

Arm's-Length Trade

A Source of Post-Crisis Trade Weakness

Csilla Lakatos

Franziska Ohnsorge



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Abstract

Trade growth has slowed sharply since the global financial crisis. U.S. trade data highlights that arm's-length trade—trade between unaffiliated firms—accounts disproportionately for the overall post-crisis trade slowdown. This is partly because arm's-length trade depends more heavily than intra-firm trade on emerging market and developing economies (EMDEs), where output growth has slowed sharply from elevated pre-crisis rates, and on sectors with rapid pre-crisis growth that boosted arm's-length trade pre-crisis but that have languished post-crisis.

Compounding such compositional effects, arm's-length trade is also more sensitive to changes in demand and real exchange rates. For example, the income elasticity of arm's-length exports is about one-fifth higher than that of intra-firm exports. Hence, post-crisis global growth weakness has weighed more on arm's-length trade than on intra-firm trade. Unaffiliated firms may also have been hindered more than multinational firms by constrained access to finance during the crisis, heightened policy uncertainty, and their typical firm-level characteristics.

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Arm's-Length Trade: A Source of Post-Crisis Trade Weakness

Csilla Lakatos and Franziska Ohnsorge*

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*Lakatos: Development Prospects Group, World Bank; clakatos1@worldbank.org. Ohnsorge: Development Prospects Group, World Bank; CAMA; fohnsorge@worldbank.org. We thank Ayhan Kose, Aaditya Mattoo, Michele Ruta and Mark Felsenthal for their valuable comments. The findings, interpretations, and conclusions expressed in this article are entirely those of the authors. They do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent. Figures and background data presented in the paper are available at www.worldbank.org/gep.

1 Introduction¹

Global trade volume growth reached a post-crisis low of 2.4 percent in 2016—significantly below the pre-crisis average of 7.6 percent. Cyclical factors, such as weak global demand, low commodity prices, and slower growth in China have all contributed to the trade deceleration. In addition, structural factors have lowered trade’s responsiveness to global output expansion (World Bank 2015a; Constantinescu, Mattoo, and Ruta 2015).

The maturing of global value chains is a key structural factor contributing to the recent trade slowdown.² Global value chains often involve numerous cross-border operations, conducted either “intra-firm,” that is, between firms related through ownership or control, or between unaffiliated firms at “arm’s-length.” A firm’s decision between arm’s-length and intra-firm transactions has its roots in the underlying motivation for vertical integration (or lack thereof) and foreign direct investment. Firms choose to internalize transactions if the cost of performing these through the market is higher than internal costs (Coase 1937). In particular, contract enforcement imposes costs when contracts are incomplete (Williamson 1985; Grossman and Hart 1986). When contracts are incomplete and their enforcement is costly, firms may prefer vertical integration and internal ownership of assets (Hart and Moore 1990; Antras 2015).³

In cross-border trade transactions, additional considerations come into play. Firms may favor arm’s-length transactions when they seek access to export markets similar to their home markets and when technology, knowledge, or resource transfers are not required (Dunning and Lundan 2008; Lanz and Miroudot 2011). As a result, arm’s-length transactions are more prevalent in low-skilled sectors and among less productive firms (Corcos et al. 2013).

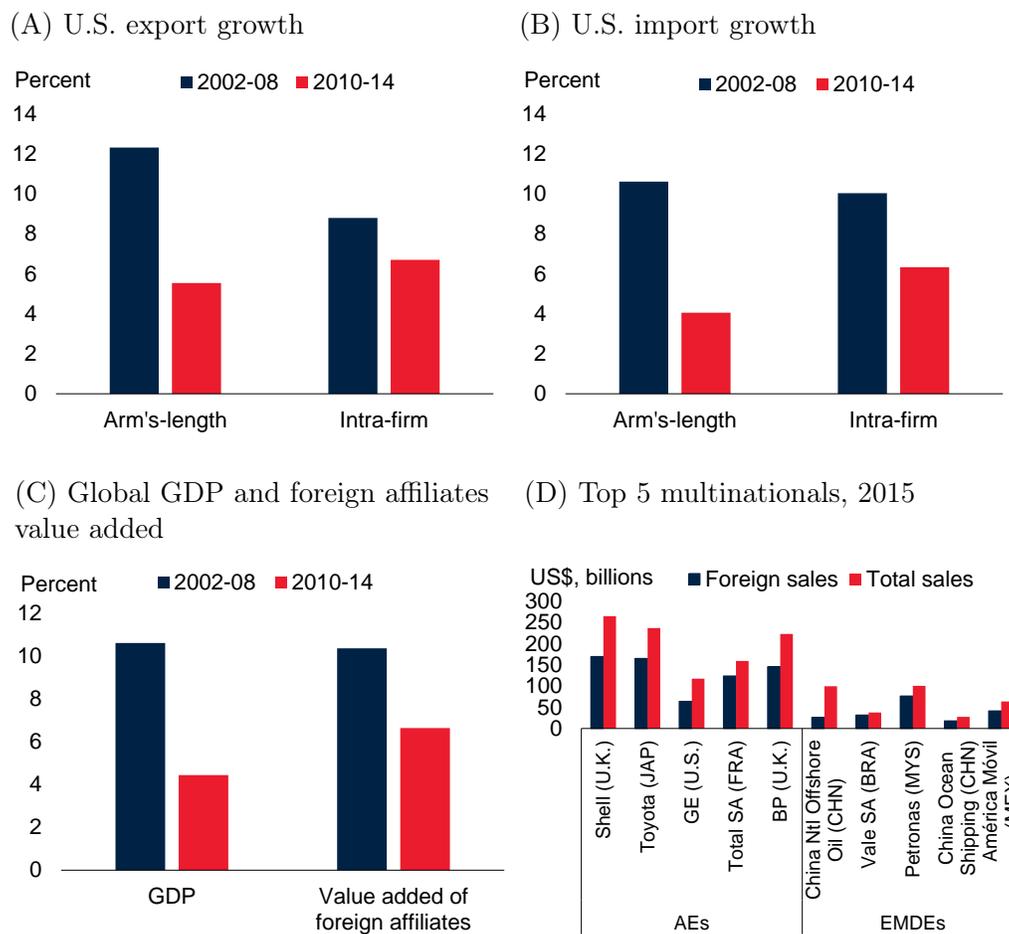
In practice, multinationals employ intra-firm and arm’s-length transactions to varying degrees. In 2015, intra-firm transactions are estimated to have accounted for about one-third of global exports (UNCTAD 2016). Vertically integrated multinational companies, such as

¹This paper draws from a background study featured in World Bank 2017. Figures and background data presented here are available at www.worldbank.org/gep.

