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Does the Global Trade Slowdown Matter?

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Abstract

Since the Global Financial Crisis, world trade growth has been subdued and lagging slightly behind growth of gross domestic product. Trade is growing more slowly not only because growth of global gross domestic product is lower, but also because trade itself has become less responsive to gross domestic product. This paper reviews the reasons behind the changing trade-income relationship, and then investigates its consequences for economic growth. On the demand side, sluggish world import growth may adversely affect individual countries' economic growth, as it limits opportunities for their exports. On the supply side, slower trade may diminish the scope for productivity growth through increasing specialization and diffusion of technologies. The paper finds preliminary evidence that the changing trade-income relationship matters, although the quantifiable effects do not appear to be large.

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Does the Global Trade Slowdown Matter?[1]

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World Bank

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1. Introduction

World trade grew at 3 percent or less in 2012-15, less than the pre-crisis average of 7 percent for 1987-2007 and less than the growth of GDP. Proximate explanations of the trade slowdown link it to changes in GDP and, hence, to the fallout of the Global Financial Crisis. While weak global demand matters for trade growth as it depresses world import demand, cyclical factors are not the only determinants of the trade slowdown. In previous work (Constantinescu, Mattoo and Ruta, 2015), we have shown that trade is growing slowly not only because GDP growth is sluggish, but also because the long-run relationship between trade and GDP is changing. The elasticity of world trade to GDP was larger than 2 in the 1990s and declined throughout the 2000s. Among the leading causes of this structural change in the trade-income relationship is a shift in vertical specialization. The long-run trade elasticity increased during the 1990s, as production fragmented internationally into global value chains (GVCs), and decreased in the 2000s as this process decelerated.

Economists disagree regarding the implications of the trade slowdown for economic growth (and welfare). Some believe that the slowing down of global trade has no real consequences for economic growth. For instance, commenting on the global trade slowdown, Paul Krugman noted that "The flattening out is neither good nor bad, it's just what happens when a particular trend reaches its limits" (Krugman, 2014). Others take the opposite view. For instance, in a speech as governor of the Central Bank of India, Raghuram Rajan concluded that "We are more dependent on the global economy than we think. That it is growing more slowly, and is more inward looking, than in the past means that we have to look to regional and domestic demand for our growth" (Rajan, 2014).

Both views have elements of truth but neither may be completely right. On the one hand, the impact of the trade slowdown should not be overstated. Most economies are more open today than they were in the 1990s. In so far as openness per se is associated with dynamic benefits, trade will continue to foster growth. On the other hand, there is a risk of understating the implications of the trade slowdown. If the expansion of trade growth in the 1990s contributed to countries' economic growth, one may suspect that the flattening of this trend will imply that the contribution of trade to the growth process will be lower.

This paper is a first attempt to try to investigate the economic consequences of the recent trade slowdown. It focuses on two channels through which the changing trade-income relationship documented in the literature may affect countries' economic performance. The demand-side Keynesian concern is that sluggish world import growth may adversely affect individual countries' economic growth as it limits opportunities for their exports. The supply side (Adam) Smithian concern is that slower trade may diminish the scope for productivity growth through increasing specialization and diffusion of technologies. In particular, a slower pace of GVC expansion may imply diminishing scope for productivity growth through a more efficient international division of labor and knowledge spillovers.

Preliminary evidence is mixed. On the demand side, we find that the elasticity of exports to global demand has decreased for both high-income and developing economies in the 2000s relative to the 1990s. We also find that the sensitivity of domestic growth to export growth is higher, and has increased more over time, for developing economies compared to high-income economies. These results, however, hold only when we measure exports in traditional gross terms. When we use value added exports, which are more relevant for the demand-side

mechanism, the change in estimated elasticities is smaller and not statistically significant (although a qualification is that value added trade data are available for a shorter period and fewer countries).

We try to assess the Smithian concern by focusing on the growth implication of a slowing pace of GVC growth. We do this in two steps. First, we report estimates from our related work (Constantinescu, Mattoo and Ruta, 2016b) of the impact of vertical specialization on productivity growth. These estimates indicate that increasing backward specialization has a positive impact on labor productivity growth, as predicted by the theory (e.g. Grossman and Rossi-Hansberg, 2008). Second, we use these estimates to quantify the growth in labor productivity due to the growth in backward vertical specialization. While this share is not large, as productivity growth is explained by many factors beyond vertical specialization, its contribution has decreased by half in recent years, suggesting that the trade slowdown is a contributing factor of the decrease in productivity growth.

The rest of the paper is organized as follows: Section 2 reviews the evidence on the trade slowdown and its explanations; Section 3 presents the evidence on the consequence of the trade slowdown, focusing on the demand and the supply channels separately; Section 4 concludes.

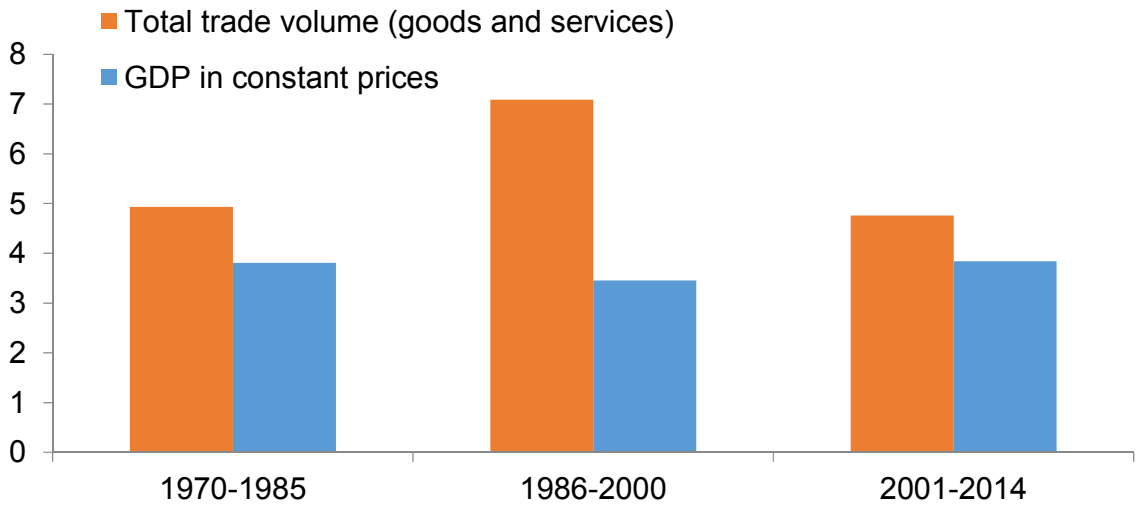
2. Why is global trade slowing down?

