The Role of Foreign Networks for Trade in Services: Firm-level Evidence

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Abstract This study provides novel evidence of a positive and significant influence of firm investment into foreign networks – through the hiring of foreign-born workers in the firm – on both the propensity to export services as well as the intensity in exports. Because trade barriers are higher for services than for goods, and since trade in services is more sensitive to informal trade barriers, firm investment in access to foreign networks could in particular help to increase services exports. Investment in foreign links could benefit the overall access in the same cluster of firms, which, however, lowers the incentive for the individual firm to invest in such linkages itself. This study formalizes this idea that that the world can become 'smaller' through firms' strategic trade-related decisions. We investigate whether firm investment to obtain access to foreign networks impacts exports of services by estimating a fixed effects panel model on a comprehensive firm-level dataset for Sweden and looking in particular at investment in links through the hiring of immigrants. Instrumental variable estimation mitigates the endogeneity concern. In addition to the key finding, our results demonstrate that weaker export experience enhances the role of investment into foreign networks in terms of propensity to export. As an ancillary result, we find that the skill level of foreign-born workers and the time elapsed since immigration also impact the degree to which firms can utilize foreign-born personnel as an investment to gain access to networks abroad. Our results provide a new understanding of how firms can overcome trade barriers that specifically impede services by investing in foreign networks, for example, through the hiring of foreign-born personnel. In this, our study emphasizes the need for policymakers to increase labor market participation among the foreign-born population as to way to promote internationalization in terms of services exports.

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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 close to 80 percent of GDP is derived from services. The corresponding figure of the EU is 73 percent. In the last two decades, the share of services in total employment of developed countries in general has increased by 12 percent. In contrast, the shares of primary and secondary industries have dropped by more than two-thirds.[3] In 1991, manufacturing and services accounted for 25 and 75 percent of total employment in developed economies, respectively, in comparison with 16 and 84 percent in 2009.[4]

The advance of the service economy does not shine through, however, in international trade. Manufactures trade still dominates international commercial exchange. The share of services in total trade of developed economies with the rest of the world has remained remarkably stable at a fifth of total trade, while total trade has increase tripled. The main explanation for this inconsistency is that trade in services is more costly and faces higher and more complex barriers than trade in merchandise.

One important explanation for this is the case has to do with the historical focus of the efforts to liberalize international trade through multilateral, regional and bilateral deals. In large, these were fixated at reducing those trade barriers that were impeding industrialized countries' manufacturing companies from shipping goods abroad, i.e., lowering tariffs and other types of visible and 'formal' barriers to manufactures trade. Whereas trade negotiation have reduced barriers to trade in goods substantially in 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.

Moreover, formal trade barriers for services are constituted by relatively non-transparent regulations such as bans or limitations rather than tariffs, which raise trade costs and complicate

[3] The relative expansion of services industries is arguably due to changes in final demand and productivity improvements in manufacturing and it is linked to the establishment of international value chains, which in turn increases 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 also be conducive to export in manufacturing by raising productivity, attuning to changes in demand and overcoming obstacles in trade (Lodefalk, 2014).

[4] The numbers are based on OECD (2013c) data for 22 developed economies.

liberalization of trade in services. Trade in services, which typically are intangible and more heterogeneous than goods, are also more sensitive to informal obstacles, such as information frictions. Firms rank differences in languages and business practices, identification of suitable foreign agents, as well as uncertainty, for example, surrounding the track record of the agents, as important barriers to trade of business services (European Commission, 2001). Moreover, despite important technological advancements, many services are still impossible to store. Proximity between the producer and the consumer is often a requirement for the exchange of a service. Finally, firms' trade in services is very limited in terms of the number of services traded or foreign markets that are served 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, for instance in regard to transport and distribution costs (e.g. Allen, 2012; Anderson and Marcouiller, 2002; Anderson and van Wincoop, 2004; Felbermayr and Toubal, 2010; Fink et al., 2005; Guiso et al., 2009; Isphording and Otten, 2013; Kneller and Pisu, 2011; Ma et al., 2012; Melitz, 2008; Melitz and Toubal, 2014; Melitz, 2003; Nunn, 2007; Petropoulou, 2011; Roberts and Tybout, 1997; Tadesse and White, 2010). Apart from general knowledge on how to carry out trade services with customers in foreign markets, firms need to acquire market-specific information concerning foreign supply, demand, rules and regulations, as well as institutions. Differences in languages and culture complicate long-distance trade relations. Therefore, firms may need to invest substantially more in building and sustaining foreign business relations, relations which frequently necessitate face-to-face contact (Hasche, 2013; Johanson and Vahlne, 2009). The mere separation in geographical space makes coordination and monitoring more difficult in foreign trade relations, in spite of modern communications technology (Cristea, 2011; Cuberes, 2013).[5]

[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 as well as find that geographic distance even discourage 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 in order to circumvent barriers to trade that in particular impede trade in services.

This study formalized the idea that that the world can become 'smaller' through firms' strategic trade-related decisions. The theoretical framework generates two distinct and four secondary hypotheses concerning the role of firm investment into foreign networks for services trade.

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

The comprehensive firm-level dataset that we employ entails information on close to 1.8 million full-time employees in close to 30,000 Swedish private sector firms, including country of birth and level of education. 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 into foreign networks – through the hiring of foreign-born workers in the firm – on both the propensity to export services as well as the intensity in exports. In contrast, however, we find that the stock of immigrants in the country at large do not significantly spur firm exports to the relevant trade partner/immigrant source country.

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

In addition to the key finding, our results demonstrate that weaker export experience enhances the role of investment into foreign networks in terms of propensity to export. The quality of the investment – in the form of the skill level of foreign-born workers and the time lapsed since immigration – also impact the degree to which firms can utilize it to gain access to networks abroad. In line with the theoretical model, the results further suggest that investment in links by others close to the firm reduces the firm's private benefit from establishing links of its own. In light of these findings there is reason to believe that firm heterogeneity in services export participation at least partly is 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 relevant strands of the previous literature. Section 3 describes the role of foreign networks for trade in services and on that basis formulates a theoretical framework and a set of testable hypotheses. Section 4 explains the empirical approach and section 5 describes the data. 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 level of the firm, and third to firm heterogeneity with respect to trade.

Commencing with 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 has been interpreted as migrants facilitating trade through their business networks.

Migrants often possess knowledge, skills, and contacts that could reduce information friction, improve the quality of information and infuse trust in business relationships (Dunlevy and Hutchinson,

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

1999; Jansen and Piermartini, 2009).[8] In weak foreign institutional settings, they are more likely to be aware of ways to circumvent corruption. Migrants can also assist in contract enforcement, both by influencing the drafting of contracts and by limiting opportunistic behavior via participation in cross-national networks (Greif, 1989; Rauch, 2001; Herander and Saavedra, 2005). Migration therefore has the potential to facilitate trade between their country of residence and their country of birth, because of their superior knowledge about the language, culture, preferences, and the regulatory environment of their home countries. And their knowledge of and access to informal networks are likely to be important (e.g., Rauch, 1999).

