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The Role of Foreign Networks for Firm Export of Services

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ABSTRACT

This study formalizes the idea that that the world can become 'smaller' through firms' strategic trade-related decisions. We investigate whether firm investment in obtaining access to foreign networks impacts exports of services by estimating a fixed effects panel model on a comprehensive firm-level dataset for Sweden. In particular, we examine investment in links through the hiring of immigrants. Because trade barriers are higher for services than for goods, and because trade in services is more sensitive to informal trade barriers, firm investment in access to foreign networks could especially help to increase services exports. However, investment in foreign links could benefit overall access within the same cluster of firms, which reduces the incentive for an individual firm to invest in such linkages itself. The novel results suggest a positive and significant influence of firm investment in foreign networks – through the hiring of foreign-born workers – on both the propensity to export services as well as the intensity of exports. Instrumental variable estimation mitigates endogeneity concerns. Weaker export experience enhances the role of investment in foreign networks in terms of the propensity to export. The skill level of foreign-born workers and the time that has elapsed since immigration also impact the degree to which firms can utilize investment in foreign-born personnel to gain access to networks abroad. Our findings provide a new understanding of how firms can overcome trade barriers that specifically impede services by investing in foreign networks, such as through hiring foreign-born personnel, and emphasize the role of foreign-born population to promote services exports.

Keywords: Networks, firms, trade, services, immigration

JEL Classification: D8, F1, F2, L1, J6

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1. Introduction

The world economy is increasingly classified as a service economy due to the increasing importance of services in many countries. Separating the economy of the United States by sector of origin reveals that nearly 80 percent of gross domestic product (GDP) is derived from services. The corresponding figure for the European Union (EU) is 73 percent. Over the last two decades, the share of services in the total employment of developed countries has increased by 12 percent. In contrast, the shares of primary and secondary industries have decreased by more than two-thirds.[2] In 1991, manufacturing and services accounted for 25 and 75 percent of total employment in developed economies, respectively, compared to 16 and 84 percent in 2009.[3]

However, advance of the service economy has not been as evident in the area of international trade. Trade in manufactured goods still dominates international commercial exchange. The share of services in the total trade of developed economies with the rest of the world has remained remarkably stable at one-fifth of total trade, while total trade has tripled. The main explanation for this inconsistency is that trade in services is more costly and faces higher and more complex barriers than does trade in merchandise.

The historical focus of efforts to liberalize international trade through multilateral, regional and bilateral deals has largely been on reducing trade barriers that impeded industrialized countries' manufacturing companies from shipping goods abroad, i.e., lowering tariffs and other types of visible and formal barriers to trade in manufactured goods. Whereas trade negotiations have reduced barriers to trade in goods substantially over the last half century, the key achievement of services negotiations, which began in the mid-1980s, has been to create rules for trade and a framework for future liberalization commitments.

[2] The relative expansion of the services sector is arguably due to changes in final demand and productivity improvements in manufacturing as well as the establishment of international value chains, which in turn increase demand for services that link production worldwide (Jones and Kierzkowski, 1990; Nickell et al., 2008; Schettkat, 2007; Schettkat and Yocarini, 2006). Services have become more important in manufacturing (Lodefalk, 2013; Nordås, 2008; Pilat, 2005; Pilat et al., 2008) and may be conducive to manufacturing exports by increasing productivity, attuning to changes in demand and overcoming obstacles to trade (Lodefalk, 2014).

[3] These figures are based on OECD (2013) data for 22 developed economies.

Moreover, formal trade barriers for services constitute relatively non-transparent regulations, such as bans or limitations rather than tariffs, which raise trade costs and complicate liberalization of trade in services. Trade in services, which are typically intangible and more heterogeneous than goods, is also more sensitive to informal obstacles, such as information friction. Firms consider language and business practice differences, suitable foreign agent identification and uncertainty (e.g., uncertainty regarding agent track records) important barriers to trade in business services (European Commission, 2001). Moreover, despite important technological advancements, many services remain impossible to store. Proximity between the producer and the consumer is often a requirement for the exchange of a service. Finally, firm trade in services is limited in terms of the number of services traded or foreign markets that are served, which also suggests that there are substantial entry barriers in services trade (e.g., Haller et al., 2012).

Numerous studies document the importance of informal barriers to trade, such as transport and distribution costs (e.g., Anderson and Marcouiller, 2002; Melitz, 2003; Anderson and van Wincoop, 2004; Fink et al., 2005; Nunn, 2007; Melitz, 2008; Guiso et al., 2009; Felbermayr and Toubal, 2010; Kneller and Pisu, 2011; Isphording and Otten, 2013; Melitz and Toubal, 2014). Apart from general knowledge on how to conduct trade in services with customers in foreign markets, firms must acquire market-specific information concerning foreign supply, demand, rules and regulations, and institutions.[4] Differences in language and culture complicate long-distance trade relations. Therefore, firms may need to invest substantially more in building and sustaining foreign business relations, which frequently necessitates face-to-face contact (Hasche, 2013; Johanson and Vahlne, 2009). Mere separation in geographical space makes coordination and monitoring more difficult in foreign trade relations despite modern communications technology (Cristea, 2011; Cuberes, 2013).[5]

[4] That trade costs primarily are market-specific is indicated in, e.g., Moxnes (2010) and Mion (2014).

[5] Recent business surveys illustrate the importance of face-to-face meetings for business-to-business commerce and teamwork (Forbes; Harvard Business Review, 2009; Oxford Economics, 2009). Several studies find that geographic distance even discourages electronic commerce (Blum and Goldfarb, 2006; Ferreira and Waldfogel, 2013; Hortacsu et al., 2009). Mok and Wellman (2007) discuss the importance of distance for interpersonal contact and support, before and after the Internet.

Against this background, it becomes highly relevant to identify and understand how firms that export services, or have this aim, may act to circumvent barriers to trade in services.

This study formalizes the idea that the world can become 'smaller' through firms' strategic trade-related decisions. The theoretical framework generates six hypotheses concerning the role of firm investment in foreign networks for services trade.

We test these hypotheses by analyzing the impact of foreign networks through immigrant employment across dimensions such as the quality of the investment (immigrant status of employees, time since immigration, skill level of foreign-born workers), previous firm experience in foreign trade, types of services traded, and investments by other firms near the firm. Moreover, we consider services traded through three of four modes of delivery.[6] Finally, we estimate a firm-level gravity model that controls for confounding factors at several levels, explicitly or through fixed effects. Identification comes from changes within the firm-partner dyad over time. The potential endogeneity of investment to trade is addressed using an instrumental variable (IV) approach as well as lagged variables.

The comprehensive firm-level dataset that we employ provides information on approximately 1.8 million full-time employees in nearly 30,000 Swedish private sector firms, including country of birth and level of education. The data also include firms' services trade with 176 partner countries during the 1998-2007 period.

This study provides novel evidence of a positive and significant influence of firm investment in foreign networks – by hiring foreign-born workers – on both the propensity to export services as well as the intensity of exports. In contrast, we find that the overall stock of immigrants in the country does not significantly spur firm exports to the relevant trade partner/immigrant source country.

In addition to the key finding, our results demonstrate that weaker export experience enhances the role of investment in foreign networks in terms of the propensity to export. The quality of the investment – measured as the skill level of foreign-born workers and the time elapsed since immigration – also impacts the degree to which firms can utilize their foreign workers to gain access to networks abroad. Consistent

[6] The exception, due to a lack of data, is services delivered through a commercial presence abroad.

with the theoretical model, the results further suggest that investment in links by nearby firms reduces a firm's private benefit from establishing links of its own. In light of these findings, there is reason to believe that firm heterogeneity in service export participation is at least partly related to varying degrees of access to foreign networks.

The remainder of this paper is organized as follows. Section 2 presents the motivation and discusses the relevant strands of previous research. Section 3 describes the role of foreign networks in trade in services, formulates a theoretical framework and provides a set of testable hypotheses. Section 4 explains the empirical approach, and section 5 describes the data. The estimation results are discussed in section 6. Section 7 concludes and provides final remarks.

2. Motivation and Previous Research

Our study relates to three main strands of existing research: first, to the literature on the role of migration in international trade; second, to the literature identifying determinants of and barriers to services trade at the firm level; and third, to firm heterogeneity with respect to trade.

Since the pioneering study of Gould (1994), a large empirical literature has established a positive link between ethnic diasporas and trade in merchandise with their countries of origin within a gravity framework.[7] This finding has been interpreted as migrants facilitating trade through their business networks.

Migrants often possess knowledge, skills, and contacts that can reduce information friction, improve information quality and infuse trust in business relationships (Dunlevy and Hutchinson, 1999; Jansen and Piermartini, 2009).[8] In weak foreign institutional settings, migrants are more likely to be aware of ways to circumvent corruption; they can also assist in contract enforcement by influencing the drafting of contracts and limiting opportunistic behavior via participation in cross-national networks (Greif, 1989; Herander and Saavedra, 2005; Rauch, 2001). Migration therefore has the potential to facilitate trade

[7] Hatzigeorgiou and Lodefalk (2013) summarize previous contributions and discuss the most recent literature.

[8] By knowing agents both at home and abroad, and by putting his reputation at stake, the migrant may be a guarantor that information provided is accurate.

between the country of residence and the country of birth due to migrants' superior knowledge of the language, culture, preferences, and regulatory environment of their home countries. Their knowledge of and access to informal networks are likely to be important (e.g., Rauch, 1999).

Most recently, studies at the subnational and micro levels have highlighted the importance of proximity between migrants and businesses to observe an impact on foreign trade (Hatzigeorgiou and Lodefalk, 2013; Herander and Saavedra, 2005; Hiller, 2013). Geographical proximity and intensity of interaction between migrants and other agents are expected to enhance the ability of migrants to relay their specific information and to match agents in their new country with others in their country of birth (Gould, 1994; Rauch, 2001). The national stock of immigrants includes immigrants employed in the non-tradable and public sectors as well as unemployed immigrants, and the stock also affects trade through the demand generated by immigrants themselves (Aleksynska and Peri, 2014). The stock of immigrants is therefore a poor measure of foreign business networks. However, few of the disaggregate studies mentioned above have examined the nexus between immigrants' foreign networks and trade in services. This constitutes a serious gap in the research because networks are likely to be particularly important impediments to trade in services due to their informal character. We intend to bridge this gap with this study.