World trade growth has been persistently sluggish since the aftermath of the Global Financial Crisis. World trade (total trade volumes) grew at 2.8 percent in 2012 and 3.4 percent in both 2013 and 2014. Data indicate a further slowdown in world trade in 2015 (Constantinescu,

Mattoo and Ruta, 2016). These growth rates of world trade are well below the pre-Crisis average of 7 percent (1987-2007) and lag behind the growth rate of world GDP in real terms, which has hovered around 3 percent in recent years.

What explains the slowdown in world trade? A first observation is that the relationship between world trade and income has changed over time. Figure 1 compares the average growth rates of world trade and income across three periods: from 1970 to 1985, from 1986 to 2000, and from 2001 to 2014. In a historical perspective, the middle period – the "long 1990s" – was different from the preceding and the subsequent periods, as world trade was largely racing ahead of world GDP. This evidence indicates the possibility of structural change in the trade-income relationship.

Figure 1. Average Growth Rates in Trade and GDP, selected periods, percent.



Source: IMF World Economic Outlook (October 2015).
Notes: GDP growth based on PPP rates.

In previous research (Constantinescu, Mattoo and Ruta, 2015), we use an Error Correction Model (ECM) to investigate more formally the behavior of world trade and income. Specifically, we estimate the following regression equation using annual data for the period 1970-2014 for the world economy:

$$\Delta \ln m_t = \alpha + \beta \Delta \ln y_t + \gamma \ln m_{t-1} + \delta \ln y_{t-1} + \varepsilon_t$$

where m is world trade in volume terms, y is real world GDP, t is year, β is the short-run trade elasticity, $-\gamma$ is the speed of adjustment, and $-\delta / \gamma$ is the long-run trade elasticity.

The regression results for this specification are reproduced in Table 1. The long 1990s were indeed different, with a long-run elasticity of world trade to GDP of 2.2. In the 2000s, this elasticity reverted back to 1.3, the level prevailing in the period 1970-1985. For each percentage growth of world income, trade was growing by 2.2 percent in the long 1990s but only by 1.3 percent in the period 1970-1985 and in the 2000s.[2] Formal tests also confirm that there was a statistically significant structural break between the long 1990s and the preceding and subsequent periods.

[2] Reported estimations are based on world GDP growth aggregated using PPP rates. Estimation using market exchange rates yields elasticities of 2.51 in the 1990s and 1.87 in the 2000s. The elasticity in the 1990s is higher than the one in 2000s, and the difference between the two estimates is statistically significant, though smaller than in the case when PPP weights are used.

Table 1. Estimates of the Error Correction Model, 1970-2013

	Pooled w/o dummy variables[1]	Pooled w/ dummy variables for separate periods[2]		
	1970-2013	1970-1985	1986-2000	2001-2013
	(1)	(2)	(3)	(4)
α	-0.43**	-0.35	-3.17***	-0.52**
	(0.17)	(0.53)	(0.64)	(0.19)
Short-run elasticity (β)	2.82***	2.13***	2.77***	3.43***
	(0.36)	(0.60)	(0.35)	(0.21)
Speed of adjustment (-γ)	0.12**	0.18	0.58***	0.31**
	(0.05)	(0.31)	(0.13)	(0.13)
δ	0.20**	0.23	1.26***	0.40**
	(0.09)	(0.39)	(0.26)	(0.17)
Long-run elasticity[3] (-δ/γ)	1.70***	1.31***	2.18***	1.31***
Stationarity of the residual	yes	yes	yes	yes
		(2) vs (3)	(2) vs (4)	(3) vs (4)
Test that long-run elasticity differs across periods[3]		8.68***	0.00	291.21***
Rsquared	0.740	0.957	0.957	0.957
N	43	43	43	43

Source: IMF World Economic Outlook (April 2014) and authors' calculations

Notes: Standard errors in paranthesis; *** indicates a significance level of 1%, ** of 5%, and * of 10%.