²The expansion of global value chains contributed significantly to the rapid rise in trade growth during 1985-2000. However, during 2000-16, growth in value chains has stabilized (Haugh et al. 2016; Constantinescu, Mattoo, and Ruta 2015).

³Incomplete contracts can result in underinvestment when firms undertake significant relationship-specific investments. Parties to a contract may underinvest in expectation of their counterpart not complying with the terms of a contract. As suppliers often customize their products to fit the needs of a specific buyer and buyers undertake significant investment specific to a particular supplier, such cost could be significant.

Figure 1: Trade growth



Sources: U.S. Census Bureau, UNCTAD.

A.B. U.S. exports and imports of goods based on data from the U.S. Census Bureau. Global data is not available.

C. Nominal terms. Value added of foreign affiliates is based on estimates from various editions of UNCTAD's World Investment Report.

D. Ranked by foreign assets in 2015. Excludes multinational companies in the financial sector. AEs stands for advanced economies. BRA=Brazil, CHN=China, FRA=France, JAP=Japan, MEX=Mexico, MYS=Malaysia.

Samsung Electronics, Nokia, and Intel, trade primarily intra-firm. Samsung, the world's biggest communications equipment multinational, has 158 subsidiaries across the world, including 43 subsidiaries in Europe, 32 in China and 30 in North and South America (Samsung 2014). Other multinationals, such as Apple, Motorola, and Nike, rely mainly on outsourcing, and hence on arm's-length trade with non-affiliated suppliers (Lanz and Miroudot 2011).

Multinational companies and their affiliates accounted for one-tenth of global GDP and their sales amounted to about half of global GDP in 2015 (UNCTAD 2016; Figure 1). The world's largest multinationals (Shell, Toyota, and General Electric in advanced economies; China National Offshore Oil, Vale SA, and Petronas in EMDEs) are systemically important in both their home and host economies. Post-crisis, foreign affiliates of multinational companies have fared better than their domestic counterparts and contributed more significantly to the recovery of global GDP. For example, during 2010-14, the value added of multinationals grew faster-than-average, at 6.6 percent—well above global GDP growth of 4.4 percent.

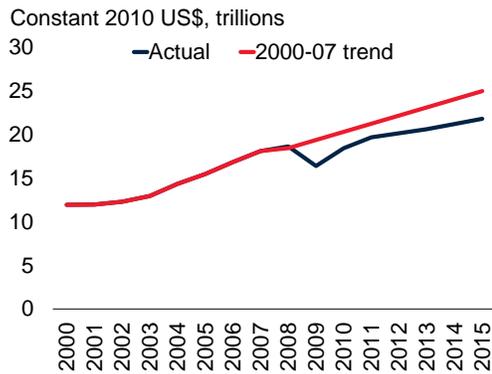
Unfortunately, data on global intra-firm trade are not available. However, a unique dataset on bilateral U.S. exports and imports can provide an indication of developments in intra-firm trade growth. The United States plays an important role in global trade (Figure 2): it accounts for about 11 percent of global goods trade and 23 percent of global foreign direct investment (FDI) stocks. It is the largest export destination for one-fifth of the world's countries and the largest import source for one-tenth. U.S. multinationals account for about 30 percent of the employment and sales of the world's largest 100 non-financial multinational companies. Most of the post-crisis slowdown in U.S. trade growth can be attributed to the sharp slowdown in arm's-length rather than intra-firm trade. By 2014, intra-firm trade growth had returned to near pre-crisis rates while arm's-length trade growth has lagged significantly below elevated pre-crisis rates.

We show that compositional effects combined with a higher income and real exchange rate elasticity of arm's-length trade contributed to the strong pre-crisis growth and the steep post-crisis slowdown of arm's-length trade compared to that of intra-firm trade. First, arm's-length trade depends more heavily than intra-firm trade on sectors with rapid pre-crisis growth that boosted arm's-length trade pre-crisis but that have languished post-crisis. Second, arm's-length trade is also more concentrated in emerging market and developing economies, where output growth has slowed sharply from elevated pre-crisis rates.

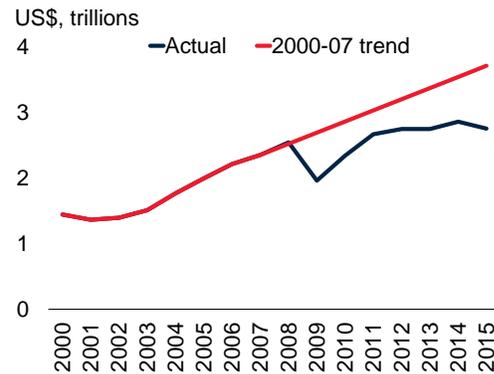
These compositional effects were compounded by a greater elasticity of arm's-length trade than intra-firm trade to demand and real exchange rate movements. Using an econometric framework of the determinants of bilateral U.S. exports by sector, we show that arm's-length exports are more sensitive to changes in demand and real exchange rates than intra-firm