Within the migration and trade literature, the research of Foster-McGregor and Pindyuk (2013) is closest to our study; they investigate the importance of emigrant stocks on nine categories of services exports that are delivered across borders or consumed by foreigners in the home country. The results confirm a positive relationship, which is somewhat stronger relative to the literature on general merchandise trade. This relationship is stronger for highly educated emigrants.[9]

We contribute to the migration and trade literature in several ways. First, we incorporate insights from social network theory into a parsimonious heterogeneous firm model of trade. The model features firm investment in links to foreign networks through the employment of immigrants as well as the externalities of such investment and the possibility that firm trade is partly driven by immigrants' home

[9] A few studies examine the nexus between tourism and trade in goods. The aspect of social networks and trade in services is not investigated, however, with the exception of de la Mata (2011).

bias in demand. Second, we employ detailed firm-level panel data for Sweden to analyze the role of foreign networks – proxied primarily by immigrant employees – in services. This disaggregated analytical approach enables us to consider the importance of proximity between immigrants and traders.

As explained, our study relates to two additional strands of existing research. In the literature on factors influencing services trade at the level of the firm, scholars have long focused on trade in goods, whereas trade in services has received little attention, particularly at the disaggregated level.[10] The most relevant study in this context is Ariu (2013), which explores and compares the extra-EU trade transactions in services and goods of Belgian firms. Wolfmayr et al. (2013) is also relevant because it analyzes the services exports of Austrian firms to 37 destinations.

In the second branch of firm heterogeneity with respect to trade, previous work, which was stimulated by the empirical work of Bernard and others, mainly explained firm heterogeneity in (merchandise) trade. Empirical investigations emphasized geographic factors, such as distance (Bernard and Jensen, 1999; Bernard et al., 1995; Disdier and Head, 2008; Leamer, 2007). Although efficiency has been found to be a key parameter behind trade participation due to trade costs, it only explains part of the puzzle (Armenter and Koren, 2009). Meanwhile, Grossman (1998) suggests that the profound impact of distance on trade may be captured most appropriately by incorporating information friction that increases with distance, whereas transport costs are of minor importance.

We contribute to these strands of the trade literature in two ways. First, by exploring the export of different types of services with virtually all the foreign partners of a panel of Swedish firms over an entire decade within a full-fledged firm-level gravity framework. Second, by incorporating heterogeneity in access to foreign networks and distance effects as explanations for different degrees of participation in trade in services. Our framework rests on the assumption that firms prepare for trade by acquiring access

[10] However, some studies have recently used firm-level data to explore the anatomy of the services trade in countries such as Austria (Walter and Dell'mour, 2010; Wolfmayr et al., 2013), Belgium (Ariu, 2013), France (Gaulier et al., 2010), Germany (Kelle and Kleinert, 2010; Kelle et al., 2013), Italy (Federico and Tosti, 2012), the United Kingdom (Breinlich and Criscuolo, 2011), and Finland, France, Ireland, and Slovenia (Haller et al., 2012).

to foreign networks to overcome imperfections and asymmetries in information between buyers and sellers.[11]

3. Theoretical Framework

We think of the global economy in terms of a universe containing different planets (foreign markets) separated by distance in space. By default, planets are detached; in such cases, travel time is only contingent upon distance in space. However, planets can be interconnected through nodes in space. These nodes (networks) are capable of drawing the connected planets closer to each other, reducing the physical distance. In addition, frictionless travel is possible through the arms of the nodes themselves. In other words, nodes (networks) that connect planets (markets) facilitate travel between such interconnections for all agents in space (firms). Space, or the world, therefore becomes 'smaller.' Agents that can access the nodes themselves also have opportunities to traveling through the arms of the nodes (network linkages) that make up the links.

Real social networks are geographically and socially clustered, while their agents are only a few neighboring connections away from each other's networks (Gastner and Newman, 2006; Kogut and Walker, 2001; Milgram, 1967). Because the minimum social distance between the agents of such networks is short, on average, the networks mimic a small world (Watts and Strogatz, 1998).

Carayol and Roux (2009) built a theory around this thinking and demonstrated through simulation how these types of small worlds may endogenously arise via the strategic formation of shortcuts (weak ties) between distant clusters. Profit-maximizing agents can establish costly direct links to other agents to benefit from those networks. Others may also benefit through spillovers from those links. Because the quality of knowledge diffusion deteriorates with social distance, the positive externality of links on other agents of the same local network decreases the farther away the strategic agent and the other agents in the network are socially. Moreover, the costs of establishing and using links increase with geographic distance because distance makes more coordination and monitoring necessary. As a result of agents' free riding on

[11] This study therefore falls under the category of international trade research, which explores the reasons behind self-selection into trade by more productive firms, as discussed in Melitz and Trefler (2012).

each other's links with distant clusters, and due to the relatively low cost of local versus distant networking, networks that mimic real social networks may emerge, as characterized above, at intermediate levels of knowledge transferability.

The types of social networks that appear in this context share some key features of the behavior of firms in trade: most firms are local. Only a few firms establish costly connections with foreign countries through trade, where the geographic distance to a market negatively influences the propensity and intensity of such a connection. Other domestic firms may benefit indirectly from the firms that connect with foreign countries by being part of the same social network, for example, as part of a corporation or through direct or indirect local business relations. The world then becomes 'smaller' through some firms' strategic decisions to invest in links with foreign clusters.[12]

To frame our discussion, we construct a simple heterogeneous firm model of trade with multiple asymmetric countries. The model incorporates firms' option of investing in costly links to foreign networks, for example, through the employment of immigrants, the externalities of such endogenous investment, and the possibility that firm trade with a foreign partner country is partly driven by idiosyncratic demand shocks. In addition to these features, the model draws heavily on Cristea (2011).

We assume there is a representative consumer in each country *j* with preferences over a continuum of differentiated goods, as captured in the utility function

$$\cup_j = \prod_h \left[\int_\omega q(\omega)_{ihj}^{1/\sigma} a(\omega)_{ihj}^{1/\sigma} x(\omega)_{ihj}^{1-1/\sigma} \, d\omega \right]^{\sigma\mu_{hj}/\sigma-1}, \quad (1)$$

where $q(\omega)_{ihj} \geq 1$ is the consumer's preference weight for variety $\omega \in \Omega_{hj}$ of good h from country i, $a(\omega)_{ihj}$ is an idiosyncratic demand shock,[13] $x(\omega)_{ihj}$ is the quantity demanded, $\sigma > 1$ is the constant elasticity of substitution between any two varieties, and μ_{hj} is the share of expenditure spent on

[12] The model of Carayol and Roux (2009) is silent on how agents form shortcuts to distant agents. However, within a trade context, studies and surveys indicate that hiring is related to firm preparation for foreign expansion (Masso et al., 2014; Minondo, 2011; Mion and Opromolla, 2013; Molina and Muendler, 2013; Sala and Yalcin, 2012). These studies focus on the export-related work experience of employees, where, e.g., Molina and Muendler (2013) find that Brazilian firms successfully prepare for expected export expansion by hiring away workers from other exporting firms using a panel of manufacturing firms.

[13] This feature comes from Crozet et al. (2012).

good h. The preference weight is a product of standard appeal ($\lambda_{ih}(\omega) \geq 1$) and appeal specific to the trade relation $\left(\lambda_{ihj}(\omega) \geq 1\right)$, that is,

$$q_{ihj}(\omega) = \lambda_{ih}(\omega)\lambda_{ihj}(\omega). \tag{2}$$

The consumer maximizes utility subject to the budget constraint

$$Y_j = w_j L_j \geq \iint_{h\omega} \tau(\omega)_{ihj} p(\omega)_{ih} x(\omega)_{ihj}\, dh\, d\omega, \tag{3}$$

where Y_j is income, w_j is wage, L_j the fixed amount of labor, $\tau(\omega)_{ihj}$ is an iceberg trade cost, and $p(\omega)_{ih}$ is the f.o.b. price. The demand in country j for variety ω of good h from country i is therefore

$$x_{ihj}(\omega) = q(\omega)_{ihj} a(\omega)_{ihj} \left(\tau(\omega)_{ihj} p(\omega)_{ih}\right)^{-\sigma} \frac{\mu_{hj} Y_j}{P_{hj}}, \tag{4}$$

where the price index is

$$P_{hj} = \sum_{\omega} q(\omega)_{ihj} a(\omega)_{ihj} \left(\tau(\omega)_{ihj} p(\omega)_{ih}\right)^{1-\sigma}. \tag{5}$$

Firms use labor (l) to produce a good for a market with the production function $y(\varphi) = \varphi^b l$, where $b < 1$ is the parameter capturing the sensitivity of output to productivity. However, firms only produce if their drawn labor productivity φ, which allows them to profitably do so, taking the presence of a fixed market entry cost, F_{ihj}, and variable trade costs into account. Market entry costs include the costs of obtaining non-immigrant visas, acquiring professional qualifications abroad and meeting other legal requirements for service provision. This set-up implies that a firm is unique in terms of both variety and productivity.

The firm also has an option to invest in linkages to the specific market, for example, through the services of immigrants. These linkages are costly but can facilitate flows of information and, as a result, firm-specific appeal, $\lambda_{ihj}(\omega)$, is added to the variety produced for the foreign market.[14] Through these links to foreign networks, firms above the productivity threshold more easily learn about market opportunities abroad. They also make acquaintances with other foreigners who are themselves embedded

[14] Links, such as immigrants, may be assumed to belong to a perfectly competitive 'linkages' sector with constant returns to scale. The sector offer firms country-specific linkages.

in potentially useful social networks. Moreover, increased knowledge, and foreign acquaintances in particular, reduces the uncertainty involved in foreign trade. For example, firms may make use of their links to networks abroad in the search for and evaluation of potential business partners and in the monitoring of existing business partners. Foreign relations might also facilitate visa procedures for the temporary movement of personnel abroad for the provision of services. To formalize the production of added value through investment in foreign links, we assume $\lambda_{ihj}(\varphi) = \delta^{\psi}\left[i_{ihj}(\varphi)\right]^{\theta_h}$, where $i_{ihj}(\varphi)$ is the service of the immigrant and $\theta_h \geq 0$ is the presence of informational friction in the h sector.[15] $\delta \geq 1$ denotes investment in foreign networks by others in the local social network of the firm, which spills over to the firm. However, the spillover in combination with the cost of investment discourages the firm from undertaking investment itself, and this effect is captured by the parameter $\psi < 0$.