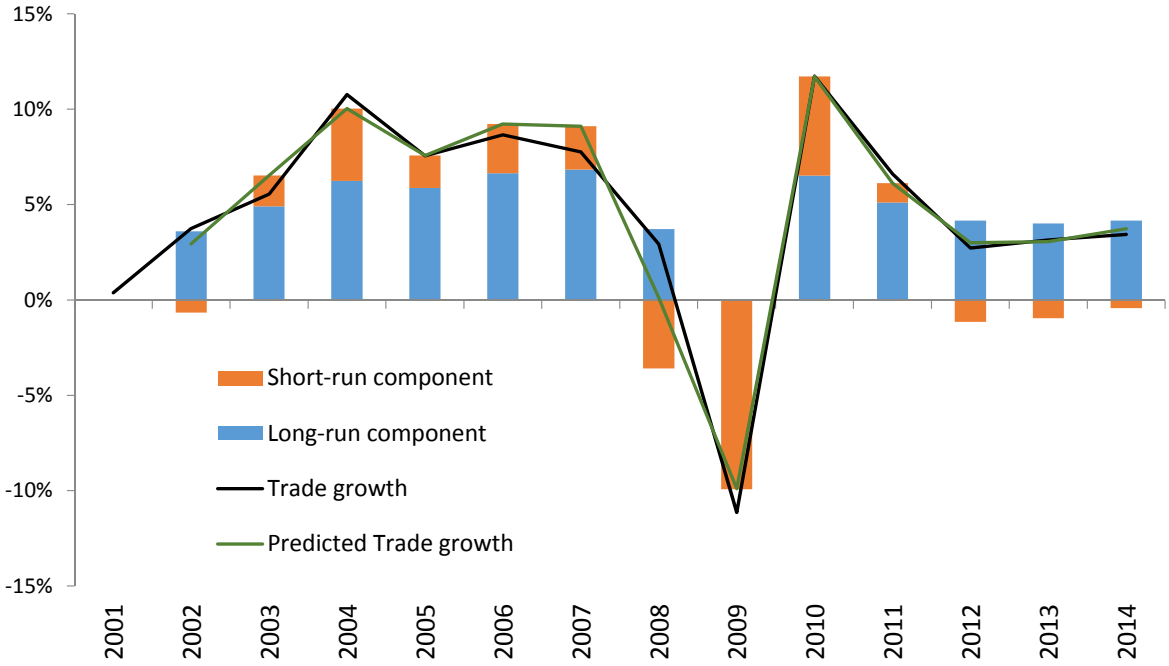
[1] $dln(imports)_t=\alpha + \beta*dln(gdp)_t + \gamma*ln(imports)_{t-1} + \delta*ln(gdp)_{t-1}+\varepsilon_t$, where imports refers to goods and services, and GDP is based on PPP rates.

[2] $dln(imports)_t=\alpha_1 + \beta_1*dln(gdp)_t*DV_1 + \gamma_1*ln(imports)_{t-1}*DV_1 + \delta_1*ln(gdp)_{t-1}*DV_1 +\alpha_2 + \beta_2*dln(gdp)_t*DV_2 + \gamma_2*ln(imports)_{t-1}*DV_2 + \delta_2*ln(gdp)_{t-1}*DV_2 +\alpha_3 + \beta_3*dln(gdp)_t*DV_3 + \gamma_3*ln(imports)_{t-1}*DV_3 + \delta_3*ln(gdp)_{t-1}*DV_3 +\varepsilon_t$, where imports refers to goods and services and GDP is based on PPP rates.

[3] Significance established using non linear Wald test

We then use the estimated coefficients to decompose the growth rate of world trade into its short-term and long-term components. Figure 2 reproduces this decomposition for the 2000s. A back of the envelope calculation for the period 2012-2014 indicates that cyclical factors account for 47 percent of the trade slowdown, while long-term factors explain the remaining 53 percent.

Figure 2: Decomposition of Trade Growth into its Short-Run and Long-Run Components



Source: IMF World Economic Outlook (October 2015) and authors' calculations.
Notes: Trade refers to imports of goods and services. Trade growth calculated as log difference.

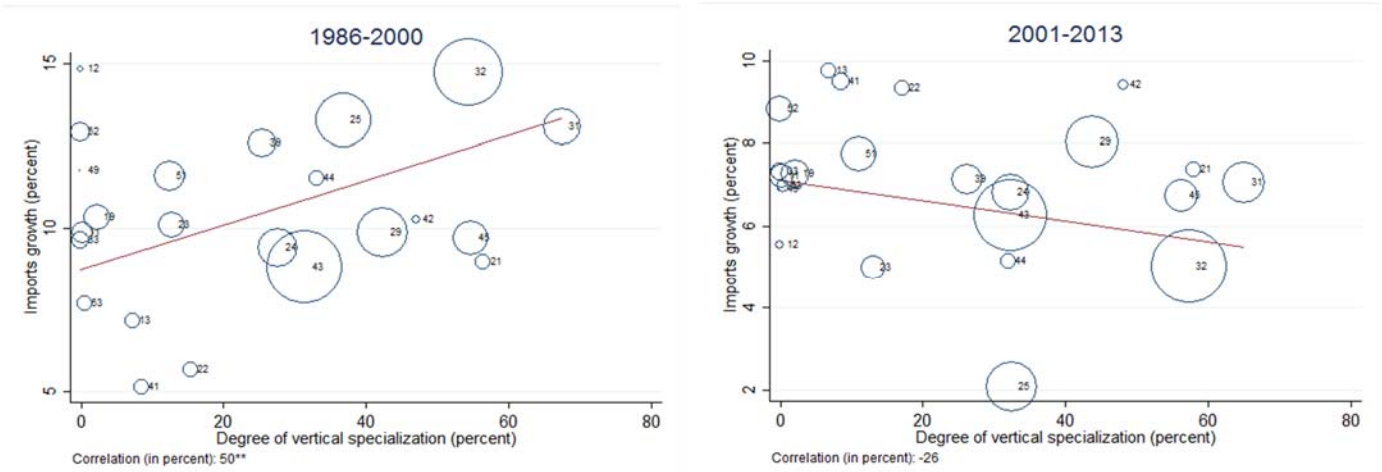
Weak global demand explains the cyclical component of the trade slowdown. Historically, the negative effect of a crisis on trade performance has not been limited to the crisis period, but has persisted through the medium term (Freund 2009, Abiad et al. 2014). The weakness in import demand is a symptom of overall weakness in aggregate demand. Indeed, in the aftermath of the Global Financial Crisis, global trade weakness was most pronounced at the epicenter of the crisis – in high-income economies, notably the United States and the Eurozone. More recently, the sharp decline in commodity prices and the transition to a slower growth rate in China are lowering import demand in emerging economies (Constantinescu, Mattoo and Ruta, 2016).