Most recently, studies at sub-national and micro levels have highlighted the importance of proximity between migrants and business for an impact on foreign trade (Hatzigeorgiou and Lodefalk, 2013; Herander and Saavedra, 2005; Hiller, 2013). Geographical proximity and intensity in 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; Herander and Saavedra, 2005; Rauch, 2001). In contrast, the country stock of immigrants also captures immigrants employed in non-tradable or public sectors, unemployed immigrants, and the stock is also affecting trade through the taste in demand of immigrants themselves (Aleksynska and Peri, 2014). It 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 since networks due to their informal character are likely to be particularly important as an impediment for trade in services. We intend to bridge this gap with this study.

Within the migration and trade literature, Foster-McGregor and Pindyuk (2013) is closest to our study. They investigate the importance of emigrant stocks on nine categories of services exports delivered cross-border, or through consumption by foreigners in the home country. The results confirm a positive

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

relationship, which is somewhat stronger relative to the literature on merchandise trade at large. The relationship is also 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, externalities of such investment, and the possibility that firm trade is partly driven by immigrants' home bias in demand. Second, we employ a detailed firm-level panel for Sweden to analyze the role of foreign networks – proxied primarily by immigrant employees – for services trade. The 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 regard to the literature on factors influencing services trade at the level of the firm, for long scholars focused exclusively on trade in goods, whereas trade in services received little attention, particularly at the disaggregate level.[10] The most relevant study in this context is Ariu (2013), which explores and compares extra-EU trade transactions in services and goods of Belgian firms. Wolfmayr et al. (2013) is also relevant since it analyzes services export of Austrian firms with 37 export destinations.

In regard to the second branch on firm heterogeneity with respect to trade, previous work, which was stimulated by the empirical work of Bernard and others, mainly tried to explain 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, because of the trade costs involved, it only explains part of the puzzle (Armenter and Koren, 2009). Meanwhile, Grossman (1998) suggests that the

[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).

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

profound impact of distance on trade may be captured most appropriately by incorporating information frictions that increase with distance, whereas transport costs are of minor importance.

We contribute and add to these strands of the trade literature, too. In part by exploring export of different types of services with virtually all foreign partners of a panel of Swedish firms over a whole decade and within a full-fledged firm-level gravity framework, and furthermore by incorporating heterogeneity in access to foreign networks as reasons for different degrees of participation in trade in services and distance effects in trade. Our framework rests on the assumption that firms prepare for trade by acquiring access to foreign networks to overcome imperfections and asymmetries in information between buyers and sellers.[11]

3. Theoretical Framework

The premise of this study fits well into social network theory. We can think of the global economy in terms of a universe containing different planets (foreign markets) separated from each other by distance in space. Planets are by default detached, in case 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 connected planets closer to each other, making the physical distance shorter. In addition, frictionless travel is possible through the arms of the nodes themselves. In other words, as a result of the existence of nodes (networks) that connect planets (markets), all agents in space (firms) will find it easier to travel between such interconnections. Space, or the world, therefore becomes 'smaller.' For agents that can access the nodes themselves also have the opportunity of traveling through the arms of the nodes (network linkages) that make up the links.

Real social networks are known to be both geographically and socially clustered while their agents, at the same time, are only a few neighboring connections away from each other's networks (Gastner and Newman, 2006; Kogut and Walker, 2001; Milgram, 1967). Since the minimum social

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

distance between agents of such networks is short, on average, the networks mimic a 'small world' (Watts and Strogatz, 1998).

Carayol and Roux (2009) build a theory around this thinking and demonstrates through simulation how these kinds of 'small worlds' may endogenously arise via strategic formation of shortcuts (weak ties) between distant clusters. Profit-maximizing agents could establish costly direct links to other agents in order to benefit from those networks. Others may also benefit through spillovers from those links. Because the quality of knowledge diffusion deteriorates with social distance, however, 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, costs of establishing and using links rise with geographic distance, since distance makes more of coordination and monitoring necessary. As a result of agents' free riding on each other's links with distant clusters, and due to the relative low cost of local versus distant networking, networks may emerge that mimics real social networks, 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 who 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

[12] The model of Carayol and Roux (2009) above is silent on how agents form shortcuts to distant agents. However, within a trade context, there are studies and surveys that indicate that hiring is related to firms' 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 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.

networks, for example, through employment of services of immigrants, externalities of such endogenous investment, and the possibility that firm trade with a foreign partner country is partly driven by idiosyncratic demand shocks. Besides 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 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,

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

The consumer maximizes utility subject to the budget constraint

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

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. Demand in country *j* for variety ω of good h from country *i* is therefore

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

where the price index is

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

Firms exist that use labor (l) to produce a good for a market with the production function being $y(\varphi) = \varphi^b l$, where $b < 1$ is the parameter capturing the sensitivity of output to productivity. However, firms only produce if their drawn labor productivity (φ) allows them to profitably do so, taking the

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

presence of a fixed market entry cost (F_{ihj}) and variable trade costs into account. The market entry costs include costs for obtaining non-immigrant visas, for acquiring recognition of professional qualifications abroad and the costs of other legal requirements for services provision. The set-up implies that a firm is unique both in terms of variety and productivity.

The firm also has an option of investing in linkages to the specific market, for example, through the services of immigrants. The 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 find out about market opportunities abroad. They also make acquaintances with other foreigners, which themselves are embedded in potentially useful social networks. Moreover, increased knowledge and having 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 for example 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 that $\lambda_{ihj}(\varphi) = \delta^{\psi}\left[i_{ihj}(\varphi)\right]^{\theta_h}$, where $i_{ihj}(\varphi)$ is the service of the immigrant and $\theta_h \geq 0$ is the presence of informational frictions in the h sector.[15] $\delta \geq 1$ denotes investment in foreign networks by others in the local social network of the firm, which spill over to the firm. However, the spillover in combination with the cost of investment discourages the firm to undertake investment itself and this 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 from investment in foreign linkages by others in the firm's local network.

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

Formally we have $\lambda_{ih}(\varphi) = \delta^{\xi}[\varphi^{1-b}]^{\sigma-1}$, where δ is defined as above and $\xi > 0$ is a parameter capturing the positive external effect of other's investment.

The firm's profit from serving a market, conditional on its productivity and consumer demand from equation 2, is

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

where c_{ih} is the unit cost of the service of immigrants. The sunk cost of investing in foreign networks, i.e., $c_{ih}i_{ihj}(\varphi)$, can be considered to correspond to the hiring of an appropriate consultant. Such a process entails search and recruitment costs as well as costs for introduction, on site. 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 optimal pricing, investment, revenues and profits rules

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

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

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

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

The firm puts a constant mark-up on marginal cost, according to Equation 7. According to Equations 8 and 9, both investment and revenues decrease in wages and transport costs and both increase in productivity and demand, while investment is positively and revenues are negatively related to information frictions, respectively. Whether investment by others in the firm's local network promotes or deters investment, revenues and profits depends on the sum of 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 benefits are larger if investment is done in-house, that is, we

assume $|\psi| > |\xi|$.[16] The net effect of others' investments on firm revenues and profits is also negative. The reason is that the increase in demand from others' investment is not large enough to compensate from the loss in demand because of less in-house investment.

