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Affiliates with Intra-Firm Trade

Sotiris Blanas and Adnan Seric

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Scarcity, Size and Productivity Advantage of Foreign Affiliates with Intra-Firm Trade

Sotiris Blanas* Adnan Seric†

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Abstract

We juxtapose the main characteristics of 2403 foreign affiliates with and without intra-firm trade in 19 sub-Saharan-African countries in 2010. While intra-firm trade is scarce among foreign affiliates in the sample, arm's length trade is a very popular activity, even among those with intra-firm trade. The main distinguishing features of the average foreign affiliate with intra-firm trade are its larger size and higher productivity level. Its size premia range between 31.5% and 56.3% and its productivity premia between 25.4% and 30.7%.

Keywords: foreign affiliates, intra-firm trade, complex FDI, sub-Saharan Africa, firm characteristics

JEL Classification: F14, F23, L21, L23, L24, L25

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1 Introduction¹

Multinational Companies (henceforth MNCs) constitute the main locomotive in the current process of internationalisation of production and markets. This stylised fact has spawned numerous theoretical and empirical studies on different types of FDI (i.e., horizontal², vertical³, and export-platform⁴ FDI) and MNCs, as well as combinations of these (Carr et al., 2001; Grossman et al., 2006; Irarrazabal et al., 2013). UNCTAD (1998) is the first to report empirical evidence on such combinations. In addition, Feinberg and Keane (2001) study US MNCs with affiliates in Canada and find that only 12% of these are of purely horizontal type and only 19% of purely vertical. Thus, terms such as “complex integration strategies” and “complex FDI” have been coined (UNCTAD, 1998; Yeaple, 2003a; Helpman, 2006).

Despite the latest evidence, we still have a very limited knowledge about the main features that distinguish foreign affiliates with intra-firm trade from those without. Hanson et al. (2001) are the first to examine imports of foreign affiliates from their US parent companies by using a measure of affiliate size. Ramondo et al. (2011), with the use of the BEA data on roughly the whole population of foreign affiliates of US MNCs, find that intra-firm trade is concentrated among a small number of relatively large foreign affiliates, while the median foreign affiliate, which is smaller in size, reports no shipments to its parent and directs the bulk of its sales to non-affiliated parties in the host country. The main objective of this paper is to shed more light on the main firm characteristics that discern foreign affiliates with intra-firm trade from those without.

To this purpose, by employing data from the UNIDO Africa Investor Survey 2010 we juxtapose the main characteristics of 2403 foreign affiliates with and without intra-firm trade located in 19 countries in sub-Saharan Africa (SSA) in 2010. Their parent companies are based either in high-income, or non-SSA low/middle-income, or SSA countries. In contrast to the vast majority of previous theoretical and empirical studies which take into consideration only the manufacturing sector, this study covers all three main sectors of the economy (i.e., primary, secondary, and tertiary).

Given the well-documented rise in MNC activity in Africa and especially, in sub-Saharan Africa, our findings can prove to be very useful for policy makers in host

¹We thank audiences at the UCLouvain IEG seminar, the UCLouvain DW May 2014, the ITSG July 2014, the ETSG 2014, the XIX DEGIT 2014, the KUL CoE ISS Fall 2014, and the 8th FIW 2014 for their comments and suggestions. Special thanks are extended to Costas Arkolakis, Gabor Békés, Rosario Crinò, Giorgia Giovannetti, Amanda Jakobsson, Florian Mayneris, Mathieu Parenti, and Lucía Pérez-Villar. Sotiris Blanas gratefully acknowledges financial support from the Fonds de la Recherche Scientifique – FNRS. All errors are ours.

²The MNC serves the foreign market by setting up a foreign affiliate rather than through exports. In doing so, the production process of the parent company is *replicated* in the foreign affiliate. Among others, see Caves (1982), Markusen (1984), Brainard (1997), Helpman et al. (2004), Horstmann and Markusen (1992), Markusen and Venables (2000), Ramondo et al. (2013).

³The MNC takes advantage of international factor differentials by transferring *part* of its production process to countries where factor prices are lower (Helpman, 1984; Helpman and Krugman, 1985, Yeaple, 2003b and Yeaple, 2008). In this case, intra-firm trade is created, as has been observed by several recent empirical studies (Hanson et al., 2001; Hanson et al., 2005; Borga and Zeile, 2004; OECD, 2002; Alfaro and Charlton, 2009).

⁴An affiliate located in a foreign country is used as platform for serving other markets nearby via exports (Ekholm et al., 2007; Badinger and Egger, 2010).

countries to implement such industrial, trade, investment and development policies so that their countries benefit the most from the presence of MNCs.

Africa and in particular, sub-Saharan Africa, still lag behind other developing regions like Asia and Latin America, regarding their FDI inflows and their participation in regional and global value chains (UNCTAD, 2013, p. 39). However, since FDI could be an essential source of finance for industrialisation of the region, Africa is increasingly tapping into it. According to UNCTAD and UNIDO (2011, p. 77), its FDI inflows increased from \$2.8 billion to \$58.6 billion between 1990 and 2009, while the share of FDI in gross fixed capital formation increased from 3.2% to 24.1% between 1990 and 2007. Although most of FDI inflows by value are concentrated in Mining, important investment activities have taken place in Manufacturing between 2003 and 2009. UNCTAD (2010b) reports that 41% of the total number of Greenfield investment projects in Africa were accounted for by the manufacturing sector.

Although developed countries account for the bulk of the FDI flows into Africa, non-African developing countries – especially Brazil, China, India, and Turkey – are increasingly important sources. Their share in total FDI inflows to Africa increased from an average of 17.7% during the period 1995 - 1999 to 20.8% over the period 2000 - 2008 (UNCTAD, 2010a, p. 81). According to the same study, FDI from non-African developing countries is mostly in natural resources but there are significant investments in infrastructure,⁵ finance, agriculture and light manufacturing. UNCTAD (2013, p. 127) reports that there has also been a remarkable increase over the past decade in intra-African investment, with 68% of Greenfield investment being accounted for by the services sector.

As regards trade activity which is very closely linked to FDI, Africa has experienced a significant rise in total merchandise trade, from \$7 billion in 1995 to \$86 billion in 2008. This has been accompanied by increasing trade with other non-African developing countries. Also, its share of global trade rose from 2.2% in 2000 to 3.3% in 2008 (UNCTAD, 2010a, p. 29).

In line with Ramondo et al. (2011), the data analysis reveals that intra-firm trade is concentrated among a small number of firms. In particular, foreign affiliates with intra-firm trade account for only 21.9% of all firms in the sample. This is an essential stylised fact because it poses the critical question as to why firm boundaries exist if not for the transfer of physical goods. According to Atalay et al. (2014), the main reason for their existence is the transfer of intangibles.⁶

Interestingly, though, we find that the big majority of foreign affiliates do trade, but they mostly do so outside the boundaries of the firm (i.e., at arm's length). Roughly half of the total number of firms in the sample have only arm's length trade. Trade at arm's length is also a very popular activity even among foreign affiliates with intra-firm trade. These findings are important in two ways. First, they are indicative of

⁵Between 2001 and 2007, China's infrastructure finance commitment in sub-Saharan Africa rose from \$470 million to \$4.5 billion. Other countries with significant investments in infrastructure are India, Kuwait, Saudi Arabia, and the United Arab Emirates (UNCTAD, 2010b, p. 81; UNCTAD, 2010a).

⁶Many terms which are related to intangibles can be found in the literature: knowledge capital (Markusen, 1984), technology capital (McGrattan and Prescott, 2010), organisational capital (Garicano and Rossi-Hansberg, 2006), core capabilities (Bernard et al., 2012), managerial ability (Bloom and Van Reenen, 2007), capabilities (Atalay et al., 2014).

the complexity that characterises import and export activities of foreign affiliates and justifies terms that have been coined in the literature, such as “complex” FDI. Second, it shows how opaque the firm boundaries remain despite the great progress that has been made in recent years both in theory (Antràs, 2003) and in empirics (Nunn and Trefler, 2013; Corcos et al., 2013). Unfortunately, in our data we do not observe firm-to-firm transactions by product and therefore, we cannot look into this issue further.

From the regression analysis we find that the main distinguishing firm characteristics of the average foreign affiliate with intra-firm are its greater size and higher productivity level. The first finding is in accord with Ramondo et al. (2011). We report size premia of 31.5% and 56.3% when proxied by the total number of employees and total sales, respectively. The productivity premia are 25.4% and 25.5% when productivity is proxied by the ratios of total sales and total value added to total employment. The estimated total factor productivity premia are 30.7%.

After decomposing intra-firm trade into intra-firm imports, exports and both imports and exports, we find that a clear sorting pattern arises. On average, foreign affiliates with both intra-firm imports and exports seem to be the biggest and most productive firms, those with only intra-firm exports smaller and less productive, those with only intra-firm imports even smaller and less productive, while those with only arm’s length trade are bigger and more productive only than those without intra-firm trade, which are the smallest and least productive firms. Reporting these premia becomes even more important after we show that foreign affiliates with only arm’s length trade differ from domestic firms which engage in international trade in terms of size and productivity. They are bigger and more productive by 11.9% and 25.7%, respectively. The sorting pattern can be easily explained theoretically based on the Melitz (2003) model of firm heterogeneity in which the fixed cost of arm’s length trade is smaller than the fixed cost of intra-firm imports, which in turn, is smaller than the fixed cost of intra-firm exports.

We draw some novel and useful conclusions about the host-country effects of FDI based on the results that we obtain. The greater size of the average foreign affiliate with intra-firm trade can be translated into a greater number of job opportunities for local job-market seekers. In addition, any local firms which manage to develop linkages with this type of foreign affiliate may benefit by more from productivity spillovers due to its productivity advantage.

The remainder of this paper is as follows. In Section 2 we describe the data and report several stylised facts on the host countries, industries and parent locations of the two types of affiliates, different combinations of these, as well as, on their distributions by size and productivity. In Section 3 we present the benchmark econometric model, while in Section 4 the main empirical results, robustness checks and the estimated size and productivity premia. In Section 5 we provide a simple theoretical explanation for the self-selection of foreign affiliates into intra-firm trade based on the model of firm heterogeneity of Melitz (2003), while in Section 6 the main concluding remarks and suggestions for further research.

2 Data and stylised facts

In this section we describe the main dataset to be employed in the econometric analysis and juxtapose foreign affiliates with and without intra-firm trade in terms of the host countries in which they are located and all possible combinations of the origin of their parent company and the industries in which they operate. We also provide statistics on the percentage of foreign affiliates with different types of trade flows (i.e., intra-firm and/or arm's length) and try to quantify any size and productivity premia of foreign affiliates with intra-firm trade.

2.1 Data

We draw all firm-level data from the UNIDO Africa Investor Survey 2010. The main aim of this survey is to collect information at the firm level directly from business owners and senior managers about their business and their assessment of the current business environment. It includes information about 2403 foreign affiliates in 19 sub-Saharan-African countries for the last financial year (i.e., 2009). All monetary variables are in national currencies and in order to convert these into US dollars (USD), we rely on the exchange rate data of the World Bank World Development Indicators (WDI).

As regards intra-firm trade, this is directly observed in the data and therefore, we do not need to construct ourselves any proxy for vertical relationship based on Input-Output (I-O) tables or disaggregated classifications of products/services produced in the parent and the foreign affiliate (Alfaro and Charlton, 2009). In particular, we claim that a foreign affiliate has intra-firm imports if its percentage of production inputs by value that was imported through the parent company is greater than 0 and less than or equal to 100. Similarly, a foreign affiliate has intra-firm exports if its percentage of direct exports by value is supplied to its parent and/or its sister affiliates is greater than 0 and less than or equal to 100. Consequently, a foreign affiliate with intra-firm trade is an entity that satisfies one of the two or both of the aforementioned conditions (i.e., the firm has either intra-firm imports, or intra-firm exports, or both).

2.2 Foreign affiliates with and without intra-firm trade

Table 1 portrays the 19 countries in sub-Saharan Africa where foreign affiliates with and without intra-firm trade are located. Among firms with intra-firm trade, the biggest number of these are based in Kenya, Uganda, Tanzania, Ghana and Cameroon (17.3%, 16.2%, 8%, 5.9%, and 5.7%, respectively), while the smallest number in Niger (0.8%), Burundi (1%), Burkina Faso (1.1%), Mali (2.5%), and Malawi (2.7%). Among firms without intra-firm trade, the biggest number of these are based in Uganda (17.1%), Kenya (10.7%), Ghana (8%), Nigeria (6.3%) and Mozambique (6.1%), and the smallest number in Niger (1%), Burkina Faso (1.2%), Malawi (1.8%), Burundi (2.2%), Lesotho and Rwanda (2.9% each).

Foreign affiliates without intra-firm trade operate in more industries than those with intra-firm trade (56 industries Vs 41 industries). This is mostly driven by the absence of affiliates with intra-firm trade from many services industries. This is in line with Ramondo et al. (2011) who find that intra-firm trade occurs primarily in goods, rather

than services. Among affiliates with intra-firm trade, the highest percentages of these are to be found in industries with ISIC 15 (11.8%), 25 (8.6%), 1 (8.4%), 24 and 51 (8.2% each), 18 (7.6%), 52 (6.3%), and 45 (5.1%), while the lowest in industries with ISIC 2, 33, 41, 63, 71, 72, and 92 (0.2% each). Among affiliates without intra-firm trade, the highest percentages of these operate in industries with ISIC 15 (8.4%), 51 (6.7%), 74 (5.6%), 45 (5.4%), 25 and 55 (5.2% each), 65 (5.1%), and 28 (4.9%), while the lowest in industries with ISIC 12, 30, 73, 85, and 93 (0.1% each). To save on space, we relegate to the Appendix the tables with the industries by type of foreign affiliate.

Table 1: Locations of foreign affiliates with and without intra-firm trade

Name	Code	with intra-firm trade		without intra-firm trade	
		# of firms	% of firms	# of firms	% of firms
Burundi	BDI	5	1	41	2.2
Burkina Faso	BFA	6	1.1	23	1.2
Cameroon	CMR	30	5.7	103	5.5
Cape Verde	CPV	22	4.2	82	4.4
Ethiopia	ETH	24	4.6	109	5.8
Ghana	GHA	31	5.9	151	8
Kenya	KEN	91	17.3	200	10.7
Lesotho	LSO	22	4.2	54	2.9
Madagascar	MDG	27	5.1	96	5.1
Mali	MLI	13	2.5	78	4.2
Mozambique	MOZ	16	3	114	6.1
Malawi	MWI	14	2.7	34	1.8
Niger	NER	4	0.8	18	1
Nigeria	NGA	30	5.7	119	6.3
Rwanda	RWA	18	3.4	55	2.9
Senegal	SEN	23	4.4	87	4.6
Tanzania	TZA	42	8	113	6
Uganda	UGA	85	16.2	321	17.1
Zambia	ZMB	23	4.4	79	4.2
Total		526	100	1877	100

Notes: Authors' calculations.
Source: UNIDO Africa Investor Survey 2010.

As for the parent locations, parents of the highest percentage of affiliates with intra-firm trade are located in India (10%), South Africa (9.5%), France and the United Kingdom (8.7% each), Kenya (6.9%), the US (4.8%), China and the Netherlands (4.1% each), Portugal (3.7%), Lebanon and Mauritius (2.5% each), Germany and Switzerland (2.5%), Hong Kong and Taiwan (1.9%), Italy (1.7%), Japan (1.5%), Denmark, Spain and the United Arab Emirates (1.4%), Belgium, Senegal, Uganda and Tanzania (1%). Parents of the highest percentage of affiliates without intra-firm trade are located in India (14%), France (9.8%), the United Kingdom (9.7%), South Africa (6.3%), China and Kenya (6% each), Portugal (4.4%), Italy (4%), Lebanon (3.9%), the US (3.6%), the Netherlands (2.1%), Switzerland (1.8%), Mauritius (1.7%), Germany (1.6%), Canada (1.2%), and Belgium (0.9%).

Table 2 reports the number of firms with and without intra-firm trade by sector and parent location. Regarding sectors, we consider the whole economy (ISIC between 1 and 99), Agriculture (ISIC between 1 and 5), Mining (ISIC between 10 and 14), Manufacturing (ISIC between 15 and 39), Resource-based manufacturing (ISIC: 15, 16, 20, 21, 23, 25, 26, 27), Low-tech manufacturing (ISIC: 17, 18, 19, 22, 28, 36), Medium/High-tech manufacturing (ISIC: 24, 29, 30, 31, 32, 33, 34, 35, 37, 38),

Electricity, gas and water supply (EGW supply) and Construction (ISIC 40 and 45, respectively), and Services (ISIC between 50 and 99). We distinguish between three different types of parent location based on the income level of the country in which the parent company is situated (i.e., high-income countries (HI), low/middle-income excluding sub-Saharan-African ones (LMI), and those in sub-Saharan Africa (SSA)). In order to classify each parent location by the level of income we rely upon the World Bank Historical Country Classification for the year 2010. Low/middle-income countries are those which are classified by the World Bank for the corresponding year as either low-income, or lower-middle-income, or upper-middle-income.

For the whole economy, the parent firms of the highest percentage of affiliates with intra-firm trade are located in high-income countries, of the second highest in low/middle-income countries, while those of the lowest in sub-Saharan Africa (52.4%, 33.4%, and 14.2%, respectively). This is also true for Agriculture (74.5%, 12.8%, 12.8%, respectively), Mining (53.3%, 46.7%, 0%, respectively), Manufacturing (50.6%, 36.3%, 13.1%, respectively), Resource-based manufacturing (52.3%, 31.5%, 16.1%, respectively), Medium/High-tech manufacturing (66.7%, 22.2%, 11.1%, respectively), EGW supply and Construction (50%, 35.7%, 14.3%, respectively), and Services (47.9%, 31.3%, 20.8%, respectively). The only exception is the low-tech manufacturing sector in which the parents of the highest percentage of foreign affiliates with intra-firm trade are based in low/middle-income countries (36.4%, 53.5%, and 10.1%, respectively).

As far as foreign affiliates without intra-firm trade are concerned, the parents of the smallest percentage of these are located in sub-Saharan Africa. This holds for the whole economy and for any other sector examined. The differences in the percentages of affiliates whose parents are located in high- and non-SSA low/middle-income countries are much smaller than before (Whole economy: 49.4% Vs 37%, Manufacturing: 44.9% Vs 43.3%, Resource-based manufacturing: 43.9% Vs 43.4%, Medium/High-tech manufacturing: 47.8% Vs 40.8%) or even vanished (Low-tech manufacturing: 44.8% Vs 44.8%). Sectors for which there are still quite big differences are: Agriculture (60.7% Vs 21.3%), Mining (58.8% Vs 41.2%), EGW supply and Construction (56% Vs 35.8%) and Services (51.5% Vs 32.1%).

Panel A in Table 3 reveals that intra-firm trade is a relatively rare activity. Only 526 out of the 2403 foreign affiliates (21.9% of the total) trade with their parent company (i.e., they have either intra-firm imports or intra-firm exports, or both). The rest 1877 (78.1% of the total) do not have any intra-firm trade flows. Among the firms with intra-firm trade, 77.8% of these have intra-firm imports (Panel B), 39.4% have intra-firm exports (Panel C), 17.1% have both intra-firm imports and exports (Panel D), 60.6% have only intra-firm imports (Panel E), while 22.2% have only intra-firm exports (Panel F).

