	0.011	0.025132	0	0.011298	0.012993	0.003159	0.005879	0.047168	0.24749
22	0.016179	0.039788	0.011069	0.022629	0.057648	0.042284	0.034554	0.037777	0.058523	0.060937	0.038281	0.045637	0.07712	0.038075	0.04905	0.059762	0.044817	0.036625	0.10258	0.037807	0.039635	0	0.048306	0.009797	0.02284	0.097772	1.12544
23	0.043344	0.066752	0.021292	0.052107	0.035837	0.077204	0.042503	0.080876	0.087583	0.105225	0.029959	0.092757	0.082411	0.081763	0.090831	0.081029	0.08489	0.055443	0.070464	0.118894	0.062783	0.063413	0	0.129729	0.023147	0.21496	1.89029
24	0.010151	0.002416	0.000685	0.001417	0.002586	0.002562	0.002069	0.004158	0.003489	0.005551	0.002066	0.004044	0.003308	0.002477	0.003919	0.005797	0.004578	0.001985	0.003425	0.007821	0.004629	0.006646	0.007006	0	0.002042	0.013555	0.09988
25	0.004924	0.008857	0.005465	0.014141	0.06515	0.012382	0.020134	0.021194	0.015999	0.031468	0.040162	0.017478	0.032003	0.016308	0.018877	0.020877	0.017292	0.025685	0.0234	0.013241	0.014533	0.024666	0.022118	0.010283	0	0.034538	0.53298
26	0.001339	0.00241	0.002055	0.001645	0.00337	0.002922	0.00699	0.004603	0.006726	0.007388	0.003204	0.003722	0.005762	0.003998	0.005065	0.005079	0.004807	0.003916	0.004869	0.007837	0.003049	0.010832	0.007803	0.001114	0.002416	0	0.11292
SUM	0.373915	1.35534	0.314954	0.800853	0.594692	1.25192	0.718072	0.987066	0.983177	1.079813	0.966031	1.437948	1.202564	0.918647	1.883196	1.206974	1.111247	0.862266	1.525012	0.414362	1.126111	1.073166	0.345379	0.26063	0.456172	2.24853	25.5944

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.227858	0.02362	0.069532	0.004926	0.431926	0.075319	0.086063	0.034848	0.043583	0.004372	0.263682	0.013194	0.005986	0.01095	0.028323	0.038589	0.00425	0.013906	0.022597	0.190877	0.017811	0.008543	0.003158	0.017304	0.163028	1.7942
2	0.002641	0	0.000832	0.026295	0.000781	0.173373	0.014604	0.009507	0.006779	0.016006	0.000677	0.007167	0.003458	0.001375	0.001894	0.002666	0.013288	0.000562	0.002454	0.001971	0.045162	0.001926	0.001407	0.000269	0.003923	0.021677	0.3607
3	0.00148	0.00274	0	0.001221	0.002051	0.002735	0.00157	0.001961	0.008656	0.007835	0.001397	0.003947	0.007002	0.00162	0.002137	0.002499	0.056982	0.000937	0.010226	0.0015	0.006466	0.00116	0.001628	0.00116	0.001594	0.005552	0.1357
4	0.00151	0.061985	0.00061	0	0.000535	0.099358	0.008355	0.002616	0.003859	0.009121	0.000467	0.004004	0.001975	0.000798	0.001089	0.00152	0.004926	0.000372	0.001347	0.001628	0.056621	4.83E-06	0.000931	0.000184	0.00294	0.010085	0.2768
5	0.052707	0.048266	0.021586	0.151162	0	0.063114	0.046045	0.074042	0.062968	0.143789	0.736259	0.097545	0.237315	0.190929	0.124878	0.089787	0.073515	0.280793	0.200161	0.026403	0.065888	0.221926	0.026895	0.012883	0.039445	0.098252	3.1866
6	0.007504	0.564722	0.003697	0.188023	0.00376	0	0.101752	0.017011	0.035166	0.046749	0.003617	0.020015	0.014442	0.004937	0.006716	0.00912	0.04244	0.003201	0.009572	0.011722	0.295537	0.00938	0.007106	0.001294	0.016712	0.120656	1.5446
7	0.000401	0.000613	0.000699	0.000556	0.000685	0.000956	0	0.001011	0.001045	0.001482	0.000737	0.000837	0.001081	0.000802	0.000835	0.001112	0.001161	0.000817	0.001358	0.003828	0.116537	0.00491	0.003678	0.000648	0.001077	0.029712	0.1766
8	0.018824	0.013429	0.02168	0.015974	0.00577	0.016533	0.014758	0	0.03154	0.091545	0.005276	0.106555	0.028	0.009749	0.014891	0.031838	0.10949	0.005933	0.020597	0.035844	0.024933	0.029973	0.002941	0.021032	0.122782	0.7994	
9	0.013017	0.01965	0.005692	0.011957	0.013008	0.030735	0.064438	0.048829	0	0.064526	0.011001	0.039674	0.054529	0.017285	0.024923	0.035757	0.046907	0.011406	0.027861	0.022328	0.02507	0.027488	0.068621	0.006133	0.093746	0.075216	0.8598
10	0.261214	0.15405	0.037265	0.090558	0.04227	0.159799	0.179961	0.348043	0.36917	0	0.039949	0.728945	0.262045	0.12119	0.161753	0.224644	0.261723	0.033904	0.157881	0.03631	0.087122	0.049304	0.009253	0.169717	0.390525	4.4897	
11	0.065957	0.05778	0.024599	0.134238	0.07629	0.046346	0.069555	0.062768	0.129739	0	0.099345	0.133802	0.097507	0.083704	0.077655	0.061229	0.172511	0.11394	0.030349	0.070818	0.34294	0.032824	0.010306	0.040587	0.096317	2.3626	
12	0.015277	0.020102	0.006376	0.035905	0.008866	0.029434	0.020052	0.030534	0.02978	0.034675	0.00729	0	0.016766	0.009766	0.026433	0.098649	0.067706	0.00806	0.030788	0.022534	0.018374	0.04765	0.009193	0.00244	0.014601	0.201627	0.8129
13	0.002366	0.00282	0.01061	0.003186	0.001909	0.003985	0.023015	0.003048	0.002456	0.008521	0.001523	0.003403	0	0.006526	0.00746	0.023247	0.01625	0.001784	0.245257	0.002096	0.008558	0.005041	0.002081	0.001395	0.002481	0.032617	0.4216
14	0.02628	0.031424	0.046909	0.025193	0.028076	0.049082	0.089529	0.030636	0.03113	0.029878	0.022488	0.031067	0.07453	0	0.918209	0.33166	0.24872	0.020107	0.292682	0.011928	0.033058	0.067494	0.014902	0.007102	0.02611	0.150086	2.6383
15	0.020453	0.025342	0.039177	0.0117	0.010903	0.042381	0.088636	0.013991	0.021366	0.017638	0.009547	0.020708	0.012682	0.011052	0	0.054853	0.026114	0.007275	0.053207	0.004252	0.025379	0.016938	0.005072	0.002598	0.010028	0.054688	0.606
16	0.06256	0.060623	0.075025	0.122884	0.15028	0.08045	0.066808	0.074526	0.066956	0.080237	0.11275	0.077357	0.119895	0.099361	0.087592	0	0.086216	0.104634	0.295395	0.048593	0.077807	0.458763	0.06777	0.017218	0.100111	0.426001	3.0288
17	0.007815	0.008011	0.016983	0.006266	0.008215	0.00837	0.007097	0.054553	0.010879	0.015508	0.006657	0.072717	0.013321	0.007632	0.019488	0.028028	0	0.005629	0.060831	0.014259	0.00782	0.013905	0.014056	0.003093	0.026324	0.084033	0.4662
18	0.027569	0.038759	0.013003	0.027659	0.025699	0.048501	0.041467	0.133289	0.07449	0.137977	0.042308	0.115372	0.151277	0.1507	0.105568	0.097287	0.076642	0	0.079947	0.034875	0.097454	0.052104	0.029064	0.032116	0.052012	0.091118	1.7783
19	0.000375	0.002782	0.001044	0.000994	0.00205	0.00157	0.001	0.002007	0.003503	0.003398	0.001981	0.001588	0.003257	0.003159	0.002269	0.002012	0.001513	0.002359	0	0.001241	0.001549	0.001887	0.003079	0.010584	0.001684	0.004103	0.061
20	0.0004	0.00839	0.000355	0.002779	0.002029	0.007482	0.004571	0.010755	0.012757	0.011236	0.003661	0.006603	0.010191	0.00873	0.012691	0.012588	0.00637	0.011201	0.011984	0	0.011367	0.005882	0.003099	0.001826	0.002099	0.017841	0.1889
21	0.001636	0.001914	0.005698	0.001152	0.003725	0.002869	0.002808	0.004436	0.005053	0.00657	0.004069	0.003726	0.005774	0.004067	0.004363	0.006069	0.007217	0.004463	0.007212	0.021617	0	0.00829	0.009931	0.002203	0.005293	0.026122	0.1563
22	0.014398	0.015493	0.007631	0.012481	0.037455	0.019484	0.01594	0.024352	0.021561	0.034949	0.031155	0.024614	0.035227	0.023687	0.027946	0.039675	0.033204	0.021686	0.091342	0.043709	0.028759	0	0.054902	0.006757	0.028769	0.087967	0.7831
23	0.023246	0.023208	0.010124	0.017573	0.011615	0.02473	0.017778	0.034456	0.027361	0.036161	0.012046	0.02975	0.033267	0.026557	0.027038	0.027376	0.028356	0.037073	0.028128	0.037079	0.022939	0.031522	0	0.0396	0.010362	0.06952	0.6869
24	0.002441	0.002129	0.000569	0.001489	0.002032	0.003758	0.001994	0.004598	0.002209	0.005853	0.001924	0.004057	0.003021	0.002982	0.003288	0.004896	0.00382	0.001699	0.002736	0.005069	0.003635	0.005274	0.007989	0	0.002096	0.010411	0.09
25	0.009031	0.0099	0.006353	0.017511	0.017842	0.014702	0.02087	0.026611	0.017154	0.031005	0.059663	0.022395	0.034633	0.021364	0.020358	0.023659	0.019808	0.028249	0.032083	0.011381	0.017489	0.039034	0.030047	0.013407	0	0.03316	0.6383
26	0.003589	0.005395	0.001878	0.010904	0.002866	0.008126	0.009292	0.008374	0.007945	0.006288	0.002743	0.004323	0.006028	0.004386	0.004859	0.005426	0.005068	0.003789	0.004492	0.012479	0.004673	0.010501	0.012333	0.003077	0.004093	0	0.1543
SUM	0.642692	1.407883	0.372502	1.084457	0.583225	1.399743	0.964004	1.114805	0.951401	1.024268	1.123557	1.735894	1.276411	0.832146	1.702337	1.260345	1.337257	0.772694	1.795386	0.437932	1.380801	1.502534	0.48543	0.191643	0.694975	2.423095	28.497