The standard appeal, $\lambda_{ih}(\omega)$, of variety ω from country i is the product of firm productivity and the positive externality of investment in foreign linkages by others in the firm's local network. Formally, $\lambda_{ih}(\varphi) = \delta^{\xi}[\varphi^{1-b}]^{\sigma-1}$, where δ is defined as above and $\xi > 0$ is a parameter capturing the positive external effect of other's investment.

Firm profit from serving a market, conditional on its productivity and consumer demand from Equation 2 is

$$\pi_{ihj}\left(p_{ih}, i_{ihj}, \varphi\right) = [p_{ih}(\varphi) - w_i\varphi^{-b}]x_{ihj}\left(\varphi, i_{ihj}\right) - c_{ih}i_{ihj}(\varphi) - F_{ihj}, \quad (6)$$

where c_{ih} is the unit cost of the service of immigrants. The sunk cost of investing in foreign networks, $c_{ih}i_{ihj}(\varphi)$, can be considered to correspond to the hiring of an appropriate consultant. Such a process entails search, recruitment and introduction costs. These costs arguably differ across foreign markets with different characteristics, including cultural distance to the home country of the firm.

Through profit maximization, the firm arrives at the following optimal pricing, investment, revenues and profits rules:

[15] In equilibrium, each firm produces a different variety ω of good h and has a unique level of productivity φ, which is why we index varieties with φ.

$$p^*_{ihj}(\varphi) = \frac{\sigma}{\sigma-1} w_h \varphi^{-b}; \quad (7)$$

$$i^*_{ihj}(\varphi) = \left[\frac{\theta_h}{\sigma c_{ih}} \varphi^{\sigma-1} a_{ihj} \delta^{\xi+\psi}_{ihj} \left(\left(\frac{\sigma}{\sigma-1} \right) w_i \right)^{1-\sigma} \tau^{-\sigma}_{ihj} \frac{\mu_{hj} Y_j}{P_{hj}} \right]^{1/1-\theta}; \quad (8)$$

$$r^*_{ihj}(\varphi) = p_{ihj}(\varphi) x_{ihj}(\varphi) = \frac{\sigma c_{ih}}{\theta_h} i^*_{ihj}(\varphi); \text{ and} \quad (9)$$

$$\pi^*_{ihj}(\varphi) = \left(\frac{1-\theta}{\sigma} \right) r^*_{ihj}(\varphi) - F_{ihj}. \quad (10)$$

The firm utilizes a constant mark-up on the marginal cost, according to Equation 7. According to Equations 8 and 9, both investments and revenues decrease in wages and transport costs and increase in productivity and demand, whereas investment is positively related and revenues are negatively related to information friction. Whether investment by others in the firm's local network promotes or deters investment, revenues and profits depends on the sum of the parameters ψ and ξ. In line with Carayol and Roux (2009), we assume that others' investment in social networks discourages the firm from making costly investment of its own, even though the benefits are larger if investment is conducted in-house, that is, we assume $|\psi| > |\xi|$.[16] The net effect of others' investments on firm revenues and profits is also negative because the increase in demand from others' investment is not large enough to compensate for the loss in demand due to less in-house investment.

In log-linear form, the export revenue function of Equation 9 is

$$\ln r^*_{ihj}(\varphi) = \ln c_{ih} + \ln i^*_{ihj}(\varphi) + \ln \sigma - \ln \theta_h. \quad (11)$$

Consequently, the following is our first main hypothesis:

- **The revenue from a market is a positive function of investment in network links with that market. (H1)**

The hypothesized relationship between investment in foreign links and exports is likely to entail a time dimension with respect to persons with foreign experience. On the one hand, relations must be

[16] Because the proximity and intensity of interactions are important for the transfer of knowledge (Granovetter, 1973), that the firm opts for a second-best choice suggests the bounded rationality of the firm or that the uncertainty involved in trade investments weighs heavily in the firm investment decision.

nurtured so that they do not deteriorate. Time away from the foreign country may therefore negatively affect the ability of persons to connect foreign firms to networks abroad. On the other hand, time away is likely to be positively correlated with knowledge about the country of the firm. For example, integration facilitates immigrant mastery of the language and culture of the host country and adaptation to expectations. Therefore, it may be easier for the immigrant to adapt her services to the needs of the firm and for the firm to trust and benefit from the services provided. Therefore, we arrive at our second hypothesis:

- **Time away from the export market impacts the reward of investment in foreign links through the hiring of persons with foreign networks. (H2)**

Furthermore, it is reasonable to assume that investments in foreign links are heterogeneous in terms of the effectiveness in providing firm access to networks. For example, in the case of links to networks through immigrants, skilled immigrants can be expected to hold information that is more relevant and be more apt to transfer this information to the firm (Gould, 1994; Herander and Saavedra, 2005). The motives of persons bridging foreign networks may also be important. For example, the reasons for migrating could be of significance to the degree to which firms gain access to networks by hiring foreign-born personnel. Immigrants who have moved to country *j* by their own will, mainly due to pull factors, are expected to embody more useful networking services relative to immigrants who have been forced to leave their source countries due to armed conflict or other push factors. Thus, we develop a third hypothesis:

- **The reward to investment in links to foreign networks is positively related to the quality of those linkage services, which in turn depends on the ability of the links. (H3)**

The export of services that are more dependent on trade-relation-specific appeal due to imperfect information may be particularly facilitated through links to foreign networks. Therefore, we also hypothesize the following:

- **Investment in foreign networks more strongly affects firm export revenues from more heterogeneous services. (H4)**

Previous export experience is a known predictor of a firm's contemporaneous exports, and research shows that previous export experience is strongly associated with the propensity and intensity of exports (Álvarez et al., 2013; Bernard and Jensen, 2004). Firms that already trade with foreign markets have acquired useful knowledge and skills in conducting business abroad. Perhaps production has been adjusted to better suit demand in foreign markets. Firms without previous experience must incur fixed costs to enter a foreign market and investment in building their appeal to customers overseas. Therefore, we would expect investment in foreign links to be particularly conducive to the exports of non-exporters, as proposed in the following hypothesis:

- **The pay-off from investment in links to a foreign market is greater for firms that lack export experience. (H5)**

In the role of networks in the world economy, the existence of networks has been suggested to pull markets closer to each other, which favors all interactions between markets. We also explained that agents who can access the networks themselves stand to gain even more than do other agents in the same cluster through the actual network interconnections between the markets. This idea is present in the model, and the impact is negative under the assumption that $|\psi| > |\xi|$. Because the firm benefits to some extent from others' investment, it abstains from making some of its own investment. Hence, our final hypothesis is as follows:

- **Investment by other firms in the vicinity of the firm itself affects revenue; the effect on the individual firm's corresponding links will be negative. (H6)**

4. Empirical Approach

Our augmented panel estimation version of Equation 11 models a firm's expected conditional export revenue as a function of investment in foreign links; key supply side factors of the firm (firm size, labor productivity, multinational status, previous trade experience, and human and physical capital intensities); time-variant characteristics that affect bilateral trade resistance (GDP and population); immigrant stock;

year-specific effects; and unobserved time-invariant heterogeneity at the firm, industry, partner country and firm-partner-country levels.[17] The specification at hand is then

$$\mathrm{E}\left(r_{fijt}|\boldsymbol{I_{fijt-n}}, \boldsymbol{G_{fijt-n}}, \boldsymbol{U_{fijt}}\right) = \boldsymbol{I_{fijt-n}\beta_I} + \boldsymbol{G_{fijt-n}\beta_G} + \boldsymbol{T\beta_T} + \boldsymbol{U_{fijt}\beta_U}, \quad (12)$$

where *f* is the firm; *i* is the source country; *j* is the partner country; *t* is the year; *n* is the lag dimension, which is one for investment and two for control variables; *r* is the export revenue scalar; $\boldsymbol{I}$ is a 1 x K_1 vector of variables that captures investment in foreign links; $\boldsymbol{G}$ is a 1 x K_2 vector of firm-level gravity covariates; $\boldsymbol{T}$ is a 1 x K_3 vector of year dummies; $\boldsymbol{U}$ is a 1 x K_4 vector of unobserved fixed effects; and the betas are column vectors of regression coefficients.

We chose to augment the model with key firm-level and gravity variables and add fixed effects that capture sunk and variable costs of serving a foreign market, unit investment costs and information friction for two reasons:

First, our theoretical framework predicts that information friction negatively affects firm exports, whereas firm investment in foreign networks has the opposite effect. To estimate the relationships captured in Equation 11, we would need scarce data on country- and sector-specific unit investment costs as well as sector-level information friction. Second, even with such data, the simple theoretical model would omit known firm-level and gravity determinants of trade, such as firm size, multinational status and population of the trade partner.

Another concern is that immigrant home bias in demand may bias the estimation coefficients if this variable omitted (White, 2007).[18] To control for this possibility, we include the immigrant stock in the estimation model, a covariate that corresponds to the idiosyncratic demand shock in our theoretical framework.

