

Department of Economics

Essays in Structural and Technological Change

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Essays in Structural and Technological Change

Publisher School of Business**Unit** Department of Economics**Series** Aalto University publication series DOCTORAL THESES 132/2024**Field of research****Date of the defence** 15 August 2024**Language** English **Monograph** **Article thesis** **Essay thesis****Abstract**

In the first essay, I study the intergenerational effects of Finland's Field Reservation Policy introduced in 1969. In the analysis, I use variations in the eligibility to the policy and regional differences in the attractiveness to it. I find that the policy that incentivized farmers to stop farming did not improve the economic outcomes of the farmers, but it did have a significant impact on their children. They achieved higher levels of education, moved away from working in agriculture into administration and managing positions, and they earned more in adulthood. Surprisingly, the effects are driven by children with lower cognitive ability.

In the second essay, I focus on the political effects of the same reform on the parliamentary elections of 1970. In particular, I study how the take-up of the policy contributed to the win of a populist agrarian Finnish Rural Party. By using exogenous mass above the eligibility threshold as an instrument in IV design, I show that a percentage-point increase in the field reservation share leads to a 1.1 percentage-point increase in the vote share of the populist party. I find both qualitative and quantitative evidence for two separate explanations for the political reaction. Identity-based backlash fueled by offended farmers who wanted to keep on farming, and negative externalities, like losing social communities and polluting fallow fields, arising from field reservation. I also show that while the policy decreased the local overall taxable income, it did not affect income per capita.

The third essay studies the effects of a technology subsidy program on employment and skill demand in Finnish firms 1994–2018. In the main analysis, we compare close winners and losers of the subsidies. We find that while the program induced investments in new technologies like CNC machines and robots, it also increased employment but did not change skill composition. We find evidence that firms used the subsidies mainly to expand their production rather than automate their work. The results are also in line with broader associations between machine investments and skill shares in Finland while IT expenditure is associated with skill upgrading.

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Authors' Contribution

1. Intergenerational Effects of Structural Change: Evidence from Finland's Field Reservation Policy

Single-authored.

2. Structural Change and Political Populism

Single-authored.

3. New Evidence on Technology Subsidies, Employment, and Skills *with Johannes Hirvonen and Joonas Tuhkuri*

All three developed ideas for the project. All three contributed to obtaining different datasets. All three conducted empirical analyses. All three contributed to the writing of the original draft. All three edited the manuscript.

1 Introduction

This dissertation consists of three essays on the effects of structural and technological change. They are case studies of how structural change affects individuals across generations, its role in the rise of political populism, and how new technologies affect the workers within the units that invest in them.

Technological progress is a key factor in economic growth and development (Kuznets, 1957). Technological change operates through innovations that can increase productivity. These innovations often increase the productivity of specific sectors so the productivity differences change between sectors leading to decline and expansions of different sectors (Schumpeter, 1947). For an economy to capture all the benefits of this technological progress it should be flexible enough for labour force and capital to reallocate efficiently across the sectors. This reallocation of the labour force between the sectors is structural change.

A classic example of structural change is the transition from agriculture to manufacturing and services. All developed countries today have made this transition at some point and this is also associated with economic growth (Lucas, 2004). The productivity growth of this transition often happens in all sectors, although the exact patterns vary between countries. On one hand, increasing productivity in agriculture can push workers away from it as fewer people are required to produce enough food for the whole population. On the other hand, increasing productivity in manufacturing and service sectors makes them more appealing to workers.

Structural change often counters also resistance. Kuznets (1973) argues that the resistance is at least partially instigated by the necessary changes in the relative economic positions of some groups compared to others. For example, even if farmers were not directly hurt by structural change they may feel left behind if other workers or business owners capture the majority of the benefits of economic growth. The rise of political populism in the 2010s has been linked to "left-behind" regions with declining economic sectors (Autor et al., 2020, The Economist, 2017, Rodríguez-Pose, 2018).

The first two essays of this dissertation are about the transition from agriculture to other sectors in 1970s Finland. I study the effects of a policy that incentivized farmers to stop farming. The results of these essays provide also broader lessons to other contexts such as declining regions due to globalization (Autor et al., 2013) or transition to a non-fossil economy (Scheiber, 2021). It is common among economists to suggest aiding people in the losing regions by enabling individuals to relocate and retrain rather than helping the places (Glaeser, 2011, Banerjee and Duflo, 2019). In the first essay of this dissertation, I show that individual-based policies, like the field reservation policy, can help the targeted population in the long run. However, as I show in the second essay, these policies can also

amplify the bitterness of the people in the regions in decline. While the potential political ramifications are presented in the media (e.g. *The Economist*, 2017), academic research on place-based policies has mostly focused on the inefficiencies they create (Kline and Moretti, 2013, 2014). More recently, studies have also documented people’s preferences for place-based redistribution (Gaubert et al., 2020). One reason for the popularity of place-based policies might be that they are politically more feasible compared to policies in which money follows the individual.