In log-linearized 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, our first main hypothesis is:

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

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

- **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. (*H1a*)**

The hypothesized relationship of investment in foreign links to exports is likely to entail a time dimension with respect to the persons with foreign experience. On the one hand, relations need to be nurtured not to deteriorate. Time away from the foreign country may therefore negatively affect the ability of persons to

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

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, regarding immigrants, integration facilitates for the immigrant to master language and culture of the host country and to adapt to expectations there. 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. In this we arrive to our next secondary hypothesis:

- **Time away from the export market impacts reward of investment in foreign links through the hiring of persons with foreign networks. (*H1b*)**

Finally, 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, why we hypothesize that:

- **Investment in foreign networks more strongly affects firm export revenues from more heterogeneous services. (*H1c*)**

Previous export experience is a known predictor of a firm's contemporaneous export 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 have already trade with foreign markets have acquired useful knowledge and skills in how to conduct business abroad. Perhaps production has been adjusted to better suit the demand in foreign markets. Firms without previous experience have to incur fixed costs to enter a foreign market and make investments in building their appeal to customers overseas. Therefore, we would expect investment in foreign links to be particularly conducive to export of non-exporters, as proposed in the following secondary hypothesis:

- **The pay-off from investment in links to a foreign market is greater for firms that lack export experience. (*H1d*)**

In the story, which conceptualized the role of networks in the world economy, it was stated that the existence of networks drag markets closer to each other. This favors all interaction between markets. We also explained, however, that agents who can access the networks themselves stand to gain even more than other agents in the same cluster, through the actual network interconnections between the markets.

This idea is present in the model, and the impact will be negative under the assumption that $|\psi| > |\xi|$. Since the firm to some extent benefits from others' investment it abstains from making as much investment of its own. Hence our second main hypothesis:

- **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.** **(*H2*)**

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, human and physical capital intensities); time-variant characteristics that affect bilateral trade resistance (GDP and population size); the immigrant stock; year-specific effects; and unobserved time-invariant heterogeneity at firm, industry, partner country and firm-partner-country levels.[17] The specification at hand is then

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

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 capture 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 $\boldsymbol{\beta}$s are column vectors of regression coefficients.

The reason for why we choose 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 frictions, is twofold:

First, our theoretical framework predicts that information frictions negatively affect firm exports while firm investment in foreign networks has an opposite effect. To estimate these relationships captured

[17] To implement firm specific and partner country specific effects, we include firm-partner country fixed effects (Andrews et al., 2006).

in Equation 11 we would need scarce data on country- and sector-specific unit investment costs as well as sector-level information frictions. 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 the population size of the trade partner.

Another concern is that immigrants' home bias in demand may bias estimation coefficients, if omitted (White, 2007).[18] To control for this, we add the immigrant stock to 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 the networks either by purchasing them on the intermediary market or through the hiring of persons with foreign networks in the firm. Purchasing services is arguably more difficult than hiring them, for example, the hiring of immigrants. Related to this is the fact that data on firm purchases of different services is scarce whereas statistical offices commonly collect employment data. Particularly interesting are services of immigrants in the form of tacit information that is specific to the destination-country, as discussed above. Services are possibly also specific to the industry. Professional networks, to which the services are intended to link, are likely to be socially clustered, like 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 linkaging 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 hiring of immigrant employees. 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 promotes exports to country j. Unlike most other variables, the immigrant employment variable is not in logs because most firms do not have an employee from a randomly selected country. Consequently, the coefficient on the immigrant employment variable is a semi-elasticity.

[18] Immigrants' presence may also have an indirect and peripheral impact on the firm's foreign links.
[19] The relevance of those networks is likely to be increasing in the effort made in recruitment process and may be increasing in the time that the immigrant stays at the firm.

To capture the idea that investment in foreign links improves overall connections between markets, which reduce incentives for private investment in access to networks by individual firms, we include a 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, like any investment, entails adjustments in the firm and primarily pays off in the future. The services provided by an immigrant contain matching between what the firm has to offer and what the customers would like to buy. The services are also about establishing and maintain 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 offer to the newly recruited immigrant. To build 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 affect firm activities, and even more time before it pays off in terms of customer demand.

A concern in the regression of export 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. In 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 avoiding time-invariant unobserved firm characteristics – such as attitudes to internationalization – from influencing the results. Second, we control for unobserved country-pair heterogeneity since 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 of 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

Micro-level data come from five databases of Statistics Sweden.[20] The resulting panel dataset covers Swedish firms in the private sector with at least ten employees during the years 1998-2007. Data include detailed economic information on firms, their employees and foreign trade with 176 countries. Our panel include 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' country of birth, as well as the skill level of foreign-born employees.

Firm-level data on trade in services are from the official collection of data for the balance of payment of 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 in the way data are collected. Between 1998 and 2002, data were collected through a requirement that all larger cross-border payments were to be reported to the Central Bank of Sweden. However, in 2003, this census of payment was replaced by a survey among a stratified sample of some 4,800 firms in a frame population of approximately 50,000

[20] The original data at Statistics Sweden consist of linked employer-employee data but for reasons of confidentiality, we have received data at the level of the firm. Information on the specific variables and their sources is available in Table A1 of the Appendix, on the countries included is in Table A2, while a detailed account of the construction of the dataset is available in a technical appendix.

[21] Typically, as an invoice is sent across the border, the firm in Sweden who receives the payment or pays the invoice is required to classify whether it corresponds to services or goods sales. In 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 cross-check the information by comparisons with other firm data from different registers.

[22] Hence, services provided through mode 3 of the General Agreement of Services of the WTO are excluded. It can be added that from 2010, services trade statistics is also to incorporate trade through commercial presence.

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 unbalanced panel data over a decade. This approach complicates inference to smaller firms and to non-trading firms, but, with respect to the latter, it should be recognized that 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 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

Data refer to the year 2007. Number of firms is 29,929. Number of observations in 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 break in the method of data collection.

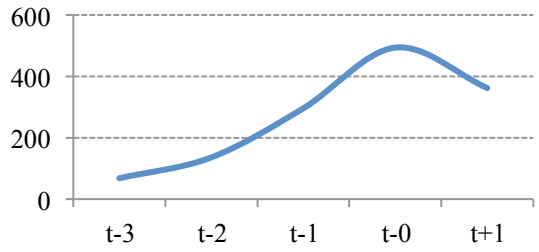
In 2007, there were approximately 29,900 firms and 6 million observations. Most firms in the dataset are small in terms of the number of full-time employees, with half of them having at most 19

[23] Growth Analysis (2010) provides an overview of the statistics. A third of firms in the sample are replaced each year. Firms that previously have been important for overall services trade, or for certain categories thereof, are continuously scrutinized and included in the survey. The 1,500 largest 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, though, as are major traders of services in the previous year. Data on tourism, which accounts for about a fifth of Swedish services export, and merchanting, which accounts for approximately a sixth, are only fully available in services trade statistics from 2003. For this reason and since merchanting partly captures trade in goods, and also is to be reclassified as such, we exclude these two types of services from our analysis.