As regards investment in foreign links, a firm may gain access to networks either by purchasing them on the intermediary market or by hiring persons with foreign networks. Purchasing services is arguably more difficult than hiring them, for example, through the hiring of immigrants. Additionally,

[17] To implement firm- and partner-specific effects, we include firm-partner fixed effects (Andrews et al., 2006).
[18] Immigrant presence may also have an indirect and peripheral impact on the firm's foreign links.

data on firm purchases of different services are scarce, whereas statistical offices commonly collect employment data. Particularly interesting are the services of immigrants in the form of tacit information that is specific to the destination country, as discussed above. Services are also possibly specific to the industry. Professional networks to which the services are intended to link are likely to be socially clustered, as are social networks in general. For example, a firm that wants to enter a foreign services market may need access to legal, regulatory and marketing professionals in the specific industry. In contrast to the purchase of tacit linking services, hiring an immigrant from the country of interest provides the firm with access to foreign networks by default.[19]

We therefore focus our empirical analysis on firm investment in foreign networks through the employment of immigrant. We straightforwardly assume that a firm can tap into networks in a foreign country *j* by hiring an immigrant from that country and that this relationship promotes exports to country *j*. Unlike most other variables, the immigrant employment variable is not in logarithmic form because most firms do not have an employee from a randomly selected country. Consequently, the coefficient on the immigrant employment variable is semi-elastic.

To capture the idea that investment in foreign links improves overall connections between markets, which reduces incentives for private investment in access to networks by individual firms, we control for the number of immigrants employed in other firms of the same corporation and its interaction with the number of immigrants employed in the firm. We expect the coefficient on the corporation immigrant employment variable to be positive and smaller than that of the firm immigrant employment variable. The coefficient on the interaction variable is expected to be negative.

In our empirical specification, export revenue is a function of investment in the previous year and conditioned on covariates previously established. The lagged structure is primarily motivated by the presumption that investment in foreign links, as in any investment, entails adjustments in the firm and pays off primarily in the future. The services provided by an immigrant contain matching between what

[19] The relevance of those networks is likely to be increasing in the effort made in the recruitment process and may be increasing in the time that the immigrant remains at the firm.

the firm has to offer and what the customers would like to buy. These services are also about establishing and maintaining trust in foreign relations. It takes time for such implicit information of immigrants to be conveyed to the firm, and likewise, it will take time for the firm to convey information about its services to the newly recruited immigrant. Building trust between the firm and foreign customers or business partners is also a time-consuming activity. We therefore expect it to take time before an investment in foreign links affects firm activities and even more time before it pays off in terms of customer demand.

One concern in the regression of exports on firm investment in foreign networks – that is, of Equation 11 – is that investment could be endogenous to the error term, thereby introducing inconsistency and omitted-variable bias. Our strategy addresses this concern. We implement a full-fledged, firm-level gravity version by estimating Equation 12 for firm-level panel data. By utilizing comprehensive panel data, we can explicitly control for heterogeneity at several levels through fixed effects.

First, we include firm-specific effects with the aim of preventing time-invariant unobserved firm characteristics – such as attitudes to internationalization – from influencing the results. Second, we control for unobserved country-pair heterogeneity because the particularities of a relation between two countries – such as cultural affinity or historical relations – may also affect a firm's investment in links to the foreign market. We can thereby discard the proxies for transport costs, such as geographical distance and adjacency. Third, by employing firm-country fixed effects, we address the risk that previous trade or employment experience vis-à-vis a foreign country will influence the firm's willingness to invest in links to that market.

5. Data

The micro-level data come from five databases maintained by Statistics Sweden.[20] The resulting panel dataset covers Swedish firms in the private sector with at least ten employees for the years 1998-2007. The data include detailed economic information on firms, employees and foreign trade with 176 countries.

[20] The original Statistics Sweden data consist of linked employer-employee data, but to protect confidentiality, we received data at the firm level. Information on the specific variables and their sources is available in Table A.1 of the Appendix. Information on the countries included is in Table A.2, and a detailed account of the construction of the dataset is available in a technical appendix.

Our panel includes both manufacturing and services firms, which is important because many manufacturing firms trade also in services (Swedish Trade Council, 2010). Core micro-level data are matched and supplemented with detailed information on workers' countries of birth as well as the skill level of foreign-born employees.

Firm-level data on trade in services are from the official balance of payment data for Sweden. Trade in services is defined as a cross-border transaction between residents and non-residents related to a contract on services sales (United Nations, 2002).[21] Export of services that takes place through commercial presence abroad is excluded.[22]

Over the period studied, changes have been made to the data collection. Between 1998 and 2002, data were collected through the requirement that all larger cross-border payments be reported to the Central Bank of Sweden. However, in 2003, this census of payments was replaced by a survey of a stratified sample of approximately 4,800 firms from a population of approximately 50,000 entities with at least 10 employees.[23] We therefore study the union of firms that are either included in the 1998-2002 period or continuously included in the subsequent period. This enables us to exploit the unbalanced panel data over a decade. This approach complicates inference to smaller and non-trading firms, but with respect to the latter, the included firms also enter into and out of trade with specific foreign countries.

Information on the GDP and population of trading partners comes from the World Bank's World Development Indicators. The geographical indicators come from the Centre d'Etudes Prospective et

[21] Typically, as an invoice is sent across the border, the firm in Sweden that receives the payment or pays the invoice is required to classify it as sales of services or goods. In the case of package sales, the firm is to specify the monetary value corresponding to the two types of sales, and for larger firms, Statistics Sweden crosschecks the information with firm data from different registers.

[22] Hence, services provided through mode 3 of the General Agreement of Services of the WTO are excluded. Since 2010, services trade statistics also incorporate trade through commercial presence.

[23] Growth Analysis (2010) provides an overview of the statistics. One-third of the firms in the sample are replaced each year. The firms that previously have been important for overall services trade, or for certain categories thereof, are continuously scrutinized and included in the survey. The largest 1,500 firms, in terms of turnover, and firms with importance for services trade are also required to answer a more in-depth questionnaire and, in particular, the destination or source of their service payment. This information is used to split services payments for other firms across foreign countries. Firms with a large turnover, approximately 1,500 firms, are always included in the sample, as are major traders of services from the previous year. Data on tourism, which accounts for approximately one-fifth of Swedish services export, and merchanting, which accounts for approximately one-sixth, are only fully available in the services trade statistics from 2003. For this reason, and because merchanting partly captures trade in goods and is to be reclassified as such, we exclude these two types of services from our analysis.

d'Informations Internationales. Our final dataset consists of 59 million firm-partner-country observations over the 1998-2007 period. A snapshot of the panel is provided in Table 1.

Table 1. Snapshot of Swedish Firms

	Mean	Median	Std. dev.	Min.	Max.
Services export volume*	4,810.59	0	191,870.20	0	23,615,000
No. of immigrant employees in the firm	8.15	2.00	56.34	0	3,108
No. of employees	60.12	19	355.02	10	n/a
Labor productivity	659.71	541.12	958.87	0.00	118,437.59
Human capital intensity	0.25	0.16	0.25	0.00	1.00
Physical capital intensity	621.06	61.93	5,043.36	0	286,863.53
Multinational status	0.22	0	0,41	0	1
Services exporter**	0.13	0	0,13	0	1

The data refer to the year 2007. The number of firms is 29,929 and the number of observations during the 1998-2007 period is 59,086,207. Monetary values are in 1,000 SEK (approximately 148 USD). One maximum value is not disclosed for confidentiality reasons.
* Based on a survey that is considered to capture virtually all trade in services.
** Mean value in the 1998-2002 period before a change in the method of data collection.

In 2007, there were approximately 29,900 firms and 6 million observations. Most firms in the dataset employ a small number of full-time employees, with half of them having at most 19 employees, and most were not part of a multinational enterprise (MNE). A mere 13 percent of firms exported services.[24] Other OECD countries absorb most of Sweden's exports of services. China and Saudi Arabia are also important export destinations for the services of Swedish firms (Table A.5). In contrast, the second and third largest immigrant stocks in Sweden are from the former Yugoslavia and the Middle East, respectively (Table A.4). We note that among the simple correlation coefficients between key variables in our dataset, the correlation between firm services exports and number of immigrant employees in the firm is as large as the correlation between export and firm size, which is a known export determinant for firms (Table A.6). Additional descriptive data are found in the Appendix.[25]

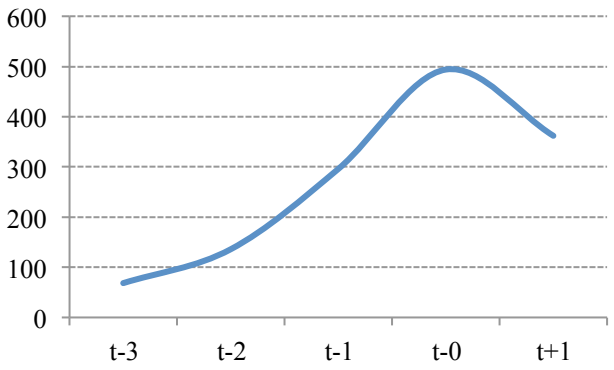
If the basic theoretical framework above is true in the sense that firms prepare for export entry by investing in links to foreign networks, we would expect that firms with no experience in exporting

[24] The mean value during the 1998-2002 period before the change in the method of data collection.

[25] The mean number of immigrant employees was eight, while half of the firms only had two immigrant employees. Compared to the descriptive statistics for manufacturing alone, the firms in the panel are smaller, fewer are part of an MNE, have less physical capital per employee and employ fewer immigrant employees. As for the characteristics of immigrant employees, most do not have a post-secondary education, and more than two-thirds of the immigrant employees have been in Sweden for over a decade (Table A.3).

services to a country prepare to export to that country by investing in links, here envisaged through the hiring of immigrants. Before estimating Equation 12, we visually inspect the most extreme case in which some firm-partner-country pairs have no previous exports or investment in links through the hiring of immigrant employees but in which immigrants are eventually hired. Figure 1 indicates that the number of such firm-country pairs increases before export entry and declines afterwards.[26]

Figure 1. Number of Firm-Country Pairs Hiring their First Immigrant at/around Time of Export Entry



6. Results

6.1. Baseline Results

Table 2 includes the results from the estimation of Equation 12 in which we account for observables and unobservables across firm-partner-country units, three-digit industries and years.[27] The results confirm our first hypothesis that exports are a positive function of investment in links with that market.[28] We find that firm hiring of immigrant employees in period *t-1* is positively associated with the probability of exporting and with export revenue in period *t-0*. The association is stronger for the intensity of export than for the probability of export. The coefficient in Column 2 is semi-elastic: hiring an immigrant from country *j* in firm *f* is associated with a 2.5 percent increase in firm export revenues from that country.

