

Deindustrialisation, structural change and sustainable economic growth

Citation for published version (APA):

Tregenna, F. (2015). *Deindustrialisation, structural change and sustainable economic growth*. UNU-MERIT. UNU-MERIT Working Papers No. 032

Document status and date:

Published: 01/01/2015

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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Working Paper Series

#2015-032

Deindustrialisation, structural change and sustainable economic growth
Fiona Tregenna

UNIDO/UNU-MERIT background papers for the UNIDO, Industrial Development Report 2016: IDR 2016 WP 4

This working paper is part of a collaborative research effort of UNIDO and UNU-MERIT. It has been commissioned as a background paper for the UNIDO Industrial Development Report 2016.

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UNU-MERIT Working Papers

ISSN 1871-9872

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Deindustrialisation, structural change and sustainable economic growth

Background paper for 2015 Industrial Development Report

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¹ Helpful comments and suggestions have been received from Eddy Szirmai and Gabriel Palma, and are acknowledged with thanks. Parts of this working paper draw from Tregenna (2013, forthcoming 2015a, forthcoming 2015b).

Abstract

This paper reviews the literature and empirical evidence on deindustrialisation, with a focus on premature deindustrialisation. Structural change and industrialisation have long been considered important for developing countries to 'catch up'. However, there has been widespread deindustrialisation over the past few decades, which is setting in at lower levels of income per capita and lower shares of manufacturing in the employment or GDP than earlier. Premature deindustrialisation can be defined as deindustrialisation that begins at a lower level of GDP per capita and/or at a lower level of manufacturing as a share of total employment and GDP, than is typically the case internationally. Many of the cases of premature deindustrialisation are in sub-Saharan Africa, in some instances taking the form of 'pre-industrialisation deindustrialisation'. It is argued here that premature deindustrialisation is likely to have especially negative effects on growth. In addition to being influenced by the level of income per capita and share of manufacturing in the economy when deindustrialisation begins, the effects of deindustrialisation on growth are also expected to depend on whether or not it is policy induced and the nature of the activities that are relatively contracting and expanding. The paper concludes by exploring the implications for policymakers facing deindustrialisation.

JEL codes: L16, J21, O14, O25

Keywords: deindustrialisation, industrial development, structural change, industrial policy, manufacturing

Table of Contents

1. Introduction	5
2. Industrialisation, deindustrialisation and structural change.....	6
2.1 Structural change	6
2.2 Industrialisation and deindustrialisation	7
2.3 Sector-specificity and activity-specificity	7
2.4 The specificity of premature deindustrialisation	9
3. Empirical overview of trends in manufacturing shares.....	13
4. The heterogeneity of deindustrialisation	20
5. Sources and causes of deindustrialisation	28
5.1 Literature and evidence on sources and causes of deindustrialisation.....	28
5.2 Specific causes of premature deindustrialisation	31
6. Effects of deindustrialisation on growth	33
6.1 Manufacturing and growth	33
6.2 What influences the effects of deindustrialisation on growth	42
6.3 Specific effects of premature deindustrialisation	43
7. Policy implications	46
7.1 Is deindustrialisation undesirable?	46
7.2 Is deindustrialisation avoidable?.....	48
7.3 What can be done to avoid, slow or reverse deindustrialisation?	48
7.4 How can the negative effects of deindustrialisation be mitigated?	53
8. Concluding remarks	54
References	56

List of Figures

Figure 1: Inverted-U curve showing some possible premature deindustrialisers, 2009.....	12
Figure 2: Share of manufacturing in total employment, countries by income group, 1970-2010	17
Figure 3: Share of manufacturing in GDP, countries by income group, 1970-2010.....	18
Figure 4: Share of manufacturing in total employment, countries by region, 1970-2010.....	19
Figure 5: Share of manufacturing in GDP, countries by region, 1970-2010.....	20
Figure 6: Decomposition of percentage change in the level of manufacturing employment	24
Figure 7: Partial results from decomposition of changes in the share of manufacturing employment.....	26
Figure 8: Relationship between manufacturing share in GDP and GDP growth, all countries, 1970-2010	35
Figure 9: Relationship between manufacturing share in employment and GDP growth, all countries, 1970-2010.....	36
Figure 10: Relationship between share of manufacturing in GDP and GDP pc growth, all countries	38
Figure 10a: 1970-1980	38
Figure 10b: 1980-1990	38
Figure 10c: 1990-2000	38
Figure 10d: 2000-2010	38
Figure 11 Relationship between share of manufacturing in GDP and GDP pc growth, country groups	39
Figure 11a: East Asia	39
Figure 11b: Latin America	39
Figure 11c: Sub-Saharan Africa	39
Figure 11d: Western Europe	39
Figure 12: Relationship between share of manufacturing in employment and GDP pc growth, all countries.....	40
Figure 12a: 1970-1980	40
Figure 12b: 1980-1990	40
Figure 12c: 1990-2000	40
Figure 12d: 2000-2010	40
Figure 13: Relationship between share of manufacturing in employment and GDP pc growth, country groups.....	41
Figure 13a: East Asia	41
Figure 13b: Latin America	41
Figure 13c: Sub-Saharan Africa	41
Figure 13d: Western Europe	41

1. Introduction

Industrialisation has long been regarded as the key route for countries to develop and grow, and in particular for developing countries to 'catch up' with advanced economies. However, there is much less consensus now than a half century earlier as to whether industrialisation remains the most important, or even an important, path to development. Among the relevant factors to consider in this regard are the challenges of industrialising in the context of current international patterns of production and consumption and competition from China and other emerging manufacturing powerhouses; the increasing prominence of global value chains in manufacturing; important differences among developing countries in their levels of industrialisation and the sophistication and competitiveness of their manufacturing sectors; and a high degree of heterogeneity and growth-pulling potential amongst different types of manufacturing activities as well as within other sectors.

Also relevant to industrialisation and catching up is the fact that some developing countries have begun deindustrialising at levels of industrialisation while in others the level of industrialisation has stagnated. It is important to understand the reasons for this stagnation or deindustrialisation, if such countries are to industrialise further.

This paper provides a wide-ranging review and analysis of deindustrialisation, with a special focus on premature deindustrialisation. The perspective draws on a 'structural change' approach, which emphasises the importance of the manufacturing sector, but with a stronger emphasis on the heterogeneity of sectors and on considering not only sector-specificity but also activity-specificity.

The next section explores some of the theoretical and conceptual issues: structural change and 'catching up', the importance of industrialisation in a structuralist approach, the meaning of deindustrialisation and why it might be seen as a problem, sector-specificity and activity-specificity in the development process, and the particularity of premature deindustrialisation. This includes a simple cross-country econometric analysis of the relationship between income per capita and the manufacturing share of total employment

internationally, which assists in identifying possible cases of premature deindustrialisation. This is followed, in section 3, by an empirical overview of changes in the shares of manufacturing in GDP and employment across countries and over time, showing the prevalence of deindustrialisation and trends therein. Section 4 emphasises the importance of recognising the heterogeneity of deindustrialisation, and what can lie behind falls in manufacturing employment in particular. Section 5 discusses sources and causes of deindustrialisation, while section 6 examines its effects on growth. Section 7 deals with policy implications, in particular what policies may be feasible and helpful in avoiding deindustrialisation or in managing it and mitigating any negative effects. Section 8 concludes.

2. Industrialisation, deindustrialisation and structural change

2.1 Structural change

Structural change has been considered central to developing countries 'catching up' with developed countries. Structural change essentially refers to changes in sectoral composition of output and employment contributing to higher economic growth and increased utilisation of underutilised resources, especially labour.

Nübler (2014) argues that catching up has two dimensions: in addition to the structural change dimension (including diversification, product differentiation and technological improvements) there is also a *process* dimension. This refers to the pace and sustainability of change: "[h]igh-performing processes are expressed in fast expansion of productive capacities and rapid productive transformation, absorbing technology and diversifying into a wide scope of different products and industries" (Nübler, 2009, p.119). The process dimension of catching up also relates to the sustainability of change, which is especially important in avoiding a 'middle-income trap'.

The basic logic behind structural change, and the perspective that this is key to the development process, lies in the relative productivity of different activities in the economy,

and the need to shift the composition of the economy from lower- to higher-productivity activities in order to raise aggregate economic growth. Structural change is thus associated with shifting labour as well as capital to more dynamic or higher-productivity activities. What is important is not only levels of productivity at a point in time, but the scope for cumulative productivity increases – productivity increases that build on one another in a virtuous circle.

2.2 Industrialisation and deindustrialisation

Structuralist economics thinking emphasises the importance of industrialisation. This derives from a belief that it is the manufacturing sector specifically that has high potential for cumulative productivity increases, increasing returns to scale, and has an important role as an engine of economic growth.

This approach suggests that, beyond the share of manufacturing in the economy increasing at a certain stage of development as a stylised fact of the development process, manufacturing growth itself is important to sustained economic growth. An issue that will be explored later in this paper is the implications of the reverse process – a decline in the relative share of manufacturing – and whether the effects on growth can be expected to be negative.

We can thus think about deindustrialisation as a particular form of structural change, albeit not the sort of change deemed desirable in a structuralist approach. Deindustrialisation is mostly commonly defined in the literature as a fall in the share of manufacturing in a country's total employment (see, for example, Palma, 2008; Rowthorn and Coutts, 2004; Rowthorn and Ramaswamy, 1997; Saeger, 1997; Alderson, 1999; and Dasgupta and Singh, 2005). It has also been defined as a sustained decline in the share of manufacturing in both employment and GDP (Tregenna, 2009).

2.3 Sector-specificity and activity-specificity

As discussed above, structuralist approaches to economic development emphasise the sectoral specificity of growth, seeing a special role for the manufacturing sector in particular. A sectoral approach is implicitly premised on the notion that there are important common characteristics of the various activities within sectors, characteristics that are relevant for growth.

The view taken here is that there are indeed important ‘common denominators’ in the characteristics of sectors that are relevant for growth, but it is also crucial to adequately recognise the heterogeneity within sectors. Activities within sectors vary widely in terms of their degree of technological advancement, export orientation, strength of backward and forward linkages, productivity and scope for cumulative productivity increases, scope for increasing returns to scale, and other characteristics important for growth. This heterogeneity is related in part to the degree of aggregation in a sectoral classification. Naturally, the more disaggregated a classification (a higher number of digits in the International Standard Industrial Classification (ISIC) system, for example), the less the degree of heterogeneity. Still, it is important to recognise that even where activities are in the same sector, there are important differences between them.

At the level of broad sectors, it is perhaps in the services sector that this heterogeneity is most clearly apparent. A wide variety of activities are classified within the broad services sector. Considering for example activities as diverse as domestic work, finance, healthcare, tourism, these play completely different roles in the economy and vary widely in their growth-pulling potential. The ‘common denominator’ of services – that their production and consumption is generally inseparable in time and mostly in space as well – is important and does have implications for their potential to act as an engine of growth, meaning that the services classification does have value. But it is also important to recognise the degree of heterogeneity among these services activities, and similarly in other sectors.

The degree of heterogeneity within sectors has arguably grown over time, making this differentiation even more important than previously. For instance, some subsectors of services have characteristics traditionally associated with manufacturing, such as scope for increasing returns to scale.

This brings us to the concept of activity-specificity. Activity-specificity refers here to differentiation by type of activity, as opposed to by sector. There are various dimensions along which activity-specificity could apply, such as degree of technological sophistication. Overall, what is important in activity-specificity is an activity's growth-pulling potential. Activity-specificity also relates to the issue of *how* something is done (in addition to *what* is done), and to what Nübler (2014) terms the 'process' dimension of catching up (in addition to the structural change dimension), as discussed earlier.

There is a relationship between sector- and activity-specificity, as sectors do have important common characteristics that are relevant for growth. This is so even at the broad level of the main sectors, and the commonality within sectors would of course increase at higher levels of disaggregation when classifying activities. Sectoral structure – and changes therein, such as deindustrialisation – does matter for growth. However, the 'activity-composition' of sectors, such as the technological profile of activities making up a sector in a specific country and point in time – also matters. With changes in sectoral structure, it is also important to look at changes in this activity-profile.

When analysing the nature and likely effects of deindustrialisation for instance, it is important to consider not only changes in the sectoral composition of the economy, but also in the composition of those sectors – which types of activities within sectors are relatively growing and shrinking. We return to this in later discussions on the heterogeneity of deindustrialisation and on factors influencing the effects of deindustrialisation on growth.

2.4 The specificity of premature deindustrialisation

The point at which deindustrialisation begins is crucial to understanding its nature and likely effects. There are two key aspects relating to the point at which deindustrialisation commences. Firstly, the level of a country's income per capita at the onset of deindustrialisation. Secondly, how high a share of GDP and total employment is contributed by manufacturing at the onset of deindustrialisation. Conceptualised in terms of the inverted U relationship between income per capita and the share of manufacturing in the

economy, the first of these two aspects thus pertains to how far to the right (in terms of how high income per capita is) at the turning point. The second aspect relates to how high the turning point is (the shares of manufacturing in employment and GDP). The implications of these and other factors for the effects of deindustrialisation on growth are explored later in this paper. Here, these two aspects allow us to introduce the concept of premature deindustrialisation.

One way of thinking of premature deindustrialisation is as deindustrialisation that begins at a lower level of GDP per capita and/or at a lower level of manufacturing as a share of total employment and GDP, than is typically the case internationally. That is, if a country begins deindustrialising at a lower level of GDP than is generally the case, or the deindustrialisation begins when manufacturing has not yet reached the shares of employment and GDP typically associated with the turning point of industrialisation, then such deindustrialisation could be considered premature. It must be emphasised that this is suggested here as an indicative statistical rule of thumb for identifying premature deindustrialisation, and not a rigorous or complete analytical definition. A country's share of manufacturing in total employment may exceed that expected for its level of income per capita but it could still be experiencing rapid and destructive deindustrialisation, with the share of manufacturing in total employment and output falling.