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.1648314	0.027226	0.0535257	0.0035052	0.3437972	0.059711	0.0623371	0.0212382	0.0280001	0.003556	0.2312125	0.0094668	0.0055294	0.0083744	0.0176337	0.0254925	0.0041452	0.0102976	0.0084089	0.1252046	0.0095416	0.0053899	0.0015988	0.00124614	0.0944195	1.3367657
2	0.001026	0	0.0005746	0.0186579	0.0004742	0.1309538	0.0105619	0.0044184	0.002859	0.0072269	0.0005087	0.0028919	0.0017732	0.0008581	0.0009788	0.0011681	0.0071353	0.0004994	0.0013125	0.0001092	0.0296054	0.0009403	0.000741	0.000178	0.00023956	0.0159889	0.2448365
3	0.0012608	0.0013929	0	0.000945	0.0016857	0.0016733	0.0011518	0.0027771	0.0196845	0.0067739	0.0011564	0.0030884	0.0063353	0.0017749	0.0021105	0.002325	0.0610458	0.0010882	0.0093031	0.0011001	0.0041258	0.0010033	0.0019315	0.0010718	0.0019734	0.0057518	0.1419304
4	0.0014649	0.0505359	0.007697	0	0.0005008	0.0715886	0.0063242	0.0019315	0.0028726	0.0106418	0.0005241	0.0041317	0.0019137	0.0005716	0.0012048	0.0013735	0.003302	0.0004759	0.0013887	0.0012184	0.0444814	0.0003666	0.0007732	0.0001883	0.00024197	0.0096365	0.2210859
5	0.056512	0.0581334	0.031619	0.1596261	0	0.0783557	0.0576851	0.0878852	0.0774893	0.1388237	0.0086677	0.0944556	0.2595236	0.2454883	0.1680997	0.1128034	0.0986804	0.3554053	0.0459337	0.0340509	0.083806	0.2451457	0.0406566	0.0234151	0.0557393	0.1251657	3.702845
6	0.052062	0.4891899	0.0042659	0.181598	0.0034424	0	0.1019202	0.0104413	0.0221818	0.0354894	0.0038766	0.0142604	0.0122241	0.0052693	0.0059705	0.0071608	0.0338542	0.0037911	0.0086244	0.0088962	0.2426949	0.007569	0.0055953	0.001279	0.0161025	0.138624	1.374059
7	0.0005528	0.0008306	0.001083	0.0006056	0.006776	0.0011393	0	0.0013761	0.0018081	0.0017962	0.000731	0.0013089	0.0014448	0.001177	0.0011417	0.001494	0.0014691	0.0010811	0.0018991	0.0030206	0.0295254	0.0059831	0.0026076	0.0004754	0.0011226	0.0403243	0.167202
8	0.0092562	0.0076414	0.0070212	0.0138434	0.0035071	0.0102469	0.0073576	0	0.0163091	0.041082	0.0035769	0.0579365	0.0168939	0.0084354	0.0097318	0.0189183	0.0785188	0.0052303	0.0130264	0.0126217	0.021111	0.012439	0.0161875	0.0023908	0.00116266	0.113951	0.5188507
9	0.0067689	0.0098335	0.0042962	0.0068398	0.0084016	0.0154899	0.0238626	0.0220964	0	0.027255	0.0072602	0.0171585	0.0248651	0.016536	0.0166052	0.019269	0.0231354	0.0091102	0.0161717	0.045464	0.0131262	0.0145944	0.0588835	0.0059242	0.0610644	0.0544168	0.4073109
10	0.1829189	0.0911502	0.0289583	0.0629405	0.0292141	0.0975383	0.1147813	0.2055662	0.2425834	0	0.0349106	0.5447135	0.1883869	0.1070118	0.1236224	0.1356503	0.1531705	0.0300728	0.1114046	0.0209547	0.0652416	0.0437612	0.0277913	0.0069662	0.1024765	0.1781793	2.9270656
11	0.0661386	0.064299	0.032537	0.2203782	0.1536329	0.0840373	0.0568766	0.0732622	0.0762132	0.1151606	0	0.054588	0.1503398	0.1520565	0.1189066	0.0951568	0.0776167	0.1894983	0.1381674	0.0356339	0.0773957	0.3442766	0.0455529	0.0161424	0.0572395	0.1207544	2.6649019
12	0.0139523	0.0159597	0.0075199	0.0289038	0.0061834	0.0240788	0.0210843	0.0287372	0.0317763	0.0298144	0.0057912	0	0.0148111	0.0112479	0.0230361	0.0655398	0.0478582	0.0074394	0.0478582	0.017385	0.0145314	0.023616	0.0063454	0.0018436	0.011048	0.0436884	0.5291937
13	0.0020222	0.0021659	0.0040281	0.0028447	0.0015239	0.0028964	0.0275994	0.0029164	0.00296	0.0084416	0.0013118	0.0035204	0	0.0045056	0.0063456	0.0194247	0.0144197	0.020979	0.2198124	0.0016523	0.0069819	0.0033831	0.0018223	0.0017874	0.0023197	0.0390167	0.3858203
14	0.0393418	0.0402295	0.0884138	0.0360968	0.0374057	0.0651977	0.071609	0.0445022	0.0531603	0.043595	0.0304169	0.0488848	0.0668419	0	0.1925645	0.4978949	0.3637816	0.0355565	0.3941667	0.0159282	0.0413267	0.079569	0.0215822	0.009753	0.039685	0.2465345	3.6688881
15	0.0225067	0.0204806	0.055024	0.0108825	0.0091478	0.0357418	0.076287	0.0115181	0.0104826	0.0164344	0.0081859	0.0202241	0.01204	0.0145049	0	0.0520403	0.0254257	0.0083977	0.0638878	0.0033957	0.0190266	0.0123824	0.0404561	0.0025692	0.0093197	0.066478	0.599438
16	0.0511905	0.0563836	0.0932888	0.088669	0.1145425	0.0767824	0.0610848	0.0726689	0.0116525	0.0148799	0.0064394	0.0136229	0.0135354	0.0105396	0.0177422	0.0248665	0	0.00883652	0.1129447	0.2593532	0.0378133	0.0709876	0.2788189	0.0609592	0.0185208	0.090001	0.2731167
17	0.0070237	0.0069545	0.0061686	0.0057816	0.0077705	0.0077008	0.006077	0.0520839	0.0116525	0.0148799	0.0064394	0.0136229	0.0135354	0.0105396	0.0177422	0.0248665	0	0.00883652	0.1129447	0.2593532	0.0378133	0.0709876	0.2788189	0.0609592	0.0185208	0.090001	0.2731167
18	0.0265806	0.0459083	0.019292	0.0313228	0.0272558	0.0695234	0.0457384	0.1463777	0.0832764	0.1275499	0.038935	0.0017065	0.004099	0.0026957	0.00214	0.0027371	0.0019289	0.0025264	0	0.0011769	0.00023805	0.0018475	0.0030844	0.0106541	0.0023105	0.0041642	0.6689832
19	0.000511	0.0026402	0.0012801	0.0013534	0.0017821	0.0015836	0.001254	0.0024779	0.0044266	0.0038935	0.0017065	0.004099	0.0026957	0.00214	0.0027371	0.0019289	0.0025264	0	0.0011769	0.00023805	0.0018475	0.0030844	0.0106541	0.0023105	0.0041642	0.6689832	
20	0.070885	0.1182611	0.0349614	0.0829422	0.0317004	0.1265532	0.0733122	0.1295517	0.1796556	0.1255993	0.0297357	0.1475646	0.0777804	0.0758751	0.0940214	0.1534637	0.151157	0.0399632	0.1328728	0	0.1175576	0.0707782	0.039762	0.0090787	0.0573545	0.1747384	2.3449654
21	0.0029757	0.0039041	0.011689	0.0027738	0.0039923	0.0052738	0.0042945	0.0067728	0.0117707	0.0090541	0.0041556	0.0073088	0.0077834	0.0063241	0.0063839	0.0082033	0.0051077	0.0102083	0.0051077	0.01211957	0	0.0099431	0.0112297	0.0024887	0.0071051	0.0249341	0.2050952
22	0.0434763	0.0541165	0.0268966	0.044221	0.0475953	0.0747824	0.0530263	0.0635413	0.0924574	0.0777429	0.0049889	0.0789034	0.0958175	0.0715748	0.0702788	0.08312	0.0806304	0.0423103	0.1811023	0.0612609	0.0774263	0	0.0953458	0.0149857	0.0616648	0.200972	1.8342382
23	0.0383952	0.039857	0.0162346	0.0310759	0.0154851	0.0454857	0.0294447	0.0519022	0.0446621	0.0487952	0.0154549	0.0482949	0.0524447	0.0614749	0.0539475	0.0446307	0.0486188	0.0065728	0.0033075	0.0078733	0.006633	0.0090074	0.0105041	0.0115951	0	0.006476	0.1595063
24	0.00935156	0.0022653	0.001364	0.0025404	0.0036278	0.0052814	0.0031362	0.0068339	0.0053877	0.0069931	0.003242	0.007474	0.0049109	0.0047518	0.0063798	0.0064009	0.0065728	0.0033075	0.0078733	0.006633	0.0090074	0.0105041	0.0115951	0	0.006476	0.1595063	
25	0.0120579	0.0145102	0.0103227	0.0208268	0.086319	0.0234325	0.0328263	0.0312034	0.0435108	0.0389971	0.0671986	0.0032555	0.052493	0.0342783	0.0309916	0.300517	0.0281326	0.0392658	0.0430356	0.134418	0.0281810	0.048727	0.035829	0.0224874	0	0.0477923	0.6869882
26	0.0023196	0.0047957	0.0016812	0.0039032	0.0025307	0.0054566	0.0057646	0.0085481	0.0062405	0.0052908	0.0024365	0.0041476	0.0069044	0.0050161	0.0052019	0.0075157	0.0056016	0.0083262	0.0052874	0.0084592	0.0047417	0.0069478	0.0064123	0.0013982	0.0032373	0	1.028165
SUM	0.667866	1.367704	0.5147736	1.1234602	0.6019037	1.4054929	0.988323	1.1311273	1.1801027	1.0548169	1.2037408	1.099461	1.373621	1.4493168	2.1902759	1.5133877	1.5261067	0.9606858	2.0295189	0.4292784	1.3588236	1.3405796	0.5557968	0.2662149	0.717859	2.291838	30.40193

Appendix 29

Symmetric Matrix Thailand

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	-0.07588	0.142197	-0.04904	-0.01559	-0.08244	0.101942	-0.02217	-0.07425	-0.05469	-0.07431	0.209542	-0.07075	-0.08342	-0.07359	-0.07072	-0.05304	-0.08297	-0.08195	-0.06717	-0.07472	-0.06811	-0.06133	-0.06602	-0.02437	-0.06007	-0.93293	
2	-0.07588	0	-0.07395	-0.05392	-0.0526	-0.06318	-0.06829	-0.0624	-0.05636	-0.05476	0.071111	-0.06597	-0.03538	0.171576	-0.02156	-0.04594	-0.04459	-0.05907	-0.02271	-0.02408	-0.05983	-0.04958	-0.04686	-0.04826	-0.05716	-0.04808	-0.94674	
3	0.142197	-0.07395	0	0.000501	-0.04995	-0.06358	-0.06529	-0.06005	-0.05875	-0.04574	-0.06373	-0.05402	-0.05774	-0.06751	-0.04821	-0.05793	-0.04934	-0.06479	-0.06313	-0.06252	-0.05861	-0.0498	-0.05081	-0.05527	-0.02758	-0.04615	-1.15178	
4	-0.04904	-0.05392	0.000501	0	-0.03827	-0.04749	-0.05182	-0.04528	-0.03638	-0.04241	-0.04467	-0.04729	-0.0041	-0.04839	-0.03398	-0.0406	-0.03607	-0.04835	-0.03922	-0.04518	-0.03553	-0.03925	-0.0359	-0.03757	-0.02476	-0.03702	-0.96198	
5	-0.01559	-0.0526	-0.04995	-0.03827	0	-0.04527	-0.05029	-0.04298	-0.01845	-0.04074	-0.04572	-0.04452	-0.03963	-0.04703	-0.03984	-0.04025	-0.0335	-0.04529	-0.04376	-0.04358	-0.03917	-0.0296	-0.03398	-0.03692	-0.03191	-0.03519	-0.98398	
6	-0.08244	-0.06318	-0.06529	-0.04749	-0.04527	0	-0.06318	-0.05381	-0.04656	-0.04956	-0.05142	-0.05332	-0.04958	-0.05953	-0.05007	-0.04893	-0.04256	-0.03667	-0.03843	-0.05457	-0.03568	-0.04912	-0.04115	-0.04282	-0.05397	-0.04123	-1.26449	
7	0.101942	-0.06829	-0.06529	-0.05182	-0.05029	-0.06318	0	0.101721	-0.0573	-0.04742	-0.05635	-0.06169	-0.05746	-0.06404	-0.05409	-0.05225	-0.04472	-0.05753	-0.05636	-0.02145	-0.06551	-0.03288	-0.04609	-0.04752	-0.06008	-0.04724	-1.02519	
8	-0.02217	-0.0624	-0.06005	-0.04528	-0.04298	-0.05381	0.101721	0	-0.04646	-0.03042	-0.05208	-0.04779	-0.0371	-0.05047	-0.04671	-0.04718	-0.04055	-0.05409	-0.04364	-0.04995	-0.03888	-0.03443	-0.04019	-0.0378	-0.04409	-0.04132	-0.98812	
9	-0.07425	-0.05636	-0.05875	-0.03638	-0.01845	-0.04656	-0.0573	-0.04646	0	-0.03136	-0.04981	-0.05194	-0.03943	-0.0541	-0.04116	-0.04115	-0.03911	-0.04208	-0.04225	-0.04733	-0.00033	-0.04301	-0.03482	-0.03516	-0.03622	-0.03553	-1.05931	
10	-0.05469	-0.05476	-0.04574	-0.04241	-0.04074	-0.04956	-0.04742	-0.03042	-0.03136	0	-0.04289	-0.0411	-0.02022	-0.05288	-0.03708	-0.04124	-0.03599	-0.0501	-0.04005	-0.04085	-0.02963	-0.04543	-0.03893	-0.04055	-0.03071	-0.03948	-1.02423	
11	-0.07431	0.071111	-0.06373	-0.04467	-0.04572	-0.05142	-0.05635	-0.05208	-0.04981	-0.04289	0	-0.05361	-0.02397	-0.05212	-0.04635	-0.04872	-0.04366	-0.05793	-0.07544	-0.04669	-0.05504	-0.02733	-0.04256	-0.04952	-0.05194	-0.04099	-0.97487	
12	-0.209542	-0.06597	-0.05402	-0.04729	-0.04452	-0.05332	-0.06169	-0.04779	-0.05194	-0.0411	-0.05361	0	-0.05212	-0.05787	-0.04836	-0.04794	-0.02782	-0.05655	-0.05096	-0.05128	-0.04848	-0.04018	-0.04302	-0.04804	-0.05594	-0.04346	-0.98373	
13	-0.07075	-0.03538	-0.05774	-0.0041	-0.03963	-0.04958	-0.05746	-0.0371	-0.03943	-0.02022	-0.02397	-0.05212	0	-0.05496	-0.05949	-0.077898	0	-0.03931	-0.03435	-0.03717	-0.03954	-0.04579	-0.02932	-0.00475	-0.0399	-0.98498		
14	-0.08342	0.171576	-0.06751	-0.04839	-0.04703	-0.05953	-0.06404	-0.05047	-0.0541	-0.05288	-0.05214	-0.05787	-0.05496	0.027898	0	0.03931	0	-0.03342	-0.04218	-0.04918	-0.01877	-0.00606	-0.05248	-0.04422	-0.04683	-0.0575	-0.97983	
15	-0.07359	-0.02156	-0.04821	-0.03398	-0.03984	-0.05007	-0.05409	-0.04671	-0.04116	-0.03708	-0.04635	-0.04836	-0.05949	0.027898	0	-0.03931	-0.03634	-0.05029	-0.04332	-0.03361	-0.02442	-0.04343	-0.03618	-0.0376	-0.04295	-0.03757	-0.99759	
16	-0.07072	-0.04594	-0.05793	-0.0406	-0.04025	-0.04933	-0.05225	-0.04718	-0.04115	-0.04124	-0.04872	-0.04794	-0.02713	-0.03954	-0.03717	-0.03634	-0.03342	0	-0.0342	-0.04075	-0.03256	-0.04128	-0.03518	-0.03821	-0.04392	-0.03578	-1.02687	
17	-0.05304	-0.04459	-0.04934	-0.03607	-0.0335	-0.04256	-0.04472	-0.04055	-0.03911	-0.03599	-0.04366	-0.02782	-0.03954	-0.03717	-0.03634	-0.03342	-0.03237	-0.04328	-0.04153	-0.04128	-0.04388	-0.02623	-0.03226	-0.03513	-0.03837	-0.03721	-0.97159	
18	-0.08297	-0.05907	-0.06479	-0.04835	-0.04529	-0.03667	-0.05753	-0.05409	-0.04208	-0.0501	-0.05793	-0.05655	-0.04579	-0.04218	-0.05029	-0.03237	-0.04328	0	-0.04817	-0.05386	-0.00025	-0.04994	-0.03982	-0.04077	-0.04512	-0.04295	-1.90023	
19	-0.08195	-0.02171	-0.06313	-0.03922	-0.04376	-0.03943	-0.05636	-0.04364	-0.04225	-0.04005	-0.05754	-0.05096	-0.02932	-0.04918	-0.04332	-0.04075	-0.04153	-0.04817	0	-0.04165	-0.01983	-0.04546	-0.03433	-0.04271	-0.02953	-0.03699	-0.9488	
20	-0.06717	-0.02408	-0.06252	-0.04518	-0.04358	-0.05457	-0.02145	-0.04995	-0.04733	-0.04085	-0.04669	-0.05128	-0.00475	-0.03777	-0.03361	-0.03256	-0.04128	-0.05386	-0.04165	0	-0.02416	-0.03947	-0.03616	-0.01686	-0.04256	-0.01717	-0.95752	
21	-0.07472	-0.05983	-0.05861	-0.03553	-0.03917	-0.03568	-0.06551	-0.03888	-0.00033	-0.02963	-0.05504	-0.04848	-0.02844	-0.0606	-0.02442	-0.01206	-0.04888	-0.00025	-0.03982	-0.04165	0	-0.03558	-0.04142	-0.0359	-0.02174	-0.04244	-0.93214	
22	-0.06811	-0.04958	-0.0498	-0.03925	-0.0296	-0.04912	-0.03288	-0.03443	-0.04301	-0.04543	-0.02733	-0.04018	-0.04564	-0.05248	-0.04343	-0.0418	-0.02623	-0.04994	-0.04546	-0.03947	-0.03558	0	-0.03465	-0.03165	-0.02533	-0.03394	-1.04223	
23	-0.06133	-0.04686	-0.05081	-0.0359	-0.03398	-0.04115	-0.04609	-0.04019	-0.03482	-0.03893	-0.04256	-0.04302	-0.03828	-0.04422	-0.03618	-0.03194	-0.03226	-0.03982	-0.03433	-0.03616	-0.04142	-0.03465	0	-0.03259	-0.03413	-0.02997	-0.9816	
24	-0.06602	-0.04826	-0.05527	-0.03757	-0.03692	-0.04282	-0.04752	-0.0378	-0.03516	-0.04055	-0.04952	-0.04804	-0.03904	-0.04683	-0.0376	-0.03821	-0.03513	-0.04077	-0.04271	-0.01686	-0.04256	-0.02714	-0.03165	-0.03259	0	-0.03002	-0.03351	-1.00628
25	-0.02437	-0.05716	-0.02758	-0.02476	-0.03191	-0.05397	-0.06008	-0.04409	-0.03622	-0.03071	-0.05194	-0.05594	-0.0452	-0.0575	-0.04295	-0.04392	-0.03837	-0.04512	-0.02953	-0.04256	-0.02714	-0.02533	-0.03413	-0.03002	0	-0.02414	-0.97923	
26	-0.06007	-0.04808	-0.04615	-0.03702	-0.03519	-0.04123	-0.04724	-0.04132	-0.03553	-0.03948	-0.04099	-0.04346	-0.0399	-0.04367	-0.03757	-0.03578	-0.03221	-0.04295	-0.03699	-0.01717	-0.04244	-0.03384	-0.02997	-0.03351	-0.02414	0	-0.96588	
SUM	-0.93293	-0.94674	-1.15178	-0.96198	-0.98398	-1.26449	-1.02519	-0.96812	-1.05931	-1.02423	-0.97487	-0.98373	-0.98498	-0.97983	-0.99759	-1.02687	-0.97159	-1.19023	-0.9488	-0.95752	-0.93214	-1.01423	-0.9816	-1.00628	-0.97923	-0.96588	-26.2141	