Table 2: Foreign investors' origin

Parent location	with intra-firm trade		without intra-firm trade	
	# of firms	% of firms	# of firms	% of firms
	Whole economy			
High-income country	265	52.4	871	49.4
Low/middle-income country	169	33.4	653	37
sub-Saharan African country	72	14.2	240	13.6
Total	506	100	1764	100
	Agriculture			
High-income country	35	74.5	37	60.7
Low/middle-income country	6	12.8	13	21.3
sub-Saharan African country	6	12.8	11	18
Total	47	100	61	100
	Mining			
High-income country	8	53.3	20	58.8
Low/middle-income country	7	46.7	14	41.2
sub-Saharan African country	0	0	0	0
Total	15	100	34	100
	Manufacturing			
High-income country	162	50.6	347	44.9
Low/middle-income country	116	36.3	334	43.3
sub-Saharan African country	42	13.1	91	11.8
Total	320	100	772	100
	Resource-based manufacturing			
High-income country	78	52.3	165	43.9
Low/middle-income country	47	31.5	163	43.4
sub-Saharan African country	24	16.1	48	12.8
Total	149	100	376	100
	Low-tech manufacturing			
High-income country	36	36.4	107	44.8
Low/middle-income country	53	53.5	107	44.8
sub-Saharan African country	10	10.1	25	10.5
Total	99	100	239	100
	Medium/High-tech manufacturing			
High-income country	48	66.7	75	47.8
Low/middle-income country	16	22.2	64	40.8
sub-Saharan African country	8	11.1	18	11.5
Total	72	100	157	100
	EGW supply/Construction			
High-income country	14	50	61	56
Low/middle-income country	10	35.7	39	35.8
sub-Saharan African country	4	14.3	9	8.3
Total	28	100	109	100
	Services			
High-income country	46	47.9	406	51.5
Low/middle-income country	30	31.3	253	32.1
sub-Saharan African country	20	20.8	129	16.4
Total	96	100	788	100

Notes: Authors' calculations. Firms with intra-firm trade are those with either intra-firm imports, or intra-firm exports or both. Resource-based manufacturing industry codes: 15, 16, 20, 21, 23, 25, 26, 27. Low-tech manufacturing industry codes: 17, 18, 19, 22, 28, 36. Medium/High-tech manufacturing industry codes: 24, 29, 30, 31, 32, 33, 34, 35, 37, 38. EGW supply: Electricity, gas and water supply (ISIC: 40). SSA: Foreign investors' country of origin is sub-Saharan African. Foreign investors' country of origin is classified as high-income (HI) and non-SSA low/middle-income (LMI) based on the World Bank historical country classification for the year 2010, and for the very few firms which answered the questionnaire in 2009, for that specific year. Low/Middle-income countries are those which are classified by the World Bank for the corresponding year as either low-income, or lower-middle-income, or upper-middle-income.
Source: UNIDO Africa Investor Survey 2010.

Table 3: Foreign affiliates with and without intra-firm trade

Panel A: With intra-firm trade	# of firms	% of firms
No	1877	78.1
Yes	526	21.9
Total	2403	100
Panel B: With intra-firm imports	# of firms	% of firms
No	117	22.2
Yes	409	77.8
Total	526	100
Panel C: With intra-firm exports	# of firms	% of firms
No	319	60.6
Yes	207	39.4
Total	526	100
Panel D: With both intra-firm imports and exports	# of firms	% of firms
No	436	82.9
Yes	90	17.1
Total	526	100
Panel E: With intra-firm imports only	# of firms	% of firms
No	207	39.4
Yes	319	60.6
Total	526	100
Panel F: With intra-firm exports only	# of firms	% of firms
No	409	77.8
Yes	117	22.2
Total	526	100

Notes: Authors' calculations. Firms with intra-firm trade are those with either intra-firm imports, or intra-firm exports or both.

Source: UNIDO Africa Investor Survey 2010.

Table 4: Foreign affiliates with different types of trade

Panel A: With trade	# of firms	% of firms
No	660	27.5
Yes	1743	72.5
Total	2403	100
Panel B: With 100% arms' length trade	# of firms	% of firms
No	1186	49.4
Yes	1217	50.6
Total	2403	100
Panel C: With 100% intra-firm trade	# of firms	% of firms
No	2226	92.6
Yes	177	7.4
Total	2403	100
Panel D: With both intra-firm and arms' length trade	# of firms	% of firms
No	2054	85.48
Yes	349	14.52
Total	2403	100.00

Notes: Authors' calculations. Firms with trade are those with either imports, or exports or both.

Source: UNIDO Africa Investor Survey 2010.

The fact that most of the foreign affiliates in our sample do not engage in intra-firm trade does not mean that they do not trade at all. They do trade, but they only do so outside the boundaries of the firm (i.e., at arm's length), as shown in Table 4. According to Panel A, 1743 out of 2403 foreign affiliates (72.5% of the total) have either type of trade (i.e., either intra-firm or arms' length) and according to Panel B, 1217 or 50.6% of the total trade only at arms' length. Panels C and D reveal that arms' length trade is a popular activity also among foreign affiliates with intra-firm trade. Only 177 out of the 526 have only intra-firm trade, the rest 349 have a combination of both.

As shown in Table 5, among the 1743 foreign affiliates which have any of the two types of trade, 88.4% of these are importers (i.e., either intra-firm importers, or arms' length importers, or both) (Panel A), 48.9% are exporters (i.e., either intra-firm exporters, or arms' length exporters, or both) (Panel B), 37.3% are both importers and exporters (Panel C), 51.1% are only importers (Panel D), and 11.6% are only exporters (Panel E).

Table 6 shows that among the 1540 importers, 73.4% of these import only at arms' length (Panel A), while 9.2% only intra-firm (Panel B). For the 853 exporters, I show that 75.7% of these export only at arms' length (Panel C), while 6.2% only intra-firm (Panel D). The vast majority of the 650 importers-exporters trade only at arms' length (86.2%) (Panel E). Only 17% of these import and export only from and to their parent and/or other affiliated parties (Panel F).

Table 5: Foreign affiliates with and without trade

Panel A: With imports	# of firms	% of firms
No	203	11.6
Yes	1540	88.4
Total	1743	100
Panel B: With exports	# of firms	% of firms
No	890	51.1
Yes	853	48.9
Total	1743	100
Panel C: With both imports and exports	# of firms	% of firms
No	1093	62.7
Yes	650	37.3
Total	1743	100
Panel D: With imports only	# of firms	% of firms
No	853	48.9
Yes	890	51.1
Total	1743	100
Panel E: With exports only	# of firms	% of firms
No	1540	88.4
Yes	203	11.6
Total	1743	100

Notes: Authors' calculations. Imports and exports are either intra-firm or arms' length or both.
Source: UNIDO Africa Investor Survey 2010.

In Table 7 we provide evidence on foreign affiliates with various combinations of intra-firm and arms' length trade flows. We show that 15.4% of the 1743 foreign affiliates with trade have both intra-firm and arms' length imports, 8.8% have both intra-firm and arms' length exports, 4.2% have intra-firm and arms' length imports and exports, 6.4% have intra-firm imports and only arms' length exports, 4.6% have intra-firm exports and only arms' length imports, 4.5% have intra-firm and arms' length imports and only arms' length exports, 3.8% have intra-firm and arms' length exports and only arms' length imports, 3.8% have intra-firm and arms' length imports and intra-firm exports, 3.4% have intra-firm and arms' length exports and intra-firm imports, 0.7% have intra-firm and arms' length imports and only intra-firm exports, and finally, 0.4% have intra-firm and arms' length exports and only intra-firm imports. We also produce the tables for those with intra-firm and/or arms' length trade, for those which trade only at arms' length, as well as for those which trade only intra-firm by sector and by sector-parent location pairs. The tables reveal a salient heterogeneity across sectors and

across sector-parent location pairs. Foreign affiliates which trade only at arms' length are the majority in all sectors and for almost all sector-parent location pairs.

Table 6: Foreign affiliates with 100% arms' length trade and 100% intra-firm trade

Panel A: With 100% arms' length imports	# of firms	% of firms
No	409	26.6
Yes	1131	73.4
Total	1540	100
Panel B: With 100% intra-firm imports	# of firms	% of firms
No	1399	90.8
Yes	141	9.2
Total	1540	100
Panel C: With 100% arms' length exports	# of firms	% of firms
No	207	24.3
Yes	646	75.7
Total	853	100
Panel D: With 100% intra-firm exports	# of firms	% of firms
No	800	93.8
Yes	53	6.2
Total	853	100
Panel E: With both 100% arms' length imports and exports	# of firms	% of firms
No	90	13.8
Yes	560	86.2
Total	650	100
Panel F: With both 100% intra-firm imports and exports	# of firms	% of firms
No	633	97.4
Yes	17	2.6
Total	650	100

Notes: Authors' calculations. Panel A: Firms whose 100% of imports are at arms' length. Panel B: Firms whose 100% of imports are intra-firm. Panel C: Firms whose 100% of exports are at arms' length. Panel D: Firms whose 100% of exports are intra-firm. Panel E: Firms whose 100% of imports and 100% of exports are at arms' length. Panel F: Firms whose 100% of imports and 100% of exports are intra-firm.
Source: UNIDO Africa Investor Survey 2010.

In sum, although most of the foreign affiliates in our sample engage in trade activities, they do so mostly at arms' length. Arm's length trade is a popular activity even among foreign affiliates with intra-firm trade. By contrast, intra-firm trade is scarce.

Despite the great progress that has been made in recent years both in theory (Antràs, 2003) and in empirics (Nunn and Trefler, 2013; Corcos et al., 2013) on the determinants of firm boundaries, the fact that most of the foreign affiliates in our sample, even those with intra-firm trade, engage in trade with unaffiliated parties, calls for further investigation of this issue. Unfortunately, the data available to us lack firm-to-firm transactions by product and therefore, we cannot look into this issue.

What is more, the scarcity of intra-firm trade makes one wonder as to why firm boundaries exist, if not for the transfer of physical goods. Atalay et al. (2014) argue that the primary reason for the existence of firm boundaries is the transfer of intangibles, rather than tangible goods. Hence, they imply that intangibles, when transferred through the market, are subject to the same inefficiencies as physical goods (Grossman and Hart, 1986; Hart and Moore, 1990; Antràs, 2003) and that these inefficiencies are mitigated when they are transferred within the firm boundaries.⁷

⁷According to the Property Rights Theory (PRT), the firm boundaries ensure that the owner has residual rights of control over relationship-specific assets.

Table 7: Foreign affiliates with combinations of intra-firm and arms' length trade

Panel A: With intra-firm and arms' length imports	# of firms	% of firms
No	1475	84.6
Yes	268	15.4
Total	1743	100
Panel B: With intra-firm and arms' length exports	# of firms	% of firms
No	1589	91.2
Yes	154	8.8
Total	1743	100
Panel C: With intra-firm and arms' length imports and exports	# of firms	% of firms
No	1670	95.8
Yes	73	4.2
Total	1743	100
Panel D: With intra-firm imports and arms' length exports	# of firms	% of firms
No	1632	93.6
Yes	111	6.4
Total	1743	100
Panel E: With intra-firm exports and arms' length imports	# of firms	% of firms
No	1663	95.4
Yes	80	4.6
Total	1743	100
Panel F: With intra-firm and arms' length imports and arms' length exports	# of firms	% of firms
No	1665	95.5
Yes	78	4.5
Total	1743	100
Panel G: With intra-firm and arms' length exports and arms' length imports	# of firms	% of firms
No	1677	96.2
Yes	66	3.8
Total	1743	100
Panel H: With intra-firm and arms' length imports and intra-firm exports	# of firms	% of firms
No	1677	96.2
Yes	66	3.8
Total	1743	100
Panel I: With intra-firm and arms' length exports and intra-firm imports	# of firms	% of firms
No	1683	96.6
Yes	60	3.4
Total	1743	100
Panel J: With intra-firm and arms' length imports and 100% intra-firm exports	# of firms	% of firms
No	1730	99.3
Yes	13	0.7
Total	1743	100
Panel K: With intra-firm and arms' length exports and 100% intra-firm imports	# of firms	% of firms
No	1736	99.6
Yes	7	0.4
Total	1743	100

Notes: Authors' calculations.
Source: UNIDO Africa Investor Survey 2010.

Table 8 displays the same statistics as in Table 3 by sector and parent location. In terms of sectors, the highest percentage of foreign affiliates with intra-firm trade operate in Agriculture (43%), Mining (32.7%), and Manufacturing (28.8%), while the lowest percentage in Services (10.7%) and EGW supply and Construction (19.3%). Within manufacturing, the percentage of the same type of affiliate in resource-based industries is a bit smaller than the whole sector (27.7%), that in low-tech industries almost identical (28.7%), and that in medium/high-tech industries slightly bigger (31.4%). In Panel A.1, the percentages of foreign affiliates with intra-firm trade whose parents are located in high-income countries are bigger than before in Agriculture (48.6%), Manufacturing (31.8%), and in particular, in Resource-based manufacturing (32.1%) and Medium/High-tech manufacturing (39%). Instead, they are smaller in Mining (28.6%)

and Low-tech manufacturing (25.2%), and only slightly smaller in EGW supply and Construction (18.7%) and Services (10.2%).

The pattern is a bit different for foreign affiliates whose parents are located in non-SSA low/middle-income countries and in SSA countries (Panel A.2 and Panel A.3). The percentages for the first, as compared to those in Panel A, are higher in Mining (33.3%), Low-tech manufacturing (33.1%), and EGW supply and Construction (20.4%), while lower or roughly equal in Agriculture (31.6%), Manufacturing (25.8%), Resource-based and Medium/High-tech manufacturing (22.4% and 20%, respectively), and in Services (10.6%). The percentages for the second are smaller or roughly equal in Agriculture (35.3%), and in Low-tech and Medium/High-tech manufacturing (28.6% and 30.8%, respectively), while bigger in Manufacturing (31.6%), Resource-based manufacturing (33.3%), EGW supply and Construction (30.8%), and Services (13.4%). There are no foreign investors from sub-Saharan Africa with foreign affiliates in Mining.

Panel B shows that among firms with intra-firm trade, the highest percentages of those with intra-firm imports operate in Services (99%), EGW supply and Construction (96.4%), Mining (88.2%), Low-tech manufacturing (82.5%), Medium/High-tech manufacturing (76.3%), Manufacturing (73.2%), while the lowest in Agriculture (51%) and Resource-based manufacturing (65.4%). Panels B.1-B.3 reveal that the patterns for foreign affiliates with intra-firm imports whose parents are located in any of the three country types are very similar to the one in Panel B. The main differences are observed in Agriculture in which there is a smaller percentage of foreign affiliates with intra-firm imports whose parents are located in high-income countries (42.9%), while a higher percentage of those whose parents are located in non-SSA low/middle-income and SSA countries (66.7% and 83.3%, respectively). In addition, while the percentage of firms with intra-firm imports whose parents are located in non-SSA low/middle-income countries is higher in Medium/High-tech manufacturing (87.5%), that of firms whose parents are located in SSA countries is much smaller (62.5%).

According to Panel C, the highest percentages of foreign affiliates with intra-firm exports are found in Agriculture (73.5%), Mining (52.9%), and Resource-based manufacturing (52.3%), while the lowest ones in Services (2%) and in EGW supply and Construction (7.1%). Panels C.1 to C.3 reveal that the percentage of firms with intra-firm exports whose parents are located in high-income countries is higher than the one in Panel C in all industries except for Medium/High-tech manufacturing (37.5% Vs 38.2%), while the percentages of firms whose parents are located in non-SSA low/middle-income countries and SSA countries are lower in all industries except for Low-tech and Medium/High-tech manufacturing (Panel C.2: 50.9% Vs 47.6% and 43.8% Vs 38.2%, respectively) and for EGW supply and Construction (Panel C.3: 25% Vs 7.1%).

Panel D indicates that the biggest percentages of foreign affiliates with both intra-firm imports and exports are in Mining (41.2%), Low-tech manufacturing (30.1%), and Agriculture (24.5%), while the smallest percentages in Services (1%) and EGW supply and Construction (3.6%). The pattern in Panel D.1 (i.e., for firms whose parents are located in high-income countries) is very similar to the one in Panel D. The percentages though, of affiliates with both intra-firm imports and exports are much higher in Mining (62.5%), and Resource-based and Low-tech manufacturing (24.4% and 36.1%, respectively). However, the percentage of affiliates in Services is zero. Panel D.2 (i.e., foreign affiliates with both intra-firm imports and exports whose parents are located in

Table 8: Foreign affiliates with intra-firm trade by sector and parent location

		Agriculture		Mining		Manufacturing		Resource-based manufacturing		Low-tech manufacturing		Medium/high-tech manufacturing		ECW supply/Construction		Services	
		# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms
Panel A: With intra-firm trade																	
No		65	57	35	67.3	821	71.2	399	72.3	256	71.3	166	68.6	117	80.7	838	89.3
Yes		49	43	17	32.7	332	28.8	153	28.8	103	28.7	76	31.4	28	19.3	100	10.7
Total		114	100	52	100	1153	100	552	100	359	100	242	100	145	100	938	100
Panel A.1: With intra-firm trade (HI)																	
No		37	51.4	20	71.4	347	68.2	165	67.9	107	74.8	75	61	61	81.3	406	89.8
Yes		35	48.6	8	28.6	162	31.8	78	32.1	36	25.2	48	39	14	18.7	46	10.2
Total		72	100	28	100	509	100	243	100	143	100	123	100	75	100	452	100
Panel A.2: With intra-firm trade (LMI)																	
No		13	68.4	14	66.7	334	74.2	163	77.6	107	66.9	64	80	39	79.6	253	89.4
Yes		6	31.6	7	33.3	116	25.8	47	22.4	53	33.1	16	20	10	20.4	30	10.6
Total		19	100	21	100	450	100	210	100	160	100	80	100	49	100	283	100
Panel A.3: With intra-firm trade (SSA)																	
No		11	64.7	0	0	91	68.4	48	66.7	25	71.4	18	69.2	9	69.2	129	86.6
Yes		6	35.3	0	0	42	31.6	24	33.3	10	28.6	8	30.8	4	30.8	20	13.4
Total		17	100	0	0	133	100	72	100	35	100	26	100	13	100	149	100
Panel B: With intra-firm imports																	
No		24	49	2	11.8	89	26.8	53	34.6	18	17.5	18	23.7	1	3.6	1	1
Yes		25	51	15	88.2	213	73.2	100	65.4	85	82.5	58	76.3	27	96.4	99	99
Total		49	100	17	100	332	100	153	100	103	100	76	100	28	100	100	100
Panel B.1: With intra-firm imports (HI)																	
No		20	57.1	1	12.5	44	27.2	26	33.3	6	16.7	12	25	0	0	1	2.2
Yes		15	42.9	7	87.5	118	72.8	52	66.7	30	83.3	36	75	14	100	45	97.8
Total		35	100	8	100	162	100	78	100	36	100	48	100	14	100	46	100
Panel B.2: With intra-firm imports (LMI)																	
No		2	33.3	1	14.3	29	25	17	36.2	10	18.9	2	12.5	0	0	0	0
Yes		4	66.7	6	85.7	87	75	30	63.8	43	81.1	14	87.5	10	100	30	100
Total		6	100	7	100	116	100	47	100	53	100	16	100	10	100	30	100
Panel B.3: With intra-firm imports (SSA)																	
No		1	16.7	0	0	13	31	9	37.5	1	10	3	37.5	1	25	0	0
Yes		5	83.3	0	0	29	69	15	62.5	9	90	5	62.5	3	75	20	100
Total		6	100	0	0	42	100	24	100	10	100	8	100	4	100	20	100
Panel C: With intra-firm exports																	
No		13	26.5	8	47.1	174	52.4	73	47.7	54	52.4	47	61.8	26	92.9	98	98
Yes		36	73.5	9	52.9	158	47.6	80	52.3	49	47.6	29	38.2	2	7.1	2	2
Total		49	100	17	100	332	100	153	100	103	100	76	100	28	100	100	100
Panel C.1: With intra-firm exports (HI)																	
No		6	17.1	2	25	80	49.4	33	42.3	17	47.2	30	62.5	13	92.9	45	97.8
Yes		29	82.9	6	75	82	50.6	45	57.7	10	52.8	18	37.5	1	7.1	1	2.2
Total		35	100	8	100	162	100	78	100	36	100	48	100	14	100	46	100
Panel C.2: With intra-firm exports (LMI)																	
No		2	33.3	5	71.4	62	53.4	27	57.4	26	49.1	9	56.3	10	100	29	96.7
Yes		4	66.7	2	28.6	54	46.6	20	42.6	27	50.9	7	43.8	0	0	1	3.3
Total		6	100	7	100	116	100	47	100	53	100	16	100	10	100	30	100
Panel C.3: With intra-firm exports (SSA)																	
No		4	66.7	0	0	25	59.5	12	50	8	80	5	62.5	3	75	20	100
Yes		2	33.3	0	0	17	40.5	12	50	2	20	3	37.5	1	25	0	0
Total		6	100	0	0	42	100	24	100	10	100	8	100	4	100	20	100

