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Determinants of Intra-Firm Trade: Evidence from Foreign Affiliates in Sub-Saharan Africa

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Determinants of Intra-Firm Trade: Evidence from Foreign Affiliates in Sub-Saharan Africa[*]

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Abstract

By exploiting a unique sample of foreign affiliates in Sub-Saharan Africa, we study previously examined and unexamined firm-level determinants of intra-firm trade. We document that foreign affiliates engaging in intra-firm trade are relatively few and that the majority of these also engage in trade at arm's length, which accounts for an important fraction of their total trade. The identified firm-level determinants of intra-firm trade are consistent with property rights and intangible assets theories of the multinational firm, with international production hierarchies theories, as well as with theories of different FDI types and of multinational activity under credit constraints.

Keywords: intra-firm trade determinants, foreign affiliates, Sub-Saharan Africa

JEL Classification: F19, F23, L21, L23, L25

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1 Introduction

Multinational Corporations (MNCs) constitute the main locomotive in the current process of global fragmentation of production. The ensuing creation of trade within multinational firm boundaries (henceforth, intra-firm trade) has received particular attention recently and is by now well documented in the international trade literature.[1] The latter observation has motivated research on the determinants of intra-firm trade, resulting in several key theoretical predictions and empirical evidence.[2] In this paper, we improve our understanding of the firm-level determinants of intra-firm trade by making three novel contributions to the literature.

First, in addition to previously examined firm-level determinants of intra-firm trade such as employment (Ramondo et al., 2016), productivity and skill intensity (Corcos et al., 2013), the richness of our dataset allows us to look into the potential role of many other characteristics of foreign affiliates in intra-firm trade. In particular, we consider their intangible to tangible capital ratio, their status as majority-owned foreign affiliates (MOFAs), their age, their creation as mergers and acquisitions (M&As), their principal business scope (e.g. market or input access), their shares of finance of working capital from various sources including the parent company, and their tax to sales ratio. In doing so, this paper is the first to identify firm-level determinants of intra-firm trade which pertain not only to property rights theories but rather, to a wider array of theories of the MNC. Second, we advance the existing literature which focuses only on the existence (extensive margin) and share (intensive margin) of intra-firm imports by considering throughout the empirical analysis the two margins of both intra-firm imports and intra-firm exports.

Third, the stylised facts on the extensive and intensive margins of intra-firm and arm's length trade and the firm-level determinants of intra-firm trade that we uncover are based on a unique sample of foreign affiliates in Sub-Saharan Africa. Focusing on MNCs in this region is particularly important for two main reasons. The first reason is that part of our findings have been documented only with the use of data on developed countries, namely the US (Antràs, 2003; Nunn and Trefler, 2013; Ramondo et al., 2016) and France (Corcos et al., 2013). The second reason is that the African continent, despite lagging behind other developing regions such as South-East Asia and Latin America in terms of FDI inflows, has

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[1]Among others, see Hanson et al. (2001), OECD (2002), Borga and Zeile (2004), Hanson et al. (2005), and Bernard et al. (2010).

[2]For surveys of this literature, see Antràs and Rossi-Hansberg (2009) and Antràs and Yeaple (2013).

experienced a remarkable increase in this regard in recent decades. Specifically, between 1990 and 2015 Africa's FDI inflows rose from US\$2.8 billion to US\$54.1 billion and its FDI stock from 13.6% of GDP to 32.1% (UNCTAD and UNIDO, 2011; UNCTAD, 2016).

For the purpose of the empirical analysis, we draw firm-level data from the UNIDO Africa Investor Survey 2010. The dataset comprises 1466 foreign affiliates that engage in international trade and covers all economic sectors and 19 countries of Sub-Saharan Africa in 2009. Foreign affiliates are formally registered businesses whose parent companies are located in countries of various income and development levels inside and outside Sub-Saharan Africa.

In order to empirically identify the firm-level determinants of the extensive and intensive margins of intra-firm trade, we estimate probit and OLS models, respectively. In the first case, the dependent variable is a dummy indicating the foreign affiliate's engagement in intra-firm imports or intra-firm exports. In the second case, the dependent variable is the share of intra-firm imports or exports. In all regressions, we control for unobserved heterogeneity across affiliate countries, affiliate industries and parent countries by incorporating the respective fixed effects.

Starting with the findings of the descriptive statistics analysis, we report three main stylised facts. First, foreign affiliates with intra-firm trade are relatively few as they account for only 36% of the whole sample of trading firms. This is consistent with recent evidence on the relatively low shares of affiliated parties which trade with each other across borders (Corcos et al., 2013; Ramondo et al., 2016) and within borders (Atalay et al., 2014). Second, the vast majority of foreign affiliates with intra-firm trade engage in arm's length trade as well. Similarly, data on French firms reveal that intra-firm and arm's length trade are jointly observed in almost all industries and combinations of firms, products and destination countries (Corcos et al., 2013). Third, arm's length trade in foreign affiliates with intra-firm trade accounts on average for an important share of their total trade.

As key findings of the econometric analysis, we document that foreign affiliates of larger size, higher productivity and higher skill intensity are more likely to engage in intra-firm trade and have a higher share of this type of trade. The two margins of intra-firm trade are also higher in foreign affiliates with greater intangible relative to tangible capital and with a higher share of finance of working capital through the parent company, as well as in foreign affiliates whose principal business scope is to access new markets, to lower production costs, to access inputs and resources, to export back to the home country, and to benefit from a trade

agreement. These findings are consistent with property rights and intangible assets theories of the MNC, with international production hierarchies theories, as well as with theories of different FDI types and of multinational activity under credit constraints.

Regarding other firm characteristics, we find no statistically significant associations of the extensive and intensive margins of intra-firm imports and intra-firm exports with MOFAs, M&As, the age of foreign affiliates, their tax to sales ratio, and their shares of finance of working capital with credit from affiliate-country banks, non-affiliate-country banks and family members.

The remainder of this paper is structured as follows. In Section 2, we describe the data, the construction of variables and descriptive statistics which allow us to uncover stylised facts on the extensive and intensive margins of foreign affiliates' intra-firm and arm's length trade. In Section 3, we describe the econometric model. In Section 4, we discuss the main empirical results, while in Section 5, we perform a battery of robustness checks. In Section 6, we conclude and provide some suggestions for further research.

2 Data and descriptive statistics

We draw all firm-level data from the UNIDO Africa Investor Survey 2010. The survey aimed at collecting information about "for-profit" public and private businesses and their assessment of the current business environment in 19 Sub-Saharan African countries.[3] Implementation of stratified sampling by the economic sub-sector, number of employees and ownership of each firm led to the creation of a representative sample of registered domestic and foreign-owned firms in all economic sectors in 2009. The quality of data collection was ensured by the conduct of face-to-face interviews, primarily with the most senior decision maker within the firm.[4] Given that all monetary variables are in national currencies, we express these in US dollars (US$) by using currency exchange rate data from the World Bank's World Development Indicators (WDI).

Intra-firm and arm's length trade

In total, the dataset comprises 6497 firms, of which 2403 are foreign-owned. Intra-firm

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[3]These are: Burkina Faso, Burundi, Cameroon, Cape Verde, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Tanzania, Uganda, and Zambia.

[4]UNIDO (2011) provides a detailed description of the design and implementation of the survey.

imports and exports of foreign-owned firms are directly observed in the dataset. This allows for the identification of the vertical relationship between the foreign affiliate and its parent company without the need to rely on Input-Output (I–O) tables or disaggregated classifications of products produced by the two entities (Alfaro and Charlton, 2009). In particular, each foreign affiliate is asked to declare the share of production inputs, by value, imported from the parent company in total production inputs and the share of direct exports, by value, to the parent and/or a sister affiliate in total direct exports. As there are 728 foreign affiliates which have not declared values for both intra-firm imports and intra-firm exports, we drop these from the sample. Based on this information, we compute the share of arm's length exports as the remaining share of exports that is not intra-firm. Regarding the arm's length import share, we compute it as the share of production inputs, by value, imported directly and indirectly from the foreign affiliate in its total production inputs. Alternatively, we compute it by excluding indirect imports.[5]

Table 1 reveals that 87.5% of the remaining 1675 foreign affiliates engage in international trade. That is, the vast majority of foreign affiliates trade either intra-firm or at arm's length or both. Among those which trade, 90.2% are importers, 51% are exporters, 41.2% are importers-exporters, 49% are only importers, and 9.8% are only exporters. Importantly though, foreign affiliates with intra-firm trade are relatively few, as they account for only 35.9% of the sample of trading firms. The remaining 64.1% of trading firms trade only at arm's length. Similarly, foreign affiliates with intra-firm flows constitute the minority among importing, exporting, importing-exporting, importing-only, and exporting-only firms (31%, 33.3%, 18.3%, 29%, and 29.4%, respectively).[6] Arm's length trade is a popular activity among foreign affiliates with intra-firm trade as 96.8% of these engage in this type of trade as well.

<< Table 1 about here >>

A similar analysis across economic sectors, shown in Table 2, produces the same stylised facts. Using the ISIC Rev. 1.1, we split the whole economy into five sectors: agriculture, min-

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[5]In addition to the share of production inputs, by value, that is imported from the parent company, each firm is asked to declare the share of production inputs, by value, that it imports directly, as well as the shares of production inputs, by value, that it sources from local importers (i.e., indirect imports), from local manufacturers, or from any other source to be specified by the firm. For this reason, the sum of intra-firm and arm's length import shares may not necessarily add up to 1, its maximum value.

[6]As we control for the response rate for intra-firm imports and intra-firm exports, the total numbers of importing, exporting, importing-exporting, and exporting-only foreign affiliates in rows 7, 9, 11, and 15 of Table 1 happen to differ from the corresponding ones in rows 6, 8, 10, and 14.

ing, manufacturing, electricity, gas and water (EGW) supply and construction, and services.[7] Based on Hatzichronoglou (1997) and UNCTAD and UNIDO (2011), we further decompose the manufacturing sector into resource-based, low-tech, and high- and medium-tech manufacturing industries. Similarly, based on Eurostat (2011), we further decompose the services sector into knowledge-intensive and less knowledge-intensive services industries.[8]

According to Panel A, the vast majority of foreign affiliates in each sector engage in international trade. The share of these firms ranges between 73.3% in knowledge-intensive services and 93.1% in high- and medium-tech manufacturing. According to Panels B and C, foreign affiliates with intra-firm trade are relatively few in all sectors examined, while those which trade only at arm's length constitute the majority. The share of foreign affiliates with intra-firm trade ranges between 31.8% in knowledge-intensive services and 48.5% in agriculture.[9] Finally, according to Panels D and E, the vast majority of foreign affiliates with intra-firm trade in manufacturing also engage in arm's length trade, while this is true for all foreign affiliates in the rest of the sectors.

<< Table 2 about here >>

In Table 3, we focus on foreign affiliates with intra-firm trade in order to shed light on their import and export shares accounted for by intra-firm and arm's length transactions. In the whole economy, the average shares of intra-firm imports and exports of these firms are 65.3% and 51.7%, respectively, while their average arm's length import and export shares are 23.5% and 48.3%. These statistics indicate that arm's length trade of the average firm, especially its exports, account for significant shares in their total trade. Producing the same statistics by sector reveals a very similar pattern. The average share of intra-firm imports ranges between 48.2% in agriculture and 73% in less knowledge-intensive services and is greater than the

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[7]Agriculture: 1–5; Mining: 10–14; Manufacturing: 15–39; Electricity, Gas and Water Supply and Construction: 40 and 45; Services: 50–99.

[8]Resource-based manufacturing: 15, 16, 20, 21, 23, 25, 26, 27; Low-tech manufacturing: 17, 18, 19, 22, 28, 36; High- and medium-tech manufacturing: 24, 29, 30, 31, 32, 33, 34, 35, 37, 38; Knowledge-intensive services: 61, 62, 64, 65, 66, 67, 70, 71, 72, 73, 74, 80, 85, 92; Less knowledge-intensive services: 50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95, 99.

[9]The scarcity of foreign affiliates with intra-firm trade is also observed in most of the individual ISIC Rev. 1.1 industries (Table A1), in all 19 Sub-Saharan African countries (Table A2), and in almost all combinations of parent country types and sectors (Table A3). In the latter case, we consider three types of parent countries: high-income countries, low/middle-income countries outside Sub-Saharan-Africa, and Sub-Saharan African countries. The first group comprises parent countries which are classified as high-income by the World Bank's Historical Country Classification for the year 2010. Based on the same classification, the second group comprises parent countries outside Sub-Saharan Africa which are classified as upper-middle-income, lower-middle-income or low-income.

average share of arm's length imports in all sectors examined. The average share of arm's length imports ranges between 18.7% in low-tech manufacturing and 37.9% in knowledge-intensive services. In addition, as the average share of intra-firm exports ranges between 18.5% in EGW supply and construction and 71.8% in agriculture, the highest and lowest average shares of arm's length exports, respectively, are observed in these two sectors. Arm's length exports account, on average, for the majority of total exports in all sectors except for agriculture and low-tech manufacturing.[10]

<< Table 3 about here >>

In conclusion, the descriptive statistics document three main stylised facts. First, among foreign affiliates which engage in international trade, the majority of these trade exclusively at arm's length and only a relatively small fraction, roughly one third of these, trades intra-firm. Ramondo et al. (2016) and Marin et al. (2013)[11] also report that only roughly one third of foreign affiliates in their samples engage in intra-firm trade. The first study employs the BEA data on almost the whole population of foreign affiliates of US MNCs, while the second study employs data on foreign affiliates in Eastern Europe whose parents are based in Austria and Germany. Similarly, Corcos et al. (2013), with the use of data on French firms, find that only 8.49% of firm-product-destination country triples correspond to intra-firm imports, but they account for roughly 40% of total imports' value. Also, using data on affiliated establishments within the US, Atalay et al. (2014) report that those which trade with each other are relatively few.

Second, among foreign affiliates with intra-firm trade, the vast majority of these engage in arm's length trade as well. This is in line with Corcos et al. (2013) who report that intra-firm and arm's length trade coexist in almost all industries and combinations of firms, products and destination countries. Third, an important share of their total trade, by value, is accounted for by arm's length trade.

The scarcity of foreign affiliates with intra-firm trade is an essential stylised fact because it poses the critical question as to why multinational firm boundaries exist, if not for the transfer of physical goods. Hence, this evidence seems to favour the view that these boundaries are crucially determined by the transfer of intangibles (Arrow, 1969; Teece, 1977; Atalay et al.,

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[10]We obtain very similar statistics when we exclude indirect exports from the calculation of the share of arm's length exports (Table A4).

[11]This study, however, investigates a different topic from ours.

2014). The other two stylised facts suggest that the "make-or-buy" decision is likely to be made for each stage of the production process. Therefore, possible explanations for these stylised facts can be the level of upstreamness of each production stage in the value chain and its degree of good and input complexity. Antràs and Chor (2013) study how the position of each production stage in the value chain can impact the internalisation choice of the firm. In their property rights model of organisational decisions, they use a production function with a continuum of sequential stages. Based on the effects of effort choices of upstream-stage suppliers on effort levels at downstream stages of production, they show that upstream stages are outsourced and downstream stages are internalised when stage inputs are sequential complements. Instead, when stage inputs are sequential substitutes, upstream stages are internalised while downstream stages are outsourced. Their predictions are supported by industry-level data (Antràs and Chor, 2013), as well as by firm-level data (Alfaro et al., 2016).

As documented by Corcos et al. (2013), production of complex inputs is more likely to take place within firm boundaries. Carluccio and Fally (2012) also stress this factor by combining it with the level of financial development in the supplier's country. Specifically, they find that complex goods and inputs are more likely to be imported intra-firm from countries with low financial development. This result is underpinned by a property rights model in which they show that the financial constraints faced by suppliers deter firms from transferring ownership rights to them. The risk level of dissipation of intangible assets used for the production of complex inputs can also impact the internalisation choice of the firm. The intuition is that since complex inputs entail the development and use of critical intangible assets such as R&D and marketing, firms can protect these assets more effectively through internalisation (Corcos et al., 2013). This explanation is pertinent to the transaction costs approach to the firm, rather than the property rights approach.

Firm-level determinants of intra-firm trade

Additional information of this dataset on characteristics and activities of foreign affiliates allows us to create variables that capture potential firm-level determinants of intra-firm trade. As measures of foreign affiliates' size and productivity, we use the total number of permanent full-time employees and the ratio of total sales to the total number of permanent full-time employees, respectively. Using information on the number of permanent full-time managerial, technical and supervisory workers, we compute skill intensity as the share of these workers in

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total permanent full-time employment. As a measure of intangible to tangible capital, we use the ratio of expenditures on training and advertising to the total value of fixed assets. We also proxy for transfer pricing within MNCs with the ratio of taxes paid by foreign affiliates to their total sales. Firm age is the number of years since the creation of the foreign affiliate. There is salient heterogeneity across foreign affiliates in all these dimensions, as indicated by the summary statistics for the corresponding variables in Table 4.

<< Table 4 about here >>

Based on information on the shares of finance of working capital from various sources, we capture the channels through which foreign affiliates have access to finance and subsequently, the channels through which they overcome credit constraints that they possibly face. Foreign affiliates finance their working capital through internal funds and earnings, credit from banks in the affiliate country, credit from banks outside the affiliate country, credit from family, friends or individual lenders, credit from non-bank financial institutions (e.g. equity funds), purchases on credit from suppliers and advances from customers, issuance of new equity shares or new debt (including commercial paper and debentures), through funds from the parent company, and from any other source to be specified by the firm. According to Table 4, internal funds and earnings, credit from banks in the affiliate country, purchases on credit from suppliers and advances from customers, as well as funds from the parent company account on average for the highest shares of finance of foreign affiliates' working capital.

Using information on the foreign ownership share, we identify majority-owned foreign affiliates (MOFAs). MOFAs are defined as firms which are owned by at least 50% by a foreign investor. In addition, we distinguish between foreign affiliates created through greenfield FDI and mergers and acquisitions (M&As) by using information on five modes of foreign investment. Greenfield FDI is captured by the creation of a new operation as a wholly-owned enterprise and the creation of a new operation as a joint venture. M&As are captured by the purchase of pre-existing assets from local private owners, the purchase of pre-existing assets from foreign private owners, and the purchase of pre-existing state-owned assets. We also distinguish across principal business scopes of foreign affiliates or equivalently, across different types of FDI and combinations of these, as captured by different principal motives for foreign investment. In particular, access to new markets proxies for horizontal[12] and export-

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[12]The MNC serves the foreign market through a foreign affiliate rather than through exports. In doing so,

platform FDI,[13] lower production costs, access to natural resources and inputs, collaboration with a specific partner in the host country, and exporting back to the home country proxy for vertical FDI,[14] while benefits from a trade agreement potentially proxy for vertical and export-platform FDI. Any other principal motive for foreign investment is specified by the firm itself. As shown in Table 5, only a small fraction of foreign affiliates is accounted for by M&As, while most of these are majority-owned and their principal business scope is to access new markets.

<< Table 5 about here >>

3 Econometric model

We study the firm-level determinants of intra-firm trade of foreign affiliate z in country c and industry j, whose parent company is located in country p, by estimating the following model:

$$X_{zcjp} = \alpha + \beta * F_{zcjp} + \beta_c * D_c + \beta_j * D_j + \beta_p * D_p + \epsilon_{zcjp} \tag{1}$$

We use probit estimations when the dependent variable, X_{zcjp}, is the dummy for intra-firm imports or intra-firm exports, capturing the extensive margin of intra-firm trade. Instead, we estimate the model by OLS when the dependent variable is the share of intra-firm imports or intra-firm exports, capturing the intensive margin of intra-firm trade. Import and export regressions are estimated on samples comprising importing and exporting foreign affiliates, respectively. Unobserved heterogeneity across affiliate countries, affiliate industries and parent countries is accounted for by the respective sets of dummies, D_c, D_p, and D_j. As matrix F comprises firm-level determinants of intra-firm trade, the marginal effects and coefficient estimates included in vector β demonstrate whether and how firm characteristics are asso-

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the production process of the parent company is replicated into the foreign affiliate. Among others, see Caves (1982), Markusen (1984), Brainard (1997), Helpman et al. (2004), Horstmann and Markusen (1992), Markusen and Venables (2000), and Ramondo et al. (2013).