1985

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	0.115073	0.011759	0.020151	0.012469	0.247354	0.064319	0.067382	0.019454	0.062222	0.017328	0.158014	0.006483	0.008018	0.007728	0.021462	0.019674	0.006994	0.006355	0.016979	0.069169	0.016209	0.01281	0.001271	0.007461	0.0132199	1.128338	
2	0.115073	0	0.002349	0.024844	0.013929	0.27176	0.004162	0.008474	0.004576	0.025236	0.018034	0.004035	0.00173	0.007384	0.005023	0.011251	0.006677	0.011812	0.005582	0.050714	0.017789	0.02061	0.012321	0.000385	0.004309	0.019322	0.667383	
3	0.017159	0.002349	0	0.001797	0.01299	0.003959	0.001595	0.004702	0.004391	0.011268	0.01507	0.003732	0.009615	0.012075	0.011291	0.011922	0.109171	0.004755	0.01542	0.007853	0.0074	0.005299	0.006713	0.002603	0.003739	0.010213	0.291681	
4	0.020151	0.024844	0.001797	0	0.054243	0.065769	0.002183	0.017174	0.00296	0.008397	0.083657	0.005667	0.00224	0.006894	0.002664	0.015895	0.00504	0.012279	0.001164	0.023021	0.01718	0.014917	0.008249	0.000341	0.006377	0.010729	0.413832	
5	0.012469	0.013929	0.01299	0.054243	0	0.017965	0.013596	0.023628	0.031863	0.046532	0.338748	0.019607	0.097172	0.154236	0.077518	0.075047	0.025572	0.119942	0.07061	0.016822	0.021241	0.104089	0.015128	0.007868	0.02467	0.038544	1.434027	
6	0.247354	0.27176	0.003959	0.065769	0.017965	0	0.037299	0.016715	0.017701	0.057224	0.024311	0.011408	0.006307	0.011115	0.009916	0.018157	0.023433	0.015691	0.007572	0.051907	0.102198	0.025381	0.014014	0.001463	0.009517	0.16786	1.235997	
7	0.064319	0.004162	0.001595	0.013596	0.037299	0	0.006319	0.016534	0.025839	0.038745	0.00451	0.012149	0.007706	0.003159	0.018695	0.012342	0.002939	0.012342	0.004281	0.028179	0.073332	0.016842	0.009318	0.00809	0.008025	0.026012	0.418892	
8	0.067382	0.008474	0.004702	0.017174	0.00296	0.008397	0	0.027908	0.010632	0.039	0.059129	0.016939	0.011721	0.009625	0.0389	0.045376	0.033176	0.014696	0.064384	0.020491	0.032041	0.019615	0.002141	0.017239	0.008251	0.780559		
9	0.019454	0.004576	0.004391	0.00296	0.031863	0.017701	0.016534	0.027908	0	0.112401	0.045264	0.022331	0.020456	0.021515	0.013121	0.043712	0.017253	0.037391	0.020286	0.068199	0.038452	0.029892	0.002243	0.024098	0.03355	0.6924		
10	0.062222	0.025236	0.011268	0.008397	0.046532	0.057224	0.025839	0.106632	0.012401	0	0.053315	0.146547	0.051781	0.043363	0.035606	0.06965	0.039157	0.053836	0.034599	0.062788	0.029215	0.044091	0.026373	0.003942	0.040295	0.061854	1.246164	
11	0.017328	0.018034	0.01507	0.083657	0.338748	0.024311	0.018745	0.0339	0.045264	0.053315	0	0.021869	0.099241	0.061974	0.042196	0.06491	0.023528	0.17893	0.057531	0.021156	0.028412	0.166018	0.022331	0.006604	0.024015	0.053894	1.520979	
12	0.158014	0.004035	0.003732	0.005667	0.019607	0.011408	0.00451	0.059129	0.022331	0.146547	0.021869	0	0.009553	0.014441	0.011803	0.074718	0.012629	0.026244	0.013592	0.05516	0.010375	0.033419	0.013433	0.00143	0.011737	0.017811	0.763196	
13	0.006483	0.00173	0.009615	0.00224	0.097172	0.006307	0.012149	0.016939	0.020456	0.051781	0.059241	0.009553	0	0.03624	0.004349	0.054558	0.009024	0.040369	0.078933	0.040942	0.014689	0.048102	0.015963	0.004267	0.013006	0.014697	0.708804	
14	0.008018	0.007384	0.012075	0.006894	0.154236	0.011115	0.007706	0.011721	0.021515	0.043363	0.061974	0.014441	0.03624	0	0.409814	0.172311	0.041625	0.05942	0.148051	0.037336	0.013094	0.040903	0.016651	0.010187	0.016144	0.036151	1.398368	
15	0.007728	0.005023	0.011251	0.002664	0.077518	0.009916	0.003159	0.009625	0.013121	0.035606	0.042196	0.011803	0.004349	0.409814	0	0.043805	0	0.032521	0.080607	0.059382	0.077935	0.019973	0.113552	0.020417	0.007128	0.025239	0.075094	1.246839
16	0.02462	0.01251	0.011922	0.015895	0.075047	0.018157	0.018695	0.0389	0.043712	0.06965	0.06491	0.074718	0.054558	0.172311	0.043805	0	0.032521	0	0.020901	0.039268	0.048086	0.00937	0.024105	0.016539	0.003779	0.012052	0.030141	0.630131
17	0.019674	0.006677	0.009171	0.00504	0.025572	0.023433	0.002939	0.045376	0.017253	0.039157	0.023528	0.012629	0.009024	0.041625	0.01227	0.032521	0	0.020901	0.039268	0.048086	0.00937	0.024105	0.016539	0.003779	0.012052	0.030141	0.630131	
18	0.006994	0.011812	0.004755	0.012279	0.119942	0.015691	0.012342	0.033176	0.037391	0.053836	0.17893	0.026244	0.040369	0.05942	0.034626	0.080607	0.020901	0	0.026921	0.040403	0.025354	0.03744	0.019676	0.009329	0.020491	0.041852	0.970779	
19	0.006355	0.005582	0.01542	0.001164	0.07061	0.007572	0.004281	0.014696	0.020286	0.034599	0.057531	0.013592	0.078933	0.148051	0.029393	0.059382	0.039268	0.026921	0	0.054598	0.011104	0.065391	0.017869	0.027859	0.015505	0.013173	0.839136	
20	0.016979	0.050714	0.007853	0.023021	0.016822	0.051907	0.028179	0.064384	0.068199	0.062788	0.021156	0.05516	0.040942	0.037336	0.052167	0.077935	0.048086	0.040403	0.054598	0	0.072362	0.044634	0.030705	0.005355	0.025437	0.085134	1.082258	
21	0.069169	0.017789	0.0074	0.01718	0.021241	0.012075	0.073332	0.020491	0.016849	0.029215	0.028412	0.010375	0.014689	0.013094	0.011109	0.015973	0.00937	0.023534	0.011104	0.072362	0	0.027668	0.022359	0.004046	0.011813	0.062521	0.719091	
22	0.016209	0.02061	0.005299	0.014917	0.104089	0.025381	0.016842	0.032041	0.038452	0.044091	0.166018	0.033419	0.048102	0.040903	0.026835	0.113552	0.024105	0.03744	0.065391	0.040463	0.027668	0	0.035526	0.00677	0.020094	0.053931	1.06232	
23	0.01281	0.012321	0.006713	0.008249	0.015128	0.04014	0.009318	0.019615	0.029892	0.026373	0.022331	0.013433	0.015963	0.016651	0.012255	0.020417	0.016539	0.019676	0.017869	0.030705	0.022359	0.035526	0	0.004852	0.013782	0.024465	0.441256	
24	0.001271	0.000385	0.002603	0.000341	0.007868	0.001463	0.000809	0.002141	0.002243	0.003942	0.006604	0.00143	0.004267	0.010187	0.003431	0.007128	0.003779	0.009329	0.027859	0.005355	0.004046	0.00677	0.004852	0	0.006419	0.001415	0.12594	
25	0.007461	0.004309	0.003739	0.006377	0.02467	0.009517	0.008025	0.017239	0.024098	0.040295	0.024015	0.011737	0.013006	0.016144	0.010431	0.025239	0.012052	0.020491	0.015505	0.025437	0.011813	0.020094	0.013782	0.006419	0	0.014077	0.385972	
26	0.132199	0.019322	0.010213	0.010729	0.038544	0.16786	0.026012	0.088251	0.03355	0.061854	0.053894	0.017811	0.014697	0.036151	0.021112	0.075094	0.030141	0.041852	0.013173	0.085134	0.062521	0.053931	0.024465	0.001415	0.014077	0	1.134002	
SUM	1.128338	0.667383	0.291681	0.413832	1.434027	1.235997	0.418892	0.780559	0.6924	1.246164	1.520979	0.763196	0.708804	1.398368	0.90123	1.246839	0.630131	0.970779	0.839136	1.082258	0.719091	1.06232	0.441256	0.12594	0.385972	1.134002	22.23957	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	0.097386	0.010329	0.022081	0.012378	0.186162	0.032983	0.043865	0.016421	0.071318	0.134821	0.054444	0.011348	0.009328	0.025795	0.017876	0.008083	0.005402	0.020955	0.0595	0.014359	0.024365	0.001289	0.007285	0.070012	0.927733		
2	0.097386	0	0.001478	0.033764	0.015309	0.330562	0.006001	0.008225	0.009369	0.037194	0.020443	0.008248	0.002494	0.014804	0.008783	0.024531	0.008943	0.016679	0.003653	0.07504	0.019382	0.020466	0.033806	0.001308	0.005592	0.009838	0.8133	
3	0.010329	0.001478	0	0.000845	0.007457	0.003139	0.001139	0.004639	0.003505	0.011509	0.008314	0.004027	0.008091	0.023162	0.015436	0.030648	0.045454	0.00524	0.00816	0.010175	0.007112	0.00614	0.01155	0.001113	0.003314	0.004761	0.23674	
4	0.022081	0.033764	0.000845	0	0.049268	0.103816	0.003389	0.004896	0.00495	0.018453	0.090331	0.017709	0.001813	0.00834	0.002969	0.029551	0.004086	0.007884	0.001032	0.029194	0.022046	0.01171	0.026421	0.000796	0.008042	0.005482	0.50887	
5	0.012378	0.015309	0.007457	0.049268	0	0.020463	0.013438	0.025026	0.033454	0.057398	0.344035	0.03902	0.110783	0.1009	0.052268	0.10386	0.023616	0.15657	0.063559	0.020241	0.021921	0.039605	0.025654	0.005638	0.04285	0.035004	1.4649	
6	0.186162	0.330562	0.003139	0.103816	0.020463	0	0.045719	0.014794	0.029148	0.06081	0.027396	0.017489	0.007368	0.02303	0.016479	0.033485	0.026249	0.02081	0.005954	0.068221	0.122337	0.025022	0.0392	0.001996	0.012637	0.068537	3.1082	
7	0.032983	0.060601	0.001139	0.003389	0.013438	0.045719	0	0.06635	0.022078	0.040793	0.015954	0.008156	0.011566	0.021137	0.012238	0.027715	0.033395	0.013688	0.00211	0.028862	0.059232	0.019433	0.022683	0.001366	0.010564	0.017879	0.44787	
8	0.043865	0.08225	0.004639	0.004896	0.025026	0.014794	0.06635	0	0.033115	0.163854	0.02615	0.053105	0.010488	0.017624	0.01187	0.043882	0.05017	0.043737	0.010014	0.012673	0.01617	0.030145	0.047439	0.003549	0.019693	0.063828	0.84068	
9	0.016421	0.009369	0.003505	0.00495	0.033454	0.029148	0.022078	0.033115	0	0.117837	0.030192	0.023738	0.023634	0.029932	0.02002	0.057037	0.025927	0.039288	0.015709	0.082078	0.013626	0.040365	0.063107	0.004866	0.038023	0.029465	0.80688	
10	0.073125	0.037194	0.015309	0.019453	0.057398	0.06081	0.040793	0.163854	0.117837	0	0.054139	0.0234019	0.051681	0.061438	0.052774	0.097641	0.077443	0.065006	0.034747	0.080236	0.027761	0.052012	0.0653	0.005593	0.045587	0.13146	1.6996	
11	0.017138	0.020443	0.008314	0.090331	0.344035	0.027396	0.015954	0.02615	0.053105	0.023738	0.0234019	0.051681	0.061438	0.052774	0.097641	0.077443	0.065006	0.034747	0.080236	0.027761	0.052012	0.0653	0.005593	0.045587	0.13146	1.6996		
12	0.134821	0.008248	0.004027	0.008091	0.023162	0.015436	0.030648	0.045454	0.00524	0.00816	0.010175	0.007112	0.00614	0.01155	0.003314	0.004761	0.005482	0.005482	0.005482	0.005482	0.005482	0.005482	0.005482	0.005482	0.005482	0.005482	0.005482	
13	0.05444	0.002494	0.008091	0.01813	0.10783	0.007368	0.01566	0.010488	0.023634	0.051681	0.052316	0.007969	0	0.095336	0.009485	0.067879	0.009787	0.051992	0.09144	0.034051	0.08663	0.04073	0.042127	0.00301	0.017455	0.013575	0.77914	
14	0.011348	0.014804	0.023162	0.00834	0.10009	0.02303	0.021137	0.017624	0.029932	0.061438	0.062726	0.038583	0.074813	0.02192	0.052774	0.039583	0.012619	0.009485	0.535236	0	0.535236	0.224649	0.061588	0	0.043179	0.078272	0.088649	0.81013
15	0.009328	0.008783	0.015436	0.002969	0.052268	0.016479	0.012238	0.01187	0.02002	0.052774	0.039583	0.012619	0.009485	0.535236	0	0.061588	0.014804	0.052448	0.025102	0.050192	0.010057	0.026685	0.046899	0.003115	0.01238	0.020885	1.2224	
16	0.025795	0.024531	0.030648	0.029551	0.10386	0.033485	0.027715	0.043882	0.057037	0.097641	0.074813	0.060829	0.067879	0.224649	0.061588	0	0.043179	0.078272	0.088649	0.081013	0.025214	0.16483	0.05906	0.008432	0.033379	0.131574	1.67751	
17	0.017876	0.008943	0.045454	0.004086	0.023616	0.026249	0.003395	0.065017	0.025927	0.077443	0.02192	0.025483	0.009787	0.102885	0.014804	0.043179	0	0.028865	0.034616	0.074841	0.0086	0.027832	0.046762	0.003791	0.018034	0.043365	0.80278	
18	0.008083	0.016679	0.00524	0.007884	0.156657	0.02081	0.013688	0.043737	0.039288	0.065006	0.115525	0.037465	0.051992	0.091857	0.052448	0.078272	0.028865	0	0.029581	0.028816	0.03669	0.033903	0.038097	0.009387	0.030255	0.036181	1.07641	
19	0.005402	0.003653	0.00816	0.001032	0.063559	0.005954	0.00211	0.010014	0.015709	0.034747	0.037314	0.011509	0.09144	0.176336	0.025102	0.088649	0.04616	0.029581	0	0.053986	0.00774	0.053181	0.037659	0.010342	0.014871	0.007705	0.83037	
20	0.020955	0.07504	0.010175	0.029194	0.020241	0.068221	0.028862	0.072673	0.082078	0.080236	0.021698	0.074164	0.034051	0.034868	0.050192	0.081013	0.074841	0.028816	0.053986	0	0.072609	0.047184	0.070996	0.007609	0.031023	0.099466	1.27019	
21	0.0595	0.019382	0.007112	0.022046	0.021921	0.122337	0.059232	0.0167	0.033626	0.027761	0.02469	0.009372	0.00863	0.013819	0.010057	0.025274	0.0086	0.03669	0.00774	0.072609	0	0.025467	0.037888	0.003894	0.010106	0.022408	0.6868	
22	0.014539	0.020466	0.00614	0.01171	0.039605	0.025022	0.019433	0.030145	0.040365	0.052012	0.138529	0.038881	0.04073	0.046714	0.026685	0.16483	0.027832	0.033903	0.053181	0.07184	0.025467	0	0.055859	0.008222	0.023753	0.054277	1.0993	
23	0.024365	0.033806	0.01155	0.026421	0.025654	0.0392	0.022683	0.047439	0.063107	0.0653	0.032372	0.048663	0.027705	0.002301	0.005355	0.003115	0.008432	0.003791	0.009387	0.010342	0.07609	0.003894	0.008222	0.008367	0	0.006163	0.007335	0.18025
24	0.001289	0.001308	0.001113	0.000796	0.005638	0.001996	0.001366	0.003549	0.004866	0.005693	0.004914	0.002705	0.003004	0.017455	0.018484	0.01238	0.033379	0.018034	0.030255	0.014871	0.031023	0.010106	0.023753	0.022632	0.006163	0	0.018477	0.49457
25	0.007285	0.005592	0.003314	0.008042	0.04285	0.012637	0.010564	0.019693	0.038023	0.045587	0.03097	0.013004	0.017455	0.018484	0.01238	0.033379	0.018034	0.030255	0.014871	0.031023	0.010106	0.023753	0.022632	0.006163	0	0.018477	0.49457	
26	0.070012	0.009838	0.004761	0.005482	0.035004	0.068537	0.017879	0.063828	0.029465	0.113146	0.036109	0.070771	0.013375	0.087425	0.020885	0.131574	0.043365	0.036181	0.007705	0.099466	0.02408	0.054277	0.111381	0.007735	0.018477	0	1.7889	
SUM	0.927733	0.813298	0.236738	0.508869	1.464897	1.310823	0.447868	0.840681	0.968817	1.699597	1.354453	0.996817	0.779145	1.869313	1.122245	1.677505	0.802781	1.076406	0.830373	1.27019	0.686801	1.099304	1.117837	0.180253	0.494574	1.778887	25.5944	