For a policy-maker, the results of the two essays create a dilemma. They provide evidence for a feasible policy option to accelerate structural change that did what it was designed to do. However, while accelerating structural change might benefit their constituencies in the long term, implementing these policies may come with a political cost. Finland’s field reservation policy is a case in point: it took three decades for the positive economic effects to appear, but only a year for a fringe part to benefit from the political backlash at the ballot box. A possible remedy for such political backlashes could be better communication and framing of such policies.

The final essay of the dissertation provides new evidence on how new technologies provided by technology subsidies affect employment and skill demand within the firm. This is a question that is often discussed in public debate. It also has long traditions within economics and there have been at least two main views on the effects. At least since Keynes (1930), economists have worried about the technologies replacing labour and taking away jobs. A more nuanced version is the idea of skill-biased technological change in which new technologies complement the skilled labour force which may lead to increasing inequality (Griliches, 1969, Welch, 1970). The current, more empirical research, has highlighted the skill-biased nature of technologies (Katz and Murphy, 1992, Autor et al., 2013, Akerman et al., 2015).

Summaries of the Essays

Essay I: Intergenerational Effects of Structural Change: Evidence from Finland’s Field Reservation Policy

The first essay examines the long-term impact of Finland’s Field Reservation Policy, implemented in the 1970s, on the socioeconomic outcomes of farmers’ descendants. The policy aimed to reduce agricultural overproduction by incentivizing farmers to leave their fields fallow. To study the effects of the policy, I utilize a novel dataset combining over 290,000 Agricultural Census forms with extensive register data and a difference-in-differences design across the individual-level eligibility for the policy and differences in local land productivity.

The study reveals that while the policy led to a significant reduction in farming activities,

it did not affect the immediate economic conditions of the farmers involved. Importantly, however, the policy had a profound intergenerational effect. Children of the affected farmers experienced a 2.7% increase in earnings compared to their counterparts from unaffected regions. They were also more likely to attain higher education levels and secure employment in more skilled sectors such as office and managerial positions. Interestingly, the study finds that these positive outcomes were more pronounced among children with lower cognitive abilities, suggesting that structural changes can provide new opportunities for upward mobility.

This research contributes to the literature of exogenous shocks on mobility (Deryugina et al., 2018, Becker et al., 2020, Nakamura et al., 2022, Sarvimäki et al., 2022). It provides new evidence on how government policies that promote structural transformation can have lasting effects on future generations. It also shows how it can take a generation to reach the potential of moving into higher productive sectors (Gollin et al., 2002, 2014, Herrendorf and Schoellman, 2018).

Essay II: Structural Change and Political Populism

The second essay explores the tension between economic development through structural change and the rise of political populism. The study specifically investigates the Field Reservation Policy implemented in Finland in 1969, which incentivized farmers to cease farming activities. Despite the policy's economic rationale aimed at reducing agricultural overproduction and fostering industrial reallocation, it sparked significant political unrest, notably contributing to the rise of the Finnish Rural Party (FRP), a populist agrarian party.

The paper provides both qualitative and quantitative evidence to explain the political reactions to the policy. Two primary reasons are identified: an identity-based backlash from farmers who took the policy as a personal insult to their profession, and negative externalities such as the dissolution of social communities and concerns about leaving fields fallow. Interestingly, while the policy did not significantly impact per capita income, it led to a decrease in overall taxable income within affected municipalities.

This research contributes to the broader discourse on the political implications of economic policies, particularly those that induce significant structural changes (Funke et al., 2016, Malgouyres, 2017, Autor et al., 2020). It shows that political populism can arise during structural change even if individuals are not economically hurt by the policy. It makes a case for a non-economic value of profession through identity and social status (Mutz, 2018). The paper highlights the delicate balance policymakers must strike between promoting economic efficiency and managing potential political and social repercussions. The study's findings resonate with contemporary global challenges, where economic policies often face resistance due to perceived threats to identity and community.

Essay III: New Evidence on Technology Subsidies, Employment, and Skills (with Johannes Hirvonen and Joonas Tuhkuri)

The final essay of the dissertation studies how technology subsidies affect employment and skill demand within firms. At the heart of the analysis are EU subsidies aimed at boosting technological investment in Finnish small- and medium-sized manufacturing enterprises (SMEs) from 1994 to 2018. These subsidies were designed to support investments in modern machinery, like robots and CNC machines, to enhance productivity and competitiveness.

The study employs a novel approach by comparing firms that narrowly won or lost the subsidies, providing a unique insight into the subsidies' impact over a decade. This methodological innovation extends to the use of text data from application reports to distinguish between close winners and losers, employing machine learning techniques to analyze and score these texts.

Contrary to the common concern that technology subsidies might lead to reduced employment due to automation, the findings reveal that the subsidies led to a significant increase in employment without altering the skill composition of the workforce. This suggests that firms predominantly used the subsidies to expand, such as by launching new products, rather than to automate existing tasks.

This research contributes to the broader discourse on industrial policy and its effectiveness (Crisciolo et al., 2019). It also challenges the narrative that technological advancements necessarily lead to labour displacement and skill-biased changes in employment (Keynes, 1930, Griliches, 1969, Autor et al., 2003). Instead, it presents a scenario where policy-driven technology investments can coexist with employment growth, without significantly skewing the demand towards higher-skilled labour.

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