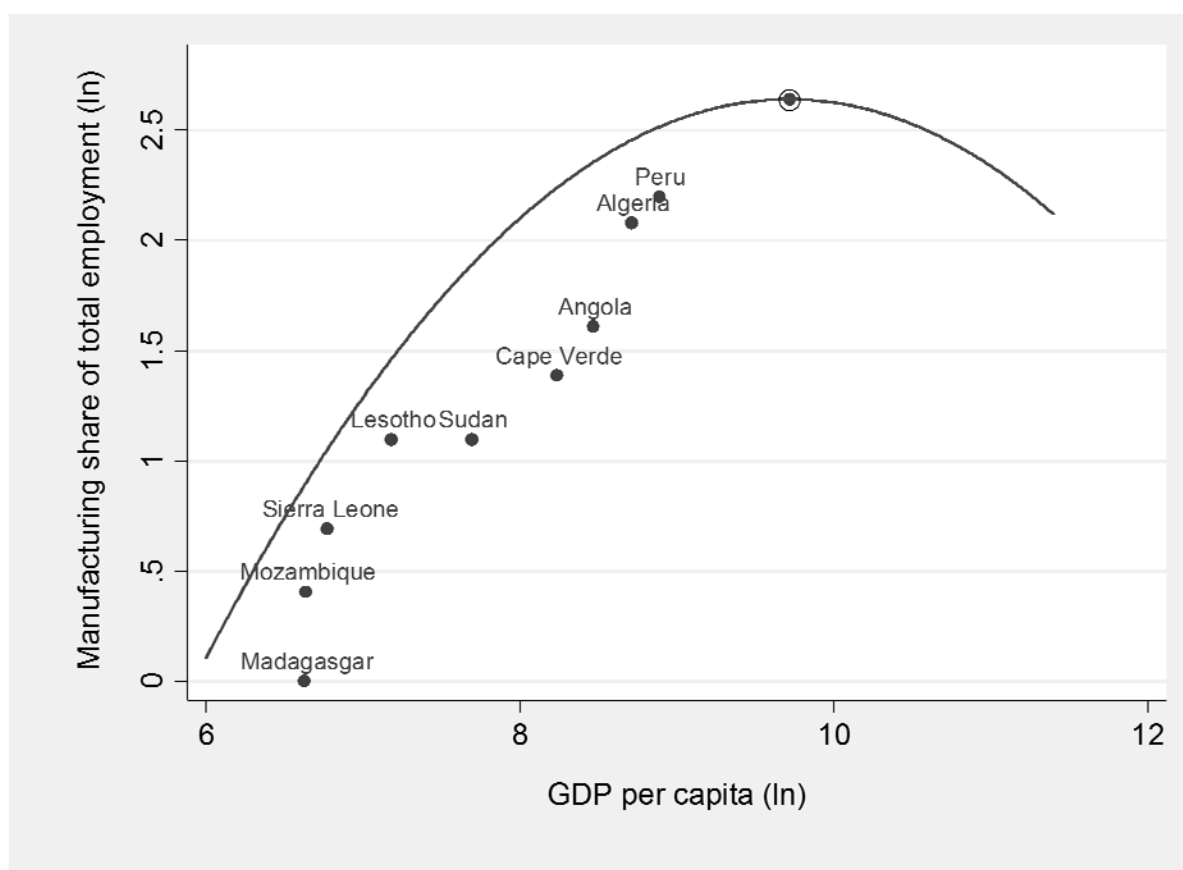
There could be alternative ways of setting an empirical benchmark for premature deindustrialisation, based on the conceptualisation suggested above. The approach taken here is to run a simple Rowthorn-type regression (see Rowthorn, 1994 and also Palma, 2005, 2008). This takes the share of manufacturing employment in total employment as the dependent variable, and GDP per capita and GDP per capita squared as explanatory variables (all in natural logs).² This exploratory analysis is undertaken only for employment shares, a fuller analysis would also consider the share of manufacturing in GDP.

² The specification and estimated parameters are as follows: $\ln_man_emp = -14.671 + 3.564\ln_GDPpc - 0.183\ln_GDPpc^2$, where \ln_man_emp is the share of manufacturing in total employment and \ln_GDPpc is the natural log of GDP per capita. Both estimated coefficients are statistically significant at the 1% level. $R^2 = 0.67$. Sample is a cross-section of 103 countries for the year 2009.

This regression yields a turning point of I\$16 582 (2005 international dollars, PPP), corresponding to a share of manufacturing in total employment of 14%. Figure 1 plots the relationship between income per capita and the share of manufacturing in total employment, for a sample of 103 countries for the year 2009. The inverted-U relationship is clearly apparent in the regression line. The sample of countries spans both the upwards and downwards sloping parts of the line. Those falling below the curve have a lower share of manufacturing in total employment than would be predicted (based only on their income per capita and income per capita squared, not controlling for any other relevant country characteristics such as natural resource endowments), and conversely for those falling above the curve.

Some possible premature deindustrialisers are identified here. These are countries meeting two conditions: falling below the curve (indicating that their share of manufacturing in total employment is lower than would be expected at their level of income per capita), and with a falling share of manufacturing in total employment. The identification of these countries is exploratory rather than definitive, and it does not take account of the complexity and heterogeneity of deindustrialisation discussed later in this paper, nor of the share of manufacturing in total output. Worth noting is that almost all of the possible deindustrialisers shown here are from Sub-Saharan Africa; this is discussed further in later sections.

Figure 1: Inverted-U curve showing some possible premature deindustrialisers, 2009



Data sources: Own calculations, employment data from ILO, income data from Penn World Tables³

It is worth noting the way in which premature deindustrialisation is conceptualised here has a strong ‘relative’ dimension, as deindustrialisation in a given country is ‘benchmarked’ against deindustrialisation internationally. There is an inherently subjective and relative aspect to characterising one episode of deindustrialisation as premature and another not, and these definitions should thus be regarded as indicative rather than precise. It is also important to note that the stylised facts of deindustrialisation have changed significantly over time (see Palma 2005, 2008). Deindustrialisation now typically commences at lower levels of GDP per capita, as well as a lower share of manufacturing in the economy, than was previously the case. This implies that what may have been characterised as premature deindustrialisation two decades ago might not be characterised as premature today. The onset of deindustrialisation, at a given level of GDP per capita and share of manufacturing in employment that was atypical by international standards previously and thus could have be

³ All data from Penn World Tables is PPP converted GDP per capita (Laspeyres), 2005 International \$.

considered premature, may actually be in line with current international patterns and thus not premature at present.

3. Empirical overview of trends in manufacturing shares

Here we show trends in the shares of manufacturing in total national employment and GDP for various country groupings over time. This provides an overview of international patterns in deindustrialisation over time.

Figures 2-5 show the share of manufacturing in countries' total employment and GDP, for a sample of 101 countries, from 1970 to 2010.⁴ In Figures 2 and 3, countries are grouped by income. Countries are divided into five quintiles based on their income per capita in each year, with quintile 1 the lowest and quintile 5 the highest. For instance, quintile 1 in 1970 includes the quintile of countries with the lowest income per capita in that year, which differs from the set of countries in that quintile in other years.⁵ In Figures 4 and 5 countries are grouped by region (Sub-Saharan Africa, South Asia, the Middle-East and North Africa, Latin America and the Caribbean, East Asia, Eastern Europe, Western Europe and North America). All country groups show unweighted averages of the countries in that group. Figures 2 and 4 show the share of manufacturing in total employment, and Figures 3 and 5 show the same for share of GDP.

Regarding trends in the share of manufacturing in GDP, it must be noted that these trends appear very sensitive to whether value added is measured in current or constant prices. Lavopa and Szirmai (2015) find that global deindustrialisation is only evident when using current prices. With constant prices the global share of manufacturing changes little over

⁴ Countries selected on the basis of data availability. The necessary data is only available up to 2009, so 2010 actually refers to 2009 data throughout.

⁵ It is preferable to update the groups of countries included in each category for each period, as done here, so that what is shown is actually the various quintiles for any given year. What we are interested in here is the share of manufacturing for the poorest or richest quintile of countries in any given period, which makes it necessary for the countries included in each category to change over time. This is similar to the World Bank's classification of low-, middle- and upper-income countries, in which countries are re-categorised annually based on countries' income per capita for that year (this classification only goes back to 1987).

the past four decades. Changes in relative prices of manufactures and non-manufactures is thus important. The issue of measurement in constant or current prices, and its implications for trends in the share of manufacturing, is of course avoided in the analysis of employment shares, as in Figures 2 and 4.

Firstly, there appears to be an almost universal trend towards deindustrialisation, across income and regional groups. The onset of deindustrialisation is mostly from around 1990, somewhat earlier than that in the case of higher-income countries and somewhat later than that in the case of lower-income countries. In quintile 5 countries (wealthy countries), manufacturing shares fell throughout the period 1970-2010 shown here; that is, the turning point was by circa 1970 or before. For quintile 4 countries, deindustrialisation is evident from around 1980; for quintile 3 countries it is around 1990; and for quintile 4 countries it is between 1990 (GDP) and 2000 (employment). The exceptions to this overall pattern of deindustrialisation are the continuing industrialisation in South Asia and the stagnation of manufacturing shares in sub-Saharan Africa, as discussed further below.

Secondly, the falling of the turning point of industrialisation – referring here to the shares of manufacturing in employment and GDP at which deindustrialisation commences – over time. Figures 2 and 3 show that the turning point at which deindustrialisation commences is lower, the later that deindustrialisation happens. A similar pattern is evident from the regional groups shown in Figures 4 and 5. For instance, from Figure 2 it can be seen that by 1970 the deindustrialisation that had already occurred in quintile 5 countries still left them with a share of manufacturing in total employment of over 26%. The deindustrialisation in the 1980s (quintile 4) was from share of around 23% in 1980, while deindustrialisation in the 1990s was from a share of 16% in 1990, and so on. In other words, for less developed countries that are deindustrialising several decades after deindustrialisation in advanced economies, deindustrialisation kicks in at a far lower level of industrialisation than was previously the case for advanced economies. This relates to the issue of premature deindustrialisation.

Thirdly, the level of industrialisation in poorer countries (see quintile 1 in Figures 2 and 3) is extremely low and is not rising. The share of manufacturing in both employment and GDP is

stagnant over time at very low levels, around just 3% for employment and 10% for GDP. For both employment and GDP, even the highest points for quintile 1 are well below the lowest points of any other quintile.

Fourthly, it is clear from a regional perspective (see Figures 4 and 5) that this low and stagnant level of industrialisation in poor countries is basically accounted for by the failure to industrialise in sub-Saharan Africa. For poor South Asian countries, there has been a historically higher level of industrialisation as well as increasing industrialisation over time, compared to sub-Saharan African countries at comparable levels of GDP per capita. Even the peak share of manufacturing in both employment and GDP in Sub-Saharan Africa is lower than the lowest points for any other region. If anything, by 2010 Sub-Saharan Africa has actually begun to slightly deindustrialise from the very low earlier 'peaks'.⁶ This sort of deindustrialisation goes beyond being premature – it could perhaps be characterised as 'pre-industrialisation deindustrialisation', in the sense of deindustrialisation beginning before there has even been any real industrialisation.⁷

Fifthly, there are rapid decreases in the levels of industrialisation in quintile 5 countries, and geographically in Western and Eastern Europe and North America. In quintile 5 countries and in Western Europe, this is related at least in large part to the advanced level of economic development in these countries, although weak industrial policy and a lack of policy emphasis on manufacturing is likely to have also played a role.

Sixthly, even with this extensive deindustrialisation in advanced economies, the shares of manufacturing in GDP and employment in the richest countries remain above both the current levels and the all-time peaks in poorer countries. Deindustrialisation in Eastern Europe, off a very high base, was especially dramatic between 1990 and 2000. This seems to demonstrate the impact of rapid liberalisation in devastating industry.

⁶ The share of manufacturing in GDP in the recent decade in quintile 1 countries in particular, and especially amongst African countries, may be 'artificially' depressed by the commodity price boom having inflated the share of primary products in GDP. See the earlier discussion on the difference in trends when using constant or current prices and Lavopa and Szirmai (2015). Even so, there seems to be a slight downward trend in the share of manufacturing in these economies; at the least, there is no substantial growth.

⁷ Deindustrialisation in Africa is discussed further in section 5.1.

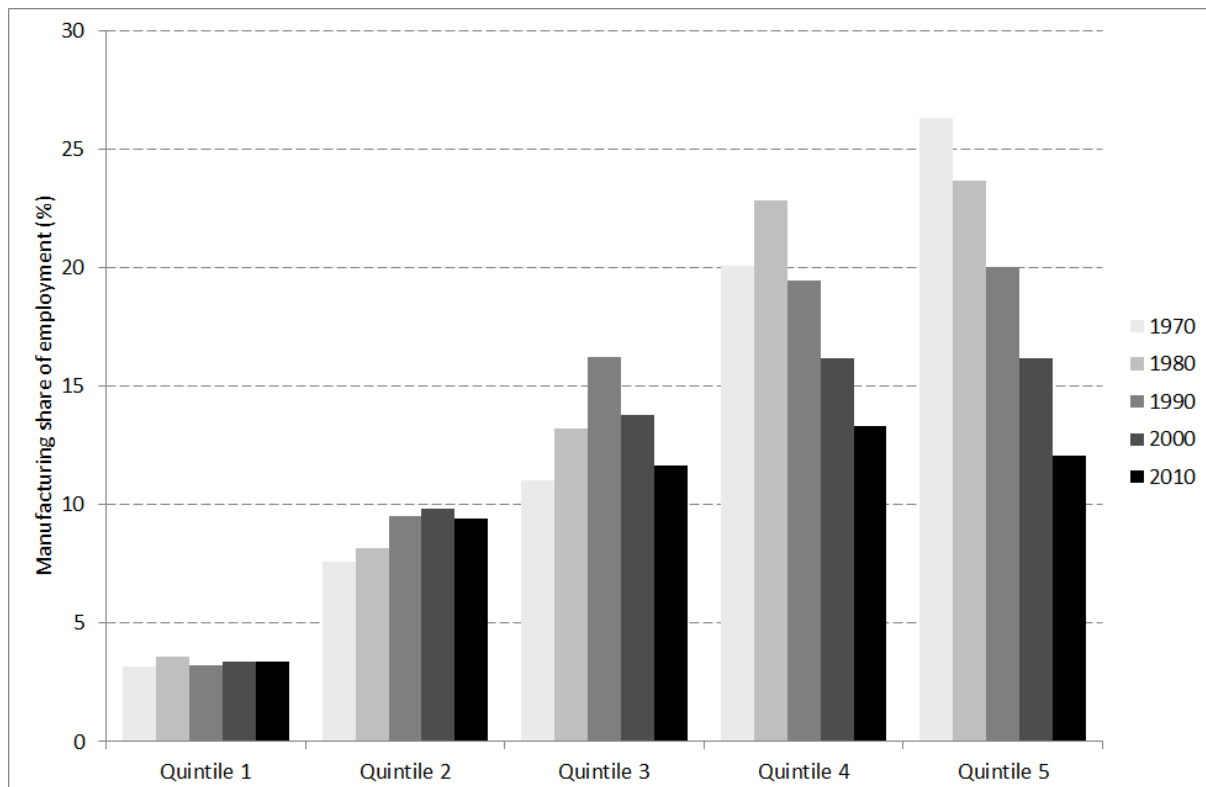
This brings us to our final observation on international trends in deindustrialisation. The literature on deindustrialisation emphasises an inverted-U relationship between income per capita and the share of manufacturing, notably in employment (Rowthorn, 1994). That is, as income per capita rises, the share of manufacturing in a country's total employment initially rises as well up to a turning point, and then falls. Something akin to an inverted-U is evident here for most country groupings over time. That is, for most regional or income country groups, the shares of manufacturing in GDP and employment rise and then subsequently fall. This seems to reflect a combination of growing income and structural changes in the degree of industrialisation over time (more on this in section 5).

However, inverted-U patterns regarding the share of manufacturing in total employment are only evident across income quintiles at later cross-sections in time (see Figure 2). In 1970-1990, the share of manufacturing in total employment rises with each income quintile. The higher the income, the higher the share of manufacturing in total employment. This could suggest that in these periods, all country groupings fell to the left of or below the inverted-U turning point. That is, an inverted-U relationship may still be evident from an econometric analysis, although not from a simple examination of the trends as shown here, where all country groups may still be below or to the left of the turning point. By 2000, there was a levelling off across country income groups, with the share of manufacturing in total employment approximately equal for the upper two quintile groups. Only in 2000 is an inverted-U relationship evident across country income groups, with the share of manufacturing in total employment being highest for quintile 4 countries. With the share of manufacturing in value added, the picture is a bit different (see Figure 3), with a turning point in an inverted-U relationship evident at an earlier stage. Overall, however, what comes through more strongly is the deindustrialisation over time across almost all country groups, with countries deindustrialising at lower income per capita and at lower shares of manufacturing (see Palma 2005, 2008).

If these trends continue, the share of manufacturing in middle-income countries will only catch up with that in upper-income countries due to deindustrialisation being more rapid in the latter than in the former. Similarly for low-income countries catching up with middle-

income countries. This ‘catch up’ is not happening through continued industrialisation among the less developed countries, rather just through different paces of deindustrialisation. This is very different from the sort of catch up envisaged through structural change.