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.115249	0.01255	0.035521	0.028817	0.219715	0.03786	0.052443	0.023933	0.152398	0.035165	0.139479	0.00778	0.016133	0.015702	0.045442	0.023202	0.01591	0.007141	0.006499	0.096256	0.016105	0.015895	0.0028	0.013168	0.083308	1.2185
2	0.115249	0	0.001786	0.04414	0.024523	0.369047	0.007609	0.011468	0.013214	0.085028	0.029229	0.013634	0.003139	0.016399	0.013618	0.031644	0.010649	0.01966	0.002618	0.005181	0.023538	0.00871	0.012308	0.001199	0.006911	0.013786	0.8843
3	0.01255	0.001786	0	0.000916	0.01818	0.003216	0.001134	0.007065	0.007174	0.02255	0.012998	0.005162	0.008806	0.024264	0.020657	0.038762	0.036983	0.00697	0.005635	0.000752	0.006082	0.004395	0.005876	0.000864	0.003974	0.003715	0.2541
4	0.035521	0.04414	0.000916	0	0.075848	0.043691	0.004456	0.009295	0.007908	0.04984	0.115985	0.002581	0.012995	0.006394	0.062202	0.005596	0.040015	0.014015	0.011171	0.002204	0.028886	0.006243	0.009252	0.000837	0.010225	0.010494	0.6806
5	0.028817	0.024523	0.011818	0.075848	0	0.033437	0.023365	0.039906	0.037988	0.093029	0.435248	0.053206	0.119612	0.109502	0.067891	0.120033	0.040865	0.153746	0.101106	0.014216	0.034807	0.12969	0.019255	0.007458	0.058963	0.050559	1.8949
6	0.219715	0.369047	0.003216	0.143691	0.033437	0	0.051354	0.016772	0.032951	0.103274	0.039953	0.024724	0.009063	0.02701	0.024548	0.044785	0.025405	0.025951	0.005571	0.009602	0.0149203	0.014432	0.015918	0.002526	0.015707	0.064391	1.4721
7	0.03786	0.007609	0.001134	0.004456	0.033437	0.051354	0	0.007884	0.032741	0.090721	0.023541	0.010445	0.012048	0.045165	0.044736	0.03396	0.004129	0.021142	0.001179	0.004199	0.059673	0.010425	0.010728	0.001321	0.010973	0.019502	0.5703
8	0.052443	0.011468	0.007065	0.009295	0.039906	0.016772	0.007884	0	0.040184	0.219794	0.037415	0.068544	0.015524	0.020193	0.014441	0.053182	0.082022	0.069611	0.011302	0.014644	0.02014	0.024372	0.022714	0.00377	0.023821	0.065578	0.9571
9	0.023933	0.013214	0.007174	0.007908	0.037988	0.032951	0.032741	0.040184	0	0.216848	0.036885	0.034727	0.028493	0.024207	0.023145	0.051356	0.028893	0.042948	0.015682	0.017543	0.015061	0.024524	0.047991	0.004171	0.05545	0.041581	0.9056
10	0.152398	0.085028	0.02255	0.04984	0.093029	0.103274	0.090721	0.219794	0.216848	0	0.084844	0.38181	0.135283	0.075534	0.089696	0.156941	0.139116	0.08594	0.080639	0.023773	0.059847	0.061035	0.042732	0.007553	0.100361	0.198406	2.757
11	0.035165	0.029229	0.012998	0.115985	0.435248	0.039953	0.023541	0.037415	0.036885	0.084844	0	0.053317	0.067662	0.059997	0.046626	0.095203	0.033943	0.10741	0.057961	0.017005	0.037444	0.187048	0.022495	0.006115	0.050125	0.04953	1.7431
12	0.139479	0.013634	0.005162	0.019954	0.053206	0.024724	0.010445	0.068544	0.034727	0.38181	0.053317	0	0.010084	0.020416	0.02357	0.088003	0.042461	0.061716	0.016188	0.015569	0.01105	0.036132	0.019472	0.003248	0.018498	0.012975	1.2744
13	0.00778	0.003139	0.008806	0.002581	0.119612	0.009063	0.012048	0.015524	0.028493	0.135283	0.075534	0.059997	0.020416	0.040528	0	0.464631	0.21551	0.128176	0.085403	0.14792	0.010329	0.018562	0.045591	0.02073	0.005042	0.023737	0.7726
14	0.016133	0.016399	0.024264	0.012995	0.109502	0.039953	0.023541	0.037415	0.024207	0.075534	0.059997	0.046626	0.02357	0.010071	0.464631	0	0.071223	0.022801	0.056922	0.027738	0.008471	0.022442	0.016055	0.002943	0.015193	0.029774	1.1542
15	0.015702	0.013618	0.020657	0.006394	0.067891	0.024548	0.044736	0.014441	0.023145	0.089696	0.046626	0.02357	0.010071	0.464631	0	0.464631	0.21551	0.128176	0.085403	0.14792	0.010329	0.018562	0.045591	0.02073	0.005042	0.023737	0.7726
16	0.045442	0.031644	0.038762	0.062202	0.120033	0.044785	0.03396	0.053182	0.051356	0.156941	0.095203	0.088003	0.071571	0.21551	0.071223	0	0.057122	0.10096	0.148704	0.03059	0.040398	0.249219	0.047573	0.011057	0.061885	0.215714	2.1446
17	0.023202	0.010649	0.036983	0.005596	0.040865	0.025405	0.004129	0.082022	0.028893	0.139116	0.033943	0.042461	0.014785	0.128176	0.022801	0.057122	0	0.041136	0.031172	0.010315	0.007518	0.023149	0.021206	0.003456	0.023666	0.044551	0.9017
18	0.01591	0.01966	0.00697	0.014015	0.153746	0.025851	0.021142	0.069611	0.042948	0.08594	0.10741	0.061716	0.07653	0.085403	0.056922	0.10096	0.041136	0	0.041153	0.023038	0.050958	0.036895	0.033068	0.016908	0.04013	0.047463	1.2755
19	0.007141	0.002618	0.005635	0.001171	0.101106	0.005571	0.001179	0.011302	0.015682	0.080639	0.057961	0.016188	0.016188	0.016188	0.016188	0.148704	0.031172	0.041153	0	0.006612	0.004381	0.046614	0.015603	0.00666	0.016883	0.004298	0.9282
20	0.006499	0.005181	0.000752	0.028886	0.034807	0.149203	0.004199	0.014644	0.017543	0.023773	0.017005	0.015569	0.006143	0.010329	0.008471	0.03059	0.010315	0.023038	0.023038	0.006612	0	0.016492	0.024796	0.020089	0.003448	0.00674	0.1516
21	0.096256	0.023538	0.006082	0.028886	0.034807	0.149203	0.004199	0.014644	0.017543	0.023773	0.017005	0.015569	0.006143	0.010329	0.008471	0.03059	0.010315	0.023038	0.023038	0.006612	0	0.016492	0.024796	0.020089	0.003448	0.00674	0.1516
22	0.016105	0.00871	0.004395	0.006243	0.12969	0.014432	0.010425	0.024372	0.024524	0.061035	0.187048	0.036132	0.020134	0.045591	0.022442	0.249219	0.023149	0.036895	0.046614	0.024796	0.018525	0	0.043212	0.006015	0.033901	0.049234	1.1428
23	0.015895	0.012308	0.005876	0.009252	0.019255	0.015918	0.010728	0.022714	0.047991	0.042732	0.022435	0.019472	0.017674	0.02073	0.016055	0.047573	0.021206	0.033068	0.015603	0.020089	0.016435	0.043212	0	0.023794	0.020205	0.040927	0.5861
24	0.0028	0.001199	0.000864	0.000837	0.007458	0.002526	0.001321	0.00377	0.004171	0.007553	0.006115	0.003248	0.002208	0.005042	0.002943	0.011057	0.003456	0.016908	0.00666	0.003448	0.002919	0.006015	0.023794	0	0.007752	0.006744	1.408
25	0.013168	0.006911	0.003974	0.010225	0.058963	0.015707	0.010973	0.023821	0.05545	0.100361	0.050125	0.018498	0.018557	0.023737	0.015193	0.061885	0.023066	0.04013	0.016883	0.00674	0.011391	0.033901	0.020205	0.007752	0	0.019045	0.6667
26	0.083308	0.013786	0.003715	0.010494	0.050559	0.064391	0.019502	0.065578	0.041581	0.198406	0.04953	0.102975	0.019322	0.077236	0.029774	0.215714	0.044551	0.047453	0.004298	0.01516	0.015398	0.049234	0.040927	0.006744	0.019045	0	1.2887
SUM	1.21847	0.884287	0.254105	0.680649	1.884889	1.472147	0.570291	0.957087	0.905598	2.756992	1.743083	1.274386	0.849023	1.735212	1.154158	2.144579	0.901719	1.275475	0.928187	0.31341	0.768539	1.142839	0.586147	0.140807	0.666661	1.28868	28.407