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 export of services. China and Saudi Arabia are also important export destinations for services from Swedish firms (Table A5). In contrast, the second and third largest immigrant stocks in Sweden are from the former Yugoslavia and the Middle East, respectively (Table A4). We note that among the simple correlation coefficients between key variables in our dataset, the one between firm services export and the number of immigrant employees in the firm is as large as the one between export and firm size, which is a known export determinant for firms (Table A6). Additional descriptive data are found in the Appendix.[25]

If the basic theoretical framework above is true in the sense that firms do prepare for export entry by investing in links to foreign networks, we would expect that firms with no experience of exporting services to a country prepares for export to that country by investing in links, here envisaged through the hiring of immigrants. Before estimating Equation 12, we therefore visually inspect the most extreme case, where there are firm-partner-country pairs without previous export and without previous investment in links through the hiring of immigrant employees but where immigrants are eventually hired. Figure 1 supports that the number of such firm-country pairs increase before export entry and decline afterwards.[26]

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



[24] Mean value in the 1998-2002 period, before a break in the method of data collection.
[25] The mean number of immigrant employees was eight, while half of the firms only had two immigrants employed. In comparison with descriptive statistics for manufacturing alone, the firms of the panel are smaller, fewer are part of an MNE, they have less physical capital per employee and they 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 A3).
[26] The figure displays how many of those firm-country dyads that experience first entry into export of services (in total, 14,826) that also hired their first immigrant from that country, all in the 1998-2003 period.

6. Results

Baseline Results

Table 2 includes result from estimation of Equation 12, where we account for observables and for unobservables across firm-partner-country, three-digit industries and years.[27]

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

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

As displayed in Column 1-2, the results would seem to confirm our first main hypothesis that export is a positive function of investment in links with that market. We find that firms' hiring of immigrant employees in period *t-1* is positively associated with the probability of exporting and with export revenue in period *t-0*, at the one percent level. The association is stronger for the intensity of export than for the probability of export. The coefficient in Column 2 is a semi-elasticity, with the coefficient indicating that hiring an immigrant from country *j* in firm *f* is associated with a 2.5 percent rise in firm export revenues from that country, which we consider to be a result that is economically sizeable.

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 in the corporation – are mixed and the coefficients are substantially smaller than for the main investment variable. The negative sign and the statistical significance of the interaction variable is in line with our second main 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 an our fourth ancillary hypothesis predicts, we find that previous export experience is positive and statistically significant in explaining the probability of exporting services and the intensity of exports (Column 1-2). The stock of immigrants in Sweden is also positively linked to export of services, but it is only statistically significant with respect to export revenues.[28]

Heterogeneous Immigrant Services

If our second ancillary hypothesis is true, that 'high-quality' investment in foreign networks raises the pay-off from such investments, then would expect the link between immigrant employment and

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

subsequent export to be higher for immigrant employees with more relevant information and networks. And if the third ancillary hypothesis is true that time since immigration affects the reward from investing in foreign links through immigrant services, then length of stay away from the country of origin should matter for export.

To test these hypotheses, we split immigrant employees into eight sub-categories. First, we divide them into those with and without post-secondary education, where education is considered a proxy for relevant information and an ability to relay and absorb such information. Second, we divide immigrant employees into three groups according to their time in Sweden. Third, we split them into foreign-born employees from countries with or 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 *per se* in these countries.[29]

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

Table 3. Results for Services Export across Foreign-born Workers' 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 (>10 years)	0.0866***	0,00000677
	(0.021)	(0.007)
Obs.	3,870,873	
Adjusted R^2	0.55	

Robust and clustered standard errors in parentheses. Firm, partner country, firm-partner country, industry, and year fixed effects are included throughout. Dependent variables are in logs (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

[29] We classify a country as having had a conflict which 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 the cause being 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, 2014b, 2014c, 2014d).

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

Table 4. Do 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 in parentheses. Firm, partner country, firm-partner country, industry, and year fixed effects are included throughout. Dependent variable is services export in logs (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

To the extent that skills and non-refugee status of immigrant employees reflect immigrants' abilities to bridge informational and social divides across countries, these results indicate that the quality of immigrant services contributes to firm export of services (Hypothesis 1a). The findings with respect to skill-level and export are in line with previous evidence on the relation between migrants and trade in merchandise, evidence which predominantly relies on more 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).

We find evidence that time since immigration affect the reward, in terms of services export, to investment in foreign links (Hypothesis 1b). Previous evidence has been mixed as to the sign of this relationship, which has been inferred to the degree of employment of immigrants with different length of stay in the host country (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, time since immigration tend to undermine the positive trade impact of investing in foreign links by hiring foreign-born personnel. This is consistent with Hatzigeorgiou and Lodefalk (2013), which deals with 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).

Non-exporters and Investment in Foreign Links

To test our fourth ancillary hypothesis that the effect of investing in foreign links is greater for firm 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 results in Table 2, we see that the pay-off from investment in foreign links is indeed stronger for firms with weaker experience from exporting services. The coefficient on immigrant employees from country *j* is twice as large for firms who have never exported to country *j* before, and five times as large for firms without any previous experience of exporting services.

Table 5. Estimation Results on Probability of Services Export across 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 in parentheses. Firm, partner country, firm-partner country, industry, and year fixed effects are included throughout. The dependent variable is the services exporter status. For brevity, other firm and gravity estimates are not reported. * p <0.10, ** p < 0.05, *** p < 0.01

Further, the fact that 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 with firms with experience from exporting services to other countries than *j* (Column 3 of Table 5) may indicate that there are economies of scale in building trade-relation specific appeal.

Heterogeneous versus Homogeneous Services

To test our third ancillary hypothesis that more export of more 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 running estimations of Equation 12 for heterogeneous and homogeneous services, drawing on industry classifications (O'Mahony and van Ark, 2003; Peneder, 2007).[30]

Table 6 confirms our third ancillary hypothesis. The semi-elasticity is 50 percent larger for firm export of heterogeneous services than for other services, which suggests that investment in foreign networks through immigrant employees help firms to overcome information frictions in 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 *x* immigrant employees in corporation	-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 in parentheses. Firm, partner country, firm-partner country, industry, and year fixed effects are included throughout. Dependent variables are services export in logs (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

[30] We consider 'high-quality services' to be heterogeneous. These types of services are defined by belonging to services industry 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 et al., 2010; Rauch, 1999). A stronger and positive relation is interpreted as suggestive of migrants' impact on merchandise trade through reduced information frictions.

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 in the preceding year. However, rather than viewing the previous export experience as a confounding factor, one could view it as an indicator of some prior ties to foreign markets. This would imply that more attention might be needed to this factor. From our theoretical model, then it follows that previous experience at other firms, that are closely related to the firm, could affect contemporaneous export of the firm via variable δ. For example, 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 pay-off from own investment may be negative or positive depending on the sum of parameters ψ and ξ, as discussed.

To incorporate these proxies for additional linkages to foreign markets in vector $\boldsymbol{I}$, beyond the hiring of immigrant employees, we choose to focus on a particular industry in Sweden, namely business services industry.[31] The business services industry is the fastest growing services industry in Sweden, in terms of value added and employment (Lodefalk, 2013). It is also accounts for the largest share of export of services of Sweden (Eliasson et al., 2011). Business services have received increasing focus in recent years because of its importance in the "knowledge economy" and because its perceived exposure to offshoring (Blinder, 2006).