Foreign affiliates with intra-firm trade by sector and parent location (continued)

	Agriculture		Mining		Manufacturing		Resource-based manufacturing		Low-tech manufacturing		Medium/high-tech manufacturing		EGW supply/Construction		Services	
	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms
Panel D: With both intra-firm imports and exports																
No	37	75.5	10	58.8	263	79.2	126	82.4	72	69.9	65	85.5	27	96.4	99	99
Yes	12	24.5	7	41.2	69	20.8	27	17.6	31	30.1	11	14.5	1	3.6	1	1
Total	49	100	17	100	332	100	153	100	103	100	76	100	28	100	100	100
Panel D.1: With both intra-firm imports and exports (HI)																
No	26	74.3	3	37.5	124	76.5	59	75.6	23	63.9	42	87.5	13	92.9	46	100
Yes	9	25.7	5	62.5	38	23.5	19	24.4	6	36.1	6	12.5	1	7.1	0	0
Total	35	100	8	100	162	100	78	100	36	100	48	100	14	100	46	100
Panel D.2: With both intra-firm imports and exports (LMI)																
No	4	66.7	6	85.7	91	78.4	44	93.6	36	67.9	11	68.8	10	100	29	96.7
Yes	2	33.3	1	14.3	25	21.6	3	6.4	17	32.1	5	31.3	0	0	1	3.3
Total	6	100	7	100	116	100	47	100	53	100	16	100	10	100	30	100
Panel D.3: With both intra-firm imports and exports (SSA)																
No	5	83.3	0	0	38	90.5	21	87.5	9	90	8	100	4	100	20	100
Yes	1	16.7	0	0	4	9.5	3	12.5	1	10	0	0	0	0	0	0
Total	6	100	0	0	42	100	24	100	10	100	8	100	4	100	20	100
Panel E: With intra-firm imports only																
No	36	73.5	9	52.9	158	47.6	80	52.3	49	47.6	29	38.2	2	7.1	2	2
Yes	13	26.5	8	47.1	174	52.4	73	47.7	54	52.4	47	61.8	26	92.9	98	98
Total	49	100	17	100	332	100	153	100	103	100	76	100	28	100	100	100
Panel E.1: With intra-firm imports only (HI)																
No	29	82.9	6	75	82	50.6	45	57.7	19	52.8	18	37.5	1	7.1	1	2.2
Yes	6	17.1	2	25	80	49.4	33	42.3	17	47.2	30	62.5	13	92.9	45	97.8
Total	35	100	8	100	162	100	78	100	36	100	48	100	14	100	46	100
Panel E.2: With intra-firm imports only (LMI)																
No	4	66.7	2	28.6	54	46.6	20	42.6	27	50.9	7	43.8	0	0	1	3.3
Yes	2	33.3	5	71.4	62	53.4	27	57.4	26	49.1	9	56.3	10	100	29	96.7
Total	6	100	7	100	116	100	47	100	53	100	16	100	10	100	30	100
Panel E.3: With intra-firm imports only (SSA)																
No	2	33.3	0	0	17	40.5	12	50	2	20	3	37.5	1	25	0	0
Yes	4	66.7	0	0	25	59.5	12	50	8	80	5	62.5	3	75	20	100
Total	6	100	0	0	42	100	24	100	10	100	8	100	4	100	20	100
Panel F: With intra-firm exports only																
No	25	51	15	88.2	243	73.2	100	65.4	85	82.5	58	76.3	27	96.4	99	99
Yes	24	49	2	11.8	89	26.8	53	34.6	18	17.5	18	23.7	1	3.6	1	1
Total	49	100	17	100	332	100	153	100	103	100	76	100	28	100	100	100
Panel F.1: With intra-firm exports only (HI)																
No	15	42.9	7	87.5	118	72.8	52	66.7	30	83.3	36	75	14	100	45	97.8
Yes	20	57.1	1	12.5	44	27.2	26	33.3	6	16.7	12	25	0	0	1	2.2
Total	35	100	8	100	162	100	78	100	36	100	48	100	14	100	46	100
Panel F.2: With intra-firm exports only (LMI)																
No	4	66.7	6	85.7	87	75	30	63.8	43	81.1	14	87.5	10	100	30	100
Yes	2	33.3	1	14.3	29	25	17	36.2	10	18.9	2	12.5	0	0	0	0
Total	6	100	7	100	116	100	47	100	53	100	16	100	10	100	30	100
Panel F.3: With intra-firm exports only (SSA)																
No	5	83.3	0	0	29	69	15	62.5	9	90	5	62.5	3	75	20	100
Yes	1	16.7	0	0	13	31	9	37.5	1	10	3	37.5	1	25	0	0
Total	6	100	0	0	42	100	24	100	10	100	8	100	4	100	20	100

Source: Authors' calculations. Firms with intra-firm trade are those with either intra-firm imports or intra-firm exports or both. Resource-based manufacturing industry codes: 15, 16, 20, 21, 23, 25, 26, 27. Low-tech manufacturing industry codes: 17, 18, 19, 22, 26, 36. Medium/High-tech manufacturing industry codes: 24, 29, 30, 31, 32, 33, 34, 35, 37, 38. EGW supply: Electricity, gas and water supply (BISG: 40). SSA: Foreign investors' country of origin is classified as high-income (HI) and non-SSA low/middle-income (LMI) based on the World Bank historical country classification for the year 2010. Source: UNIDO Africa Investor Survey 2010.

non-SSA low/middle-income countries) displays a different pattern. The highest percentages of these type of affiliates belong to Agriculture (33.3%), and Low-tech and Medium/High-tech manufacturing (32.1% and 31.3%, respectively), while the lowest ones to Services (3.3%) and Resource-based manufacturing (6.4%). EGW supply and Construction includes no firms of this type. Panel D.3 (i.e., foreign affiliates with both intra-firm imports and exports whose parents are based in SSA countries) shows that there are no firms of this type in Mining, Medium/High-tech manufacturing, EGW supply and Construction, and Services. Also, their percentages in Agriculture, and Resource-based and Low-tech manufacturing are much smaller than those in Panel D.

Panel E displays for each sector the percentages of foreign affiliates which have only intra-firm imports. The highest ones are found in Services (98%) and EGW supply and Construction (92.9%), in Manufacturing (52.4%), and in particular, in Low-tech and Medium/High-tech manufacturing (52.4% and 61.8%, respectively). The lowest ones are found in Agriculture (26.5%) and Mining (47.1%). Most of these percentages decline in all industries but Services and EGW supply and Construction when the parents of these affiliates are based in high-income countries. The percentages of firms whose parents are in non-SSA low/middle-income countries (Panel E.2) and in SSA countries (Panel E.3) remain as high as in Panel E in Services and EGW supply and Construction. The percentages of the first firm type are higher in Agriculture (33.3%) and in Mining (71.4%). There are not any differences in Manufacturing. The percentages of the second firm type are much higher in Agriculture (66.7%) and in Low-tech manufacturing (80%).

As Panels F to F.3 are mirror images of Panels E to Panel E.3, they indicate that the lowest percentages of foreign affiliates which have only intra-firm exports are to be found in Services (1%) and EGW supply and Construction (3.6%), regardless of the origin of the parent company. In most of the industries, the percentage of foreign affiliates whose parents come from high-income countries is higher than that in Panel F. The opposite is true for foreign affiliates whose parents come from non-SSA low/middle-income countries and SSA countries (Panels F.2 and F.3). The exceptions are firms in Mining (14.3%), Resource-based manufacturing (36.2%), and Low-tech manufacturing (18.9%) in Panel F.2, and firms in Manufacturing (31%), and especially, in Resource-based manufacturing and Medium/High-tech manufacturing (37.5% each) in Panel F.3.

Given that foreign affiliates trade mostly at arms' length, we produce the same tables for those with trade (i.e., either intra-firm or arms' length trade, or both) (Table A1), for those which trade only at arms' length (Table A2), as well as for those which trade only within firm boundaries (Table A3). The tables are provided in the Appendix and reveal, similar to Table 8, that there is salient heterogeneity by sector and by sector and parent location. In contrast to foreign affiliates with intra-firm trade, those which trade at arms' length are the majority for almost all combinations of sectors and parent locations.

Having found evidence for the scarcity of intra-firm trade as [Ramondo et al. \(2011\)](#), and the popularity of arm's length trade even among foreign affiliates with intra-firm trade, we compare the distributions of the two firms types in terms of their size and productivity level. The top panel of Figure ?? plots the kernel densities of the two firm types in terms of their size, proxied by the log of the total number of employees, while the bottom panel the densities in terms of their level of productivity, proxied by the log of the ratio of total sales to total number of employees. Both panels show

that the distribution of foreign affiliates with intra-firm trade is more skewed to the left compared to the distribution of those without intra-firm trade. In other words, the density of foreign affiliates with intra-firm trade is greater for higher values of size and productivity.

Figure 1: Density of foreign affiliates by size and productivity

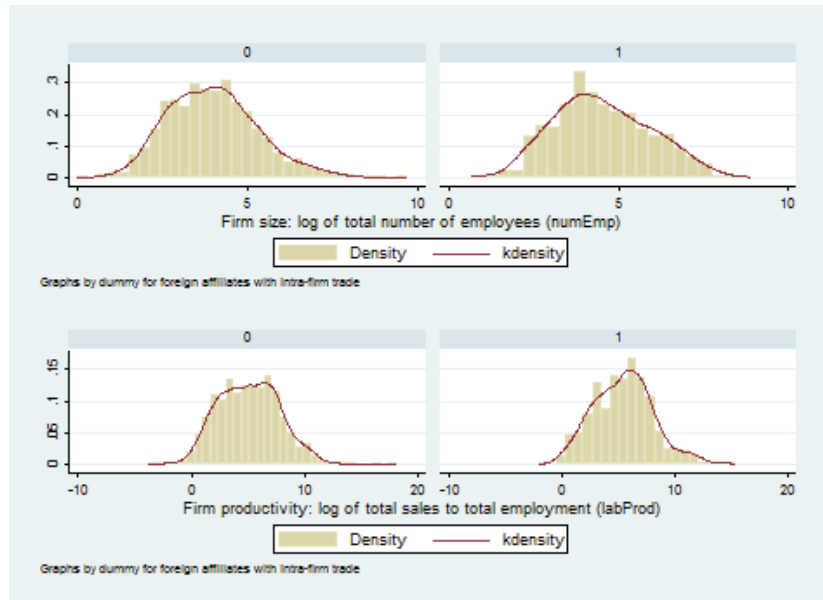
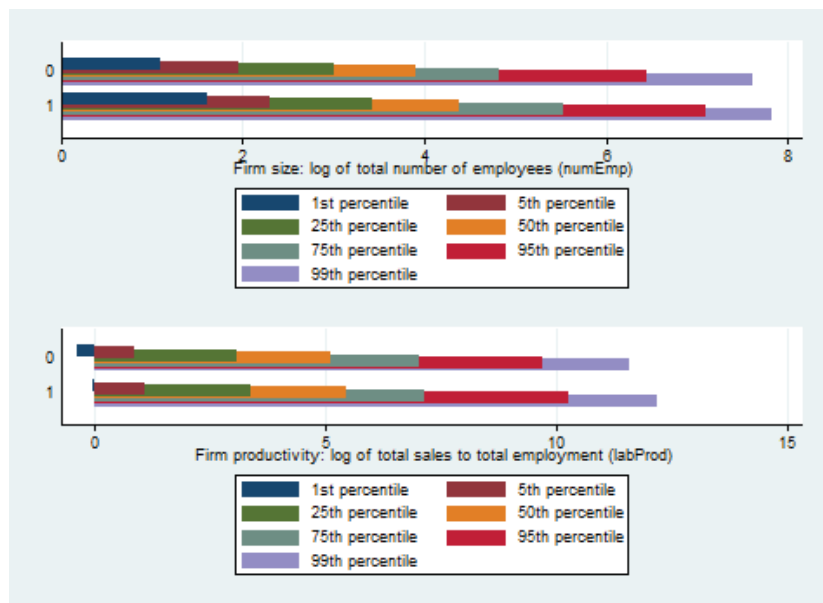


Figure 2: Foreign affiliates by size and productivity in percentiles



We draw the same conclusions from Figure 2 which plots the percentile distributions

of the two firm types in terms of size (top panel) and productivity (bottom panel). Foreign affiliates with intra-firm trade have higher size and productivity values at all seven percentiles examined.

We obtain very similar kernel densities and percentile distributions in graphs that we plot with alternative proxies for size and productivity. We proxy size with total sales (Figures A1 and A2 in Appendix A) and productivity with the ratio of value added to total number of employees (Figures A3 and A4 in Appendix A) and total factor productivity (Figures A5 and A6 in Appendix A).

3 Econometric model

We estimate a probit model in order to investigate which firm characteristics are more likely to be pertinent to one of the two firm types. For firm z in (host) country c and industry j , whose parent company is located in country p , the estimating benchmark model is the following:

$$\begin{aligned}
 D_{ift,zcjp} = & \alpha + \beta_1 * skillInt_{zcjp} + \beta_2 * capInt_{zcjp} + \beta_3 * numEmp_{zcjp} \\
 & + \beta_4 * wageEmp_{zcjp} + \beta_5 * labProd_{zcjp} + \beta_6 * inpInt_{zcjp} \\
 & + \beta_7 * D_{training_{zcjp}} + \beta_c * D_c + \beta_j * D_j + \beta_p * D_p + \epsilon_{zcjp}
 \end{aligned} \tag{1}$$

where the dependent variable, $D_{ift,zcjp}$, is a dummy taking value 1 if firm z has any type of intra-firm trade flows (i.e., either intra-firm imports, or intra-firm exports, or both), and 0 otherwise; $skillInt$ is the log of skill intensity (i.e., share of technical, supervisory and managerial employees in total number of employees), $capInt$ is the log of capital intensity (i.e., ratio of capital stock to total number of employees), $numEmp$ is the log of total number of employees as a proxy for firm size, $wageEmp$ is the log of wage per employee (i.e., total wage bill over total number of employees), $labProd$ is the log of labour productivity (i.e., ratio of total sales to total number of employees), $inpInt$ is the log of input intensity (i.e., ratio of value of inputs to total number of employees), $D_{training}$ is a dummy which takes value 1 if firm j provides formal internal/external training to its employees and 0 otherwise, D_c is a set of host-country dummies, D_j a set of industry dummies, and D_p a set of parent-location dummies (i.e., country of origin of the parent company).

The host-country dummies control for any unobserved heterogeneity across the countries which receive foreign investment (e.g. cross-country differences in institutional quality and business environment). By adding industry dummies, we control for any unobserved heterogeneity across industries (e.g. technology and knowledge intensity of industries). The parent-location dummies account for any unobserved heterogeneity across the countries of origin of the investors (e.g. cross-country differences in corporate culture).

The interpretation of the coefficient estimates is as follows. A positive and statistically significant coefficient estimate indicates that foreign affiliates with intra-firm trade are more likely to acquire the respective characteristic as compared to those without intra-firm trade. Likewise, a negative coefficient estimate implies that the probability foreign affiliates with intra-firm trade have the respective characteristic is lower.

4 Empirical results

4.1 Main results

The results from the probit estimation of equation 1 are portrayed in column 1 of Table 9. The coefficient estimates of firm size and labour productivity are positive and significant at the level of 1%. The estimated coefficients of skill and capital intensity are negative but not statistically significant. Those of the average wage, input intensity, and the dummy for provision of training to employees are all positive and insignificant.

In column 2, we use total sales as an alternative proxy for firm size and drop labour productivity in order to avoid collinearity. Its coefficient estimate is still positive and highly significant. In columns 3, we run the same probit regression as in column 1, with the only difference that we substitute total factor productivity for labour productivity. By and large, the results are the same with those in column 1. The magnitude of the coefficient estimate of the main proxy for firm size is smaller and significant only at 5%.

Table 9: Main characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0153 [0.014]	-0.0198 [0.013]	-0.0169 [0.014]	-0.00840 [0.0086]	-0.00241 [0.012]	-0.00102 [0.0050]
<i>capInt</i>	-0.00580 [0.0077]	-0.00667 [0.0076]	-0.00113 [0.0075]	-0.00179 [0.0050]	-0.00351 [0.0065]	-0.000100 [0.0029]
<i>numEmp</i>	0.0476*** [0.010]		0.0283** [0.012]	0.0352*** [0.0069]	0.0232*** [0.0087]	0.0146*** [0.0041]
<i>wageEmp</i>	0.0170 [0.012]	0.0148 [0.011]	0.0147 [0.012]	0.000245 [0.0075]	0.0178* [0.0100]	0.00267 [0.0044]
<i>labProd</i>	0.0332*** [0.0099]			0.0231*** [0.0071]	0.0216** [0.0087]	0.0109** [0.0048]
<i>inpInt</i>	0.00442 [0.0080]	0.00132 [0.0075]	0.00278 [0.0079]	-0.00233 [0.0052]	0.00739 [0.0072]	0.00205 [0.0033]
$D_{training}$ (d)	0.0219 [0.023]	0.0241 [0.023]	0.0187 [0.023]	-0.0126 [0.014]	0.0355* [0.019]	-0.00395 [0.0088]
<i>totSales</i>		0.0403*** [0.0072]				
<i>tfp</i>			0.0394*** [0.010]			
Obs	1581	1581	1580	1247	1555	940
<i>Pseudo</i> - R^2	0.20	0.20	0.21	0.28	0.17	0.30
<i>Log</i> - likelihood	-730.0	-730.5	-728.1	-382.1	-644.2	-194.0

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, $D_{training}$: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

In column 4, we re-estimate the benchmark model by having as dependent variable a dummy which takes value 1 if the foreign affiliate has intra-firm exports (D_{ifex}). Affiliates with intra-firm exports seem to be bigger and more productive than those without intra-firm exports. The first finding is in line with that of Ramondo et al. (2011) who use the same dependent variable.