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM		
1	0	0.0829287	0.0142434	0.0274953	0.0300086	0.1745017	0.0301319	0.0358016	0.0140035	0.1055045	0.0348473	0.1225824	0.0051445	0.0224556	0.0154406	0.0344121	0.0162581	0.0153629	0.0054043	0.039647	0.0640902	0.0265089	0.0218925	0.0025527	0.0125256	0.0482595	1.0023177		
2	0.0829287	0	0.0009838	0.0345969	0.0293338	0.3100729	0.0057063	0.0060299	0.0063462	0.0491885	0.0324038	0.0094258	0.0019696	0.0205438	0.0107297	0.0287658	0.0070449	0.0232012	0.0019764	0.0596765	0.0167547	0.0275384	0.020299	0.0016917	0.0084529	0.0103923	0.8060535		
3	0.0142434	0.0009838	0	0.0008573	0.0164238	0.0029696	0.0011174	0.0045992	0.0119903	0.0168661	0.0172051	0.0053041	0.0051817	0.0450944	0.0285664	0.0478069	0.0336072	0.0101901	0.0052916	0.0180307	0.0079074	0.01395	0.009083	0.0012279	0.0061481	0.0037165	0.328352		
4	0.0274953	0.0345969	0.0008573	0	0.0800635	0.1265742	0.0034649	0.0078875	0.0084852	0.0363411	0.1104512	0.0165178	0.0023792	0.0185772	0.0056437	0.0511213	0.0045418	0.0158994	0.001371	0.0420393	0.0236276	0.0222938	0.0159245	0.0013643	0.0116232	0.0067699	0.6727231		
5	0.0300086	0.0293338	0.0164238	0.0800635	0	0.040899	0.0291814	0.0456961	0.0429454	0.0840189	0.4811503	0.0378145	0.1305283	0.141447	0.0876237	0.113723	0.0522884	0.1913305	0.0981879	0.0328751	0.0438991	0.1463705	0.0280708	0.0135214	0.0710442	0.0641482	2.1525941		
6	0.1745017	0.3100729	0.0029696	0.1265742	0.040899	0	0.0515298	0.0103441	0.0188338	0.0650338	0.043957	0.0196196	0.0075603	0.0352335	0.0208562	0.0497616	0.0217775	0.0366573	0.005104	0.0677747	0.0132984	0.0411442	0.0255405	0.0032802	0.0197675	0.0720403	1.3884494		
7	0.0301319	0.0057063	0.0011174	0.0045992	0.0029696	0.0103441	0	0.0043669	0.0128353	0.0582888	0.0288038	0.0111966	0.0145071	0.0541680	0.0387143	0.0312894	0.003773	0.0234098	0.0015765	0.0381664	0.0486234	0.0290597	0.0160261	0.0018658	0.0169745	0.0230445	0.5777625		
8	0.0358016	0.0060299	0.0008573	0.0078875	0.0084852	0.0034649	0.0103441	0	0.0043669	0.0128353	0.0582888	0.0288038	0.0111966	0.0145071	0.0541680	0.0387143	0.003773	0.0234098	0.0015765	0.0381664	0.0486234	0.0290597	0.0160261	0.0018658	0.0169745	0.0230445	0.5777625		
9	0.0140035	0.0063462	0.0119903	0.0084852	0.0429454	0.0188358	0.0128353	0.0192028	0	0.1349192	0.0473767	0.0244674	0.0139126	0.0348482	0.0180439	0.0628566	0.0173939	0.0461933	0.0102991	0.097001	0.0174484	0.0535259	0.0517728	0.0056559	0.0522876	0.0303286	0.8387068		
10	0.0550495	0.0491885	0.0168661	0.0363411	0.0840189	0.0665038	0.0582888	0.123241	0.1349192	0	0.0730356	0.287264	0.0984143	0.0752584	0.1106357	0.0840252	0.0787988	0.057649	0.073232	0.0371479	0.060752	0.1926328	0.0395039	0.0096022	0.062219	0.0615954	1.9904412		
11	0.0348473	0.0324038	0.0172051	0.1104512	0.4811503	0.043957	0.0288038	0.0384195	0.0417367	0.0750356	0	0.055625	0.055625	0.0758258	0.0912367	0.0635473	0.0930339	0.042028	0.1097335	0.0638369	0.0326848	0.0407756	0.1926328	0.0395039	0.0096022	0.062219	0.0615954	1.9343213	
12	0.1225824	0.0094258	0.0053041	0.0165178	0.0578145	0.0196196	0.0111966	0.0192028	0.0139126	0.0750356	0	0.055625	0.055625	0.0758258	0.0912367	0.0635473	0.0930339	0.042028	0.1097335	0.0638369	0.0326848	0.0407756	0.1926328	0.0395039	0.0096022	0.062219	0.0615954	1.9343213	
13	0.0057045	0.0019606	0.0051817	0.0023792	0.01305283	0.0075803	0.0145071	0.0099052	0.0139126	0.0984143	0.0738258	0.0091658	0	0.0506738	0.0091928	0.0603547	0	0.0710662	0.021584	0.0728499	0.0330139	0.0488086	0.0172053	0.0413306	0.0293018	0.0044745	0.0197056	0.0358399	1.394857
14	0.0274956	0.0205438	0.0450944	0.0185772	0.141447	0.0352335	0.0541680	0.0264688	0.0348482	0.0752584	0.0912367	0.0300663	0.0506738	0	0.6035347	0.3009441	0.1871606	0.1137483	0.1984812	0.0459016	0.0238254	0.042658	0.0451286	0.0072524	0.0368817	0.1257753	2.4054025		
15	0.0154406	0.0107297	0.0285664	0.0056437	0.0876237	0.0208562	0.0387143	0.010625	0.0180439	0.0700284	0.0635473	0.0216301	0.0091928	0.0603547	0	0.0710662	0.021584	0.0728499	0.0330139	0.0488086	0.0172053	0.0413306	0.0293018	0.0044745	0.0197056	0.0358399	1.394857		
16	0.0344121	0.0287658	0.0478069	0.0511213	0.131723	0.0419716	0.0312894	0.0457936	0.0528566	0.1106357	0.0930339	0.0733788	0.0663797	0.3009441	0.0710662	0	0.0566158	0.108453	0.1256451	0.0956385	0.0395955	0.052945	0.0124629	0.0600263	0.1403162	2.0467465			
17	0.0162581	0.0070449	0.0336072	0.0045418	0.0522884	0.0217775	0.003773	0.0653014	0.0173939	0.0840252	0.042028	0.0307405	0.0139675	0.1871606	0.021584	0.0566158	0	0.0566158	0.108453	0.1256451	0.0956385	0.0395955	0.052945	0.0124629	0.0600263	0.1403162	2.0467465		
18	0.0153629	0.022402	0.0101901	0.0158994	0.1913305	0.0366573	0.0234098	0.075794	0.0461933	0.0787988	0.099735	0.0619234	0.075183	0.1137483	0.0728499	0.108453	0.0482201	0	0.0489939	0.0387947	0.0653321	0.0469926	0.0449787	0.026145	0.0474303	0.0519027	1.4749555		
19	0.0054043	0.0019764	0.0052916	0.001371	0.0981879	0.005104	0.0015765	0.0077522	0.0102991	0.057649	0.0689369	0.0414711	0.1119557	0.1984312	0.0330139	0.1265451	0.0229261	0.0489939	0	0.0670248	0.0657318	0.0914749	0.0268959	0.0092637	0.022673	0.0047258	1.040206		
20	0.039647	0.0596765	0.0180307	0.0420393	0.0328751	0.0677747	0.0381664	0.0710667	0.097001	0.073232	0.0326848	0.0824748	0.0397164	0.0459016	0.0488086	0.0954385	0.0816177	0.0387917	0.0670248	0	0.0693817	0.0660196	0.0447281	0.0078538	0.0353981	0.0916088	1.3871219		
21	0.040902	0.0167547	0.0079074	0.0236276	0.0438991	0.1239843	0.0486234	0.0139419	0.0124044	0.0371479	0.0407756	0.0109201	0.0071126	0.0238254	0.0127653	0.0395955	0.0088859	0.0625321	0.0065718	0.0693817	0	0.0436847	0.0252813	0.0057811	0.0176405	0.0448379	0.7819594		
22	0.0265089	0.0275384	0.01395	0.0222938	0.1463705	0.0411442	0.0290597	0.0379902	0.0535259	0.060752	0.1926328	0.0512597	0.0496003	0.0742658	0.0413306	0.1809695	0.0452913	0.0469926	0.0347149	0.0660196	0.0436847	0	0.0728399	0.0127449	0.0552888	0.0395999	1.5874089		
23	0.0218925	0.020299	0.009083	0.0159245	0.0280708	0.0255405	0.0160261	0.0340448	0.0517728	0.0382933	0.0305039	0.0273201	0.0271185	0.0415286	0.0293018	0.052945	0.029225	0.0449787	0.0268959	0.0447281	0.0252813	0	0.0352899	0.0298075	0.0392137	0.8179151			
24	0.0025527	0.0016917	0.0012179	0.0013643	0.0135214	0.0032802	0.0018058	0.0046124	0.0056559	0.0069796	0.0096922	0.0037955	0.0031491	0.0072524	0.0044745	0.0124629	0.048163	0.026145	0.0092637	0.0078538	0.0557811	0.0227449	0.0352899	0	0.0144817	0.0105485	0.2065556		
25	0.0122596	0.0084529	0.0061481	0.0116232	0.0710442	0.0197675	0.0169745	0.021415	0.0522876	0.0707368	0.062219	0.0206517	0.0274064	0.0369817	0.0197056	0.0600263	0.027567	0.0474303	0.022673	0.0353981	0.0176405	0.0552088	0.0298075	0.0144817	0	0.0255148	0.7934236		
26	0.0482595	0.0103923	0.0037165	0.0067699	0.0641482	0.0230445	0.020403	0.0612496	0.0303286	0.0917351	0.0615954	0.023918	0.0292976	0.1257753	0.0383399	0.1403162	0.0453895	0.0519027	0.0407258	0.0916088	0.0148379	0.0395999	0.0392137	0.0105485	0.0255148	0	1.2100015		
SUM	1.0023177	0.8060535	0.328352	0.6727231	2.1525941	1.3884494	0.5777625	0.824989	0.8387068	1.9904412	1.9343213	1.145699	0.8797206	2.4054025	1.394857	2.0467465	0.772456	1.4749555	1.048206	1.3871219	0.7819594	1.5874089	0.8179151	0.2106556	0.7934236	1.2100015	30.64193		

Appendix 30
Anti-Symmetric Matrix, Thailand
1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	-0.01431	0.146768	-0.01785	0.015577	-0.04002	0.148892	0.009211	-0.03235	-0.03622	-0.03318	0.2427	-0.03058	-0.04126	-0.0416	-0.03515	-0.02201	-0.04383	-0.03907	-0.0314	-0.02359	-0.02562	-0.0265	-0.025	0.02416	-0.0278	-3.7E-05
2	0.014313	0	-0.02551	-0.02279	-0.02119	-0.01999	-0.0221	-0.03098	-0.01713	-0.0138	0.092824	-0.03317	0.005984	0.210359	0.012972	-0.01407	-0.01313	-0.02003	-0.00121	0.005818	-0.00837	-0.01384	-0.01256	-0.01329	-0.02289	-0.01634	-0.00011
3	-0.14677	0.025506	0	0.050394	0.000397	0.001957	0.010995	-0.00955	0.003455	0.010459	0.007334	0.000705	0.001603	-0.00173	-0.01262	0.002388	0.001521	-0.00202	-0.00025	-0.00464	0.007993	-0.00345	0.004232	0.007153	0.040818	0.004579	0.000466
4	0.017853	0.022793	-0.05039	0	0.002747	0.005658	0.005924	-0.00426	-0.00018	0.004471	0.009188	-0.00237	-0.03457	0.004298	-0.00549	0.004705	0.005321	0.001743	-0.00149	0.000304	0.000579	0.002956	0.006411	0.006968	-0.00603	0.003648	0.000776
5	-0.01558	0.021192	-0.0004	-0.00075	0	0.003204	0.004134	-0.00701	-0.01847	0.002713	0.010057	-0.00528	0.000835	0.002677	8.34E-05	0.004184	0.002591	-0.00173	0.002757	-0.00168	0.003519	-0.00743	0.004289	0.006075	-0.00978	0.000929	-0.00084
6	0.040024	0.019988	-0.00196	-0.00566	-0.0032	0	6.36E-05	-0.01163	0.007489	-0.00197	0.002064	-0.00934	0.000109	-0.00161	-0.00279	0.001248	0.000568	0.007674	-0.01698	-0.00738	-0.013	0.000536	0.00184	0.000189	-0.00147	8.94E-05	-0.0001
7	-0.14889	0.022098	-0.01099	-0.00592	-0.00413	-6.4E-05	0	0.147972	0.002851	-0.00656	0.001942	-0.01256	0.002367	-0.00218	-0.0045	-0.00191	0.000645	7.99E-05	-0.00518	0.030118	0.012552	-0.02251	0.003016	0.003509	-0.00114	-0.00069	-0.00011
8	-0.00921	0.030977	0.009554	0.004264	0.007006	0.011633	-0.14797	0	0.01191	-0.00806	0.016347	-0.00219	-0.00196	0.006052	0.007035	0.01208	0.009644	0.007004	0.002533	0.005113	0.003321	-0.00266	0.010498	0.006961	0.002844	0.007157	-0.00011
9	0.032246	0.017128	-0.00346	0.000175	0.018467	-0.00249	-0.00285	-0.01191	0	0.001353	0.001809	-0.01186	0.001386	-0.00421	-0.0007	0.001061	-0.00152	0.000511	-0.00864	-0.00779	-0.00243	-0.00235	-0.00194	-0.00193	-0.00916	-0.00034	0.00066
10	0.036225	0.013798	-0.01046	-0.00447	-0.00271	0.001966	0.006562	0.008058	-0.00135	0	-0.00346	0.000261	0.006771	-0.00305	-0.00515	0.003169	0.002943	-0.00304	-0.01417	0.001604	-0.01654	-0.00289	-1E-04	-0.00044	-0.0117	-0.0018	1.09E-05
11	0.033381	-0.09282	-0.00733	-0.00919	-0.01006	-0.00206	-0.00194	-0.01635	-0.00181	0.003463	0	-0.01416	0.024582	-0.00449	-0.01142	-0.00703	-0.00693	-0.01331	0.117745	-0.00561	0.013304	0.019977	-0.00228	-0.00299	0.001745	-0.0042	1.98E-06
12	-0.2427	0.033165	-0.0007	0.002373	0.005279	0.009337	0.012565	0.002183	0.011859	-0.00026	0.014162	0	0.010994	0.01011	0.005304	0.009412	0.022635	0.005515	0.006638	0.004901	0.012725	0.018415	0.011111	0.013695	0.015471	0.006771	0.000964
13	0.030578	-0.00598	-0.0016	0.034573	-0.00084	-0.00011	-0.00237	0.001958	-0.00139	-0.00677	-0.02458	-0.01099	0	-0.00395	-0.01791	0.015355	-0.00058	0.002293	-0.0247	0.036807	-0.00612	-0.00401	0.001568	5.29E-05	-0.00827	-0.00185	0.001161
14	0.041259	-0.21036	0.001732	-0.0043	-0.00268	0.00161	0.002181	-0.00605	0.004214	0.003057	0.004492	-0.01011	0.003952	0	0.076383	0.014696	0.008153	0.013146	-0.00367	0.030239	0.012938	0.002675	0.004748	0.006927	0.003603	0.00105	-0.00011
15	0.041598	-0.01297	0.01262	0.005486	-8.3E-05	0.002785	0.004504	-0.00704	0.000701	0.005149	0.011423	-0.0053	0.017909	0.07638	0	0.000688	0.004256	-0.001	-2.1E-05	0.01058	-0.01243	0.002451	0.004852	0.003874	-0.00136	0.001125	0.013424
16	0.035146	0.014068	-0.00239	-0.0047	-0.00418	-0.00125	0.001913	-0.01208	-0.00106	-0.00317	0.007029	-0.00941	-0.01536	-0.0147	-0.00069	0	0.003475	0.012032	-0.00083	0.00826	-0.03087	-0.00134	0.003846	0.001714	0.000689	-0.00019	0.01405
17	0.022009	0.013131	-0.00152	-0.00532	-0.00259	-0.00057	-0.00065	-0.00964	0.001516	-0.00294	0.006934	-0.02264	0.00058	-0.00815	-0.00426	-0.00348	0	-0.00473	-0.00031	-0.00457	0.00803	0.009658	0.001682	0.003165	0.005332	-0.00092	-0.00025
18	0.043831	0.020033	0.002017	-0.00174	0.001725	-0.00767	-8E-05	-0.007	-0.00051	0.003038	0.01331	-0.00552	-0.00229	-0.01315	0.000997	-0.01203	0.00473	0	-0.00283	-0.00243	-0.04351	0.004142	0.003583	0.002835	-0.00533	0.002942	-0.00091
19	0.039066	0.001208	0.000249	0.001495	-0.00276	0.016985	0.005182	-0.00253	0.008642	0.014166	-0.11774	-0.00664	0.024698	0.003665	2.13E-05	0.000834	0.000314	0.002829	0	-0.00916	-0.01389	-0.00017	0.005908	0.00445	0.01858	0.004498	-0.0001
20	0.031403	-0.00582	0.004638	-0.0003	0.001679	0.007379	-0.03012	-0.00511	0.007788	-0.0016	0.00561	-0.0049	-0.03681	-0.03024	-0.01058	-0.00826	0.004568	0.00243	0.00916	0	-0.00211	0.000592	0.011052	0.002422	0.001253	0.026267	0.00039
21	0.023595	0.008369	-0.00799	-0.00058	-0.00352	0.012996	-0.01255	-0.00332	0.002432	0.016538	-0.0133	-0.01273	0.006123	-0.01294	0.012425	0.030873	-0.00803	0.043511	0.013889	0.002108	0	-0.0113	-0.01944	-0.03326	-0.01843	-0.01602	-0.00056
22	0.025015	0.013844	0.003445	-0.00296	0.007426	-0.00054	0.022511	0.002656	0.002352	0.002894	-0.01998	-0.01841	0.004007	-0.00268	-0.00245	0.001337	-0.00966	-0.00414	0.000172	-0.00059	0.011302	0	-0.00206	-0.01362	-0.02036	-0.00024	-0.00011
23	0.026504	0.012562	-0.00423	-0.00641	-0.00429	-0.00184	-0.03002	-0.0105	0.001937	1E-04	0.002279	-0.01111	-0.00157	-0.00475	-0.00485	-0.00385	-0.00168	-0.00358	-0.00591	-0.01105	0.019436	0.002065	0	0.006729	0.006289	0.00062	-0.00012
24	0.025002	0.013286	-0.00715	-0.00697	-0.00608	-0.00019	-0.00351	-0.00696	0.001931	0.000443	0.002991	-0.01369	-5.3E-05	-0.00693	-0.00387	-0.00171	-0.00317	-0.00284	-0.00445	-0.02242	0.033261	0.013616	-0.00673	0	0.009378	-0.0032	-1.4E-05
25	-0.02416	0.022892	-0.04082	0.00603	0.00978	0.001474	0.001142	-0.00284	0.009159	0.011705	-0.00174	-0.01547	0.008269	-0.0036	0.001358	-0.00069	-0.00533	0.005327	-0.01858	-0.00125	0.018434	0.020357	-0.00629	-0.00938	0	0.013992	-0.00024
26	0.027799	0.016344	-0.00458	-0.00365	-0.00093	-8.9E-05	0.000688	-0.00716	0.00034	0.001799	0.0042	-0.00677	0.001855	-0.00105	-0.00113	0.000189	0.000923	-0.00294	-0.0045	-0.02627	0.01602	0.000236	-0.00062	0.003204	-0.01399	0	-7.1E-05
SUM	3.72E-05	0.000113	-0.00047	-0.00078	0.000842	0.000102	0.000105	0.000113	-0.00066	-1.1E-05	-2E-06	-0.00096	-0.00116	0.000109	-0.01342	0.014047	0.000252	0.000914	0.000103	-0.00039	0.000556	0.000113	0.000117	1.44E-05	0.000245	7.09E-05	0

