Factor proportions and the growth of world trade ☆

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ABSTRACT

Most of the expansion of global trade since 1980 has been of the North–South kind — between capital-abundant developed and labour-abundant developing countries. Based on this observation, I argue that the recent growth of world trade is best understood from a factor-proportions perspective. Using data on trade barriers and estimates of capital–labour ratios for a group of 45 economies between 1980 and 2008, I find that a calibrated factor-proportions model can generate significant trade growth during this period, amounting to 90% of the observed rise in North–South trade. The opening up of China alone accounts for three quarters of the predicted increase. In line with the model, I present evidence that China's liberalisation has raised the exports and imports of capital-abundant countries relative to more labour-abundant economies. Overall, my findings suggest that factor-proportions theory may be useful for interpreting several quantitative and qualitative aspects of growing world trade in a period during which the group of large, open economies has become significantly less homogenous.

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1. Introduction

The rapid growth of world trade has been one of the most striking developments in the global economy during the last three decades. Fig. 1 shows that the traded share of world output rose by 7 percentage points between 1980 and 2008, from 12% to 19%. This surge follows a period from the mid-1970s to the late 1980s during which the growth in global trade appeared to have levelled off, and it exceeds the increase which accompanied the GATT rounds of the 1960s and 1970s.[1] Most of the recent rise in world trade has taken place between capital-abundant countries — the "North" — and capital-scarce countries — the "South", as

Fig. 2 illustrates.[2] Starting from this observation, this paper puts forward the view that factor-proportions differences are the key to explaining the expansion of global trade since 1980.

Earlier attempts, by Bergoeing and Kehoe (2003) and Yi (2003), to account for world-trade growth in the post-War era using calibrated trade models have struggled to replicate both the quantitative and qualitative features of the rise in the world trade share. The surge in trade during recent decades has proven especially difficult to explain because of the modest observed decline of average tariff rates among the world's largest economies. In this paper, I show that even relatively small reductions in tariffs can generate a large increase in the traded share of world output if they encourage classical factor-proportions trade. Using data on trade barriers and endowments of physical and human capital for a group of 45 economies between 1980 and 2008, I find that a calibrated factor-proportions model can generate significant trade growth during this period, amounting to 90% of the observed rise in North–South trade. Since the expansion of North–South trade is roughly equal to 60% of the overall rise in world trade relative to GDP, this implies that the model can explain more than half of recent world trade growth.

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[1] This remains true if the decline in global trade during the Great Recession, and its subsequent resurgence, are taken into account. Since this paper is primarily concerned with the long-run causes of world trade growth, I will focus on the period of expansion between 1980 and 2008. For studies of the collapse in world trade during the recent recession see Alessandria et al. (2010), Eaton et al. (2011), Engel and Wang (2011) and Levchenko et al. (2010), among others.

[2] Figs. 1 and 2 are based on bilateral trade flows between 45 economies which accounted for 86% of global output and 70% of world trade between 1980–2008. Trade refers to one half times the sum of imports and exports. The "North" and "South" in a given year are defined as countries with ratios of capital per effective worker above and below the world's aggregate ratio, respectively. Details on data sources and construction are provided in Section 3.1 and Appendix A1.
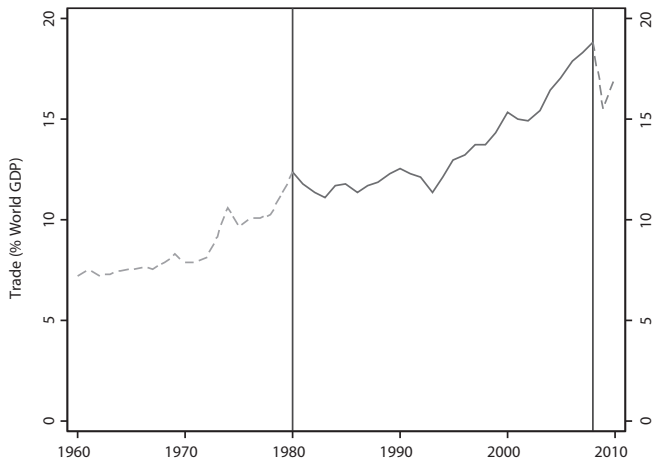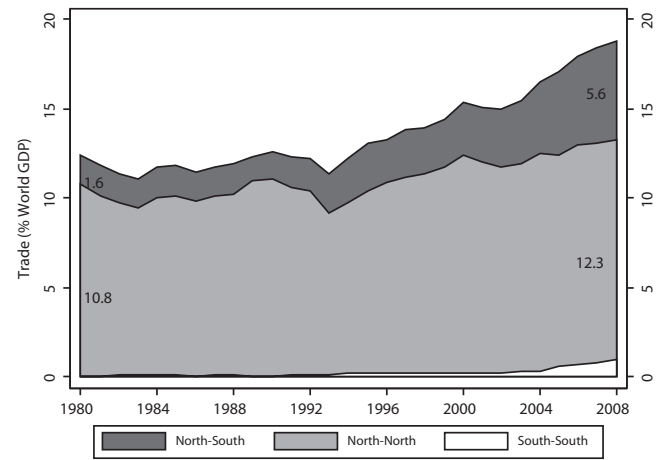
Fig. 1. The growth of world trade, 1960–2010.