The same authors use also imports of foreign affiliates from their parent as dependent variable. In the same direction, Hanson et al. (2001) study the flows of intermediate

goods from the parent to the foreign affiliate by using a measure of the affiliate size. In addition, as already discussed in Section 2, we find that, among foreign affiliates with intra-firm trade, the number of these with intra-firm imports is exceptionally high in many sectors of the economy (Mining, Low-tech and Medium/High-tech manufacturing, EGW supply and Construction, Services). Hence, we estimate the benchmark model with a dummy as dependent variable, which is equal to 1 if the foreign affiliate has intra-firm imports. The results remain unchanged and are shown in column 5.

Using the narrow definition of “vertical” FDI, according to which the foreign affiliate has both intra-firm imports and exports, we re-estimate the benchmark model after replacing the dependent variable with a dummy which takes value 1 if the affiliate has both intra-firm flows. The main results still hold and are shown in column 6.

In short, we conclude that the average foreign affiliate with intra-firm trade tends to have bigger size and higher level of productivity. In the next section, we perform several test to check the robustness of these results.

4.2 Robustness checks

In this section, we perform several tests in order to check the robustness of the main results of Table 9. All relevant tables are relegated to the Appendix. By and large, the regressions estimated pass successfully the robustness checks.

We re-estimate all 7 regressions after restricting the sample to the manufacturing sector (Table B1), to majority-owned foreign affiliates (MOFAs) (i.e., those owned by their parent by at least 50%) in the whole economy (Table B2) and to MOFAs in manufacturing (Table B3).

In the benchmark case we construct the dummy for intra-firm trade by assuming that any missing observations of intra-firm imports and exports are due to the fact that the firm did not have any intra-firm flows and the respondent of the questionnaire left the relevant questions unanswered. However, it may also be the case that the respondent did not want to disclose such kind of information. We control for this possibility by dropping all missing observations of intra-firm flows. Then, we estimate all 7 regressions for the whole economy (Table B4), the manufacturing sector (Table B5), for MOFAs in the whole economy (Table B6) and the manufacturing sector (Table B7).

In order to ensure that the positive and significant coefficient estimates of size and productivity do not simply capture the age of the firm (i.e., the older the firm, the bigger its size and the higher its productivity), we augment all 7 regressions with firm age (Table B8).

We also test the sensitivity of results to alternative functional forms, such as the logistic (Table B9) and linear probability models (Table B10).

We replace dummies for the country of the foreign investor with dummies for a broader definition of parent location. That is, we construct dummies for whether the parent is domiciled in a high-income, or non-SSA low/middle-income, or SSA country (Table B11). We also replace the host-country and industry dummies with dummies for pairs of host countries and industries (Table B12).

In robustness checks related to firm productivity and performance, we examine any differences regarding the most important reason for production capacity under-utilisation under normal circumstances. We find that the probability of foreign affiliates

with intra-firm trade not having their production capacity under-utilised under normal circumstances is higher (Table B13). Motivated by the literature on credit constraints and export performance (e.g. Chor and Manova, 2012) and the vulnerability of SSA to financial crises mostly through the disruption of the finance of trade channels (Berman and Martin, 2010), we also identify any differences in the change in their performance after the financial crisis of 2007-2008. We use two different measures. The first is based on the firm’s performance compared to overall expectations before the crisis (Table B14) and compared to *revised* expectations after the crisis (Table B15). The second is the average level of capacity utilisation of the firm three years before the crisis and immediately after (Tables B16 to B20). There do not seem to be any statistically significant differences in terms of firm performance either before or after the global financial crisis.

4.3 Selection into intra-firm trade

Helpman et al. (2004) and Bernard et al. (2007) find that US exporters have a productivity advantage over US non-exporters in 1996 and 1997, respectively. The second study also reports productivity and employment premia for importers over non-importers, as well as for importers-exporters over those without imports and exports. Employment, sales and productivity premia of importers over non-importers are also found by Antràs et al. (2014). Given that importing activities may result in an increase in firm productivity (Amiti and Konings, 2007), they also show that these premia existed before these firms began importing. Since we don’t have data for any year prior to the one examined (i.e., 2010), we are not able to test this either for imports or exports.

The graphical analysis in Section 2.2 shows that foreign affiliates with intra-firm seem to have an advantage in terms of size and productivity. In Table 10, we show the results from OLS regressions which quantify size and productivity premia. In Panel A, we regress the log of each proxy for firm productivity and size on a dummy for intra-firm trade (i.e., it takes value 1 if the foreign affiliates has either intra-firm imports, or exports, or both) and additional controls such as: skill intensity, capital intensity, input intensity, total employment, host-country, parent-location and industry dummies.⁸ The proxies for firm productivity are the following: ratio of total sales to total employment (column 1), ratio of value added to total employment (column 3), and total factor productivity (column 5). The proxies for firm size are: total employment (column 2) and total sales (column 4). We find that the productivity premia are between 25.4% (column 1) and 30.7% (column 5), while the size premia are between 31.5% (column 2) and 56.3% (column 4).

In Panel B, we run the same regressions as in Panel A after controlling for firms with only arms’ length trade. We do this by adding a dummy with value 1 if the firm has either imports or exports or both, but only at arms’ length (D_{armt}). Not surprisingly, we observe the same sorting pattern and even greater size and productivity premia.

⁸Firm size regressions omit the log of total employment as a covariate.

Table 10: Productivity and size premia of foreign affiliates with intra-firm and arm's length trade

Panel A: Foreign affiliates with intra-firm trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
<i>D_{ift}</i>	0.254***	0.315***	0.255**	0.563***	0.307***
	[0.066]	[0.066]	[0.10]	[0.090]	[0.067]
Obs	1815	1831	1348	1815	1812
Panel B: Foreign affiliates with intra-firm and arm's length trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
<i>D_{ift}</i>	0.292***	0.606***	0.334**	0.888***	0.376***
	[0.094]	[0.093]	[0.14]	[0.13]	[0.096]
<i>D_{armt}</i>	0.0450	0.348***	0.0958	0.390***	0.0820
	[0.083]	[0.079]	[0.11]	[0.12]	[0.084]
Obs	1815	1831	1348	1815	1812
Panel C: Foreign affiliates with different intra-firm flows					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
<i>D_{ifimonly}</i>	0.255**	0.489***	0.164	0.732***	0.342***
	[0.10]	[0.11]	[0.16]	[0.15]	[0.11]
<i>D_{ifexonly}</i>	0.282**	0.719***	0.504***	0.992***	0.358***
	[0.12]	[0.13]	[0.17]	[0.17]	[0.13]
<i>D_{ifimez}</i>	0.453***	0.869***	0.559**	1.308***	0.536***
	[0.17]	[0.15]	[0.24]	[0.23]	[0.17]
<i>D_{armt}</i>	0.0479	0.353***	0.103	0.397***	0.0848
	[0.083]	[0.079]	[0.11]	[0.12]	[0.084]
Obs	1815	1831	1348	1815	1812

Notes: OLS estimations with control variables in both panels and all columns: skill intensity, capital intensity, input intensity, total employment, host-country, parent-location and industry dummies. Firm size regressions omit the log of total employment as a covariate. Standard errors are clustered at the firm level. Productivity (column 1): log of the ratio of total sales to total employment. Size (column 2): total employment. Productivity (column 3): log of the ratio of value added to total employment. Size (column 4): log of total sales. Productivity (column 5): log of total factor productivity. Panels A and B: *D_{ift}*: firm has intra-firm imports or exports, or both (dummy). Panels B and C: *D_{armt}*: firm with arm's length trade only (i.e., either arm's length imports or exports or both but with no intra-firm trade). Panel C: *D_{ifimonly}*: firm has intra-firm imports only (dummy), *D_{ifexonly}*: firm has intra-firm exports only (dummy), *D_{ifimez}*: firm has both intra-firm imports and exports (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. All variables are in logs except for dummies.

In Panel C, we regress the same dependent variables on dummies for intra-firm imports only (i.e., it takes value 1 if the firm has only intra-firm imports), intra-firm exports only (i.e., it takes value 1 if the firm has only intra-firm exports), for both intra-firm imports and exports (i.e., it takes value 1 if the firm has both intra-firm imports and exports), for arm's length trade only, and the same control variables as in Panels A and B. Column 1 shows that foreign affiliates with only intra-firm imports, with only intra-firm exports and with both intra-firm imports and exports have a productivity advantage of 25.5%, 28.2%, and 45.3%, respectively, over those without intra-firm trade. The same sorting pattern arises when we use the other two proxies for firm productivity in columns 3 and 5. In all three columns, we fail to find any statistically significant premia for foreign affiliates which trade only at arm's length. In terms of size premia, these are: 48.9% for foreign affiliates with intra-firm imports only, 71.9% for foreign affiliates with intra-firm exports only, and 86.9% for foreign affiliates with both intra-firm imports and exports (column 2). Those with arm's length trade have the smallest size premia, of 35.3%. We obtain the same sorting pattern with even larger premia with the alternative proxy for firm size in column 4. We also find the same sorting pattern when we drop from the regressions the dummy for only arm's length trade but, as expected, the productivity and size premia are smaller.

Table 11: Productivity and size premia of foreign affiliates with intra-firm and arm's length trade (Manufacturing sector)

Panel A: Foreign affiliates with intra-firm trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
D_{ift}	0.216*** [0.076]	0.303*** [0.079]	0.243** [0.12]	0.524*** [0.11]	0.296*** [0.081]
Obs	961	963	835	961	957
Panel B: Foreign affiliates with intra-firm and arm's length trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
D_{ift}	0.313*** [0.12]	0.667*** [0.12]	0.470*** [0.18]	0.996*** [0.18]	0.393*** [0.13]
D_{armt}	0.112 [0.11]	0.428*** [0.11]	0.266 [0.16]	0.555*** [0.17]	0.113 [0.12]
Obs	961	963	835	961	957
Panel C: Foreign affiliates with different intra-firm flows					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
$D_{ifimonly}$	0.198 [0.13]	0.490*** [0.13]	0.263 [0.20]	0.698*** [0.20]	0.323** [0.14]
$D_{ifexonly}$	0.386*** [0.13]	0.820*** [0.15]	0.615*** [0.21]	1.218*** [0.19]	0.407*** [0.14]
D_{ifimex}	0.533** [0.23]	0.898*** [0.17]	0.793*** [0.30]	1.445*** [0.30]	0.578** [0.23]
D_{armt}	0.119 [0.11]	0.433*** [0.11]	0.273* [0.16]	0.563*** [0.17]	0.118 [0.12]
Obs	961	963	835	961	957

Notes: OLS estimations with control variables in both panels and all columns: skill intensity, capital intensity, input intensity, total employment, host-country, parent-location and industry dummies. Firm size regressions omit the log of total employment as a covariate. Standard errors are clustered at the firm level. Productivity (column 1): log of the ratio of total sales to total employment. Size (column 2): total employment. Productivity (column 3): log of the ratio of value added to total employment. Size (column 4): log of total sales. Productivity (column 5): log of total factor productivity. Panel A: D_{ift} : firm has intra-firm imports or exports, or both (dummy). Panel B: D_{ifim} : firm has intra-firm imports only (dummy), $D_{ifexonly}$: firm has intra-firm exports only (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy). Panels A and B: D_{armt} : firm with arms' length trade only (i.e., either arms' length imports or exports or both but with no intra-firm trade) (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. All variables are in logs except for dummies.

We check the robustness of these results by restricting the sample to firms in manufacturing. All columns in Panels A and B of Table 11 confirm the size and productivity advantage of foreign affiliates with intra-firm. Same as in Panels A and B of Table 10, the estimated premia are greater when foreign affiliates with only arm's length trade are controlled for. In addition, these premia are slightly smaller for foreign affiliates with intra-firm trade in manufacturing than in the whole economy when we do not control for foreign affiliates with only arm's length trade. When we control for this type of firms, their premia in manufacturing become greater than those in the whole economy. Importantly, the sorting pattern still holds (Panel C).

The premia documented above may be driven by a potential similarity in terms of size and productivity between foreign affiliates with only arm's length trade and locally-owned firms which engage in international trade. We compute size and productivity premia of these two firm types and find that foreign affiliates with only arm's length trade are dissimilar from domestic firms which trade. As shown in Table 12, they are bigger and more productive by 11.9% and 25.7%, respectively. We obtain very similar results after restricting the sample to firms in manufacturing (Table B21).

Table 12: Productivity and size premia of foreign affiliates with arms' length trade over domestic firms with arms' length trade

Panel A: Foreign affiliates with arms' length trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
D_{ftrade}	0.119*** [0.044]	0.257*** [0.044]	0.252*** [0.066]	0.388*** [0.064]	0.106** [0.043]
$D_{fnotrade}$	0.0759 [0.070]	-0.188*** [0.067]	0.242** [0.094]	-0.108 [0.10]	0.0340 [0.072]
$D_{nofnotrade}$	-0.250*** [0.047]	-0.558*** [0.041]	-0.217*** [0.065]	-0.832*** [0.063]	-0.236*** [0.044]
Obs	4672	4722	3528	4672	4647
Panel B: Foreign affiliates with different arms' length trade flows					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
$D_{fimponly}$	0.0987* [0.053]	0.0444 [0.049]	0.294*** [0.077]	0.142* [0.075]	0.0850 [0.053]
$D_{fexponly}$	0.248** [0.10]	0.266** [0.11]	0.441*** [0.13]	0.536*** [0.15]	0.302*** [0.095]
$D_{fimpexp}$	0.107 [0.074]	0.664*** [0.073]	0.102 [0.11]	0.797*** [0.10]	0.0664 [0.070]
$D_{fnotrade}$	0.0781 [0.070]	-0.187*** [0.067]	0.247*** [0.094]	-0.104 [0.10]	0.0375 [0.072]
$D_{nofnotrade}$	-0.249*** [0.047]	-0.562*** [0.041]	-0.209*** [0.065]	-0.835*** [0.063]	-0.233*** [0.044]
Obs	4672	4722	3528	4672	4647

Notes: OLS estimations with control variables in both panels and all columns: skill intensity, capital intensity, input intensity, total employment, host-country, parent-location and industry dummies. Firm size regressions omit the log of total employment as a covariate. Standard errors are clustered at the firm level. Productivity (column 1): log of the ratio of total sales to total employment. Size (column 2): total employment. Productivity (column 3): log of total factor productivity. Panel A: D_{ftrade} : firm is foreign-owned and has arms' length trade only (dummy). Panel B: $D_{fimponly}$: firm is foreign-owned and has arms' length imports only (dummy), $D_{fexponly}$: firm is foreign-owned and has arms' length exports only (dummy), $D_{fimpexp}$: firm is foreign-owned and has arms' length imports and exports (dummy). Panels A and B: $D_{fnotrade}$: firm is foreign-owned and has neither intra-firm nor arms' length trade (dummy), $D_{nofnotrade}$: firm is domestic (i.e., not foreign-owned) and has no trade (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. All variables are in logs except for dummies.

The evidence for self-selection of foreign affiliates into intra-firm and arm's length trade is similar to the evidence for self-selection of firms into aggregate trade (Bernard et al., 2007). However, in Table 13, we show that foreign affiliates with trade (either intra-firm or arms' length trade, or both) have size but not productivity premia (Panel A) and that the aforementioned sorting pattern is found only for size and not for productivity (Panel B). We get very similar results when we study only manufacturing firms (Table B22).

Table 13: Productivity and size premia of foreign affiliates with trade, both intra-firm and arms' length trade and arms' length trade only

Panel A: Foreign affiliates with trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
D_{trade}	0.0957 [0.081]	0.403*** [0.077]	0.145 [0.11]	0.499*** [0.11]	0.142* [0.082]
Obs	1815	1831	1348	1815	1812
Panel B: Foreign affiliates with different trade flows					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
D_{import}	0.0373 [0.086]	0.226*** [0.080]	0.101 [0.12]	0.257** [0.12]	0.0613 [0.087]
D_{export}	0.176 [0.12]	0.371*** [0.11]	0.312** [0.15]	0.548*** [0.16]	0.287** [0.12]
$D_{importexp}$	0.181* [0.098]	0.766*** [0.091]	0.139 [0.14]	0.937*** [0.13]	0.242** [0.099]
Obs	1815	1831	1348	1815	1812

Notes: OLS estimations with control variables in all panels and all columns: skill intensity, capital intensity, input intensity, total employment, host-country, parent-location and industry dummies. Firm size regressions omit the log of total employment as a covariate. Standard errors are clustered at the firm level. Productivity (column 1): log of the ratio of total sales to total employment. Size (column 2): total employment. Productivity (column 3): log of the ratio of value added to total employment. Size (column 4): log of total sales. Productivity (column 5): log of total factor productivity. Panel A: D_{trade} : firm has imports or exports, or both (dummy). Panel B: D_{import} : firm has imports only (dummy), D_{export} : firm has exports only (dummy), $D_{importexp}$: firm has both imports and exports (dummy). Dummies take value 1 if statement holds, and 0 otherwise. All variables are in logs except for dummies.

4.4 Summary of results and implications for the host country

We summarise the main findings of the empirical analysis as follows. Foreign affiliates with intra-firm trade account for only a small fraction of all firms in the sample, and are of larger size and higher productivity level. The first two findings are in line with those of Ramondo et al. (2011).

Their size premia range between 31.5% (size proxied by total number of employees) and 56.3% (size proxied by total sales). Their productivity premia are 25.4% (ratio of total sales to total number of employees), 25.5% (ratio of total value added to total number of employees) and 30.7% (total factor productivity).

Our evidence for self-selection of foreign affiliates into different intra-firm and arm's length trade flows indicates that, on average, foreign affiliates with both intra-firm imports and exports are the biggest and most productive firms, those with only intra-firm exports smaller and less productive, those with only intra-firm imports even smaller and less productive, while those with only arm's length trade are bigger and more productive only than those without intra-firm trade, which are the smallest and least productive firms. Reporting these premia becomes even more important after we show that foreign affiliates with only arm's length trade differ from domestic firms which engage in international trade in terms of size and productivity. They are bigger and more productive by 11.9% and 25.7%, respectively.

In attempt to link these findings to host-country effects of FDI, the size premia of the average foreign affiliate with intra-firm trade may in practice result in a higher number of job vacancies to be filled by local job-market seekers. Its productivity premia may imply greater productivity spillovers to local firms (e.g. supplier of inputs) with which it develops linkages.

5 Theoretical background

In this section we describe in detail the theoretical background of our subsequent econometric analysis. Motivated by our findings in section 4 for size and productivity premia of foreign affiliates with intra-firm trade, we start by providing a theoretical explanation for the selection of foreign affiliates into intra-firm trade. In addition, we study theoretically the potential differences between foreign affiliates with and without intra-firm trade in the following areas: stock and flow of intangibles, delegation of authority and grant of rights of control, extensive and intensive margins of sister affiliates, mode of foreign investment of the parent company, extensive and intensive margins of local and international procurement activities and of exporting activities.

