

# Economic growth in the face of changes

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## Impact Paragraph

This dissertation contributes to the understanding of the impact of adjustment costs on aggregate dynamics and provides implications for policy-making in the fast-changing world. Adjustment costs matter because constant technological developments bring about enormous changes, and adjustments often encounter obstacles. Economic growth is thus subject to changes, and the future is hard to predict. It is the change that would cause, consequently, changes in policies.

Frontier technologies like artificial intelligence, robotics, big data, and networks are expected to revolutionize production processes. They can have a crucial impact on economic growth and inequality because technologies increase productivity and favor skilled labor, high-tech industries, and countries. It goes without saying that the pie is larger, but not everyone gets a bigger slice. It means that although an economy's GDP is growing, not everyone's income is increasing. The contradiction between economic growth and equality has never been fully resolved, even though policymakers always put both topics at the center of their agenda and attempt to reconcile this contradiction. Technological progress makes this issue even more complicated. This dissertation analyzes the effects of adjustment costs on these topics at the skill level, industry level, and country level. The key takeaway is that adjustment costs curtail the advantages of those who benefit from technical change and impair economic growth. Policymakers should place attention to minimizing adjustment costs and aiding those disadvantaged groups.

Chapter 2 emphasizes the effects of skill-biased technical change on labor markets. It contributes to the debate on SBTC by applying a novel measure of SBTC that considers the effects of adjustment costs. It shows that the adjustment costs of

changes in the skill composition diminish the effects of SBTC on economic growth in the short term. Therefore, the influences of adjustment costs on SBTC can help explain the widening wage skill premium. It provides evidence that technical change has the attribute of skill bias, and this attribute drives the shift in the structure of wages toward high-skilled workers against the low-skilled. Consequentially, this chapter provides implications for the changing demand for knowledge and skills because of technological innovation. Research shows that most OECD countries have experienced a remarkable increase in educational attainment, which is commonly used as a proxy for human capital and skill levels (OECD, 2021). Chapter 2 suggests that SBTC may be the reason for the educational expansion, and investing in education is of vital importance. To adapt to fast-developing technology, individuals have incentives to pursue more education, and governments need to provide more education infrastructure and incentivize higher levels of educational attainment across the population. Especially, policymakers should consider providing assistance for the less fortunate to receive a better education, which can help them obtain higher wages and better adaptability to changes. Offering everyone a fair chance to receive a high-quality education can contribute to economic growth and equality. Another major finding of this chapter is that high-skilled labor may have higher adjustment costs. This indicates that investing in higher education may also engender higher adjustment costs, which makes education investments risky.

Although education investments are indispensable, not all of them have good returns. Another question worth pondering is where those investments should concentrate. For example, it is more favorable to support someone to study computer science than library science. Chapter 3 attempts to answer this question and provide more thoughtful advice on adjustments to industry-specific technical change. Technical change is often industry-specific, and specific industries require certain skills. Technological breakthroughs can disrupt the labor market when they increase the returns to related skills while making others less obsolete (Fillmore & Hall, 2021). They change the demand for skills and make current human capital investment risky, especially investment in non-transferable (specific) human capital. As a result, we can not examine education investment individually. Policymakers need to use a multifaceted approach, taking industrial strategies, labor market policies, and education policies altogether into consideration. To achieve that, policymakers should consider different factors and economic contexts to coordinate distinct policies. Chapter 3 illustrates four prime factors to bear in mind: the competitiveness of product markets, the specificity of human capital, the bargaining power of firms, and education costs.

In Chapter 3, I theoretically explore how adjustment costs affect labor market adjustments to industry-specific technology shocks. I bridge the gap in understanding

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how the interaction between education and building skills on the job will influence switching jobs and human capital dynamics. I consider on-the-job learning as specific and non-transferable human capital, which causes adjustment costs. Based on the findings of Chapter 2, high-skilled labor has higher adjustment costs than low-skilled labor, implying a higher specific human capital. In Chapter 3, I find that when this is the case, the skill premium will be higher in the expanding industry than in the contracting one. There will be relatively fewer high-skilled workers switching industries but more skill upgrading in the expanding industry. The results show that in the responses to technology shocks, the specificity of human capital can impair inter-industry labor mobility but stimulate skill upgrading. In addition, firms with more bargaining power can compress the wages of high-skilled labor and invest in upgrading the skills of low-skilled labor. This promotes equality, especially when high-skilled labor has higher specific human capital than low-skilled labor. However, the previous situation changes when product markets are competitive, meaning products are highly substitutable. In that case, the expanding industry will barely attract high-skilled labor and upgrade skills.

Those findings offer an overview of various situations to consider to policymakers and help them make better policy options. To identify and evaluate their policy options, they should study the following questions. What is the objective of policy-making? How specialized is the economy? Do firms in target industries have bargaining power? How expensive are education investments? How specific are skills? When they perceive the particular situation, they can adjust labor market policies and education investment policies accordingly. Labor market policies need to help lower adjustment costs, reallocate labor of different skill levels, and enhance human capital. Besides that, governments can make a profound impact on education and training by cutting costs for individuals to invest in human capital. Investing in more transferable skills is essential for human capital accumulation and economic growth, and investing in on-the-job training is imperative for technological progress.

Even though taking various options into consideration, policymakers often face painful trade-offs between different policy objectives. Chapter 4 contributes to our understanding of achieving the optimal trade-off between two distinct goals: managing inflation and maintaining low unemployment. This trade-off, well known as the Phillips curve, is often used in macroeconomic models and monetary policies. First, this chapter finds the optimal attainable combinations of low inflation and unemployment across countries and distinguishes inefficient drifts from the best practice frontier. Whereas most studies estimate a Phillips curve for an individual country and subsequently compare curves across countries, I build a single frontier for all countries given the data at hand. Second, I discover how the mix of inflation and unemployment can influence inefficiency and uncertainty, meaning how

hard to achieve both goals. The results illustrate that it is harder to manage both in a low inflationary environment. Third, I investigate whether labor market policies can drive the gap between the best-performing countries on the frontier and the rest. I discover that in general, countries with higher collective bargaining coverage and trade union density are more efficient than their lower counterparts, whereas countries with relatively higher minimum wages are less efficient. I propose that to narrow the gap and decrease the uncertainty of inefficiency, policymakers can increase collective bargaining coverage ratios and decrease trade union density or minimum wage. When collective bargaining coverage and union density are high, policymakers should contemplate both the inflationary and unemployment effects of wage increases and achieve high coordination at the national level. Additionally, policymakers need careful thoughts to adjust minimum wages. In consequence, this chapter calls for well-designed labor market institutions to reduce labor market frictions and hence to well balance two contrary policy goals.

In summary, policy-making is far from easy. The conclusions of this dissertation provide advice for education policies and labor market policies. I hope this dissertation offers valuable insights to develop well-designed programs and policies and helps policymakers make the right decisions.