Figure 2: Role of the United States in trade and foreign direct investment

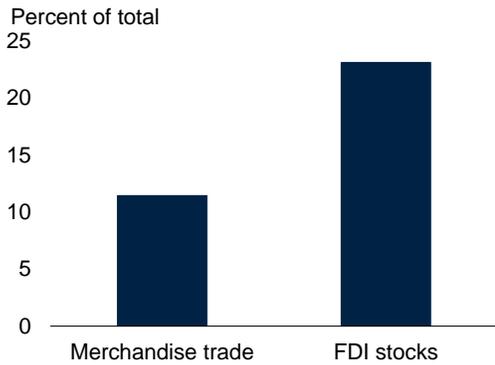
(A) Global trade



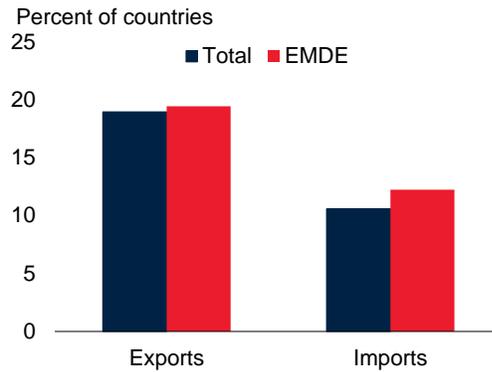
(B) U.S. trade



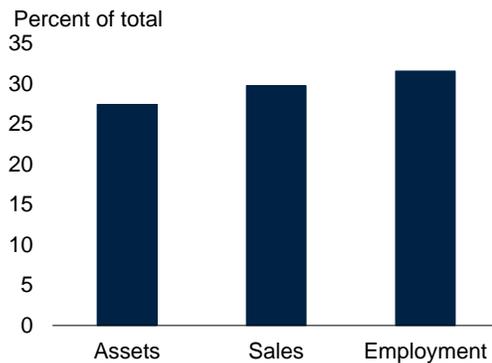
(C) U.S. share of global trade and FDI



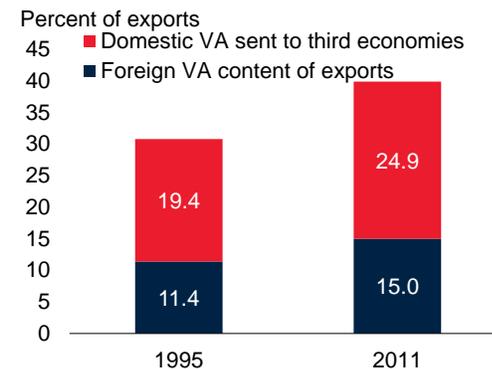
(D) Countries for which the United States is the largest export destination and import source



(E) Share of U.S. multinationals in largest 100 non-financial multinationals



(F) U.S. firms participation in global value chains



Sources: UNCTAD, World Bank, WTO.

A.B. Includes merchandise and services imports.

C. Total of merchandise exports and imports and total of inward and outward FDI stocks.

D. The sample includes 190 countries, of which 139 EMDEs, for exports and 189 countries, of which 139 EMDEs, for imports.

F. VA refers to value added.

exports. The income elasticity of arm’s-length exports is about one-fifth higher than that of intra-firm exports. Similarly, the real exchange rate elasticity of arm’s-length exports is one-tenth stronger. As a result, the post-crisis global growth weakness has weighed more on arm’s-length than on intra-firm trade growth.

Several other factors may have also constrained trade among unaffiliated firms. In particular, unaffiliated firms may have been hindered more than multinational firms by constrained access to finance during the crisis, heightened policy uncertainty, and their typical firm-level characteristics.

The rest of the paper is organized as follows: Section 2 examines the characteristics of U.S. arm’s-length exports and imports focusing on sectoral and regional composition; Section 3 explores the evolution of pre- and post-crisis arm’s-length and intra-firm trade flows; Section 4 discusses the factors that contributed to the sharp post-crisis slowdown of arm’s-length trade; Section 5 uses an econometric framework of the determinants of U.S. exports to demonstrate differentials in the income and real exchange rate elasticity between arm’s-length and intra-firm trade; and finally, Section 6 concludes.

2 Characteristics of arm’s-length and intra-firm trade

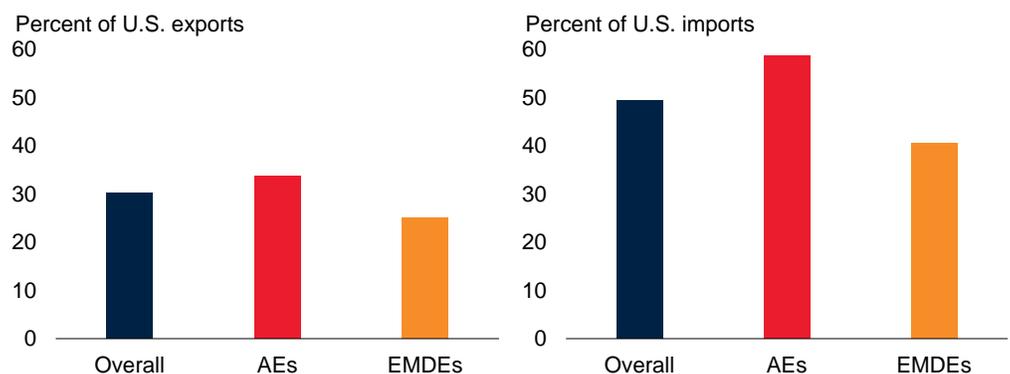
Data. There is only one publicly available dataset on international intra-firm trade with a comprehensive set of partner economies. This unique U.S. trade dataset from the U.S. Census Bureau uses customs declarations to distinguish arm’s-length trade from intra-firm transactions.⁴ At the most detailed level, the data contain exports and imports at the 6-digit North American Industry Classification System (NAICS) level as well as information on countries of origin and destination, covering annual bilateral trade flows with 234 partner economies for 2002-14. Similar data are unavailable at the global level; hence, the analysis here relies on this U.S. trade dataset.