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

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

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

Accounting for previous export experience at the firm, corporation and detailed industry, as well as its interaction 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 is 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 export, whereas the one at the level of the firm affects export strongly negatively. Notably, the immigrant employment variable somewhat counteracts the negative impact of the export experience of the firm on export.

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. As for the negative result for the firm export experience variable, this could be because firm experience in export of services in any preceding year is only a first step towards internationalization, with the next step in services export being to provide the services through commercial presence. In contrast, previous export of other firms in the corporation and, certainly, of other firms in the same industry, is less likely to be succeeded by the firm switching to supply through commercial presence abroad. Although, it might conceivably help the firm to leapfrog to that mode of delivery without passing the stage of export through Modes 1, 2 and 4. Therefore, earlier experience at the higher levels of aggregation may rather spillover to the firm, *inter alia*, in the form of access to distant links that promote firm export.

That the interactions between the export experience variables and immigrant employment of the firm are positive rather than negative, as the one between immigrant employees in the firm and the

corporation, could be because such access to distant links are too remote to viably replace firm investment in links of its own while still assisting in export.

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 in parentheses. Firm, partner country, firm-partner country, industry, and year fixed effects are included throughout. Dependent variables are services export in logs (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

Robustness Analysis

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

Further, concerning reverse causality, we address the concern that our results reflect a scenario in which export drive investment rather than *vice versa* by adopting a lagged variable approach and by implementing instrumental variable estimation. We do this despite the fact that previous empirical studies on migration and trade have not found support for reverse causality, at least regarding merchandise trade (Aguiar et al., 2007; Gould, 1994; Hatzigeorgiou, 2010).

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

Our estimation results could be biased in the case where unobserved and time-variant particularities to relations with partner countries. We are convinced 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 into estimation.

The results could also be biased because of non-random sample selection.[32] To consider this, while still exploiting the panel structure of the data, we employ a panel selection model (Wooldridge,

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

2010).[33] First, yearly probits with firm-destination-country specific effects á la (Mundlak, 1978) are estimated. In these estimations, we augment the specification with a theoretically anchored exclusion restriction, to assist 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).[34] To allow for heterogeneous impacts of regulatory costs across firm size, we interact the exclusion restriction with the workforce of the firm. Second, inverted Mill's ratios (IMR) are computed from information in the first step. Third, we run 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 export and immigration partner countries, by dropping the top five partners to Sweden.

We can confirm the robustness of the main results by looking at Column 1-4 of Table 7. 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, yet statistically significant. However, only at very high levels of investment would the return turn negative. In fact, in the last year of the panel, there is not a single firm with that many employees born in country *j*.

[33] Additionally, we account for heterogeneous impacts across industries.
[34] For a detailed account of how we construct of the exclusion restriction, see (Hatzigeorgiou and Lodefalk, 2013).

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 sources**
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

Using the third instead of the first lag of investment in foreign links does not put in question the main conclusion either. The impact on export three years on is however smaller than the one next year. We also introduced the lagged response variable, whose coefficient turned out to be substantial and significant, and ran estimation that controlled for time-variant partner-country heterogeneity. Both results from the partial adjustment model and the model with partner-country-year fixed effect suggest that there is a robust positive relation between foreign links and subsequent export revenues.

Next, in Column 5, our panel selection estimation results are displayed. Immigrants are still positively associated with the export of services of their employer to the immigrant source countries, although the magnitude of the association is smaller, suggesting a moderate positive selection bias in the main estimation of Table 2.[35]

Another issue that we set out to address was if results were driven by exports to particular countries, such as major export destinations. Columns 6-7 present estimates of 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.

Concerning endogeneity due to reverse causality we implement – as discussed – instrumental-variable analysis. We utilize a generalized-method-of-moments (GMM) estimator. An ideal instrument at

[35] For detailed results of the yearly selection and the target equation estimations, see Tables A7-8.

the firm level would have been a variable that is correlated with the number of immigrants employed, but not with the response variable and the error term. For data reasons we are restricted to the meso-level, however. In this we look for a factor that positively influences firms of a specific Swedish industry to hire persons born in a particular country, since such a factor is likely to be positively related to the extent to which the educational and occupational profile of those immigrants matches the particular needs of that industry at a certain point in time.[36] A relatively good match at the industry level is likely to affect the likelihood of a specific firm employing immigrants from that foreign country. Meanwhile, we would argue that the decisions on exports to a particular foreign country by an individual firm is not likely to be directly driven by the time trend in hiring patterns at the industry level, why immigrant employment at the detailed industry level is a suitable instrument for such employment at the firm level.

Table 8 includes results from IV-estimation. The instrument for a firm's lagged hiring of immigrants from a particular country is the lagged average number of immigrant employees employed in other firms of the same three-digit industry.

The IV-analysis seems to suggest a causal relationship of investing in foreign links through the hiring of immigrant personnel on services export, in line with our first hypothesis. The coefficient on the treatment variable is positive and significant at the one percent level. Meanwhile, tests for under-identification and weak partial correlation between the instrument and investment in foreign links suggest that our instrument is valid.

[36] Alternative variables might be determinants of employment in the surrounding of a firm, such as housing availability. However, this requires geographical information about the location of the firm, which we lack.

Table 9. Results from Instrumental Variable Estimation with Respect to Exports

Immigrant employees	**2.192*** **		
	(0.471)	Labor productivity (log)	-0.00377
Country immigrant stock (log)	0.00126***		(0.004)
	(0.000)	Human capital intensity (log)	0.000296
Immigrant employees in the corporation	0.0145		(0.000)
	(0.014)	Physical capital intensity (log)	0.00242***
Workforce (log)	-0.0983***		(0.001)
	(0.029)	GDP (log)	0.196***
Multinational (0,1)	-0.00963		(0.026)
	(0.009)	Population (log)	0.268***
Exporter (0,1)	1.099***		(0.083)
	(0.078)		
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 instrument for the lagged no of immigrant employees from country j in firm f. Robust and clustered standard errors in parentheses. Firm, partner country, firm-partner country, industry, and year fixed effects are included. The dependent variable is in logs (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 ID.

7. Concluding Remarks

In spite of 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 especially help to increase 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 could prove a piece in the puzzle of why some firms trade and why others do not, beyond possible 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. In specific we provide fresh knowledge on the role of networks in international trade, in particular with respect to services, which contributes to the understanding of how firms can overcome trade barriers that specifically impede services by hiring foreign-born personnel. The study also contributes to a sparsely studied area in the previous research on migration and trade, as only one previous study has investigated the role of migrants for services trade, as far as we know (Foster-McGregor and Pindyuk (2013).