Fig. 2. World trade by region, 1980–2008.

Classical factor-proportions models emphasise differences in countries' relative endowments of production factors as the source of gains from trade. To exploit these gains, countries export in industries which make intensive use of their relatively abundant factor, and import in industries using their relatively scarce factor. In the presence of trade barriers, factor-proportions trade will take place only if these barriers are sufficiently low, or if a country's factor proportions are sufficiently different from the rest of the world's, giving rise to potentially large and non-linear effects of declines in trade frictions on international trade. The reason a factor-proportions model can easily generate significant trade growth when calibrated to fit recent data is that the largest declines in trade barriers since 1980 have taken place in countries whose ratios of capital per effective worker are dramatically different from the rest of the world's. The most notable example of this is China, whose average import tariff fell by 18 percentage points between 1980 and 2008, raising its share of world trade from 1% to nearly 10% (see Fig. 3).[3] During this period, China's ratio of capital per effective worker was a mere 21% of the world's aggregate capital–labour ratio.

China's trade liberalisation – in accordance with the program of "reform and opening up" initiated by the Communist Party of China under Deng Xiaoping in 1978 – is generally viewed as an exogenous policy shock. Although the Chinese economy's comparative advantage in labour-intensive industries is widely acknowledged,[4] to the best of my knowledge I provide the first quantitative assessment of the contribution of China's opening to the growth in world trade from a factor-proportions perspective. In my calibrations, China alone is responsible for three quarters of the model-predicted growth in North–South trade. The opening up of a large, labour-abundant country like China creates new trade with capital-abundant countries, but also reduces the trade of already-open labour-abundant economies with the rest of the world. I test the latter prediction of the theoretical analysis using a model-consistent difference-in-difference estimation and find robust empirical support for it in the data. This provides additional evidence that factor-proportions theory is useful for interpreting both the quantitative and qualitative impacts of China's integration into the global economy.

China's significance for any factor-proportions-based view of international goods trade derives from its sheer size and labour abundance. In line with this, most of the remainder of the rise in factor-proportions trade predicted by my calibration exercise can be traced to trade liberalisation in two other large, labour-abundant economies: Brazil and India. Previous papers which have attempted to provide an account of post-War trade growth have given little weight in their calibrations to observed factor-proportions differences among the set of trading countries.[5] My analysis suggests that factor proportions may have become a more important determinant of international trading patterns since 1980 because the group of large open economies has become significantly less homogenous, with several labour-abundant economies emerging as key players in the global trading system.

My paper adds to a long literature on the quantitative implications of international trade models for the level and growth of world trade. The development of the so-called "new" trade theory by Krugman (1979), Lancaster (1980) and Helpman (1981) was motivated in part by the failure of traditional, comparative-advantage-based models to explain the volume of world trade and its concentration among a small group of industrialised nations. Beyond this, new trade theory has implications for trade growth, linking it to declining trade frictions or increasing income similarity across countries.[6] There is little evidence that increased income similarity has played a quantitatively important part in the recent growth of world trade, causing most authors to focus on the role of declining trade frictions.[7]

Yi (2003) shows that the decline in world tariffs in the last decades of the 20th century has been too small to match the observed growth in trade using a standard Ricardian or new trade model with plausible assumptions about the elasticity of substitution between goods. He suggests that this may be due to the models' failure to account for vertical specialisation, whereby goods cross borders several times during the production process. His paper and subsequent work by Bridgman (2012) show that models which explicitly allow for input trade can explain at least half of the recent rise in trade relative to output. Both papers assume that the extent and pattern of vertical specialisation are determined by classical comparative advantage due to productivity differences. My work is complementary with theirs, insofar as I also assume a comparative-advantage motive for trade. However, I impose that comparative advantage is determined by differences in observed capital stocks per effective worker and show that, even in the absence

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[3] China's average tariff is measured as the value of revenue from import duties relative to total imports, based on data from Clemens and Williamson (2004), Woo and Ren (2002) and the World Development Indicators.

[4] See, for example, Rodrik (2006) and Amiti and Freund (2010).

[5] Yi (2003) does not consider factor proportions as a motive for international trade at all. Bergoeing and Kehoe (2003) do allow for factor-proportions trade but focus on the period before 1990, and do not constrain their calibrated capital–labour ratios to equal available estimates for their sample period.

[6] See Helpman (1987) for a discussion of the second channel.

[7] See Hummels and Levinsohn (1995), Baier and Bergstrand (2001) and Bergoeing and Kehoe (2003).