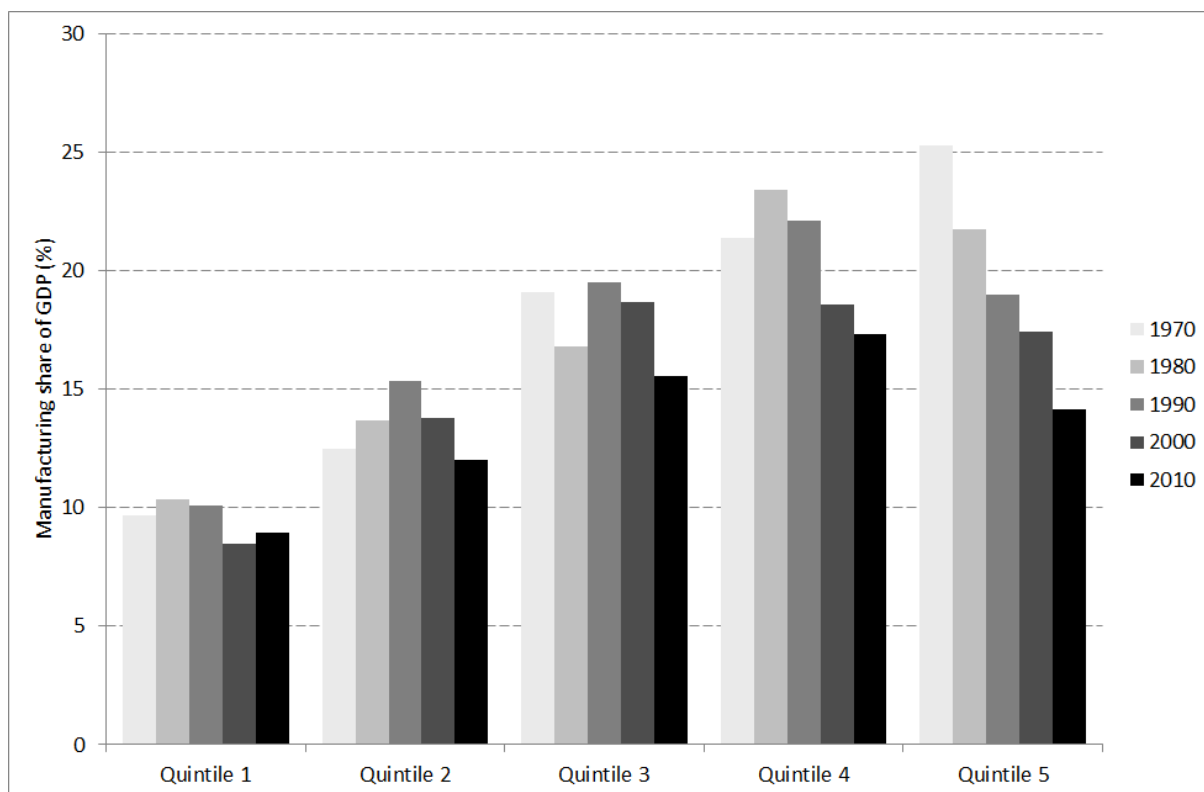
Figure 2: Share of manufacturing in total employment, countries by income group, 1970-2010



Sources: Employment data from ILO, income data from Penn World Tables

Note: Income measured in income per capita. Quintile 1 is countries in the lowest quintile for a given year; quintile 5 is countries in the highest quintile for a given year.

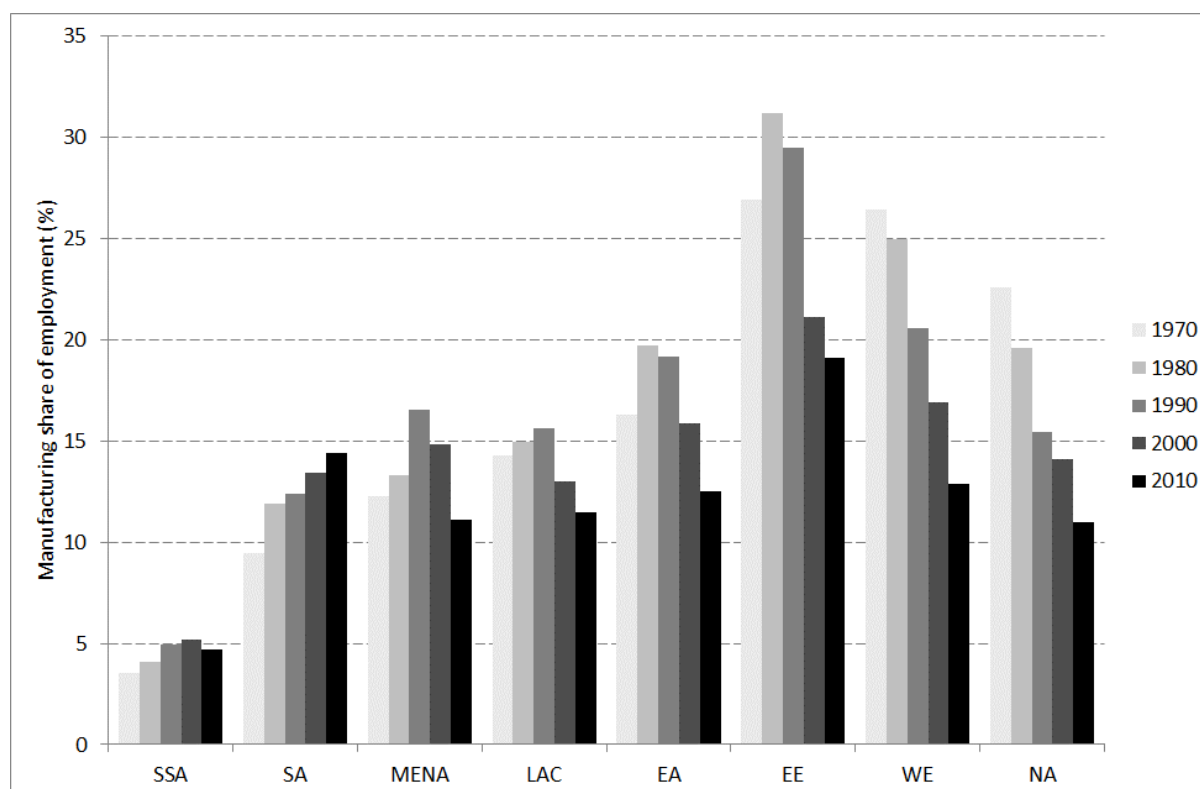
Figure 3: Share of manufacturing in GDP, countries by income group, 1970-2010



Sources: Value added data from UN, income data from Penn World Tables

Note: Income measured in income per capita. Quintile 1 is countries in the lowest quintile for a given year; quintile 5 is countries in the highest quintile for a given year.

Figure 4: Share of manufacturing in total employment, countries by region, 1970-2010

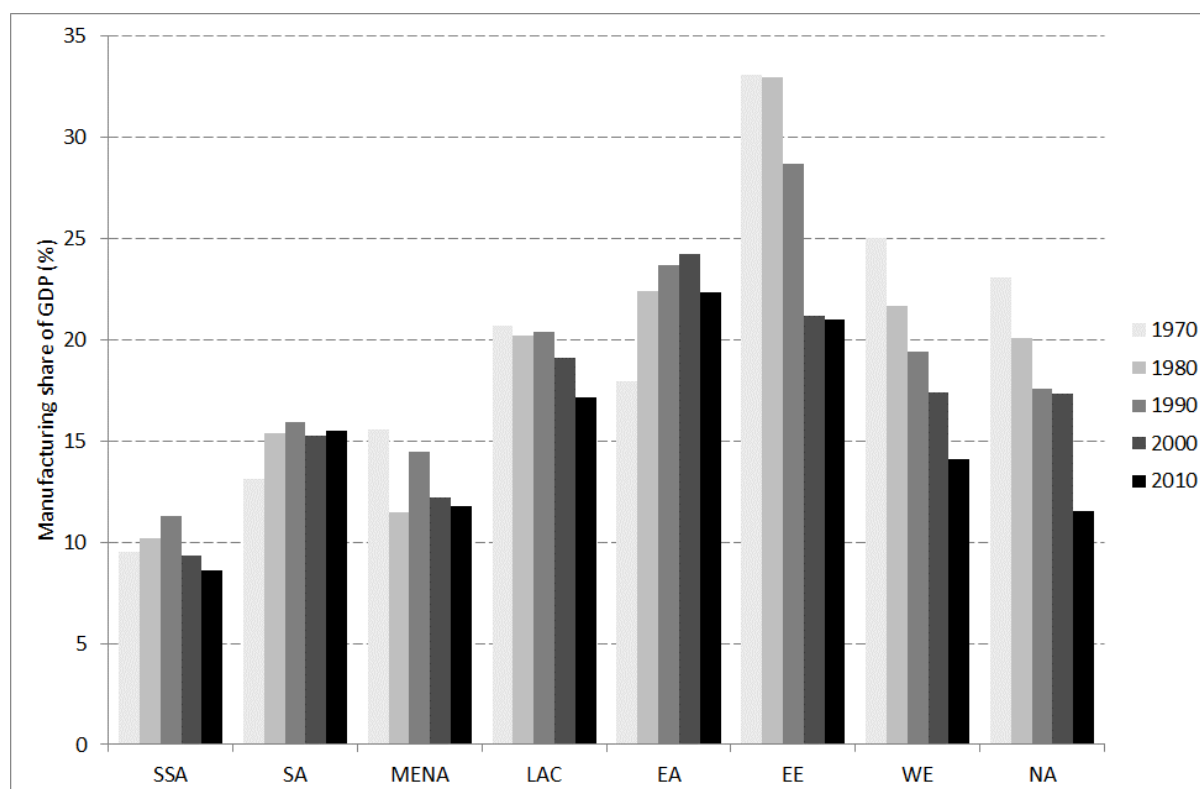


Source: Employment data from ILO

Note: SSA = Sub-Saharan Africa; SA = South Asia; MENA = Middle East and North Africa; LAC = Latin America and Caribbean; EA = East Asia; EE = Eastern Europe; WE = Western Europe; NA = North America.⁸

⁸ Countries included in regional groups are as follows: SSA - Burundi, Liberia, Niger, Central African Republic, Malawi, Madagascar, Mozambique, Guinea-Bissau, Guinea, Sierra Leone, Burkina Faso, Comoros, Mali, Rwanda, Uganda, Tanzania, Kenya, Ghana, Lesotho, Cote d'Ivoire, The Gambia, Mauritania, Zambia, Cameroon, Nigeria, Republic of Congo, Cape Verde, Namibia, Angola, Botswana, Mauritius, Gabon; MENA – Turkey, Morocco, Syria, Tunisia, Egypt, Algeria; LAC - Barbados, Puerto Rico, Trinidad and Tobago, Nicaragua, Honduras, Paraguay, Bolivia, Ecuador, Guatemala, El Salvador, Peru, Colombia, Venezuela, Brazil, Dominican Republic, Panama, Suriname, Uruguay, Costa Rica, Mexico, Argentina, Chile; EA – Philippines, Indonesia, Thailand, Malaysia, Hong Kong, Singapore, Republic of Korea; EE – Romania, Poland, Hungary; WE - Portugal, Greece, Spain, Italy, France, Finland, Germany, Ireland, United Kingdom, Denmark, Belgium, Sweden, Canada, Iceland, Austria, Switzerland, Netherlands, Norway, Luxembourg; NA – Canada and United States of America. Countries included in the income groups but excluded from the geographic groups are: Fiji, Papua New Guinea, Japan, South Africa, Australia, New Zealand, Israel, the United States of America and Malta.

Figure 5: Share of manufacturing in GDP, countries by region, 1970-2010



Source: Value added data from UN

Note: SSA = Sub-Saharan Africa; SA = South Asia; MENA = Middle East and North Africa; LAC = Latin America and Caribbean; EA = East Asia; EE = Eastern Europe; WE = Western Europe; NA = North America.⁹

4. The heterogeneity of deindustrialisation

Deindustrialisation can describe a wide range of country experiences. The circumstances under which the share of manufacturing in total employment and/or GDP declines, can vary

⁹ Countries included in regional groups are as follows: SSA - Burundi, Liberia, Niger, Central African Republic, Malawi, Madagascar, Mozambique, Guinea-Bissau, Guinea, Sierra Leone, Burkina Faso, Comoros, Mali, Rwanda, Uganda, Tanzania, Kenya, Ghana, Lesotho, Cote d'Ivoire, The Gambia, Mauritania, Zambia, Cameroon, Nigeria, Republic of Congo, Cape Verde, Namibia, Angola, Botswana, Mauritius, Gabon; MENA – Turkey, Morocco, Syria, Tunisia, Egypt, Algeria; LAC - Barbados, Puerto Rico, Trinidad and Tobago, Nicaragua, Honduras, Paraguay, Bolivia, Ecuador, Guatemala, El Salvador, Peru, Colombia, Venezuela, Brazil, Dominican Republic, Panama, Suriname, Uruguay, Costa Rica, Mexico, Argentina, Chile; EA – Philippines, Indonesia, Thailand, Malaysia, Hong Kong, Singapore, Republic of Korea; EE – Romania, Poland, Hungary; WE - Portugal, Greece, Spain, Italy, France, Finland, Germany, Ireland, United Kingdom, Denmark, Belgium, Sweden, Canada, Iceland, Austria, Switzerland, Netherlands, Norway, Luxembourg; NA – Canada and United States of America. Countries included in the income groups but excluded from the geographic groups are: Fiji; Papua New Guinea; Japan; South Africa; Australia; New Zealand; Israel; United States; and Malta.

considerably. For example, in one country the share of manufacturing in employment could fall because rapid technological progress in manufacturing raises productivity in manufacturing more than in other sectors, yet with healthy growth in manufacturing output, exports and employment. In another country the entire manufacturing sector could be collapsing altogether. While both these episodes might be seen as deindustrialisation – at least according to the standard definitions of deindustrialisation typically used in the literature – they are fundamentally different phenomena.

Tregenna (2013) analyses the changes in manufacturing output and employment in 28 countries over the period 1985-2005.¹⁰ Decomposing the change in the level of manufacturing employment into the components associated with manufacturing output growth and changes in labour-intensity or labour productivity in manufacturing, and decomposing changes in the share of manufacturing employment into the components associated with changes in the share of manufacturing in GDP, changes in labour-intensity or labour productivity in manufacturing, and changes in aggregate labour-intensity or labour productivity, brings out the considerable heterogeneity in what might be viewed as deindustrialisation.

Figure 6 decomposes changes in the level of manufacturing employment into changes in the value added of manufacturing ('sector growth effect') and changes in the labour-intensity of manufacturing ('labour-intensity effect'). For each country, changes are shown for two periods: 1985-1995 and 1995-2005. The coordinates of each point show the contribution of changes in manufacturing labour-intensity (that is, the inverse of labour productivity) (x-axis) and changes in manufacturing growth (y-axis), to the percentage change in manufacturing employment for a country for each period. These coordinates sum to the actual percentage change in the level of manufacturing employment in the country for each period.

To illustrate with the example of Korea: the initial coordinates of Korea (-89; 126) indicate that between 1985 and 1995 the fall in manufacturing labour-intensity accounted for a 89%

¹⁰ This section is based on Tregenna (2013), which has additional technical details and discussion.

fall in the level of Korea's manufacturing employment, and the growth of manufacturing value added accounted for a 126% increase in manufacturing employment. The sum of these two effects, 37%, is the actual percentage increase in the level of manufacturing employment in Korea over the period 1985-1995. The coordinates of Korea for the period 1995-2005, denoted by the end point of the line for Korea, are (-80; 68). Korea experienced a 12% decline in the level of manufacturing jobs over this period, which is the sum of these coordinates. Decomposing this decline, the reduction in the labour-intensity of manufacturing accounted for an 80% decline in Korea's manufacturing employment which was mostly mitigated by a 68% increase in employment associated with growth in manufacturing value added.