Two factors can explain the structural component of the global trade slowdown.[3] First, the slower pace of trade liberalization in the 2000s relative to the previous period could plausibly have contributed to the lower trade elasticity. Second, changes in international vertical specialization could underlie the slowdown in world trade. The long-run trade elasticity increased during the long 1990s as trade was progressively liberalized and production fragmented internationally into global value chains, and decreased in the 2000s as these processes decelerated.

As the changes in vertical specialization play an important role in our discussion of the consequences of the trade slowdown in the next section, it is worth taking a closer look at this channel. The trade slowdown was concentrated in the manufacturing sector. A finer decomposition reveals that manufacturing sub-sectors witnessing the largest declines in growth are those with greater vertical specialization. Focusing on ISIC2 category 38 (Manufacturing of Fabricated Metal Products, Machinery and Equipment), Figure 3 shows the relationship between the average growth rates of world trade of industrial manufacturing sub-sectors and their degree of international vertical specialization (measured by the share of parts and components in total trade of the sub-sector). In the 1990s, there was a strongly positive relationship between the two, with trade in the most vertically specialized sub-sectors seeing much faster rates of growth than in sub-sectors where GVCs are less developed. Then in the 2000s, while trade growth fell across the board, the largest declines were in precisely the sub-sectors with higher degrees of vertical specialization, such as the manufacture of radio, televisions and communication equipment (-10 percent) and manufacture of electrical industrial machinery (-6 percent).

[3] For other explanations, see Hoekman (2015).

Figure 3. Growth Rates and the Degree of Vertical Specialization in Manufacturing of Fabricated Metal Products and Equipment (division 38 of ISIC2)



Source: UN Comtrade, via WITS (ISIC2 classification).
Notes: *** indicates a significance level of 1%, ** of 5% and * of 10%. Charts display sub-sectors of "Manufacturing of Fabricated Metal Products, Machinery and Equipment" (division 38 in ISIC2). Vertical specialization is the share of parts and components in a sub-sector's trade. The size of the bubbles denotes sub-sector's share in trade of ISIC2 division 38.

Sub-sectors of ISIC2 division 38:
11 Manuf. of cutlery, hand tools and general hardware
12 Manuf. of furnitures and fixtures primarily of metal
13 Manuf. of structural metal products
19 Manuf. of fabricated metal products except machinery and equip n.e.c.
21 Manuf. of engines and turbines
22 Manuf. of agricultural machinery and equipment
23 Manuf. of metal and wood working machinery
24 Manuf. of special industrial machinery and equipment except metal and wood working machinery
25 Manuf. of office, computing and accounting machinery
29 Machinery and equipment except electrical not elsewhere classified
31 Manuf. of electrical industrial machinery and apparatus
32 Manuf. of radio, television and communication equipment and apparatus
33 Manuf. of electrical appliances and housewares
39 Manuf. of electrical apparatus and supplies n.e.c.
41 Shipbuilding and repairing
42 Manuf. of railroad equipment
43 Manuf. of motor vehicles
44 Manuf. of motorcycles and bicycles
45 Manuf. of aircraft
49 Manuf. of transport equipment n.e.c.
51 Manuf. of professional and scientific, and measuring and controlling equip. n.e.c
52 Manuf. of photographic and optical goods
53 Manuf. of watches and clocks

This first section has outlined the causes of the global trade slowdown. The results suggest that trade after the Global Crisis is growing more slowly not only because global GDP growth is lower (cyclical factors), but also because trade itself has become less responsive to GDP (structural factors). Regarding the latter, we have emphasized the role that changes in vertical specialization have had in explaining the recent decline in world trade growth. Based on these explanations, the next section investigates the consequences of the structural change in the trade-income relationship for individual countries' growth prospects.

3. What is the impact of the changes in the trade-income relationship?

In this section, we turn to the consequences of the changing trade-income relationship. We start from a preliminary consideration. Most economies are more open today than they were in the 1990s. The ratio of imports of goods and services to GDP, a measures of openness to trade, increased from less than 20 percent in the early 1990s to over 30 percent right before the Crisis for high-income countries as well as emerging and developing economies. After a dip during the Crisis, the ratio has returned to the pre-Crisis level in recent years. Thus, the level of openness is as high as it has ever been. In so far as openness per se is associated with dynamic benefits, trade will continue to foster growth.

Nevertheless, the global trade slowdown may have implications for countries' growth prospects. There are two main channels through which the diminished responsiveness of world trade to world GDP may affect countries' economic performance. On the demand side, sluggish world imports may limit opportunities for individual countries' exports. We refer to this as the Keynesian concern. On the supply side, slower trade can diminish the scope for productivity growth through increasing specialization and diffusion of technologies. In particular, a slower pace of GVC expansion may imply diminishing scope for productivity growth through a more efficient international division of labor and knowledge spillovers. We refer to this second channel as the Smithian concern.

As the impact of the trade slowdown on countries' growth through the demand and the supply channels is largely an empirical question, in the next two subsections we take a first look at the data to assess whether these mechanisms may be at work.

a. The demand side: The Keynesian concern

We begin our discussion with a highly stylized model of the Keynesian concern. The worry is that any growth in world income will translate into less growth in a country's exports and hence in a country's GDP today than it did during the 1990s. To capture these relationships, we use two distinct elasticity measures. The first one is the elasticity of a country's exports with respect to world GDP (e_x). (At the aggregate level, this elasticity is identical to the elasticity notion introduced in the previous section, the elasticity of world trade with respect to world GDP (e_i)). Intuitively, e_x tells us how closely tied a particular country's exports are to world income, or conversely, how changes in world income affect the demand for the products of a particular country. The second is the elasticity of the GDP of a country with respect to its exports (e_g). This measures how a country's GDP changes when its exports change. The idea here is that changes in exports are largely driven by foreign incomes, which are exogenous to the GDP of any one country. But since exports are a key component of aggregate demand for a country's product, changes in its exports can be expected to affect a country's GDP.

