

[Value] chain reactions: how does China's upskilling affect other industrializing economies?

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For middle-income economies, the key to sustained growth is to increase human capital and technology inputs in production. Climbing the skills ladder in industrial production reduces dependence on primary sectors and nonrenewable resources, and accelerates the labor force transition from blue-collar to more knowledge-based occupations. Successful transitions are characterized by higher labor productivity. One important indicator is greater skill-intensity in production and exports.

This transition, however, is neither automatic nor inevitable. In addition to domestic constraints, challenges may arise when changes in the global economy alter a country's terms of trade or competitiveness in ways that may impede growth in skill-intensive industries. In recent years, China has emerged as a major exporter of medium to high skill-intensity products to global markets. This trend reflects the deepening of China's domestic manufacturing supply chain and is driven in part by two domestic policies: unprecedented investments in tertiary education (Hanushek et al. 2023), and industrial policies targeting growth in skill and technology-intensive sectors (Naughton 2021). The scale of these interventions, coupled with the magnitude of China's contribution to global trade, ensures that their effects are felt throughout the world economy. As China's exports of skill-intensive products rise, the prices of those products in world markets decline. This motivates the research question addressed in our paper: do China's measures to increase the skill-intensity of its economy complement middle-income countries' own upskilling efforts, or impede them?

Answers to this question are likely to be country-specific, with economic and geographic proximity to China being an important source of variation. The Asian regional economy centered around China has dense networks of trade not only in raw materials and finished products, but also in intermediate goods. Reductions in one country-sector measure of revealed comparative advantage may possibly

be offset by increases in others. The net effect on the skill-intensity of the production mix, and thus on relative demand for skills, cannot be predicted in ex ante models.

In addition to standard metrics for economic efficiency, productivity and wellbeing, two key sets of outcome variables help to answer our research question. First, simulated changes in the composition of production and exports point to the effects of trade shocks on the competitiveness of industries that are heterogeneous in skill-intensity. Second, changes in skill premia, for example the wage of tertiary-educated workers relative to blue-collar workers, provide *ceteris paribus* indicators of change in the opportunity cost of schooling and returns to educational investments, both of which are relevant to educational investments by the next generation of labor force entrants.

In this paper we build on earlier exploratory work using a parsimonious Eaton-Kortum type model with 30 countries and 20 traded industries (Kitayaporn and Coxhead, 2024). Instead of an Eaton-Kortum structure, we use the standard Global Trade Analysis Project (GTAP) model (Corong et al., 2017) and version 11 Data Base (Aguiar et al., 2022) to simulate the effects of China's tertiary education investments and industrial policies on patterns of trade, production, and factor returns in the global economy. To facilitate improved modelling of the link between education and skill intensity, we supplement the initial GTAP Data Base by replacing the five standard occupational categories with detailed labor data classified by education and gender, based on the World Bank's Gendered Labor Disaggregated Database (World Bank, 2023).

Our main empirical focus is on those middle-income economies most exposed to changes in China's economy. Results reported in Kitayaporn and Coxhead (2024) suggested that these economies would lose global export shares in their more skill-intensive sectors, notably electronics and electrical goods and be pushed toward blue-collar and resource-based exports. They also found that skill premia would fall both globally and in the most-affected middle-income countries, reducing incentives to invest in human capital. GTAP enables us to revisit these scenarios in a more data-rich setting with more countries, industries, production inputs, taxes and subsidies. Other features of GTAP's structure—notably, inclusion of international trade and transport margins, and partner-specific import prices faced by importing countries—address simplifications in the Eaton-Kortum model. These advantages provide a foundation for more detailed country- and sector-specific results and policy discussion. The simulation results also facilitate links to microdata from labor force and

household surveys, enabling fine-scale analysis of welfare and distributional outcomes as well as key indicators of future development, such as incentives for educational investment.

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