Definition of arm’s-length and intra-firm trade. Intra-firm trade consists of cross-border transactions between firms linked by a degree of control and ownership whereas arm’s-length trade is defined as cross-border transactions between unrelated firms. The U.S. Census Bureau records transactions between related-parties. Related-party imports are defined as shipments between “any person directly or indirectly, owning, controlling or holding power to

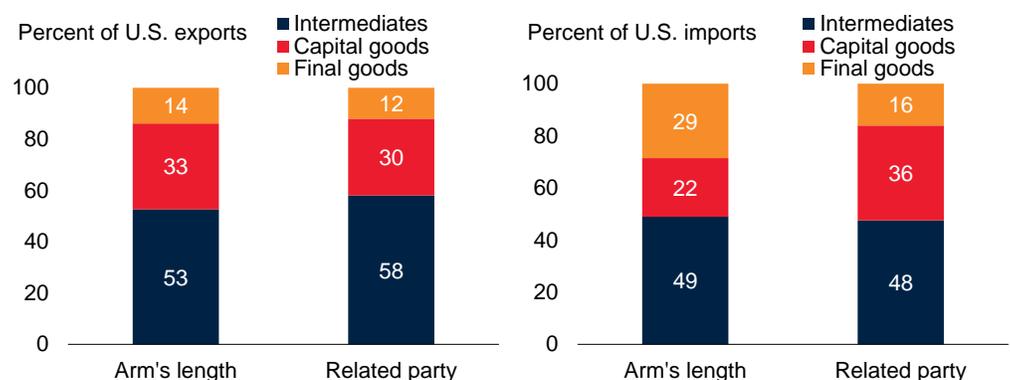
⁴The U.S. Bureau of Economic Analysis collects similar data with a confidential dataset on intra-firm trade data based on firm surveys. The Organisation for Economic Co-Operation and Development (OECD) database on the Activities of Multinational Enterprises covers trade between OECD countries.

Figure 3: Characteristics of U.S. arm's-length and intra-firm trade

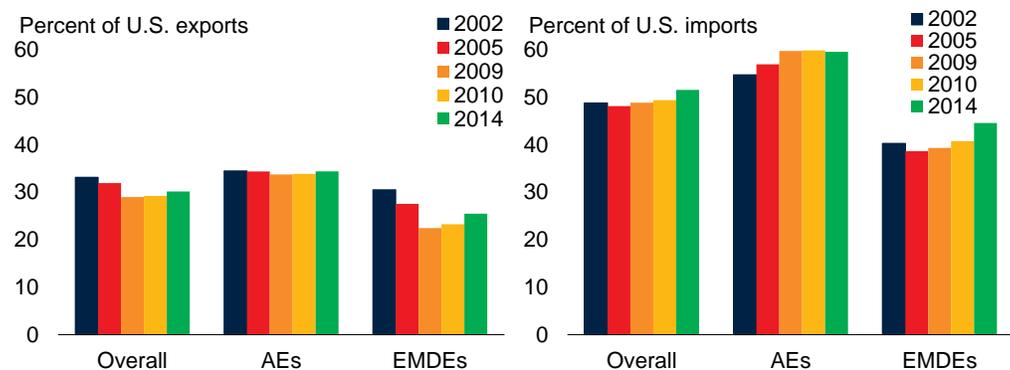
(A) Share of intra-firm exports in total U.S. exports (B) Share of intra-firm exports in total U.S. imports



(C) Structure of U.S. exports (D) Structure of U.S. imports



(E) Evolution of intra-firm exports in total U.S. exports (F) Evolution of intra-firm imports in total U.S. imports



Source: U.S. Census Bureau.

Note: AE stands for advanced economies.

A.B.E.F. U.S. exports and imports of goods, average for 2002-14. The residual to 100 percent is the share of arm's-length trade in total U.S. goods exports or imports with the world, advanced economies (AEs) or EMDEs. The shares are broadly stable over the period.

C.D. 2014 averages. The classification into intermediates, capital, and final goods is according to the Broad Economic Categories (BEC) rev.4 classification of goods according to their use. Category 51—passenger motor cars—has been excluded.

vote 6 percent of the outstanding voting stock or shares of any organization.” The ownership threshold for related-party exports is set at 10 percent (U.S. Census Bureau 2014). For notational convenience, related-party and intra-firm trade are hereinafter interchangeably referred to as intra-firm trade.⁵

Quantitative importance of arm’s-length and intra-firm trade. Just over half (about 57 percent) of total U.S. trade is conducted at arm’s-length between unrelated firms. The share of arm’s-length trade is much lower for U.S. imports (50 percent) than exports (70 percent), for U.S. trade in capital goods (50 percent) than final goods (60 percent), and for U.S. trade with advanced economies (51 percent) than with EMDEs (64 percent). In general, a higher per capita income of a trading partner is associated with a lower share of arm’s-length trade. The share of intra-firm trade of total U.S. trade has remained broadly stable from 2002 until the global financial crisis but subsequently increased, especially for U.S. trade with EMDEs (Figure 3).

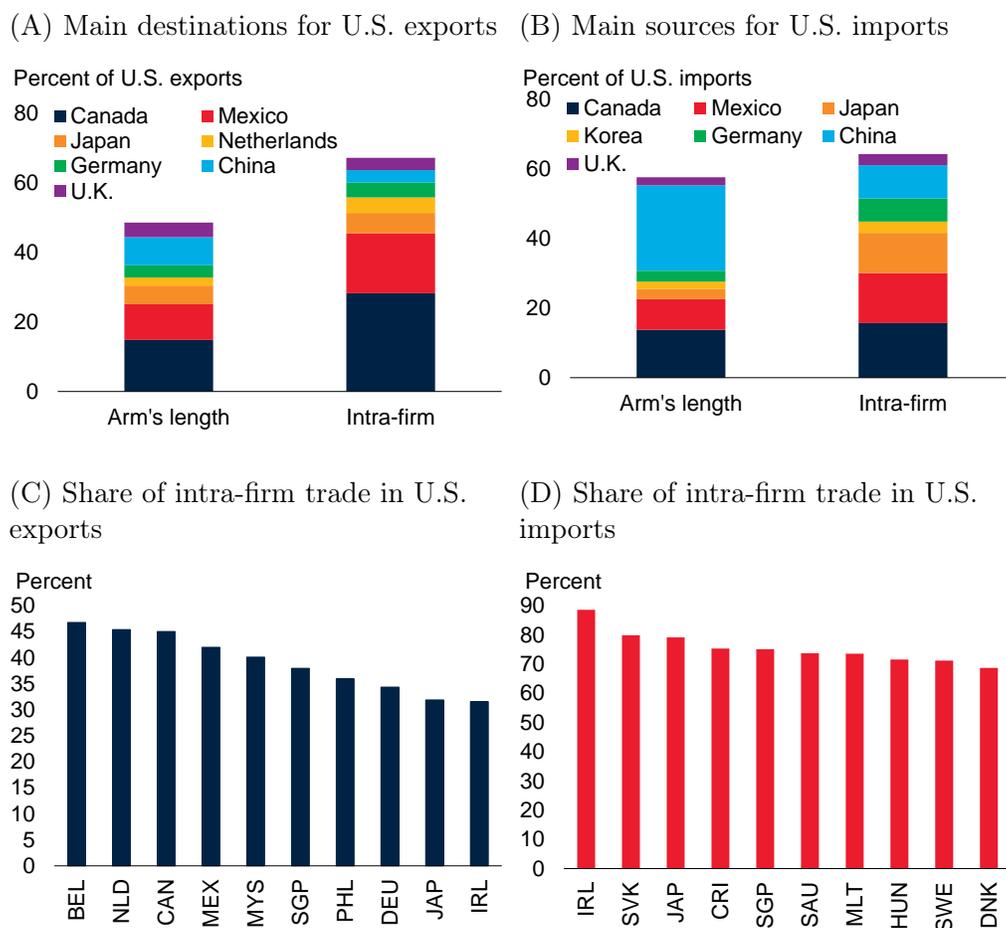
Country composition of arm’s-length and intra-firm U.S. trade. Geographical proximity and the North American Free Trade Agreement (NAFTA) favor intra-firm transactions with two of the United States’ largest trading partners, Mexico and Canada. About half of all U.S. exports to, and more than half of all U.S. imports from, Canada and Mexico are intra-firm transactions. Canada is the single largest destination of U.S. intra-firm exports (almost one-third of total U.S. intra-firm exports) and imports, followed by Mexico (about one-fifth of total U.S. intra-firm exports; Figure 4). More than half of U.S. imports from its main non-NAFTA trading partners (with the exception of China and Italy) are also intra-firm transactions. In contrast, U.S. exports to its main non-NAFTA trading partners are predominantly arm’s-length—53-65 percent of U.S. exports to large European Union and Asian countries (France, Germany, Japan, Korea, Netherlands, and United Kingdom; Figure 4) fit this description.