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.114118	0.009572	0.019682	-0.00798	0.240957	0.063971	0.058388	0.01458	-0.00761	-0.01198	0.153812	0.004763	-0.00206	0.000881	0.001056	0.015202	-0.00061	0.004039	-0.00561	0.06636	-0.0009	-0.00556	0.000927	0.002674	0.130241	0.858913
2	-0.11412	0	-0.00171	-0.01616	-0.1347	-0.16217	0.003008	-0.00421	-0.00185	-0.01388	-0.01748	-0.00157	-0.0006	-0.00663	-0.00402	-0.00985	0.001292	-0.01121	-0.00436	-0.04925	0.011335	-0.01953	-0.01146	-6.4E-05	-0.00237	0.017168	-0.43315
3	-0.00957	0.001711	0	0.001554	-0.00715	-0.00023	0.000768	-0.00169	0.002438	0.002422	-0.01113	0.002286	0.004124	-0.00801	-0.00469	-0.00592	0.10393	-0.00158	0.011129	-0.0042	0.004886	-0.00268	-0.00112	0.002452	-0.00106	0.002833	0.081095
4	-0.01968	0.016156	-0.00155	0	-0.05346	-0.01272	0.001766	-0.0161	-0.0006	-0.00433	-0.0827	-0.00436	-0.00056	-0.0059	-0.00159	-0.01449	-0.00238	-0.01128	0.003372	-0.02124	0.013393	-0.008	-0.00688	3.36E-06	-0.0046	0.00943	-0.23082
5	0.00798	0.013473	0.00715	0.053457	0	0.013553	0.012501	0.017314	0.026496	0.030545	0.257092	0.013703	0.095141	0.133557	0.071265	0.008082	0.021502	0.101634	0.062188	-0.00219	0.011907	0.05962	0.003764	0.00725	-0.00723	0.030773	1.060533
6	-0.24096	0.162174	0.000228	0.012723	-0.01355	0	0.035485	-0.00468	0.008766	0.01184	-0.01817	0.004489	0.003894	-0.00527	-0.00181	-0.00758	0.017892	-0.0096	0.001196	-0.03895	0.093379	-0.01605	-0.00644	0.000742	0.00101	0.164601	0.155371
7	-0.06397	-0.00301	-0.00077	-0.00177	-0.0125	-0.03548	0	-0.00412	-0.01299	-0.02153	-0.01701	-0.00241	-0.00958	-0.00572	-0.00117	-0.0161	-0.00117	-0.01052	-0.00187	-0.02288	0.06231	-0.01274	-0.00511	0.000407	-0.00667	0.019986	-0.18634
8	-0.05839	0.004213	0.001695	-0.01609	-0.01731	0.004679	0.004115	0	0.008405	-0.05646	-0.02603	0.046253	0.013502	-0.00264	0.003436	0.001118	0.033512	-0.02064	0.003973	-0.04272	0.005568	-0.0036	-0.0027	0.001585	-0.00077	0.083409	0.000294
9	-0.01458	0.001853	-0.00244	0.000603	-0.0265	-0.00877	0.012986	-0.00841	0	-0.04913	-0.03933	-0.00061	0.01472	-0.00894	0.000135	-0.02631	0.002392	-0.03019	-0.00397	-0.04822	-0.00493	-0.02447	0.006263	0.001335	0.007449	0.014071	-0.23499
10	0.007609	0.013879	-0.00242	0.004332	-0.03054	-0.01184	0.021526	0.056464	0.049135	0	-0.02507	0.1106	0.031298	0.01726	0.024267	0.015433	0.025697	-0.00698	0.015609	-0.05221	0.000607	-0.0196	-0.00515	0.001854	-0.00452	0.049451	0.286676
11	0.01198	0.017475	0.011126	0.0827	-0.25709	0.018167	0.017005	0.026031	0.03933	0.025075	0	0.01475	0.097079	0.041956	0.033816	0.008678	0.019248	0.09837	0.048555	-0.00172	0.014531	0.136196	0.003987	0.005592	-0.0035	0.045753	0.566554
12	-0.15381	0.001569	-0.00229	0.004363	-0.0137	-0.00449	0.002407	-0.04625	0.000606	-0.1106	-0.01475	0	0.004606	-0.00333	0.003467	0.03888	0.005699	-0.01069	0.004483	-0.04772	-0.00343	-0.00856	-0.00902	0.000589	-0.00399	0.012791	-0.35337
13	-0.00476	0.000596	-0.00412	0.00056	-0.09514	-0.00389	0.009577	-0.0135	-0.01472	-0.0313	-0.09708	-0.00461	0	-0.0324	-0.00146	-0.03252	-0.00262	-0.03612	0.062976	-0.0361	-0.06617	-0.04446	-0.01367	0.002012	-0.00918	-0.00059	-0.41206
14	0.002056	0.006628	0.008007	0.005904	-0.13356	0.005266	0.005715	0.002644	0.00894	-0.01726	-0.04196	0.003326	0.033243	0	0.405588	0.098225	0.034703	-0.03409	0.138226	-0.02952	-0.00038	-0.00578	-0.00589	0.009452	-0.00263	0.03073	0.527581
15	-0.00088	0.004024	0.004691	0.001592	-0.07126	0.001806	0.001169	-0.00344	-0.00013	-0.02427	-0.03382	-0.00347	0.00146	-0.40559	0	-0.01766	-0.00091	-0.02744	0.020504	-0.04842	-0.00318	-0.02077	-0.00731	0.002236	-0.00551	0.009923	-0.62665
16	-0.00106	0.009852	0.00592	0.014494	-0.00808	0.007585	0.0161	-0.00112	0.026314	-0.01543	-0.00868	0.032518	-0.09823	0.017657	0	0.007419	0.030263	0.049327	-0.06199	0.001102	0.049282	0.000335	0.004885	0.004817	0.064716	0.109122	
17	-0.0152	-0.00129	-0.0393	0.002384	-0.0215	-0.01789	0.001175	-0.03351	-0.00239	-0.0257	-0.01925	-0.0057	0.002623	-0.0347	0.000914	-0.00742	0	-0.01548	0.031962	-0.03614	-0.00418	-0.0179	-0.00203	0.003121	-6.8E-05	0.021468	-0.30065
18	0.000605	0.011205	0.001579	0.01128	-0.10163	0.009604	0.010519	0.020639	0.030193	0.006979	-0.10984	0.010689	0.036123	0.034095	0.027443	-0.03026	0.01548	0	0.017665	-0.02418	0.011326	-0.00101	0.004505	0.006862	0.001289	0.032476	0.033626
19	-0.00404	0.004364	-0.01113	-0.00037	-0.06219	-0.0012	0.001866	-0.00397	0.003969	-0.01561	-0.04855	-0.00448	-0.06298	-0.13823	-0.0205	-0.04933	-0.03196	-0.01766	0	-0.04952	-0.00534	-0.05716	-0.00785	0.026905	-0.00635	0.005405	-0.55591
20	0.005615	0.049246	0.004204	0.021238	0.002189	0.039846	0.022876	0.042719	0.048219	0.05221	0.00172	0.047719	0.038612	0.029525	0.048424	0.06199	0.036141	0.024181	0.049516	0	0.033746	0.017074	-0.00582	0.005167	0.007665	0.075606	0.758727
21	-0.06636	-0.01134	-0.00489	-0.0139	-0.00191	-0.09338	-0.06231	-0.00557	0.004933	-0.00061	-0.01453	0.003434	0.006173	0.000384	0.003177	-0.0011	0.004179	-0.01133	0.005341	-0.03375	0	-0.012	0.001515	0.003257	-0.00399	0.057968	-0.25569
22	0.000901	0.019528	0.002684	0.008001	-0.06962	0.016046	0.012736	0.0036	0.024472	0.019602	-0.1362	0.008558	0.044458	0.005719	0.020766	-0.04928	0.017902	0.001015	0.057157	-0.01707	0.012005	0	0.010252	0.003466	-0.00247	0.040461	0.058345
23	0.005564	0.011455	0.001122	0.006883	-0.00376	0.006439	0.005112	0.002701	-0.00626	0.005148	-0.00399	0.009019	0.013671	0.005885	0.007307	-0.00033	0.002032	-0.0045	0.007854	0.005819	-0.00151	-0.01025	0	0.002674	-0.00699	0.01472	0.075793
24	-0.00093	6.39E-05	-0.00245	-3.4E-06	-0.00725	-0.00074	-0.00041	-0.00158	-0.00133	-0.00185	-0.00559	-0.00059	-0.00201	-0.00945	-0.00224	-0.00488	-0.00312	-0.00686	-0.02691	-0.00517	-0.00326	-0.00347	-0.00267	0	-0.00512	0.000408	-0.09742
25	-0.00267	0.002369	0.001059	0.004603	0.007227	-0.00101	0.006665	0.000769	-0.00745	0.004524	0.003504	0.003992	0.009181	0.002634	0.00551	-0.00482	6.81E-05	-0.00129	0.006346	-0.00766	0.003089	0.00247	0.006992	0.005117	0	0.009845	0.061059
26	-0.13024	-0.01717	-0.00243	-0.00943	-0.03078	-0.1646	-0.01999	-0.08341	-0.01407	-0.04945	-0.04575	-0.01279	0.000592	-0.03073	-0.00992	-0.06472	-0.02147	-0.03248	-0.00541	-0.07561	-0.05797	-0.04406	-0.01472	-0.00041	-0.00984	0	-0.94684
SUM	-0.85891	0.433149	-0.08109	0.230821	-1.06053	-0.15537	0.186345	-0.00029	0.234988	-0.28668	-0.56655	0.35317	0.412061	-0.52758	0.626647	-0.10912	0.300645	-0.033463	0.555907	-0.75873	0.255694	-0.05834	-0.07579	0.097417	-0.06106	0.946843	0

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	0.096487	0.009491	0.021644	-0.00813	0.181612	0.032612	0.032424	0.010102	-0.0371	-0.01305	0.128914	0.003236	-0.00618	-0.00116	-0.00632	0.012755	-0.0032	0.004145	-0.01238	0.057453	-0.00182	-0.01898	0.000238	0.002361	0.068673	0.55382	
2	-0.09649	0	-0.00091	-0.01815	-0.01472	-0.18594	0.00508	-0.00285	-0.00447	-0.02691	-0.01986	-0.00482	-0.00109	-0.01385	-0.0076	-0.02309	0.000766	-0.01614	-0.0023	-0.07372	0.01424	-0.01932	-0.03295	-0.00111	-0.00327	0.007428	-0.542	
3	-0.00949	0.000912	0	0.000356	-0.00464	-0.00665	0.00022	-0.00339	-0.00072	-0.00621	-0.00645	0.000733	-0.00072	-0.02213	-0.01299	-0.02812	0.036905	-0.00394	0.005211	-0.00885	-0.00147	-0.00493	-0.00974	0.000428	-0.00215	0.002706	-0.0782	
4	-0.02164	0.018147	-0.00036	0	-0.0488	-0.02166	0.002922	-0.00346	-0.00213	-0.01371	-0.08988	-0.01606	-0.00086	-0.00775	-0.0022	-0.02864	-0.00034	-0.00744	-0.00016	-0.02793	0.019448	-0.01092	-0.02569	-0.00062	-0.0061	0.003837	-0.292	
5	0.00813	0.014718	0.004642	0.048796	0	0.016354	0.01249	0.018923	0.023301	0.029411	0.247163	0.024134	0.017692	0.063708	0.043175	-0.04514	0.017266	0.018859	-0.01663	0.002348	-0.0049	0.016566	0.035958	-0.01018	0.003052	-0.0223	0.031654	0.8702
6	-0.18161	0.18594	0.00065	0.021657	-0.01635	0	0.044534	0.00523	0.007146	-0.00877	-0.02295	-0.00043	0.002654	-0.01741	-0.00913	-0.02488	0.018859	-0.01663	0.002348	-0.05838	0.116292	-0.01726	-0.0331	-0.00067	0.000255	0.065615	0.0589	
7	-0.03261	-0.00508	-0.00022	-0.00292	-0.01249	-0.04453	0	-0.00496	-0.02026	-0.03819	-0.01497	-0.06674	-0.0099	-0.02001	-0.01083	-0.02601	-0.0018	-0.01258	-0.00035	-0.02519	0.053781	-0.01512	-0.01982	-0.0007	-0.00957	0.010888	-0.2702	
8	-0.03242	0.002846	0.003387	0.00346	-0.01892	-0.00052	0.004961	0	0.000158	-0.0768	-0.02012	0.035663	0.007084	-0.00704	0.004413	-0.01563	0.027363	-0.03537	0.00605	-0.05659	0.008608	-0.00763	-0.03344	-0.00061	-0.0025	0.059225	-0.1464	
9	-0.0101	0.004474	0.000716	0.002134	-0.0233	-0.00715	0.020265	-0.00016	0	-0.05899	-0.02772	0.00361	0.018925	-0.00906	0.004334	-0.02969	0.012315	-0.02814	0.00398	-0.06401	0.002764	-0.01816	-0.02448	0.001376	0.022024	0.027739	-0.1763	
10	0.0371	0.028912	0.006206	0.013714	-0.02941	0.008766	0.038104	0.076798	0.05899	0	-0.01931	0.195741	0.050615	0.029118	0.04134	0.019076	0.061483	-0.0313	0.02752	0.01418	-0.00893	-0.03993	0.000142	0.01412	0.105759	0.61978		
11	0.013052	0.019865	0.006453	0.089875	-0.24716	0.022949	0.014965	0.020121	0.027717	0.01931	0	0.029641	0.050156	0.039067	0.031657	-0.01746	0.017488	0.084949	0.032506	-0.00269	0.018842	0.100248	-0.00459	0.002848	-0.00919	0.032905	0.38851	
12	-0.12891	0.004822	-0.00073	0.016064	-0.02413	0.000429	0.006737	-0.03366	-0.00361	-0.19574	-0.02964	0	0.003242	-0.008	0.003679	0.00492	0.014866	-0.02843	0.007638	-0.06245	0.001399	-0.00676	-0.04409	-0.00134	-0.00447	0.067049	-0.4411	
13	-0.00324	0.001094	0.000723	0.000858	-0.10769	-0.00265	0.009899	-0.00708	-0.01893	-0.03662	-0.05016	-0.00324	0	-0.08048	0.001722	-0.04456	0.000328	-0.04892	0.083281	-0.03212	-0.00144	-0.03639	-0.04028	-0.0008	-0.01455	0.007813	-0.4234	
14	0.006181	0.013853	0.021226	0.007751	-0.06371	0.017408	0.020008	0.007045	0.009063	-0.02912	-0.03907	0.008	0.080478	0	0.523762	0.124695	0.095473	-0.0687	0.172091	-0.02509	0.007408	0.008639	-0.03522	0.002883	0.002176	0.083427	0.95067	
15	0.001161	0.007598	0.012988	0.002199	-0.04318	0.009134	0.010833	-0.00441	-0.00433	-0.04134	-0.03166	-0.00368	-0.00172	-0.52376	0	-0.02389	-0.0005	-0.04671	0.020759	-0.04768	0.001013	-0.01836	-0.04393	-0.0008	-0.00065	0.015821	-0.761	
16	0.006319	0.023093	0.028122	0.028636	0.045144	0.024879	0.026013	0.015629	0.029692	-0.01908	0.017465	-0.00492	0.044559	-0.1247	0.023886	0	0.021931	0.014677	0.084531	-0.05448	0.014394	0.105068	-0.02197	0.002635	0.012502	0.126495	0.47053	
17	-0.01275	-0.00077	-0.03691	0.000342	-0.01727	-0.01886	0.001802	-0.02736	-0.01232	-0.06148	-0.01749	-0.01487	-0.00033	-0.09547	0.000497	-0.02193	0	-0.02376	0.030894	-0.06109	-0.00275	-0.01699	-0.03813	-0.00079	0.000742	0.038558	-0.4085	
18	0.003204	0.016142	0.003941	0.007442	-0.12853	0.016627	0.012585	0.035371	0.028141	0.031298	-0.08495	0.028425	0.04892	0.0687	0.046715	-0.01468	0.02376	0	0.023601	-0.00574	0.030003	-0.00272	-0.01735	0.007402	0.00357	0.032265	0.21414	
19	-0.00414	0.002298	-0.00521	0.000159	-0.05739	-0.00235	0.000352	-0.00605	-0.00398	-0.02752	-0.03251	-0.00764	-0.08328	-0.17209	-0.02076	-0.08453	-0.03089	-0.0236	0	0.05127	-0.00326	-0.0494	-0.0328	0.006917	-0.00853	0.002836	-0.6946	
20	0.012382	0.073716	0.00885	0.027926	0.004901	0.058383	0.025187	0.05659	0.064006	0.063118	0.002694	0.062452	0.032117	0.025092	0.047679	0.05448	0.061089	0.005745	0.051266	0	0.047477	0.009378	-0.0479	-0.00021	0.017782	0.091629	0.85583	
21	-0.05745	-0.01424	0.001471	-0.01945	-0.01627	-0.11629	-0.05378	-0.00861	-0.00276	-0.01418	-0.01884	-0.0014	-0.001441	-0.00741	-0.00101	-0.01439	0.002751	-0.03	0.00326	-0.04748	0	-0.01447	-0.02489	-0.00074	-0.00423	0.019359	-0.4393	
22	0.00182	0.019321	0.00493	0.010919	-0.03596	0.017262	0.015121	0.007632	0.018158	0.008926	-0.10025	0.006755	0.03639	-0.00864	0.018365	-0.10507	0.016986	0.002723	0.049399	-0.00938	0.014168	0	-0.00755	0.001575	-0.00091	0.043445	0.02614	
23	0.018979	0.032945	0.009742	0.025886	0.010183	0.033104	0.01982	0.033437	0.024477	0.039925	0.004587	0.040095	0.040284	0.035216	0.043932	0.021969	0.038128	0.017347	0.032805	0.047898	0.024895	0.007554	0	0.061361	0.000515	0.103578	0.77246	
24	-0.00024	0.001108	-0.00043	0.000621	-0.00305	0.000666	0.000703	0.000609	-0.00138	-0.00014	-0.00285	0.001339	0.000797	-0.00288	0.000804	-0.00264	0.000787	-0.0074	0.00692	0.000212	0.000735	-0.00158	-0.06136	0	-0.00412	0.006221	-0.0804	
25	-0.00236	0.003265	0.002151	0.006099	0.0223	-0.00025	0.00957	0.0025	-0.02202	-0.01412	0.009192	0.004475	0.014548	-0.00218	0.006496	-0.0125	-0.00074	-0.00357	0.008529	-0.01778	0.004227	0.000913	-0.00051	0.004121	0	0.016061	0.0384	
26	-0.06867	-0.00743	-0.00271	-0.00384	-0.03163	-0.06561	-0.01089	-0.05922	-0.02274	-0.10576	-0.03291	-0.06705	-0.00781	-0.08343	-0.01532	-0.1265	-0.03856	-0.03226	-0.00284	-0.09163	-0.01936	-0.04344	-0.10358	-0.06622	-0.01606	0	-1.066	
SUM	-0.55382	0.542042	0.078216	0.291984	-0.8702	-0.0589	0.270204	0.146385	0.176295	-0.61978	-0.38851	0.441131	0.023419	-0.95067	0.760951	-0.47053	0.408465	-0.21414	0.694639	-0.85583	0.43931	-0.02614	-0.77246	0.080377	-0.0384	1.065966	0	