[26] The figure displays how many of those firm-country dyads that experience first entry into export of services (14,826) also hired their first immigrant from that country all during the 1998-2003 period.

[27] In the probit estimation of Column 1, time-invariant firm-partner-country heterogeneity is modeled as a linear function of the time averages of predictors in the spirit of Mundlak (1978).

[28] The difference in number of observations between the estimations in Columns 1 and 2 is due to the fact that the country dummies of two very small island nations and another sub 100 inhabitants nation perfectly predict no export in the maximum likelihood estimation of Column 1.

Table 2. Baseline Estimation Results

	P(Export)	Export
Immigrant employees	0.00475***	0.0247***
	(0.002)	(0.006)
Country immigrant stock (log)	0.00204	0.000741**
	(0.007)	(0.000)
Immigrant employees in the corporation	-0.000248	-0.000679
	(0.000)	(0.001)
Immigrant employees in firm and corp. interaction	-0.0000176***	-0.0000482**
	(0.000)	(0.000)
Workforce (log)	-0.0482***	0.0330***
	(0.013)	(0.004)
Multinational (0,1)	-0.142***	-0.0195***
	(0.017)	(0.005)
Exporter (0,1)	1.700***	1.279***
	(0.01)	(0.056)
Labor productivity (log)	-0.0179*	0.0122***
	(0.009)	(0.002)
Human capital intensity (log)	-0.00696	0.000202
	(0.027)	(0.000)
Physical capital intensity (log)	-0.0150***	0.000985*
	(0.002)	(0.001)
GDP (log)	0.323***	0.164***
	(0.065)	(0.01)
Population (log)	0.373**	0.432***
	(0.167)	(0.046)
Obs.	3,819,983	3,870,873
Adjusted / Pseudo R^2	0.50	0.55

Robust and clustered standard errors are in parentheses. Firm, partner country, firm-partner-country, industry, and year fixed effects are included throughout. In column 2, the dependent variable is logged (1e-7 added to avoid truncation).
* p <0.10, ** p < 0.05, *** p < 0.01

The results for the other two investment variables in vector ***I*** – immigrant employees in other firms of the same corporation and the interaction between immigrant employees in the firm and the corporation – are mixed, and the coefficients are substantially smaller than for the main investment variable. The negative sign and statistical significance of the interaction variable are in line with our hypothesis that investment by related firms may reduce investment incentives for the firm itself and thereby affect firm revenues negatively. However, no significant link between immigrant employees in the rest of the corporation and firm export is found.

As predicted, we find that previous export experience is positive and statistically significant in explaining the probability of exporting services and the intensity of exports (Columns 1-2). The stock of immigrants in Sweden is also positively linked to export of services but is only statistically significant with respect to export revenues.[29]

6.2. Heterogeneous Immigrant Services

If our hypothesis that high-quality investment in foreign networks increases the payoff from such investments were true, then we would expect the link between immigrant employment and subsequent export to be higher for immigrant employees with more relevant information and networks. If the hypothesis that the time since immigration affects the reward from investing in foreign links through immigrant services is true, then the length of time away from the country of origin should matter for export.

To test these hypotheses, we split immigrant employees into eight subcategories. First, we divide them into those with and without post-secondary education, where education is considered a proxy for relevant information and the ability to relay and absorb such information. Second, we divide immigrant employees into three groups according to their residence in Sweden. Third, we split them into foreign-born employees from countries with and without violent conflicts; immigrants from conflict countries are more likely to be refugees and therefore may have weaker access to networks in their country of birth. Alternatively, there are weaker networks in these countries.[30]

[29] The negative coefficient of the MNE dummy is unexpected when compared to firm-level gravity estimations of export of goods as the dependent variable. However, in contrast to exports of goods, where cross-border trade is common, a commercial presence (mode 3) is a more important mode of delivery in export of services. With respect to services, export via a commercial presence is therefore more likely to be a substitute for export modes 1, 2 and 4, and this claim would seem to be confirmed by the negative sign of the MNE coefficient. We also note that the coefficients of some firm-level explanatory variables have unexpected signs in the probit estimation, and we consider this pattern a result of controlling for unobserved factors because the probit estimates without control variables for unobservables display the expected signs (available upon request).

[30] We classify a country as having had a conflict that may have resulted in a push flow of emigration if at least 25 persons in the country died in a battle in a single year, irrespective of whether the cause was an armed conflict involving at least one state, a non-state conflict or violence from an organized group against civilians. Our classification is based on merged data for the 1968-2007 period from the Uppsala Conflict Database Program (2014a; b; c; d).

Tables 3-4 present the within-firm-partner-country estimates across eight subcategories of immigrant employees. Skilled immigrant employees are positively and statistically significantly related to subsequent firm exports of services, unlike unskilled immigrant employees (not statistically significant).

Table 3. Results for Services Exports by Skill and Time since Immigration

Time since immigration	Skilled	Low-skilled
Short time (0-3 years)	0.184***	0.0457
	(0.047)	(0.029)
Medium time (4-10 years)	0.0864***	0.00508
	(0.029)	(0.008)
Long time (more than 10 years)	0.0866***	0.00000677
	(0.021)	(0.007)
Obs.	3,870,873	
Adjusted R^2	0.55	

Robust and clustered standard errors are in parentheses. Firm, partner country, firm-partner-country, industry, and year fixed effects are included throughout. Dependent variables are logged (1e-7 added to avoid truncation). For brevity, other firm and gravity estimates are not reported.
* p <0.10, ** p < 0.05, *** p < 0.01

For the time since immigration to Sweden, the relation to the export of services is substantially stronger for immigrant employees who have been in Sweden at most three years than for those who have been in Sweden longer. Table 4 demonstrates that employees who are less likely to be refugees are more strongly linked to the export of services. The semi-elasticity is almost three times larger for non-refugees.

To the extent that the skills and non-refugee status of immigrant employees reflect their ability to bridge informational and social divides across countries, these results indicate that the quality of immigrant services contributes to firm exports of services. The findings with respect to skill-level and export are consistent with previous evidence on the relation between migrants and trade in merchandise, which predominantly relies on aggregate data (Aleksynska and Peri, 2014; Felbermayr and Jung, 2009; Hatzigeorgiou and Lodefalk, 2013; Head and Ries, 1998; Herander and Saavedra, 2005; Koenig, 2009; Mundra, 2012).

Table 4. Do the Reasons for Emigrating Matter for the Influence on Services Export?

	Non-refugees	Refugees
Immigrant employees	0.0370***	0.0130***
	(0.014)	(0.004)
Immigrant employees in the corporation	-0.00222	0.000739**
	(0.002)	(0.000)
Immigrant employees in firm and corp. interaction	-0.0000628***	0.00185**
	(0.000)	(0.001)
Obs.	3,870,873	3,870,873
Adjusted R^2	0.55	0.55

Robust and clustered standard errors are in parentheses. Firm, partner country, firm-partner-country, industry, and year fixed effects are included throughout. The dependent variable is logged services exports (1e-7 added to avoid truncation). The immigrant employment measures are based on the UCDP. For brevity, other firm and gravity estimates are not reported.
* p <0.10, ** p < 0.05, *** p < 0.01

We find evidence that time since immigration affects the reward in terms of services exports to investment in foreign links. Previous evidence for the direction of this relationship, which has been inferred to the degree of employment of immigrants with different lengths of stay in the host country, has been mixed (Gould, 1994; Herander and Saavedra, 2005; Jansen and Piermartini, 2009; Partridge and Furtan, 2008). Our results indicate that with respect to immigrant employees in firms that export services, the time since immigration tends to undermine the positive trade impact of investing in foreign links by hiring foreign-born personnel. This pattern is consistent with Hatzigeorgiou and Lodefalk (2013), which addresses the exports of manufacturing firms. Our interpretation is also justified by the fact that distance in time and space is likely to attenuate social relations (Granovetter, 1973).

6.3. Non-exporters and Investment in Foreign Links

To test our fourth ancillary hypothesis that the effect of investing in foreign links is greater for firms with less export experience, we classify firms as non-exporters if they have never exported before (in the period studied). Furthermore, we divide them into non-exporters of goods, non-exporters of services and non-exporters of services to country *j*.

Table 5 confirms our hypothesis. When compared with the results in Table 2, we see that the pay-off from investment in foreign links is indeed stronger for firms with weaker experience in exporting

services. The coefficient on immigrant employees from country *j* is twice as large for firms that have never exported to country *j* before and five times as large for firms without experience in exporting services.

Table 5. Estimation Results on the Probability of Services Exports by Trade Experience

	Non-merchandise exporters	Non-services exporters	Non-services exporters to *j*
Immigrant employees	0.0136**	0.0253***	0.00838***
	(0.007)	(0.004)	(0.002)
Country immigrant stock (log)	0.00149	0.0874	0.00142
	(0.021)	(0.097)	(0.009)
Immigrant employees in the corporation	-0.00147	-0.00039	-0.000446
	(0.001)	(0.001)	(0.001)
Immigrant employees in firm and corp. interaction	-0.00000534	-0.00000726	-0.0000115
	(0.000)	(0.000)	(0.000)
Obs.	384,161	1,391,473	3,739,503
Adjusted / Pseudo R^2	0.33	0.25	0.27

Robust and clustered standard errors are in parentheses. Firm, partner country, firm-partner-country, industry, and year fixed effects are included throughout. The dependent variable is services exporter status. For brevity, other firm and gravity estimates are not reported.
* p <0.10, ** p < 0.05, *** p < 0.01

Furthermore, the association between investment in foreign links and export of services is three times larger for the least experienced firms (Column 2 of Table 5) compared to firms with experience from exporting services to countries other than *j* (Column 3 of Table 5), which may indicate that there are economies of scale in building trade-relation specific appeal.