3 Evolution of arm’s-length and intra-firm trade since the crisis

Global trade growth has slowed sharply since the global financial crisis, from an average of 7.6 percent during 2002-08 to an average of 4.3 percent during 2010-14. During the 2007-09 global financial crisis, global trade volumes contracted by 11 percent, as domestic demand dropped and trade finance was curtailed (Levchenko, Lewis, and Tesar 2010; Chor and Manova 2012).

⁵The two terms imply different ownership shares. Intra-firm trade is defined as trade between firms with control and ownership shares of at least 50 percent.

Figure 4: Regional decomposition of U.S. arm's-length and intra-firm trade



Source: U.S. Census Bureau.

Note: Top 10 trading partners, averages for 2002-14.

A.B. Residual to 100 percent is the share of all other countries in total U.S. arm's-length or intra-firm exports (A) or imports (B).

C.D. Residual to 100 percent is the share of arm's-length transactions in bilateral U.S. exports (C) or imports (D) with each trading partner. BEL=Belgium, NLD=Netherlands, CAN=Canada, MEX=Mexico, MYS=Malaysia, SGP=Singapore, PHL=Philippines, DEU=Germany, JAP=Japan, IRL=Ireland, SVK=Slovak Republic, CRI=Costa Rica, SAU=Saudi Arabia, MLT=Malta, HUN=Hungary, SWE=Sweden, DNK=Denmark.

The contribution of global value chains to propagating the negative effects of the global financial crisis remains unsettled.⁶

The U.S. trade data highlight that arm's-length trade accounted disproportionately for the overall post-crisis trade slowdown. This reflected a higher pre-crisis average and a weaker post-crisis rebound in arm's-length trade growth compared with intra-firm trade. During the crisis itself, the U.S. data suggest a broad-based trade collapse in which intra-firm and arm's-length trade contracted to similar degrees. By 2014, intra-firm trade growth had returned close to its pre-crisis average (4.3 percent of exports and 5.0 percent for imports). In contrast, arm's-length trade growth remained significantly below its high pre-crisis average: its growth slowed to a post-crisis annual average of 4.7 percent compared to 11.3 percent during 2002-08 (Figure 1).

4 Factors contributing to the sharp post-crisis slowdown in arm's-length trade

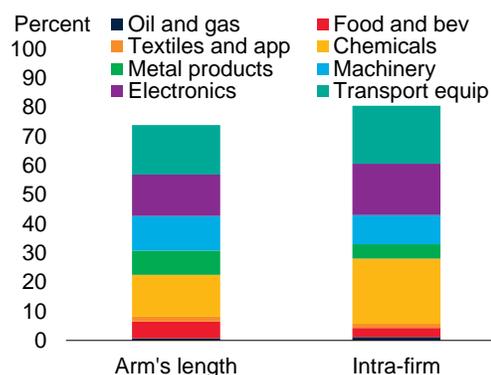
On average, arm's-length U.S. trade growth exceeded U.S. intra-firm trade growth by 1.6 percentage point pre-crisis (2002-08), but fell short of U.S. intra-firm trade growth by 1.7 percentage point post-crisis (2010-14). This sharp slowdown in arm's-length trade reflected in part compositional effects in response to global macro-economic trends. In addition, several other factors may have disadvantaged firms trading at arm's-length, raised the cost of arm's-length transactions, and hence discouraged arm's-length trade.

Compositional effects. First, a greater share of arm's-length exports than intra-firm exports is shipped to EMDEs, especially BRICS economies. Just as the rapid pre-crisis growth in EMDEs lifted arm's-length export growth, their sharp post-crisis growth slowdown dampened it (Figure 6; Didier et al. 2016). Second, arm's-length exports and imports include a greater share of sectors that grew rapidly pre-crisis but have struggled post-crisis (textiles and apparel and machinery) or sectors that benefited from the pre-crisis commodity price boom (mining, metals, and energy; Figure 5). The collapse in metals and energy prices from their peak in the first quarter of 2011 has weighed on trade (World Bank 2015a and 2015b; Baffes et al. 2015). These compositional differences are the main reason behind the steeper-than-average slowdown in arm's-length trade growth. Had the composition of arm's-length

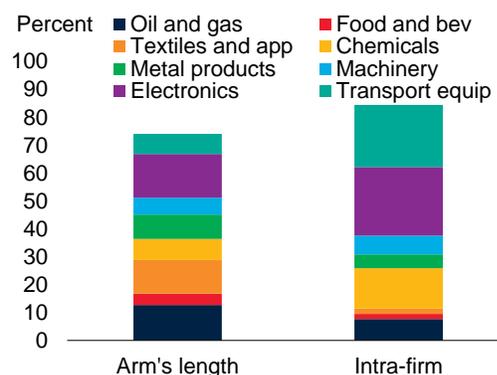
⁶Global production chains may have facilitated the transmission of output contractions across the global economy through intra-firm contagion (Bems, Johnson, and Yi 2009). Conversely, they may have strengthened the resilience of trade by facilitating better access to finance or due to the stability of long-established contractual relationships in supply chains (Altomonte and Ottaviano 2009; Bernard et al. 2009).