[13]An affiliate located in a foreign country is used as a platform for serving other markets nearby via exports (Ekholm et al., 2007; Badinger and Egger, 2010). Ekholm et al. (2007) consider also the special case in which an affiliate of export-platform type exports back to its parent in order to serve the home market and thus, engages in intra-firm trade.

[14]The 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; Yeaple, 2008).

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ciated with the extensive and intensive margins of intra-firm trade. In benchmark probit estimations, the marginal effect of each covariate is produced across all values of the rest of the covariates. The selection of the possible firm-level determinants of intra-firm trade allows us to study several theories and concepts of the MNC. In particular, these covariates can potentially capture property rights, intangible assets and resource-based theories of the MNC, international production hierarchies theories, theories of different FDI types, of transfer pricing and of multinational activity under credit constraints, as well as the strength of ties between foreign affiliates and their parents.

Recent theoretical frameworks predicated upon the property rights approach to the firm (Grossman and Hart, 1986; Hart and Moore, 1990) predict that larger, more productive and skill intensive firms are more likely to engage in intra-firm trade (Antràs, 2003; Antràs and Helpman, 2004; Antràs and Helpman, 2008). These theoretical predictions are empirically validated by Antràs (2003), Corcos et al. (2013) and Nunn and Trefler (2013). Hanson et al. (2001) are the first to associate the transfer of intermediate inputs from the parent to the foreign affiliate with the latter entity's size. Similarly, Ramondo et al. (2016) find that the main determinant of a foreign affiliate's intra-firm trade is its size. Grossman et al. (2006) emphasise the economies of scale in production generated by the concentration of intra-firm trade in a small number of relatively large affiliated parties, while Helpman et al. (2004) report productivity premia of MNCs over non-MNC exporters. For this purpose, the first three covariates of our model are the log of the total number of permanent full-time employees as a measure of firm size, the log of the ratio of total sales to total permanent full-time employment as a measure of firm productivity, and the share of permanent full-time managerial workers in the total number of permanent full-time workers as a measure of the firm's skill intensity. Including skill intensity in the model is also motivated by international production hierarchies theories. Specifically, MNCs save on communication and monitoring costs because managers in foreign affiliates supervise production workers in these entities who would otherwise be supervised by managers in the parent company (Antràs et al., 2008).

Also, according to property rights theories, intra-firm trade is deemed as an effective way for the parent company to have residual rights of control over relationship-specific assets (Antràs and Rossi-Hansberg, 2009; Antràs and Yeaple, 2013). As a result, majority ownership of the foreign affiliate may be of utmost importance for the foreign investor. Majority ownership also implies greater involvement of the parent in the affiliate's decision-making

process and greater control over the use of its financial resources (Manova et al., 2015). For this reason, we include in the model a dummy variable indicating whether a foreign affiliate is majority-owned or not. What is more, foreign affiliates may start to develop or expand a network of suppliers and buyers in the host country and overseas which may substitute partly or fully for intra-firm trade in the course of time. We capture the development of such a network by including in the model the age of the foreign affiliate, that is, the years since its establishment.

Ethier (1986) and Ethier and Markusen (1996), among other studies, stress the close ties between MNCs and knowledge-based capital. We test for intangible asset theories of the MNC by incorporating in the model the intangible to tangible capital ratio, calculated as the sum of expenditures on training and advertising divided by the total value of fixed assets.

We also test for the resource-based view of the MNC, according to which there is an interplay between a firm's complementary capabilities (Nocke and Yeaple, 2007; Antràs and Yeaple, 2013). Due to the fact that some capabilities such as marketing, distribution and country-specific institutional competency are likely to be imperfectly mobile, cross-border M&As allow the acquiring firm to complement its own capabilities with the capabilities of a local firm. If such complementarity exists, then M&As may determine intra-firm trade. In addition, the creation of synergies after cross-border M&As may be mutually beneficial for the acquiring and acquired firms if the latter are capital constrained because they operate in financially vulnerable sectors (Javorcik and Spatareanu, 2009; Poncet et al., 2010; Manova and Yu, 2012; Manova et al., 2015; Huang et al., 2016). For all these reasons, we incorporate in the model a dummy indicating whether the foreign affiliate was created through M&As. This dummy can also be considered as an important control variable of the model. The intuition is that property rights theories of the MNC predict that larger and more productive firms are more likely to engage in intra-firm trade, while, based on the "cherry-picking" argument, foreign investors may choose to take over larger and more productive firms in the host country through M&As (Javorcik, 2004).

In principle, foreign affiliates of horizontal type are unlikely to engage in intra-firm trade, while those of vertical type, by definition, do. "Export-platform" foreign affiliates also engage in intra-firm trade in case their exports are directed to affiliated parties overseas. However, recent empirical evidence for complex FDI and complex integration strategies of MNCs suggests that this sort of classification of foreign affiliates is unlikely to be accurate (UNCTAD,

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1998; Hanson et al., 2001; Yeaple, 2003a; Helpman, 2006). Motivated by this evidence, we incorporate in the model a set of dummy variables indicating the principal motive for foreign investment (e.g. new market access) and subsequently, the principal business scope of the foreign affiliate and the type of FDI. Since these dummies are mutually exclusive, we choose the dummy indicating any other principal motive for foreign investment to be specified by the firm as the reference variable. Therefore, their marginal effects and coefficient estimates are interpreted with respect to this variable.

In addition, transfer pricing is a common practice among MNCs as it allows them to evade taxation by transferring tangibles and intangibles to their foreign affiliates.[15] Had intra-firm trade been driven solely by transfer pricing, then one would expect to observe remarkable differences in taxes paid by foreign affiliates with and without intra-firm trade. We test for this by including in the model the ratio of taxes paid by the foreign affiliate to its total sales. Motivated by the literature on multinational activity and credit constraints (Antràs et al., 2009; Manova et al., 2015) and the vulnerability of Sub-Saharan Africa to financial crises mostly through the disruption of trade finance channels (Berman and Martin, 2012), we also include in the model the shares of finance of working capital from various sources, among which are internal funds and earnings of the foreign affiliate, credit from banks in the affiliate country or overseas, credit form non-bank financial institutions, as well as funds from the parent company.

4   Empirical results

We display the estimation results of the benchmark model in Table 6. The firm-level determinants of the extensive and intensive margins of intra-firm imports are studied in the first two columns, while the firm-level determinants of the two margins of intra-firm exports are studied in the last two columns. The principal theory or concept of the MNC captured by each potential firm-level determinant is also shown in the table. The dependent variable in column 1 is the dummy for intra-firm imports. The positive and statistically significant marginal effects of employment, productivity and skill intensity suggest that larger, more productive and more skill intensive foreign affiliates are more likely to engage in intra-firm imports. In addition, the positive and significant marginal effect of the intangible to tangible capital ratio

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[15]Among others, see Desai et al. (2006), Dischinger and Riedel (2011), Bauer and Langenmayr (2013), Keuschnigg and Devereux (2013), and Davies et al. (2017).

suggests that foreign affiliates with greater intangible relative to tangible capital are more likely to engage in intra-firm imports. The probability of engagement in intra-firm imports is also higher in foreign affiliates whose principal business scope is to access new markets, to access inputs and resources, to lower production costs, to join a specific partner in the host country, as well as to benefit from a trade agreement. Also, foreign affiliates with higher shares of finance of working capital through internal funds and earnings, credit from non-bank financial institutions, purchases on credit from suppliers and advances from customers, as well as through the parent company, are more likely to engage in intra-firm imports.

<< Table 6 about here >>

In column 2, the dependent variable is the share of intra-firm imports. Larger, more productive and more skill intensive foreign affiliates have a higher share of intra-firm imports. Foreign affiliates whose principal business scope is to access new markets, to access inputs and resources, to lower production costs, and to benefit from a trade agreement have a higher share of intra-firm imports as well. The share of intra-firm imports is also higher in foreign affiliates with higher shares of finance of working capital through issuance of new equity shares or debt and through the parent company. The dependent variable in column 3 is the dummy for intra-firm exports. According to this column, larger and more productive foreign affiliates, as well as those with higher intangible to tangible capital ratio are more likely to engage in intra-firm exports. The probability of engagement in intra-firm exports is also higher in foreign affiliates whose principal business scope is to export back to the home country and in those with a higher share of finance of working capital through the parent company. By contrast, foreign affiliates whose principal business scope is to join a specific partner in the host country and those with a lower share of finance of working capital through credit from non-bank financial institutions are less likely to engage in intra-firm exports.

In column 4, the dependent variable is the share of intra-firm exports. Larger foreign affiliates and those with a higher intangible to tangible capital ratio have a higher share of intra-firm exports. The share of intra-firm exports is also higher in foreign affiliates with a higher share of finance of working capital through the parent company. By contrast, it is lower in foreign affiliates with a higher share of finance of working capital through credit from non-bank financial institutions. In all four columns, we do not find statistically significant associations of the extensive and intensive margins of intra-firm imports and intra-firm exports

with M&As, majority-owned foreign affiliates, the age of foreign affiliates, their tax to sales ratio, and their shares of finance of working capital through credit from affiliate-country banks, non-affiliate-country banks, family, and from any other source specified by the firm itself.[16]

Overall, the results in the four columns suggest that foreign affiliates of larger size, higher productivity and higher skill intensity are more likely to engage in intra-firm trade and have a higher share of this type of trade. The probability of engagement in intra-firm trade and the share of intra-firm trade are also higher in foreign affiliates with greater intangible relative to tangible capital and with higher share of finance of working capital through the parent company, as well as in foreign affiliates whose principal business scope is to access new markets, to lower production costs, to access inputs and resources, to export back to the home country, and to benefit from a trade agreement.

Discussion

The identification of employment, productivity and skill intensity as determinants of intra-firm trade is consistent with the main predictions of recent theoretical frameworks of the MNC predicated upon the property rights approach to the firm (Grossman and Hart, 1986; Hart and Moore, 1990). According to this approach, a firm can be held up by a non-integrated supplier after production takes place due to contract incompleteness. Property rights, implied by the internalisation of production, act as residual rights of control over productive assets which mitigate the hold-up problem. Based on this concept, Antràs (2003) builds a partial equilibrium model which predicts that skill intensive firms are more likely to engage in intra-firm trade. Also, Antràs and Helpman (2004) consider firm heterogeneity à la Melitz (2003) in order to study different sourcing modes of the firm. They show that the biggest and most productive firms opt for FDI, that is, for integration of foreign entities. Instead, smaller and less productive firms opt for foreign outsourcing, that is, for collaboration with unaffiliated parties overseas. Their prediction is driven by the plausible assumption that the affiliate set-up cost associated with FDI is greater than the independent supplier search cost associated with foreign outsourcing. Along with our study, the predictions of the two models are empirically

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[16]We ensure that the fewer observations in benchmark regressions than those in the importing and exporting firms samples do not result in sample selection which in turn might bias the main results in three ways (Tables B1 to B6). First, we estimate the benchmark regressions with each type of firm-level determinants individually. Second, we add sequentially to the model firm-level determinants of intra-firm trade pertaining to specific theories of the MNC. Third, we estimate the benchmark regressions after dropping the tax to sales ratio since, according to Table 4, this variable has the highest number of missing observations among all main covariates. We also ensure that the results of probit estimations do not change quantitatively and qualitatively when the marginal effect of each covariate is calculated for all other covariates held at their means (Table B7).

validated with data on the US (Antràs, 2003; Nunn and Trefler, 2013) and France (Corcos et al., 2013).

Other relevant empirical evidence is provided by Hanson et al. (2001) and Ramondo et al. (2016) who employ the US BEA data. The first paper studies the flows of intermediate goods from the parent to the foreign affiliate by using a measure of affiliate size, while the second paper finds that the main determinant of a foreign affiliate's intra-firm trade is its size. The findings on intra-firm trade and firm size can be also rationalized by the theoretical framework of Grossman et al. (2006) which studies optimal integration strategies of heterogeneous firms. According to this framework, concentration of intra-firm trade in a small number of relatively large affiliated parties allows the MNC to take advantage of economies of scale in production. Another relevant theoretical framework is that of Helpman et al. (2004) which introduces firm heterogeneity in a multi-country and multi-sector model where firms face the proximity-concentration trade-off while servicing foreign markets. The main prediction of this framework is that the biggest and most productive firms engage in (horizontal) FDI, while smaller and less productive firms engage in exports. Similar to Antràs and Helpman (2004), this prediction is driven by the plausible assumption that the affiliate set-up cost associated with FDI is greater than the cost of forming a distribution and servicing network associated with exporting. The same paper validates this prediction with US data by reporting productivity premia of MNCs over non-MNC exporters.

In addition to property rights theories, our findings on intra-firm trade and skill intensity may also be explained by international production hierarchies theories. By perceiving the MNC as an international production team with a knowledge-based hierarchy (Garicano, 2000), Antràs et al. (2008) show that the role of managers in foreign affiliates is pivotal as they are in charge of supervising local production workers. In their absence, this role would have been undertaken by managers in the parent company which would have increased considerably communication and monitoring costs.

Our evidence on the intangible to tangible capital ratio being a determinant of intra-firm trade is rationalised by intangible assets theories. Ethier (1986) incorporates FDI into a general equilibrium model of international trade where the internalisation choice is endogenous. He argues that the main issue for the good understanding of FDI within the trade theory context is internalisation and that this is mostly driven by the exchange of critical knowledge between agents. The strong link between MNCs and knowledge-based capital is by now a well-

documented stylised fact (Mansfield and Romeo, 1980; Caves, 1982; Markusen, 1984; Teece, 1986). Exploiting this link, Ethier and Markusen (1996) argue that if a firm's ownership advantage is strongly connected to its knowledge-based capital, then its effective protection will favour the service of a foreign market through a foreign affiliate than through exports or licencing. Hence, the need for protection of a firm's knowledge-based capital impacts its mode of servicing foreign markets. In addition, Mansfield (1995), using survey data, shows that the perception of intellectual property protection in developing countries impacts the decision of MNCs to establish affiliates and undertake joint ventures in these countries, as well as the extent of knowledge transfer to their foreign operations.

Our findings on intra-firm trade and the foreign affiliates' principal business scope support the notions of vertical and export-platform FDI (Helpman and Krugman, 1985; Ekholm et al., 2007) and especially, the notions of complex FDI and complex integration strategies (UNCTAD, 1998; Yeaple, 2003a; Helpman, 2006) which point to different combinations of FDI. UNCTAD (1998) is the first study to report empirical evidence on such combinations. Feinberg and Keane (2001) examine affiliates of US MNCs in Canada and find that only 12% of these are of purely horizontal type and only 19% of purely vertical type. The rest of these represent complex FDI. In their analysis of operations of US MNCs and their foreign affiliates, Hanson et al. (2001) conclude that the distinction between horizontal and vertical FDI fails to capture the strategies implemented by MNCs. In addition, Grossman et al. (2006) argue that in a more realistic theoretical framework with multiple countries and multiple production stages, the distinction between horizontal and vertical FDI becomes less clear.

Finally, our findings on intra-firm trade and the shares of finance of working capital through the parent and other sources are consistent with empirical evidence of Desai et al. (2004) and Feinberg and Phillips (2004) who document that foreign affiliates of MNCs in financially under-developed countries overcome frictions in external capital markets by borrowing from the parent company. It is also consistent with the theoretical framework of Antràs et al. (2009) where MNCs arise endogenously, through the integration of input suppliers who are financially constrained due to capital market frictions. After integration, input suppliers are directly funded by the parent company or can borrow more easily from banks in the host country. The latter, however, is not supported by our results. In addition, this group of findings is pertinent to empirical evidence on the impact of credit constraints on the choice between (horizontal) FDI and exporting (Buch et al., 2009) and on the choice among horizontal, vertical and

export-platform FDI (Bilir et al., 2014). Consistent with FDI substituting for capital market frictions, Manova et al. (2015) find that foreign affiliates and joint ventures in China have better export performance than private domestic firms in sectors which are financially more vulnerable. Also, Desai et al. (2008) find that foreign affiliates of US MNCs expand their sales and investment by more than domestic companies when facing large real exchange rate devaluations. Finally, Alfaro and Chen (2012) find that foreign affiliates worldwide performed better than domestic firms with similar characteristics in the aftermath of the financial crisis of 2007–2008.

5   Robustness checks

In this section, we perform numerous checks to verify the robustness of the main results. To save on space, we present only a selection of the relevant tables and relegate all the rest to the Online Appendix. In order to account for any characteristics of affiliate-parent-country pairs (e.g. geographic distance) which may affect trade of the foreign affiliate with its parent company, we re-estimate the benchmark model after replacing the affiliate-country dummies and parent-country dummies with dummies for pairs of affiliate and parent countries. The results, shown in Table 7, are very similar to the main ones in terms of sign, size and precision. Similarly, the results do not change quantitatively and qualitatively when we estimate the benchmark model with standard errors clustered by affiliate country and affiliate industry, by affiliate country and parent country, as well as by affiliate country, affiliate industry and parent country (Tables B8 to B10).

<< Table 7 about here >>

Similar to Corcos et al. (2013), we use as dependent variables in probit regressions dummies indicating that imports from the parent and exports to the parent and/or sister affiliates account for at least 25% and 75% of the foreign affiliate's total production inputs and total direct exports, respectively. As shown in Table 8, the main results remain largely unchanged. Interestingly, we also find that older foreign affiliates are less likely to import at least 75% of their production inputs from the parent company. A possible explanation for this result is that older foreign affiliates develop local and international backward linkages with unaffiliated parties or have the necessary know-how to produce inputs themselves which partly substitute

for production inputs sourced from the parent.

<< Table 8 about here >>

In another exercise, we test the sensitivity of our main results to the use of alternative firm-level variables as determinants of intra-firm trade. We first capture firm size with total sales instead of total employment. Since labour productivity is computed as the ratio of total sales to total employment, we drop it from these regressions in order to avoid multi-collinearity. We also replace skill intensity with the average wage, computed as the ratio of total wage bill to total permanent full-time employment, and with the wage gaps between non-production and production workers, managerial and production workers, as well as between managerial and non-production workers. The wage gaps between these worker types are calculated as the ratios of the monthly wage for one worker type to the monthly wage for another. In all three cases, we obtain very similar results to the main ones (Tables B11 to B13). We also find that foreign affiliates which pay a higher average wage have a higher share of intra-firm imports, while those which pay a higher monthly wage to managerial workers relative to production workers are more likely to engage in intra-firm imports. Both findings are consistent with international production hierarchies theories which stress that the supervisory role of managers in foreign affiliates is crucial as it allows the MNC to save on communication and monitoring costs (Antràs et al., 2008). The main results also remain largely unchanged when we replace the tax to sales ratio with the tax to assets ratio (Table B14).

As part of the same exercise, we replace the shares of finance of working capital from various sources with five alternative sets of firm-level variables. The first alternative set comprises the shares of finance of *fixed assets* from the same sources as of working capital. The second and third alternative sets comprise dummies indicating whether foreign affiliates have non-zero shares of working capital and fixed assets from each source examined. By and large, we obtain very similar results to the main ones (Tables B15 to B17). Most importantly, we find that foreign affiliates which have their parent as a source of finance of working capital and fixed assets and those which have a higher share of finance of fixed assets from this source are more likely to engage in intra-firm imports and intra-firm exports and have higher shares of both intra-firm trade flows. The fourth set of firm-level variables comprises dummies indicating the importance of parental assistance received by foreign affiliates in accessing finance. In particular, these dummies indicate whether parental assistance was not received,

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was received but it was not important, was received and it was slightly important, important, very important, and crucial. Since these dummies are mutually exclusive, we consider the first dummy as the reference variable and exclude it from the regressions. In line with the main results, we find that foreign affiliates which are importantly assisted by the parent in order to access finance are more likely to engage in intra-firm imports, while those which are crucially assisted by the parent in this respect are more likely to engage in intra-firm imports and have a higher share of this intra-firm trade flow (Table B18).

Since capital goods, such as production machinery, are part of a firm's working capital and fixed assets, the fifth set of firm-level variables comprises dummies indicating four alternative channels through which foreign affiliates acquire capital goods. The relevant question in the questionnaire is addressed only to foreign affiliates in non-services industries and asks whether capital goods are mostly imported directly by the company, acquired through distributors in the affiliate country, imported through the parent company, or acquired from any other source to be specified by the firm. As these choices are mutually exclusive, we choose the fourth dummy to be the reference variable in regressions. Similar to the main findings, we show that foreign affiliates which acquire capital goods from their parent are more likely to engage in intra-firm imports and have a higher share of this intra-firm trade flow. Also, foreign affiliates which acquire capital goods from local distributors are less likely to engage in intra-firm exports (Table B19).