2000

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM
1	0	0.112608	0.01107	0.034011	-0.02389	0.21211	0.037459	0.03362	0.010916	-0.10882	-0.03079	0.124202	0.005414	-0.01015	-0.00475	-0.01712	0.015387	-0.01166	0.006766	0.006098	0.09462	0.001707	-0.00735	0.000359	0.004137	0.079719	0.3758
2	-0.11261	0	-0.00095	-0.01785	-0.02374	-0.19567	0.006995	-0.00196	-0.00644	-0.06902	-0.02855	-0.00647	0.000319	-0.01502	-0.01172	-0.02898	0.002639	-0.0191	-0.00016	-0.00321	-0.021624	-0.00678	-0.0109	-0.00093	-0.00299	0.007891	-0.524
3	-0.01107	0.000954	0	0.000306	-0.00977	-0.00048	0.000435	-0.0051	0.001482	-0.01472	-0.0116	-0.00121	-0.0018	-0.02264	-0.01852	-0.03626	0.019999	-0.00603	0.004591	0.000398	0.000384	-0.00324	-0.00425	0.000295	-0.00238	0.001837	-0.118
4	-0.03401	0.017845	-0.00031	0	-0.07531	-0.04433	0.0039	-0.00668	-0.00405	-0.04072	-0.11552	-0.01595	-0.00061	-0.0122	-0.00531	-0.06068	-0.00067	-0.01364	0.000176	-0.00058	0.027735	-0.00624	-0.00832	-0.00065	-0.00729	-0.00041	-0.404
5	0.02389	0.023743	0.009767	0.075314	0	0.029677	0.02268	0.034136	0.02498	0.05076	0.301011	0.04434	0.117703	0.081427	0.056988	-0.03025	0.03265	0.127047	0.099055	0.012187	0.031082	0.092235	0.00764	0.005426	-0.01952	0.047693	1.3017
6	-0.21221	0.195675	0.000481	0.044332	-0.02968	0	0.050398	0.000239	0.002216	-0.05452	-0.03634	-0.00471	0.005079	-0.02207	-0.01783	0.03567	0.017035	-0.02265	0.004001	0.00212	0.146334	-0.00905	-0.00881	-0.00123	0.001005	0.056265	0.0724
7	-0.03746	-0.007	-0.00044	-0.0039	-0.02268	-0.0504	0	0.00687	-0.0317	-0.08924	-0.0228	-0.00961	-0.01097	-0.04436	-0.0439	-0.03285	-0.00297	-0.02032	0.000179	-0.00037	0.058604	-0.00551	-0.00705	-0.00067	-0.0099	0.01021	-0.394
8	-0.03362	0.001961	0.005103	0.006679	-0.03414	-0.00024	0.006873	0	-0.00864	-0.12825	-0.03214	0.038011	0.012476	-0.01044	0.00045	-0.02134	0.027469	-0.06368	0.009295	0.003889	0.015704	2.06E-05	-0.00674	-0.00083	-0.00279	0.057204	-0.158
9	-0.01092	0.006436	-0.00148	0.004049	-0.02498	-0.00222	0.031696	0.008644	0	-0.15232	-0.02588	0.004947	0.026037	-0.00692	0.001778	-0.0156	0.018014	-0.03154	0.012179	0.004785	0.001008	0.002964	0.02063	0.001962	0.038296	0.033635	-0.046
10	0.108815	0.069022	0.014715	0.040719	-0.05076	0.056525	0.08924	0.128249	0.152322	0	-0.0449	0.347135	0.126762	0.045656	0.072657	0.067703	0.122607	-0.05204	0.077242	0.012537	0.053276	0.026087	0.006572	0.0017	0.069356	0.192118	1.7327
11	0.030793	0.028552	0.011601	0.115518	-0.30101	0.036336	0.022805	0.032139	0.025884	0.044895	0	0.046027	0.06614	0.037509	0.037078	-0.01755	0.027286	0.065102	0.05598	0.013344	0.033374	0.155892	0.010388	0.004191	-0.00954	0.046787	0.6195
12	-0.1242	0.006468	0.001214	0.015951	-0.04434	0.004709	0.009608	-0.03801	-0.00495	-0.34713	-0.04603	0	0.006682	-0.01065	0.002863	0.010646	0.025245	-0.05366	0.0146	0.006965	0.007324	0.011518	-0.01028	-0.00081	-0.0039	0.098652	-0.462
13	-0.00541	-0.00032	0.001804	0.000606	-0.1177	-0.00508	0.010967	-0.01248	-0.02604	-0.12676	-0.06614	-0.00668	0	-0.034	-0.00261	-0.04832	0.001465	-0.07475	0.121	-0.00405	0.001392	-0.01509	-0.01559	-0.00081	-0.01608	0.013295	-0.427
14	0.010147	0.015025	0.022644	0.012198	-0.08143	0.022072	0.044363	0.010443	0.006922	-0.04566	-0.03751	0.010651	0.034002	0	0.453579	0.116149	0.120544	-0.0653	0.144761	0.001599	0.014495	0.021904	-0.00583	0.00206	0.002373	0.07285	0.9031
15	0.004751	0.011724	0.01852	0.005305	-0.05699	0.017833	0.043901	-0.00045	-0.00178	-0.07206	-0.03708	-0.00286	0.002611	-0.45358	0	-0.01637	0.003313	-0.04965	0.025469	-0.00422	0.010508	-0.0055	-0.01098	-0.00035	-0.00517	0.024915	-0.548
16	0.017118	0.028979	0.036263	0.060882	0.030247	0.035665	0.032848	0.021344	0.0156	-0.0677	0.017547	-0.01065	0.048324	-0.11615	0.01637	0	0.029094	0.003673	0.146692	0.018003	0.035869	0.209544	0.020197	0.006161	0.038226	0.210287	0.8842
17	-0.01539	-0.00264	-0.02	0.00067	-0.03265	-0.07704	0.002968	-0.02747	-0.01801	-0.12261	-0.02729	0.02524	-0.00146	-0.12054	-0.00331	-0.02909	0	-0.03551	0.029659	0.003945	0.000301	-0.01005	-0.00715	-0.00036	0.003258	0.039482	-0.436
18	0.01659	0.019098	0.006033	0.013644	-0.12705	0.02265	0.020325	0.063678	0.031542	0.052037	-0.0651	0.053656	0.074746	0.065296	0.049646	-0.00367	0.035507	0	0.038794	0.011837	0.046495	0.015209	-0.004	0.015208	0.011881	0.043664	0.5028
19	-0.06677	0.000164	-0.00459	-0.00018	-0.09906	-0.004	-0.00018	-0.00929	-0.01218	-0.07724	-0.05598	-0.0146	-0.121	-0.14476	-0.02547	-0.14669	-0.02966	-0.03879	0	-0.00537	-0.00283	-0.04473	-0.01252	0.003924	-0.0152	-0.00019	-0.867
20	-0.0061	0.003209	-0.004	0.000576	-0.01219	-0.00212	0.000371	-0.00389	-0.00479	-0.01254	-0.01334	-0.00697	0.000407	-0.0016	0.00422	-0.018	-0.00394	-0.01184	0.005372	0	-0.00513	-0.01891	-0.01699	-0.00162	-0.00464	0.002681	-0.125
21	-0.09462	-0.02162	-0.00038	-0.02773	-0.03108	-0.14633	-0.05686	-0.0157	-0.01001	-0.05328	-0.03337	-0.00732	-0.00139	-0.0145	-0.01051	-0.03587	-0.0003	-0.0465	0.002832	0.005125	0	-0.01023	-0.0065	-0.00072	-0.0061	0.010725	-0.612
22	-0.00171	0.006784	0.003235	0.006238	-0.09224	0.005052	0.005515	-2.1E-05	-0.00296	-0.02609	-0.15589	-0.01152	0.015093	-0.0219	0.005504	-0.20954	0.010055	-0.01521	0.044727	0.018914	0.010234	0	0.01169	0.000741	-0.00513	0.038733	-0.36
23	0.007351	0.01019	0.004248	0.008321	-0.00764	0.008812	0.00705	0.006742	-0.02063	-0.00657	-0.01039	0.010279	0.015593	0.005827	0.010983	-0.0202	0.00715	0.004004	0.012524	0.01699	0.006504	-0.01169	0	0.015806	-0.00984	0.028593	0.1007
24	-0.00036	0.00093	-0.0003	0.000652	-0.00543	0.001232	0.000673	0.000829	-0.00196	-0.0017	-0.00419	0.000809	0.000813	-0.00206	0.000345	-0.00616	0.000363	-0.01521	-0.00392	0.001622	0.000716	-0.00074	-0.01581	0	-0.00566	0.003667	-0.051
25	-0.00414	0.002989	0.00238	0.007285	0.019519	-0.00101	0.009897	0.002789	-0.0383	-0.06936	0.009538	0.003897	0.016076	-0.00237	0.005165	-0.03823	-0.00326	-0.01188	0.015199	0.004641	0.006098	0.005133	0.009942	0.005655	0	0.014115	-0.028
26	-0.07972	-0.00789	-0.00184	0.000409	-0.04769	-0.05627	-0.01021	-0.0572	-0.03364	-0.19212	-0.04679	-0.09865	-0.01329	-0.02491	-0.21029	-0.03948	-0.04366	0.000195	-0.00268	-0.01072	-0.03873	-0.02859	-0.00367	-0.01412	0	0.014115	-0.134
SUM	-0.57578	0.523595	0.118398	0.403808	-1.30166	-0.0724	0.393713	0.151718	0.045803	-1.73272	-0.61953	0.461508	0.427388	-0.90307	0.548179	-0.88423	0.435538	-0.50278	0.867199	0.124522	0.612262	0.359696	-0.10072	0.050836	0.028314	1.134415	0