This model is helpful to illustrate the relationships among the key variables that are driving our empirical investigation. However, given the complex interactions between variables

considered in this analysis, the implied causality requires strong assumptions and should be viewed with caution. With this caveat in mind, we proceed with our empirical investigation.

We estimate first the responsiveness of export growth to world GDP growth (e_x). Specifically, we use the following error correction model to study the behavior of export volumes (x_{it}) and real world income (y_t), controlling for the Real Effective Exchange Rate ($reer_{it}$):

$$\Delta \ln x_{it} = \alpha_i^x + \beta_i^x \Delta \ln y_{it} + \gamma_i^x \ln x_{it-1} + \delta_i^x \ln y_{it-1} + \eta_i \Delta \ln reer_{it} + \theta_i \ln reer_{it-1} + \varepsilon_i$$

where i is country and t is year. The long-run elasticity of exports to world demand (e_x) is given by $- \delta_i^x / \gamma_i^x$.

Second, we estimate the responsiveness of domestic growth to export growth (e_g). We use the following ECM specification to study the behavior of real income (y_{it}) and export volumes (x_{it}):

$$\Delta \ln y_{it} = \alpha_i^g + \beta_i^g \Delta \ln x_{it} + \gamma_i^g \ln y_{it-1} + \delta_i^g \ln x_{it-1} + \varepsilon_{it}$$

where i denotes the country, t the year and the long-run elasticity of domestic growth to exports (e_g) is $- \delta_i^g / \gamma_i^g$.[4]

Both regression equations are estimated for gross exports and value-added exports. The sample period for gross exports is 1986 to 2014, with the data split into two periods: 1986-2000 and 2001-2014, while the sample period for value-added exports is more limited due to data availability going from 1995 to 2011 and being split into two roughly equal periods: 1995-2003

[4] Long-run trade elasticities are period-specific, since all terms of the equation are interacted with period dummies.

and 2004-2011.[5] Sample countries include 29 high-income economies and 11 emerging countries. The data for trade in value added come from the World Input-Output Database (Timmer et al, 2015) and are processed based on the methodology described by Wang, Wei, Zhu (2015), using an algorithm developed in Quast and Kummritz (2015).

We present the regression results in a synthetic way, reporting in the table below the average of the country-specific elasticities for high-income economies and for developing economies. The first two rows in Table 2 report the (average) elasticity of exports to global demand (e_x), where exports are measured in gross terms and in value-added terms, respectively. The upshot is that this elasticity has decreased over time for both the average high-income economy and the average developing economy when trade is measured in gross terms. For instance, a 1 percent increase in world GDP was associated with a 2.5 (2.7) percent increase in gross exports for the average high-income (developing) economy in the 1990s and with a 1.9 percent increase in the 2000s. The elasticity of value added exports to gross trade, however, has remained fairly stable across the two periods for both high-income and developing economies.

[5] Note that, with an abuse of notation, we refer to the two periods in the analysis as the 1990s and the 2000s, even though as just discussed the actual coverage for gross and value-added export data is in part different.

Table 2: Estimates of Elasticities of Exports to World GDP and Own GDP to Exports

	Advanced Economies			Emerging Market Economies		
	1986-2000	2001-2014	*# countries*	1986-2000	2001-2014	*# countries*
Elasticities of Export Volume to Real World GDP (excl. own GDP):						
Gross exports of goods and services	2.5	1.9	*28*	2.7	1.9	*43*
Value-added exports of goods and services	2	1.8	*22*	3.2	3.2	*6*
Elasticities of Real GDP to Export Volume:						
Gross exports of goods and services	0.5	0.6	*18*	0.7	1	*48*
Value-added exports of goods and services	0.5	0.6	*18*	0.5	0.7	*7*

Sources: IMF World Economic Outlook, IMF Information Notice System, World Input-Output Database, IMF Information Notice System.

Notes: Countries included in the averages passed the following filters: data to start no later than 1992; elasticities to be neither negative nor outliers. Estimations to derive elasticiy of exports to GDP include Real Effective Exchange Rate as an explanatory factor.

The results for the sensitivity of domestic growth to export growth (e_g) are presented in the last two rows of Table 2. We find that for the average high-income economy, the elasticity of domestic GDP to exports is very close across the two periods (0.5 and 0.6, respectively), both in gross terms and in value added terms. For the average developing economy, the change over time in the estimated elasticity is slightly larger: from 0.7 to 1.0 in gross terms, and from 0.5 to 0.7 in value added terms. T-tests confirmed that the differences in elasticities between 1990s and 2000s were statistically significant for estimates based on gross export data, but not for estimates based on value-added trade data, possibly due to the reduced sample size.[6]

[6] A set of alternative methodologies validated the results reported in Table 2. First, averages were recalculated after removing elasticities from estimations with non-significant coefficients of adjustment. Second, ratios of 10-year (for gross) and 5-year (for value-added) moving averages of export and GDP percentage changes were computed and averaged by country group. Differences in the 2000s relative to 1990s were assessed by inspecting the monotonicity of the country-specific ratios. Finally, estimates of elasticities were derived using panel estimations with country fixed effects. Regressions were run only on the gross export data set – due to limitations in the value added exports data– and separately for high-income and emerging market economies. Elasticities for the 1990s and 2000s were found to be statistically different from each other.

