

The future quantity and structural effects of contemporary automation

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Summary

The thesis investigates the potential consequences of the adoption of modern automation technologies in advanced and developing economies. In recent decades, the enthusiasm to comprehend the effects of the proliferation of novel automation technologies has been ignited by the rapid advancements in technologies such as Artificial Intelligence (AI), robotics, and related fields. Given that, historically, automation has been associated with productivity growth, technological unemployment, and structural changes in the labour market resulting in inequality, the present debate reflects both high expectations and deep concerns.

Key questions raised comprise whether modern automation will result in higher productivity growth gains than earlier automation waves and through what channels the expected gains would be realized. Other questions have been more concerned with identifying the group of workers who are the most susceptible to displacement through automation. From a global viewpoint, questions have also emerged regarding whether the developing world would be adversely impacted through trade with the advanced world, as the latter adopts automation and returns previously offshored production activities from the former. This thesis focuses on addressing these questions.

Chapter 1 presents an overall introduction to the thesis and its motivations. The chapter also outlines the structure of the thesis and summarizes the primary contributions to the extant literature.

Chapter 2 proceeds to empirically analyse the effects of the adoption of both tangible and intangible automation technologies on aggregate labour productivity growth and considers the relative importance of the channels through which productivity gains can be reaped. The chapter suggests that while the use of robot technology offers positive productivity benefits in advanced economies, it has not exceeded the previous automation wave (Information Communication Technology) thus far. However, structural change or movement of workers across sectors could offer an alternative channel for boosting productivity growth alongside productivity gains realized via task reallocation to efficient machine agents within sectors.

The potential productivity benefits of the use of modern automation are not without costs which manifest as risks of displacement to workers, especially given the capability of novel automation to replace a wider range of both routine and non-routine tasks, as well as manual and cognitive tasks. **Chapter 3** estimates the risk of automation that workers face in advanced and developing economies across the gender, age, and skill dimensions of the labour market. The results of this chapter indicate that, given the tasks that workers undertake within jobs, workers in advanced countries are more exposed to automation than developing-country workers on average. Male and middle-aged workers are more vulnerable to automation, whereas high-skilled workers are likely to be the least affected by automation. The results additionally show that automation could reduce gender inequality not only through jobs but also via wages earned.

Concerns of inequality through structural changes in employment requirements are not limited to the borders of the countries leveraging novel automation. **Chapter 4** proposes an extended World Trade Model, which accounts for non-tradable sectors, and examines the effect of automation on global income distribution considering two main cases. In one case, only countries in the advanced world adopt automation and in the other case, all countries do so. The findings demonstrate that automation adoption alters the cost structure of production in favour of industrialized economies which triggers the reshoring of production activities away from the developing world to the advanced world, thus aggravating global income inequality. However, when all countries adopt automation reshoring is weaker and so is the degree of inequality engendered. This suggests that leaving the developing world behind is not an optimal choice, especially given that inequality can be linked to other challenges such as instability, and immigration issues, among others.

Finally, **Chapter 5** offers the concluding remarks of the thesis, together with policy recommendations. The limitations of the thesis and areas for future research are also discussed in this chapter.