We have provided novel evidence of a positive and significant influence on services export of firm investment into foreign networks. We have demonstrated how this influence is derived through the hiring of foreign-born workers in the firm, which increases both the propensity to export services as well as the intensity in exports. Our estimation results have indicated that an average firm which invests in foreign links through the hiring of an immigrant from a specific country is associated with approximately 2 percent rise in subsequent service export to that country, which is arguably an economically sizeable 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 frictions, the results of previous studies that have used merchandise data are likely to be upward biased since they fail to account for spillovers from foreign links in closely related firms. In this light 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 into foreign networks in terms of propensity to export. The skill level of foreign-born workers and the time lapsed since immigration impact the degree to which firms can utilize foreign-born personnel as an investment to gain access to networks abroad. And, the fact that investment in such links by firms in the vicinity of the firm interacts negatively with its own investment, would seem to suggest that investments by others discourages the firm from investing as much itself, and thereby hurts firm export. On the contrary, our sub-analysis for the business services industry would seem to indicate that distant links that have been acquired through

any previous export at the corporation and finest industry level add to rather than substitute for foreign networks of the firm.

From a policy-perspective, our study highlights the paradox that 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 movement of persons. But the fact that there is substantial discrepancy across countries in terms of openness to persons that are willing to migrate (temporarily or permanently) with the aim of delivering services, suggests that there is a large 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, in light of the fact that foreign-born persons often are poorly integrated into labor markets of their host country, it indicates that current immigrants provide an untapped source of potential in terms of being able to promote exports of services if their labor market participation would be higher. In this, our study emphasizes the need for policymakers to improve labor market participation among the foreign-born population as a way to promote internationalization, especially services exports.

References

Aguiar, A., Walmsley, T., Abrevaya, J., 2007. Effects of Bilateral Trade on Migration Flows: the case of the United States, Presented at the 10th Annual Conference on Global Economic Analysis, Purdue University, USA.

Aleksynska, M., Peri, G., 2014. Isolating the Network Effect of Immigrants on Trade. The World Economy 37, 434-455.

Allen, T.D., 2012. Information Frictions in Trade. Yale University.

Álvarez, R., Faruq, H., López, R.A., 2013. Is Previous Export Experience Important for New Exports? The Journal of Development Studies 49, 426-441.

Anderson, J.E., Marcouiller, D., 2002. Insecurity and the Pattern of Trade: An Empirical Investigation. Review of Economics and Statistics 84, 342-352.

Anderson, J.E., van Wincoop, E., 2004. Trade Costs. Journal of Economic Literature 42, 691-751.

Andrews, M., Schank, T., Upward, R., 2006. Practical fixed-effects estimation methods for the three-way error-components model. Stata Journal 6, 461.

Ariu, A., 2013. Services versus Goods Trade: Are They the Same? Universite catholique de Louvain, Institut de Recherches Economiques et Sociales (IRES), Discussion Papers (IRES - Institut de Recherches Economiques et Sociales): 2013015, pp. 25-25.

Armenter, R., Koren, M., 2009. Economies of scale and the size of exporters. Federal Reserve Bank of Philadelphia, Working Papers: 09-15.
Bernard, A.B., Jensen, J.B., 1999. Exceptional Exporter Performance: Cause, Effect, or Both? Journal of International Economics 47, 1-25.
Bernard, A.B., Jensen, J.B., 2004. Why Some Firms Export. Review of Economics and Statistics 86, 561-569.
Bernard, A.B., Jensen, J.B., Lawrence, R.Z., 1995. Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987. Brookings Papers on Economic Activity. Microeconomics 1995, 67-119.
Blinder, A.S., 2006. Offshoring: The Next Industrial Revolution? Council on Foreign Relations, pp. 113-128.
Blum, B.S., Goldfarb, A., 2006. Does the Internet Defy the Law of Gravity? Journal of International Economics 70, 384-405.
Breinlich, H., Criscuolo, C., 2011. International Trade in Services: A Portrait of Importers and Exporters. Journal of International Economics 84, 188-206.
Carayol, N., Roux, P., 2009. Knowledge flows and the geography of networks: A strategic model of small world formation. Journal of Economic Behavior & Organization 71, 414-427.
Cristea, A.D., 2011. Buyer-seller relationships in international trade: Evidence from U.S. States' exports and business-class travel. Journal of International Economics 84, 207-220.
Crozet, M., Head, K., Mayer, T., 2012. Quality Sorting and Trade: Firm-level Evidence for French Wine. The Review of Economic Studies 79, 609-644.
Cuberes, D., 2013. Are Internet and Face-to-Face Contacts Complements or Substitutes? Evidence from Internet Traffic between Cities. The University of Sheffield, Department of Economics.
de la Mata, T., 2011. Does trade creation by social and business networks hold in services? An analysis for Accommodation and Restaurants in Spain. Universidad Autónoma de Madrid (Spain), Department of Economic Analysis (Economic Theory and Economic History).
Disdier, A.-C., Head, K., 2008. The Puzzling Persistence of the Distance Effect on Bilateral Trade. Review of Economics and Statistics 90, 37-48.
Egger, P.H., von Ehrlich, M., Nelson, D.R., 2012. Migration and Trade. The World Economy 35, 216-241.
Eliasson, K., Hansson, P., Lindvert, M., 2011. Tjänsteexporten allt viktigare för Sverige. Ekonomisk Debatt 39, 28-40.
European Commission, 2001. Final Report: Barriers to Trade in Business Services. EC.
Federico, S., Tosti, E., 2012. Exporters and importers of services: firm-level evidence on Italy. Bank of Italy, Economic Research and International Relations Area.
Felbermayr, G.J., Jung, B., 2009. The Pro-trade Effect of the Brain Drain: Sorting Out Confounding Factors. Economics Letters 104, 72-75.
Felbermayr, G.J., Toubal, F., 2010. Cultural Proximity and Trade. European Economic Review 54, 279-293.
Ferreira, F., Waldfogel, J., 2013. Pop internationalism: Has half a century of world music trade displaced local culture? Economic Journal 123, 634-664.
Fink, C., Mattoo, A., Neagu, I.C., 2005. Assessing the Impact of Communication Costs on International Trade. Journal of International Economics 67, 428-445.
Forbes, 2009. Business Meetings: The Case for Face-to-Face, Insights. Forbes.
Foster-McGregor, N., Pindyuk, O., 2013. Ethnic Networks and Services Trade. Vienna Institute for International Economic Studies.
Freeman, R.B., 2006. People Flows in Globalization. The Journal of Economic Perspectives 20, 145-170.
Gastner, M.T., Newman, M.E.J., 2006. The spatial structure of networks. European Physical Journal B -- Condensed Matter 49, 247-252.
Gaulier, G., Milet, E., Mirza, D., 2010. Les firmes françaises dans le commerce de service. CEPII research center.