In Table 9, we show that the main results do not change quantitatively and qualitatively when we re-estimate the benchmark regressions on a sample which comprises only goods-producing industries (Atalay et al., 2014).[17] The results remain largely unchanged also when our estimating sample comprises only manufacturing industries (Table B20). Given that the firm-level data employed in our empirical analysis correspond to 2009, only a year after the eruption of the global financial crisis of 2007–2008 and the subsequent global trade collapse (Levchenko et al., 2010), the two types of foreign affiliates might have been hit disproportionately by these events. We control for the crisis effect in three ways. First, we augment the benchmark model with dummies indicating whether the performance of the firm is well below, below, in line with, above, and well above its expectations before the crisis. Second, we incorporate similar dummies capturing firm performance as compared to *revised* expecta-

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[17]Based on the US Bureau of Economic Analysis (http://www.bea.gov/faq/index.cfm?faq_id=182 – accessed June 13, 2017) and the US Bureau of Labour Statistics (http://www.bls.gov/iag/tgs/iag06.htm#about – accessed June 13, 2017), this sample comprises industries in agriculture (1–5), mining (10–14), manufacturing (15–39), and construction (45).

tions after the crisis. In both cases, the dummies are mutually exclusive and therefore, we choose those indicating firm performance well above expectations and revised expectations before and after the crisis, respectively, as the reference variables. The results remain largely unchanged, while the marginal effects and coefficient estimates of all additional dummies are statistically insignificant (Tables B21 to B22).

<center><< Table 9 about here >></center>

As a third way of controlling for the crisis effect, we incorporate in the benchmark model dummies indicating whether there was a decrease, an increase or no change in the average capacity utilisation level of the firm during the crisis as compared to the last three years before the crisis. By and large, the main results remain unchanged (Table B23). The marginal effects of the additional dummies suggest that foreign affiliates which experienced no change or a decrease in their average capacity utilisation during the crisis are less likely to engage in intra-firm exports. Those with lower average capacity utilisation during the crisis also have a lower share of intra-firm exports. Similar results on the better performance of foreign affiliates during the recent crisis as compared to domestic firms with similar characteristics have been documented by Alfaro and Chen (2012).

6 Conclusion

By exploiting a unique sample of foreign affiliates in Sub-Saharan Africa for the year 2009, we uncover stylised facts on the extensive and intensive margins of intra-firm and arm's length trade and identify the firm-level determinants of the first type of trade. Importantly, the empirical evidence that we provide is consistent with a broad array of theories of the MNC. Specifically, it is consistent with property rights and intangible assets theories, with international production hierarchies theories, as well as with theories of different FDI types and of multinational activity under credit constraints.

The descriptive statistics analysis reveals that foreign affiliates with intra-firm trade are relatively few in the sample examined. Among foreign affiliates with intra-firm trade, the vast majority of these also engage in arm's length trade, which accounts for an important fraction of their total trade. The econometric analysis reveals that the extensive and intensive margins of intra-firm trade are higher in foreign affiliates of larger size and in foreign affiliates with

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higher productivity, skill intensity, intangible to tangible capital ratio, and share of finance of working capital through the parent company. They are also higher in foreign affiliates whose principal business scope is to access new markets, to access inputs, to lower production costs, to export back to the home country, and to benefit from trade agreements.

The scarcity of foreign affiliates with intra-firm trade is an essential stylised fact which calls for further investigation of multinational firm boundaries on the basis of their role in facilitating the transfer of intangibles (Arrow, 1969; Teece, 1977; Atalay et al., 2014). However, our findings on intra-firm trade and intangible to tangible capital ratio suggest that emphasis should be also put on their role in facilitating the transfer of intangible assets which accompanies the transfer of tangible goods (Simon, 1991; Grant, 1996). The other two stylised facts on the presence of arm's length trade in almost all foreign affiliates with intra-firm trade and its significant share in their total trade are also essential, motivating further research on the "make-or-buy" choice at each stage of the production process. Specifically, future theoretical and empirical work could focus on determinants of the internalisation choice such as the position of each production stage in the value chain (Antràs and Chor, 2013; Alfaro et al., 2016) and the degree of its input complexity (Corcos et al., 2013). The focus on the latter determinant could be combined with suppliers' capacity to access credit (Carluccio and Fally, 2012) and the risk of knowledge expropriation by them (Ethier and Markusen, 1996).

In addition, our findings on intra-firm trade and the principal business scope of foreign affiliates encourage further theoretical and empirical research on complex FDI and complex integrations strategies of MNCs. Finally, our robust evidence on the extensive and intensive margins of intra-firm trade being determined by the intangible to tangible capital ratio of foreign affiliates, as well as their share of finance of working capital from their parent company and other sources would be nicely complemented with a similar analysis on foreign affiliates located in countries with good contract enforcement and strong intellectual property rights, as well as with well-developed capital markets.

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Tables with main descriptive statistics

Table 1: Trade activities of foreign affiliates

Trade activities	No		Yes		Total	
	#	%	#	%	#	%
Aggregate trade	209	12.5	1466	87.5	1675	100
– Intra-firm trade	940	64.1	526	35.9	1466	100
– Intra-firm trade only	509	96.8	17	3.2	526	100
– Intra-firm and arm's length trade	17	3.2	509	96.8	526	100
– Arm's length trade only	526	35.9	940	64.1	1466	100
Aggregate imports	144	9.8	1322	90.2	1466	100
– Intra-firm imports	909	69	409	31	1318	100
Aggregate exports	718	49	748	51	1466	100
– Intra-firm exports	414	66.7	207	33.3	621	100
Aggregate imports and exports	862	58.8	604	41.2	1466	100
– Intra-firm imports and exports	401	81.7	90	18.3	491	100
Aggregate imports only	748	51	718	49	1466	100
– Intra-firm imports only	510	71	208	29	718	100
Aggregate exports only	1322	90.2	144	9.8	1466	100
– Intra-firm exports only	89	70.6	37	29.4	126	100

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

Table 2: Trade activities of foreign affiliates by affiliate sector

Panel A: Aggregate trade	No		Yes		Total	
	#	%	#	%	#	%
Agriculture	10	9	101	91	111	100
Mining	5	11.6	38	88.4	43	100
Manufacturing	140	12.7	962	87.3	1102	100
– Resource-Based Manufacturing	82	15.6	445	84.4	527	100
– Low-Tech Manufacturing	42	12.2	302	87.8	344	100
– High/Medium-Tech Manufacturing	16	6.9	215	93.1	231	100
EGW and Construction	22	22.4	76	77.6	98	100
Services	32	10	289	90	321	100
– Knowledge-Intensive Services	8	26.7	22	73.3	30	100
– Less Knowledge-Intensive Services	24	8.2	267	91.8	291	100
Panel B: Intra-firm trade	**No**		**Yes**		**Total**	
	#	%	#	%	#	%
Agriculture	52	51.5	49	48.5	101	100
Mining	21	55.3	17	44.7	38	100
Manufacturing	630	65.5	332	34.5	962	100
– Resource-Based Manufacturing	292	65.6	153	34.4	445	100
– Low-Tech Manufacturing	199	65.9	103	34.1	302	100
– High/Medium-Tech Manufacturing	139	64.7	76	35.3	215	100
EGW and Construction	48	63.2	28	36.8	76	100
Services	189	65.4	100	34.6	289	100
– Knowledge-Intensive Services	15	68.2	7	31.8	22	100
– Less Knowledge-Intensive Services	174	65.2	93	34.8	267	100
Panel C: Arm's length trade only	**No**		**Yes**		**Total**	
	#	%	#	%	#	%
Agriculture	49	48.5	52	51.5	101	100
Mining	17	44.7	21	55.3	38	100
Manufacturing	332	34.5	630	65.5	962	100
– Resource-Based Manufacturing	153	34.4	292	65.6	445	100
– Low-Tech Manufacturing	103	34.1	199	65.9	302	100
– High/Medium-Tech Manufacturing	76	35.3	139	64.7	215	100
EGW and Construction	28	36.8	48	63.2	76	100
Services	100	34.6	189	65.4	289	100
– Knowledge-Intensive Services	7	31.8	15	68.2	22	100
– Less Knowledge-Intensive Services	93	34.8	174	65.2	267	100.0
Panel D: Intra-firm trade only	**No**		**Yes**		**Total**	
	#	%	#	%	#	%
Agriculture	49	100	0	0	49	100
Mining	17	100	0	0	17	100
Manufacturing	315	94.9	17	5.1	332	100
– Resource-Based Manufacturing	149	97.4	4	2.6	153	100
– Low-Tech Manufacturing	92	89.3	11	10.7	103	100
– High/Medium-Tech Manufacturing	74	97.4	2	2.6	76	100
EGW and Construction	28	100	0	0	28	100
Services	100	100	0	0	100	100
– Knowledge-Intensive Services	7	100	0	0	7	100
– Less Knowledge-Intensive Services	93	100	0	0	93	100
Panel E: Intra-firm and arm's length trade	**No**		**Yes**		**Total**	
	#	%	#	%	#	%
Agriculture	0	0	49	100	49	100
Mining	0	0	17	100	17	100
Manufacturing	17	5.1	315	94.9	332	100
– Resource-Based Manufacturing	4	2.6	149	97.4	153	100
– Low-Tech Manufacturing	11	10.7	92	89.3	103	100
– High/Medium-Tech Manufacturing	2	2.6	74	97.4	76	100
EGW and Construction	0	0	28	100	28	100
Services	0	0	100	100	100	100
– Knowledge-Intensive Services	0	0	7	100	7	100
– Less Knowledge-Intensive Services	0	0	93	100	93	100

Notes: Authors' calculations. Sectors are defined on the basis of the ISIC Rev. 1.1. Agriculture (1–5); Mining (10–14); Manufacturing (15–39); Resource-Based Manufacturing (15, 16, 20, 21, 23, 25, 26, 27); Low-Tech Manufacturing (17, 18, 19, 22, 28, 36); High- and Medium-Tech Manufacturing (24, 29, 30, 31, 32, 33, 34, 35, 37, 38); Electricity, Gas and Water Supply and Construction (40 and 45); Services (50–99); Knowledge-Intensive Services (61, 62, 64, 65, 66, 67, 70, 71, 72, 73, 74, 80, 85, 92); Less Knowledge-Intensive Services (50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95, 99). *Source:* UNIDO Africa Investor Survey 2010.

Table 3: Average shares of intra-firm and arm's length trade by affiliate sector

Sector	intra-firm imports (share) #	Mean	intra-firm exports (share) #	Mean	arm's length imports (share) #	Mean	arm's length exports (share) #	Mean
Whole Economy	409	0.653	207	0.517	406	0.235	207	0.483
Agriculture	25	0.482	36	0.718	25	0.21	36	0.282
Mining	15	0.594	9	0.466	15	0.328	9	0.534
Manufacturing	243	0.652	158	0.48	241	0.218	158	0.52
– Resource-Based Manufacturing	100	0.579	80	0.428	99	0.241	80	0.572
– Low-Tech Manufacturing	85	0.717	49	0.585	85	0.187	49	0.415
– High/Medium-Tech Manufacturing	58	0.685	29	0.447	57	0.224	29	0.553
EGW and Construction	27	0.6	2	0.185	27	0.322	2	0.815
Services	99	0.719	2	0.34	98	0.246	2	0.66
– Knowledge-Intensive Services	7	0.579	0	0	7	0.379	0	0
– Less Knowledge-Intensive Services	92	0.73	2	0.34	91	0.236	2	0.66

Notes: Authors' calculations. Sectors are defined on the basis of the ISIC Rev. 1.1. Agriculture (1–5); Mining (10–14); Manufacturing (15–39); Resource-Based Manufacturing (15, 16, 20, 21, 23, 25, 26, 27); Low-Tech Manufacturing (17, 18, 19, 22, 28, 36); High- and Medium-Tech Manufacturing (24, 29, 30, 31, 32, 33, 34, 35, 37, 38); Electricity, Gas and Water Supply and Construction (40 and 45); Services (50–99); Knowledge-Intensive Services (61, 62, 64, 65, 66, 67, 70, 71, 72, 73, 74, 80, 85, 92); Less Knowledge-Intensive Services (50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95, 99).
Source: UNIDO Africa Investor Survey 2010.

Table 4: Descriptive statistics for firm-level determinants of intra-firm trade (non-dummy variables)

Variable	Obs	Mean	Sd	Min	Max
employment	1455	220	655	0	15887
productivity (thousand US$)	1424	21	337	0	11409
skill intensity	1425	0.18	0.15	0	1
intangible to tangible capital	1400	1.63	31.28	0	838
firm age	1458	19	17	1	142
tax to sales	1287	0.05	0.09	0	1
finance of working capital: internal funds (share)	1421	0.57	0.39	0	1
finance of working capital: borrow from affiliate-country banks (share)	1416	0.17	0.27	0	1
finance of working capital: borrow from non-affiliate-country banks (share)	1415	0.03	0.13	0	1
finance of working capital: borrow from family (share)	1414	0.02	0.12	0	1
finance of working capital: borrow from non-bank institutions (share)	1413	0.01	0.07	0	1
finance of working capital: purchases on credit/advances (share)	1414	0.08	0.19	0	1
finance of working capital: new equity/debt (share)	1412	0.01	0.06	0	1
finance of working capital: funds from parent company (share)	1415	0.08	0.24	0	1
finance of working capital: borrow from another source (share)	1405	0.01	0.10	0	1

Notes: Authors' calculations. For the description of the variables, see Table 10.
Source: UNIDO Africa Investor Survey 2010.

Table 5: Descriptive statistics for firm-level determinants of intra-firm trade (dummy variables)

Dummy variable	No		Yes		Total	
	#	%	#	%	#	%
majority-owned foreign affiliate (MOFA)	170	11.8	1272	88.2	1442	100
mergers and acquisitions (M&As)	1224	84.8	219	15.2	1443	100
principal motive to invest: market access	412	28.7	1022	71.3	1434	100
principal motive to invest: low-cost structure	1331	92.8	103	7.2	1434	100
principal motive to invest: input access	1329	92.7	105	7.3	1434	100
principal motive to invest: join partner	1381	96.3	53	3.7	1434	100
principal motive to invest: export back home	1401	97.7	33	2.3	1434	100
principal motive to invest: TA benefits	1391	97	43	3	1434	100
principal motive to invest: other	1359	94.8	75	5.2	1434	100

Notes: Authors' calculations. Each dummy is equal to 1 if the corresponding statement is valid, and 0 otherwise.
For the description of the variables, see Table 10.
Source: UNIDO Africa Investor Survey 2010.

Tables with main empirical results

Table 6: Firm-level determinants of intra-firm trade

		(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
	Dependent variable:				
property rights theory	employment	0.033**	0.019*	0.059***	0.026*
		[0.013]	[0.011]	[0.019]	[0.014]
	productivity	0.037***	0.029***	0.047***	0.014
		[0.0089]	[0.0077]	[0.013]	[0.0091]
	skill intensity	0.17*	0.17**	-0.11	0.036
		[0.093]	[0.086]	[0.17]	[0.16]
intangible assets theory	intangible to tangible capital	0.00059***	0.00014	0.0016***	0.00066**
		[0.00021]	[0.00013]	[0.00030]	[0.00028]
affiliate-parent ties	MOFA	0.013	-0.014	-0.066	-0.0024
		[0.046]	[0.037]	[0.054]	[0.042]
	firm age	0.00096	-0.00099	0.00031	-0.00038
		[0.00089]	[0.00071]	[0.0012]	[0.0010]
resource-based theory	M&As	-0.017	-0.0038	0.067	0.037
		[0.038]	[0.030]	[0.050]	[0.043]
FDI types	market access	0.29***	0.15***	0.11	0.055
		[0.090]	[0.036]	[0.087]	[0.058]
	low cost	0.26**	0.16***	0.12	0.062
		[0.10]	[0.052]	[0.10]	[0.076]
	input access	0.25**	0.10*	0.14	0.081
		[0.11]	[0.055]	[0.10]	[0.074]
	join partner	0.27**	0.12*	-0.26*	-0.088
		[0.11]	[0.066]	[0.14]	[0.070]
	export back home	0.15	0.078	0.33*	0.11
		[0.12]	[0.070]	[0.18]	[0.20]
	TA benefits	0.19*	0.12*	0.055	0.023
		[0.12]	[0.067]	[0.17]	[0.086]
transfer pricing	tax to sales	0.10	-0.087	0.22	0.019
		[0.16]	[0.14]	[0.20]	[0.14]
access to credit	internal funds (share)	0.19*	0.094	0.043	-0.15
		[0.11]	[0.067]	[0.16]	[0.14]
	borrow from affiliate-country banks (share)	0.089	0.023	0.041	-0.19
		[0.12]	[0.074]	[0.17]	[0.15]
	borrow from non-affiliate-country banks (share)	0.12	0.025	0.32	-0.059
		[0.15]	[0.12]	[0.20]	[0.15]
	borrow from family (share)	0.19	0.055	0.14	-0.11
		[0.16]	[0.11]	[0.25]	[0.18]
	borrow from non-bank financial institutions (share)	0.33*	0.11	-1.78**	-0.48***
		[0.18]	[0.14]	[0.77]	[0.19]
	purchases on credit/advances (share)	0.25**	0.14	0.082	-0.014
		[0.13]	[0.097]	[0.19]	[0.16]
	new equity/debt (share)	0.25	0.47*	0.29	-0.25
		[0.29]	[0.25]	[0.38]	[0.23]
	funds from parent company (share)	0.66***	0.51***	0.62***	0.27*
		[0.12]	[0.088]	[0.18]	[0.15]
	borrow from another source (share)	0.20	0.14	-0.17	-0.15
		[0.19]	[0.16]	[0.32]	[0.19]
	Obs	971	1048	432	501
	$Pseudo-R^2$	0.22		0.32	
	$Log-likelihood$	-458.2		-189.2	
	R^2		0.16		0.27
	Affiliate-country dummies	Yes	Yes	Yes	Yes
	Affiliate-industry dummies	Yes	Yes	Yes	Yes
	Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table 10.

Table 7: Firm-level determinants of intra-firm trade (affiliate-parent-country dummies in lieu of affiliate-country and parent-country dummies)

	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm	intra-firm	intra-firm	intra-firm
	imports	imports	exports	exports
	(dummy)	(share)	(dummy)	(share)
employment	0.045***	0.023*	0.046*	0.025
	[0.015]	[0.013]	[0.025]	[0.018]
productivity	0.038***	0.026***	0.040**	0.015
	[0.011]	[0.0094]	[0.018]	[0.012]
skill intensity	0.14	0.097	-0.13	0.11
	[0.11]	[0.11]	[0.24]	[0.20]
intangible to tangible capital	0.00087***	0.00019	0.0014***	0.00057*
	[0.00025]	[0.00014]	[0.00031]	[0.00030]
MOFA	0.020	-0.016	-0.0081	0.020
	[0.059]	[0.047]	[0.083]	[0.051]
firm age	0.00097	-0.0012	0.0011	-0.00035
	[0.0010]	[0.00083]	[0.0014]	[0.0013]
M&As	-0.036	-0.0041	0.14*	0.047
	[0.046]	[0.036]	[0.079]	[0.059]
market access	0.24**	0.11***	0.23	0.094
	[0.10]	[0.043]	[0.15]	[0.067]
low cost	0.23**	0.091	0.37**	0.13
	[0.12]	[0.062]	[0.17]	[0.081]
input access	0.19	0.069	0.30*	0.11
	[0.12]	[0.062]	[0.17]	[0.085]
join partner	0.34***	0.14*	.	-0.11
	[0.13]	[0.083]	.	[0.096]
export back home	0.078	0.022	0.71**	0.40
	[0.14]	[0.085]	[0.29]	[0.26]
TA benefits	0.024	0.023	0.12	0.085
	[0.13]	[0.073]	[0.25]	[0.10]
tax to sales	0.053	-0.21	0.23	0.023
	[0.18]	[0.18]	[0.22]	[0.20]
internal funds (share)	0.21*	0.11	0.16	-0.17
	[0.12]	[0.089]	[0.20]	[0.14]
borrow from affiliate-country banks (share)	0.15	0.079	0.17	-0.26*
	[0.13]	[0.098]	[0.22]	[0.15]
borrow from non-affiliate-country banks (share)	0.12	0.066	0.41	-0.17
	[0.19]	[0.15]	[0.25]	[0.19]
borrow from family (share)	0.28	0.16	0.036	-0.27
	[0.18]	[0.14]	[0.36]	[0.25]
borrow from non-bank financial institutions (share)	0.29	0.16	-0.96*	-0.42**
	[0.21]	[0.15]	[0.52]	[0.20]
purchases on credit/advances (share)	0.28**	0.21*	0.056	-0.085
	[0.14]	[0.12]	[0.25]	[0.16]
new equity/debt (share)	0.59**	0.73***	-0.73	-0.25
	[0.26]	[0.25]	[0.52]	[0.33]
funds from parent company (share)	0.77***	0.52***	0.79***	0.22
	[0.14]	[0.11]	[0.23]	[0.15]
borrow from another source (share)	0.29	0.20	-0.12	-0.23
	[0.20]	[0.18]	[0.42]	[0.22]
Obs	762	1048	289	501
$Pseudo - R^2$	0.24		0.29	
$Log - likelihood$	-360.4		-136.4	
R^2		0.15		0.29
Affiliate-country dummies	No	No	No	No
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	No	No	No	No
Affiliate-parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-parent-country and affiliate-industry dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table 10.