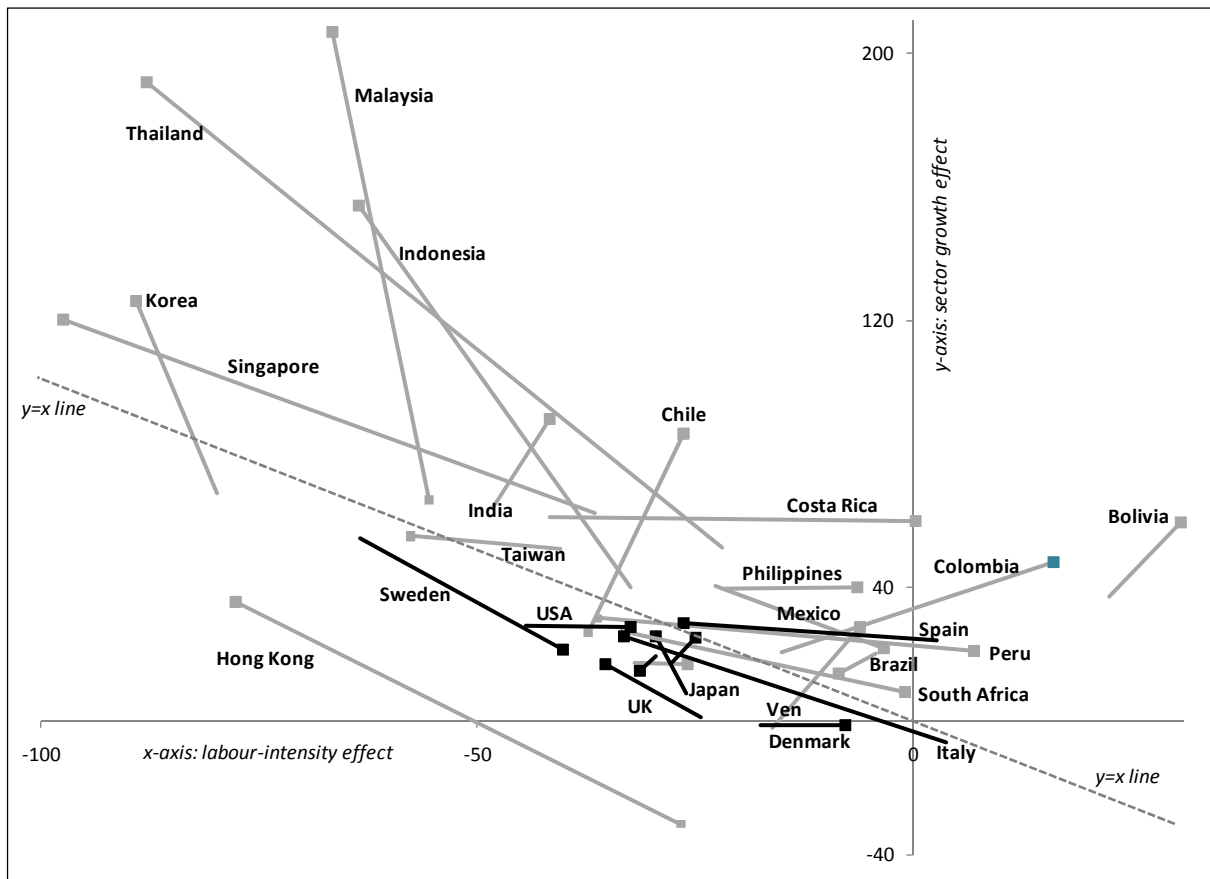
In Figure 6, the position of a point in the North-East quadrant indicates that both the labour-intensity and sector growth effects were positive, such that the increase in the labour-intensity of manufacturing and the growth in manufacturing value added each accounted for some manufacturing employment creation, with unambiguously positive manufacturing employment growth. Conversely, the location of a point in the South-West quadrant indicates that the change in labour-intensity and the change in manufacturing sector size each accounted for negative manufacturing employment growth, with an unambiguously negative change in manufacturing employment. A point in the North-West quadrant indicate that the drop in labour-intensity accounted for a negative change in manufacturing employment while the sector growth accounted for a positive change in manufacturing employment. The position of a point in this quadrant that lies above the diagonal $y=x$ line would indicate that the positive sector growth effect outweighed the negative labour-intensity effect, hence net manufacturing job creation. Below the diagonal line in this quadrant indicates the reverse, and thus net manufacturing job loss. Finally, a point in the South-East quadrant points to a case where the rise in labour-intensity accounted for a positive change in manufacturing employment while the change in sector size accounted for a negative change in manufacturing employment. A country in this quadrant above the diagonal $y=x$ line would have had net manufacturing employment creation, with the positive labour-intensity outweighing the negative sector growth effect, with a country below the diagonal line having had net manufacturing employment loss. Overall, any point falling below/to the left of the dashed diagonal line shows manufacturing employment loss for that

country, while any point above/to the right of the diagonal line shows manufacturing employment growth.

Developing Asian countries are clustered in the top left quadrant in Figure 6, with large and positive sector growth effects and large and negative labour-intensity effects. This is indicative of their strong manufacturing performance, both in value added and in productivity. The only developing Asian country that is an exception to this pattern is the 'honorary Latin American' case of the Philippines. Compared to developing Asian countries, Latin American countries have relatively low sector growth effects and the labour-intensity effects are either positive or less negative than in the case of Asian countries. The difference between the results for Asia and Latin America fits in with the fact that the former generally had higher growth in both value added and productivity in manufacturing than the latter. The contrast between Latin American and Asian countries can be illustrated with a comparison of manufacturing performance in Korea and Venezuela. These two countries experienced roughly similar trends in the level of manufacturing employment between the two periods. However, their performance is vastly different when it comes to manufacturing value added and productivity, with growth of these variables multiple times higher in Korea than in Venezuela.

Unlike the majority of developing countries, almost all developed countries fall below the dashed diagonal line in both periods, indicating absolute falls in manufacturing employment. The positive sector growth effects were outweighed by larger negative labour-intensity effects. This shows a different pattern of deindustrialisation in advanced economies.

Figure 6: Decomposition of percentage change in the level of manufacturing employment



Source: Figure taken from Tregenna (2013)

Notes: Square marker refers to 1985-1995; end of line refers to 1995-2005. Venezuela, Argentina, France and Netherlands are included in the chart but are not labelled for reasons of space; these are the short lines located nearby the UK and Japan. Developed countries are shown in black and developing countries in grey.

In Figure 7, changes in the *share* of manufacturing in total employment are decomposed into three components. The 'labour-intensity effect' measures the contribution of changes in the labour-intensity of manufacturing. The 'sector share effect' measures the contribution of changes in the share of manufacturing in total value added. The 'aggregate labour productivity effect' measures the contribution of changes in aggregate labour productivity; this component is not shown in this two-dimensional chart for heuristic reasons. Each point in Figure 7 shows the combination of the labour-intensity effect (x-coordinate) and sector share effect (y-coordinate) for a country. For each country, the initial point (square marker) is for 1985-1995 and the second point is for 1995-2005.

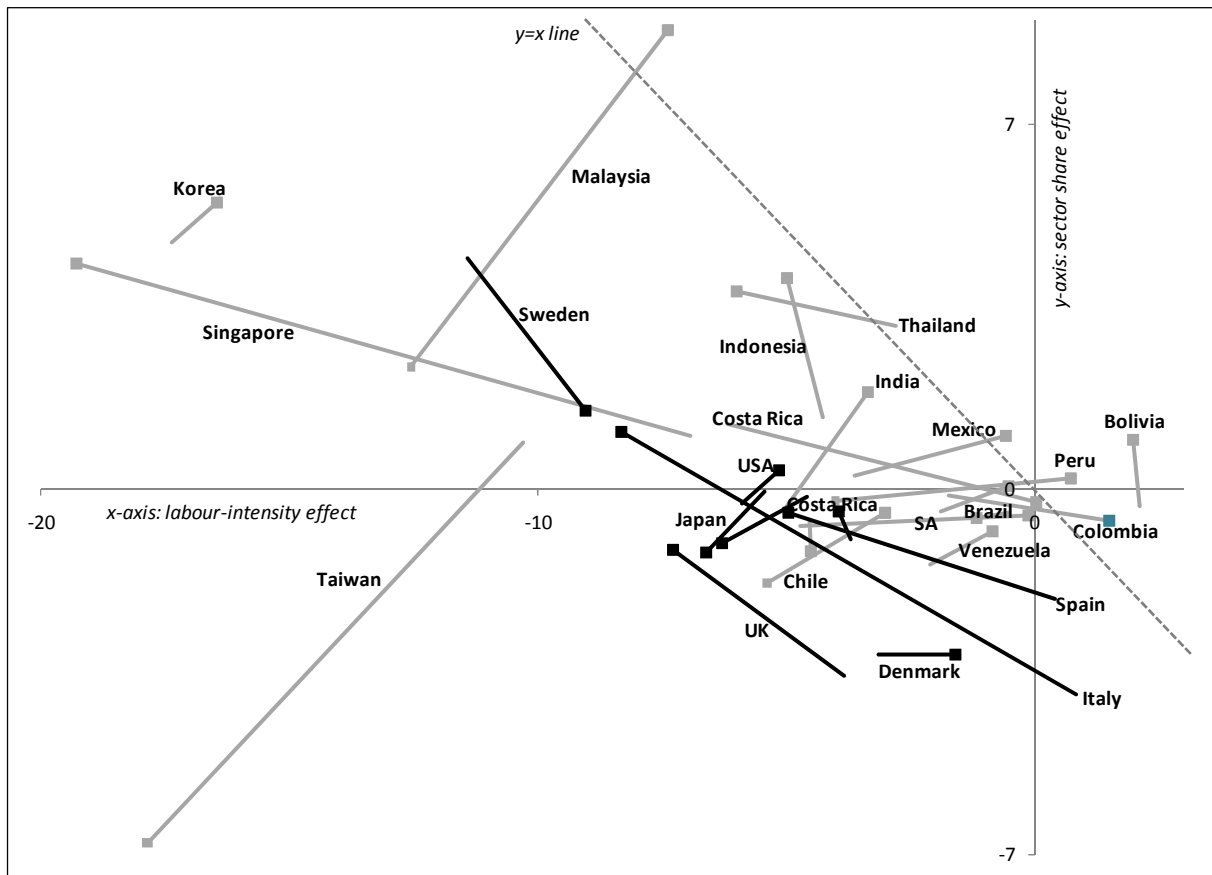
Since the decomposition of employment shares is three-dimensional, the location of a point in this two-dimensional figure (not showing the aggregate labour productivity effect) cannot be as neatly interpreted as in the first decomposition, which decomposed changes in the level of manufacturing employment into just two dimensions. In Figure 7, the location of a point in the North-East quadrant indicates that both the labour-intensity and sector share effects contributed positively growth in the share of manufacturing in total employment. The net change in the share of manufacturing in total employment would, however, depend on the sign and relative magnitude of the aggregate labour productivity effect as well. A location in the North-West quadrant indicates that, for that country and time period, manufacturing grew as a share of total value added but became less labour-intensive. Where the point falls to the right of the $y=x$ line, the positive share effect outweighs the negative labour-intensity effect, and conversely to the left of the line. Both the sector share and labour-intensity effects are negative in the South-West quadrant, and unless their sum were outweighed by a positive aggregate labour productivity effect there would have been a fall in the share of manufacturing in total employment for that country and time period. For a point located in the South-East quadrant, manufacturing became more labour-intensive but shrank as a share of total value added. In this quadrant, for a point to the right of the diagonal $y=x$ line the positive labour-intensity effect outweighed the negative sector share effect, and vice versa.

The paucity of points in the North-East quadrant points to the improbability of a country's manufacturing sector simultaneously becoming more labour-intensive and growing as a share of total value added, especially at higher levels of income per capita. The overwhelming majority of points are located either in the South-West quadrant, where manufacturing became less labour-intensive while shrinking as a share of total value added, or in the North-West quadrant below the $y=x$ line, where manufacturing became less labour-intensive but grew as a share of total value added.

There is again an interesting difference between Asian and Latin American countries. Almost all the Asian Newly Industrialised Countries (NICs) in both periods are in the North-West quadrant, with manufacturing becoming less labour-intensive (i.e. more productive) and growing as a share of value added. In most middle-income Latin American countries, by

contrast, both the labour-intensity and sector share effects were negative in both periods. Even though manufacturing constituted a lower share of GDP in Latin America than in the Asian NICs at the beginning of the period, the share of manufacturing in GDP shrank further in the Latin American countries while growing further in the Asian NICs.

Figure 7: Partial results from decomposition of changes in the share of manufacturing employment



Source: Figure taken from Tregenna (2013)

Notes: Only the labour-intensity and sector share effects are shown here, not the aggregate labour productivity effect. Square marker refers to 1985-1995; end of line refers to 1995-2005. Italy and the Philippines are included in the chart but are not labelled for reasons of space. Developed countries are shown in black and developing countries in grey.

Where a decrease in manufacturing employment share is primarily accounted for by falling labour-intensity of manufacturing, and where the manufacturing sector is growing in real terms as well as increasing its share of GDP, we would argue that this should not even be

appropriately be characterised as deindustrialisation. Such a phenomenon would not necessarily negatively affect growth, and could well have positive effects.

Such a case is very different from one in which a fall in the share of manufacturing employment is accounted for primarily by a decline of the manufacturing sector as a share of GDP or even an absolute contraction of manufacturing output. In such a scenario, an economy would be particularly at risk of losing out on the growth-pulling effects of manufacturing and it is more likely to be a pathological phenomenon. These two phenomena are likely to have different underlying and proximate causes, and to affect growth differently. This difference underscores the need to recognise the heterogeneity of 'deindustrialisations' and for nuanced analysis of any specific country experience.

This analysis illustrates the considerable heterogeneity of experiences that would be characterised as 'deindustrialisation' when considered exclusively in terms of the share of manufacturing in total employment (as with the conventional definition of deindustrialisation). It can be argued that a case in which the sector growth effect, sector share effect, and aggregate labour productivity effects are all positive and the decline in manufacturing employment level and/or share is accounted for entirely by a negative labour-intensity effect should not be characterised as deindustrialisation in any real sense. Deindustrialisation could more appropriately be defined as a sustained decline in both the share of manufacturing in total employment and the share of manufacturing in GDP.

One dimension along which we can distinguish different types of deindustrialisation is thus changes in the shares and levels of manufacturing value added and employment. If deindustrialisation is defined (as per the standard literature) as a fall in the share of manufacturing in total employment, then in this dimension we can distinguish between cases in which the share of manufacturing in GDP falls or rises, as well as with respect to changes in the levels of manufacturing value added and employment. We have suggested here (see also Tregenna 2009, 2013) that the only true case of deindustrialisation is one of sustained declines in the shares of manufacturing in both GDP and employment. A second important dimension along which we can differentiate deindustrialisation is whether it is premature or is occurring in an advanced economy (see the discussion in section 2.4 and

elsewhere in this paper). What we have termed ‘pre-industrialisation deindustrialisation’ could be regarded as a special case of premature deindustrialisation. Beyond these two important dimensions, there are of course other aspects to the heterogeneity of deindustrialisation, such as its causes, what is happening with productivity in manufacturing, and which types of manufacturing activities are (relatively) shrinking and which other activities are (relatively) growing.¹¹ Recognising this variation is important to understanding the dynamics and likely effects of specific deindustrialisation experiences as well as changing international patterns over time.

5. Sources and causes of deindustrialisation

5.1 Literature and evidence on sources and causes of deindustrialisation

Rising income per capita can be considered the first and most basic source of deindustrialisation. As a stylised fact, as countries’ income increases beyond a certain point, the share of manufacturing tends to decline and the share of services to increase *pari passu*. This relationship is captured in Rowthorn’s inverted-U curve, showing the relationship between income per capita and manufacturing as a share of total employment (Rowthorn, 1994).