In order to explain the selection of foreign affiliates into intra-firm and arm's length trade, we rely on the concept of firm heterogeneity in terms of productivity introduced by Melitz (2003). We plausibly assume that the fixed cost of engaging in intra-firm trade is greater than the fixed cost of engaging in arm's length trade since the first includes the cost of set-up of a new affiliate or the takeover of an existing firm, while the second the cost of search and match with an unaffiliated supplier or buyer (Antras and Helpman, 2004). Although the first fixed cost is initially borne by the parent company which is in charge of building a network of domestic and foreign affiliates, we assume that this cost is shared with its affiliates through intra-firm trade.

In sum, we plausibly assume that the fixed cost of selling in or buying from the host-country market is lower than the fixed cost of arm's length trade, which in turn, is lower than the fixed cost of intra-firm trade ($f_D < f_{armt} < f_{ift}$). The productivity cutoffs above which a firm can incur each of these fixed costs have the following order: ($\Theta_D < \Theta_{armt} < \Theta_{ift}$). Hence, only the most productive foreign affiliates, with productivity level of at least Θ_{ift} are able to engage in intra-firm trade. Those with intermediate levels of productivity ($\Theta_{armt} \leq \Theta < \Theta_{ift}$) engage in arm's length trade, while those with lower productivity levels ($\Theta_D \leq \Theta < \Theta_{armt}$) only sell in or buy from the host country. Foreign affiliates with productivity below Θ_D exit the market.

After decomposing intra-firm trade into different flows (i.e., imports, exports, both), we assume the following order for their fixed costs: $f_{ifim} < f_{ifex} < f_{ifimex} = f_{ifim} + f_{ifex}$. Similarly the order of their corresponding productivity cutoffs are: $\Theta_{ifim} < \Theta_{ifex} < \Theta_{ifimex}$. Eventually, the following sorting pattern arises: the biggest and most productive foreign affiliates engage in both intra-firm imports and exports, smaller and less productive in intra-firm exports, even smaller and even less productive in intra-firm imports, while among those whose size and productivity do not allow them to engage in any type of intra-firm trade, the biggest and most productive have only arm's length trade, smaller and less productive only sell into and source from the host-country market and the least productive exit.

6 Conclusion

In this paper we juxtapose the main firm characteristics between foreign affiliates with and without intra-firm trade located in 19 countries in sub-Saharan Africa in 2010.

Foreign affiliates with intra-firm trade are relatively few, of bigger size and higher

productivity level. We report size and productivity premia of 31.5% and 25.4%, respectively. The first two findings are in line with those of [Ramondo et al. \(2011\)](#). Further analysis reveals that foreign affiliates self-select into intra-firm and arm's length trade. On average, foreign affiliates with both intra-firm imports and exports seem to be the biggest and most productive firms, those with only intra-firm exports smaller and less productive, those with only intra-firm imports even smaller and less productive, while those with only arm's length trade are bigger and more productive only than those without intra-firm trade, which are the smallest and least productive firms.

After linking these findings to the debate on host-country effects of FDI, we argue that the greater size of the average foreign affiliate with intra-firm trade can be translated into a greater number of job opportunities for local job-market seekers. Moreover, any productivity spillovers to local firms may be higher when these firms develop linkages with the same type of foreign affiliate.

Despite the novelty of all results set out above, some intriguing issues can be studied in more depth while others remain unexplored. First, the time dimension would allow for studying causality and therefore, shed more light on the positive link between intra-firm trade and size and productivity.

Second, given the popularity of arm's length trade among the foreign affiliates in our sample, even among those with intra-firm trade, upon data availability on transactions between buyers and sellers by product, further investigation of the boundaries of the firm would be desirable.

Finally, even if firm boundaries mainly exist for the transfer of intangibles rather than of tangible goods ([Atalay et al., 2014](#)), which may be a plausible explanation for our evidence on the scarcity of intra-firm trade, a complementary question arises. Given the strong link between production sharing and knowledge flows ([Demsetz, 1988](#); [Simon, 1991](#); [Grant, 1996](#)), are there any differences between foreign affiliates with and without intra-firm trade in terms of knowledge transfers to them from their parent? By definition, the first type of foreign affiliate share production with its parent, while the second, either does not share production or it shares with an affiliated party. In the last case, knowledge associated with production sharing flows through the market and may be subject to inefficiencies that are mitigated within firm boundaries. Thus, the internalisation argument is present again. In addition, if there are indeed any differences between the two firm types in this respect, then one would expect that their concerns over knowledge expropriation from unaffiliated parties (e.g. local suppliers in the host country) could potentially differ as well. [Blanas and Seric \(2014\)](#) look into these two novel and intriguing issues.

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Table 14: Description of variables

Variable	Description
D_{ift}	the firm has intra-firm trade (imports, exports, or both) (dummy)
D_{ifim}	the firm has intra-firm imports (dummy)
D_{ifex}	the firm has intra-firm exports (dummy)
D_{ifimez}	the firm has both intra-firm imports and exports (dummy)
$skillInt$	log of skill intensity
$capInt$	log of capital intensity
$numEmp$	log of total number of employees (firm size)
$wageEmp$	log of wage per employee
$labProd$	log of labour productivity
tfp	log of total factor productivity
$inpInt$	log of input intensity
$D_{training}$	the firm provides formal internal and/or external training to its employees (dummy)
$D_{ifimonly}$	the firm has only intra-firm imports (dummy)
$D_{ifexonly}$	the firm has only intra-firm exports (dummy)
D_{arnt}	the firm has only arms' length trade (dummy)
D_{ftrade}	the firm is foreign-owned and has arms' length trade only (dummy)
$D_{fnotrade}$	firm is foreign-owned and has neither intra-firm nor arms' length trade (dummy)
$D_{nofnotrade}$	firm is domestic (i.e., not foreign-owned) and has no trade (dummy)
$D_{fimportonly}$	the firm is foreign-owned and has arms' length imports only (dummy)
$D_{fexportonly}$	the firm is foreign-owned and has arms' length exports only (dummy)
$D_{fimportexp}$	firm is foreign-owned and has arms' length imports and exports (dummy)
D_{trade}	firm has trade (imports, exports, or both) (dummy)
$D_{importonly}$	firm has only imports (dummy)
$D_{exportonly}$	firm has only exports (dummy)
$D_{importexp}$	firm has both imports and exports (dummy)
$D_{capUnderLowDem}$	main reason for production capacity under-utilisation: low demand (dummy)
$firmAge$	firm age
$D_{capUnderUnrelSupply}$	main reason for production capacity under-utilisation: unreliable supply of production inputs (raw materials and supplies) (dummy)
$D_{capUnderLackSkill}$	main reason for production capacity under-utilisation: lack of skilled workers (dummy)
$D_{capUnderLackWC}$	main reason for production capacity under-utilisation: lack of working capital/credit (dummy)
$D_{capUnderLabMarReg}$	main reason for production capacity under-utilisation: labour market regulations (dummy)
$D_{capUnderLackTech}$	main reason for production capacity under-utilisation: lack of specialised technology, machinery and spare-parts (dummy)
$D_{capUnderNo}$	main reason for production capacity under-utilisation: production capacity not under-utilised (dummy)
$D_{perfOvBCWcllBelow}$	company's performance is well below overall expectations for this company before the global financial crisis (dummy)
$D_{perfOvBCBelow}$	company's performance is below overall expectations for this company before the global financial crisis (dummy)
$D_{perfOvBCInLine}$	company's performance is in line with overall expectations for this company before the global financial crisis (dummy)
$D_{perfOvBCAbove}$	company's performance is above overall expectations for this company before the global financial crisis (dummy)
$D_{perfOvBCWcllAbove}$	company's performance is well above overall expectations for this company before the global financial crisis (dummy)
$D_{perfOvACWcllBelow}$	company's performance is well below revised expectations for this company after the global financial crisis (dummy)
$D_{perfOvACBelow}$	company's performance is below revised expectations for this company after the global financial crisis (dummy)
$D_{perfOvACInLine}$	company's performance is in line with revised expectations for this company after the global financial crisis (dummy)
$D_{perfOvACAbove}$	company's performance is above revised expectations for this company after the global financial crisis (dummy)
$D_{perfOvACWcllAbove}$	company's performance is well above revised expectations for this company after the global financial crisis (dummy)
$D_{capUtilNoChange}$	no change in capacity utilisation after the global financial crisis (dummy)
$D_{capUtilDec}$	decrease in capacity utilisation after the global financial crisis (dummy)
$D_{capUtilInc}$	increase in capacity utilisation after the global financial crisis (dummy)
$D_{capUtilNoChangeHM}$	no change in capacity utilisation after the global financial crisis (higher mean values) (dummy)
$D_{capUtilDecHM}$	decrease in capacity utilisation after the global financial crisis (higher mean values) (dummy)
$D_{capUtilIncHM}$	increase in capacity utilisation after the global financial crisis (higher mean values) (dummy)
$D_{capUtilNoChange10T}$	no change in capacity utilisation after the global financial crisis (10% tolerance) (dummy)
$D_{capUtilDec10T}$	decrease in capacity utilisation after the global financial crisis (10% tolerance) (dummy)
$D_{capUtilInc10T}$	increase in capacity utilisation after the global financial crisis (10% tolerance) (dummy)
$D_{capUtilNoChange20T}$	no change in capacity utilisation after the global financial crisis (20% tolerance) (dummy)
$D_{capUtilDec20T}$	decrease in capacity utilisation after the global financial crisis (20% tolerance) (dummy)
$D_{capUtilInc20T}$	increase in capacity utilisation after the global financial crisis (20% tolerance) (dummy)
$D_{capUtilNoChange30T}$	no change in capacity utilisation after the global financial crisis (30% tolerance) (dummy)
$D_{capUtilDec30T}$	decrease in capacity utilisation after the global financial crisis (30% tolerance) (dummy)
$D_{capUtilInc30T}$	increase in capacity utilisation after the global financial crisis (30% tolerance) (dummy)

A Appendix: Additional stylised facts

Table A1: Foreign affiliates with trade by sector and parent location

		Agriculture		Mining		Manufacturing		Resource-based manufacturing		Low-tech manufacturing		Medium/high-tech manufacturing		EGW supply/Construction		Services	
		# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms	# of firms	% of firms
Panel A: With trade		12	10.5	4	17.3	164	14.2	94	17	49	13.6	21	8.7	42	29	432	46.1
No		102	89.5	43	82.7	989	85.8	458	83	310	86.4	221	91.3	103	71	506	53.9
Yes		114	100	52	100	1153	100	552	100	359	100	242	100	145	100	938	100
Panel A.1: With trade (HI)		5	6.9	7	25	55	10.8	32	13.2	16	11.2	7	5.7	27	36	213	47.1
No		67	93.1	21	75	454	89.2	211	86.8	127	88.8	116	94.3	48	64	239	52.9
Yes		72	100	28	100	509	100	243	100	143	100	123	100	75	100	452	100
Panel A.2: With trade (LMI)		2	10.5	2	9.5	69	15.3	38	18.1	24	15	7	8.8	13	26.5	114	40.3
No		17	89.5	19	90.5	381	84.7	172	81.9	136	85	73	91.3	36	73.5	169	59.7
Yes		19	100	21	100	450	100	210	100	160	100	80	100	49	100	283	100
Panel A.3: With trade (SSA)		3	17.6	0	0	20	15	13	18.1	4	11.4	3	11.5	0	0	70	47
No		14	82.4	0	0	113	85	59	81.9	31	88.6	23	88.5	13	100	79	53
Yes		17	100	0	0	133	100	72	100	35	100	26	100	13	100	149	100
Panel B: With imports		32	31.4	5	11.6	101	10.2	59	12.9	29	9.4	13	5.9	8	7.8	57	11.3
No		70	68.6	38	88.4	888	89.8	399	87.1	281	90.6	208	94.1	95	92.2	449	88.7
Yes		102	100	43	100	989	100	458	100	310	100	221	100	103	100	506	100
Panel B.1: With imports (HI)		23	34.3	3	14.3	47	10.4	24	11.4	14	11	9	7.8	2	4.2	39	16.3
No		44	65.7	18	85.7	407	89.6	187	88.6	113	89	107	92.2	46	95.8	200	83.7
Yes		67	100	21	100	454	100	211	100	127	100	116	100	48	100	239	100
Panel B.2: With imports (LMI)		5	29.4	2	10.5	37	9.7	24	14	11	8.1	2	2.7	2	5.6	7	4.1
No		12	70.6	17	89.5	344	90.3	148	86	125	91.9	71	97.3	34	94.4	162	95.9
Yes		17	100	19	100	381	100	172	100	136	100	73	100	36	100	169	100
Panel B.3: With imports (SSA)		3	21.4	0	0	12	10.6	9	15.3	1	3.2	2	8.7	0	0	8	10.1
No		11	78.6	0	0	101	89.4	50	84.7	30	96.8	21	91.3	13	100	71	89.9
Yes		14	100	0	0	113	100	59	100	31	100	23	100	13	100	79	100
Panel C: With exports		14	13.7	17	39.5	427	43.2	198	43.2	123	39.7	106	48	82	79.6	350	69.2
No		88	86.3	26	60.5	562	56.8	260	56.8	187	60.3	115	52	21	20.4	156	30.8
Yes		102	100	43	100	989	100	458	100	310	100	221	100	103	100	506	100
Panel C.1: With exports (HI)		6	9	9	42.9	181	39.9	87	41.2	45	35.4	49	42.2	39	81.3	155	64.9
No		61	91	12	57.1	273	60.1	124	58.8	82	64.6	67	57.8	9	18.8	84	35.1
Yes		67	100	21	100	454	100	211	100	127	100	116	100	48	100	239	100
Panel C.2: With exports (LMI)		3	17.6	8	42.1	186	48.8	84	48.8	56	41.2	46	63	33	91.7	131	77.5
No		14	82.4	11	57.9	195	51.2	88	51.2	80	58.8	27	37	3	8.3	38	22.5
Yes		17	100	19	100	381	100	172	100	136	100	73	100	36	100	169	100
Panel C.3: With exports (SSA)		5	35.7	0	0	44	38.9	20	33.9	16	51.6	8	34.8	9	69.2	52	65.8
No		9	64.3	0	0	69	61.1	39	66.1	15	48.4	15	65.2	4	30.8	27	34.2
Yes		14	100	0	0	113	100	59	100	31	100	23	100	13	100	79	100
Panel D: With both imports and exports		46	45.1	22	51.2	528	53.4	257	56.1	152	49	119	53.8	90	87.4	407	80.4
No		56	54.9	21	48.8	461	46.6	201	43.9	158	51	102	46.2	13	12.6	99	19.6
Yes		102	100	43	100	989	100	458	100	310	100	221	100	103	100	506	100
Panel D.1: With both imports and exports (HI)		29	43.3	12	57.1	228	50.2	111	52.6	59	46.5	58	50	41	85.4	194	81.2
No		38	56.7	9	42.9	226	49.8	100	47.4	68	53.5	58	50	7	14.6	45	18.8
Yes		67	100	21	100	454	100	211	100	127	100	116	100	48	100	239	100
Panel D.2: With both imports and exports (LMI)		8	47.1	10	52.6	223	58.5	108	62.8	67	49.3	48	65.8	35	97.2	138	81.7
No		9	52.9	9	47.4	158	41.5	64	37.2	69	50.7	25	34.2	1	2.8	31	18.3
Yes		17	100	19	100	381	100	172	100	136	100	73	100	36	100	169	100
Panel D.3: With both imports and exports (SSA)		8	57.1	0	0	56	49.6	29	49.2	17	54.8	10	43.5	9	69.2	60	75.9
No		6	42.9	0	0	57	50.4	30	50.8	14	45.2	13	56.5	4	30.8	19	24.1
Yes		14	100	0	0	113	100	59	100	31	100	23	100	13	100	79	100

Notes: Authors' calculations. Firms with trade are those with other imports, or exports or both. Imports and exports are either intrafirm or arms' length or both. Resource-based manufacturing industry codes: 15, 16, 20, 21, 23, 25, 26, 27. Low-tech manufacturing industry codes: 17, 18, 19, 22, 26, 36. Medium/high-tech manufacturing industry codes: 24, 29, 30, 31, 32, 33, 34, 35, 37, 38. SSA: Foreign investors' country of origin is sub-Saharan African. Foreign investors' country of origin is classified as high-income (HI) and non-SSA low/middle-income (LMI) based on the World Bank historical country classification for the year 2010. Source: UNIDO Africa Investor Survey 2010.

Table A3: Foreign affiliates with 100% intra-firm trade by sector and parent location