Table 8: Firm-level determinants of intra-firm trade (intra-firm trade share threshold)

	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm imports	intra-firm imports	intra-firm exports	intra-firm exports
	$\geq 25\%$	$\geq 75\%$	$\geq 25\%$	$\geq 25\%$
employment	0.034***	0.011	0.0096	0.011
	[0.012]	[0.0098]	[0.016]	[0.016]
productivity	0.038***	0.026***	0.016	0.013
	[0.0084]	[0.0071]	[0.013]	[0.014]
skill intensity	0.15*	0.16**	-0.073	0.11
	[0.087]	[0.072]	[0.16]	[0.14]
intangible to tangible capital	0.00063***	-0.0077	0.0012***	0.00064***
	[0.00020]	[0.0060]	[0.00020]	[0.00015]
MOFA	-0.019	-0.054	-0.13***	-0.0089
	[0.043]	[0.036]	[0.052]	[0.050]
firm age	-0.0013	-0.0017**	-0.000039	-0.00018
	[0.00090]	[0.00077]	[0.0011]	[0.0010]
M&As	-0.028	0.0056	0.0093	0.10**
	[0.037]	[0.030]	[0.045]	[0.051]
market access	0.31***	0.25***	0.21***	0.095
	[0.093]	[0.079]	[0.081]	[0.074]
low cost	0.31***	0.27***	0.22**	0.072
	[0.10]	[0.085]	[0.093]	[0.087]
input access	0.23**	0.21**	0.24**	0.058
	[0.11]	[0.091]	[0.095]	[0.094]
join partner	0.29***	0.18**	-0.19	-0.17
	[0.11]	[0.089]	[0.13]	[0.15]
export back home	0.28**	0.12	0.21	0.0058
	[0.12]	[0.10]	[0.18]	[0.17]
TA benefits	0.22**	0.15	0.30**	0.16
	[0.11]	[0.10]	[0.13]	[0.11]
tax to sales	-0.043	-0.29*	0.15	-0.36
	[0.17]	[0.16]	[0.17]	[0.36]
internal funds (share)	0.15*	0.044	-0.24*	-0.34***
	[0.092]	[0.073]	[0.14]	[0.11]
borrow from affiliate-country banks (share)	0.065	-0.029	-0.36**	-0.46***
	[0.10]	[0.083]	[0.15]	[0.14]
borrow from non-affiliate-country banks (share)	0.060	0.019	0.020	-0.37***
	[0.14]	[0.12]	[0.17]	[0.13]
borrow from family (share)	0.045	0.077	-0.12	-0.17
	[0.15]	[0.12]	[0.25]	[0.20]
borrow from non-bank financial institutions (share)	0.099	0.084	-4.02*	.
	[0.17]	[0.13]	[2.06]	.
purchases on credit/advances (share)	0.18	0.14	-0.15	-0.15
	[0.11]	[0.090]	[0.16]	[0.14]
new equity/debt (share)	0.39	0.44***	0.029	-0.11
	[0.25]	[0.17]	[0.41]	[0.30]
funds from parent company (share)	0.53***	0.32***	0.21	-0.026
	[0.10]	[0.080]	[0.15]	[0.12]
borrow from another source (share)	0.14	0.13	-0.42	-0.47
	[0.18]	[0.15]	[0.34]	[0.32]
Obs	966	941	391	278
$Pseudo - R^2$	0.22	0.25	0.33	0.43
$Log - likelihood$	-413.7	-304.6	-141.8	-73.9
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit estimations with affiliate-country, affiliate-industry and parent-country dummies in all columns. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in all columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table 10.

Table 9: Firm-level determinants of intra-firm trade (sample of firms in goods-producing industries)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.020	0.018	0.060***	0.025*
	[0.014]	[0.012]	[0.019]	[0.014]
productivity	0.034***	0.027***	0.046***	0.014
	[0.010]	[0.0089]	[0.014]	[0.0091]
skill intensity	0.073	0.21*	-0.11	0.034
	[0.13]	[0.11]	[0.17]	[0.16]
intangible to tangible capital	0.0068	0.00020*	0.0016***	0.00066**
	[0.0064]	[0.00012]	[0.00030]	[0.00028]
MOFA	0.049	0.020	-0.059	-0.0060
	[0.050]	[0.039]	[0.055]	[0.042]
firm age	0.0014	-0.00091	0.00029	-0.00036
	[0.00098]	[0.00078]	[0.0012]	[0.0010]
M&As	0.0048	0.013	0.067	0.037
	[0.041]	[0.032]	[0.050]	[0.043]
market access	0.27***	0.15***	0.11	0.056
	[0.085]	[0.038]	[0.086]	[0.058]
low cost	0.22**	0.16***	0.13	0.060
	[0.10]	[0.058]	[0.10]	[0.076]
input access	0.24**	0.097*	0.14	0.081
	[0.099]	[0.057]	[0.10]	[0.073]
join partner	0.27**	0.084	-0.26*	-0.089
	[0.11]	[0.078]	[0.14]	[0.070]
export back home	0.27*	0.17	0.34*	0.11
	[0.14]	[0.11]	[0.18]	[0.20]
TA benefits	0.19*	0.13**	0.055	0.023
	[0.11]	[0.068]	[0.17]	[0.086]
tax to sales	0.11	-0.10	0.22	0.019
	[0.18]	[0.17]	[0.20]	[0.14]
internal funds (share)	0.20*	0.11	0.048	-0.15
	[0.11]	[0.071]	[0.16]	[0.14]
borrow from affiliate-country banks (share)	0.11	0.053	0.047	-0.19
	[0.13]	[0.079]	[0.17]	[0.14]
borrow from non-affiliate-country banks (share)	0.10	0.015	0.32	-0.061
	[0.17]	[0.13]	[0.20]	[0.15]
borrow from family (share)	0.28*	0.18	0.17	-0.12
	[0.17]	[0.15]	[0.26]	[0.18]
borrow from non-bank financial institutions (share)	0.084	0.15	-1.81**	-0.48***
	[0.21]	[0.15]	[0.79]	[0.18]
purchases on credit/advances (share)	0.27*	0.17	0.094	-0.020
	[0.14]	[0.11]	[0.19]	[0.16]
new equity/debt (share)	0.0052	0.33	0.29	-0.25
	[0.37]	[0.36]	[0.38]	[0.23]
funds from parent company (share)	0.65***	0.51***	0.61***	0.27*
	[0.13]	[0.094]	[0.18]	[0.15]
borrow from another source (share)	0.23	0.15	-0.17	-0.16
	[0.19]	[0.17]	[0.32]	[0.19]
Obs	764	826	430	495
$Pseudo - R^2$	0.23		0.32	
$Log - likelihood$	-347.9		-188.8	
R^2		0.15		0.28
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Sample restricted to foreign affiliates in goods-producing industries. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table 10.

Table 10: Description of variables

Variable	Description
intra-firm imports (dummy)	the firm has a non-zero share of production inputs imported from the parent in total production inputs
intra-firm imports (share)	share of production inputs imported from the parent in total production inputs
intra-firm exports (dummy)	the firm has a non-zero share of exports to the parent/sister affiliate in total direct exports
intra-firm exports (share)	share of exports to the parent/sister affiliate in total direct exports
employment	total number of permanent full-time employees
productivity	total sales to total permanent full-time employment
skill intensity	share of permanent full-time technical, supervisory and managerial employees in total number of permanent full-time employees
intangible to tangible capital	ratio of the sum of advertising and training expenditures to the total value of fixed assets
MOFA	the firm is owned by a foreign investor by at least 50% (dummy)
firm age	number of years since the establishment of the firm
M&As	the foreign-owned firm has been acquired through Mergers and Acquisitions (dummy)
market access	principal motive of foreign investor to invest in the host country: access new markets (dummy)
low cost	principal motive of foreign investor to invest in the host country: lower production cost (dummy)
input access	principal motive of foreign investor to invest in the host country: access to natural resources/inputs (dummy)
join partner	principal motive of foreign investor to invest in the host country: collaboration with a specific partner (dummy)
export back home	principal motive of foreign investor to invest in the host country: export back to home country (dummy)
TA benefits	principal motive of foreign investor to invest in the host country: benefits from a trade agreement (dummy)
other motive	principal motive of foreign investor to invest in the host country: any other motive to be specified by the firm (dummy)
tax to sales	ratio of taxes to total sales
internal funds (share)	share of finance of working capital through internal funds/retained earnings
borrow from affiliate-country banks (share)	share of finance of working capital through credit from banks in the affiliate country
borrow from affiliate-country banks (share)	share of finance of working capital through credit from banks outside the affiliate country
borrow from family (share)	share of finance of working capital through credit from family/friends/individual lenders
borrow from non-bank (financial) institutions (share)	share of finance of working capital through credit from non-bank financial institutions (e.g. equity funds)
purchases on credit/advances (share)	share of finance of working capital through purchases on credit from suppliers and advances from customers
new equity/debt (share)	share of finance of working capital through issuance of new equity or debt (including commercial paper and debentures)
funds from parent company (share)	share of finance of working capital through the parent company
borrow from another source (share)	share of finance of working capital from any other source to be specified by the firm
intra-firm imports ≥ 25%	at least 25% of the value of production inputs of the firm are accounted for by intra-firm imports (dummy)
intra-firm imports ≥ 75%	at least 75% of the value of production inputs of the firm are accounted for by intra-firm imports (dummy)
intra-firm exports ≥ 25%	at least 25% of the value of direct exports of the firm are accounted for by intra-firm exports (dummy)
intra-firm exports ≥ 75%	at least 75% of the value of direct exports of the firm are accounted for by intra-firm exports (dummy)

Notes: Authors' notation.

Online Appendix

A   Appendix: Additional descriptive statistics

Table A1: Foreign affiliates with and without intra-firm trade by affiliate industry

| | | With intra-firm trade | | | | | |
| | | No | | Yes | | Total | |
ISIC Rev. 1.1	Name	#	%	#	%	#	%
1	Agriculture, hunting and related service activities	46	51.1	44	48.9	90	100
2	Forestry, logging and related service activities	3	75	1	25	4	100
5	Fishing, operation of fish hatcheries and fish farms; service activities incidental to fishing	3	42.9	4	57.1	7	100
10	Mining of coal and lignite; extraction of peat	8	80	2	20	10	100
11	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction excluding surveying	1	20	4	80	5	100
13	Mining of metal ores	6	66.7	3	33.3	9	100
14	Other mining and quarrying	6	42.9	8	57.1	14	100
15	Manufacture of food products and beverages	111	64.2	62	35.8	173	100
16	Manufacture of tobacco products	10	62.5	6	37.5	16	100
17	Manufacture of textiles	22	61.1	14	38.9	36	100
18	Manufacture of wearing apparel; dressing and dyeing of fur	36	47.4	40	52.6	76	100
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	19	73.1	7	26.9	26	100
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	21	77.8	6	22.2	27	100
21	Manufacture of paper and paper products	21	75	7	25	28	100
22	Publishing, printing and reproduction of recorded media	18	69.2	8	30.8	26	100
23	Manufacture of coke, refined petroleum products and nuclear fuel	4	57.1	3	42.9	7	100
24	Manufacture of chemicals and chemical products	80	65	43	35	123	100
25	Manufacture of rubber and plastics products	74	62.2	45	37.8	119	100
26	Manufacture of other non-metallic mineral products	28	66.7	14	33.3	42	100
27	Manufacture of basic metals	23	69.7	10	30.3	33	100
28	Manufacture of fabricated metal products, except machinery and equipment	71	78	20	22	91	100
29	Manufacture of machinery and equipment n.e.c.	17	58.6	12	41.4	29	100
30	Manufacture of office, accounting and computing machinery	1	33.3	2	66.7	3	100
31	Manufacture of electrical machinery and apparatus n.e.c.	14	66.7	7	33.3	21	100
32	Manufacture of radio, television and communication equipment and apparatus	4	66.7	2	33.3	6	100
33	Manufacture of medical, precision and optical instruments, watches and clocks	6	85.7	1	14.3	7	100
34	Manufacture of motor vehicles, trailers and semi-trailers	8	61.5	5	38.5	13	100
35	Manufacture of other transport equipment	3	60	2	40	5	100
36	Manufacture of furniture; manufacturing n.e.c.	33	70.2	14	29.8	47	100
37	Recycling	2	50	2	50	4	100
38	Other manufacturing	4	100	0	0	4	100
40	Electricity, gas, steam and hot water supply	9	100	0	0	9	100
41	Collection, purification and distribution of water	0	0	1	100	1	100
45	Construction	39	59.1	27	40.9	66	100
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	31	66	16	34	47	100
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	92	68.1	43	31.9	135	100
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	51	60.7	33	39.3	84	100
61	Water transport	1	100	0	0	1	100
63	Supporting and auxiliary transport activities; activities of travel agencies	0	0	1	100	1	100
64	Post and telecommunications	2	100	0	0	2	100
70	Real estate activities	1	33.3	2	66.7	3	100
71	Renting of machinery and equipment without operator and of personal and household goods	0	0	1	100	1	100
72	Computer and related activities	2	66.7	1	33.3	3	100
74	Other business activities	8	80	2	20	10	100
92	Recreational, cultural and sporting activities	1	50	1	50	2	100
	Total	940	64.1	526	35.9	1466	100

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

Table A2: Foreign affiliates with and without intra-firm trade by affiliate country

Affiliate country	without intra-firm trade		with intra-firm trade		Total	
	#	%	#	%	#	%
Burkina Faso	8	57.1	6	42.9	14	100
Burundi	11	68.8	5	31.3	16	100
Cameroon	39	56.5	30	43.5	69	100
Cape Verde	24	52.2	22	47.8	46	100
Ethiopia	71	74.7	24	25.3	95	100
Ghana	88	73.9	31	26.1	119	100
Kenya	140	60.6	91	39.4	231	100
Lesotho	42	65.6	22	34.4	64	100
Madagascar	37	57.8	27	42.2	64	100
Malawi	15	51.7	14	48.3	29	100
Mali	30	69.8	13	30.2	43	100
Mozambique	81	83.5	16	16.5	97	100
Niger	6	60	4	40	10	100
Nigeria	51	63	30	37	81	100
Rwanda	24	57.1	18	42.9	42	100
Senegal	28	54.9	23	45.1	51	100
Tanzania	47	52.8	42	47.2	89	100
Uganda	159	65.2	85	34.8	244	100
Zambia	39	62.9	23	37.1	62	100
Total	940	64.1	526	35.9	1466	100

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

Table A3: Foreign affiliates with and without intra-firm trade by parent country and affiliate sector

Parent country	without intra-firm trade		with intra-firm trade		Total	
	#	%	#	%	#	%
Whole Economy						
High-Income Countries	422	61.4	265	38.6	687	100
Low/Middle-Income Countries	373	68.8	169	31.2	542	100
Sub-Saharan African Countries	112	60.9	72	39.1	184	100
Agriculture						
High-Income Countries	31	47	35	53	66	100
Low/Middle-Income Countries	11	64.7	6	35.3	17	100
Sub-Saharan African Countries	8	57.1	6	42.9	14	100
Mining						
High-Income Countries	8	50	8	50	16	100
Low/Middle-Income Countries	12	63.2	7	36.8	19	100
Sub-Saharan African Countries	0	0	0	0	0	0
Manufacturing						
High-Income Countries	282	63.5	162	36.5	444	100
Low/Middle-Income Countries	255	68.7	116	31.3	371	100
Sub-Saharan African Countries	70	62.5	42	37.5	112	100
Resource-Based Manufacturing						
High-Income Countries	128	62.1	78	37.9	206	100
Low/Middle-Income Countries	119	71.7	47	28.3	166	100
Sub-Saharan African Countries	35	59.3	24	40.7	59	100
Low-Tech Manufacturing						
High-Income Countries	88	71	36	29	124	100
Low/Middle-Income Countries	81	60.4	53	39.6	134	100
Sub-Saharan African Countries	21	67.7	10	32.3	31	100
High- and Medium-Tech manufacturing						
High-Income Countries	66	57.9	48	42.1	114	100
Low/Middle-Income Countries	55	77.5	16	22.5	71	100
Sub-Saharan African Countries	14	63.6	8	36.4	22	100
EGW Supply and Construction						
High-Income Countries	26	65	14	35	40	100
Low/Middle-Income Countries	10	50	10	50	20	100
Sub-Saharan African Countries	9	69.2	4	30.8	13	100
Services						
High-Income Countries	75	62	46	38	121	100
Low/Middle-Income Countries	85	73.9	30	26.1	115	100
Sub-Saharan African Countries	25	55.6	20	44.4	45	100
Knowledge-Intensive Services						
High-Income Countries	9	69.2	4	30.8	13	100
Low/Middle-Income Countries	3	100	0	0	3	100
Sub-Saharan African Countries	3	75	1	25	4	100
Less Knowledge-Intensive Services						
High-Income Countries	66	61.1	42	38.9	108	100
Low/Middle-Income Countries	82	73.2	30	26.8	112	100
Sub-Saharan African Countries	22	53.7	19	46.3	41	100

Notes: Authors' calculations. Parent countries classified as high-income or low/middle-income outside Sub-Saharan Africa according to the World Bank Historical Country Classification for the year 2010 which comprises four country groups: high-income, upper-middle-income, lower-middle-income, low-income. Sectors are defined on the basis of the ISIC Rev. 1.1. Agriculture (1–5); Mining (10–14); Manufacturing (15–39); Resource-Based Manufacturing (15, 16, 20, 21, 23, 25, 26, 27); Low-Tech Manufacturing (17, 18, 19, 22, 28, 36); High- and Medium-Tech Manufacturing (24, 29, 30, 31, 32, 33, 34, 35, 37, 38); Electricity, Gas and Water Supply and Construction (40 and 45); Services (50–99); Knowledge-Intensive Services (61, 62, 64, 65, 66, 67, 70, 71, 72, 73, 74, 80, 85, 92); Less Knowledge-Intensive Services (50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95, 99).
Source: UNIDO Africa Investor Survey 2010.

Table A4: Average shares of intra-firm and arm's length trade by sector (indirect imports excluded from arm's length imports)

Sector	intra-firm imports (share)		intra-firm exports (share)		arm's length imports (share)		arm's length exports (share)	
	#	Mean	#	Mean	#	Mean	#	Mean
Whole Economy	409	0.653	207	0.517	406	0.182	207	0.483
Agriculture	25	0.482	36	0.718	25	0.169	36	0.282
Mining	15	0.594	9	0.466	15	0.236	9	0.534
Manufacturing	243	0.652	158	0.48	241	0.154	158	0.52
– Resource-Based Manufacturing	100	0.579	80	0.428	99	0.18	80	0.572
– Low-Tech Manufacturing	85	0.717	49	0.585	85	0.129	49	0.415
– High/Medium-Tech Manufacturing	58	0.685	29	0.447	57	0.146	29	0.553
EGW and Construction	27	0.6	2	0.185	27	0.265	2	0.815
Services	99	0.719	2	0.34	98	0.224	2	0.66
– Knowledge-Intensive Services	7	0.579	0	0	7	0.314	0	0
– Less Knowledge-Intensive Services	92	0.73	2	0.340	91	0.217	2	0.66

Notes: Authors' calculations. Sectors are defined on the basis of the ISIC Rev. 1.1. Agriculture (1–5); Mining (10–14); Manufacturing (15–39); Resource-Based Manufacturing (15, 16, 20, 21, 23, 25, 26, 27); Low-Tech Manufacturing (17, 18, 19, 22, 28, 36); High- and Medium-Tech Manufacturing (24, 29, 30, 31, 32, 33, 34, 35, 37, 38); Electricity, Gas and Water Supply and Construction (40 and 45); Services (50–99); Knowledge-Intensive Services (61, 62, 64, 65, 66, 67, 70, 71, 72, 73, 74, 80, 85, 92); Less Knowledge-Intensive Services (50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95, 99).
Source: UNIDO Africa Investor Survey 2010.