Figure 5: Sectoral decomposition of U.S. arm's-length and intra-firm trade

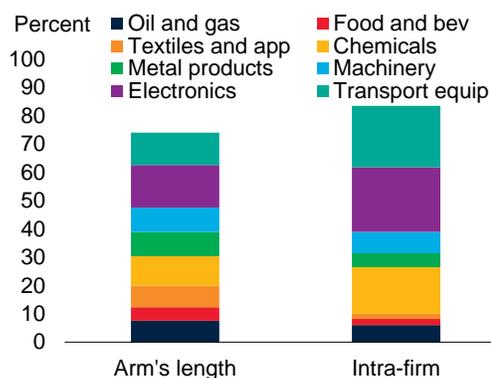
(A) Share of sector in intra-firm and arm's-length exports



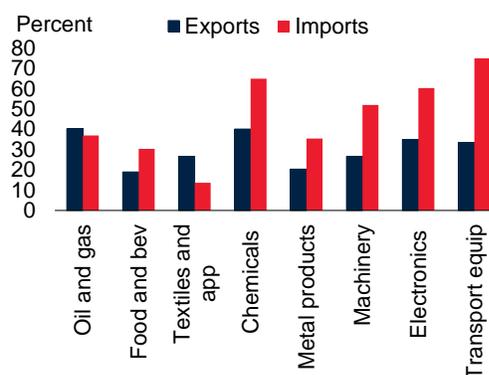
(B) Share of sector in intra-firm and arm's-length imports



(C) Share of sector in intra-firm and arm's-length trade



(D) The share of intra-firm transactions in sectoral exports and imports



Source: U.S. Census Bureau.

Note: U.S. exports and imports of goods, averages for 2002-14. Agricultural products, paper products, printing, non-metallic minerals, furniture, and miscellaneous manufactures have been omitted as they each account for less than 2 percent of total trade. Food and bev includes food and beverages. Textiles and app include textiles and apparel. Chemicals include chemicals and plastics. Electronics includes electronics and electrical equipment.

A.-C. Residual to 100 percent is the share of all other sectors in exports (A), imports (B), and trade (C).

D. Residual to 100 percent is the share of arm's-length transactions in U.S. exports and imports in each sector.

trade matched that of average exports and imports, arm’s-length export and import growth would have slowed by 1.2 and 1.8 percentage points less, respectively, between the pre-crisis and post-crisis periods (Figure 6).⁷

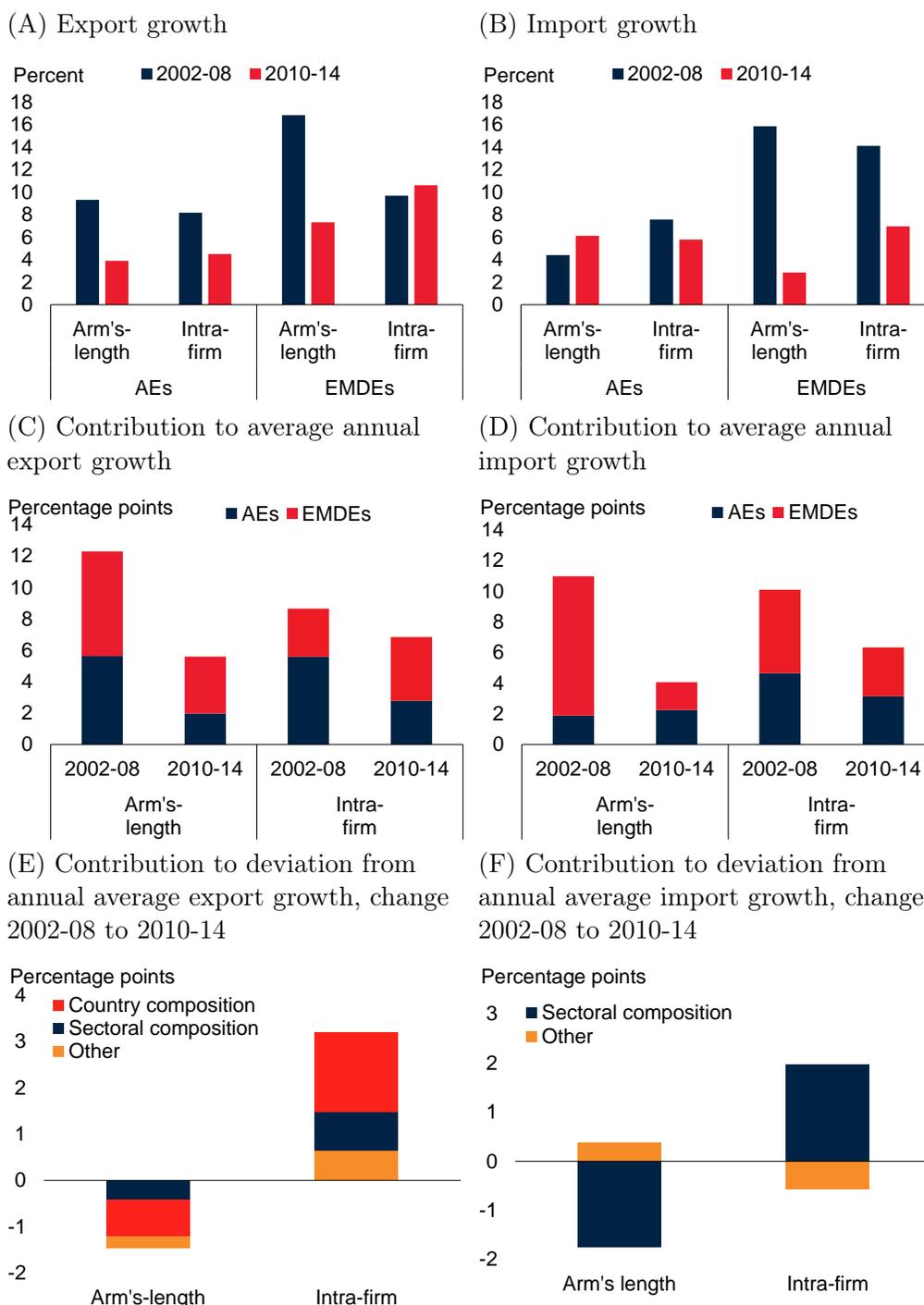
Other contributing factors. Other factors may have further contributed to the post-crisis weakness in arm’s-length trade.⁸