Palma’s (2005, 2008) conceptualisation of deindustrialisation begins with Rowthorn’s approach in which deindustrialisation occurs through a transition into the downwards-sloping part of the curve. Such deindustrialisation is associated with the maturation and development of economies. This is the ‘classical’ form of deindustrialisation, with deindustrialisation regarded as part of the stylised facts of a transition from secondary to tertiary sectors. However, Palma argues that there are more complex dynamics at work than those identified by Rowthorn and the ‘classical’ school. He thus brings in three additional sources of deindustrialisation.

¹¹ See also Rowthorn and Wells’ (1987) seminal distinction between what they term ‘positive’ and ‘negative’ deindustrialisation.

First, he demonstrates that the inverted-U curve itself has shifted over time. This means that whether or not countries reached the turning-point, there was a declining level of manufacturing employment associated with each level of income per capita. This shift could be attributed to the causes of deindustrialisation typically discussed in the literature, notably: the 'statistical illusion' element associated with intersectoral outsourcing; falling income-elasticity of manufactures, especially in advanced economies; higher productivity growth in manufacturing than in other sectors; and a new international division of labour reducing the demand for labour in advanced economies.

Second, he shows that there is a fall in the level of income per capita at which the share of manufacturing in total employment begins to decline. Empirically, this fall is found to have taken place during the 1980s in particular. This is understood as a shift to the left in the turning-point of the curve. Between 1980 and 1990, the income per capita at the turning point of the regression halved, from approximately \$21 000 in 1980 to just over \$10 000 in 1990 (1985 international US\$).

Together, these two shifts mean that since the 1960s deindustrialisation has begun at lower levels of income per capita and lower shares of manufacturing in total employment than was previously the case. This is of particular importance for developing countries, as will be discussed further later.

Third, Palma (2008) defines Dutch Disease as a specific form and additional source of deindustrialisation, associated with a switching between industrialisation paths. Commodity-rich countries have a different and lower path of industrialisation than commodity-poor ones. As some of the latter countries have become commodity-rich, for instance with the discovery of natural resources, they experienced an 'excess' degree of deindustrialisation. This is due to switching from a higher path of industrialisation to a lower one. In this context, Dutch Disease should only be regarded as the *additional* level of deindustrialisation associated with the latter movement. Palma shows that this 'extra' degree of deindustrialisation is not only found in cases of discovery of new natural resources, but also when countries developed significant export finance or tourism. (It could be argued that an 'aid resource boom' deriving from a ballooning of foreign aid might have similar

effects.) Additionally, he shows that it can also happen as a result of policy shifts, especially trade or financial liberalisation, in middle-income countries.

In addition to these overall sources of deindustrialisation, various specific causes are discussed in the literature, such as import penetration in manufacturing, productivity rising faster in manufacturing than in other sectors in the same economy, and outsourcing of jobs from manufacturing to services. These specific causes could feed into the broad sources of deindustrialisation as discussed above.

A number of empirical studies analyse the extent to which trade, and specifically increasing import penetration of manufactured goods, has contributed to deindustrialisation. Kucera and Milberg (2003), Saeger (1997), Wood (1995) and Rowthorn and Ramaswamy (1997) all find the expansion in North-South trade in manufactures to account for approximately 20-30% of the percentage point decline in the share of manufacturing in total employment in the North, using different country samples and methodologies.

Apart from trade, other specific causes of deindustrialisation identified in the literature include the domestic outsourcing of activities from manufacturing to specialised service providers. With outsourcing, jobs previously classified in manufacturing become reclassified to services, without any real change in the sectoral composition of the economy. Just looking at changes in the sectoral composition of employment, without taking account of domestic outsourcing, can thus lead to deindustrialisation being overestimated. This has been referred to as the 'statistical artefact' or 'statistical illusion' aspect of deindustrialisation.

A couple of country studies have attempted to estimate the extent of intersectoral outsourcing. Karaomerlioglu and Carlsson (1999) use input-output tables to analyse changes in sectoral structure in the USA. They find that the 'unbundling' of producer services, such as legal or data processing services, from manufacturing explains most of the apparent growth in producer services between 1987 and 1994. Tregenna (2010) used labour microdata to estimate the extent of intersectoral outsourcing in South Africa. The results indicate that the relatively high growth in services employment in the 2000s was based in part on the

outsourcing-type reallocation and reclassification of services such as cleaning and security. Without this outsourcing, it is projected that manufacturing employment in South Africa would have grown slightly faster than employment in private services. This implies that at least some of South Africa's apparent deindustrialisation over this period is attributable simply to outsourcing. The 2013 Industrial Development Report (2013) attempts to estimate the number of manufacturing-related jobs in services worldwide (not necessarily the change due to outsourcing). Using input-output data, these jobs are proxied by quantifying the proportion of services that go as inputs into manufacturing, and counting that proportion of services employment as manufacturing-related jobs. The report estimates that there were 73 million manufacturing-related jobs in services in 1995, rising to 95 million in 2009 due in part to outsourcing. This evidence underscores the importance of taking account of outsourcing when analysing the real extent of deindustrialisation.

There is also literature on the causes of deindustrialisation in specific countries and regions. Africa presents an interesting case in this regard, especially concerning deindustrialisation in developing countries. Section 3 of this paper showed the very low levels of industrialisation in Sub-Saharan Africa, and observed that some African countries have begun deindustrialising before even having industrialised in any real sense. It has been suggested here that this might be termed 'pre-industrialisation deindustrialisation'. There are divergent views in the literature as to the extent of deindustrialisation in Africa, and the causes of any deindustrialisation that did occur, in particular the extent to which it can be attributed to Structural Adjustment Programmes (SAPs).

5.2 Specific causes of premature deindustrialisation

Most of the literature and empirical evidence concerning the causes of deindustrialisation focuses on the global North. In particular, the fairly well established literature on the contribution of trade to deindustrialisation investigates the extent to which imports from developing countries have contributed to deindustrialisation in developed countries. Special consideration is thus needed regarding the causes of deindustrialisation in developing countries, despite the paucity of empirical evidence on this.

Premature deindustrialisation is likely to have different causes, or at least immediate triggers, than 'mature' deindustrialisation. Implicit in the way in which we have conceptualised premature deindustrialisation here is the notion that it is out of kilter with, and earlier than, would be expected by international standards. This is associated with the idea that premature deindustrialisation is not merely a product of the gradual maturation of an economy over time, as some would consider 'advanced' deindustrialisation to be. There must be country-specific factors causing a certain economy to deindustrialise earlier than its peers.

Policy – whether by commission or omission – is likely to be especially important in bringing about premature deindustrialisation. Policies will commonly have differential effects across as well as within sectors, either affecting sectors to different degrees, or aiding some sectors while disadvantaging others. An overvalued exchange rate will have specific negative effects on tradables, depressing the export of manufactured and non-manufactured tradables. Macroeconomic policies have markedly different effects on the 'real' and financial sectors. While high interest rates may benefit the financial sector, they are likely to hurt the industrial sector by raising the costs of borrowing to finance productive investment.

Overall, austere macroeconomic policies, especially high interest rates and overvalued exchange rates, are likely to have more pronounced negative effects on industry (and the rest of the 'real economy') than on the financial sector. Such policies are likely to contribute to financialisation and concomitant deindustrialisation. Similarly, trade liberalisation will affect tradables more than non-tradables, and of course will have uneven effects among tradables. Rapid tariff liberalisation in particular, that does not allow manufacturing sufficient time to adjust and restructure, is a significant contributor to deindustrialisation.

Trade among developing countries can be an important contributor to deindustrialisation in some of them, in as much as this trade can be a source of demand for the manufacturing sector in the net exporters. Import penetration of manufactures from relatively low unit labour cost producers, especially in Asia, appears to have been an important contributor to deindustrialisation in middle-income countries. This was initially in products such as clothing and textiles, but more recently in more advanced manufactures as well as countries such as

China have moved up value chains. In low-income countries, especially in Sub-Saharan Africa, imports from low unit labour cost Asian producers can be a significant obstacle to industrialisation and a contributor to the 'pre-industrialisation deindustrialisation' discussed earlier. Existing scale economies and market capture, along with efficient production methods and export infrastructure and low unit labour costs, make it difficult for low-income entrants without an existing manufacturing base to break in, even in industries such as clothing that have been traditional stepping stones for developing country manufacturing. These challenges are discussed further in section 7.

6. Effects of deindustrialisation on growth

A key concern for policymakers must be whether or not deindustrialisation negatively affects economic growth. If deindustrialisation does have adverse effects on growth, this would suggest that policy interventions might be justified to prevent, reverse or mitigate deindustrialisation. Here, we begin in section 6.1 with an exploratory descriptive empirical analysis of the relationship between the share of manufacturing in the economy and subsequent economic growth. We then argue in section 6.2 that the ways in which deindustrialisation affects growth are likely to be complex and varied, and put forward some factors that are likely to be important in determining the ways in which deindustrialisation actually affects growth in a particular time and place. This discussion is extended in section 6.3 to a special focus on premature deindustrialisation.

6.1 Manufacturing and growth

Although the issue of how sectoral structure and changes therein affect growth is an important issue for development and growth, the empirical literature on this is inconclusive. It is also mainly focussed on advanced economies, with limited empirical evidence for developing countries. There is limited literature specifically on the effects of deindustrialisation on growth, but a number of studies analyse how the share of manufacturing in the economy affects growth. Important recent contributions here include those of Szirmai and Verspagen (2011), Dasgupta and Singh (2006), Pieper (2000), Szirmai

(2012), and Naudé et al (2013). The empirical evidence is mixed. A positive relationship between manufacturing and growth is found in several studies, but there is variation in this relationship, including for different periods of time.

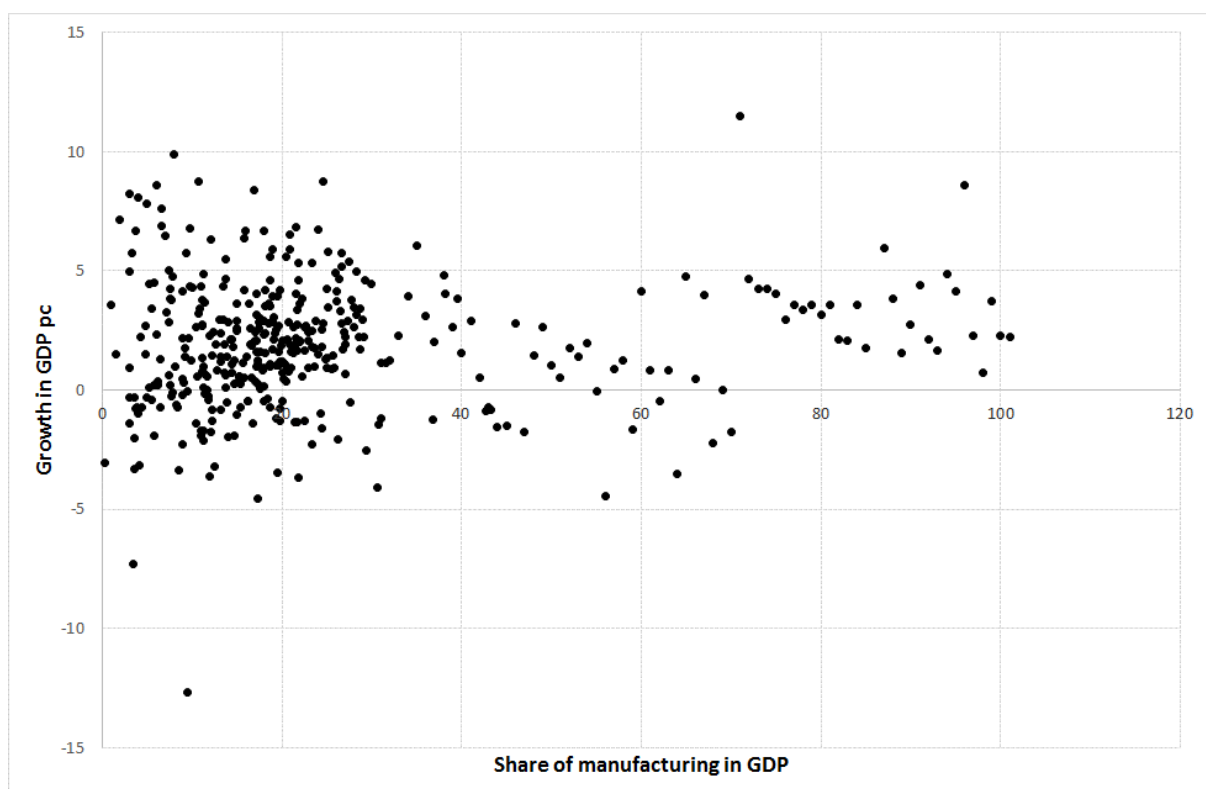
In lieu of a comprehensive empirical analysis, here we present some descriptive charts for a preliminary take on the relationships between the share of manufacturing and economic growth. These plot the relationships between share of manufacturing in GDP (Figures 8, 10 and 11) or total employment (Figures 9, 12 and 13), at the beginning of each decade, with growth in GDP per capita in the subsequent decade, across countries and across time. For instance, in Figure 8 each point represents a country and decade (1970-1980, 1980-1990, 1990-2000 and 2000-2010). The x-coordinate shows the share of manufacturing in GDP in a country at the beginning of a decade (e.g. 1970), while the y-coordinate shows the growth rate in GDP per capita in the subsequent decade (e.g. 1970-1980). Figure 9 shows the same, but for the share of manufacturing in a country's total employment (instead of GDP). The four panels of Figure 10 break down the scatterplot of Figure 8 into the four decades, thus comparing countries over the same periods. Figure 12 does the same for the share of manufacturing in total employment. Figures 11 and 13 break down the aggregate scatterplots of Figures 8 and 9 respectively into regional groupings. These are based on the same regional groups as used in Figures 4 and 5 (see section 3), but only groupings with a fairly large number of countries in the sample are shown here – East Asia, Sub-Saharan Africa, Latin America and the Caribbean, and Western Europe. These provide a good sample of global levels of development.

Needless to say, these descriptive charts do not shed any light on causal relationships between the shares of manufacturing in the economy and economic growth rates.¹² They merely show the correlations between manufacturing shares and subsequent economic growth, without controlling for any other relevant factors. We can thus make some observations from this exploratory analysis, without drawing any conclusions about how sectoral structure and changes therein actually affect growth.

¹² For such a study, see Szirmai and Verspagen (2011).

From the overall scatterplots, a slight positive relationship is evident between the share of manufacturing and subsequent growth, notably in the case of the share of manufacturing in total employment (Figure 9). However, this may be accounted for at least in part by different patterns of sectoral structure and growth in different periods of time and/or different regions. The subsequent figures therefore break the overall scatterplots down by period and by region.

