

From Micro to Macro

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Valorization

In accordance with article 23.5 of the 'Regulation governing the attainment of doctoral degrees at Maastricht University' decreed by resolution of the Board of Deans, dated 3 July 2013, this chapter on addendum discusses the valorization opportunities of this doctoral thesis.

There has been a resurgence of interest from popular media, academia, and policy makers in the relationship between technological change and income inequality, and the growth of income. Each chapter of this thesis expands on this ongoing discussion by investigating the relationship between technological change and income at the individual, industry and national level, and provides insights for policymakers and researchers.

The first study, Chapter two, is particularly useful for European policymakers concerned about rising income inequality. By providing an in-depth decomposition analysis, policymakers have insight into which factors remain an important driver of inequality in their country. Unlike cross-country analysis which seeks to find patterns across many countries, this chapter first analyzes each country in depth, and then compares the drivers across nations. Since countries are idiosyncratic, not every factor will impact a nation in the same way. Thus, this chapter informs policymakers within each country to address particular factors that may be quite large. However, when there are strong shared experiences across many European countries, as this chapter found, this can inform policymakers for the European Union. The strongest result in this chapter is the role that automation plays on driving inequality. This chapter highlights that each European labor market uniquely adopt automation in their own way, but all nations have been impacted by automation. By large, policy makers must confront that automation is polarizing employment, and the current set of labor institution policies are not equipped to combat this effect. Some ways forward is to promote vocational education

that includes apprenticeships and short-term training programs such as "coding bootcamps" that can help displaced workers re-skill.

The main contribution of Chapter three is providing a novel way to measure knowledge diversity within industries, and is particularly useful for researchers. The method is a general approach to measuring knowledge diversity, which can be applied in a variety of contexts beyond industries. For example, another area of research where this can be applied is in co-authorship networks to understand the role that multidisciplinary research can have on advancing scientific output. There is ongoing discussion on understanding which fields benefit or promote multidisciplinary research, but measuring field specialization, specifically, how field specialization relate to one another, remains quite difficult. This measure provides one way to estimate the relationship between various fields in scientific research. Beyond a new measure of knowledge diversity, the chapter also highlights how knowledge diversity plays a role in wage formation, particularly in regards to the inter-industry wage premium, which has not been previously identified to the best of the author's knowledge. The chapter provides insight into the possible mechanism as to why individuals received wage premiums for working in knowledge diverse industries, specifically how social and interpersonal skills could reduce coordination costs for firms. This conclusion builds on previous research that establishes rising wage premiums are associated with social skills, and further promotes that these types of skills should be taught in primary school education as it remains an important skill in the labor market.

In the final study of the thesis, the main contribution is providing an in depth overview of measuring country capabilities. Previous work has not identified nor linked the relationship between aggregated and export based algorithm approaches to measuring country capabilities. It provides a detailed assessment of the various measures available, and their strengths and weaknesses, that can guide researchers on when and how to use these measures of country capabilities. In addition, the chapter highlights a main limitation to export based algorithms, which is that it fails to explain economic growth patterns for developed nations. For developing nations to "catch-up," they must invest in a broad range of capabilities that may allow them to innovate and participate in exporting. Developed nations must invest in measuring services more robustly. A large source of their growth patterns may be hidden within the knowledge sector. Traditional measures that use export

information or production metrics fail to capture that a large part of economic growth for these countries lie in their ideas and services.

This thesis will be available for governments, researchers, policymakers. These findings have already been presented in conferences to both academic, non-academic and international organizations. Chapter three was presented at the IBS Jobs Conference: Tech., Demography and the Division of Labour in Warsaw, Poland, B4: Bits, Bots, Brain and Behavior in Valparaiso, Chile, Festival of Economics in Edinburgh, UK and the Geography of Innovation and Complexity in Utrecht, NL. Chapter three of this thesis was presented at UNU-MERIT Research Theme 3 Meeting on Economic Development, Innovation, Governance, and Institutions, and parts of the chapter were included in the UNIDO IDR Report 2016, UNIDO working paper series, and the Innovation Space CCES research project.

Overall, the thesis provides insight into how automation is increasing income inequality from a variety of perspectives. By using individual detailed data, the thesis provides a fine grained understanding of the factors that contribute to rising inequality in Europe, and specifically, if this is driven due to pay differences or employment composition changes. The thesis also contributes a new measure of knowledge diversity. Knowledge specialization is notoriously difficult to capture, but by using an applied network approach allows this thesis to proxy knowledge specialization, and specifically to estimate the relative distances between any two occupations. Finally, the thesis aims to understand how technological change across countries contributes to economic growth by comparing and applying capability metrics.