- ***Reduced access to finance for unaffiliated firms.*** Tightening lending conditions during and after the global financial crisis restricted access to trade credit and other forms of financing (Chor and Manova 2012). This may have disproportionately affected transactions between non-affiliated parties (Desai, Foley, and Hines 2004; Alvarez and Görg 2012).
- ***Disadvantages due to size and productivity.*** Vertically integrated firms tend to be larger, more productive, and more skill- and capital-intensive (Corcos et al. 2013). More efficient management of stocks also helps vertically integrated firms adjust to large demand shocks, such as the global financial crisis (Altomonte et al. 2011). Such factors may account for the smaller likelihood of exit from foreign markets for firms exporting on an intra-firm basis, especially since the global financial crisis. The number of U.S. firms exporting intra-firm fell by 8.5 percent during 2009, whereas the number of firms exporting at arm’s-length fell by 12.5 percent (Carballo 2015).
- ***Shock amplification in complex supply chains.*** The demand for complex goods, such as automobiles, reacts more strongly to income shocks than the demand for basic goods (Ferrantino and Taglioni 2014). As a negative demand shock spreads through the supply chain, participating firms observe greater swings in demand the further up they are on the supply chain (the “bullwhip effect”). Although intra-firm trade in intermediate goods fell more significantly at the beginning of the crisis, it also benefitted from a stronger recovery thereafter (Alessandria 2011).
- ***U.S. dollar appreciation.*** Trade conducted through global value chains generally shows less sensitivity to real exchange rates. That’s because competitiveness gains from real depreciations are partly offset by rising input costs (Ahmed, Appendino, and Ruta 2015; Mattoo, Mishra, and Subramaniam 2012; Amiti, Itskhoki, and Konings

⁷The results are robust to using manufacturing trade only.

⁸Trade policy may have favored intra-firm trade. However, in the post-crisis period under consideration here (2010-14) there were no major changes in U.S. trade policy. Apart from three bilateral U.S. FTAs that are slowly being phased in since 2012 (Korea, Panama, Colombia), applied tariffs imposed by the United States on its imports and faced by the United States on its exports did not change significantly.

Figure 6: Pre- and post-crisis growth in U.S. trade



Source: U.S. Census Bureau.

Note: AE stands for advanced economies.

C.D. Average annual contribution of export (C) and import (D) transactions with EMDEs and AEs to total U.S. merchandise exports (C) or imports (D).

E. "Country composition" measures the extent to which growth in arm's-length or intra-firm exports exceeded that of total exports due to a higher initial share of fast-growing countries. It is defined as the difference between hypothetical arm's-length (intra-firm) export growth, had arm's-length (intra-firm) exports to each country grown at the same rate as total exports to each country, and actual total export growth. "Sectoral composition" measures the extent to which growth in arm's-length or intra-firm exports exceeded that of total exports because of a higher initial share of fast-growing sectors. It is defined as the difference between hypothetical arm's-length (intra-firm) export growth, had arm's-length (intra-firm) sectoral exports grown at the same rate as total sectoral exports, and actual total export growth. "Other" is the residual. The figure shows the change in these contributions between the 2002-08 average and the 2010-14 average.

F. The definitions are as in E. Country composition is omitted since the destination country of all imports is the United States.

2014). To the extent that intra-firm trade is more strongly associated with global value chains than arm’s-length trade, intra-firm U.S. exports may have benefited less from the pre-crisis U.S. dollar depreciation and been dampened to a lesser degree by the post-crisis appreciation than arm’s-length exports. In addition, firms integrated vertically may have a wider range of tools available to them to hedge against exchange rate movements.

- **Uncertainty.** Uncertainty influences whether firms outsource or integrate vertically (Antras and Helpman 2004). Although uncertainty discourages cross-border vertical integration, once established, vertically integrated U.S. firms tend to be less sensitive to uncertainty in their trade decisions (Carballo 2015; Bernard et al. 2010). Heightened economic and trade policy uncertainty during and after the global financial crisis, may therefore have encouraged a post-crisis preference for intra-firm transactions over arm’s-length ones.

5 Empirical estimation

We delve deeper into the role of demand shocks and U.S. dollar movements in an econometric analysis of U.S. export elasticities. The econometric specification follows that of the typical determinants of export growth recently summarized in Eichengreen and Gupta (2013) and Ahmed, Appendino, and Ruta (2015). It aims to test for differences between the elasticity of arm’s-length and intra-firm export growth to export market growth (GDP) and changes in real exchange rates. The specification used here is as follows:

$$\begin{aligned} \widehat{X}_{irt} = & \alpha + \beta \widehat{GDP}_{irt} + \gamma \widehat{REER}_{irt} + \delta IFT_{irt} + \theta (\widehat{GDP}_{irt} \times IFT_{irt}) \\ & + \lambda (\widehat{REER}_{irt} \times IFT_{irt}) + \rho_i + \rho_r + \rho_t + \rho_{rt} + \epsilon_{irt} \end{aligned} \quad (1)$$

where subscript i represents the 4 digit NAICS industry, r the importing country and t the year. The dependent variable is growth in real U.S. exports (\widehat{X}), while among the explanatory variables we have real GDP growth (\widehat{GDP}) and changes in bilateral real effective exchange rates (\widehat{REER}). IFT_{irt} is a dummy variable equal to 1 for intra-firm transactions and 0 for arm’s-length trade. Interaction terms between GDP growth and REER, on the one hand, and the IFT dummy, on the other hand, aim to capture differences in the sensitivity of arm’s-length and intra-firm trade to changes in these independent variables. Finally, sector, country, importer and importer-time characteristics are accounted for by using different fixed effects $\rho_i, \rho_r, \rho_t, \rho_{rt}$.