2005

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	SUM	
1	0	0.0819027	0.0129826	0.026304	-0.025503	0.169295	0.0295791	0.0265355	0.0072347	-0.077414	-0.031291	0.0086301	0.0037223	-0.016906	-0.007066	-0.016778	0.0092344	-0.011218	0.0048933	-0.031238	0.061145	-0.016967	-0.016593	-0.000963	0.0002018	0.0459399	0.3344481	
2	-0.081903	0	-0.000409	-0.015939	-0.02886	-0.179117	0.0048557	-0.001611	-0.003487	-0.041962	-0.031895	-0.006534	-0.000196	-0.019686	-0.009751	-0.027598	0.0385-05	-0.022707	-0.000664	-0.058585	0.0128507	-0.026578	-0.019558	-0.001514	-0.006657	0.0055966	-0.561217	
3	-0.012983	0.0004091	0	8.76E-05	-0.014738	-0.001296	3.4E-05	-0.002422	0.0076941	-0.010092	-0.016049	-0.002216	0.0011536	-0.043319	-0.026456	-0.045482	0.0274386	-0.009102	0.0400115	-0.016931	-0.003782	-0.012947	-0.007152	-0.000146	-0.004175	0.0020353	-0.186422	
4	-0.02693	0.015939	-8.76E-05	0	-0.079563	-0.054986	0.0028593	-0.005956	-0.001984	-0.025699	-0.109927	-0.001236	-0.000466	-0.01752	-0.004439	-0.049748	-0.00124	-0.015423	1.75E-05	-0.040812	0.0208538	-0.021927	-0.015151	-0.001176	-0.009204	0.0026667	-0.451387	
5	0.0265034	0.0285956	0.0147381	0.0795627	0	0.0376566	0.0285037	0.042189	0.0345439	0.0548048	0.3275174	0.0516311	0.1290431	0.104043	0.0784759	-0.00082	0.0445179	0.164079	0.0964058	0.0011752	0.0399069	0.0987752	0.0125858	0.0098937	-0.015275	0.0616175	1.556904	
6	-0.169295	0.179117	0.0012963	0.0549856	-0.037457	0	0.0503904	9.77E-05	0.0033459	-0.031034	-0.04008	-0.005359	0.0046339	-0.029964	-0.014886	-0.034811	0.0140767	-0.032866	0.033204	-0.05828	0.1187105	-0.033638	-0.019945	-0.002001	-0.003665	0.0665837	-0.017043	
7	-0.029579	-0.004856	-3.4E-05	-0.002859	-0.028504	-0.05039	0	-0.002991	-0.011027	-0.056493	-0.028073	-0.009888	-0.013992	-0.052992	-0.037573	-0.029795	-0.002304	-0.022329	0.0003225	-0.053146	0.0443289	-0.023967	-0.013419	-0.00133	-0.015852	0.0172798	-0.41056	
8	-0.026535	0.0016115	0.002422	0.0059559	-0.042189	-9.77E-05	0.0029907	0	-0.002894	-0.082242	-0.034843	0.0145936	0.0069888	-0.018033	-0.000893	-0.026875	0.0132174	-0.070584	0.0052743	-0.058465	0.0071691	-0.025551	-0.017857	-0.002222	-0.009788	0.0527015	-0.360138	
9	-0.007235	0.0034873	-0.007694	0.0019836	-0.034544	-0.003346	0.0110272	0.0028936	0	-0.107664	-0.034477	-0.007309	0.0109525	-0.018312	-0.001439	-0.043588	0.0057455	-0.037083	0.0058725	-0.082655	0.0006778	-0.038931	0.0071107	0.0002383	0.0087768	0.0240882	-0.341396	
10	0.0774144	0.0419617	0.0109922	0.0256994	-0.054805	0.031045	0.0544926	0.0822421	0.076642	0	-0.400125	0.2574495	0.0899726	0.0317534	0.053594	0.0250146	0.091453	-0.048726	0.0537556	-0.052277	0.028938	-0.016991	-0.010502	-1.3E-05	0.0317397	0.0864443	0.9361244	
11	0.0312933	0.0319552	0.0160486	0.0099271	-0.327517	0.0400804	0.0280728	0.0348427	0.0344765	0.040125	0	0.0498338	0.074514	0.0608198	0.0533613	0.0021229	0.0355887	0.0789758	0.0672305	0.0029491	0.0366201	0.1516439	0.015949	0.0064502	-0.00498	0.0591589	0.7305806	
12	-0.10863	0.0065339	0.0022159	0.0123861	-0.051631	0.0053592	0.0098877	-0.0146	0.007309	-0.25745	-0.049834	0	0.0056453	-0.018818	0.001406	-0.007839	0.0171176	-0.054485	0.0119321	-0.06509	0.003613	-0.027644	-0.028975	-0.01952	-0.009604	0.0197704	-0.385376	
13	-0.003722	0.0001964	-0.001154	0.0004655	-0.129004	-0.004664	0.0130923	-0.006989	-0.010953	-0.089973	-0.074514	-0.005645	0	-0.46168	-0.002847	-0.040955	0.004521	-0.073085	0.0178567	-0.038064	-0.000131	-0.046217	-0.025296	-0.01562	-0.025087	0.0166662	-0.4939	
14	0.0169662	0.0196857	0.0433194	0.0175196	-0.104041	0.0259642	0.052992	0.0180334	0.0183122	-0.031753	-0.060682	0.0188185	0.0461682	0	0.5800298	0.1969508	0.176621	-0.078192	0.057355	-0.029973	0.0175013	0.002691	-0.019946	0.0025006	0.0027034	0.207592	1.2614857	
15	0.0070662	0.0097509	0.026456	0.0043389	-0.078476	0.0148856	0.0375727	0.0008931	0.0014387	-0.053594	-0.022123	0.007839	0.0469551	-0.196951	0.0190259	0	0.0317493	-0.064452	0.0308739	-0.045213	0.0063224	-0.028948	-0.024646	-0.01905	-0.010386	0.0306381	-0.795419	
16	0.0167784	0.0275977	0.0454819	0.0497478	0.0008196	0.0348108	0.0297954	0.0268753	0.0435876	-0.025015	-0.009145	-0.035589	-0.017118	-0.000452	-0.176621	0	0.0317493	0.0045116	0.123808	-0.057825	0.0313921	0.0978494	0.0080142	0.006058	0.0299747	0.1328005	0.5335588	
17	-0.009234	-9.04E-05	-0.027439	0.0012398	-0.044518	-0.014077	0.0023809	-0.013217	-0.005741	-0.069145	-0.035589	-0.017118	-0.000452	-0.176621	0	-0.031749	0	-0.041639	0.0209972	-0.069539	-0.001322	-0.035339	-0.019394	-0.001756	-0.009567	0.039988	-0.533861	
18	0.0112177	0.0227072	0.0091019	0.0154235	-0.164075	0.0328662	0.0223287	0.0765837	0.0370831	0.048726	-0.078976	0.054485	0.0730851	0.0781919	0.0644522	-0.040512	0.0416392	-0.123808	-0.020997	0.0464675	-0.001172	0.0574244	0.0046823	-0.007501	0.0228376	0.0082246	0.0435764	0.5888697
19	-0.004893	0.0006638	-0.004012	-1.77E-05	-0.096406	-0.00952	-0.000323	-0.006524	-0.006873	-0.053756	-0.06731	-0.011932	-0.07857	-0.195735	-0.030874	-0.123808	-0.020997	-0.046467	0	-0.065848	-0.004191	-0.089627	-0.023801	0.0013904	-0.0020963	-0.000562	-0.981313	
20	0.031238	0.0585846	0.0169307	0.0408119	-0.001175	0.0588285	0.0351468	0.058465	0.0826546	0.0522773	-0.002949	0.065098	0.038064	0.029975	0.0452129	0.0578252	0.0695393	0.0011716	0.065848	0	0.0481859	0.0047587	-0.004966	0.0012228	-0.0219564	0.031496	0.9578435	
21	-0.061114	-0.012851	0.0037816	0.020854	-0.039907	-0.118711	-0.044329	-0.007169	-0.000678	-0.028094	-0.03662	-0.001611	0.0001307	-0.017501	-0.066321	-0.031392	0.0013124	-0.0574024	0.0041913	-0.048186	0	-0.033742	-0.014052	-0.003292	-0.010538	0.0010962	-0.578664	
22	0.0196973	0.0257881	0.0129466	0.0219272	-0.008775	0.0363883	0.0239666	0.0255512	0.0389315	0.0169099	-0.151644	0.0276437	0.0462172	-0.002691	0.0289482	-0.097849	0.0353392	-0.004682	0.0896274	-0.004759	0.0337416	-0.022506	0	0.022506	0.0022408	0.006456	0.0970121	0.2468293
23	0.0165027	0.019558	0.0071515	0.0151514	-0.012586	0.0194952	0.0134185	0.017874	-0.007111	0.0109509	-0.015049	0.0026919	0.0051618	-0.002501	0.0019053	-0.000658	0.0071365	-0.022838	-0.00319	0.001223	0.0032923	-0.002241	-0.023695	0	0.023697	-0.009775	0.0328014	0.262184
24	0.0099629	0.0015137	0.0001461	0.0011761	-0.009894	0.0020012	0.0013304	0.0022216	-0.000268	1.34E-05	-0.00645	0.0019519	0.0051618	-0.002501	0.0019053	-0.000658	0.0071365	-0.022838	-0.00319	0.001223	0.0032923	-0.002241	-0.023695	0	0.023697	-0.009775	0.0328014	0.262184
25	-0.000202	0.0060573	0.0041746	0.0092936	0.0152748	0.003665	0.0158518	0.0097894	-0.008777	-0.03174	0.0049796	0.0096037	0.0250867	-0.002703	0.0103859	-0.029975	0.0095668	-0.00825	0.0203625	-0.021956	0.005384	-0.006456	0.0097753	0.0080057	-0.008006	0.0091503	-0.055579	
26	-0.04594	-0.005597	-0.002035	-0.002867	-0.061618	-0.066584	-0.01728	-0.052701	-0.024008	-0.066444	-0.059159	-0.01977	-0.010666	-0.120759	-0.036638	-0.1328	-0.199888	-0.043576	0.0005616	-0.08315	-0.010096	-0.097012	-0.032801	-0.00915	-0.022278	-0.01	-1.081836	
SUM	-0.334448	0.5612169	0.1864216	0.4511872	-1.55069	0.0170435	0.4105605	0.3061383	0.341959	-0.936124	-0.730581	0.5853762	0.4939004	-1.261486	0.795419	-0.533559	0.5538611	-0.50887	0.9813129	-0.57844	0.576842	-0.246829	-0.262118	0.055593	-0.075565	0.1081836	0	

Curriculum Vitae

Norman Dytianquin was born on 16 February in Manila, Philippines. He spent his high school and half of his university years in a Catholic seminary and originally majored in theology and philosophy. He later shifted to economics and has since university graduation at age 19, worked professionally in the Philippines as a researcher and later manager of a private universal commercial bank for three years, as a bank economist for the central bank for ten years and as a strategy and then project post-evaluation specialist for a major regional development bank/international financial institution for seven years. He completed three graduate degrees – one in applied business economics at the University of Asia and the Pacific (then Center for Research and Communication) where he graduated with No. 1 rank in class; the second one in business administration at the Ateneo de Manila Graduate School of Business, both in the Philippines; and a third in development/social studies in the Hague, the Netherlands at the Institute of Social Studies now under the Erasmus University. He graduated with distinction in the latter and was awarded the Best Thesis prize for work on the economics of debt-equity swaps. He has also written and co-written publications for both the Central Bank of the Philippines and the Asian Development Bank. In 1997, he got accepted for the PhD program at the United Nations University in Maastricht, Netherlands which was later merged with the Maastricht Economic Research Institute of Technology (MERIT). He has done a lot of teaching and project consultancy work at various institutes such as the Maastricht School of Management (MSM), Centre for European Studies (CES), University of Maastricht, and the Zuyd University of Applied Sciences in the Netherlands, giving courses on general economics, statistics, quantitative methods, management, finance (sales finance, logistics finance, treasury and finance, financial market and institutions, corporate finance, and macroeconomics and finance), history of economic thought, globalization, business ethics and corporate social responsibility, research methods, business strategy and European integration. For fifteen years, he was the Coordinator of economics courses for the European Studies program of the Faculty of Arts and Social Sciences (FaSOS) of the University of Maastricht while teaching and coordinating some courses as well for the School of Business and Economics and University College Maastricht (UCM). In the Philippines, he also taught for ten years at the Ateneo de Manila University, Ateneo Graduate School of Business, De La Salle University, College of St. Benilde, St. Scholastica's College, and Assumption College, teaching courses on research methods, money and banking, development economics, history of economic thought, econometrics, public finance, managerial economics, mathematical economics, international economics, macroeconomics, microeconomics, financial economics, and corporate planning/strategic management. His consultancy work for the United Nations involved projects relating to national innovation systems, information technology, and developing innovation surveys which also involved co-writing reports and publications. His teaching stint at the MSM involved him in the MBA outreach programs in Rwanda, Namibia and Kuwait as well as the in-house MBA program. Currently, he is working part time for the International Business program of the Zuyd University of Applied Sciences.

Social/Economic and Scientific Relevance

The most significant economic contribution of this study is the application of input-output analysis in a dynamic context to understand economic growth and crisis episodes where technology is a driver or trigger. In applying the field of influence approach to the input-output tables of the subject countries, a program was developed using Excel by the author where the equations or formulas were keyed in with reference to column and row entries in the spreadsheet instead of actual numbers. Thus, once a matrix is plugged in, the necessary calculations are immediately computed. The software though is limited to a 29 x 29 size which was the largest matrix size for the subject economies (i.e., Philippines) although the matrices could be reduced to any size by just deleting rows and columns for smaller sizes as done in the cases of Malaysia and Thailand (26 x 26) or expanded by simply adding rows and columns and replicating or copying previous cells into them for larger sizes bigger than 29 x 29. The field of influence was first tested in the case of a 3 x 3 sample matrix comprising the three major sectors agriculture, industry and services for the Philippines which led to an approximate balance according to the field of influence formula and were then expanded to the actual matrix sizes of the three countries using the constructed Excel software.

The results of the study will be relevant in terms of contributing to the literature on the economics of technological change, in terms of policy insights for institutional and capability-building efforts in the area of technology in developing countries, and in enhancing the overall technological policy context in these developing countries.

Contributions to the Literature

The findings of this study and its empirical results will greatly enrich the understanding of five ongoing controversies surrounding the economics of technical change.

First, the study contributes to the *accumulation versus assimilation debate* on the causes of East Asia's growth. The standard growth accounting equation uses total factor productivity (TFP) or the Solow residual to proxy for technological progress as a source of economic growth. While the growth accounting approach has been subject to criticism due to the assumptions relating to the specification of the production function and other components of the growth accounting formula, recent techniques such as the field of influence approach, have shown promise. This technique will be tested in the case of the Asian countries to showcase changes in input coefficients over time as a feature of technological change.

Second, the study links to the debate on *real and monetary explanations of business cycles*. If technology is proven to have a bearing on the Asian crisis, it will enhance and support the growing interest in real business cycle (RBC) analysis, which because of methodological issues, has been questioned as to relevance in favour of monetary business cycle (MBC) theories. While the study believes that monetary factors did trigger the crisis, it would also want to explore the possible role that technology could have contributed to the crisis in line with RBC thinking using input-output analysis to show the dynamics of how shocks are propagated among sectors or industries.

Third, the study relates to the *fundamentals versus contagion debate* about the causes of the Asian crisis. The study, by exploring how productivity shocks are propagated in the countries affected by the Asian crisis, will supplement existing explanations by incorporating a supply-side perspective. This will enrich understanding of business cycle

phenomenon, which is caused by a cluster or combination of factors that could include technology shocks in addition to monetary or financial shocks.

Fourth, research gaps in the field of the microeconomics as opposed to the macroeconomics of technological change have also been noted and the industry-level or meso-approach used in the study could help strengthen this area. The study would also contribute significantly to the widening applications of empirical methodologies in analysing the role of technological change on growth and economic fluctuations. The resulting empirical findings from the study, based on the developing country perspective acquired from the selected study sample of three crisis economies, may lend useful insights to applications of input-output analysis such as studying Schumpeterian waves of technology across sectors and the whole economy. Another possible area for future research is to conduct a similar analysis for the other crisis economies of Korea and Indonesia, and to those Asian countries that were not as severely affected by the crisis such as Singapore, Taiwan, Viet Nam and China. With European countries such as Greece, Spain, Portugal, Italy and Ireland experiencing similar crisis episodes, the study can also be extended in these economies as a future area for research. This will be useful in extending generalisations and conclusions about the impact of technology on growth and business cycles using the field of influence approach to input-output analysis.

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