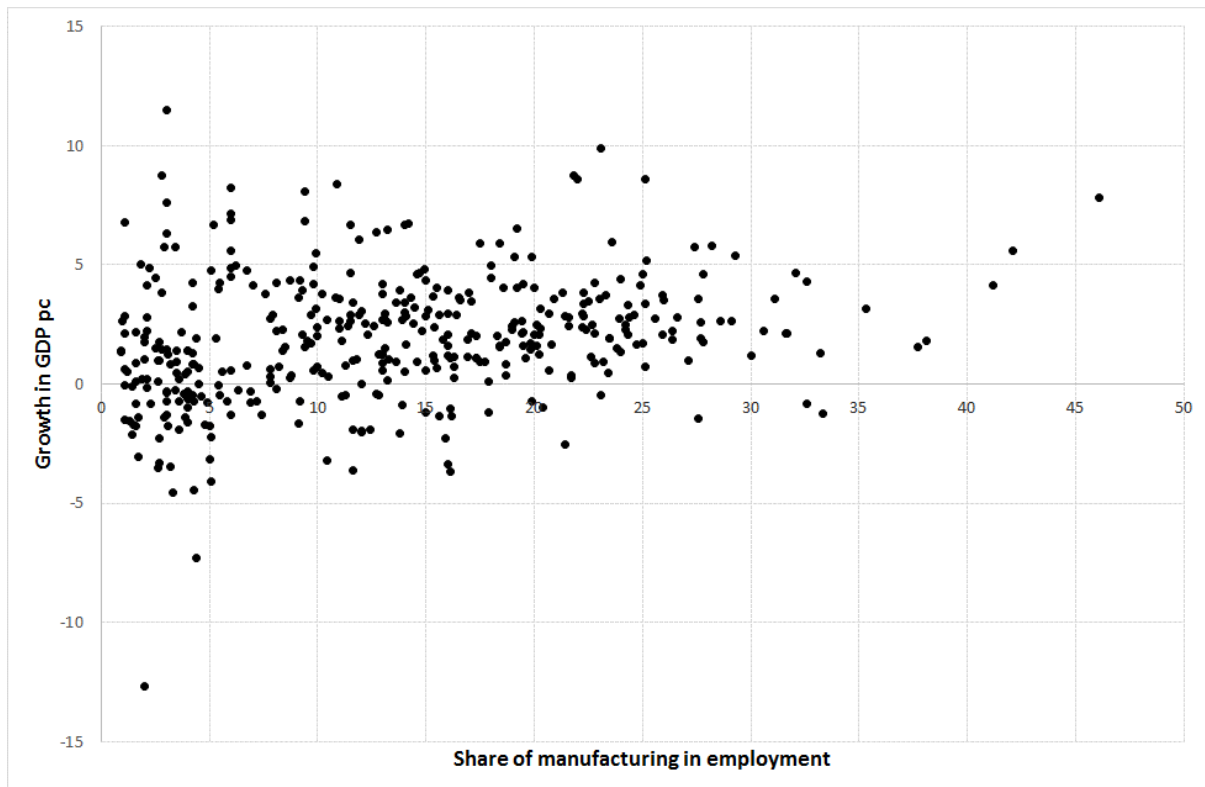
Figure 8: Relationship between manufacturing share in GDP and GDP growth, all countries, 1970-2010



Sources: Value added data from UN, income data from Penn World Tables

Notes: Share of manufacturing in GDP at the beginning of each decade (1970, 1980, 1990, 2000); Growth in GDP per capita during each decade.

Figure 9: Relationship between manufacturing share in employment and GDP growth, all countries, 1970-2010



Sources: Employment data from ILO, income data from Penn World Tables

Notes: Share of manufacturing in employment at the beginning of each decade (1970, 1980, 1990, 2000); Growth in GDP per capita during each decade.

Figures 10 and 12 illustrate the considerable variation in the relationships over time. In the first three decades (1970-2000), there is generally a positive correlation between the share of manufacturing in the economy and subsequent economic growth (with the exception of the relationship between the share of manufacturing in GDP in 1970 and growth in the 1970s). However, in the most recent decade 2000-2010, a negative relationship is apparent. This indicates a negative correlation across countries between the share of manufacturing in GDP and employment in 2000, and growth in the subsequent decade. As with all these charts, this does not demonstrate any causality, as there would be multiple other factors influencing growth, as well as heterogeneity across countries. However, it does raise interesting and important questions around whether the role of manufacturing as an engine of growth has changed in recent times; this merits further investigation using appropriate econometric models and techniques.

Figures 11 and 13 explore the variation in regional patterns, with each panel plotting country points (with markers differentiating the four decades). There are no clear patterns evident here from which clear conclusions could be drawn; there are differences between regions as well as between periods within regions. The distinct differences between regions underscore the complexity of this relationship and the importance of a rigorous and nuanced analysis that takes account of all relevant determinants of growth. Even within regions, the relationship between sectoral structure and economic growth clearly varies over time. See for instance the clustering of points in the South-West of panels 11d and 13d for Western Europe, showing the slowdown of growth in the recent decade combined with the lower shares of manufacturing in 2000 (as a result of preceding deindustrialisation, not necessarily any causal relationship between these).

Figure 10: Relationship between share of manufacturing in GDP and GDP pc growth, all countries

Figure 10a: 1970-1980

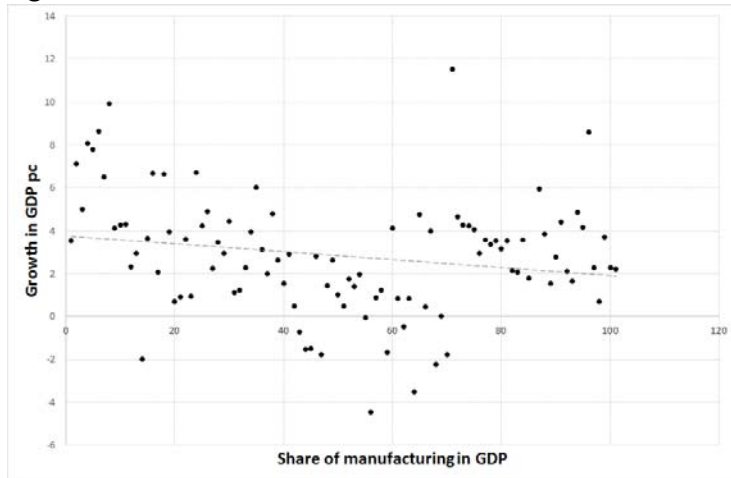


Figure 10b: 1980-1990

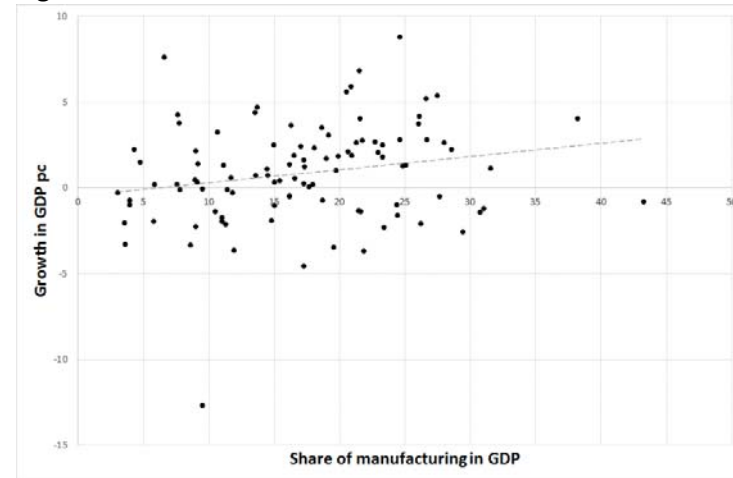


Figure 10c: 1990-2000

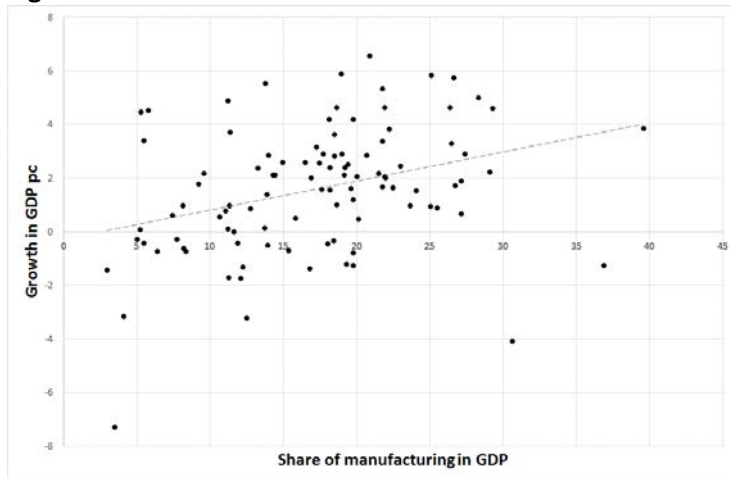
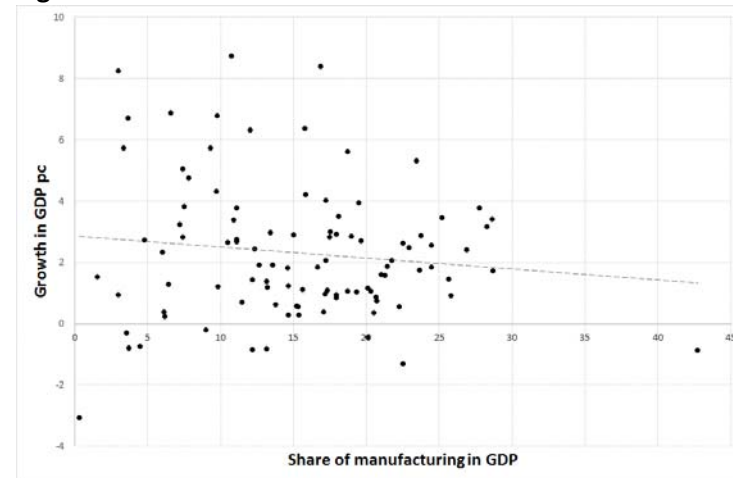


Figure 10d: 2000-2010



Source: Value added data from UN, income data from Penn World Tables. Notes: Share of manufacturing in GDP at the beginning of each decade (1970, 1980, 1990, 2000); Growth in GDP per capita during each decade. Trendline is linear regression line

Figure 11 Relationship between share of manufacturing in GDP and GDP pc growth, country groups

Figure 11a: East Asia

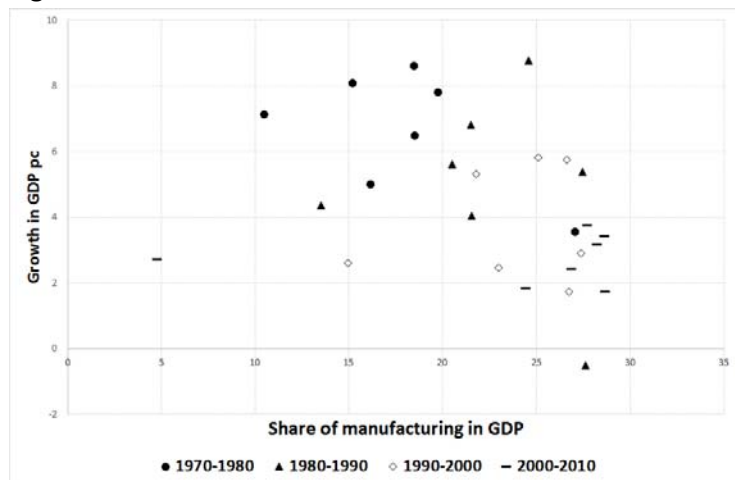


Figure 11b: Latin America

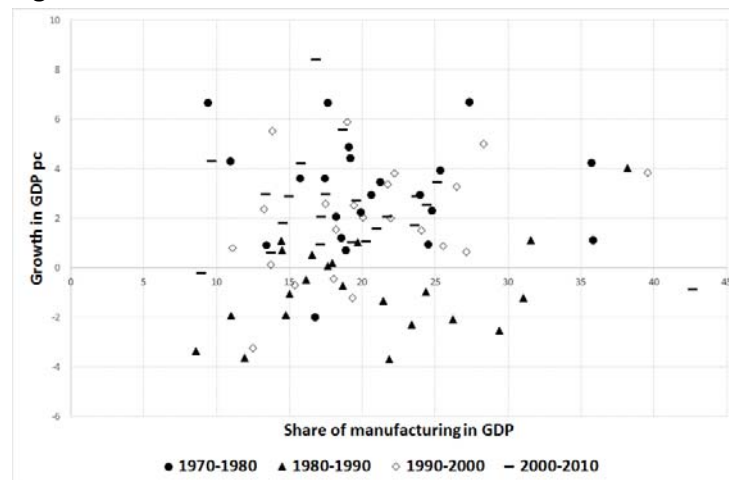


Figure 11c: Sub-Saharan Africa

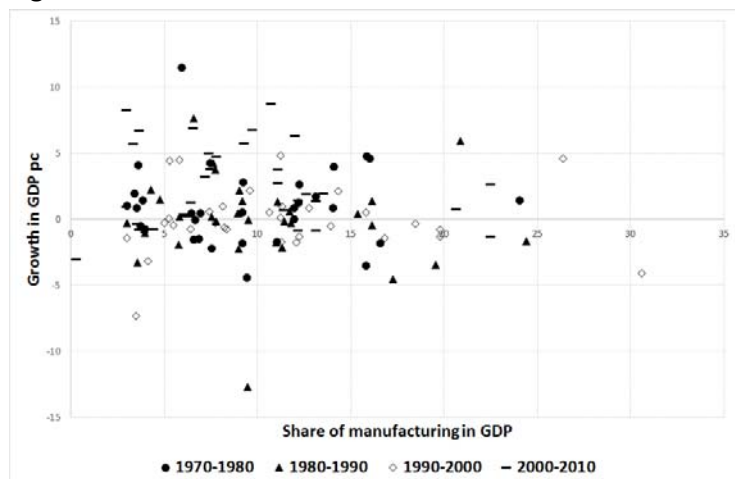
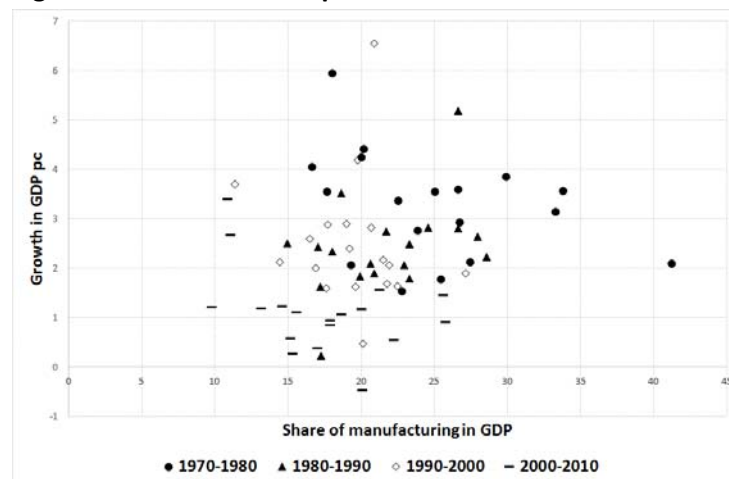


Figure 11d: Western Europe



Source: Value added data from UN, income data from Penn World Tables

Notes: Share of manufacturing in GDP at the beginning of each decade (1970, 1980, 1990, 2000); Growth in GDP per capita during each decade.

