Essays on the Impact of Technological Change on Economic Structure

Abstract

This dissertation investigates the interplay between technological change and economic structure. Welcomed technological change sometimes brings changes to the structure of the economy which introduces not so welcomed economic frictions. On the other hand, economic structure can foster or hinder technological change. This thesis focuses mainly on structural changes such as R&D financing and global value chain (GVC) integration potentially translating into economic productivity.

In Chapter 2, I show that business R&D spending exerts both direct and indirect positive effects on value added. Nevertheless, the heterogeneity of the returns to R&D has seldom been examined. Using detailed sectoral data from Czechia over the period 1995-2015, this study finds that privately funded business R&D has both direct and spillover effects, but that the publicly funded part of business R&D only leads to spillovers. The results further suggest that both upstream and downstream spillovers matter, regardless of the source of funding, and that during the period studied, R&D returns were heavily affected by the economic crisis. Lastly, private R&D offers significant returns only after reaching a critical mass, while the effects of public R&D spending do not display such non-linearity. This heterogeneity in the returns to business R&D should be reflected in innovation policy design.

In Chapter 3, I investigate whether GVC participation provides benefits in terms of greater specialization and technology diffusion and whether these benefits are homogeneous across countries and industries. The chapter shows that taking into account functional specialization helps to explain how the benefits of GVC participation are distributed. Using data for 35 industries in 40 countries in 2000-2011, we estimate the impact of GVC participation on value added within a production function framework. The results indicate that there is heterogeneity in the effects of GVC participation, according to the functional specialization of the respective industry and its GVC partners. Participating in R&D-related GVCs is especially profitable for fabrication-oriented industries and low-developed countries. It follows that any GVC participation analysis will be incomplete if it fails to take the functional specialization of the GVC participants into consideration.

In Chapter 4, I deal with how GVC participation and R&D spending complement one another. Since value-added distribution along the production chain is unlikely uniform and since the hierarchy of the chain depends on technological capabilities, I hypothesize that greater R&D prowess will also spur greater benefits from GVC participation. Using data from the World Input-Output Database and combining it with R&D expenditures of 49 Czech industrial sectors over the 2000-2014 period, I show that the benefits of GVC participation are indeed not identical between industries and that GVC participation benefits are stimulated by R&D stock of the respective sector.