6.4. Heterogeneous versus Homogeneous Services

To test whether more exports of heterogeneous services enhances the importance of investment in foreign links, we follow the convention of the previous literature on migration and merchandise trade by separately estimating Equation 12 for heterogeneous and homogeneous services, drawing on industry classifications (O'Mahony and van Ark, 2003; Peneder, 2007).[31]

[31] We consider high-quality services heterogeneous. These types of services are defined by belonging to services industries that are dominated by occupations requiring high-skilled or very high-skilled labor. In the previous studies on merchandise trade, a common approach is to examine whether the relation between migrants and export is especially strong with respect to differentiated goods relative to homogeneous goods (e.g., Felbermayr and Toubal,

Table 6 confirms our hypothesis: the semi-elasticity is 50 percent larger for firm exports of heterogeneous services than for other services, which suggests that investment in foreign networks through immigrant employees helps firms overcome information friction in the trade of services.

Table 6. Estimation Results across
Heterogeneous and Homogeneous Services

	Heterogeneous	Homogeneous
Immigrant employees	0.0196***	0.0130***
	(0.006)	(0.005)
Country immigrant stock (log)	0.000939***	-0.00116***
	(0.000)	(0.000)
Immigrant employees in the corporation	0.000574	-0.000128
	(0.001)	(0.001)
Immigrant employees in firm and immigrant employees in the corporation interaction	-0.0000335	-0.0000515**
	(0.000)	(0.000)
Obs.	3,871,008	3,871,066
Adjusted R^2	0.53	0.58

Robust and clustered standard errors are in parentheses. Firm, partner country, firm-partner-country, industry, and year fixed effects are included throughout. The dependent variable is logged services exports (1e-7 added to avoid truncation). For brevity, other firm and gravity estimates are not reported.
* p <0.10, ** p < 0.05, *** p < 0.01

6.5. Extended Analysis of Networks: The Business Services Industry

In Equation 12, we control for the immigrant stock from a particular country and consider whether the firm exported to that country during the preceding year. However, rather than viewing previous export experience as a confounding factor, one could view it as an indicator of prior ties to foreign markets. This would imply that this factor might require more attention. From our theoretical model, it follows that previous experience at other closely related firms could affect the contemporaneous exports of the firm via variable δ. For example, the previous export experience of the same corporation or at the finest-digit industry of the firm may spill over to the firm in terms of foreign links. The net spillover effect on export payoffs from own investment may be negative or positive depending on the sum of parameters ψ and ξ, as discussed.

2010; Rauch, 1999). A stronger and positive relation is suggestive of migrants' impact on merchandise trade through reduced information friction.

To incorporate these proxies for additional linkages to foreign markets in vector ***I***, beyond the hiring of immigrant employees, we choose to focus on a particular industry in Sweden, namely, the business services industry.[32] The business services industry is the fastest growing services industry in Sweden in terms of both value added and employment (Lodefalk, 2013). It also accounts for the largest share of Swedish services exports (Eliasson et al., 2011). Business services have received increasing attention in recent years due to its importance in the knowledge economy and its perceived exposure to offshoring (Blinder, 2006).

Because the products of the industry can be considered relatively differentiated, we expect foreign links to be particularly important for its exports. Interestingly, businesses also express this expectation, pinpointing business, language and cultural differences as the key barriers to exports in this particular industry (Statistics Sweden, 2006).

In Table 7, we present the estimation results for a version of Equation 12, which has been augmented with variables to capture previous experience in exporting services to country *j* – at the firm, corporation and five-digit industry levels – and interactions of those variables with the immigrant employment variable. The baseline estimates are in Column 1, which we compare to the augmented specification in Column 2.

Accounting for previous export experience at the firm, corporation and detailed industry levels as well as their interactions with investment in links through the hiring of immigrant employees has a small (negative) impact on the average marginal effect of immigrant employees of the firm. However, the result for the immigrant employment variable at the corporation level remains largely intact.

Turning to the export experience variables, we find that factors at the level of the corporation and industry have a positive marginal effect on exports, whereas factors at the level of the firm affect exports

[32] The industry consists of firms in ISIC rev. 3 sectors 71-74. By restricting the analysis to one industry, it is viable to augment the already demanding specification and estimate it within the means offered by Statistics Sweden for register data analysis. Arguably, the advantages of controlling more fully for other firm linkages and of furthering understanding outweigh the disadvantages of restricting the possibility to generalize the results.

strongly and negatively. Notably, the immigrant employment variable somewhat counteracts the negative impact of the export experience of the firm on exports.

Table 7. Extended Networks through Previous Exporting

	Benchmark	Extended network specification
dy/dx w.r.t. Immigrant employees	0.0222**	0.0166*
	(0.00924)	(0.00962)
dy/dx w.r.t. Immigrant employees in the corporation	0.00737**	0.00761***
	(0.00289)	(0.00292)
dy/dx w.r.t. Firm ever exported to *j*		-3.444***
		(0.232)
dy/dx w.r.t. Corporation ever exported to *j*		0.106***
		(0.0160)
dy/dx w.r.t. 5-digit industry ever exported to *j*		0.100***
		(0.0100)
Immigrant employees	0.0222**	0.00788
	(0.009)	(0.008)
Country immigrant stock (log)	0.000726	0.000126
	(0.001)	(0.001)
Immigrant employees in the corporation	0.00736**	0.00760***
	(0.003)	(0.003)
Immigrant employees in firm x immigrant employees in corporation	0.0000323	0.0000653
	(0.000)	(0.000)
Firm ever exported to *j*		-3.466***
		(0.233)
Immigrant employees x Firm ever exported to *j*		0.224***
		(0.047)
Corporation ever exported to *j*		0.106***
		(0.016)
Immigrant employees x Corporation ever exported to *j*		0.00280
		(0.006)
5-digit industry ever exported to *j*		0.0989***
		(0.010)
Immigrant employees x 5-digit industry ever exported to *j*		0.0112
		(0.009)
Obs.	989,411	989,411
Adjusted R^2	0.53	0.53

Notes: Robust and clustered standard errors are in parentheses. Firm, partner country, firm-partner-country, industry, and year fixed effects are included throughout. The dependent variable is logged services exports (1e-7 added to avoid truncation). For brevity, other firm and gravity estimates are not reported.
* p <0.10, ** p < 0.05, *** p < 0.01

Overall, the extended results suggest that the benchmark estimate may be slightly upward biased when our proxies for distant links at the level of the firm, corporation and industry are omitted. The negative result for the firm export experience variable could indicate that firm experience in the export of services in any preceding year is only a first step towards internationalization, with the next step in services exports being to provide the services through commercial presence. In contrast, the previous export of other firms in the corporation and, certainly, of other firms in the same industry, is less likely to be succeeded by switching to supply through a commercial presence abroad, although it might conceivably help the firm to leapfrog to that mode of delivery without passing a stage of exporting through Modes 1, 2 or 4. Therefore, earlier experience at higher levels of aggregation may spillover to the firm, inter alia, in the form of access to distant links that promote firm exports.

That the interactions between export experience and immigrant employment of the firm are positive rather than negative, as the interaction between immigrant employees in the firm and the corporation is, could indicate that access to distant links is too remote to viably replace firm investment in links of its own while still assisting in exports.

6.6. Robustness Analysis

In the following analysis, we ensure through considerable econometric analysis that our results are robust and largely unbiased. First, concerning potential misspecification, one issue that has been raised in previous research is that the relation between foreign links in the form of migrants and exports might be non-linear, for example, a marginal benefit declining in the number of links to the foreign market (Egger et al., 2012; Gould, 1994). We address this concern by including the square of the foreign link variable in the estimation of Equation 12.

Furthermore, we address the concern of reverse causality, that is, that our results reflect a scenario in which exports drive investment rather than vice versa by adopting a lagged variable approach and by implementing an IV estimation. We test for this concern despite the fact that previous empirical studies on

migration and trade have not found support for reverse causality, at least in merchandise trade (Aguiar et al., 2007; Hatzigeorgiou, 2010).

A related cause for caution when estimating Equation 12 comes from the risk that export revenues are path-dependent, which would introduce omitted-variable-bias and serial correlation. Therefore, we add the first lag of the response variable to Equation 12 in addition to our universal approach of clustering standard errors to allow for serial correlation in the firm-partner observations over time.

Our estimation results could be biased in cases of unobserved and time-variant particularities to relationships with partner countries. We are convinced that this risk is minimized through controls for unobserved time-invariant heterogeneity across partner-countries, but to ensure robustness, we include partner-country-year fixed effects in the estimation.

The results could also be biased by non-random sample selection.[33] To consider this possibility while still exploiting the panel structure of the data, we employ a panel selection model (Wooldridge, 2010).[34] First, yearly probit models with firm-partner specific effects á la Mundlak (1978) are estimated. In these estimations, we augment the specification with a theoretically anchored exclusion restriction to assist in the identification and drawing on Helpman et al. (2008). The exclusion restriction is a proxy for the regulatory cost of doing business, using macro-level data on the costs of start-ups, close-downs, contracts, and limited investor protection (World Bank, 2011).[35] To allow for heterogeneous impacts of regulatory costs across firm size, we interact the exclusion restriction with the workforce of the firm. Second, inverse Mills ratios (IMR) are computed from the information in the first step. Third, we estimate a within-firm-partner-country specification that includes interactions between the IMR and year indicators.

Finally, we test the sensitivity of the results with respect to key exports and immigration partner countries by excluding the top five partners to Sweden.

[33] One reason could be that investment in links has a more profound impact when entering a foreign market rather than when expanding in that market. Firms that enter into trade may also be superior to firms that do not, which could result in a lower marginal benefit of investment.

[34] Additionally, we account for heterogeneous impacts across industries.

[35] For a detailed account of how we construct the exclusion restriction, see (Hatzigeorgiou and Lodefalk, 2013).

We can confirm the robustness of the main results by looking at Columns 1-4 of Table 8. The results demonstrate a positive and statistically significant association between investment in foreign links and export revenues regardless of changes to the functional form. As for diminishing marginal returns to investment in foreign links, the quadratic term is very small in magnitude but statistically significant. However, only at very high levels of investment would the return be negative. In fact, in the last year of the panel, there is not a single firm with that many employees born in country *j*.

