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The determinants of structural change in the global economy: an analysis based on historical simulations

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Abstract

In this paper we analyse the determinants of structural change based on historical simulations. We calibrate a recursive dynamic Eaton-Kortum quantitative trade model featuring multiple sectors, intermediate linkages and non-homothetic CES preferences to WIOD data from 1995 until 2011. We conduct historical simulations imposing actual growth rates of GDP, employment by skill type, population, changes in trade balance, savings rates and trade costs, estimated sectoral differences in productivity growth, and changes in intermediate demand. Changes in trade costs are based on actual changes in both tariffs and NTMs, instead of inferring trade cost changes based on the rise in international relative to intra-national trade. We use the discrepancy between simulation outcomes and actual data to estimate historical changes in the structure of intermediate demand of firms. We use the model simulations to identify the most important determinants of two important changes in the structure of the global economy between the 1990s and the 2010s: (i) structural change, measured by the falling share of manufacturing and the rising share of services in production; and (ii) the increasing import competition from emerging economies. The analysis compares the following determinants: (i) shifting preferences because of rising incomes (non-homothetic preferences); (ii) differential productivity growth; (iii) changes in the intermediate demand structure; (iv) economic growth in developing countries; (v) falling trade costs; (vi) changes in the savings rate.

Keywords: Structural change, international trade, globalization.

JEL codes: F15, F62, F63

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1 Introduction

The aim of this paper is to study the determinants of structural change through historical simulations. In order to do so, we employ a recursive dynamic Eaton-Kortum quantitative trade model featuring multiple sectors, intermediate linkages and non-homothetic CES preferences based on Comin et al. (2021).

The model is calibrated using the World Input Output Database, which provides a detailed accounting of the evolution of the global economy from 1995 to 2011. The World Input Output Tables (WIOT) allow us to identify the final demand by firms, government and consumers as well as intermediate linkages, while the WIOD Socio Economic Accounts (SEA) provide information on the capital and labor stock.

We conduct historical simulations imposing the actual growth rates of real GDP, employment by skill type and population as well as changes in the trade balance, savings rates, trade costs, intermediate demand shifters, and estimates of the sectoral differences in productivity growth. The growth rates of real GDP and population are based on IMF projections, while changes in the savings rates and trade costs are induced from WIOD. The growth of the labor supply by skill type is based on WIOD SEA and integrated with data on population by educational attainment from the World Population Program of the International Institute for Applied Systems Analysis (IIASA). Differential productivity growth is estimated based on EU-KLEMS data.

We identify the changes in trade costs based on a two-steps procedure. In a first stage we run our baseline simulation imposing changes in tariff and non tariff trade costs. Tariffs come from the UNCTAD TRAINS database, while the ad valorem equivalents of non tariff measures are computed based on the Design of Trade Agreements (DESTA) depth scores as well as AVE estimates: the AVEs for Regional Trade Agreements (including the enlargement of the European Union) come from Egger et al. (2015), while the AVE of joining the WTO comes from Larch et al. (2019). In a second step, we compute the change in bilateral trade costs based on the difference between observed and simulated bilateral expenditure shares, as in Head and Ries (2001).

Similarly, we identify the intermediate demand shifters from the discrepancy between observed and simulated intermediate demand shares and between simulated prices and actual price indices from the SEA.

We employ the model simulations to identify the most important determinants of the changes in the structure of the global economy between 1995 and 2011, in particular structural change in different regions, measured by the falling share of manufacturing and the rising share of services in production. We disentangle the impact of shifting preferences because of rising incomes, differential productivity growth, changes in the intermediate demand structure, economic growth in emerging economies and falling trade costs, both policy driven (tariffs and NTMs) and technology driven (induced trade costs *à la* Head and Ries, 2001).

Our preliminary results suggest that import competition from emerging economies (in particular China) was mainly induced by the decline in trade costs, while structural change was driven both by the sectoral differences in productivity growth and the reduction in trade costs, with a significant heterogeneity at

the country level. For example, our model implies that structural change in Germany was driven almost exclusively by the productivity growth of the manufacturing sectors, while productivity growth and declining trade costs had an equal importance in Great Britain and the United States. Changes in the savings rate seem to have a non negligible impact on structural change as well, especially in countries (like Japan) where it systematically decreased during the period under analysis. Our conjecture is that a decrease in savings, other things being equal, induces a reduction in the demand for investments and decreases the prices of investment goods in the manufacturing sector. This hypothesis will be further tested and extended in the final version of the paper.

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