Table A5: Descriptive statistics for additional firm–level dummy variables (robustness checks)

Dummy variable	Panel A: Firm-level					
	No		Yes		Total	
	#	%	#	%	#	%
finance of working capital: internal funds	263	18.5	1158	81.5	1421	100
finance of working capital: borrow from affiliate-country banks	828	58.5	588	41.5	1416	100
finance of working capital: borrow from affiliate-country banks	1293	91.4	122	8.6	1415	100
finance of working capital: borrow from family	1317	93.1	97	6.9	1414	100
finance of working capital: borrow from non-bank institutions	1365	96.6	48	3.4	1413	100
finance of working capital: purchases on credit/advances	1119	79.1	295	20.9	1414	100
finance of working capital: new equity/debt	1381	97.8	31	2.2	1412	100
finance of working capital: funds from parent company	1233	87.1	182	12.9	1415	100
finance of working capital: borrow from another source	1360	96.8	45	3.2	1405	100
finance of fixed assets: internal funds	319	23	1069	77	1388	100
finance of fixed assets: borrow from affiliate-country banks	867	62.5	520	37.5	1387	100
finance of fixed assets: borrow from affiliate-country banks	1263	91.3	121	8.7	1384	100
finance of fixed assets: borrow from family	1299	93.9	85	6.1	1384	100
finance of fixed assets: borrow from non-bank institutions	1351	97.7	32	2.3	1383	100
finance of fixed assets: purchases on credit/advances	1261	91	124	9	1385	100
finance of fixed assets: new equity/debt	1364	98.6	20	1.4	1384	100
finance of fixed assets: funds from parent company	1204	87	180	13	1384	100
finance of fixed assets: borrow from another source	1330	96.9	43	3.1	1373	100
access to finance: parental assistance not received	1359	95.5	64	4.5	1423	100
access to finance: received parental assistance unimportant	1366	96	57	4	1423	100
access to finance: received parental assistance slightly important	1339	94.1	84	5.9	1423	100
access to finance: received parental assistance important	1115	78.4	308	21.6	1423	100
access to finance: received parental assistance very important	900	63.2	523	36.8	1423	100
access to finance: received parental assistance crucial	1036	72.8	387	27.2	1423	100
source of capital goods (imports)	306	26.8	837	73.2	1143	100
source of capital goods (local)	1013	88.6	130	11.4	1143	100
source of capital goods (parent)	988	86.4	155	13.6	1143	100
pre-crisis performance well below expectations	1418	97.4	38	2.6	1456	100
pre-crisis performance below expectations	1287	88.4	169	11.6	1456	100
pre-crisis performance in line with expectations	774	53.2	682	46.8	1456	100
pre-crisis performance above expectations	984	67.6	472	32.4	1456	100
pre-crisis performance well above expectations	1361	93.5	95	6.5	1456	100
post-crisis performance well below expectations	1373	94.2	84	5.8	1457	100
post-crisis performance below expectations	1093	75	364	25	1457	100
post-crisis performance in line with expectations	798	54.8	659	45.2	1457	100
post-crisis performance above expectations	1153	79.1	304	20.9	1457	100
post-crisis performance well above expectations	1411	96.8	46	3.2	1457	100
post-crisis capacity utilisation: no change	710	61.5	445	38.5	1155	100
post-crisis capacity utilisation: decrease	543	47	612	53	1155	100
post-crisis capacity utilisation: increase	1057	91.5	98	8.5	1155	100

Notes: Authors' calculations. Each dummy is equal to 1 if the corresponding statement is valid, and 0 otherwise. For the description of the variables, see Table B24.
Source: UNIDO Africa Investor Survey 2010.

Table A6: Descriptive statistics for additional firm-level non-dummy variables (robustness checks)

		Panel A: Firm-level			
Variable	Obs	Mean	Sd	Min	Max
sales (million US$)	1434	2	25	0	552
average wage (thousand US$)	1386	5	152	0	5569
monthly wage (non-production to production workers)	1275	2.71	3.67	0	67
monthly wage (managerial to production workers)	1274	3.97	4.24	0	69
monthly wage (managerial to non-production workers)	1315	2.07	2.08	0	23
finance of fixed assets: internal funds (share)	1388	0.56	0.41	0	1
finance of fixed assets: borrow from affiliate-country banks (share)	1387	0.19	0.31	0	1
finance of fixed assets: borrow from affiliate-country banks (share)	1384	0.03	0.13	0	1
finance of fixed assets: borrow from family (share)	1384	0.03	0.13	0	1
finance of fixed assets: borrow from non-bank institutions (share)	1383	0.01	0.07	0	1
finance of fixed assets: purchases on credit/advances (share)	1385	0.03	0.14	0	1
finance of fixed assets: new equity/debt (share)	1384	0.01	0.08	0	1
finance of fixed assets: funds from parent company (share)	1384	0.09	0.25	0	1
finance of fixed assets: borrow from another source (share)	1373	0.02	0.12	0	1

Notes: Authors' calculations. The data on capital and skill abundance and on legal rights strength in parent countries correspond to the year 2009. For the description of the variables, see Table B24.
Source: UNIDO Africa Investor Survey 2010.

B Appendix: Robustness checks

Table B1: Firm-level determinants of intra-firm trade by type of determinant

Panel A: Employment	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm imports (dummy)	intra-firm imports (share)	intra-firm exports (dummy)	intra-firm exports (share)
employment	0.03**	0.003	0.06***	0.02
	[0.01]	[0.009]	[0.02]	[0.01]
Obs	1188	1265	508	592
$Pseudo - R^2$	0.12		0.17	
$Log - likelihood$	-649.3		-274.8	
R^2		0.088		0.21
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Panel B: Productivity	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm imports (dummy)	intra-firm imports (share)	intra-firm exports (dummy)	intra-firm exports (share)
productivity	0.03	0.02***	0.03**	0.008
	.	[0.007]	[0.01]	[0.009]
Obs	1160	1234	504	583
$Pseudo - R^2$	0.12		0.16	
$Log - likelihood$	-626.5		-276.5	
R^2		0.093		0.20
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Panel C: Skill intensity	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm imports (dummy)	intra-firm imports (share)	intra-firm exports (dummy)	intra-firm exports (share)
skill intensity	0.2	0.2***	-0.1	0.008
	.	[0.08]	[0.2]	[0.1]
Obs	1165	1240	502	583
$Pseudo - R^2$	0.12		0.16	
$Log - likelihood$	-633.1		-275.6	
R^2		0.093		0.20
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Panel D: Intangible to tangible capital	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm imports (dummy)	intra-firm imports (share)	intra-firm exports (dummy)	intra-firm exports (share)
intangible to tangible capital	0.0007**	0.0002	0.01	0.0007**
	[0.0003]	[0.0001]	[0.03]	[0.0003]
Obs	1146	1222	498	581
$Pseudo - R^2$	0.11		0.16	
$Log - likelihood$	-622.7		-275.6	
R^2		0.081		0.20
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Panel E: Majority foreign ownership	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm imports (dummy)	intra-firm imports (share)	intra-firm exports (dummy)	intra-firm exports (share)
MOFA	0.02	0.007	-0.02	0.02
	[0.04]	[0.03]	[0.06]	[0.04]
Obs	1184	1261	506	590
$Pseudo - R^2$	0.11		0.16	
$Log - likelihood$	-650.3		-279.2	
R^2		0.086		0.20
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Firm-level determinants of intra-firm trade by type of determinant (continued)

Panel F: Firm age	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm	intra-firm	intra-firm	intra-firm
	imports	imports	exports	exports
	(dummy)	(share)	(dummy)	(share)
firm age	0.002*	-0.0005	0.002	0.00005
	[0.0008]	[0.0006]	[0.001]	[0.0009]
Obs	1193	1269	511	596
$Pseudo-R^2$	0.11		0.16	
$Log-likelihood$	-655.4		-281.9	
R^2		0.087		0.21
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Panel G: Mergers and acquisitions	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm	intra-firm	intra-firm	intra-firm
	imports	imports	exports	exports
	(dummy)	(share)	(dummy)	(share)
M&As	-0.03	-0.04	0.05	0.04
	[0.04]	[0.03]	[0.05]	[0.04]
Obs	1183	1260	509	596
$Pseudo-R^2$	0.11		0.15	
$Log-likelihood$	-649.3		-281.1	
R^2		0.085		0.21
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Panel H: Tax to sales	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm	intra-firm	intra-firm	intra-firm
	imports	imports	exports	exports
	(dummy)	(share)	(dummy)	(share)
tax to sales	0.2	-0.08	0.10	-0.02
	[0.2]	[0.1]	[0.2]	[0.1]
Obs	1054	1132	457	537
$Pseudo-R^2$	0.12		0.14	
$Log-likelihood$	-569.1		-253.7	
R^2		0.085		0.21
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Panel I: Principal motive to invest	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm	intra-firm	intra-firm	intra-firm
	imports	imports	exports	exports
	(dummy)	(share)	(dummy)	(share)
market access	0.3***	0.1***	0.2***	0.1**
	[0.08]	[0.04]	[0.09]	[0.05]
low cost	0.3***	0.1***	0.2**	0.1*
	[0.09]	[0.05]	[0.1]	[0.07]
input access	0.2***	0.1**	0.2**	0.1*
	[0.09]	[0.05]	[0.1]	[0.07]
join partner	0.3***	0.1*	0.02	0.006
	[0.10]	[0.07]	[0.1]	[0.07]
export back home	0.2	0.06	0.5***	0.3*
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2**	0.1**	0.2	0.1
	[0.1]	[0.07]	[0.1]	[0.09]
Obs	1176	1253	508	593
$Pseudo-R^2$	0.12		0.18	
$Log-likelihood$	-640.7		-274.2	
R^2		0.094		0.23
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Firm-level determinants of intra-firm trade by type of determinant (continued)

Panel J: Shares of finance of working capital	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm	intra-firm	intra-firm	intra-firm
	imports	imports	exports	exports
	(dummy)	(share)	(dummy)	(share)
internal funds (share)	0.1	0.06	-0.06	-0.2
	[0.10]	[0.06]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.03	-0.03	-0.001	-0.2*
	[0.1]	[0.06]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.08	0.05	0.1	-0.09
	[0.1]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.05	-0.02	-0.3	-0.2
	[0.2]	[0.1]	[0.3]	[0.1]
borrow from non-bank financial institutions (share)	0.2	0.04	-1.2***	-0.4***
	[0.2]	[0.1]	[0.4]	[0.1]
purchases on credit/advances (share)	0.2	0.09	-0.03	-0.08
	[0.1]	[0.08]	[0.2]	[0.1]
new equity/debt (share)	-0.00003	0.09	0.10	-0.3
	[0.2]	[0.2]	[0.4]	[0.2]
funds from parent company (share)	0.6***	0.5***	0.4**	0.2*
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from another source (share)	0.1	0.1	-0.3	-0.2
	[0.2]	[0.1]	[0.3]	[0.1]
Obs	1152	1227	498	575
$Pseudo - R^2$	0.17		0.22	
$Log - likelihood$	-583.6		-251.1	
R^2		0.16		0.26
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B2: Firm-level determinants of the extensive margin of intra-firm imports

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (dummy)	(3) intra-firm imports (dummy)	(4) intra-firm imports (dummy)	(5) intra-firm imports (dummy)	(6) intra-firm imports (dummy)	(7) intra-firm imports (dummy)
employment	0.03***	0.03***	0.03**	0.04***	0.03***	0.03**	0.03***
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
productivity	0.03***	0.04***	0.04***	0.04***	0.04***	0.03***	0.04***
	[0.008]	[0.009]	[0.009]	[0.009]	[0.008]	[0.009]	[0.009]
skill intensity	0.2**	0.2**	0.2**	0.2**	0.2**	0.2**	0.2*
	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]
intangible to tangible capital		0.0007***	0.0007***	0.0007***	0.0006**	0.0007***	0.0006***
		[0.0003]	[0.0002]	[0.0003]	[0.0003]	[0.0002]	[0.0002]
MOFA				0.03	0.03	0.02	0.04	0.01
				[0.05]	[0.05]	[0.05]	[0.05]
firm age				0.0006	0.0006	0.0007	0.0008	0.0010
				[0.0009]	[0.0009]	[0.0009]	[0.0009]
M&As				-0.09**	-0.07*	-0.06	-0.02
				[0.04]	[0.04]	[0.04]	[0.04]
market access					0.3***	0.3***	0.3***
					[0.07]	[0.08]	[0.09]
low cost					0.3***	0.3***	0.3**
					[0.09]	[0.10]	[0.1]
input access					0.3***	0.3***	0.3**
					[0.09]	[0.10]	[0.1]
join partner					0.3***	0.3***	0.3**
					[0.10]	[0.1]	[0.1]
export back home					0.07	0.1	0.2
					[0.1]	[0.1]	[0.1]
TA benefits					0.2**	0.2*	0.2*
					[0.1]	[0.1]	[0.1]
tax to sales						0.07	0.1
						[0.2]	[0.2]
internal funds (share)							0.2*
							[0.1]
borrow from affiliate-country banks (share)							0.09
							[0.1]
borrow from non-affiliate-country banks (share)							0.1
							[0.2]
borrow from family (share)							0.2
							[0.2]
borrow from non-bank financial institutions (share)							0.3*
							[0.2]
purchases on credit/advances (share)							0.3**
							[0.1]
new equity/debt (share)							0.2
							[0.3]
funds from parent company (share)							0.7***
							[0.1]
borrow from another source (share)							0.2
							[0.2]
Obs	1141	1120	1108	1100	1087	993	971
$Pseudo-R^2$	0.13	0.14	0.14	0.14	0.16	0.16	0.22
$Log-likelihood$	-609.0	-590.9	-581.3	-573.1	-558.0	-506.7	-458.2
Affiliate-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Probit estimations with affiliate-country, affiliate-industry and parent-country dummies in all columns. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in all columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B3: Firm-level determinants of the intensive margin of intra-firm imports

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	intra-firm imports (share)	intra-firm imports (share)	intra-firm imports (share)	intra-firm imports (share)	intra-firm imports (share)	intra-firm imports (share)	intra-firm imports (share)
employment	0.01	0.01	0.02	0.02*	0.02*	0.02	0.02*
	[0.010]	[0.010]	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]
productivity	0.02***	0.02***	0.03***	0.03***	0.03***	0.03***	0.03***
	[0.007]	[0.007]	[0.007]	[0.007]	[0.007]	[0.008]	[0.008]
skill intensity	0.2**	0.2**	0.2**	0.2**	0.2**	0.2**	0.2**
	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]	[0.09]
intangible to tangible capital		0.0001	0.0002	0.0002	0.0001	0.0002	0.0001
		[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]	[0.0001]
MOFA			0.01	0.009	-0.001	0.001	-0.01
			[0.04]	[0.04]	[0.04]	[0.04]	[0.04]
firm age			-0.001*	-0.001*	-0.001*	-0.001	-0.0010
			[0.0007]	[0.0007]	[0.0007]	[0.0007]	[0.0007]
M&As				-0.06**	-0.04	-0.03	-0.004
				[0.03]	[0.03]	[0.03]	[0.03]
market access					0.2***	0.2***	0.2***
					[0.03]	[0.03]	[0.04]
low cost					0.2***	0.2***	0.2***
					[0.05]	[0.05]	[0.05]
input access					0.1**	0.1***	0.1*
					[0.05]	[0.05]	[0.05]
join partner					0.1*	0.1**	0.1*
					[0.07]	[0.07]	[0.07]
export back home					0.03	0.07	0.08
					[0.07]	[0.07]	[0.07]
TA benefits					0.2**	0.1**	0.1*
					[0.07]	[0.07]	[0.07]
tax to sales						-0.1	-0.09
						[0.1]	[0.1]
internal funds (share)							0.09
							[0.07]
borrow from affiliate-country banks (share)							0.02
							[0.07]
borrow from non-affiliate-country banks (share)							0.02
							[0.1]
borrow from family (share)							0.06
							[0.1]
borrow from non-bank financial institutions (share)							0.1
							[0.1]
purchases on credit/advances (share)							0.1
							[0.10]
new equity/debt (share)							0.5*
							[0.3]
funds from parent company (share)							0.5***
							[0.09]
borrow from another source (share)							0.1
							[0.2]
Obs	1214	1193	1180	1172	1159	1069	1048
R^2	0.093	0.097	0.095	0.093	0.10	0.095	0.16
Affiliate-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in all columns. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The dependent variable is not in logs. Among non-dummy covariates, only employment and productivity are in logs. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B4: Firm-level determinants of the extensive margin of intra-firm exports

Dependent variable:	(1) intra-firm exports (dummy)	(2) intra-firm exports (dummy)	(3) intra-firm exports (dummy)	(4) intra-firm exports (dummy)	(5) intra-firm exports (dummy)	(6) intra-firm exports (dummy)	(7) intra-firm exports (dummy)
employment	0.07***	0.06***	0.06***	0.06***	0.06***	0.06***	0.06***
	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]
productivity	0.04***	0.04**	0.04***	0.04***	0.04***	0.05***	0.05***
	[0.01]	[0.01]	[0.01]	[0.01]	[0.01]	[0.02]	[0.01]
skill intensity	-0.03	-0.06	-0.06	-0.06	-0.07	-0.05	-0.1
	[0.2]	[0.2]	[0.2]	[0.2]	[0.2]	[0.2]	[0.2]
intangible to tangible capital		0.008	0.004	0.004	0.002	0.002***	0.002***
		[0.03]	[0.03]	[0.03]	[0.03]	[0.0005]	[0.0003]
MOFA			0.02	0.02	-0.01	-0.04	-0.07
			[0.06]	[0.06]	[0.06]	[0.06]	[0.05]
firm age			0.0005	0.0004	-0.00002	-0.0003	0.0003
			[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
M&As				0.05	0.06	0.08	0.07
				[0.05]	[0.05]	[0.05]	[0.05]
market access					0.2**	0.2*	0.1
					[0.09]	[0.09]	[0.09]
low cost					0.2*	0.1	0.1
					[0.1]	[0.1]	[0.1]
input access					0.2	0.2*	0.1
					[0.1]	[0.1]	[0.1]
join partner					-0.07	-0.2*	-0.3*
					[0.1]	[0.1]	[0.1]
export back home					0.5**	0.3*	0.3*
					[0.2]	[0.2]	[0.2]
TA benefits					0.1	0.03	0.06
					[0.1]	[0.1]	[0.2]
tax to sales						0.2	0.2
						[0.2]	[0.2]
internal funds (share)							0.04
							[0.2]
borrow from affiliate-country banks (share)							0.04
							[0.2]
borrow from non-affiliate-country banks (share)							0.3
							[0.2]
borrow from family (share)							0.1
							[0.3]
borrow from non-bank financial institutions (share)							-1.8**
							[0.8]
purchases on credit/advances (share)							0.08
							[0.2]
new equity/debt (share)							0.3
							[0.4]
funds from parent company (share)							0.6***
							[0.2]
borrow from another source (share)							-0.2
							[0.3]
Obs	498	490	486	485	483	439	432
$Pseudo-R^2$	0.18	0.19	0.19	0.19	0.21	0.21	0.32
$Log-likelihood$	-265.6	-260.9	-257.8	-257.3	-250.0	-225.9	-189.2
Affiliate-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Probit estimations with affiliate-country, affiliate-industry and parent-country dummies in all columns. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in all columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B5: Firm-level determinants of the intensive margin of intra-firm exports