Figure 12: Relationship between share of manufacturing in employment and GDP pc growth, all countries

Figure 12a: 1970-1980

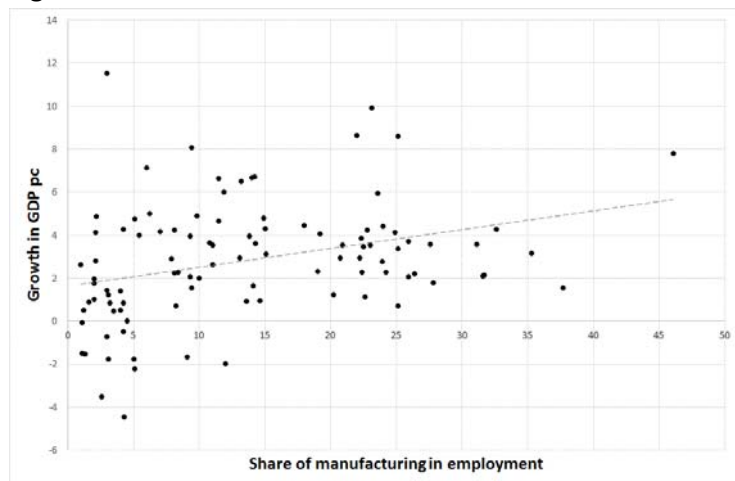


Figure 12b: 1980-1990

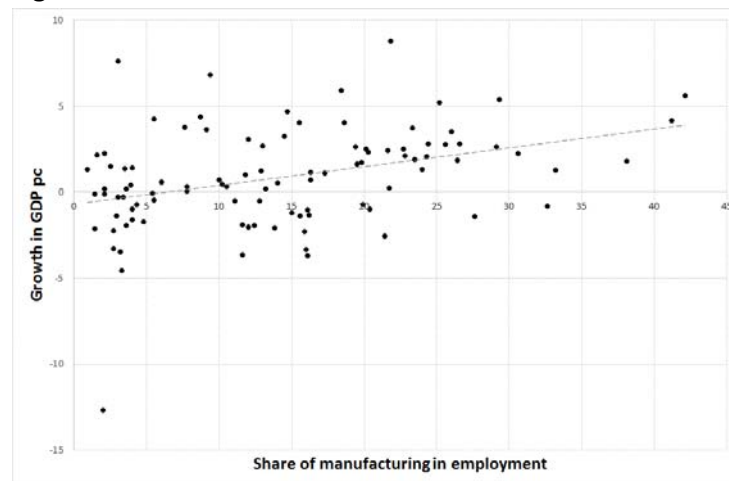


Figure 12c: 1990-2000

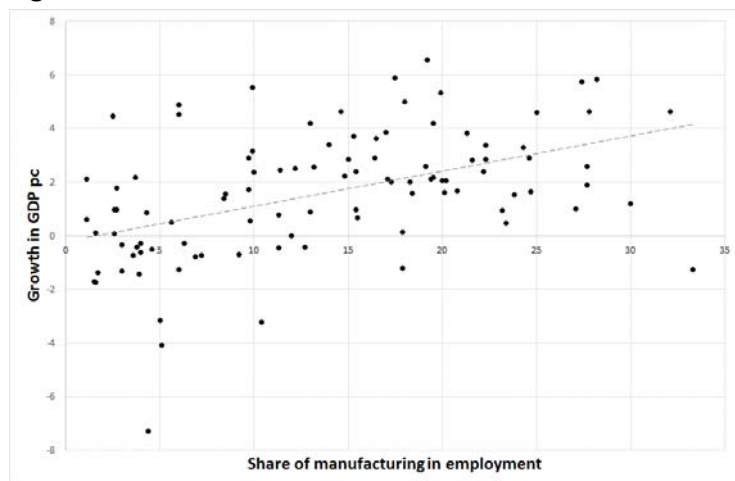
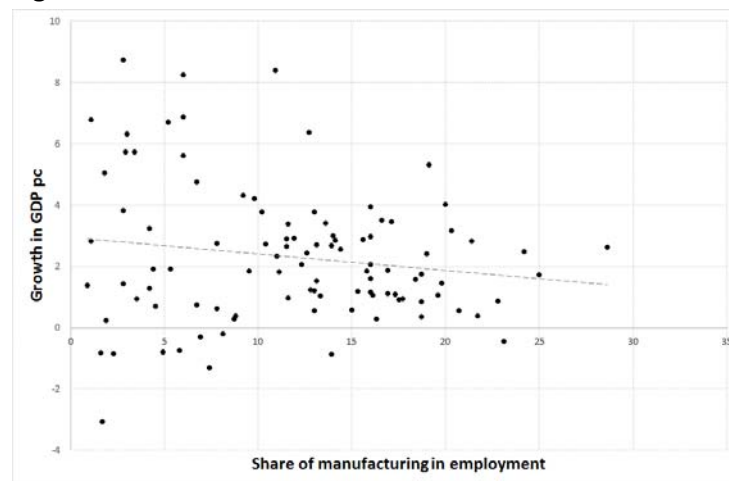


Figure 12d: 2000-2010



Sources: Employment data from ILO, income data from Penn World Tables. Notes: Share of manufacturing in employment at the beginning of each decade (1970, 1980, 1990, 2000); Growth in GDP per capita during each decade. Trendline is linear regression line.

Figure 13: Relationship between share of manufacturing in employment and GDP pc growth, country groups

Figure 13a: East Asia

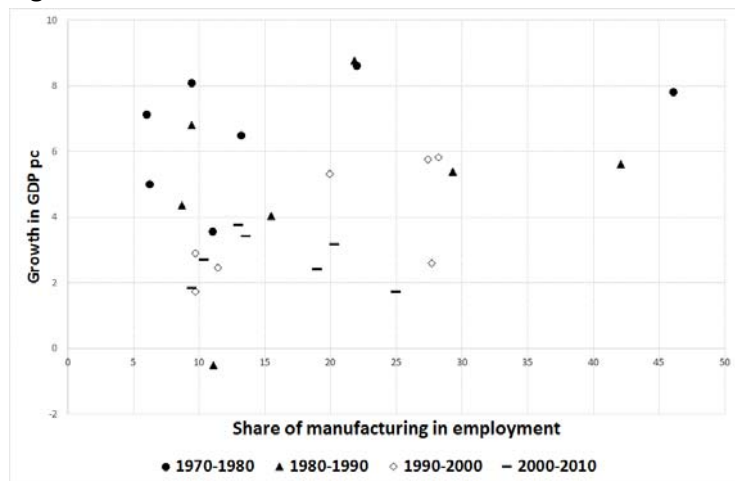


Figure 13b: Latin America

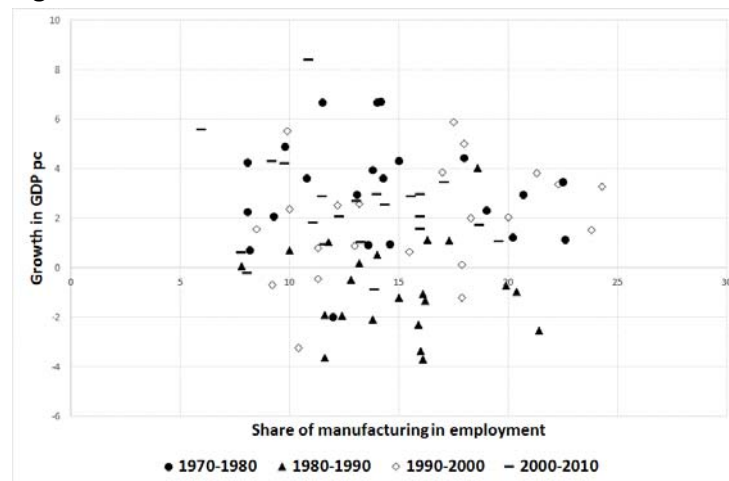


Figure 13c: Sub-Saharan Africa

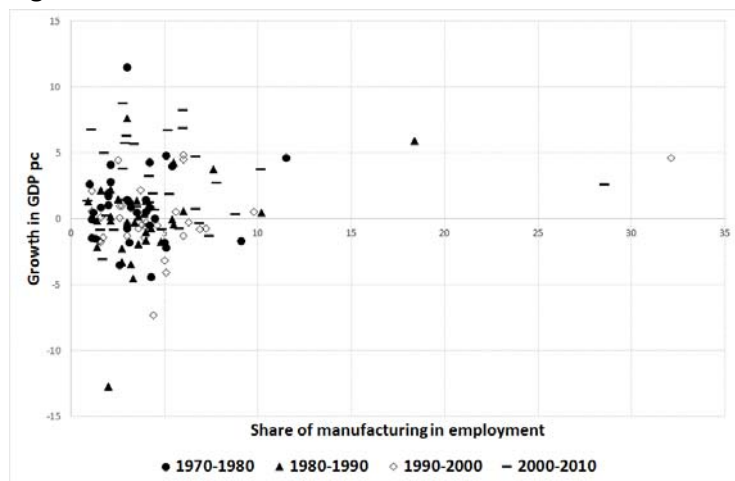
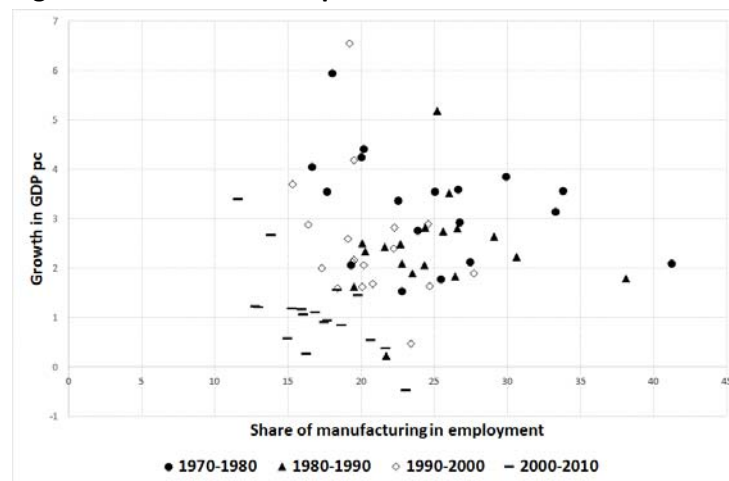


Figure 13d: Western Europe



Sources: Employment data from ILO, income data from Penn World Tables

Notes: Share of manufacturing in employment at the beginning of each decade (1970, 1980, 1990, 2000); Growth in GDP per capita during each decade.

6.2 What influences the effects of deindustrialisation on growth?

There is mixed and inconclusive empirical evidence concerning the effects of deindustrialisation on growth. Expectations around these effects depend in part on whether or not manufacturing is regarded as having special properties as an engine of growth.

As discussed in section 4, there is a good deal of variation between different types of deindustrialisation. These differences are especially relevant when considering the effects of deindustrialisation for growth. Rather than just seeing deindustrialisation as either bad for growth or as not affecting growth, it may be helpful to identify the specific characteristics or dimensions of deindustrialisation that are germane to whether and how it affects growth. From a policy perspective, this is relevant to assisting policymakers in assessing the specific character of deindustrialisation occurring in a country, and its possible or probable effects on growth.

The first aspect that can be identified here is the level of income per capita at which deindustrialisation begins. Secondly, the degree of industrialisation – which can be measured in terms of the shares of manufacturing in total employment and GDP – at which manufacturing begins. In general, we would expect that, the lower the level of GDP per capita at which deindustrialisation begins, and the lower the share of manufacturing in the economy, the more negatively deindustrialisation is likely to affect growth. The reasons for this are discussed in the next section.

Thirdly, the extent to which deindustrialisation is triggered or accelerated by a policy change, as opposed to just gradually taking place over time with economic development, will also influence the likely effects of deindustrialisation on growth. Policy-induced deindustrialisation is more likely to kick in before the full benefits of industrialisation have been obtained, before manufacturing has matured as well as before a dynamic and advanced services sector has properly developed.

A fourth feature of specific deindustrialisations that is relevant to the likely effects on growth, is the nature of the manufacturing activities that are in relative decline as well as of

the non-manufacturing activities that are relatively growing. This relates to the issue of sector-specificity and activity-specificity discussed earlier. While there is a relationship between these, there is also considerable heterogeneity in 'activity quality' within sectors. For instance, how technologically advanced are the declining manufacturing activities compared to the non-manufacturing activities that are relatively growing, how strongly are they linked to the rest of the domestic economy, and so forth. Where specific manufacturing activities that are contracting have limited scope for increasing returns to scale and limited scope for cumulative productivity increases, and a dynamic services sector with the opposite characteristics is growing, there need not be negative effects on growth. It is thus important to take cognisance of the specific characteristics of activities, and to analyse shifts not only at the sectoral level but also at the sub-sectoral level, to ascertain probable consequences for growth.

Even taking account of these dimensions and of the specificity of particular deindustrialisation processes, on the balance of probabilities it is most likely that deindustrialisation will negatively affect a country's growth. This is due in part to the relationship between sector-specificity and activity-specificity discussed earlier. The incidence and extent of these negative effects will be contingent on factors such as the four discussed above.

6.3 Specific effects of premature deindustrialisation

Turning to the effects of premature deindustrialisation, any negative effects of deindustrialisation are likely to be stronger in the case of premature deindustrialisation. This relates to the four factors, identified above, that affect the probable effects of deindustrialisation on growth.

Firstly, as per the conceptualisation of premature deindustrialisation put forward here, this occurs at lower levels of income per capita and/or at a lower share of manufacturing in total employment and GDP. This suggests that a country may have obtained less of the benefits of manufacturing for broader economic growth where deindustrialisation is premature, which would impinge on growth prospects. The growth-pulling role of manufacturing is

especially important in the earlier stages of development, and more important for developing than developed countries. In an advanced economy, certain subsectors of the services sector may have some of the 'progressive' characteristics attributed to manufacturing. These characteristics could include increasing returns to scale, scope for cumulative productivity increases, strong linkages with other sectors, technological advancement, and so on. It is unlikely that the services sector in developing countries will have strongly developed such characteristics. Even to the extent that it does, these countries would still miss out on the growth-pulling benefits of manufacturing if manufacturing declines before fully developing.

Where a country begins deindustrialising with manufacturing having reached 30% of GDP, it is likely that the benefits of manufacturing will have diffused through the economy over an extended period of time: skills development through learning-by-doing, technological benefits to other sectors, the generation of foreign exchange relieving balance of payments constraints on growth, the stimulation of other sectors through forward and backward linkages, and so forth. When a country fails to industrialise, or experiences what we have termed 'pre-industrialisation deindustrialisation', such that manufacturing fails to rise to even 5% of total employment, these pro-growth economic benefits will not have been realised.

Secondly, and related to the above, deindustrialisation at a premature stage potentially jeopardises the potential of the services sector to act as an alternative engine of growth. With 'mature deindustrialisation', certain advanced and dynamic services activities may have the sorts of growth-enhancing properties attributed to manufacturing. However, the types of services activities that are likely to 'replace' manufacturing in circumstances of premature deindustrialisation are more likely to be relatively low-skilled, low-productivity, non-tradable activities such as retail or personal services, which do not have strong properties of increasing returns or the potential for cumulative productivity increases. For example, casual observation of economic activity in low-income African countries reveals an abundance of services activities such as hairdressing and retail, which are expanding despite the failure to industrialise and in the absence of the development of advanced tertiary activities. While low-skilled, low-productivity, non-tradable activities may have an important

role to play in job creation, they are unlikely to drive growth. Furthermore, it seems unlikely that these countries can 'leapfrog' to dynamic growth-pulling services activities, skipping industrialisation. A partial exception to this in the developing country context may be India, the 'office of the world', which has developed enclaves of dynamic services activities.¹³

In general, where deindustrialisation sets in at low levels of income per capita, there is likely to be insufficient effective demand to support the sustainable development of dynamic services that can act as an alternative engine of growth. The non-tradable nature of many services make domestic effective demand more of a constraint than in the case of manufacturing. To the extent that services can play such a role as an engine of growth, this is more likely to be feasible in advanced than developing countries.

Thirdly, premature deindustrialisation is typically likely to be more sudden than deindustrialisation in advanced economies. This is partly because premature deindustrialisation is typically more likely to be brought about by policy changes, such as liberalisation, than is the case in deindustrialisation in advanced economies. While advanced economies can and do engage in sudden liberalisations that can accelerate deindustrialisation, this tends to be more common in developing countries. In part, this is because developing countries are more likely to be dependent on international financial institutions and to have 'adjustment' programmes imposed upon them. The relatively low diversification in most developing countries also renders their economies more susceptible to shocks. The impact of sudden liberalisation in triggering or accelerating deindustrialisation is thus likely to be more pronounced. Policy-induced premature deindustrialisation will have different characteristics and effects from incremental 'mature deindustrialisation' in advanced economies.

¹³ Ghani and Kharas (2010) argue with reference to the case of India that services can drive sustainable growth, employment creation and poverty reduction, and that services can provide developing countries with an alternative route to economic development instead of industrialisation. Roncolata and Kucera (2014) in a cross-country study find that labour productivity growth was driven largely by services in India, as compared to China where it was driven largely by manufacturing. For developing countries as a whole, they find labour productivity growth to be driven as much by services as by manufacturing; these results are based on an accounting decomposition and do not demonstrate causality. It is worth noting that India did in fact invest heavily in manufacturing in the post-independence period and that the share manufacturing in the economy did increase significantly, prior to the more recent take-off of services.