Using the third instead of the first lag of investment in foreign links does not affect the main conclusion. The impact on exports three years later is smaller than the impact the next year. We also introduce a lagged response variable, whose coefficient was substantial and significant, and conducted an estimation that controlled for time-variant partner-country heterogeneity. Both results from the partial adjustment and partner-country-year fixed effect models suggest that there is a robust positive relation between foreign links and subsequent export revenues.

Our panel selection estimation results are displayed in Column 5. Immigrants are still positively associated with the export of services, although the magnitude of the association is smaller, suggesting a moderate positive selection bias in the main estimation of Table 2.[36]

An issue that we set out to address was whether the results were driven by exports to particular countries, such as major export destinations. Columns 6 and 7 present estimated within firm-partner-country regressions that exclude the five main export destinations as well as the five main immigrant source countries, respectively. This robustness test does not alter the main findings.

[36] For detailed results of the yearly selection and target equation estimations, see Tables A.7-A.8.

Table 8. Robustness Estimations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Quadratic	Lagged model (t-3)	Partial adjustment model	Extended FE specification	Panel selection specification	Excluding top five export destinations	Excluding top five immigration countries
Immigrant employees	0.0393***	0.0110**	0.0186***	0.0246***	0.0115**	0.0227***	0.0631***
	(0.007)	(0.004)	(0.005)	(0.006)	(0.005)	(0.006)	(0.011)
Immigrant employees^2	-0.0000258***						
	(0.000)						
$Export_{t-1}$			0.222***				
			(0.003)				
Obs.	3,870,873	3,693,401	3,870,664	3,874,767	31,812	3,782,594	3,760,489
Adjusted R^2	0.55	0.56	0.58	0.55	0.34	0.54	0.57

Concerning endogeneity due to reverse causality, we implement – as discussed – an IV ar
We utilize a generalized method of moments (GMM) estimator. An ideal instrument at the firm le
variable that is correlated with the number of immigrants employed but not with the response vari
the error term. For data reasons, we are restricted to the meso-level. We look for a factor that pos
influences the firms of a specific Swedish industry to hire persons born in a particular country b
such a factor is likely to be positively related to the extent to which the educational and occup
profile of those immigrants matches the particular needs of that industry at a certain point in tin
relatively good match at the industry level is apt to affect the likelihood of a specific firm emp
immigrants from that foreign country. Meanwhile, we argue that the export decisions to a par
foreign country of an individual firm are not likely to be directly driven by the time trend in the
patterns at the industry level, which is why immigrant employment at the detailed industry lev
suitable instrument for such employment at the firm level.

Table 9 includes the results of the IV estimation. The instrument for a firm's lagged hi
immigrants from a particular country is the lagged average number of immigrant employees emplo
other firms of the same three-digit industry.

The IV analysis suggests a causal relationship of investing in foreign links through the hi
immigrant personnel on services exports.. The IV results are larger than the baseline results,
indicate that the baseline results might underestimate the impact of investment in foreign links rec
facilitating services exports.

The coefficient on the treatment variable is positive and significant at the one percent
Meanwhile, tests for under-identification and weak partial correlation between the instrume
investment in foreign links suggest that our instrument is valid.

[37] Alternative variables might be determinants of employment in the surroundings of a firm, such as l
availability. However, this alternative requires geographical information about the location of the firm that we

Table 9. Results from the IV Estimation with Respect to Exports

Explanatory variables	Coefficient	Explanatory variables, cont'd	Coefficient
Immigrant employees	2.192***	Exporter (0,1)	1.099***
	(0.471)		(0.078)
Country immigrant stock (log)	0.00126***	Labor productivity (log)	-0.00377
	(0.000)		(0.004)
Immigrant employees in the corporation	0.0145	Human capital intensity (log)	0.000296
	(0.014)		(0.000)
Workforce (log)	-0.0983***	Physical capital intensity (log)	0.00242***
	(0.029)		(0.001)
Multinational (0,1)	-0.00963	GDP (log)	0.196***
	(0.009)		(0.026)
		Population (log)	0.268***
			(0.083)
Obs.	3,787,769	Kleibergen-Paap rk LM statistic	25.38***
F(151,753458)	12.99***	Kleibergen-Paap rk Wald F statistic	25.452†

2-Step GMM estimation with the lagged 3-digit industry average of immigrant employees from country j (excluding employees in firm f) as an instrument for the lagged number of immigrant employees from country j in firm f. Robust and clustered standard errors are in parentheses. Firm, partner country, firm-partner-country, industry, and year fixed effects are included. The dependent variable is logged (1e-7 added to avoid truncation).
* p <0.10, ** p < 0.05, *** p < 0.01.
† Stock-Yogo critical values, suggesting rejection of the null of weak identification.

7. Concluding Remarks

Despite globalization, trade liberalization and substantial technological progress over the past few decades, most firms do not trade with other countries. In particular, firms that produce and deliver services find it difficult to reap the benefits of international markets. Trade barriers are higher for services trade than for goods, and trade in services is more sensitive to informal trade barriers.

Social and business networks can be important facilitators of trade and international commerce. Therefore, firm investment in access to foreign networks could help increase the exports of service firms. Investing in foreign links may reduce imperfections and asymmetries in information between agents at home and those abroad and therefore promote exports. Thus, heterogeneity in access to foreign networks might explain why some firms trade while others do not, beyond differences in productivity.

This study contributes to the firm trade literature by incorporating aspects of social network theory into a simple firm model of trade and testing its predictions on unique and comprehensive firm-level data from Sweden. In general, we contribute to the understanding of identifying and quantifying the

determinants of services trade in the global economy. We provide new knowledge on the role of networks in international trade, especially for trade in services, which contributes to understandings of how firms overcome trade barriers that specifically impede services by hiring foreign-born personnel. This study also contributes to a sparsely studied area in migration and trade research; as far as we know, only one other study has investigated the role of migrants in services trade (Foster-McGregor and Pindyuk, 2013).

We have provided novel evidence of a positive and significant influence on the services exports of firm investment in foreign networks. We have demonstrated how this influence is derived through the hiring of foreign-born workers, which increases both the firm propensity to export services as well as the intensity of exports. Our estimation results have indicated that an average firm that invests in foreign links through the hiring of an immigrant from a specific country is associated with an approximately 2 percent increase in subsequent services exports to that country, which is arguably a sizeable economic impact. Our results are similar in magnitude to the handful of other firm-level studies available, albeit not completely comparable due to their focus on merchandise exports. Although merchandise exports are expected to be less sensitive to information friction, the results of previous studies that have examined merchandise are likely to be upward biased because they fail to account for spillover from foreign links in closely related firms. Thus, we argue that the results of this study are not only statistically significant and robust but also sensible.

In addition to confirming the role of foreign networks for firm trade in services, our results demonstrate that weaker export experience enhances the role of investment in foreign networks in terms of the propensity to export. The skill level of foreign-born workers and the time that has elapsed since immigration both impact the degree to which firms can utilize foreign-born personnel as an investment to gain access to networks abroad. The fact that investment in such links by other nearby firms interacts negatively with its own investment suggests that investment by others discourages the firm from investing as much itself and thereby hurts firm exports. By contrast, our analysis of the business services industry indicates that distant links that have been acquired through previous exporting at the corporation and finest industry level add to, rather than substitute for, the foreign networks of the firm.

From a policy perspective, our study highlights the paradox that the movement of persons is both a means and mode of delivery for firms involved in the export of services, while such movement is the most restricted form of globalization (Freeman, 2006). Countries have erased numerous barriers to the movement of persons. However, substantial discrepancies across countries in terms of openness to persons that are willing to migrate (temporarily or permanently) with the aim of delivering services suggest that there is considerable room for improvement.

Several studies indicate that the welfare gains of a limited increase in movement of persons could be substantial (e.g. Walmsley et al., 2011). At the same time, the fact that foreign-born persons are often poorly integrated into the labor markets of their host country indicates that current immigrants represent untapped potential in terms of being able to promote exports of services with higher labor market participation. Our study emphasizes the need for policymakers to improve labor market participation among the foreign-born population as a way to promote internationalization, especially of services exports.

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Appendix

Table A1. Data description and sources

Variable	Description	Source
Services export	Services exports in 1,000 SEK (approx. 148 USD)	Statistics Sweden, FTS
Immigrant employees	Number of foreign born employees in firms	Statistics Sweden, RAMS and PS
Employees	Number of employees (full-time equivalents)	Statistics Sweden, SBS
Multinational	Multinational status dummy; unity if a firm is part of an enterprise with firms abroad, zero otherwise	Statistics Sweden, EGR
Exporter	Unity if the firms exports, zero otherwise	Statistics Sweden, FTS
Labor productivity	Value-added per full-time employee	Statistics Sweden, SBS
Human capital intensity	Share of employees with post-secondary education	Statistics Sweden, RAMS
Physical capital intensity	Capital stock per full-time employee	Statistics Sweden, SBS
GDP	Partner's GDP calculated in constant prices	World Bank
Population	Partner's size of population	World Bank
Trade openness	Index based on partner's trade-weighted average tariff, plus the incidence of non-tariff barriers to trade (0-100, where higher values correspond to freer trade)	Heritage Foundation
Business burden	Index of cumbersome business environment (0-1, where a higher value correspond to a more cumbersome business environment)	World Bank; authors' calculations

Note: Sources from Statistics Sweden are Structural Business Statistics (SBS); Register Based Labor Market Statistics (RAMS), Foreign Trade Statistics (FTS); Population Statistics (PS); and Enterprise Group Register (EGR).