Bringing together the findings in Table 2, there is no clear evidence that the diminished responsiveness of world trade to world GDP has weakened the demand-side transmission channel of either high-income or developing economies. But more work and data are needed to assess the extent of the Keynesian concern.

b. The supply side: The Smithian concern

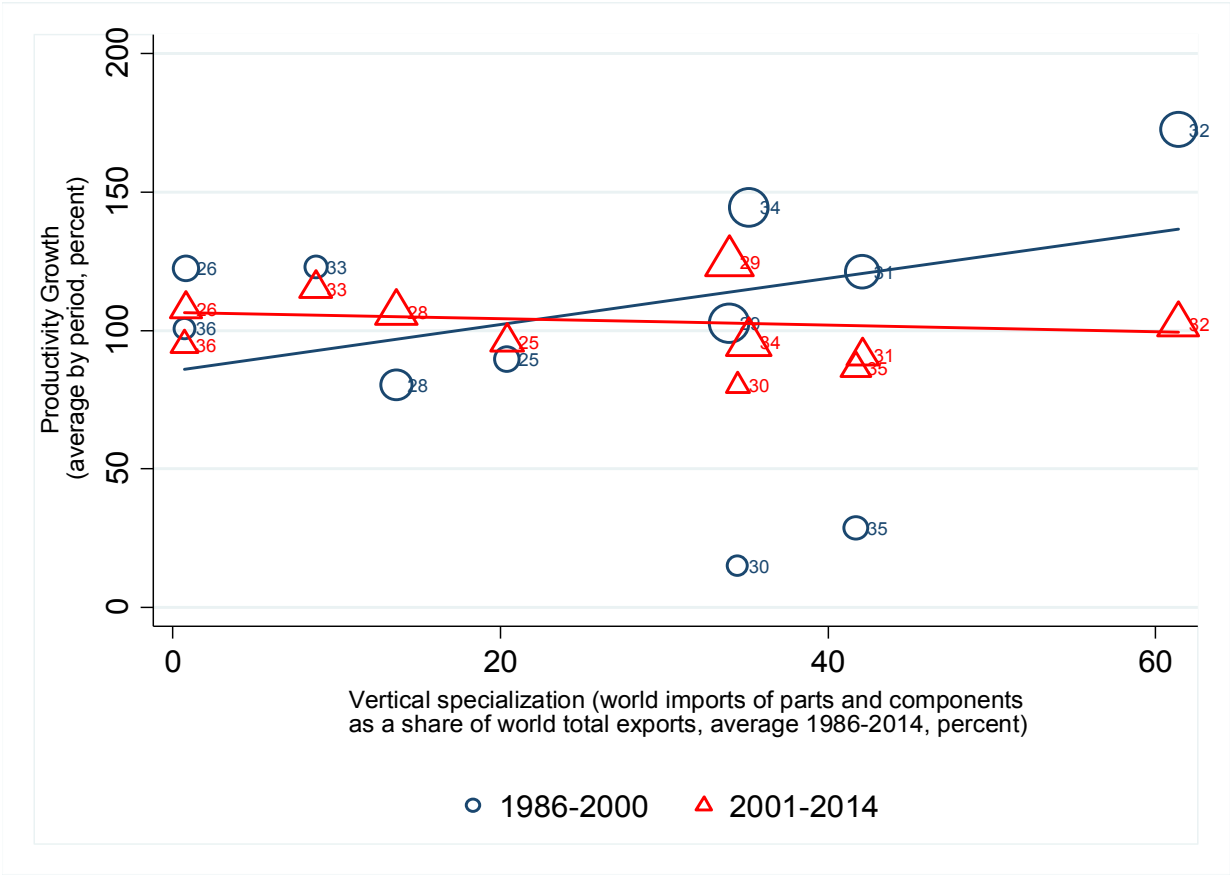
We now investigate the potential supply-side effects of the trade slowdown. In principle, trade growth may affect productivity growth through several channels, including specialization, technology diffusion, and enhanced competition. Since, as discussed in Section 2, the global trade slowdown is associated with a maturation of global value chains, we focus on this specific mechanism.

A body of microeconometric literature links increases in productivity growth at the firm level to various aspects of GVC participation, such as imports of parts and components (e.g. Amiti and Konings 2007, Goldberg et al. 2010) and knowledge spillovers through the production chain (e.g. Atkin et al. 2014). In general, since a finer international division of labor is isomorphic to factor-augmenting technical change (Grossman and Rossi-Hansberg 2008), a slower pace of its expansion could mean that world trade is contributing less to growth today than it did in the long 1990s. The question is whether the data support this theoretical prediction.

Figures 4a and 4b present some motivating evidence. Figure 4a plots the world average labor productivity growth by sector for the 1990s and the 2000s as a function of (a measure of) the sector's vertical specialization. In the 1990s, when global value chains were expanding,

productivity growth tended to be higher in more vertically fragmented sectors. This association, however, disappears in the 2000s. Figure 4b reproduces the same chart for a group of countries (China, Czech Republic, Indonesia and United States), where the vertical axis shows the average productivity growth for the decade at the country level. The results indicate stronger productivity growth for vertically specialized sectors in the 1990s, but not in the 2000s. Assuming that there was no change across the two periods in the nature of the relationship between changes in productivity and changes in vertical specialization, the evidence in Figures 4a and 4b suggests that productivity growth may have been affected by a slower pace of expansion in global value chains.