	Agriculture			Mining			Manufacturing			Resources-based manufacturing			Low-tech manufacturing			Medium/high-tech manufacturing			ECGW supply/Construction			Services				
	# of firms	% of firms	% of firms	# of firms	% of firms	% of firms	# of firms	% of firms	% of firms	# of firms	% of firms	% of firms	# of firms	% of firms	% of firms	# of firms	% of firms	% of firms	# of firms	% of firms	% of firms	# of firms	% of firms			
Panel A: with 100% intra-firm trade																										
No	95	83.3	50	96.2	1047	90.8	517	93.7	100	359	100	242	90.1	138	95.2	895	95.4	100	145	100	938	100	100	95.4	895	95.4
Yes	19	16.7	2	3.8	106	9.2	35	6.3	47	13.1	24	7	4.8	7	4.8	43	4.6	100	145	100	938	100	100	95.2	895	95.4
Total	114	100	52	100	1153	100	552	100	359	100	242	100	145	145	100	938	100	100	145	100	938	100	100	95.2	895	95.4
Panel A.1: with 100% intra-firm trade (HI)																										
No	57	79.2	27	96.4	463	91	229	94.2	127	88.8	107	87	70	70	93.3	426	94.2	100	145	100	938	100	100	93.3	426	94.2
Yes	15	20.8	1	3.6	46	9	14	5.8	16	11.2	16	13	5	5	6.7	26	5.8	100	145	100	938	100	100	93.3	426	94.2
Total	72	100	28	100	509	100	243	100	143	100	123	100	75	75	100	452	100	100	145	100	938	100	100	93.3	426	94.2
Panel A.2: with 100% intra-firm trade (LMI)																										
No	17	89.5	20	95.2	407	90.4	196	93.3	135	84.4	76	95	48	48	98	272	96.1	100	145	100	938	100	100	98	272	96.1
Yes	2	10.5	1	4.8	43	9.6	14	6.7	25	15.6	4	5	1	1	2	3.9	3.9	100	145	100	938	100	100	98	272	96.1
Total	19	100	21	100	450	100	210	100	160	100	80	100	49	49	100	283	100	100	145	100	938	100	100	98	272	96.1
Panel A.3: with 100% intra-firm trade (SSA)																										
No	16	94.1	0	0	121	91	66	91.7	30	85.7	25	96.2	12	12	92.3	144	96.6	100	145	100	938	100	100	92.3	144	96.6
Yes	1	5.9	0	0	12	9	6	8.3	5	14.3	1	3.8	1	1	7.7	5	3.4	100	145	100	938	100	100	7.7	5	3.4
Total	17	100	0	0	133	100	72	100	35	100	26	100	13	13	100	149	100	100	145	100	938	100	100	100	149	100
Panel B: with 100% intra-firm imports																										
No	63	90	36	94.7	806	90.8	373	93.5	245	87.2	188	90.4	88	88	92.6	406	90.4	100	145	100	938	100	100	92.6	406	90.4
Yes	7	10	2	5.3	82	9.2	26	6.5	36	12.8	20	7.4	7	7	7.4	43	9.6	100	145	100	938	100	100	7.4	43	9.6
Total	70	100	38	100	888	100	399	100	281	100	208	100	95	95	100	449	100	100	145	100	938	100	100	100	449	100
Panel B.1: with 100% intra-firm imports (HI)																										
No	40	90.9	17	94.4	372	91.4	178	95.2	100	88.5	94	87.9	41	41	89.1	174	87	100	145	100	938	100	100	89.1	174	87
Yes	4	9.1	1	5.6	35	8.6	9	4.8	35	11.5	13	12.1	5	5	10.9	26	13	100	145	100	938	100	100	10.9	26	13
Total	44	100	18	100	407	100	187	100	135	100	107	100	46	46	100	200	100	100	145	100	938	100	100	100	200	100
Panel B.2: with 100% intra-firm imports (LMI)																										
No	11	91.7	16	94.1	310	90.1	136	91.9	107	85.6	67	94.4	33	33	97.1	151	93.2	100	145	100	938	100	100	97.1	151	93.2
Yes	1	8.3	1	5.9	34	9.9	12	8.1	18	14.4	4	5.6	1	1	2.9	11	6.8	100	145	100	938	100	100	2.9	11	6.8
Total	12	100	17	100	344	100	148	100	125	100	71	100	34	34	100	162	100	100	145	100	938	100	100	100	162	100
Panel B.3: with 100% intra-firm imports (SSA)																										
No	10	90.9	0	0	91	90.1	45	90	26	86.7	20	95.2	12	12	92.3	66	93	100	145	100	938	100	100	92.3	66	93
Yes	1	9.1	0	0	10	9.9	5	10	4	13.3	1	4.8	1	1	7.7	5	7	100	145	100	938	100	100	7.7	5	7
Total	11	100	0	0	101	100	50	100	30	100	21	100	13	13	100	71	100	100	145	100	938	100	100	100	71	100
Panel C: with 100% intra-firm exports																										
No	76	86.4	26	100	521	92.7	247	95	165	88.2	109	94.8	21	21	100	156	100	100	145	100	938	100	100	100	156	100
Yes	12	13.6	0	0	41	7.3	13	5	22	11.8	6	5.2	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	88	100	26	100	562	100	260	100	187	100	115	100	21	21	100	156	100	100	145	100	938	100	100	100	156	100
Panel C.1: with 100% intra-firm exports (HI)																										
No	50	82	12	100	252	92.3	115	92.7	74	90.2	63	94	9	9	100	84	100	100	145	100	938	100	100	100	84	100
Yes	11	18	0	0	21	7.7	9	7.3	9.8	4	6	6	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	61	100	12	100	273	100	124	100	82	100	67	100	9	9	100	84	100	100	145	100	938	100	100	100	84	100
Panel C.2: with 100% intra-firm exports (LMI)																										
No	13	92.9	11	100	179	91.8	86	97.7	67	83.8	26	96.3	3	3	100	38	100	100	145	100	938	100	100	100	38	100
Yes	1	7.1	0	0	16	8.2	2	2.3	13	16.3	1	3.7	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	14	100	11	100	195	100	88	100	80	100	27	100	3	3	100	38	100	100	145	100	938	100	100	100	38	100
Panel C.3: with 100% intra-firm exports (SSA)																										
No	9	100	0	0	67	97.1	38	97.4	14	93.3	15	100	4	4	100	27	100	100	145	100	938	100	100	100	27	100
Yes	0	0	0	0	2	2.9	1	2.6	0	6.7	0	0	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	9	100	0	0	69	100	39	100	15	100	15	100	4	4	100	27	100	100	145	100	938	100	100	100	27	100
Panel D: with both 100% intra-firm imports and exports																										
No	56	100	21	100	444	96.3	197	98	147	93	100	98	13	13	100	99	100	100	145	100	938	100	100	100	99	100
Yes	0	0	0	0	17	3.7	4	2	11	7	2	2	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	56	100	21	100	461	100	201	100	158	100	102	100	13	13	100	99	100	100	145	100	938	100	100	100	99	100
Panel D.1: with both 100% intra-firm imports and exports (HI)																										
No	38	100	9	100	216	95.6	96	96	63	92.6	57	98.3	7	7	100	45	100	100	145	100	938	100	100	100	45	100
Yes	0	0	0	0	4	4.4	4	4	5	7.4	1	1.7	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	38	100	9	100	220	100	100	100	68	100	58	100	7	7	100	45	100	100	145	100	938	100	100	100	45	100
Panel D.2: with both 100% intra-firm imports and exports (LMI)																										
No	9	100	9	100	151	95.6	64	100	63	91.3	24	96	1	1	100	31	100	100	145	100	938	100	100	100	31	100
Yes	0	0	0	0	7	4.4	0	0	6	8.7	1	1	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	9	100	9	100	158	100	64	100	69	100	25	100	1	1	100	31	100	100	145	100	938	100	100	100	31	100
Panel D.3: with both 100% intra-firm imports and exports (SSA)																										
No	6	100	0	0	57	100	30	100	14	100	13	100	4	4	100	19	100	100	145	100	938	100	100	100	19	100
Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	145	100	938	100	100	0	0	0
Total	6	100	0	0	57	100	30	100	14	100	13	100	4	4	100	19	100	100	145	100	938	100	100	100	19	100

Figure A1: Density of foreign affiliates by total sales

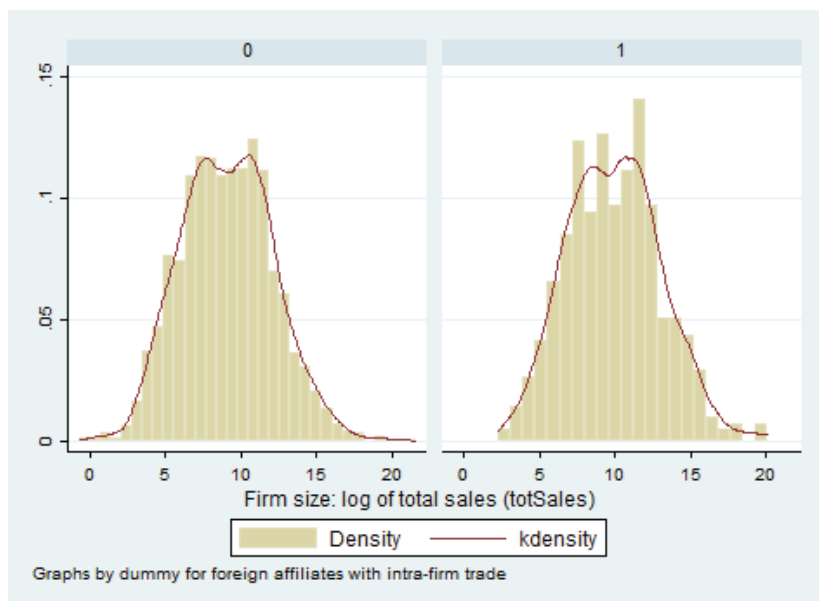


Figure A2: Foreign affiliates by total sales in percentiles

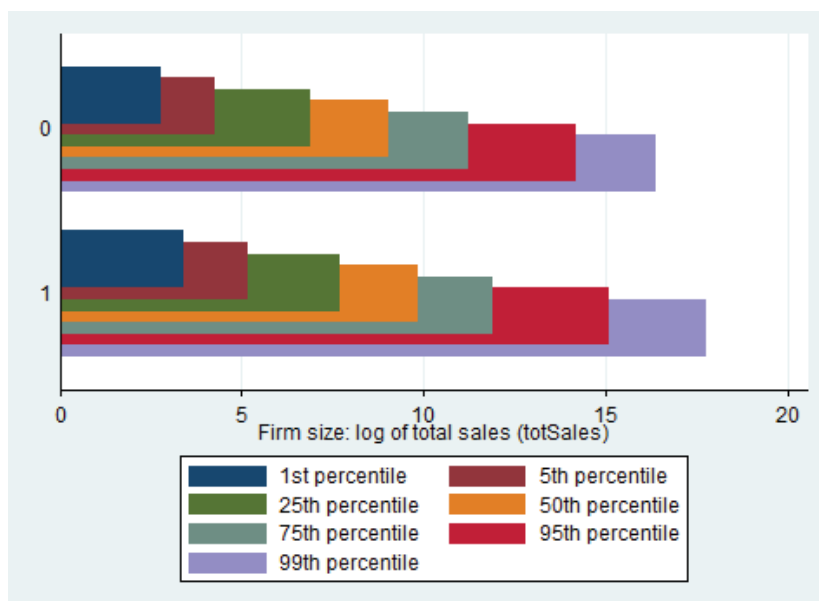


Figure A3: Density of foreign affiliates by total value added to total employment

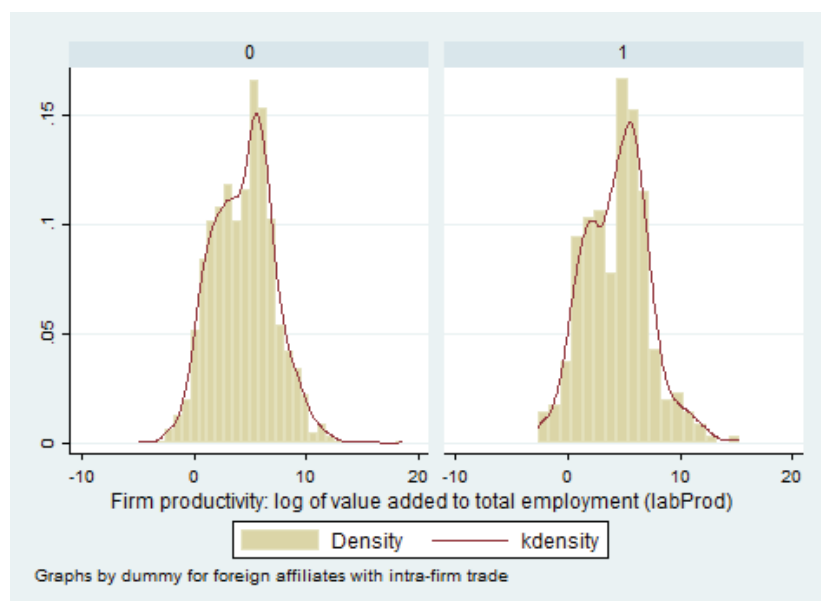


Figure A4: Foreign affiliates by total value added to total employment in percentiles

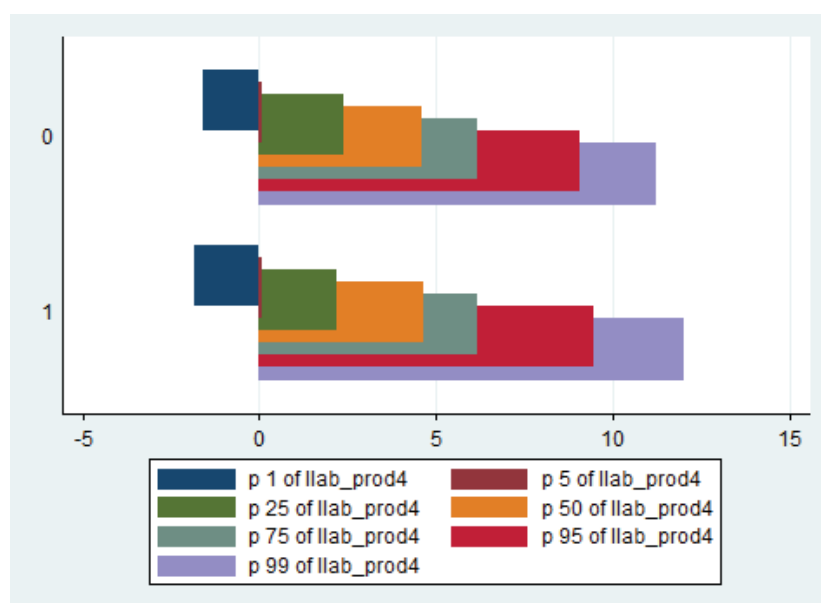


Figure A5: Density of foreign affiliates by total factor productivity

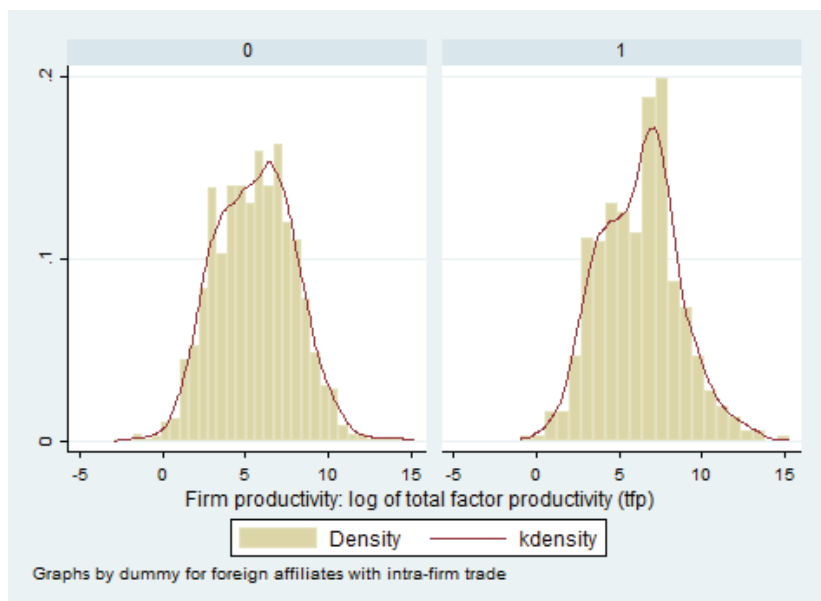
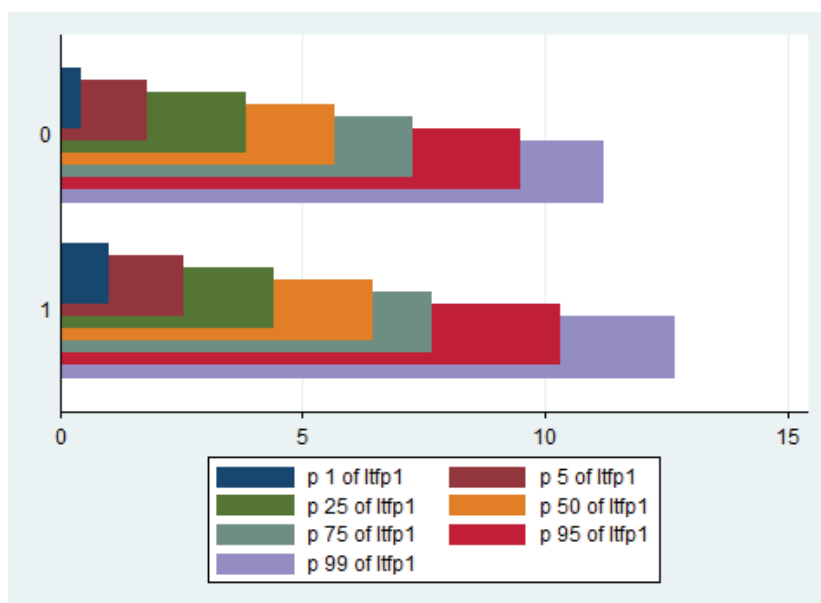


Figure A6: Foreign affiliates by total factor productivity in percentiles



B Appendix: Robustness checks

Table B1: Main characteristics (Manufacturing sector)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0153 [0.014]	-0.0198 [0.013]	-0.0169 [0.014]	-0.00840 [0.0086]	-0.00241 [0.012]	-0.00102 [0.0050]
<i>capInt</i>	-0.00580 [0.0077]	-0.00667 [0.0076]	-0.00113 [0.0075]	-0.00179 [0.0050]	-0.00351 [0.0065]	-0.000100 [0.0029]
<i>numEmp</i>	0.0476*** [0.010]		0.0283** [0.012]	0.0352*** [0.0069]	0.0232*** [0.0087]	0.0146*** [0.0041]
<i>wageEmp</i>	0.0170 [0.012]	0.0148 [0.011]	0.0147 [0.012]	0.000245 [0.0075]	0.0178* [0.0100]	0.00267 [0.0044]
<i>labProd</i>	0.0332*** [0.0099]			0.0231*** [0.0071]	0.0216** [0.0087]	0.0109** [0.0048]
<i>inpInt</i>	0.00442 [0.0080]	0.00132 [0.0075]	0.00278 [0.0079]	-0.00233 [0.0052]	0.00739 [0.0072]	0.00205 [0.0033]
<i>D_{training}</i> (d)	0.0219 [0.023]	0.0241 [0.023]	0.0187 [0.023]	-0.0126 [0.014]	0.0355* [0.019]	-0.00395 [0.0088]
<i>totSales</i>		0.0403*** [0.0072]				
<i>tfp</i>			0.0394*** [0.010]			
Obs	1581	1581	1580	1247	1555	940
<i>Pseudo - R²</i>	0.20	0.20	0.21	0.28	0.17	0.30
<i>Log - likelihood</i>	-730.0	-730.5	-728.1	-382.1	-644.2	-194.0

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. The sample includes firms in manufacturing only. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (2) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B2: Main characteristics (Whole economy - Majority-owned foreign affiliates)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimez}
<i>skillInt</i>	-0.0253*	-0.0274*	-0.0260*	-0.0116	-0.0107	-0.00703
	[0.015]	[0.014]	[0.015]	[0.0085]	[0.013]	[0.011]
<i>capInt</i>	-0.00335	-0.00375	0.00200	-0.00266	-0.00198	-0.00367
	[0.0082]	[0.0082]	[0.0081]	[0.0050]	[0.0069]	[0.0063]
<i>numEmp</i>	0.0452***		0.0254**	0.0313***	0.0197**	0.0245***
	[0.011]		[0.013]	[0.0074]	[0.0095]	[0.0083]
<i>wageEmp</i>	0.0156	0.0144	0.0149	0.00326	0.0181*	0.0116
	[0.013]	[0.012]	[0.013]	[0.0074]	[0.011]	[0.010]
<i>labProd</i>	0.0385***			0.0215***	0.0242***	0.0221**
	[0.011]			[0.0072]	[0.0092]	[0.010]
<i>inpInt</i>	0.00214	0.000702	0.00168	-0.00225	0.00568	0.00305
	[0.0084]	[0.0079]	[0.0084]	[0.0051]	[0.0076]	[0.0066]
<i>D_{training}</i> (d)	0.0279	0.0289	0.0249	-0.0100	0.0425**	-0.00569
	[0.024]	[0.024]	[0.024]	[0.014]	[0.021]	[0.019]
<i>totSales</i>		0.0418***				
		[0.0078]				
<i>tfp</i>			0.0415***			
			[0.011]			
Obs	1384	1384	1383	1045	1364	566
<i>Pseudo - R²</i>	0.23	0.22	0.23	0.31	0.19	0.28
<i>Log - likelihood</i>	-625.8	-625.9	-624.9	-313.9	-558.7	-149.1

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. The sample includes only majority-owned foreign affiliates (i.e., affiliates owned by the parent company by at least 50%) in the whole economy. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimez} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B3: Main characteristics (Manufacturing sector - Majority-owned foreign affiliates)