Dependent variable:	(1) intra-firm exports (share)	(2) intra-firm exports (share)	(3) intra-firm exports (share)	(4) intra-firm exports (share)	(5) intra-firm exports (share)	(6) intra-firm exports (share)	(7) intra-firm exports (share)
employment	0.02	0.02	0.02	0.02	0.02	0.02	0.03*
	[0.01]	[0.01]	[0.02]	[0.02]	[0.02]	[0.02]	[0.01]
productivity	0.009	0.008	0.007	0.007	0.009	0.01	0.01
	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]	[0.009]
skill intensity	0.06	0.03	0.04	0.03	0.04	0.05	0.04
	[0.1]	[0.1]	[0.1]	[0.1]	[0.1]	[0.1]	[0.2]
intangible to tangible capital		0.0006*	0.0007**	0.0007**	0.0007**	0.0007***	0.0007**
		[0.0003]	[0.0003]	[0.0003]	[0.0003]	[0.0003]	[0.0003]
MOFA			0.04	0.04	0.008	-0.003	-0.002
			[0.04]	[0.04]	[0.04]	[0.04]	[0.04]
firm age			-0.0003	-0.0003	-0.0005	-0.0007	-0.0004
			[0.0009]	[0.0010]	[0.001]	[0.001]	[0.001]
M&As				0.03	0.04	0.04	0.04
				[0.04]	[0.04]	[0.04]	[0.04]
market access					0.1**	0.09	0.06
					[0.06]	[0.06]	[0.06]
low cost					0.1*	0.09	0.06
					[0.08]	[0.08]	[0.08]
input access					0.1	0.1	0.08
					[0.07]	[0.08]	[0.07]
join partner					-0.008	-0.06	-0.09
					[0.07]	[0.08]	[0.07]
export back home					0.3*	0.2	0.1
					[0.2]	[0.2]	[0.2]
TA benefits					0.10	0.007	0.02
					[0.09]	[0.08]	[0.09]
tax to sales						0.05	0.02
						[0.2]	[0.1]
internal funds (share)							-0.1
							[0.1]
borrow from affiliate-country banks (share)							-0.2
							[0.1]
borrow from non-affiliate-country banks (share)							-0.06
							[0.1]
borrow from family (share)							-0.1
							[0.2]
borrow from non-bank financial institutions (share)							-0.5***
							[0.2]
purchases on credit/advances (share)							-0.01
							[0.2]
new equity/debt (share)							-0.2
							[0.2]
funds from parent company (share)							0.3*
							[0.2]
borrow from another source (share)							-0.2
							[0.2]
Obs	575	569	562	561	557	511	501
R^2	0.20	0.21	0.19	0.19	0.21	0.21	0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in all columns. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The dependent variable is not in logs. Among non-dummy covariates, only employment and productivity are in logs. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B6: Firm-level determinants of intra-firm trade (tax to sales ratio dropped)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.04***	0.02*	0.06***	0.03*
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.04***	0.03***	0.04***	0.010
	[0.008]	[0.007]	[0.01]	[0.008]
skill intensity	0.2**	0.2***	-0.2	-0.02
	[0.09]	[0.09]	[0.2]	[0.1]
intangible to tangible capital	0.0006***	0.0001	0.001***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	-0.010	-0.02	-0.03	0.005
	[0.04]	[0.03]	[0.05]	[0.04]
firm age	0.0009	-0.0009	0.0002	-0.0003
	[0.0008]	[0.0007]	[0.001]	[0.001]
M&As	-0.04	-0.02	0.05	0.05
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.1***	0.1*	0.08
	[0.08]	[0.04]	[0.08]	[0.05]
low cost	0.2**	0.1**	0.2	0.1
	[0.09]	[0.05]	[0.10]	[0.07]
input access	0.2**	0.08	0.1	0.07
	[0.09]	[0.05]	[0.1]	[0.07]
join partner	0.2**	0.09	-0.10	-0.05
	[0.10]	[0.06]	[0.1]	[0.07]
export back home	0.07	0.02	0.5***	0.3
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2**	0.1*	0.08	0.08
	[0.1]	[0.07]	[0.1]	[0.08]
internal funds (share)	0.2*	0.09	0.1	-0.1
	[0.1]	[0.06]	[0.1]	[0.1]
borrow from affiliate-country banks (share)	0.08	0.007	0.1	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.09	0.0008	0.3	-0.05
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.2	0.03	0.04	-0.1
	[0.2]	[0.1]	[0.2]	[0.2]
borrow from non-bank financial institutions (share)	0.3*	0.1	-1.6***	-0.4***
	[0.2]	[0.1]	[0.6]	[0.2]
purchases on credit/advances (share)	0.3**	0.1	0.2	0.02
	[0.1]	[0.09]	[0.2]	[0.1]
new equity/debt (share)	0.2	0.3	0.3	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
funds from parent company (share)	0.6***	0.5***	0.7***	0.3**
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from another source (share)	0.2	0.1	-0.07	-0.1
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	1064	1135	474	546
$Pseudo - R^2$	0.22		0.31	
$Log - likelihood$	-502.1		-212.8	
R^2		0.17		0.28
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B7: Firm-level determinants of intra-firm trade (marginal effects calculated at covariates' means)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.04**	0.02*	0.08***	0.03*
	[0.02]	[0.01]	[0.03]	[0.01]
productivity	0.04***	0.03***	0.06***	0.01
	[0.01]	[0.008]	[0.02]	[0.009]
skill intensity	0.2*	0.2**	-0.2	0.04
	[0.1]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0007***	0.0001	0.002***	0.0007**
	[0.0003]	[0.0001]	[0.0004]	[0.0003]
MOFA	0.02	-0.01	-0.09	-0.002
	[0.05]	[0.04]	[0.07]	[0.04]
firm age	0.001	-0.0010	0.0004	-0.0004
	[0.001]	[0.0007]	[0.002]	[0.001]
M&As	-0.02	-0.004	0.09	0.04
	[0.05]	[0.03]	[0.07]	[0.04]
market access	0.3***	0.2***	0.1	0.06
	[0.1]	[0.04]	[0.1]	[0.06]
low cost	0.3**	0.2***	0.2	0.06
	[0.1]	[0.05]	[0.1]	[0.08]
input access	0.3**	0.1*	0.2	0.08
	[0.1]	[0.05]	[0.1]	[0.07]
join partner	0.3**	0.1*	-0.4*	-0.09
	[0.1]	[0.07]	[0.2]	[0.07]
export back home	0.2	0.08	0.5*	0.1
	[0.1]	[0.07]	[0.3]	[0.2]
TA benefits	0.2*	0.1*	0.08	0.02
	[0.1]	[0.07]	[0.2]	[0.09]
tax to sales	0.1	-0.09	0.3	0.02
	[0.2]	[0.1]	[0.3]	[0.1]
internal funds (share)	0.2*	0.09	0.06	-0.1
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.1	0.02	0.06	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.1	0.02	0.4	-0.06
	[0.2]	[0.1]	[0.3]	[0.1]
borrow from family (share)	0.2	0.06	0.2	-0.1
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.4*	0.1	-2.5**	-0.5***
	[0.2]	[0.1]	[1.1]	[0.2]
purchases on credit/advances (share)	0.3**	0.1	0.1	-0.01
	[0.2]	[0.10]	[0.3]	[0.2]
new equity/debt (share)	0.3	0.5*	0.4	-0.2
	[0.4]	[0.3]	[0.5]	[0.2]
funds from parent company (share)	0.8***	0.5***	0.9***	0.3*
	[0.2]	[0.09]	[0.3]	[0.2]
borrow from another source (share)	0.2	0.1	-0.2	-0.2
	[0.2]	[0.2]	[0.4]	[0.2]
Obs	971	1048	432	501
$Pseudo-R^2$	0.22		0.32	
$Log-likelihood$	-458.2		-189.2	
R^2		0.16		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated at covariates' means are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B8: Firm-level determinants of intra-firm trade (clustered standard errors by affiliate-country and affiliate-industry)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.03**	0.02*	0.06***	0.03*
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.04***	0.03***	0.05**	0.01
	[0.010]	[0.009]	[0.02]	[0.01]
skill intensity	0.2*	0.2**	-0.1	0.04
	[0.10]	[0.09]	[0.1]	[0.2]
intangible to tangible capital	0.0006***	0.0001	0.002***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.01	-0.07	-0.002
	[0.05]	[0.04]	[0.06]	[0.05]
firm age	0.0010	-0.0010	0.0003	-0.0004
	[0.0009]	[0.0006]	[0.001]	[0.001]
M&As	-0.02	-0.004	0.07	0.04
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.1	0.06
	[0.09]	[0.03]	[0.10]	[0.06]
low cost	0.3***	0.2***	0.1	0.06
	[0.1]	[0.05]	[0.09]	[0.07]
input access	0.3**	0.1	0.1	0.08
	[0.1]	[0.06]	[0.1]	[0.08]
join partner	0.3**	0.1*	-0.3**	-0.09
	[0.1]	[0.06]	[0.1]	[0.06]
export back home	0.2	0.08	0.3	0.1
	[0.1]	[0.08]	[0.2]	[0.2]
TA benefits	0.2*	0.1*	0.06	0.02
	[0.1]	[0.06]	[0.2]	[0.08]
tax to sales	0.1	-0.09	0.2	0.02
	[0.2]	[0.1]	[0.2]	[0.1]
internal funds (share)	0.2*	0.09	0.04	-0.1
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.09	0.02	0.04	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.1	0.02	0.3*	-0.06
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.2	0.06	0.1	-0.1
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.3	0.1	-1.8**	-0.5**
	[0.2]	[0.1]	[0.8]	[0.2]
purchases on credit/advances (share)	0.3*	0.1	0.08	-0.01
	[0.1]	[0.1]	[0.2]	[0.2]
new equity/debt (share)	0.2	0.5*	0.3	-0.2
	[0.3]	[0.3]	[0.3]	[0.2]
funds from parent company (share)	0.7***	0.5***	0.6***	0.3*
	[0.1]	[0.09]	[0.2]	[0.2]
borrow from another source (share)	0.2	0.1	-0.2	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	971	1048	432	501
$Pseudo - R^2$	0.22		0.32	
$Log - likelihood$	-458.2		-189.2	
R^2		0.16		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Affiliate-country clustered standard errors	Yes	Yes	Yes	Yes
Affiliate-industry clustered standard errors	Yes	Yes	Yes	Yes
Parent-country clustered standard errors	No	No	No	No

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on clustered standard errors by affiliate country and affiliate industry. For the description of the variables, see Table B24.

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Table B9: Firm-level determinants of intra-firm trade (clustered standard errors by affiliate-country and parent-country)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.03**	0.02	0.06***	0.03
	[0.01]	[0.01]	[0.02]	[0.02]
productivity	0.04***	0.03***	0.05**	0.01
	[0.008]	[0.009]	[0.02]	[0.01]
skill intensity	0.2**	0.2**	-0.1	0.04
	[0.09]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0006***	0.0001	0.002***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.01	-0.07	-0.002
	[0.05]	[0.04]	[0.06]	[0.04]
firm age	0.0010	-0.0010	0.0003	-0.0004
	[0.001]	[0.0009]	[0.0010]	[0.001]
M&As	-0.02	-0.004	0.07	0.04
	[0.04]	[0.03]	[0.06]	[0.05]
market access	0.3***	0.2***	0.1	0.06
	[0.10]	[0.04]	[0.09]	[0.06]
low cost	0.3**	0.2***	0.1	0.06
	[0.1]	[0.05]	[0.1]	[0.09]
input access	0.3**	0.1*	0.1	0.08
	[0.1]	[0.05]	[0.1]	[0.08]
join partner	0.3**	0.1*	-0.3*	-0.09
	[0.1]	[0.07]	[0.1]	[0.07]
export back home	0.2	0.08	0.3	0.1
	[0.1]	[0.08]	[0.2]	[0.2]
TA benefits	0.2*	0.1**	0.06	0.02
	[0.1]	[0.06]	[0.2]	[0.1]
tax to sales	0.1	-0.09	0.2	0.02
	[0.2]	[0.2]	[0.2]	[0.1]
internal funds (share)	0.2*	0.09	0.04	-0.1
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.09	0.02	0.04	-0.2
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.1	0.02	0.3	-0.06
	[0.1]	[0.1]	[0.2]	[0.2]
borrow from family (share)	0.2	0.06	0.1	-0.1
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.3*	0.1	-1.8**	-0.5**
	[0.2]	[0.1]	[0.7]	[0.2]
purchases on credit/advances (share)	0.3*	0.1	0.08	-0.01
	[0.1]	[0.1]	[0.2]	[0.2]
new equity/debt (share)	0.2	0.5*	0.3	-0.2
	[0.3]	[0.3]	[0.3]	[0.2]
funds from parent company (share)	0.7***	0.5***	0.6***	0.3
	[0.1]	[0.09]	[0.2]	[0.2]
borrow from another source (share)	0.2	0.1	-0.2	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	971	1048	432	501
$Pseudo-R^2$	0.22		0.32	
$Log-likelihood$	-458.2		-189.2	
R^2		0.16		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Affiliate-country clustered standard errors	Yes	Yes	Yes	Yes
Affiliate-industry clustered standard errors	No	No	No	No
Parent-country clustered standard errors	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on clustered standard errors by affiliate country and parent country. For the description of the variables, see Table B24.

Table B10: Firm-level determinants of intra-firm trade (clustered standard errors by affiliate-country, affiliate-industry and parent-country)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.03**	0.02*	0.06***	0.03*
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.04***	0.03***	0.05***	0.01
	[0.009]	[0.008]	[0.02]	[0.010]
skill intensity	0.2*	0.2**	-0.1	0.04
	[0.09]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0006***	0.0001	0.002***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.01	-0.07	-0.002
	[0.05]	[0.04]	[0.06]	[0.04]
firm age	0.0010	-0.0010	0.0003	-0.0004
	[0.0010]	[0.0007]	[0.002]	[0.001]
M&As	-0.02	-0.004	0.07	0.04
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.1	0.06
	[0.10]	[0.04]	[0.09]	[0.06]
low cost	0.3**	0.2***	0.1	0.06
	[0.1]	[0.05]	[0.1]	[0.07]
input access	0.3**	0.1*	0.1	0.08
	[0.1]	[0.05]	[0.1]	[0.08]
join partner	0.3**	0.1*	-0.3*	-0.09
	[0.1]	[0.07]	[0.1]	[0.07]
export back home	0.2	0.08	0.3*	0.1
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2*	0.1*	0.06	0.02
	[0.1]	[0.06]	[0.2]	[0.08]
tax to sales	0.1	-0.09	0.2	0.02
	[0.2]	[0.1]	[0.2]	[0.1]
internal funds (share)	0.2*	0.09	0.04	-0.1
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.09	0.02	0.04	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.1	0.02	0.3	-0.06
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.2	0.06	0.1	-0.1
	[0.2]	[0.1]	[0.2]	[0.2]
borrow from non-bank financial institutions (share)	0.3*	0.1	-1.8**	-0.5**
	[0.2]	[0.1]	[0.8]	[0.2]
purchases on credit/advances (share)	0.3*	0.1	0.08	-0.01
	[0.1]	[0.10]	[0.2]	[0.2]
new equity/debt (share)	0.2	0.5*	0.3	-0.2
	[0.3]	[0.2]	[0.4]	[0.2]
funds from parent company (share)	0.7***	0.5***	0.6***	0.3*
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from another source (share)	0.2	0.1	-0.2	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	971	1048	432	501
$Pseudo-R^2$	0.22		0.32	
$Log-likelihood$	-458.2		-189.2	
R^2		0.16		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes
Affiliate-country clustered standard errors	Yes	Yes	Yes	Yes
Affiliate-industry clustered standard errors	Yes	Yes	Yes	Yes
Parent-country clustered standard errors	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on clustered standard errors by affiliate country, affiliate industry and parent country. For the description of the variables, see Table B24.

Table B11: Firm-level determinants of intra-firm trade (total sales in lieu of total employment)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
sales	0.04***	0.03***	0.05***	0.02**
	[0.007]	[0.006]	[0.01]	[0.008]
skill intensity	0.2**	0.2**	-0.1	0.004
	[0.09]	[0.08]	[0.2]	[0.2]
intangible to tangible capital	0.0006***	0.0001	0.002***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.01	-0.07	-0.006
	[0.05]	[0.04]	[0.05]	[0.04]
firm age	0.0009	-0.001	0.0004	-0.0003
	[0.0009]	[0.0007]	[0.001]	[0.0010]
M&As	-0.02	-0.006	0.07	0.04
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.1	0.05
	[0.09]	[0.04]	[0.09]	[0.06]
low cost	0.3**	0.2***	0.1	0.06
	[0.1]	[0.05]	[0.1]	[0.08]
input access	0.3**	0.1*	0.1	0.08
	[0.1]	[0.05]	[0.1]	[0.07]
join partner	0.3**	0.1*	-0.3**	-0.10
	[0.1]	[0.07]	[0.1]	[0.07]
export back home	0.2	0.08	0.3*	0.1
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2*	0.1*	0.05	0.02
	[0.1]	[0.07]	[0.2]	[0.09]
tax to sales	0.1	-0.09	0.2	0.03
	[0.2]	[0.1]	[0.2]	[0.1]
internal funds (share)	0.2*	0.10	0.04	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.09	0.02	0.04	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.1	0.02	0.3	-0.06
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.2	0.06	0.1	-0.1
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.3*	0.1	-1.8**	-0.5***
	[0.2]	[0.1]	[0.8]	[0.2]
purchases on credit/advances (share)	0.3**	0.1	0.08	-0.02
	[0.1]	[0.10]	[0.2]	[0.2]
new equity/debt (share)	0.2	0.5*	0.3	-0.2
	[0.3]	[0.2]	[0.4]	[0.2]
funds from parent company (share)	0.7***	0.5***	0.6***	0.3*
	[0.1]	[0.09]	[0.2]	[0.2]
borrow from another source (share)	0.2	0.1	-0.2	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	971	1048	432	501
$Pseudo - R^2$	0.22		0.32	
$Log - likelihood$	-458.3		-189.3	
R^2		0.16		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B12: Firm-level determinants of intra-firm trade (average wage in lieu of skill intensity)