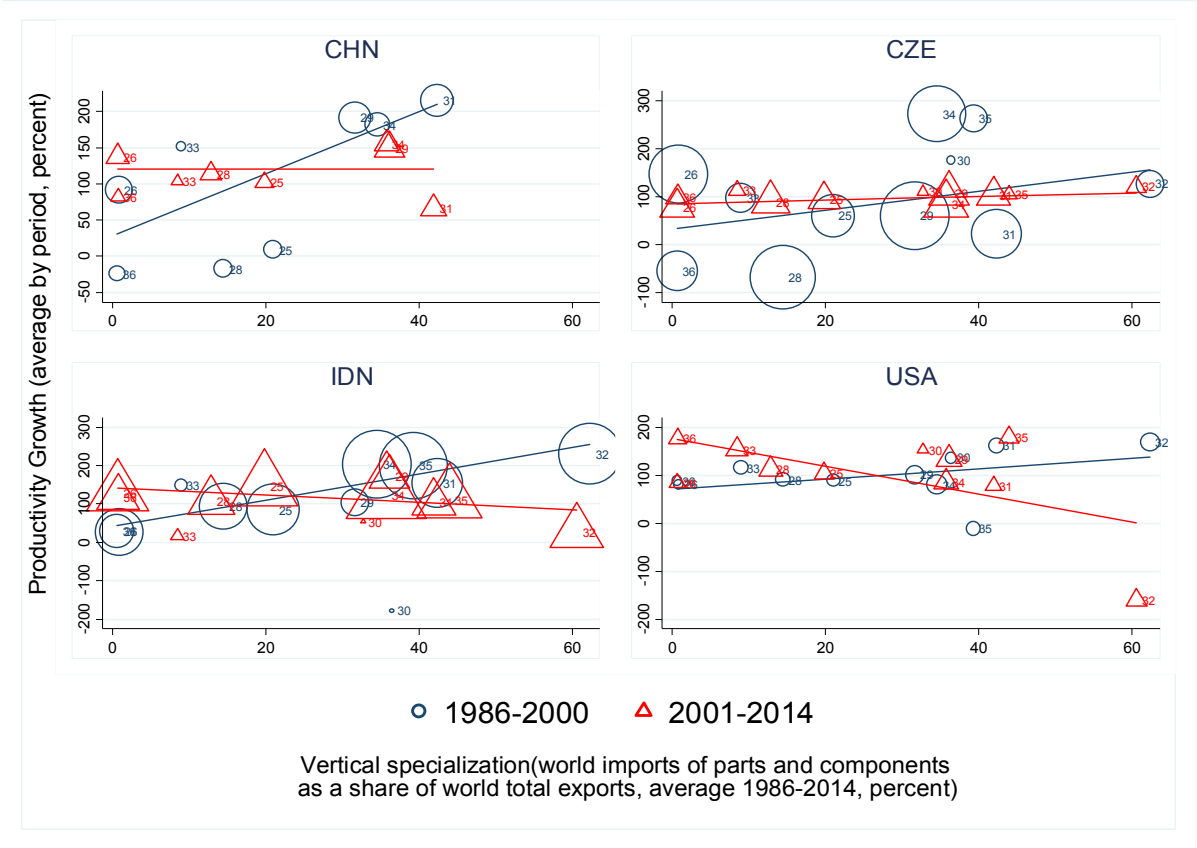
Figures 4a: Global Productivity Growth and Vertical Specialization by Industrial Sector, 1986-2014



Source: UNIDO (INDSTAT2), UN Comtrade, and authors' calculations.
Notes: ISIC3 industry codes are used; productivity is normalized using average industry productivity; weights are represented by value added.

ISIC3 codes: 25 Manufacture of rubber and plastics products; 26 Manufacture of other non-metallic mineral products; 28 Manufacture of fabricated metal products, except machinery and equipment; 29 Manufacture of machinery and equipment n.e.c.; 30 Manufacture of office, accounting and computing machinery; 31 Manufacture of electrical machinery and aparatus n.e.c.; 32 Manufacture of radio, television and communication equipment and apparatus ; 33 Manufacture of medical, precision and optical instruments, watches and clocks ; 34 Manufacture of motor vehicles, trailers and semi-trailers; 35 Manufacture of other transport equipment; 36 Manufacture of furniture; manufacturing n.e.c.

Figure 4b: Productivity Growth and Vertical Specialization in China, Czech Republic, Indonesia and the United States by Industrial Sector, 1986-2014



Source: UNIDO (INDSTAT2), UN Comtrade, and authors' calculations.
Notes: ISIC3 industry codes are used; sample includes 85 countries; productivity is normalized using average industry productivity; weights are represented by value added.

ISIC3 codes: 25 Manufacture of rubber and plastics products; 26 Manufacture of other non-metallic mineral products; 28 Manufacture of fabricated metal products, except machinery and equipment; 29 Manufacture of machinery and equipment n.e.c.; 30 Manufacture of office, accounting and computing machinery; 31 Manufacture of electrical machinery and aparatus n.e.c.; 32 Manufacture of radio, television and communication equipment and apparatus ; 33 Manufacture of medical, precision and optical instruments, watches and clocks ; 34 Manufacture of motor vehicles, trailers and semi-trailers; 35 Manufacture of other transport equipment; 36 Manufacture of furniture; manufacturing n.e.c.

Motivated by this preliminary evidence, we try to quantify the impact of the diminished responsiveness of world trade to world GDP on productivity growth. We do this in two steps. First, we use estimates from Constantinescu, Mattoo and Ruta (2016b) to assess the impact of vertical specialization on productivity growth. Second, we do a back-of-the-envelope calculation

to assess how the contribution of vertical specialization to productivity growth has changed between the 1990s and the 2000s.