(7)	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0406 [0.025]	-0.0395 [0.024]	-0.0424* [0.025]	-0.0197 [0.017]	-0.0180 [0.021]	-0.00773 [0.011]
<i>capInt</i>	0.0197 [0.014]	0.0200 [0.014]	0.0266* [0.014]	0.00573 [0.0097]	0.00857 [0.013]	-0.00409 [0.0064]
<i>numEmp</i>	0.0517*** [0.019]		0.0222 [0.022]	0.0597*** [0.014]	0.00468 [0.016]	0.0189** [0.0094]
<i>wageEmp</i>	0.0280 [0.021]	0.0289 [0.020]	0.0261 [0.021]	0.0155 [0.016]	0.0214 [0.017]	0.0105 [0.011]
<i>labProd</i>	0.0563** [0.022]			0.0424** [0.017]	0.0303 [0.020]	0.0276** [0.012]
<i>inpInt</i>	-0.0195 [0.018]	-0.0181 [0.015]	-0.0208 [0.017]	-0.0207 [0.013]	0.00627 [0.015]	-0.00189 [0.0068]
<i>D_{training}</i> (d)	0.0493 [0.039]	0.0490 [0.039]	0.0476 [0.039]	0.00748 [0.028]	0.0615* [0.033]	0.0147 [0.020]
<i>totSales</i>		0.0537*** [0.014]				
<i>tfp</i>			0.0639*** [0.021]			
Obs	721	721	719	656	715	433
<i>Pseudo - R²</i>	0.18	0.18	0.18	0.23	0.19	0.32
<i>Log - likelihood</i>	-368.5	-368.6	-367.2	-245.4	-311.2	-106.2

Notes: Linear probability estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. The sample includes only majority-owned foreign affiliates (i.e., affiliates owned by the parent company by at least 50%) in manufacturing. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B4: Main characteristics (Drop missing observations of intra-firm trade)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0255 [0.033]	-0.0220 [0.031]	-0.0293 [0.034]	-0.0279 [0.033]	0.00838 [0.028]	0.00978 [0.022]
<i>capInt</i>	-0.00830 [0.018]	-0.00741 [0.017]	0.00363 [0.017]	-0.0394** [0.018]	0.0116 [0.015]	-0.0134 [0.012]
<i>numEmp</i>	0.0667** [0.026]		0.0238 [0.028]	0.0880*** [0.026]	0.0338 [0.022]	0.0516*** [0.019]
<i>wageEmp</i>	0.0364 [0.030]	0.0379 [0.029]	0.0361 [0.029]	0.0302 [0.030]	0.0399 [0.026]	0.0273 [0.022]
<i>labProd</i>	0.0769*** [0.027]			0.0879*** [0.026]	0.0458* [0.024]	0.0488** [0.020]
<i>inpInt</i>	-0.0265 [0.021]	-0.0236 [0.020]	-0.0350 [0.021]	-0.0190 [0.021]	-0.00308 [0.017]	0.00717 [0.012]
$D_{training}$ (d)	-0.0462 [0.053]	-0.0470 [0.053]	-0.0529 [0.053]	-0.0873 [0.054]	0.0373 [0.048]	-0.0136 [0.041]
<i>totSales</i>		0.0713*** [0.019]				
<i>tfp</i>			0.101*** [0.026]			
Obs	493	493	493	473	461	393
<i>Pseudo</i> – R^2	0.17	0.17	0.18	0.21	0.17	0.25
<i>Log</i> – likelihood	-282.9	-283.0	-280.0	-246.8	-230.7	-146.0

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, $D_{training}$: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B5: Main characteristics (Drop missing observations of intra-firm trade - Manufacturing)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0197 [0.038]	-0.0160 [0.036]	-0.0228 [0.038]	-0.0187 [0.037]	0.00128 [0.032]	0.00663 [0.022]
<i>capInt</i>	0.00227 [0.021]	0.00318 [0.021]	0.0107 [0.021]	-0.0448** [0.020]	0.0173 [0.018]	-0.0187* [0.011]
<i>numEmp</i>	0.0625** [0.031]		0.0203 [0.033]	0.0905*** [0.031]	0.0210 [0.028]	0.0424** [0.021]
<i>wageEmp</i>	0.0461 [0.034]	0.0481 [0.033]	0.0461 [0.034]	0.0488 [0.036]	0.0355 [0.029]	0.0208 [0.021]
<i>labProd</i>	0.0750** [0.033]			0.0916*** [0.032]	0.0568** [0.029]	0.0562*** [0.020]
<i>inpInt</i>	-0.0514* [0.028]	-0.0478* [0.025]	-0.0562** [0.028]	-0.0370 [0.026]	-0.0274 [0.021]	-0.0102 [0.012]
<i>D_{training}</i> (d)	-0.00647 [0.059]	-0.00763 [0.059]	-0.00593 [0.059]	-0.0455 [0.060]	0.0662 [0.055]	0.0152 [0.039]
<i>totSales</i>		0.0681*** [0.023]				
<i>tfp</i>			0.0935*** [0.031]			
Obs	401	401	401	382	366	306
<i>Pseudo - R²</i>	0.18	0.18	0.18	0.22	0.20	0.29
<i>Log - likelihood</i>	-226.6	-226.6	-225.0	-191.5	-177.9	-101.1

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. The sample includes firms in manufacturing only. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B6: Main characteristics (Drop missing observations of intra-firm trade - MOFAs)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0532 [0.037]	-0.0502 [0.034]	-0.0595 [0.038]	-0.0501 [0.036]	-0.00210 [0.032]	-0.00117 [0.023]
<i>capInt</i>	-0.00968 [0.020]	-0.00880 [0.019]	0.00189 [0.019]	-0.0383* [0.020]	-0.000918 [0.017]	-0.0257** [0.013]
<i>numEmp</i>	0.0669** [0.029]		0.0227 [0.031]	0.0850*** [0.028]	0.0233 [0.026]	0.0442** [0.020]
<i>wageEmp</i>	0.0601* [0.034]	0.0614* [0.034]	0.0588* [0.034]	0.0516 [0.034]	0.0512* [0.030]	0.0413* [0.024]
<i>labProd</i>	0.0757*** [0.029]			0.0856*** [0.029]	0.0431* [0.026]	0.0503** [0.020]
<i>inpInt</i>	-0.0200 [0.023]	-0.0177 [0.021]	-0.0345 [0.023]	-0.0118 [0.022]	-0.00227 [0.019]	0.00571 [0.012]
<i>D_{training}</i> (d)	-0.0106 [0.058]	-0.0114 [0.058]	-0.0214 [0.059]	-0.0657 [0.057]	0.0592 [0.054]	0.00349 [0.044]
<i>totSales</i>		0.0710*** [0.021]				
<i>tfp</i>			0.113*** [0.028]			
Obs	418	418	418	411	373	318
<i>Pseudo - R²</i>	0.18	0.18	0.20	0.22	0.15	0.26
<i>Log - likelihood</i>	-236.2	-236.3	-232.2	-210.8	-194.8	-118.9

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. The sample includes only majority-owned foreign affiliates (i.e., affiliates owned by the parent company by at least 50%) in the whole economy. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B7: Main characteristics (Drop missing observations of intra-firm trade - MOFAs in Manufacturing)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0563 [0.042]	-0.0522 [0.040]	-0.0618 [0.042]	-0.0504 [0.039]	-0.0159 [0.036]	-0.00887 [0.020]
<i>capInt</i>	0.00247 [0.022]	0.00363 [0.022]	0.00839 [0.023]	-0.0414** [0.020]	0.00870 [0.021]	-0.0267** [0.011]
<i>numEmp</i>	0.0490 [0.035]		0.00857 [0.037]	0.0745** [0.033]	-0.0111 [0.033]	0.0238 [0.022]
<i>wageEmp</i>	0.0788* [0.042]	0.0814** [0.040]	0.0750* [0.042]	0.0807* [0.042]	0.0494 [0.034]	0.0367* [0.021]
<i>labProd</i>	0.0636* [0.034]			0.0779** [0.033]	0.0470 [0.033]	0.0531*** [0.020]
<i>inpInt</i>	-0.0343 [0.029]	-0.0301 [0.026]	-0.0470 [0.029]	-0.0148 [0.026]	-0.0162 [0.023]	0.00417 [0.011]
<i>D_{training}</i> (d)	0.0439 [0.065]	0.0422 [0.065]	0.0415 [0.065]	-0.0114 [0.063]	0.109* [0.060]	0.0407 [0.040]
<i>totSales</i>		0.0558** [0.025]				
<i>tfp</i>			0.0976*** [0.033]			
Obs	336	336	336	330	297	252
<i>Pseudo - R²</i>	0.19	0.19	0.20	0.23	0.19	0.32
<i>Log - likelihood</i>	-187.0	-187.1	-184.6	-162.7	-146.5	-80.0

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. The sample includes only majority-owned foreign affiliates (i.e., affiliates owned by the parent company by at least 50%) in manufacturing. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B8: Main characteristics (control for firm age)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0148 [0.014]	-0.0195 [0.013]	-0.0164 [0.014]	-0.00915 [0.0086]	-0.00198 [0.012]	-0.00161 [0.0050]
<i>capInt</i>	-0.00616 [0.0077]	-0.00710 [0.0076]	-0.00152 [0.0076]	-0.00233 [0.0050]	-0.00371 [0.0065]	-0.000514 [0.0029]
<i>numEmp</i>	0.0479*** [0.011]		0.0289** [0.012]	0.0327*** [0.0069]	0.0239*** [0.0090]	0.0127*** [0.0041]
<i>wageEmp</i>	0.0173 [0.012]	0.0148 [0.011]	0.0150 [0.012]	-0.000688 [0.0075]	0.0181* [0.010]	0.00216 [0.0044]
<i>labProd</i>	0.0329*** [0.0100]			0.0228*** [0.0071]	0.0215** [0.0087]	0.0105** [0.0047]
<i>inpInt</i>	0.00489 [0.0080]	0.00175 [0.0075]	0.00314 [0.0079]	-0.00207 [0.0052]	0.00760 [0.0072]	0.00217 [0.0032]
<i>D_{training}</i> (d)	0.0222 [0.023]	0.0243 [0.023]	0.0190 [0.023]	-0.0126 [0.014]	0.0356* [0.019]	-0.00380 [0.0087]
<i>firmAge</i>	-0.00321 [0.017]	-0.0000734 [0.016]	-0.00464 [0.017]	0.0122 [0.010]	-0.00521 [0.014]	0.00930 [0.0063]
<i>totSales</i>		0.0401*** [0.0073]				
<i>tfp</i>			0.0394*** [0.010]			
Obs	1575	1575	1574	1244	1549	938
<i>Pseudo - R²</i>	0.20	0.20	0.21	0.29	0.17	0.30
<i>Log - likelihood</i>	-728.2	-728.7	-726.3	-380.8	-643.0	-192.8

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B9: Main characteristics (logit model)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.103 [0.089]	-0.130 [0.085]	-0.114 [0.089]	-0.126 [0.12]	-0.0296 [0.098]	-0.00604 [0.17]
<i>capInt</i>	-0.0387 [0.049]	-0.0443 [0.048]	-0.0108 [0.048]	-0.0196 [0.074]	-0.0298 [0.053]	0.00740 [0.11]
<i>numEmp</i>	0.289*** [0.066]		0.170** [0.074]	0.495*** [0.095]	0.181*** [0.070]	0.523*** [0.13]
<i>wageEmp</i>	0.104 [0.076]	0.0884 [0.074]	0.0878 [0.077]	0.0181 [0.11]	0.136* [0.081]	0.128 [0.17]
<i>labProd</i>	0.201*** [0.064]			0.328*** [0.11]	0.164** [0.070]	0.380** [0.18]
<i>inpInt</i>	0.0268 [0.050]	0.00805 [0.047]	0.0153 [0.050]	-0.0418 [0.075]	0.0606 [0.058]	0.0526 [0.11]
<i>D_{training}</i>	0.138 [0.14]	0.152 [0.14]	0.116 [0.14]	-0.181 [0.21]	0.280* [0.16]	-0.0906 [0.31]
<i>totSales</i>		0.246*** [0.045]				
<i>tfp</i>			0.245*** [0.065]			
Obs	1581	1581	1580	1247	1555	940
<i>Pseudo - R²</i>	0.20	0.20	0.21	0.29	0.17	0.31
<i>Log - likelihood</i>	-730.1	-730.6	-728.0	-380.6	-644.5	-191.8

Notes: Logit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy), *firmAge*: firm age. Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B10: Main characteristics (linear probability model)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.00860 [0.013]	-0.0134 [0.012]	-0.00994 [0.013]	-0.00577 [0.0093]	0.000543 [0.012]	0.00337 [0.0072]
<i>capInt</i>	-0.00773 [0.0070]	-0.00840 [0.0070]	-0.00358 [0.0069]	-0.00287 [0.0052]	-0.00668 [0.0067]	-0.00182 [0.0040]
<i>numEmp</i>	0.0432*** [0.0096]		0.0269** [0.011]	0.0353*** [0.0070]	0.0258*** [0.0090]	0.0179*** [0.0053]
<i>wageEmp</i>	0.0143 [0.011]	0.0120 [0.011]	0.0116 [0.011]	0.000178 [0.0086]	0.0169* [0.010]	0.00275 [0.0066]
<i>labProd</i>	0.0281*** [0.0085]			0.0176*** [0.0059]	0.0201** [0.0082]	0.00963** [0.0047]
<i>inpInt</i>	0.00618 [0.0073]	0.00337 [0.0071]	0.00469 [0.0073]	-0.000732 [0.0054]	0.00984 [0.0074]	0.00292 [0.0048]
<i>D_{training}</i>	0.0138 [0.022]	0.0160 [0.022]	0.0116 [0.022]	-0.0237 [0.016]	0.0311 [0.021]	-0.00637 [0.011]
<i>totSales</i>		0.0353*** [0.0063]				
<i>tfp</i>			0.0335*** [0.0086]			
Obs	1741	1741	1740	1741	1741	1741
R^2	0.16	0.16	0.16	0.15	0.11	0.077

Notes: Linear Probability estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B11: Main characteristics (dummies for parent located in HI, non-SSA LMI, SSA countries)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0122 [0.014]	-0.0178 [0.013]	-0.0133 [0.014]	-0.00254 [0.0082]	-0.00200 [0.012]	0.00349 [0.0050]
<i>capInt</i>	-0.00329 [0.0075]	-0.00440 [0.0074]	0.00115 [0.0073]	-0.00167 [0.0049]	-0.00212 [0.0065]	0.0000504 [0.0028]
<i>numEmp</i>	0.0480*** [0.010]		0.0310*** [0.011]	0.0369*** [0.0064]	0.0255*** [0.0087]	0.0158*** [0.0039]
<i>wageEmp</i>	0.0217* [0.012]	0.0193* [0.011]	0.0196* [0.012]	0.00517 [0.0072]	0.0203** [0.0098]	0.00476 [0.0045]
<i>labProd</i>	0.0310*** [0.0099]			0.0226*** [0.0067]	0.0192** [0.0087]	0.00866** [0.0044]
<i>inpInt</i>	0.00463 [0.0078]	0.00104 [0.0075]	0.00391 [0.0077]	-0.00235 [0.0048]	0.00876 [0.0070]	0.00258 [0.0031]
<i>D_{training}</i> (d)	0.0313 [0.022]	0.0341 [0.022]	0.0291 [0.022]	-0.00967 [0.013]	0.0452** [0.019]	0.00235 [0.0084]
<i>totSales</i>		0.0396*** [0.0069]				
<i>tfp</i>			0.0352*** [0.0099]			
Obs	1639	1639	1638	1383	1639	1208
<i>Pseudo - R²</i>	0.14	0.14	0.15	0.22	0.11	0.21
<i>Log - likelihood</i>	-805.1	-805.8	-804.0	-431.2	-715.6	-236.0

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Parent location: high-income country, non-SSA low/middle-income country, SSA country. Standard errors are clustered at the firm level. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B12: Main characteristics (dummies for pairs of host countries and industries)

	(1)	(2)	(3)	(4)	(5)	(6)
	D_{ift}	D_{ift}	D_{ift}	D_{ifex}	D_{ifim}	D_{ifimex}
<i>skillInt</i>	-0.0278 [0.025]	-0.0370 [0.024]	-0.0316 [0.025]	0.00154 [0.026]	-0.0170 [0.023]	0.0105 [0.020]
<i>capInt</i>	-0.00270 [0.013]	-0.00470 [0.012]	0.00452 [0.012]	0.00516 [0.015]	0.000319 [0.012]	0.00681 [0.012]
<i>numEmp</i>	0.0764*** [0.018]		0.0456** [0.019]	0.100*** [0.020]	0.0380** [0.016]	0.0684*** [0.015]
<i>wageEmp</i>	0.0186 [0.019]	0.0149 [0.019]	0.0147 [0.019]	-0.00766 [0.023]	0.0307* [0.018]	0.0243 [0.016]
<i>labProd</i>	0.0512*** [0.017]			0.0355* [0.021]	0.0375** [0.017]	0.0171 [0.019]
<i>inpInt</i>	0.0141 [0.012]	0.00899 [0.012]	0.0113 [0.012]	0.0183 [0.016]	0.00999 [0.012]	0.0130 [0.012]
<i>D_{training}</i> (d)	0.0228 [0.036]	0.0259 [0.036]	0.0156 [0.036]	-0.0550 [0.039]	0.0690** [0.034]	-0.0149 [0.032]
<i>totSales</i>		0.0634*** [0.013]				
<i>tfp</i>			0.0619*** [0.017]			
Obs	977	977	976	573	924	363
<i>Pseudo - R²</i>	0.18	0.18	0.18	0.25	0.18	0.30
<i>Log - likelihood</i>	-522.1	-522.6	-519.3	-251.2	-452.4	-116.2

Notes: Probit estimations with dummies for parent-location and for pairs of host countries and industries in all columns. Standard errors are clustered at the firm level. In column (2) total employment is replaced by total sales while dropping labour productivity to avoid multicollinearity. In column (3) labour productivity is replaced by total factor productivity. D_{ift} : firm has intra-firm imports or exports, or both (dummy), D_{ifex} : firm has intra-firm exports (dummy), D_{ifim} : firm has intra-firm imports (dummy), D_{ifimex} : firm has both intra-firm imports and exports (dummy), *skillInt*: skill intensity, *capInt*: capital intensity, *numEmp*: firm size (total number of employees), *numEmp*: firm size (total sales), *wageEmp*: wage per employee, *labProd*: labour productivity, *tfp*: total factor productivity, *inpInt*: input intensity, *D_{training}*: firm provides formal internal/external training to its employees (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B13: Production capacity under-utilisation