	(1)	(2)	(3)	(4)
Dependent variable:	intra-firm imports (dummy)	intra-firm imports (share)	intra-firm exports (dummy)	intra-firm exports (share)
employment	0.03**	0.01	0.07***	0.02*
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.03***	0.02***	0.05***	0.02**
	[0.01]	[0.008]	[0.01]	[0.01]
average wage	0.02	0.02*	0.03	-0.02
	[0.01]	[0.01]	[0.02]	[0.02]
intangible to tangible capital	0.0006***	0.0002	0.001***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.02	-0.07	-0.02
	[0.05]	[0.04]	[0.05]	[0.04]
firm age	0.0008	-0.001	-0.0002	-0.0003
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	-0.02	-0.002	0.04	0.02
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.1***	0.1	0.05
	[0.09]	[0.04]	[0.10]	[0.06]
low cost	0.2**	0.2***	0.1	0.05
	[0.1]	[0.05]	[0.1]	[0.08]
input access	0.2**	0.09	0.2	0.04
	[0.1]	[0.06]	[0.1]	[0.07]
join partner	0.3**	0.1*	-0.3**	-0.1
	[0.1]	[0.07]	[0.1]	[0.08]
export back home	0.2	0.08	0.3*	0.08
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.1	0.08	0.2	0.07
	[0.1]	[0.07]	[0.2]	[0.10]
tax to sales	-0.01	-0.2	0.4	0.1
	[0.2]	[0.1]	[0.2]	[0.2]
internal funds (share)	0.2	0.07	-0.01	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.06	-0.005	-0.04	-0.2
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.07	-0.010	0.2	-0.09
	[0.2]	[0.1]	[0.2]	[0.2]
borrow from family (share)	0.2	0.05	0.2	-0.08
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.1	0.1	-2.5**	-0.5***
	[0.2]	[0.2]	[1.1]	[0.2]
purchases on credit/advances (share)	0.2*	0.1	0.01	-0.05
	[0.1]	[0.1]	[0.2]	[0.2]
new equity/debt (share)	0.2	0.5*	0.2	-0.2
	[0.3]	[0.3]	[0.4]	[0.2]
funds from parent company (share)	0.6***	0.5***	0.5***	0.2
	[0.1]	[0.09]	[0.2]	[0.1]
borrow from another source (share)	0.2	0.1	-0.2	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	940	1022	425	491
$Pseudo - R^2$	0.21		0.33	
$Log - likelihood$	-443.7		-184.1	
R^2		0.15		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B13: Firm-level determinants of intra-firm trade (relative monthly wage for production, non-production and managerial workers in lieu of skill intensity)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.04***	0.02*	0.06***	0.02
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.03***	0.02***	0.05***	0.01
	[0.009]	[0.008]	[0.01]	[0.01]
monthly wage (non-production to production workers)	0.001	0.001	0.005	0.002
	[0.004]	[0.004]	[0.01]	[0.004]
monthly wage (managerial to production workers)	0.008*	0.003	-0.002	0.001
	[0.004]	[0.004]	[0.008]	[0.005]
monthly wage (managerial to non-production workers)	-0.02	-0.006	0.01	0.007
	[0.01]	[0.01]	[0.01]	[0.01]
intangible to tangible capital	0.0007***	0.0002**	0.002***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.001	-0.05	-0.02
	[0.05]	[0.04]	[0.06]	[0.05]
firm age	0.001	-0.0009	0.00009	0.000006
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	0.02	0.03	0.05	0.03
	[0.04]	[0.03]	[0.05]	[0.05]
market access	0.3***	0.2***	0.1	0.07
	[0.09]	[0.04]	[0.09]	[0.06]
low cost	0.2**	0.1**	0.09	0.04
	[0.1]	[0.06]	[0.1]	[0.08]
input access	0.3***	0.1*	0.1	0.08
	[0.1]	[0.06]	[0.1]	[0.08]
join partner	0.2**	0.10	-0.3*	-0.1
	[0.1]	[0.07]	[0.1]	[0.07]
export back home	0.2*	0.1	0.3	0.1
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.1	0.07	0.08	0.09
	[0.1]	[0.06]	[0.2]	[0.1]
tax to sales	0.2	-0.10	0.2	0.006
	[0.2]	[0.2]	[0.2]	[0.2]
internal funds (share)	0.1	0.05	0.04	-0.2
	[0.1]	[0.07]	[0.2]	[0.2]
borrow from affiliate-country banks (share)	0.03	-0.002	0.06	-0.2
	[0.1]	[0.08]	[0.2]	[0.2]
borrow from non-affiliate-country banks (share)	0.05	0.02	0.3	-0.10
	[0.2]	[0.1]	[0.2]	[0.2]
borrow from family (share)	0.06	0.03	0.2	-0.1
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.2	0.2	-1.6**	-0.5**
	[0.2]	[0.2]	[0.6]	[0.2]
purchases on credit/advances (share)	0.2	0.1	0.10	-0.03
	[0.1]	[0.1]	[0.2]	[0.2]
new equity/debt (share)	0.2	0.5*	0.2	-0.4
	[0.3]	[0.3]	[0.4]	[0.2]
funds from parent company (share)	0.6***	0.5***	0.6***	0.2
	[0.1]	[0.09]	[0.2]	[0.2]
borrow from another source (share)	0.1	0.1	-0.1	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	866	931	410	476
$Pseudo-R^2$	0.23		0.31	
$Log-likelihood$	-399.4		-183.7	
R^2		0.14		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B14: Firm-level determinants of intra-firm trade (tax to assets ratio in lieu of tax to sales ratio)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.04***	0.03**	0.06***	0.02
	[0.01]	[0.01]	[0.02]	[0.02]
productivity	0.03***	0.02***	0.04***	0.01
	[0.009]	[0.008]	[0.01]	[0.009]
skill intensity	0.2**	0.2*	0.05	0.1
	[0.10]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0004	0.0001	0.002***	0.0005**
	[0.0003]	[0.0001]	[0.0003]	[0.0002]
MOFA	-0.002	-0.02	-0.07	0.002
	[0.04]	[0.04]	[0.06]	[0.04]
firm age	0.0004	-0.001	-0.00003	-0.0006
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	-0.04	-0.02	0.1*	0.05
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.1***	0.1	0.07
	[0.1]	[0.04]	[0.09]	[0.06]
low cost	0.3***	0.1**	0.2	0.07
	[0.1]	[0.06]	[0.1]	[0.08]
input access	0.3**	0.08	0.1	0.07
	[0.1]	[0.06]	[0.1]	[0.07]
join partner	0.3**	0.09	-0.4***	-0.1
	[0.1]	[0.07]	[0.1]	[0.08]
export back home	0.08	0.02	0.3*	0.1
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.3**	0.1*	0.04	0.005
	[0.1]	[0.08]	[0.2]	[0.09]
taxes to assets	0.00008	-0.000001	0.0006***	0.00003
	[0.00006]	[0.00002]	[0.0002]	[0.00002]
internal funds (share)	0.2	0.07	0.1	-0.1
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.04	-0.0006	0.09	-0.2
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.03	-0.04	0.4*	-0.03
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.1	0.05	0.3	-0.04
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.3	0.008	-1.7**	-0.4**
	[0.2]	[0.1]	[0.7]	[0.2]
purchases on credit/advances (share)	0.3**	0.1	0.1	-0.05
	[0.1]	[0.1]	[0.2]	[0.2]
new equity/debt (share)	0.2	0.4*	0.2	-0.3
	[0.3]	[0.3]	[0.4]	[0.2]
funds from parent company (share)	0.6***	0.5***	0.7***	0.3*
	[0.1]	[0.10]	[0.2]	[0.2]
borrow from another source (share)	0.2	0.1	-0.010	-0.04
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	888	971	396	466
$Pseudo-R^2$	0.22		0.34	
$Log-likelihood$	-412.2		-168.3	
R^2		0.15		0.26
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B15: Firm-level determinants of intra-firm trade (shares of finance of fixed assets from various sources in lieu of shares of finance of working capital)

	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
Dependent variable:				
employment	0.03**	0.02	0.05***	0.02
	[0.01]	[0.01]	[0.02]	[0.02]
productivity	0.03***	0.03***	0.04***	0.01
	[0.009]	[0.008]	[0.01]	[0.010]
skill intensity	0.1	0.2*	-0.1	0.01
	[0.10]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0006***	0.00009	0.001***	0.0006*
	[0.0002]	[0.0001]	[0.0002]	[0.0004]
MOFA	0.02	-0.01	-0.02	-0.004
	[0.05]	[0.04]	[0.06]	[0.04]
firm age	0.001	-0.0008	-0.0009	-0.0006
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	-0.02	0.003	0.1**	0.06
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.08	0.04
	[0.09]	[0.04]	[0.08]	[0.06]
low cost	0.2**	0.2***	0.1	0.07
	[0.10]	[0.05]	[0.10]	[0.08]
input access	0.3**	0.1**	0.09	0.06
	[0.1]	[0.05]	[0.10]	[0.07]
join partner	0.2**	0.1	-0.3**	-0.1*
	[0.1]	[0.07]	[0.1]	[0.08]
export back home	0.1	0.07	0.2	0.03
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2	0.09	-0.008	-0.01
	[0.1]	[0.07]	[0.1]	[0.09]
tax to sales	0.05	-0.1	0.1	0.002
	[0.2]	[0.1]	[0.2]	[0.1]
finance fixed assets: internal funds (share)	-0.0007	-0.06	-0.04	-0.1
	[0.09]	[0.08]	[0.1]	[0.10]
finance fixed assets: borrow from affiliate-country banks (share)	-0.08	-0.1	0.07	-0.06
	[0.09]	[0.09]	[0.1]	[0.1]
finance fixed assets: borrow from non-affiliate-country banks (share)	-0.1	-0.1	0.08	-0.07
	[0.1]	[0.1]	[0.2]	[0.1]
finance fixed assets: borrow from family (share)	0.09	-0.09	-0.2	-0.2
	[0.1]	[0.1]	[0.2]	[0.1]
finance fixed assets: borrow from non-bank financial institutions (share)	-0.2	-0.09	-0.8**	-0.5**
	[0.2]	[0.1]	[0.3]	[0.2]
finance fixed assets: purchases on credit/advances (share)	0.06	-0.004	-0.01	-0.1
	[0.1]	[0.1]	[0.2]	[0.2]
finance fixed assets: new equity/debt (share)	0.04	-0.1	1.7**	0.1
	[0.3]	[0.3]	[0.7]	[0.6]
finance fixed assets: funds from parent company (share)	0.4***	0.3***	0.4***	0.3**
	[0.10]	[0.10]	[0.1]	[0.1]
finance fixed assets: borrow from another source (share)	0.2	0.07	0.08	-0.02
	[0.1]	[0.1]	[0.2]	[0.2]
Obs	959	1035	424	491
$Pseudo - R^2$	0.22		0.28	
$Log - likelihood$	-450.7		-195.6	
R^2		0.15		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B16: Firm-level determinants of intra-firm trade (dummies for finance of working capital from various sources in lieu of their shares)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.03**	0.02*	0.05***	0.02
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.03***	0.03***	0.04***	0.01
	[0.009]	[0.008]	[0.01]	[0.009]
skill intensity	0.1	0.2*	-0.2	0.006
	[0.09]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0006***	0.0001	0.001***	0.0007***
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.02	-0.09	-0.010
	[0.05]	[0.04]	[0.05]	[0.04]
firm age	0.0009	-0.0010	-0.00008	-0.0007
	[0.0009]	[0.0007]	[0.001]	[0.0009]
M&As	-0.01	-0.002	0.07	0.04
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.09	0.07
	[0.08]	[0.03]	[0.08]	[0.06]
low cost	0.2**	0.1***	0.09	0.07
	[0.10]	[0.05]	[0.1]	[0.07]
input access	0.3**	0.1**	0.1	0.1
	[0.10]	[0.05]	[0.10]	[0.07]
join partner	0.2**	0.1	-0.3**	-0.10
	[0.1]	[0.07]	[0.1]	[0.07]
export back home	0.08	0.03	0.2	0.08
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2*	0.1*	0.03	0.02
	[0.1]	[0.06]	[0.2]	[0.09]
tax to sales	0.06	-0.1	0.2	-0.01
	[0.2]	[0.2]	[0.2]	[0.1]
internal funds (dummy)	-0.03	-0.05	-0.02	-0.06
	[0.04]	[0.03]	[0.05]	[0.04]
borrow from affiliate-country banks (dummy)	-0.06**	-0.06***	-0.01	-0.02
	[0.03]	[0.02]	[0.04]	[0.03]
borrow from non-affiliate-country banks (dummy)	-0.03	-0.04	0.2***	0.03
	[0.05]	[0.04]	[0.06]	[0.05]
borrow from family (dummy)	0.010	-0.03	0.1*	0.07
	[0.05]	[0.04]	[0.08]	[0.05]
borrow from non-bank financial institutions (dummy)	0.03	0.03	-0.3***	-0.2***
	[0.07]	[0.06]	[0.1]	[0.05]
purchases on credit/advances (dummy)	-0.03	-0.02	-0.09*	-0.006
	[0.03]	[0.03]	[0.05]	[0.04]
new equity/debt (dummy)	0.07	0.1	0.2	0.1
	[0.10]	[0.08]	[0.1]	[0.09]
funds from parent company (dummy)	0.3***	0.2***	0.4***	0.3***
	[0.04]	[0.04]	[0.05]	[0.05]
borrow from another source (dummy)	-0.002	-0.02	-0.05	-0.03
	[0.08]	[0.07]	[0.1]	[0.1]
Obs	971	1048	432	501
$Pseudo-R^2$	0.22		0.34	
$Log-likelihood$	-458.0		-183.0	
R^2		0.15		0.28
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B17: Firm-level determinants of intra-firm trade (dummies for finance of fixed assets from various sources in lieu of dummies for finance of working capital)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.03**	0.02	0.04**	0.02
	[0.01]	[0.01]	[0.02]	[0.02]
productivity	0.03***	0.02***	0.04***	0.010
	[0.009]	[0.008]	[0.01]	[0.010]
skill intensity	0.1	0.2*	-0.2	0.02
	[0.09]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0006***	0.0001	0.001***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.02	-0.01	-0.03	-0.01
	[0.05]	[0.04]	[0.06]	[0.04]
firm age	0.0010	-0.0008	-0.001	-0.0009
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	-0.02	-0.001	0.1**	0.06
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.05	0.05
	[0.08]	[0.04]	[0.08]	[0.06]
low cost	0.2**	0.1***	0.02	0.06
	[0.10]	[0.05]	[0.1]	[0.08]
input access	0.3**	0.1**	0.05	0.08
	[0.10]	[0.05]	[0.10]	[0.07]
join partner	0.2**	0.1*	-0.3**	-0.1
	[0.1]	[0.06]	[0.1]	[0.08]
export back home	0.1	0.07	0.2	0.08
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.1	0.09	0.004	-0.005
	[0.1]	[0.07]	[0.1]	[0.08]
tax to sales	0.07	-0.1	0.3	0.003
	[0.2]	[0.1]	[0.2]	[0.1]
finance fixed assets: internal funds (dummy)	-0.03	-0.04	0.06	-0.08*
	[0.03]	[0.03]	[0.05]	[0.04]
finance fixed assets: borrow from affiliate-country banks (dummy)	-0.04	-0.04	0.08*	0.03
	[0.03]	[0.02]	[0.04]	[0.03]
finance fixed assets: borrow from non-affiliate-country banks (dummy)	-0.05	-0.04	0.1*	0.03
	[0.04]	[0.04]	[0.07]	[0.05]
finance fixed assets: borrow from family (dummy)	0.05	-0.004	0.04	-0.06
	[0.05]	[0.05]	[0.1]	[0.06]
finance fixed assets: borrow from non-bank financial institutions (dummy)	-0.1	-0.07	-0.2	-0.2*
	[0.1]	[0.05]	[0.2]	[0.1]
finance fixed assets: purchases on credit/advances (dummy)	-0.02	-0.010	0.08	-0.004
	[0.05]	[0.04]	[0.07]	[0.06]
finance fixed assets: new equity/debt (dummy)	0.1	0.03	0.2	0.1
	[0.1]	[0.1]	[0.2]	[0.1]
finance fixed assets: funds from parent company (dummy)	0.3***	0.3***	0.4***	0.2***
	[0.04]	[0.04]	[0.05]	[0.05]
finance fixed assets: borrow from another source (dummy)	0.2**	0.08	0.2	0.10
	[0.08]	[0.08]	[0.1]	[0.2]
Obs	959	1035	424	491
$Pseudo-R^2$	0.24		0.31	
$Log-likelihood$	-439.5		-189.0	
R^2		0.16		0.26
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B18: Firm-level determinants of intra-firm trade (dummies for level of importance of parental assistance in access to finance)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.02*	0.01	0.06***	0.02
	[0.01]	[0.01]	[0.02]	[0.02]
productivity	0.03***	0.02***	0.05***	0.01
	[0.009]	[0.008]	[0.02]	[0.010]
skill intensity	0.2**	0.2**	-0.06	0.04
	[0.09]	[0.09]	[0.2]	[0.1]
intangible to tangible capital	0.0007***	0.0002	0.002	0.0007**
	[0.0003]	[0.0001]	[0.001]	[0.0003]
MOFA	0.04	-0.002	-0.05	-0.006
	[0.05]	[0.04]	[0.06]	[0.04]
firm age	0.0007	-0.001	-0.0006	-0.0008
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	-0.06	-0.03	0.09*	0.05
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.2*	0.09
	[0.09]	[0.03]	[0.08]	[0.06]
low cost	0.3***	0.2***	0.1	0.09
	[0.10]	[0.05]	[0.1]	[0.08]
input access	0.3***	0.1***	0.2	0.1
	[0.1]	[0.05]	[0.1]	[0.08]
join partner	0.3***	0.1**	-0.3**	-0.08
	[0.1]	[0.07]	[0.1]	[0.08]
export back home	0.2	0.07	0.4*	0.2
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2*	0.1*	0.002	-0.02
	[0.1]	[0.07]	[0.1]	[0.08]
tax to sales	0.07	-0.1	0.2	0.04
	[0.2]	[0.1]	[0.2]	[0.2]
access to finance: parental assistance unimportant	0.2**	0.1	0.04	0.02
	[0.10]	[0.08]	[0.2]	[0.1]
access to finance: parental assistance slightly important	0.04	0.04	0.05	0.03
	[0.09]	[0.07]	[0.1]	[0.08]
access to finance: parental assistance important	0.1*	0.06	0.1	0.08
	[0.07]	[0.05]	[0.1]	[0.07]
access to finance: parental assistance very important	0.09	0.06	0.007	0.04
	[0.07]	[0.05]	[0.1]	[0.07]
access to finance: parental assistance crucial	0.1*	0.1**	0.07	0.07
	[0.07]	[0.05]	[0.1]	[0.07]
Obs	983	1059	435	504
$Pseudo-R^2$	0.16		0.21	
$Log-likelihood$	-496.8		-222.0	
R^2		0.098		0.21
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B19: Firm-level determinants of intra-firm trade (acquisition mode of capital goods)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.01	0.01	0.05**	0.02
	[0.01]	[0.01]	[0.02]	[0.02]
productivity	0.03***	0.02**	0.04***	0.010
	[0.010]	[0.008]	[0.01]	[0.009]
skill intensity	0.02	0.09	-0.1	-0.01
	[0.1]	[0.09]	[0.2]	[0.1]
intangible to tangible capital	0.01***	0.0004***	0.002**	0.0008***
	[0.004]	[0.00008]	[0.0009]	[0.0002]
MOFA	0.03	0.005	-0.03	0.001
	[0.05]	[0.04]	[0.06]	[0.04]
firm age	0.001	-0.0008	0.0002	-0.0005
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	-0.03	-0.007	0.08	0.04
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.1***	0.2**	0.09*
	[0.09]	[0.04]	[0.09]	[0.05]
low cost	0.2**	0.1**	0.09	0.04
	[0.1]	[0.06]	[0.1]	[0.07]
input access	0.3***	0.1**	0.2	0.1
	[0.10]	[0.05]	[0.1]	[0.07]
join partner	0.4***	0.1*	-0.3**	-0.08
	[0.1]	[0.07]	[0.1]	[0.08]
export back home	0.2*	0.1	0.3**	0.2
	[0.1]	[0.09]	[0.2]	[0.2]
TA benefits	0.2	0.10	0.04	0.03
	[0.1]	[0.06]	[0.1]	[0.08]
tax to sales	0.2	-0.07	0.3	0.1
	[0.2]	[0.2]	[0.2]	[0.2]
source of capital goods (imports)	-0.0006	-0.01	-0.1	-0.10
	[0.1]	[0.1]	[0.1]	[0.1]
source of capital goods (local)	0.0005	-0.05	-0.3**	-0.1
	[0.1]	[0.1]	[0.1]	[0.1]
source of capital goods (parent)	0.4***	0.4***	0.1	0.1
	[0.1]	[0.1]	[0.1]	[0.1]
Obs	781	847	435	505
$Pseudo-R^2$	0.28		0.25	
$Log-likelihood$	-331.9		-210.1	
R^2		0.25		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B20: Firm-level determinants of intra-firm trade (sample of firms in manufacturing)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.02	0.02	0.07***	0.03**
	[0.02]	[0.01]	[0.02]	[0.02]
productivity	0.03***	0.03***	0.04***	0.01
	[0.01]	[0.01]	[0.02]	[0.01]
skill intensity	0.02	0.1	0.02	0.09
	[0.1]	[0.1]	[0.2]	[0.2]
intangible to tangible capital	0.006	0.0003**	0.002***	0.0006**
	[0.006]	[0.0001]	[0.0003]	[0.0003]
MOFA	-0.003	-0.004	-0.07	0.0008
	[0.05]	[0.04]	[0.06]	[0.04]
firm age	0.0001	-0.0010	-0.0009	-0.001
	[0.001]	[0.0010]	[0.001]	[0.001]
M&As	-0.03	-0.02	0.06	0.03
	[0.05]	[0.03]	[0.06]	[0.05]
market access	0.5***	0.2***	0.08	0.1*
	[0.1]	[0.04]	[0.09]	[0.06]
low cost	0.4***	0.2***	0.1	0.1
	[0.1]	[0.06]	[0.1]	[0.08]
input access	0.5***	0.2**	0.1	0.1
	[0.1]	[0.07]	[0.1]	[0.08]
join partner	0.5***	0.1	-0.3**	-0.07
	[0.1]	[0.08]	[0.2]	[0.08]
export back home	0.7***	0.2*	0.3	0.3
	[0.2]	[0.1]	[0.2]	[0.2]
TA benefits	0.4***	0.1**	-0.10	0.06
	[0.1]	[0.07]	[0.2]	[0.09]
tax to sales	0.2	-0.05	0.07	-0.1
	[0.2]	[0.2]	[0.2]	[0.1]
internal funds (share)	0.2*	0.1	0.3*	0.02
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.1	0.06	0.3	-0.05
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.07	-0.02	0.5**	0.02
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.3*	0.2	0.4	0.06
	[0.2]	[0.2]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.01	0.2	-2.0**	-0.3
	[0.2]	[0.2]	[0.9]	[0.2]
purchases on credit/advances (share)	0.3**	0.2*	0.2	-0.07
	[0.2]	[0.1]	[0.2]	[0.1]
new equity/debt (share)	0.02	0.3	0.5	-0.2
	[0.3]	[0.4]	[0.4]	[0.2]
funds from parent company (share)	0.7***	0.5***	0.9***	0.3***
	[0.1]	[0.1]	[0.2]	[0.1]
borrow from another source (share)	0.2	0.2	0.08	0.02
	[0.2]	[0.2]	[0.3]	[0.2]
Obs	629	692	351	406
$Pseudo - R^2$	0.26		0.34	
$Log - likelihood$	-267.6		-146.4	
R^2		0.15		0.25
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Sample restricted to foreign affiliates in manufacturing industries. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B21: Firm-level determinants of intra-firm trade (crisis effect 1)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.04***	0.02*	0.06***	0.02
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.04***	0.03***	0.04***	0.01
	[0.009]	[0.008]	[0.01]	[0.009]
skill intensity	0.2*	0.2**	-0.10	0.03
	[0.09]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0005***	0.00010	0.002***	0.0007**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.02	-0.07	-0.0004
	[0.05]	[0.04]	[0.05]	[0.04]
firm age	0.001	-0.0010	0.0005	-0.0003
	[0.0009]	[0.0007]	[0.001]	[0.001]
M&As	-0.008	-0.001	0.08	0.04
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.1	0.04
	[0.09]	[0.04]	[0.09]	[0.06]
low cost	0.3***	0.2***	0.1	0.08
	[0.1]	[0.05]	[0.1]	[0.08]
input access	0.3**	0.1*	0.1	0.08
	[0.1]	[0.06]	[0.1]	[0.07]
join partner	0.3***	0.1*	-0.3*	-0.1
	[0.1]	[0.07]	[0.1]	[0.07]
export back home	0.2	0.07	0.4**	0.1
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2	0.1	0.01	-0.02
	[0.1]	[0.07]	[0.2]	[0.08]
tax to sales	0.09	-0.1	0.2	0.05
	[0.2]	[0.1]	[0.2]	[0.1]
internal funds (share)	0.2*	0.09	0.05	-0.1
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.08	0.02	0.06	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.1	0.01	0.4*	-0.02
	[0.1]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.2	0.05	0.1	-0.1
	[0.2]	[0.1]	[0.3]	[0.2]
borrow from non-bank financial institutions (share)	0.4**	0.1	-1.8**	-0.5***
	[0.2]	[0.1]	[0.8]	[0.2]
purchases on credit/advances (share)	0.2*	0.1	0.1	0.004
	[0.1]	[0.10]	[0.2]	[0.2]
new equity/debt (share)	0.3	0.5**	0.3	-0.2
	[0.3]	[0.2]	[0.4]	[0.2]
funds from parent company (share)	0.6***	0.5***	0.6***	0.3*
	[0.1]	[0.09]	[0.2]	[0.1]
borrow from another source (share)	0.2	0.1	-0.1	-0.1
	[0.2]	[0.2]	[0.3]	[0.2]
pre-crisis performance well below expectations	0.004	-0.04	-0.01	0.2
	[0.1]	[0.1]	[0.2]	[0.1]
pre-crisis performance below expectations	0.010	0.01	-0.01	-0.007
	[0.07]	[0.06]	[0.1]	[0.09]
pre-crisis performance in line with expectations	0.06	0.04	0.02	0.008
	[0.06]	[0.05]	[0.09]	[0.07]
pre-crisis performance above expectations	-0.05	-0.04	0.09	0.02
	[0.06]	[0.05]	[0.09]	[0.07]
Obs	968	1045	429	498
$Pseudo - R^2$	0.23		0.33	
$Log - likelihood$	-451.3		-185.4	
R^2		0.16		0.27
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B22: Firm-level determinants of intra-firm trade (crisis effect 2)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.03**	0.02*	0.05**	0.02
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.04***	0.03***	0.05***	0.02*
	[0.009]	[0.008]	[0.01]	[0.009]
skill intensity	0.2*	0.2*	-0.2	0.001
	[0.09]	[0.09]	[0.2]	[0.2]
intangible to tangible capital	0.0006***	0.0002	0.002***	0.0006**
	[0.0002]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.01	-0.01	-0.07	0.007
	[0.05]	[0.04]	[0.05]	[0.04]
firm age	0.0009	-0.001	0.0006	-0.0002
	[0.0009]	[0.0007]	[0.001]	[0.0010]
M&As	-0.01	-0.004	0.08	0.05
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.2***	0.08	0.04
	[0.09]	[0.04]	[0.08]	[0.06]
low cost	0.3**	0.2***	0.1	0.08
	[0.1]	[0.05]	[0.10]	[0.08]
input access	0.3**	0.1*	0.1	0.06
	[0.1]	[0.06]	[0.10]	[0.07]
join partner	0.3**	0.1*	-0.3**	-0.09
	[0.1]	[0.07]	[0.1]	[0.07]
export back home	0.2	0.08	0.3*	0.1
	[0.1]	[0.07]	[0.2]	[0.2]
TA benefits	0.2	0.1	0.03	-0.008
	[0.1]	[0.07]	[0.2]	[0.08]
tax to sales	0.1	-0.09	0.2	0.02
	[0.2]	[0.1]	[0.2]	[0.1]
internal funds (share)	0.2*	0.09	-0.006	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.08	0.02	0.008	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.1	0.02	0.3	-0.05
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.2	0.05	0.10	-0.1
	[0.2]	[0.1]	[0.2]	[0.2]
borrow from non-bank financial institutions (share)	0.3*	0.10	-1.6***	-0.5***
	[0.2]	[0.1]	[0.6]	[0.2]
purchases on credit/advances (share)	0.2*	0.1	0.03	-0.01
	[0.1]	[0.10]	[0.2]	[0.2]
new equity/debt (share)	0.3	0.5*	0.2	-0.3
	[0.3]	[0.2]	[0.4]	[0.2]
funds from parent company (share)	0.7***	0.5***	0.6***	0.3*
	[0.1]	[0.09]	[0.2]	[0.1]
borrow from another source (share)	0.2	0.1	-0.2	-0.2
	[0.2]	[0.2]	[0.3]	[0.2]
post-crisis performance well below expectations	-0.09	-0.10	-0.2	-0.1
	[0.1]	[0.10]	[0.2]	[0.1]
post-crisis performance below expectations	-0.007	-0.08	0.02	0.06
	[0.08]	[0.09]	[0.1]	[0.09]
post-crisis performance in line with expectations	-0.03	-0.09	0.002	0.08
	[0.08]	[0.09]	[0.1]	[0.09]
post-crisis performance above expectations	-0.04	-0.09	0.05	0.09
	[0.08]	[0.09]	[0.1]	[0.09]
Obs	968	1045	429	498
$Pseudo-R^2$	0.22		0.33	
$Log-likelihood$	-456.0		-184.2	
R^2		0.16		0.29
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B23: Firm-level determinants of intra-firm trade (crisis effect 3)