Gould, D.M., 1994. Immigrant Links to the Home Country: Empirical Implications for U.S. Bilateral Trade Flows. Review of Economics and Statistics 76 2, 302-316.
Granovetter, M.S., 1973. The Strength of Weak Ties. American Journal of Sociology 78, 1360-1380.
Grossman, G.M., 1998. Comment on Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World? by Alan V. Deardorff, in: Frankel, J.A.e. (Ed.), The Regionalization of the World Economy. University of Chicago Press, Chicago and London.
Growth Analysis, 2010. Svensk tjänstehandel - omfattning, utveckling och betydelse. Swedish Agency for Growth Policy Analysis, Sweden.
Guiso, L., Sapienza, P., Zingales, L., 2009. Cultural Biases in Economic Exchange? Quarterly Journal of Economics 124, 1095-1131.
Haller, S.A., Damijan, J.e., Kaitila, V., Kostevc, C., Maliranta, M., Milet, E., Mirza, D., Rojec, M., 2012. A portrait of trading firms in the services sectors ? Comparable evidence from four EU countries. The Research Institute of the Finnish Economy.
Harvard Business Review, 2009. Managing Across Distance in Today's Economic Climate: The Value of Face-to-Face Communication. Harvard Business Review, Analytic Services.
Hasche, N., 2013. Value co-creating processes in international business relationships : three empirical stories of cooperation between Chinese customers and Swedish suppliers. Örebro universitet, Örebro.
Hatzigeorgiou, A., 2010. Migration as Trade Facilitation: Assessing the Links between International Trade and Migration. B.E. Journal of Economic Analysis and Policy: Topics in Economic Analysis and Policy 10.
Hatzigeorgiou, A., Lodefalk, M., 2013. Investigating the Link between Immigrant Employees and Firm Trade, in: Lodefalk, M. (Ed.), Tackling Barriers to Firm Trade: Liberalisation, Migration, and Servicification. Örebro University, Örebro.
Head, K., Ries, J., 1998. Immigration and Trade Creation: Econometric Evidence from Canada. Canadian Journal of Economics 31 1, 47-62.
Helpman, E., Melitz, M., Rubinstein, Y., 2008. Estimating Trade Flows: Trading Partners and Trading Volumes. The Quarterly Journal of Economics 123, 441-487.
Herander, M.G., Saavedra, L.A., 2005. Exports and the Structure of Immigrant-Based Networks: The Role of Geographic Proximity. Review of Economics and Statistics 87, 323-335.
Hiller, S., 2013. Does Immigrant Employment Matter for Export Sales? Evidence from Denmark. Review of World Economics/Weltwirtschaftliches Archiv 149, 369-394.
Hortacsu, A., Martinez-Jerez, F.A., Douglas, J., 2009. The Geography of Trade in Online Transactions: Evidence from eBay and MercadoLibre. American Economic Journal: Microeconomics 1, 53-74.
Isphording, I.E., Otten, S., 2013. The Costs of Babylon—Linguistic Distance in Applied Economics. Review of International Economics 21, 354-369.
Jansen, M., Piermartini, R., 2009. Temporary Migration and Bilateral Trade Flows. The World Economy 32, 735-753.
Johanson, J., Vahlne, J.-E., 2009. The Uppsala internationalization process model revisited: From liability of Foreignness to Liability of Outsidership. Journal of International Business Studies 40, 1411-1431.
Jones, R.W., Kierzkowski, H., 1990. The Role of Services in Production and International Trade: A Theoretical Framework, in: Jones, R.W., Krueger, A.O. (Eds.), The political economy of international trade: Essays in honor of Robert E. Baldwin. Oxford and Cambridge, Mass.: Blackwell, pp. 31-48.
Kelle, M., Kleinert, J., 2010. German Firms in Service Trade. Applied Economics Quarterly 56, 51-71.
Kelle, M., Kleinert, J., Raff, H., Toubal, F., 2013. Cross-Border and Foreign Affiliate Sales of Services: Evidence from German Microdata. World Economy 36, 1373-1392.
Kneller, R., Pisu, M., 2011. Barriers to Exporting: What Are They and Who Do They Matter To? World Economy 34, 893-930.
Koenig, P., 2009. Immigration and the export decision to the home country. HAL.

Kogut, B., Walker, G., 2001. The Small World of Germany and the Durability of National Networks. American Sociological Review 66, 317-335.
Leamer, E.E., 2007. A flat world, a level playing field, a small world after all, or none of the above? A review of Thomas L. Friedman's the world is flat. Journal of Economic Literature 45, 83-126.
Lodefalk, M., 2013. Servicification of Manufacturing--Evidence from Sweden. International Journal of Economics and Business Research 6, 87-113.
Lodefalk, M., 2014. The role of services for manufacturing firm exports. Review of World Economics 150, 59-82.
Ma, Y., Qu, B., Zhang, Y., 2012. Complex Goods' Exports and Institutions: Empirics at the Firm Level. Review of International Economics 20, 841-853.
Masso, J., Rõigas, K., Vahter, P., 2014. Foreign Market Experience, Learning by Hiring and Firm Export Performance. University of Tartu.
Melitz, J., 2008. Language and Foreign Trade. European Economic Review 52, 667-699.
Melitz, J., Toubal, F., 2014. Native language, spoken language, translation and trade. Journal of International Economics 93, 351-363.
Melitz, M.J., 2003. The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity. Econometrica 71, 1695-1725.
Melitz, M.J., Trefler, D., 2012. Gains from Trade When Firms Matter. Journal of Economic Perspectives 26, 91-118.
Milgram, S., 1967. The Small-World Problem. Psychology Today 1, 61-67.
Minondo, A., 2011. Learning to Export with New Managers. Empirical Economics Letters 10, 7-11.
Mion, G., Opromolla, L.D., 2013. Managers' mobility, trade performance, and wages. European Central Bank.
Mok, D., Wellman, B., 2007. Did distance matter before the Internet?. Interpersonal contact and support in the 1970s. Social Networks 29, 430-461.
Molina, Muendler, M.-A., 2013. Preparing to export.
Mundlak, Y., 1978. On the Pooling of Time Series and Cross Section Data. Econometrica 46, 69-85.
Mundra, K., 2012. Immigration and Trade Creation for the U.S.: The Role of Immigrant Occupation. Institute for the Study of Labor (IZA).
Nickell, S., Redding, S., Swaffield, J., 2008. The Uneven Pace of Deindustrialisation in the OECD. World Economy 31, 1154-1184.
Nordås, H.K., 2008. The Impact of Services Trade Liberalisation on Trade in Non-Agricultural Products. OECD Publishing.
Nunn, N., 2007. Relationship-Specificity, Incomplete Contracts, and the Pattern of Trade. The Quarterly Journal of Economics 122, 569-600.
O'Mahony, M., van Ark, B., 2003. EU productivity and competitiveness: an industry perspective. Can Europe resume the catching-up process?
Oxford Economics, 2009. The Return on Investment of U.S. Business Travel.
Partridge, J., Furtan, H., 2008. Immigration Wave Effects on Canada's Trade Flows. Canadian Public Policy 34, 193-214.
Peneder, M., 2007. A sectoral taxonomy of educational intensity. Empirica 34, 189-212.
Petropoulou, D., 2011. Information costs, networks and intermediation in international trade. Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper: 76.
Pilat, D., 2005. Measuring the Interaction Between Manufacturing and Services, OECD STI Working Paper. Organisation for Economic Co-operation and Development, Paris.
Pilat, D., Cimper, A., Olsen, K., Webb, C., 2008. The Changing Nature of Manufacturing in OECD Economies, in: Organisation for Economic, C.-o., Development (Eds.), Staying Competitive in the Global Economy: Compendium of Studies on Global Value Chains. Paris and Washington, D.C.: Organisation for Economic Co-operation and Development, pp. 103-140.
Rauch, J.E., 2001. Business and Social Networks in International Trade. Journal of Economic Literature 39, 1177-1203.