D_{ift}	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>skillInt</i>	-0.0156 [0.014]	-0.0150 [0.014]	-0.0156 [0.014]	-0.0153 [0.014]	-0.0151 [0.014]	-0.0153 [0.014]	-0.0136 [0.014]
<i>capInt</i>	-0.00579 [0.0077]	-0.00581 [0.0077]	-0.00563 [0.0077]	-0.00589 [0.0077]	-0.00592 [0.0077]	-0.00582 [0.0077]	-0.00609 [0.0077]
<i>numEmp</i>	0.0474*** [0.010]	0.0476*** [0.010]	0.0478*** [0.010]	0.0480*** [0.010]	0.0479*** [0.010]	0.0476*** [0.010]	0.0471*** [0.010]
<i>wageEmp</i>	0.0169 [0.012]	0.0172 [0.012]	0.0177 [0.012]	0.0170 [0.012]	0.0172 [0.012]	0.0170 [0.012]	0.0152 [0.012]
<i>labProd</i>	0.0330*** [0.0099]	0.0334*** [0.0099]	0.0334*** [0.0099]	0.0334*** [0.0099]	0.0333*** [0.0099]	0.0332*** [0.0099]	0.0332*** [0.0099]
<i>inpInt</i>	0.00458 [0.0080]	0.00422 [0.0080]	0.00412 [0.0080]	0.00440 [0.0080]	0.00434 [0.0080]	0.00442 [0.0080]	0.00440 [0.0080]
$D_{training}$ (d)	0.0206 [0.023]	0.0216 [0.023]	0.0198 [0.023]	0.0224 [0.023]	0.0217 [0.023]	0.0221 [0.023]	0.0237 [0.023]
$D_{capUnderLowDem}$ (d)	-0.0239 [0.024]						
$D_{capUnderUnrelSupply}$ (d)		0.0300 [0.037]					
$D_{capUnderLackSkill}$ (d)			0.0785 [0.070]				
$D_{capUnderLackWC}$ (d)				0.0263 [0.060]			
$D_{capUnderLabMarReg}$ (d)					-0.0304 [0.073]		
$D_{capUnderLackTech}$ (d)						-0.00794 [0.054]	
$D_{capUnderNo}$ (d)							0.0676* [0.036]
Obs	1581	1581	1581	1581	1581	1581	1581
$Pseudo - R^2$	0.21	0.21	0.21	0.21	0.21	0.20	0.21
$Log - likelihood$	-729.6	-729.6	-729.3	-729.9	-729.9	-730.0	-728.0

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. $D_{capUnderLowDem}$: low demand (dummy), $D_{capUnderUnrelSupply}$: unreliable supply of production inputs (raw materials and supplies) (dummy), $D_{capUnderLackSkill}$: lack of skilled workers (dummy), $D_{capUnderLackWC}$: lack of working capital/credit (dummy), $D_{capUnderLabMarReg}$: labour market regulations, $D_{capUnderLackTech}$: lack of specialised technology, machinery and spare-parts (dummy), $D_{capUnderNo}$: production capacity not under-utilised (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B14: Performance before the crisis

D_{ift}	(1)	(2)	(3)	(4)	(5)
<i>skillInt</i>	-0.0155 [0.014]	-0.0151 [0.014]	-0.0146 [0.014]	-0.0151 [0.014]	-0.0155 [0.014]
<i>capInt</i>	-0.00596 [0.0077]	-0.00620 [0.0077]	-0.00530 [0.0077]	-0.00512 [0.0077]	-0.00587 [0.0077]
<i>numEmp</i>	0.0478*** [0.010]	0.0471*** [0.010]	0.0481*** [0.010]	0.0490*** [0.010]	0.0475*** [0.010]
<i>wageEmp</i>	0.0172 [0.012]	0.0171 [0.012]	0.0169 [0.012]	0.0172 [0.012]	0.0173 [0.012]
<i>labProd</i>	0.0333*** [0.0099]	0.0335*** [0.0099]	0.0336*** [0.0100]	0.0330*** [0.0099]	0.0327*** [0.0099]
<i>inpInt</i>	0.00455 [0.0080]	0.00417 [0.0080]	0.00456 [0.0080]	0.00507 [0.0080]	0.00439 [0.0080]
$D_{training}$ (d)	0.0220 [0.023]	0.0216 [0.023]	0.0205 [0.023]	0.0207 [0.023]	0.0220 [0.023]
$D_{perfOvBCWellBelow}$ (d)	0.0232 [0.073]				
$D_{perfOvBCBelow}$ (d)		-0.0348 [0.034]			
$D_{perfOvBCInLine}$ (d)			0.0248 [0.022]		
$D_{perfOvBCAbove}$ (d)				-0.0323 [0.023]	
$D_{perfOvBCWellAbove}$ (d)					0.0363 [0.048]
Obs	1581	1581	1581	1581	1581
$Pseudo - R^2$	0.21	0.21	0.21	0.21	0.21
$Log - likelihood$	-730.0	-729.5	-729.4	-729.1	-729.7

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. $D_{perfOvBCWellBelow}$: company's performance is well below overall expectations for this company before the global financial crisis (dummy), $D_{perfOvBCBelow}$: company's performance is below overall expectations for this company before the global financial crisis (dummy), $D_{perfOvBCInLine}$: company's performance is in line with overall expectations for this company before the global financial crisis (dummy), $D_{perfOvBCAbove}$: company's performance is above overall expectations for this company before the global financial crisis (dummy), $D_{perfOvBCWellAbove}$: company's performance is well above overall expectations for this company before the global financial crisis (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B15: Performance after the crisis

D_{ift}	(1)	(2)	(3)	(4)	(5)
<i>skillInt</i>	-0.0171 [0.014]	-0.0155 [0.014]	-0.0153 [0.014]	-0.0154 [0.014]	-0.0159 [0.014]
<i>capInt</i>	-0.00565 [0.0077]	-0.00567 [0.0077]	-0.00583 [0.0077]	-0.00582 [0.0077]	-0.00581 [0.0077]
<i>numEmp</i>	0.0456*** [0.010]	0.0478*** [0.010]	0.0475*** [0.010]	0.0478*** [0.010]	0.0476*** [0.010]
<i>wageEmp</i>	0.0169 [0.012]	0.0172 [0.012]	0.0171 [0.012]	0.0172 [0.012]	0.0168 [0.012]
<i>labProd</i>	0.0330*** [0.0100]	0.0333*** [0.0099]	0.0333*** [0.0099]	0.0335*** [0.0099]	0.0328*** [0.0099]
<i>inpInt</i>	0.00433 [0.0080]	0.00441 [0.0080]	0.00438 [0.0080]	0.00434 [0.0080]	0.00463 [0.0080]
$D_{training}$ (d)	0.0212 [0.023]	0.0213 [0.023]	0.0219 [0.023]	0.0211 [0.023]	0.0210 [0.023]
$D_{perfOvACWellBelow}$ (d)	-0.0797* [0.043]				
$D_{perfOvACBelow}$ (d)		0.0129 [0.027]			
$D_{perfOvACInLine}$ (d)			0.00370 [0.022]		
$D_{perfOvACAbove}$ (d)				-0.0135 [0.025]	
$D_{perfOvACWellAbove}$ (d)					0.0653 [0.071]
Obs	1581	1581	1581	1581	1581
$Pseudo - R^2$	0.21	0.21	0.21	0.21	0.21
$Log - likelihood$	-728.6	-729.9	-730.0	-729.9	-729.6

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. $D_{perfOvACWellBelow}$: company's performance is well below revised expectations for this company after the global financial crisis (dummy), $D_{perfOvACBelow}$: company's performance is below revised expectations for this company after the global financial crisis (dummy), $D_{perfOvACInLine}$: company's performance is in line with revised expectations for this company after the global financial crisis (dummy), $D_{perfOvACAbove}$: company's performance is above revised expectations for this company after the global financial crisis (dummy), $D_{perfOvACWellAbove}$: company's performance is well above revised expectations for this company after the global financial crisis (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B16: Financial crisis effect: change in capacity utilisation

D_{ift}	(1)	(2)	(3)
$skillInt$	-0.0151 [0.014]	-0.0147 [0.014]	-0.0151 [0.014]
$capInt$	-0.00600 [0.0077]	-0.00586 [0.0077]	-0.00640 [0.0077]
$numEmp$	0.0479*** [0.010]	0.0479*** [0.010]	0.0475*** [0.010]
$wageEmp$	0.0172 [0.012]	0.0174 [0.012]	0.0170 [0.012]
$labProd$	0.0334*** [0.0099]	0.0337*** [0.0099]	0.0331*** [0.0100]
$inpInt$	0.00463 [0.0080]	0.00406 [0.0080]	0.00499 [0.0080]
$D_{training}$ (d)	0.0222 [0.023]	0.0221 [0.023]	0.0222 [0.023]
$D_{capUtilNoChange}$ (d)	-0.0233 [0.025]		
$D_{capUtilDec}$ (d)		0.0242 [0.025]	
$D_{capUtilInc}$ (d)			0.0559 [0.049]
Obs	1581	1581	1581
$Pseudo - R^2$	0.21	0.21	0.21
$Log - likelihood$	-729.6	-729.5	-729.3

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. $D_{capUtilNoChange}$: no change in capacity utilisation after the global financial crisis (dummy), $D_{capUtilDec}$: decrease in capacity utilisation after the global financial crisis (dummy), $D_{capUtilInc}$: increase in capacity utilisation after the global financial crisis (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B17: Financial crisis effect: change in capacity utilisation with higher mean values

	(1)	(2)	(3)
D_{ift}			
$skillInt$	-0.0151 [0.014]	-0.0151 [0.014]	-0.0147 [0.014]
$capInt$	-0.00600 [0.0077]	-0.00640 [0.0077]	-0.00586 [0.0077]
$numEmp$	0.0479*** [0.010]	0.0475*** [0.010]	0.0479*** [0.010]
$wageEmp$	0.0172 [0.012]	0.0170 [0.012]	0.0174 [0.012]
$labProd$	0.0334*** [0.0099]	0.0331*** [0.0100]	0.0337*** [0.0099]
$inpInt$	0.00463 [0.0080]	0.00499 [0.0080]	0.00406 [0.0080]
$D_{training}$ (d)	0.0222 [0.023]	0.0222 [0.023]	0.0221 [0.023]
$D_{capUtilNoChangeHM}$ (d)	-0.0233 [0.025]		
$D_{capUtilDecHM}$ (d)		0.0559 [0.049]	
$D_{capUtilIncHM}$ (d)			0.0242 [0.025]
Obs	1581	1581	1581
$Pseudo - R^2$	0.21	0.21	0.21
$Log - likelihood$	-729.6	-729.3	-729.5

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. $D_{capUtilNoChangeHM}$: no change in capacity utilisation after the global financial crisis (higher mean values) (dummy), $D_{capUtilDecHM}$: decrease in capacity utilisation after the global financial crisis (higher mean values) (dummy), $D_{capUtilIncHM}$: increase in capacity utilisation after the global financial crisis (higher mean values) (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B18: Financial crisis effect: change in capacity utilisation with 10% tolerance

	(1)	(2)	(3)
<i>D_{ift}</i>			
<i>skillInt</i>	-0.0153 [0.014]	-0.0150 [0.014]	-0.0153 [0.014]
<i>capInt</i>	-0.00580 [0.0077]	-0.00588 [0.0077]	-0.00599 [0.0077]
<i>numEmp</i>	0.0476*** [0.010]	0.0478*** [0.010]	0.0476*** [0.010]
<i>wageEmp</i>	0.0170 [0.012]	0.0173 [0.012]	0.0171 [0.012]
<i>labProd</i>	0.0332*** [0.0099]	0.0335*** [0.0099]	0.0331*** [0.0099]
<i>inpInt</i>	0.00442 [0.0080]	0.00421 [0.0080]	0.00459 [0.0080]
<i>D_{training}</i> (d)	0.0219 [0.023]	0.0221 [0.023]	0.0218 [0.023]
<i>D_{capUtilNoChange10T}</i> (d)	0.000141 [0.025]		
<i>D_{capUtilDec10T}</i> (d)		0.0165 [0.025]	
<i>D_{capUtilInc10T}</i> (d)			0.0218 [0.057]
Obs	1581	1581	1581
<i>Pseudo - R²</i>	0.20	0.21	0.21
<i>Log - likelihood</i>	-730.0	-729.8	-730.0

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. *D_{capUtilNoChange10T}*: no change in capacity utilisation after the global financial crisis (10% tolerance) (dummy), *D_{capUtilDec10T}*: decrease in capacity utilisation after the global financial crisis (10% tolerance) (dummy), *D_{capUtilInc10T}*: increase in capacity utilisation after the global financial crisis (10% tolerance) (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B19: Financial crisis effect: change in capacity utilisation with 20% tolerance

	(1)	(2)	(3)
D_{ift}			
$skillInt$	-0.0155 [0.014]	-0.0151 [0.014]	-0.0152 [0.014]
$capInt$	-0.00582 [0.0077]	-0.00594 [0.0077]	-0.00593 [0.0077]
$numEmp$	0.0479*** [0.010]	0.0483*** [0.010]	0.0476*** [0.010]
$wageEmp$	0.0174 [0.012]	0.0177 [0.012]	0.0173 [0.012]
$labProd$	0.0331*** [0.0099]	0.0334*** [0.0099]	0.0330*** [0.0099]
$inpInt$	0.00468 [0.0080]	0.00449 [0.0080]	0.00447 [0.0080]
$D_{training}$ (d)	0.0218 [0.023]	0.0222 [0.023]	0.0214 [0.023]
$D_{capUtilNoChange20T}$ (d)	-0.0162 [0.026]		
$D_{capUtilDec20T}$ (d)		0.0379 [0.028]	
$D_{capUtilInc20T}$ (d)			0.0397 [0.080]
Obs	1581	1581	1581
$Pseudo - R^2$	0.21	0.21	0.21
$Log - likelihood$	-729.8	-729.1	-729.9

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. $D_{capUtilNoChange20T}$: no change in capacity utilisation after the global financial crisis (20% tolerance) (dummy), $D_{capUtilDec20T}$: decrease in capacity utilisation after the global financial crisis (20% tolerance) (dummy), $D_{capUtilInc20T}$: increase in capacity utilisation after the global financial crisis (20% tolerance) (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B20: Financial crisis effect: change in capacity utilisation with 30% tolerance

	(1)	(2)	(3)
D_{ift}			
$skillInt$	-0.0149 [0.014]	-0.0153 [0.014]	-0.0152 [0.014]
$capInt$	-0.00579 [0.0077]	-0.00583 [0.0077]	-0.00577 [0.0077]
$numEmp$	0.0473*** [0.010]	0.0476*** [0.010]	0.0475*** [0.010]
$wageEmp$	0.0169 [0.012]	0.0171 [0.012]	0.0174 [0.012]
$labProd$	0.0334*** [0.0099]	0.0332*** [0.0099]	0.0331*** [0.0099]
$inpInt$	0.00417 [0.0080]	0.00441 [0.0080]	0.00454 [0.0080]
$D_{training}$ (d)	0.0214 [0.023]	0.0220 [0.023]	0.0209 [0.023]
$D_{capUtilNoChange30T}$ (d)	0.0217 [0.030]		
$D_{capUtilDec30T}$ (d)		0.00422 [0.036]	
$D_{capUtilInc30T}$ (d)			0.0908 [0.14]
Obs	1581	1581	1581
$Pseudo - R^2$	0.21	0.20	0.21
$Log - likelihood$	-729.8	-730.0	-729.7

Notes: Probit estimations with host-country, parent-location and industry dummies in all columns. Standard errors are clustered at the firm level. See Table 14 for a description of variables capturing main firm characteristics. $D_{capUtilNoChange30T}$: no change in capacity utilisation after the global financial crisis (30% tolerance) (dummy), $D_{capUtilDec30T}$: decrease in capacity utilisation after the global financial crisis (30% tolerance) (dummy), $D_{capUtilInc30T}$: increase in capacity utilisation after the global financial crisis (30% tolerance) (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. (d): discrete change of dummy variable from 0 to 1. All variables are in logs except for dummies.

Table B21: Productivity and size premia of foreign affiliates with arms' length trade over domestic firms with arms' length trade (Manufacturing sector)

Panel A: Foreign affiliates with arms' length trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
D_{ftrade}	0.0875* [0.051]	0.328*** [0.060]	0.212*** [0.078]	0.436*** [0.082]	0.0359 [0.052]
$D_{fnotrade}$	0.0207 [0.082]	-0.0827 [0.093]	0.115 [0.13]	-0.0704 [0.14]	-0.0561 [0.090]
$D_{nofnotrade}$	-0.236*** [0.068]	-0.613*** [0.056]	-0.219*** [0.084]	-0.886*** [0.089]	-0.200*** [0.060]
Obs	2372	2381	2062	2372	2349
Panel B: Foreign affiliates with different arms' length trade flows					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
$D_{fimponly}$	0.0911 [0.061]	0.0600 [0.068]	0.316*** [0.092]	0.149 [0.098]	0.0310 [0.067]
$D_{fexponly}$	0.0277 [0.13]	0.224 [0.14]	0.361** [0.14]	0.288 [0.20]	0.165* [0.100]
$D_{fimpexp}$	0.101 [0.078]	0.712*** [0.087]	0.0247 [0.12]	0.856*** [0.12]	0.00181 [0.075]
$D_{fnotrade}$	0.0203 [0.082]	-0.0772 [0.093]	0.113 [0.13]	-0.0646 [0.14]	-0.0553 [0.090]
$D_{nofnotrade}$	-0.236*** [0.068]	-0.614*** [0.056]	-0.211** [0.084]	-0.888*** [0.089]	-0.198*** [0.060]
Obs	2372	2381	2062	2372	2349

Notes: OLS estimations with control variables in both panels and all columns: skill intensity, capital intensity, input intensity, total employment, host-country, parent-location and industry dummies. Firm size regressions omit the log of total employment as a covariate. Standard errors are clustered at the firm level. Productivity (column 1): log of the ratio of value added to total employment. Size (column 2): total employment. Productivity (column 3): log of total factor productivity. Panel A: D_{ftrade} : firm is foreign-owned and has arms' length trade only (dummy). Panel B: $D_{fimponly}$: firm is foreign-owned and has arms' length imports only (dummy), $D_{fexponly}$: firm is foreign-owned and has arms' length exports only (dummy), $D_{fimpexp}$: firm is foreign-owned and has arms' length imports and exports (dummy). Panels A and B: $D_{fnotrade}$: firm is foreign-owned and has neither intra-firm nor arms' length trade (dummy), $D_{nofnotrade}$: firm is domestic (i.e., not foreign-owned) and has no trade (dummy). Dummies take value 1 if the statement holds, and 0 otherwise. All variables are in logs except for dummies.

Table B22: Productivity and size premia of foreign affiliates with trade, both intra-firm and arms' length trade and arms' length trade only (Manufacturing sector)

Panel A: Foreign affiliates with trade					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
D_{trade}	0.171 [0.11]	0.504*** [0.11]	0.331** [0.16]	0.695*** [0.16]	0.195* [0.12]
Obs	961	963	835	961	957
Panel B: Foreign affiliates with different trade flows					
	(1)	(2)	(3)	(4)	(5)
	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>	<i>Size</i>	<i>Productivity</i>
$D_{imponly}$	0.109 [0.12]	0.249** [0.11]	0.307* [0.17]	0.361** [0.18]	0.104 [0.12]
$D_{exponly}$	0.198 [0.16]	0.422*** [0.14]	0.463** [0.21]	0.647*** [0.21]	0.373*** [0.14]
D_{impexp}	0.243** [0.12]	0.795*** [0.12]	0.315* [0.18]	1.060*** [0.18]	0.255** [0.13]
Obs	961	963	835	961	957

Notes: OLS estimations with control variables in all panels and all columns: skill intensity, capital intensity, input intensity, total employment, host-country, parent-location and industry dummies. Firm size regressions omit the log of total employment as a covariate. Standard errors are clustered at the firm level. Productivity (column 1): log of the ratio of value added to total employment. Size (column 2): total employment. Productivity (column 3): log of the ratio of value added to total employment. Size (column 4): log of total sales. Productivity (column 5): log of total factor productivity. Panel A: D_{trade} : firm has imports or exports, or both (dummy). Panel B: $D_{imponly}$: firm has imports only (dummy), $D_{exponly}$: firm has exports only (dummy), D_{impexp} : firm has both imports and exports (dummy). Dummies take value 1 if statement holds, and 0 otherwise. All variables are in logs except for dummies.