These three ways in which the economic effects of premature deindustrialisation are likely to be especially negative, are closely related to one another, as well as to the four factors identified in the previous section as influencing the effects of deindustrialisation on growth.

7. Policy implications

A policy approach to deindustrialisation needs to consider three basic questions, which are discussed below: is it undesirable; is it avoidable; and what can be done about it. An ancillary issue concerns policy measures to mitigate any negative consequences of deindustrialisation that occurs.

7.1 Is deindustrialisation undesirable?

For policymakers, this is not so much a general or theoretical question as one that needs to be considered for a specific country at a specific point in time, as the answer will to a large extent be place- and time-specific. The heterogeneity of deindustrialisation, as discussed earlier, is thus relevant here. The effects of deindustrialisation, and concomitantly the extent to which it is considered undesirable, may depend partly on the nature of the deindustrialisation, including its causes and dynamics.

While the empirical evidence on the economic effects of deindustrialisation remains inconclusive, it seems likely that deindustrialisation would typically have negative effects on growth. It has been suggested here that these effects would depend *inter alia* on the level of income per capita and the degree of industrialisation at which deindustrialisation commences, whether or not the deindustrialisation is policy-induced, and the nature of the activities that are in relative decline and growth. To the extent that deindustrialisation has negative effects on growth, this should point to the importance of policies to avoid it, reverse it, or at least slow it down.

Discussing the causes of premature deindustrialisation in section 5, it was argued that policy – in particular the rapid liberalisation of macroeconomic and trade policy – is an important contributor to premature deindustrialisation. Proponents of macroeconomic and trade liberalisation might argue that, insofar as such liberalisation leads to or accelerates premature deindustrialisation, this is not necessarily a bad thing. In this line of argument, manufacturing in developing countries could have been ‘artificially overdeveloped’ by the diversion of public resources through industrial policies, despite low productivity and efficiency, at the expense of other sectors. From such a perspective, deindustrialisation could be considered not only inevitable but even desirable. Once exposed to competition through liberalisation, equilibrating market forces will rationalise or eliminate such activities. Rather than seeing such a process as premature deindustrialisation or as a pathological phenomenon, such a perspective would view these liberalisation-induced adjustments as leading to improvements in the allocation of resources and to economy-wide gains in productivity and efficiency.

However, one serious limitation of such an approach is that it tends to take an implicitly static view of productivity. If some activities have the potential for increasing returns to scale¹⁴ and cumulative productivity increases, then even if such activities have below-average productivity at a certain point in time, it would still be judicious to invest resources in growing them to a scale at which increasing returns can be realised and a virtuous circle of productivity improvements can kick in. This is part of the logic of the ‘structural change’ approach discussed earlier, and indeed of industrial policy.

The pace of deindustrialisation is also germane to its likely effects. In general, the more rapidly deindustrialisation occurs, the more negative its economic and social effects are likely to be. With rapid deindustrialisation spurred by an internal or external shock, firms have little opportunity to adapt and adjust, such as through diversification or upgrading. Negative externalities and spillovers from firm closures are likely to magnify the negative effects, within manufacturing and more broadly in other sectors as well. The negative effects of rapid deindustrialisation can be expected to be especially pronounced for

¹⁴ See Reinert (2007) on the importance of activities with increasing returns to scale for economic growth.

individual workers as well, as their chances of reskilling and quickly finding alternative employment would be curtailed.

Apart from any negative effects on growth, deindustrialisation can be considered undesirable for political or social reasons as well (see Tregenna 2015a for a review of the literature on social effects of deindustrialisation).

7.2 Is deindustrialisation avoidable?

If deindustrialisation is considered undesirable, then the next question is whether it is avoidable. This will depend in part on the specific causes of the deindustrialisation. Even if deindustrialisation is not completely avoidable, its pace will invariably be subject to policy interventions, such that policy could slow down and manage deindustrialisation. This is particularly so in cases of premature deindustrialisation.

Whatever the causes and characteristics of deindustrialisation, there are generally policy instruments available that can at least slow deindustrialisation, even if not avoiding it. The feasibility of this is not so much a technical issue as one of political economy, and whether the state has the political will to implement the necessary policies. Policy approaches that may be useful in combatting deindustrialisation are discussed further below.

7.3 What can be done to avoid, slow or reverse deindustrialisation?

If deindustrialisation is considered undesirable and avoidable, it is important to consider what can be done to avoid it, or at least to slow it down, and even to reverse deindustrialisation that has already occurred. This issue is discussed here in a little more detail than the other three aspects of policy identified, as this is the most relevant for policymakers concerned about deindustrialisation.

Central in this regard are industrial policy interventions to support the manufacturing sector. A comprehensive discussion of industrial policy is beyond the scope of this paper, but some key issues are highlighted here. Industrial policy of course need not be confined to

the industrial sector: the tools of industrial policy are also relevant in policy interventions to support agriculture, services and other sectors. However, when considering on policy to avoid, decelerate or reverse deindustrialisation, it is industrial policy for manufacturing specifically that is the focus.

Industrial policy needs to take account of current realities such as new products, and new ways of making them; the new international geography of production, including global value chains (GVCs), trading blocs and patterns, and changes in the geographic distribution of production and consumption internationally. It also needs to take account of individual countries' political economy, resource endowments, and other relevant factors.

Active policy interventions are needed to promote industrialisation, avoid or mitigate deindustrialisation, and support re-industrialisation where deindustrialisation has already occurred. These policy measures are especially necessary in developing countries that are threatened by or have already experienced premature deindustrialisation. The development of a strong industrial sector is important for a developing country to attain long-term sustainable growth. Furthermore, it is important for a country to tap the benefits of the industrial sector for the rest of the economy as much as possible and for as long as possible. This points to the need to actively build linkages between manufacturing and other activities, for instance for services and other sectors to source their inputs from the domestic manufacturing sector.

Industrial policy alone is not enough to build a strong manufacturing sector and avoid, slow down or reverse deindustrialisation. Supportive macroeconomic policy is also essential, especially regarding interest rates and exchange rates. Complementary trade policy, technology policy, labour market policy and skills and education policies are also needed.

The success of industrial policy is contingent on the extent to which scarce resources channelled into supporting manufacturing have the desired results of creating a sustainable and competitive manufacturing sector, as opposed to just going into a 'black hole'. A well-known challenge in this regard is in ensuring that 'infant industries' receiving support do eventually 'grow up' and become independent of direct public transfers. South Korean

industrial policy during its period of rapid industrialisation is a well-known example of success in this regard. Infant industries that were initially not competitive and would not have been viable without extensive support became competitive and developed into important export industries.¹⁵

Central to this is rent management: how state policies ensure that the rents created through industrial policy and other support are reinvested into growing the productivity, competitiveness and sustainability of supported industries (see Khan, 2000a, 2000b on rents and industrial policy). Without effective rent management, public resources spent on supporting industry can simply be diverted into the enrichment of an elite, or wasted in poorly run enterprises, with no long-term national benefit. An essential element of successful industrial policy is thus ensuring that rents that directly or indirectly derive from support to industry, whether financial support or otherwise), go into growing sustainable and competitive industries.

This is fundamentally a political economy issue rather than a technical issue, although technical expertise and appropriate design and implementation of suitable industrial policy is of course also necessary. The political economy aspect of rent management in industrial policy lies in managing the relationships between the state and capital such that rents are as much as possible reinvested in pro-growth ways. At least some of the differential growth outcomes between East Asia and Latin America seem to derive from differences in rent-management (see Khan and Blankenburg, 2009 and Palma, 2009 on differences between these two regions in industrial development and growth).

Low-income countries that are not industrialising face particular challenges. As seen in section 3, manufacturing is in some cases stagnant at a very low share of the economy, in sub-Saharan Africa in particular, with some countries are experiencing ‘pre-industrialisation deindustrialisation’. Industrialisation (or re-industrialisation) in such cases is arguably more difficult now than was the case for comparable countries several decades ago. The manufacturing power of China, as well as other emerging Asian manufacturing

¹⁵ See for example Amsden (1989).

powerhouses, lies in the combination of low unit labour costs with growing technological sophistication. This makes it difficult for low-income economies that, while having lower wages than China, also have lower productivity, poorer infrastructure and less technological advancement, to gain manufacturing competitiveness.

This is especially difficult – but no less necessary – where there is no existing manufacturing base to build on. Even industries such as clothing, which have traditionally served as entry points into manufacturing, are increasingly difficult for low-income countries to enter and gain market share in.

One feasible route for such countries is to build on existing strengths in the primary sectors, by cultivating vertically linked manufacturing activities. These could include agro-processing activities and beneficiation of minerals. Using their existing activities as anchors to move up these value chains could allow low-income countries to capture more of the value of the final products, while developing manufacturing capacity. This capacity – in skills, technology, institutions and infrastructure – can serve as a base for broader industrialisation, and for beginning to realise increasing returns in the sector as a whole, beyond individual firms.

The geographical splitting up of GVCs in this era of globalisation may also open up avenues for industrialisation in developing countries. As Baldwin (2011) argues, countries can now industrialise by joining an existing supply chain, without having to build one. He notes that while industrialisation through this strategy is easier and faster, it is also less meaningful, in the sense that exporting sophisticated manufactures may just reflect where a country is located in a GVC. Milberg et al (2014) argue that, with GVCs, competitive improvements derive from moving into higher value activities associated with an industry, as opposed to the development of the full scope of activities in an industry as was previously the case.

Specialising in niche manufacturing activities may allow developing countries to develop manufacturing capabilities in certain areas without or before building up broader manufacturing capabilities. Such a strategy may be especially suitable for low-income countries lacking an industrial base and with limited resources and skills.

However, industrial policy in such cases should aim to use those niche manufacturing activities as platforms for building up a broader industrial base. The obvious avenue is through cultivating activities with forward or backward linkages in the same value chains. This sort of industrialisation corresponds to a decline in vertical specialisation, while growing the scope or values of manufactures and capturing value added from others in the chain (Milberg et al, 2014).

The increasing returns to scale that make manufacturing important for growth, can be realised not only at firm level but also at industry level. Insofar as there are positive externalities from one manufacturing activity to another, and industry-wide cumulative productivity increases, then growing one manufacturing activity could be beneficial for others and at least some scale economies would materialise with higher levels of industrial production. Practically, these sort of industry-wide externalities and scale economies could operate through channels such as availability of skilled industrial labour and infrastructure for production and exports. For instance, there is more likely to be suitable transport, power and other infrastructure where there is a large manufacturing sector than where there is only a small albeit successful niche industry. Nonetheless, countries need to start somewhere in industrialising, and entering niche areas of GVC may be strategic entry points. Industrial policy can aim to make these activities really serve as entry points to industrialisation, as discussed above.

In the different situation of a wealthy advanced economy with a sophisticated and dynamic services sector, policymakers might consider deindustrialisation to be either unavoidable or not problematic. In such a case, the focus of policy could be not so much on preventing deindustrialisation but rather on mitigating the negative effects thereof, while also modulating as far as possible the pace and path of such deindustrialisation.

The need for policy interventions to mitigate the negative fall-out of deindustrialisation derives in part from the uneven distributional effects of deindustrialisation. Indeed, concerns around early deindustrialisation in the United States and United Kingdom from around the 1970s were centred on job losses, especially as these were concentrated in some regions, and the poor prospects of those affected gaining other employment or at

least other employment with comparable wages and benefits.¹⁶ The uneven distributional effects of deindustrialisation can provide a rationale for policies that mitigate negative effects on affected individuals and communities and regions. This could include active labour market policies, retraining, welfare support, and industrial policies (in the broad sense, not limited to manufacturing) to support the growth of other economic activities in affected areas.

Apart from these sort of policies to mitigate the negative effects of 'mature deindustrialisation' in advanced economies on those affected, industrial policy is also important in modulating the pace and path of such deindustrialisation. Slowing the pace of deindustrialisation can be crucial to giving industries, firms, individuals and areas time to adjust.

Policymakers also need to identify which industries it is especially beneficial to retain, and support those industries, rather than just allowing wholesale deindustrialisation. For instance, an advanced economy may accept 'grandfather industries' shifting to developing economies, while making efforts to retain industries with strong technological spill-overs for the rest of their economies, or that are important anchors for or inputs into advanced service activities. Targeted industrial policies would be essential in protecting specific sectors and activities from deindustrialisation.

7.4 How can the negative effects of deindustrialisation be mitigated?

Even where deindustrialisation itself is not considered to be undesirable or unavoidable, some of its social or economic consequences may be. Various policy measures can be considered to manage or mitigate these consequences.

¹⁶ Literature on the negative effects of deindustrialisation on employment and welfare of affected manufacturing workers as well as surrounding communities and regions, includes Bluestone (1983), Armah (1992), Rowthorn and Webster (2008), Brady and Wallace (2001), Friedhoff et al (2010), Graham and Spence (2000), Kottis (1972), and Ostry et al (2001).

Such measures could include active labour market policies for those losing their jobs through deindustrialisation (retraining, job placement and so on); welfare policies to protect vulnerable workers and communities directly affected by deindustrialisation; spatial and urban regeneration policies to revive and develop cities or regions especially hard hit by deindustrialisation; and industrial policy and other measures to promote non-manufacturing activities that can create jobs and contribute to growth.

8. Concluding remarks

This paper has explored a number of issues pertaining to deindustrialisation, including: industrialisation and deindustrialisation in the processes of structural change and catching up; the relationship between sectoral-specificity and activity-specificity in the growth process; the particularity of premature deindustrialisation; trends across countries over time in the shares of manufacturing in employment and GDP; empirical evidence on the heterogeneity of deindustrialisation internationally; causes and sources of deindustrialisation; effects of deindustrialisation on growth; and the implications for policy.

Having discussed the reasons why deindustrialisation could be of concern, we have also drawn attention to nuances and complexities that need to be considered. One aspect of this is the heterogeneity of deindustrialisation. ‘Deindustrialisation’ driven by a faster rate of productivity growth in manufacturing than in other sectors is a very different phenomenon to a collapse of manufacturing output and employment.

Another relevant aspect is the stage of development at which deindustrialisation sets in. Premature deindustrialisation may be expected to have greater negative effects than deindustrialisation in advanced economies. We have also pointed to other pertinent nuances and complexities that need to be considered when analysing deindustrialisation and its likely implications. One of these is the extent to which deindustrialisation is accounted for simply by the reclassification of activities due to intersectoral outsourcing, as opposed to a shift in the underlying sectoral structure of an economy.

Furthermore, our discussion of activity-specificity underscores the importance of considering not just changes in sectoral structure but also the characteristics and growth-pulling potential of the activities that are growing and contracting, at the sub-sectoral level. It is not enough to know that manufacturing is shrinking: for analytical and policy purposes it is also important to know which kinds of manufacturing activities are shrinking, and which services or other activities are growing. In this respect it is important to consider activity characteristics such as technological intensity, scope for increasing returns and cumulative productivity increases, and linkages with other sectors. While there are some relevant common characteristics within sectors concerning such characteristics, making a sectoral angle valuable, there are also important intra-sectoral differences.

There remain important gaps in the academic and policy literature on deindustrialisation. Two particular avenues for further research on deindustrialisation can be suggested here. One is rigorous and comprehensive empirical study of the effects of deindustrialisation on growth internationally. It would be important for this to take account of *inter alia* how these effects have changed over time, how they differ for different types of countries (such as at different levels of development), and how these effects differ depending on the nature of deindustrialisation. A second issue of particular relevance to policy is a comprehensive quantitative and qualitative study of the effects of policy on deindustrialisation: what sort of policies have triggered or accelerated deindustrialisation, and what sort of policies have managed to avoid, slow or even reverse it.

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