Dependent variable:	(1) intra-firm imports (dummy)	(2) intra-firm imports (share)	(3) intra-firm exports (dummy)	(4) intra-firm exports (share)
employment	0.02	0.02	0.06***	0.02
	[0.01]	[0.01]	[0.02]	[0.01]
productivity	0.03***	0.03***	0.05***	0.01
	[0.010]	[0.009]	[0.01]	[0.009]
skill intensity	0.01	0.1	-0.2	-0.02
	[0.1]	[0.1]	[0.2]	[0.2]
intangible to tangible capital	0.001***	0.0003***	0.002***	0.0007**
	[0.0003]	[0.0001]	[0.0003]	[0.0003]
MOFA	0.02	0.0008	-0.07	0.0006
	[0.05]	[0.04]	[0.05]	[0.04]
firm age	0.001	-0.0009	0.0004	-0.0004
	[0.0010]	[0.0008]	[0.001]	[0.0010]
M&As	-0.008	0.007	0.08	0.06
	[0.04]	[0.03]	[0.05]	[0.04]
market access	0.3***	0.1***	0.07	0.05
	[0.08]	[0.04]	[0.08]	[0.06]
low cost	0.2**	0.1**	0.2	0.08
	[0.10]	[0.06]	[0.10]	[0.08]
input access	0.2**	0.09*	0.1	0.08
	[0.10]	[0.06]	[0.1]	[0.07]
join partner	0.3**	0.08	-0.3**	-0.1
	[0.1]	[0.08]	[0.1]	[0.07]
export back home	0.3**	0.2	0.3*	0.1
	[0.1]	[0.1]	[0.2]	[0.2]
TA benefits	0.1	0.1	0.002	-0.02
	[0.1]	[0.07]	[0.2]	[0.08]
tax to sales	0.08	-0.1	0.3	0.04
	[0.2]	[0.2]	[0.2]	[0.1]
internal funds (share)	0.2	0.08	-0.03	-0.2
	[0.1]	[0.07]	[0.2]	[0.1]
borrow from affiliate-country banks (share)	0.07	0.04	0.01	-0.2
	[0.1]	[0.08]	[0.2]	[0.1]
borrow from non-affiliate-country banks (share)	0.04	-0.04	0.2	-0.05
	[0.2]	[0.1]	[0.2]	[0.1]
borrow from family (share)	0.2	0.2	-0.06	-0.2
	[0.2]	[0.1]	[0.2]	[0.2]
borrow from non-bank financial institutions (share)	0.1	0.2	-1.7***	-0.5***
	[0.2]	[0.2]	[0.7]	[0.2]
purchases on credit/advances (share)	0.2*	0.2	-0.006	-0.02
	[0.1]	[0.1]	[0.2]	[0.2]
new equity/debt (share)	0.03	0.3	0.1	-0.2
	[0.4]	[0.4]	[0.4]	[0.2]
funds from parent company (share)	0.6***	0.5***	0.5***	0.3*
	[0.1]	[0.09]	[0.2]	[0.2]
borrow from another source (share)	0.2	0.1	-0.2	-0.1
	[0.2]	[0.2]	[0.3]	[0.2]
post-crisis capacity utilisation: no change	-0.03	-0.06	-0.2***	-0.04
	[0.05]	[0.05]	[0.07]	[0.06]
post-crisis capacity utilisation: decrease	0.007	-0.03	-0.2***	-0.1**
	[0.05]	[0.05]	[0.07]	[0.05]
Obs	757	828	414	492
$Pseudo-R^2$	0.24		0.34	
$Log-likelihood$	-336.0		-175.0	
R^2		0.15		0.30
Affiliate-country dummies	Yes	Yes	Yes	Yes
Affiliate-industry dummies	Yes	Yes	Yes	Yes
Parent-country dummies	Yes	Yes	Yes	Yes

Notes: Probit and OLS estimations with affiliate-country, affiliate-industry and parent-country dummies in odd-numbered and even-numbered columns, respectively. Dummies take value 1 if the corresponding statement is valid, and 0 otherwise. The non-dummy dependent variables are not in logs. Among non-dummy covariates, only employment and productivity are in logs. Marginal effects calculated across all values of the covariates are displayed in odd-numbered columns. *** significant at 1%, ** significant at 5%, * significant at 10%, based on robust standard errors. For the description of the variables, see Table B24.

Table B24: Description of variables

Variable	Description
intra-firm imports (dummy)	the firm has a non-zero share of production inputs imported from the parent in total production inputs
intra-firm imports (share)	share of production inputs imported from the parent in total production inputs
intra-firm exports (dummy)	the firm has a non-zero share of exports to the parent/sister affiliate in total direct exports
intra-firm exports (share)	share of exports to the parent/sister affiliate in total direct exports
employment	total number of permanent full-time employees
productivity	total sales to total permanent full-time employment
skill intensity	share of permanent full-time technical, supervisory and managerial employees in the total number of permanent full-time employees
intangible to tangible capital	ratio of the sum of advertising and training expenditures to the total value of fixed assets
MOFA	the firm is owned by a foreign investor by at least 50% (dummy)
firm age	number of years since the establishment of the firm
M&As	the foreign-owned firm has been acquired through Mergers and Acquisitions (dummy)
market access	principal motive of foreign investor to invest in the host country: access to new markets (dummy)
low cost	principal motive of foreign investor to invest in the host country: lower production cost (dummy)
input access	principal motive of foreign investor to invest in the host country: access to natural resources/inputs (dummy)
join partner	principal motive of foreign investor to invest in the host country: collaboration with a specific partner (dummy)
export back home	principal motive of foreign investor to invest in the host country: export back to home country (dummy)
TA benefits	principal motive of foreign investor to invest in the host country: benefits from a trade agreement (dummy)
other motive	principal motive of foreign investor to invest in the host country: any other motive to be specified by the firm (dummy)
tax to sales	ratio of taxes to total sales
internal funds (share)	share of finance of working capital through internal funds/retained earnings
borrow from affiliate-country banks (share)	share of finance of working capital through credit from banks in the affiliate country
borrow from affiliate-country banks (share)	share of finance of working capital through credit from banks outside the affiliate country
borrow from family (share)	share of finance of working capital through credit from family/friends/individual lenders
borrow from non-bank (financial) institutions (share)	share of finance of working capital through credit from non-bank financial institutions (e.g. equity funds)
purchases on credit/advances (share)	share of finance of working capital through purchases on credit from suppliers and advances from customers
new equity/debt (share)	share of finance of working capital through issuance of new equity or debt (including commercial paper and debentures)
funds from parent company (share)	share of finance of working capital through the parent company
borrow from another source (share)	share of finance of working capital from any other source to be specified by the firm
sales	total value of sales of the firm
average wage	ratio of total wage bill to total number of permanent full-time employees
monthly wage (non-production to production workers)	ratio of monthly wage for non-production workers to monthly wage for production workers
monthly wage (managerial to production workers)	ratio of monthly wage for managerial workers to monthly wage for production workers
monthly wage (managerial to non-production workers)	ratio of monthly wage for managerial workers to monthly wage for non-production workers
tax to assets	total tax payment to total value of assets

Description of variables (continued)

Variable	Description
internal funds (dummy)	the firm has a non-zero share of finance of working capital through internal funds/retained earnings
borrow from affiliate-country banks (dummy)	the firm has a non-zero share of finance of working capital through credit from banks in the affiliate country
borrow from affiliate-country banks (dummy)	the firm has a non-zero share of finance of working capital through credit from banks outside the affiliate country
borrow from family (dummy)	the firm has a non-zero share of finance of working capital through credit from family/friends/individual lenders
borrow from non-bank (financial) institutions (dummy)	the firm has a non-zero share of finance of working capital through credit from non-bank financial institutions (e.g. equity funds)
purchases on credit/advances (dummy)	the firm has a non-zero share of finance of working capital through purchases on credit from suppliers and advances from customers
new equity/debt (dummy)	the firm has a non-zero share of finance of working capital through issuance of new equity or debt (including commercial paper and debentures)
funds from parent company (dummy)	the firm has a non-zero share of finance of working capital through the parent company
borrow from another source (dummy)	the firm has a non-zero share of finance of working capital from any other source to be specified by the firm
finance of fixed assets: internal funds (share)	share of finance of fixed assets through internal funds/retained earnings
finance of fixed assets: borrow from affiliate-country banks (share)	share of finance of fixed assets through credit from banks in the affiliate country
finance of fixed assets: borrow from affiliate-country banks (share)	share of finance of fixed assets through credit from banks outside the affiliate country
finance of fixed assets: borrow from family (share)	share of finance of fixed assets through credit from family/friends/individual lenders
finance of fixed assets: borrow from non-bank (financial) institutions (share)	share of finance of fixed assets through credit from non-bank financial institutions (e.g. equity funds)
finance of fixed assets: purchases on credit/advances (share)	share of finance of fixed assets through purchases on credit from suppliers and advances from customers
finance of fixed assets: new equity/debt (share)	share of finance of fixed assets through issuance of new equity or debt (including commercial paper and debentures)
finance of fixed assets: funds from parent company (share)	share of finance of fixed assets through the parent company
finance of fixed assets: borrow from another source (share)	share of finance of fixed assets from any other source to be specified by the firm
finance of fixed assets: internal funds (dummy)	the firm has a non-zero share of finance of fixed assets through internal funds/retained earnings
finance of fixed assets: borrow from affiliate-country banks (dummy)	the firm has a non-zero share of finance of fixed assets through credit from banks in the affiliate country
finance of fixed assets: borrow from affiliate-country banks (dummy)	the firm has a non-zero share of finance of fixed assets through credit from banks outside the affiliate country
finance of fixed assets: borrow from family (dummy)	the firm has a non-zero share of finance of fixed assets through credit from family/friends/individual lenders
finance of fixed assets: borrow from non-bank (financial) institutions (dummy)	the firm has a non-zero share of finance of fixed assets through credit from non-bank financial institutions (e.g. equity funds)
finance of fixed assets: purchases on credit/advances (dummy)	the firm has a non-zero share of finance of fixed assets through purchases on credit from suppliers and advances from customers
finance of fixed assets: new equity/debt (dummy)	the firm has a non-zero share of finance of fixed assets through issuance of new equity or debt (including commercial paper and debentures)
finance of fixed assets: funds from parent company (dummy)	the firm has a non-zero share of finance of fixed assets through the parent company
finance of fixed assets: borrow from another source (dummy)	the firm has a non-zero share of finance of fixed assets from any other source to be specified by the firm

Description of variables (continued)

Variable	Description
access to finance: parental assistance not received	assistance from the parent in access to finance was not received (dummy)
access to finance: parental assistance unimportant	unimportant assistance from the parent in access to finance was received (dummy)
access to finance: parental assistance slightly important	slightly important assistance from the parent in access to finance was received (dummy)
access to finance: parental assistance important	important assistance from the parent in access to finance was received (dummy)
access to finance: parental assistance very important	very important assistance from the parent in access to finance was received (dummy)
access to finance: parental assistance crucial	crucial assistance from the parent in access to finance was received (dummy)
source of capital goods (imports)	capital goods imported directly by the firm (dummy)
source of capital goods (local)	capital goods acquired from local distributors (dummy)
source of capital goods (parent)	capital goods acquired from the parent company (dummy)
pre-crisis performance well below expectations	company's performance is well below overall expectations before the global financial crisis of 2007–2008 (dummy)
pre-crisis performance below expectations	company's performance is below overall expectations before the global financial crisis of 2007–2008 (dummy)
pre-crisis performance in line with expectations	company's performance is in line with overall expectations before the global financial crisis of 2007–2008 (dummy)
pre-crisis performance above expectations	company's performance is above overall expectations before the global financial crisis of 2007–2008 (dummy)
pre-crisis performance well above expectations	company's performance is well above overall expectations before the global financial crisis of 2007–2008 (dummy)
post-crisis performance well below expectations	company's performance is well below revised expectations after the global financial crisis of 2007–2008 (dummy)
post-crisis performance below expectations	company's performance is below revised expectations after the global financial crisis of 2007–2008 (dummy)
post-crisis performance in line with expectations	company's performance is in line with revised expectations after the global financial crisis of 2007–2008 (dummy)
post-crisis performance above expectations	company's performance is above revised expectations after the global financial crisis of 2007–2008 (dummy)
post-crisis performance well above expectations	company's performance is well above revised expectations after the global financial crisis of 2007–2008 (dummy)
post-crisis capacity utilisation: no change	no change in capacity utilisation after the global financial crisis of 2007–2008 (dummy)
post-crisis capacity utilisation: decrease	decrease in capacity utilisation after the global financial crisis of 2007–2008 (dummy)
post-crisis capacity utilisation: increase	increase in capacity utilisation after the global financial crisis of 2007–2008 (dummy)

Notes: Authors' notation.