Table A2. Countries and regions included in the sample

AMERICA	Kyrgyzstan	Oman	SOUTHEASTERN AFRICA
Antigua and Barbuda	Latvia	Qatar	Angola
Argentina	Lithuania	Saudi Arabia	Botswana
Bahamas	Moldova	Syrian Arab Republic	Burundi
Belize	Poland	United Arab Emirates	Comoros
Bermuda	Romania	Yemen	Ethiopia
Bolivia	Russian Federation		Eritrea
Brazil	Serbia and Montenegro	NORTHERN AFRICA	Kenya
Canada	Tajikistan	Algeria	Lesotho
Chile	Turkmenistan	Djibouti	Madagascar
Colombia	Ukraine	Egypt	Malawi
Costa Rica	Uzbekistan	Libya	Mauritius
Cuba		Morocco	Mozambique
Dominica	EASTERN PACIFIC	Tunisia	Namibia
Dominican Republic	Australia		Rwanda
Ecuador	Brunei Darussalam	REST OF EUROPE	Seychelles
El Salvador	Cambodia	Andorra	South Africa
Grenada	China	Austria	Sudan
Guatemala	East Timor	Belgium	Swaziland
Guyana	Fiji	/Luxembourg	Tanzania, United Rep. of
Haiti	Hong Kong	Cyprus	Uganda
Honduras	Indonesia	Denmark	Zambia
Jamaica	Japan	Finland	
Mexico	Kiribati	France	WESTERN AFRICA
Nicaragua	Korea	Germany	Benin
Panama	Lao People's Dem.	Greece	Burkina Faso
Paraguay	Malaysia	Greenland	Cameroon
Peru	Marshall Islands	Iceland	Cape Verde
Saint Kitts and Nevis	Micronesia	Ireland	Central African Republic
Saint Lucia	Mongolia	Italy	Chad
Saint Vincent and the Grenadines	New Zealand	Malta	Congo
Suriname	Palau	Netherlands	Congo (Democr. R.)
Trinidad and Tobago	Papua New Guinea	Norway	Côte d'Ivoire
United States of America	Philippines	Portugal	Equatorial Guinea
Uruguay	Samoa	San Marino	Gabon
Venezuela	Singapore	Spain	Gambia
	Solomon Islands	Switzerland	Ghana
EASTERN EUROPE & CENTRAL ASIA	Thailand	Turkey	Guinea
Albania	Tonga	United Kingdom	Guinea-Bissau
Armenia	Vanuatu		Liberia
Azerbaijan	Vietnam	SOUTHERN ASIA	Mali
Belarus		Bangladesh	Mauritania
Bulgaria	MIDDLE EAST	Bhutan	Niger
Czech Republic	Bahrain	India	Nigeria
Estonia	Iran	Maldives	Senegal
Georgia	Iraq	Nepal	Sierra Leone
Hungary	Israel	Pakistan	Togo
Kazakhstan	Jordan	Sri Lanka	
	Kuwait		
	Lebanon		

Table A3. Characteristics of immigrant employees in Sweden

		Skilled				Unskilled			
	Population	All skilled	Short	Medium	Long	All unskilled	Short	Medium	Long
Share	100	31	15	23	61	69	9	15	76
#	243,782	76,336	11,739	17,663	46,934	167,446	15,308	24,762	127,376

Notes: Displayed are the number of immigrant employees by firms in Sweden in 2007.

Table A4. Immigrant stocks in Sweden

	Source country	Stock 2000	Stock 2010	Change # 2000-2010	Change % 2000-2010	Share of population 2000	Share of population 2010
1	Finland	195	170	-26	-13%	2.20%	1.80%
2	Iraq	49	122	72	147%	0.56%	1.29%
3	Yugoslavia	72	71	-1	-2%	0.81%	0.75%
4	Poland	40	70	30	75%	0.45%	0.75%
5	Iran	51	62	11	22%	0.58%	0.66%
6	Bosnia-Herzegovina	52	56	5	9%	0.58%	0.60%
7	Germany	38	48	10	26%	0.43%	0.51%
8	Denmark	38	46	7	19%	0.43%	0.48%
9	Norway	42	43	1	2%	0.48%	0.46%
10	Turkey	32	43	11	33%	0.36%	0.45%

Notes: Immigrant stocks in thousands.
Source: Statistics Sweden; authors' calculations.

Table A5. Major destinations for Swedish exports of services

Partner country	Volume	Export share	Immigrant stock
USA	20,551,731	0,14	15,309
United Kingdom	14,361,337	0,10	18,486
France	13,265,435	0,09	6,946
Finland	8,777,601	0,06	178,179
Switzerland	8,300,199	0,06	2,761
Germany	8,233,209	0,06	45,034
Denmark	7,954,279	0,06	45,941
Norway	7,132,684	0,05	4,459
Saudi Arabia	5,252,965	0,04	1,223
China	4,521,943	0,03	16,013
Netherlands	4,110,556	0,03	7,204
Belgium & Luxembourg	3,840,592	0,03	1,837
Spain	2,323,567	0,02	5,872
Italy	1,949,999	0,01	6,845
Ireland	1,935,237	0,01	1,618

Note: Top Swedish services export destinations in 2007.
Values in 1,000 SEK (approximately 148 USD).

Table A6. Pairwise correlations

	Export volume	Immigrant employees in the firm	Immigrant employees in the corporation	Country immigrant stock	Workforce	Multinational	Exporter	Labor productivity	Human capital int.	Physical capital int.	GDP	Population
Export volume	1.0000											
Immigrant employees in the firm	0.0923	1.0000										
Immigrant employees in the corporation	0.0507	0.1723	1.0000									
Country immigrant stock	0.0281	0.0312	0.0388	1.0000								
Workforce	0.0913	0.0760	0.0479	-0.0003	1.0000							
Multinational	0.0493	0.0235	0.0488	-0.0007	0.3986	1.0000						
Exporter	0.9951	0.0873	0.0502	0.0281	0.0913	0.0494	1.0000					
Labor productivity	0.0239	0.0012	0.0068	0.0063	0.0871	0.1633	0.0237	1.0000				
Human capital int.	0.0206	0.0101	0.0131	0.0029	0.2429	0.2220	0.0207	0.1218	1.0000			
Physical capital int.	0.0090	0.0018	0.0000	-0.0015	0.0635	0.0067	0.0089	0.1661	-0.0473	1.0000		
GDP	0.0563	0.0245	0.0285	0.6262	-0.0005	0.0002	0.0560	0.0091	0.0045	-0.0019	1.0000	
Population	0.0262	0.0183	0.0204	0.6500	-0.0001	0.0002	0.0261	0.0015	0.0007	-0.0003	0.7507	1.0000

Note: All variables in logs, except dummy variables and the immigrant employees variable.

Table A7. Panel selection estimation results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Selection equation estimation								Target equation
dy/dx w.r.t. Immigrant employees									0.0115**
									(0.00476)
Immigrant employees	0.0166***	0.0156***	0.00584	0.00492	0.0214***	.00862*	0.00334	-0.00265	-0.00370
	(0.00496)	(0.00513)	(0.00462)	(0.00517)	(0.00663)	(0.00460)	(0.00431)	(0.00352)	(0.004)
Country immigrant stock (log)			-0.0456***	-0.0158	-0.0204	-0.0111	-0.108***	-0.0141	0.0362
			(0.00708)	(0.0173)	(0.0368)	(0.0451)	(0.0311)	(0.0676)	(0.036)
Business burden	-1.507***	-1.246***	-1.627***	-0.126	-0.425**	-0.359	-0.988***	-0.376**	
	(0.144)	(0.137)	(0.142)	(0.190)	(0.203)	(0.220)	(0.201)	(0.172)	
Business burden x Workforce (log)	0.271***	0.218***	0.266***	0.0670*	0.0904***	0.114***	0.236***	0.0965***	
	(0.0285)	(0.0275)	(0.0276)	(0.0301)	(0.0317)	(0.0323)	(0.0294)	(0.0263)	
λ_{2000}									-0.138*
									(0.084)
$\lambda_{2001} * I_{2001}$									0
									(.)
$\lambda_{2002} * I_{2002}$									0.840***
									(0.063)
$\lambda_{2003} * I_{2003}$									-0.0483
									(0.064)
$\lambda_{2004} * I_{2004}$									-0.0793
									(0.066)
$\lambda_{2005} * I_{2005}$									-0.0523
									(0.061)
$\lambda_{2006} * I_{2006}$									-0.0597
									(0.063)
$\lambda_{2007} * I_{2007}$									-0.0397
									(0.065)
Obs.	615,819	631,122	629,799	593,172	611,486	597,791	576,835	567,925	31,812
Adjusted/Pseudo R^2	0,70	0,68	0,65	0,75	0,79	0,77	0,77	0,72	0,34

Notes: In the selection equations and target equation, the response variable is the propensity and intensity in firm export of services, respectively. Columns 1-8 contains yearly (selection) probit within-firm-destination-country estimates for the 2000-2007 period and Column 9 the corresponding (target) OLS estimates. Robust and clustered standard errors in parentheses. Firm, destination-country, firm-destination-country, industry, and year fixed effects are included throughout. For brevity, other firm and gravity estimates are not reported, but are available upon request.

* p <0.10, ** p < 0.05, *** p < 0.01

Table A8. Panel selection estimation results (target equation)

	Export
dy/dx w.r.t.	0.0115**
Immigrant employees	(0.00476)
Immigrant employees	-0.00370
	(0.004)
Country immigrant stock (log)	0.0362
	(0.036)
Immigrant employees	-0.00339
in the corporation	(0.008)
Immigrant employees in	0.00000129
firm and corp. interaction	(0.000)
Workforce (log)	0.395***
	(0.054)
Multinational (0,1)	-0.345***
	(0.068)
Exporter (0,1)	0.199***
	(0.034)
Labor productivity (log)	0.0991***
	(0.029)
Human capital intensity (log)	-0.0261
	(0.055)
Physical capital intensity (log)	-0.0513***
	(0.015)
GDP (log)	0.238
	(0.331)
Population (log)	0.135
	(0.929)
Obs.	31,812
Adjusted R^2	0.34

Notes: The results displayed are for the target equation in a panel selection specification with firm, partner country, firm-destination country, industry, and year fixed effects as well as immigrant employees and two-digit industry interactions. Robust and clustered standard errors in parentheses.
* p <0.10, ** p < 0.05, *** p < 0.01