In Constantinescu, Mattoo and Ruta (2016b), we estimate the impact of (forward and backward) vertical specialization on productivity growth at the country-sector level. Specifically, we use the following panel estimation with multiple sets of fixed effects: country/industry (μ_{ci}), country/year (ν_{ct}) and industry/year (τ_{it}):

$$\Delta \quad \ln LP_{cit} = \alpha + \beta \Delta \ln LK_{cit} + \gamma \Delta \ln BVS_{cit-1} + \delta \Delta \ln FVS_{cit-1} + \mu_{ci} + \nu_{ct} + \tau_{it} + \varepsilon_{cit},$$

where c denotes country, i is industry, and t year. The left-hand side variable LP is the change in labor productivity, measured as value-added divided by employment. The key explanatory variables are the change in backward vertical specialization (BVS), which is the foreign content in own exports, and the change in forward vertical specialization (FVS), which is own value added re-exported by the direct importer. As standard, the analysis also controls for the capital stock per employee (LK), which is capital divided by employment, where capital is derived by cumulating gross fixed capital formation.[7] The key insight of this regression analysis is that backward linkages have a positive impact on productivity growth, although the effect is not large, while forward linkages do not appear to have a statistically significant impact. Specifically a one standard deviation increase in backward specialization increases productivity growth of the average sector by 0.06 percent.

[7] The sample in Constantinescu, Mattoo and Ruta (2016b) consists of 1995-2009 annual data (as 2010 and 2011 are excluded due to lack of capital data) for 14 manufacuring sectors and 39 countries (Russian Federation is excluded due to prevalence of commodity exports). Data come from the World Input-Output Database (Timmer et al, 2015), obtained by interacting Census data (interpolated for years between Censuses) with yearly trade data. Vertical specialization indicators are computed based on the methodology described by Wang, Wei, Zhu (2015), using an algorithm developed in Quast and Kummritz (2015).

We next use this estimate of the impact of vertical specialization on labor productivity growth to quantify the GVC channel of the supply-side effect of the trade slowdown. Actual yearly growth in labor productivity has decreased over time from 9 percent in the period 1995-2003 to below 5 percent in the period 2004-2011. The estimates reported above suggest that the yearly contribution of (backward) vertical specialization to productivity growth declined from 0.11 in the period 1995-2003 to 0.05 in the period 2004-2011.

4. Conclusions

This paper reviews the key facts of the global trade slowdown and investigates its potential impact on economic growth. Our preliminary evidence suggests that the diminished responsiveness of world trade to world GDP identified in the literature has consequences for countries' performance, although the quantifiable effects do not appear to be large. On the demand side, sluggish trade growth may impact growth prospects through diminished export opportunities. However, when we use value added exports, which are more relevant for the demand-side mechanism, there is no clear evidence that the change in the trade-income relationship has weakened the demand-side transmission channel. On the supply side, the reduced pace of GVC growth may be a factor among others that explain the diminished productivity growth in recent years. Indeed, our estimates indicate that the yearly contribution of vertical specialization to productivity growth declined by more than half in recent years.

This paper is a first attempt to try to assess the consequences of the global trade slowdown, and more work in this area would be important. On the demand side, we have made strong

assumptions on the relationship between the variables involved (a country's GDP and exports, and world GDP). These regressions are useful reduced forms, but they are not a substitute for models that account for the complex structural relationships between these variables. On the supply side, we have focused on a narrow issue: the impact of the slowing pace of expansion of vertical specialization on productivity growth. Because the slowing pace of GVCs is a driving factor of the trade slowdown, this initial focus appears justified. However, future work may want to take a broader perspective and evaluate other supply-side channels, such as technology spillovers or enhanced competition, through which sluggish trade growth may matter.

References

Abiad, A, P Mishra and P Topalova (2014), "How Does Trade Evolve in the Aftermath of Financial Crises?", IMF Economic Review 62, pp. 213-247.

Amiti, M and J Konings (2007), "Trade Liberalization, Intermediate Inputs, and Productivity", American Economic Review 97(5), pp. 1611-1638.

Atkin, D, A Khandelwal and A Osman (2014), "Exporting and Firm Performance: Evidence from a Randomized Experiment", mimeo, UCLA.

Constantinescu, Mattoo and Ruta (2015), The Global Trade Slowdown: Cyclical or Structural? World Bank Policy Research Working Paper No. 7158

Constantinescu, Mattoo and Ruta (2016a), Global Trade Watch: Trade Developments in 2015, World Bank Policy Report, March 2016.

Constantinescu, Mattoo and Ruta (2016b), Does Vertical Specialization Increase Productivity Growth?, Work in Progress

Freund, C (2009), "The Trade Response to Global Downturns: Historical Evidence", World Bank Policy Research Working Paper Series 5015, Washington, DC.

Goldberg, P, A Khandelwal, N Pavcnik and P Topalova (2010), "Imported Intermediate Inputs and Domestic Product Growth: Evidence from India", Quarterly Journal of Economics 125(4), pp. 1727-1767.

Grossman, G M and E Rossi-Hansberg (2008), “Trading Tasks: A Simple Theory of Offshoring”, American Economic Review 98(5), pp. 1978-1997.

Hoekman, Bernard. 2015. The Global Trade Slowdown: A New Normal? VoxEU.org e-Book. London: Centre for Economic Policy Research.

Krugman, Paul (2014), “Flattening Flattens”, New York Times Blog, 3 November 2014.

Quast, Bastiaan and V. Kummritz (2015), “Decompr: Global Value Chain Decomposition in R,” CTEI Working Papers 01-2015, Centre for Trade and Economic Integration.

Timmer, Marcel P., E. Dietzenbacher, B. Los, R. Stehrer, and G. J. de Vries (2015), "An Illustrated User Guide to the World Input–Output Database: the Case of Global Automotive Production", Review of International Economics 23, pp. 575–605.

Wang, Zhi, S.-J. Wei and Z. Kunfu (2014), “Quantifying International Production Sharing at the Bilateral and Sector Levels,” NBER Working Paper 19677.