For any variable Y in the specification above (X , GDP and REER), growth rates are calculated as in Davis, Haltiwanger and Schuh (1996) based on the following:

$$\widehat{Y}_{irt} = \frac{Y_{irt} - Y_{irt-1}}{(Y_{irt} + Y_{irt-1})/2} \quad (2)$$

The data on exports come the U.S. Census Bureau Related Party Database as described above and cover U.S. goods exports for the period 2002-2014. Export values were deflated using data on the importer's consumer price index (CPI) from the IMF's International Financial Statistics. Data on real GDP comes from the World Bank's World Development Indicators while bilateral real exchange rates were constructed using the importing country's exchange rate against the U.S. dollar, deflated by the ratio between U.S. and importing country's CPI.

The results of the econometric estimation are presented in Table 1 for the sample as a whole (1) as well as sub-samples that include exports of manufactures (2), exports to advanced economies (3) and to emerging markets (4). They suggest that arm's-length exports are more sensitive to changes in demand and in real exchange rates.

The income elasticity of arm's-length U.S. exports is significantly (about one-fifth) higher than that of intra-firm exports. This finding is robust to the use of different sub-samples. For instance, a 1 percentage point increase in the real GDP growth of the importing county is associated with 1.5 percentage point higher growth in arm's length exports, but only 1.2 percentage point higher growth in intra-firm exports.

Similarly, a real exchange rate appreciation of 1 percentage point is associated with 3.1 percentage point lower growth in arm's-length exports but only 2.8 percentage point lower growth in intra-firm export growth. This result is consistent with findings of Ahmed, Appendino and Ruta (2015) who show that rising participation in global value chains explains on average 40 percent of the fall in the real exchange rate elasticity of exports.

These result suggest that the higher elasticity of arm's length trade compounded compositional effects that hindered arm's-length trade over intra-firm trade. As a result of the greater income elasticity or arm's-length trade, post-crisis weakness in global growth and, especially, the growth slowdown in EMDEs weighed more on arm's-length trade than on intra-firm trade.

Table 1: Regression results

Dependent variable: export growth				
	(1)	(2)	(3)	(4)
	Full sample	Manufactures	AE	EMDE
\widehat{GDP}	1.530*** (0.253)	1.628*** (0.259)	-13.69 (13.00)	1.519*** (0.253)
$\widehat{GDP} \times IFT$	-0.307*** (0.079)	-0.299*** (0.082)	-0.484* (0.207)	-0.268** (0.091)
\widehat{REER}	-3.133* (1.380)	-3.790** (1.409)	-9.843 (5.432)	-3.111* (1.381)
$\widehat{REER} \times IFT$	0.322*** (0.052)	0.306*** (0.055)	0.454*** (0.091)	0.254*** (0.064)
IFT	0.007* (0.003)	0.009* (0.003)	0.013** (0.005)	0.003 (0.005)
Sector fixed effects	yes	yes	yes	yes
Importer fixed effects	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes
Importer-time fixed effects	yes	yes	yes	yes
N	216,362	187,920	61,155	155,207

Standard errors in parentheses:

*p<0.05, **p<0.01, ***p<0.001

6 Conclusion

The United States plays an important role in global trade. It accounts for about 11 percent of global goods trade and is the largest export destination for one-fifth of the world's countries. U.S. multinationals account for about 30 percent of the employment and sales of the world's largest 100 non-financial multinational companies. U.S. arm's-length trade growth has slowed steeply relative to intra-firm trade in the aftermath of the global financial crisis, from high pre-crisis rates. During the 2010-14 recovery, trade between non-affiliated firms grew at about half the pre-crisis rate. Intra-firm trade growth also slowed but to a considerably lesser degree.

The sharp slowdown in arm's-length trade growth stems from a number of factors. A high share of arm's-length exports is conducted with EMDEs, where growth has slowed sharply from elevated pre-crisis rates. In addition, firms trading at arm's-length are more concentrated in sectors that grew particularly rapidly pre-crisis and sectors that benefited from the pre-crisis commodity price boom, which boosted pre-crisis trade but have languished since the crisis. In addition, arm's-length trade is more sensitive to changes in demand and real exchange rates. For example, the income elasticity of arm's-length U.S. exports is about one-fifth higher than that of intra-firm exports. For the United States, these effects account for a significant part of the post-crisis growth gap between arm's-length and intra-firm trade.

Other factors have also been at play. Among these, the characteristics that make firms engaged in arm's-length trade less resilient to the severe demand and financing shocks of the global financial crisis contributed to the post-crisis weakness of arm's-length trade. Firms engaged in outsourcing tend to be smaller, less productive, less efficient in inventory management, and have more restricted access to finance than firms integrated vertically. Such factors may have accelerated the exit of firms trading at arm's-length during the global financial crisis and its aftermath. Heightened financial risks and policy uncertainty may also have discouraged arm's-length transactions.

While the post-crisis environment has favored multinationals that focus on intra-firm transactions, their activities can also raise policy challenges. For example, multinationals may have an incentive to adjust their transfer pricing—the prices assigned to intra-firm transactions—to raise the value of goods and services produced in countries with low corporate income taxes and reduce the value of those produced in countries with higher taxes. Policies to promote FDI and trade therefore have to be carefully calibrated to protect fiscal revenues. A number of global initiatives have been introduced since the global financial crisis to make global tax practices more transparent (IMF/OECD/UN/World Bank 2011, 2016). In addition, large and internationally active firms also tend to be better able to absorb the

significant fixed costs of exporting. Measures to reduce asymmetries of information and help small and medium-sized companies overcome regulatory burdens can help level the playing field (World Bank 2016).

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