Roberts, M.J., Tybout, J.R., 1997. The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Costs. American Economic Review 87, 545-564.
Sala, D., Yalcin, E., 2012. Export Experience of Managers and the Internationalization of Firms. Ifo Institute for Economic Research at the University of Munich.
Schettkat, R., 2007. The Astonishing Regularity of Service Employment Expansion. Metroeconomica 58, 413-435.
Schettkat, R., Yocarini, L., 2006. The Shift to Services Employment: A Review of the Literature. Structural Change and Economic Dynamics 17, 127-147.
Statistics Sweden, 2006. Utrikeshandel med IT- och företagstjänster 2005. Statistics Sweden.
Swedish Trade Council, 2010. Tjänsteexporten – Den snabbast växande sektorn i svensk ekonomi. Swedish Trade Council.
Tadesse, B., White, R., 2010. Cultural Distance as a Determinant of Bilateral Trade Flows: Do Immigrants Counter the Effect of Cultural Differences? Applied Economics Letters 17, 147-152.
United Nations, 2002. Manual on statistics of international trade in services, Statistical Papers Series M. UN, Department of Economic and Social Affairs, Statistics Division.
Uppsala Conflict Database Program, 2014a. UCDP Battle-related Deaths Dataset, in: University, U. (Ed.).
Uppsala Conflict Database Program, 2014b. UCDP Non-state Conflict Dataset, in: University, U. (Ed.).
Uppsala Conflict Database Program, 2014c. UCDP One-sided Violence Dataset, in: University, U. (Ed.).
Uppsala Conflict Database Program, 2014d. UCDP Prio Armed Conflict Dataset, in: University, U. (Ed.).
Walmsley, T.L., Winters, A., Ahmed, A., 2011. The Impact of the Movement of Labour: Results from a Model of Bilateral Migration Flows. Global Economy Journal 11.
Walter, P., Dell'mour, R., 2010. Firm level analysis of international trade in services, IFC Working Papers. Bank for International Settlements, Irving Fischer Committee on Central Bank Statistics.
Watts, D.J., Strogatz, S.H., 1998. Collective dynamics of /`small-world/' networks. Nature 393, 440-442.
White, R., 2007. Immigrant-Trade Links, Transplanted Home Bias and Network Effects. Applied Economics 39, 839-852.
Wolfmayr, Y., Christen, E., Pfaffermayr, M., 2013. Pattern, Determinants and Dynamics of Austrian Service Exports – A Firmlevel Analysis. FIW.
Wooldridge, J.M., 2010. Econometric analysis of cross section and panel data. MIT, Cambridge, Mass.
World Bank, 2011. Doing Business database.

Appendix to "The Role of Foreign Networks for Services Exports: Firm-level Evidence"

Variable	*Definition*	*Sources*
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 trac	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).

AMERICA

Antigua and Barbuda
Argentina
Bahamas
Belize
Bermuda
Bolivia
Brazil
Canada
Chile
Colombia
Costa Rica
Cuba
Dominica
Dominican Republic
Ecuador
El Salvador
Grenada
Guatemala
Guyana
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Suriname
Trinidad and Tobago
United States of America
Uruguay
Venezuela

EASTERN EUROPE & CENTRAL ASIA

Albania
Armenia
Azerbaijan
Belarus
Bulgaria
Czech Republic
Estonia
Georgia
Hungary
Kazakhstan
Kyrgyzstan
Latvia
Lithuania
Moldova
Poland
Romania
Russian Federation
Serbia and Montenegro
Tajikistan
Turkmenistan
Ukraine
Uzbekistan

EASTERN PACIFIC

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Brunei Darussalam
Cambodia
China
East Timor
Fiji
Hong Kong
Indonesia
Japan
Kiribati
Korea
Lao People's Dem.
Malaysia
Marshall Islands
Micronesia
Mongolia
New Zealand
Palau
Papua New Guinea
Philippines
Samoa
Singapore
Solomon Islands
Thailand
Tonga
Vanuatu
Vietnam

MIDDLE EAST

Bahrain
Iran
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
Syrian Arab Republic
United Arab Emirates
Yemen

NORTHERN AFRICA

Algeria
Djibouti
Egypt
Libya
Morocco
Tunisia

REST OF EUROPE

Andorra
Austria
Belgium
/Luxembourg
Cyprus
Denmark
Finland
France
Germany
Greece
Greenland
Iceland
Ireland
Italy
Malta
Netherlands
Norway
Portugal
San Marino
Spain
Switzerland
Turkey
United Kingdom

SOUTHERN ASIA

Bangladesh
Bhutan
India
Maldives
Nepal
Pakistan
Sri Lanka

SOUTHEASTERN AFRICA

Angola
Botswana
Burundi
Comoros
Ethiopia
Eritrea
Kenya
Lesotho
Madagascar
Malawi
Mauritius
Mozambique
Namibia
Rwanda
Seychelles
South Africa
Sudan
Swaziland
Tanzania, United Rep. of
Uganda
Zambia

WESTERN AFRICA

Benin
Burkina Faso
Cameroon
Cape Verde
Central African Republic
Chad
Congo
Congo (Democr. R.)
Côte d'Ivoire
Equatorial Guinea
Gabon
Gambia
Ghana
Guinea
Guinea-Bissau
Liberia
Mali
Mauritania
Niger
Nigeria
Senegal
Sierra Leone
Togo

		Skilled				Unskilled			
	All	***Skilled***	*Short time (0-3 yrs)*	*Medium time (4-10 yrs)*	*Long time (>10 yrs)*	***Unskilled***	*Short time (0-3 yrs)*	*Medium time (4-10 yrs)*	*Long time (>10 yrs)*
Share (%)	100	**31**	15	23	61	**69**	9	15	76
Number of persons	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.

	Source country	*Stock 2000*	*Stock 2010*	*Δ 2000-2010*	*Δ % 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%

Note: Immigrant stocks in thousands.

Source: Statistics Sweden; authors' calculations.

Partner country	*Volume*	*Share of SE export*	*Country immigrant stock*
United States of America	20551731	0.14	15309
United Kingdom	14361337	0.10	18486
France	13265435	0.09	6946
Finland	8777601	0.06	178179
Switzerland	8300199	0.06	2761
Germany	8233209	0.06	45034
Denmark	7954279	0.06	45941
Norway	7132684	0.05	4459
Saudi Arabia	5252965	0.04	1223
China	4521943	0.03	16013
Netherlands	4110556	0.03	7204
Belgium and Luxembourg	3840592	0.03	1837
Spain	2323567	0.02	5872
Italy	1949999	0.01	6845
Ireland	1935237	0.01	1618

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

	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.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Selection equation estimation								*Target equation estimation*
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 * 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

	Export
dy/dx w.r.t. Immigrant employees	***0.0115****
	(0.00476)
Immigrant employees	-0.00370
	(0.004)
Country immigrant stock (log)	0.0362
	(0.036)
Immigrant employees in the corporation	-0.00339
	(0.008)
Immigrant employees in firm and corp. interaction	0.00000129
	(0.000)
Workforce (log)	0.395***
	(0.054)
Multinational (0,1)	-0.345***
	(0.068)
Exporter (0,1)	0.199***
	(0.034)
Labour 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