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Temporary Expats for Export: Firm-Level Evidence

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Temporary Expats for Exports: Firm-Level Evidence

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Abstract

We analyze the relation between temporary expats in firms and exports. Temporary expats are positively associated with exports. The within-firm-destination-country link with export intensity is substantially larger for services than for merchandise and for exports of heterogeneous services and merchandise than for exports of homogeneous products. Additionally, the association with exports is stronger for temporary than for permanent expats. Furthermore, our evidence suggests that temporary expats are positively related to exports by assisting firms in overcoming informal trade barriers. Overall, our findings suggest the importance of the temporary movement of persons for providing firms with up-to-date links to export markets.

JEL classification: D8, F1, F2, J6

Key words: Expats, temporary movement of persons, migration, networks, firm trade

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I. Introduction

Firms commonly emphasize the importance of face-to-face meetings, in-depth information and personal relations in trade with foreign markets.¹ People with foreign experience may therefore be instrumental to firms for trade because they may hold superior tacit knowledge of foreign markets and be part of foreign networks. The international movement of persons is key to international production networks, which account for an increasing share of trade (National Board of Trade 2013b). With global business enterprises, it may be important to transfer people between distant operations. Movement may facilitate the exchange of tacit knowledge and information, improve coordination, and promote a common business culture. Corporations may also use intra-corporate transfers to develop the competences of employees and to offer them international careers. Employing foreign talent is also necessary when specific skills are scarce domestically. As one firm puts it, *“We work globally – we need people to meet and exchange knowledge. We also need to adapt quickly, or we lose competitive advantages. Mobility is therefore very important to us. Business is better when the right people are at the right place at the right time”*.²

In the situations noted above, persons do not need to move permanently across borders to meet the firm’s objective. One advantage of temporary expatriation is that there are fewer restrictions than for immigration. In addition, social network theory indicates that foreignness is advantageous in linking agents to distant networks, although the characteristic of foreignness arguably vanishes over time (Granovetter 1973).

¹ In addition to case studies and some limited empirical studies (e.g. Denstadli et al. 2013, Gustafson 2012, National Board of Trade 2013b, Westermark 2013, The Economist 2014a), this emphasis is indicated in business surveys regarding meetings and obstacles to trade (Harvard Business Review 2009, Kneller and Pisu 2011).

² The Swedish multinational SKF, cited in National Board of Trade (2013b, p. 10). The Economist (2014b) also highlights the importance of avoiding "bumpkinism" for the performance of multinational firms, such as by promoting cosmopolitan management and cross-country mobility within corporations.

However, even temporary expatriation is substantially circumscribed and often involves substantial, lengthy, costly and sometimes unpredictable administrative procedures.³ Therefore, it may be no coincidence that the temporary movement of service providers within the General Agreement of Services (GATS) appears to account for only a very small share of trade in services (Magdeleine and Maurer 2008).

Figure 1 presents recent OECD data that display an indicator of the restrictiveness across groups of countries of the temporary movement of persons for the provision of services.⁴ Observing “best practices” among countries, there is ample room for improvement with regard to facilitating firm trade through openness to temporary expats. Nevertheless, temporary movement has increased in recent years prior to the global economic crisis (Figure A1).⁵

³ An illustrative example is Massive Entertainment, a fast-growing firm in the Swedish computer game industry. It currently employs 300 persons from 26 countries and continuously needs scarce gaming specialists (Holm 2014). The firm must wait up to 12 months for work permits for foreign specialists and, in the meantime, does not receive any information on the status of the applications. As a result, the firm loses potential foreign specialists and oftentimes must resort to bought-in services or consultants. Another example is the British digital finance firm Wonga, which intended to expand its operations in the United Kingdom (The Economist 2013). Instead, the firm opted to open offices abroad because of the combination of scarce native talent and tough immigration rules. More generally, surveys among multinational corporations suggest that the temporary movement of people implies substantial risks of accidental violations of government policies, thereby incurring penalties (EY 2009, 2013a, b). Moreover, the majority of obstacles to factor flows within the EU (69 percent) involve the movement of people (EU 2013).

⁴ The indicator only captures formal barriers such as bans, quotas and limits, which are delineated in official documents. Other aspects, such as waiting times, visa restrictions, and the uncertainty involved in the process, are not considered. With respect to visa restrictions, i.a., using panel data for Spain, Bertoli and Fernández-Huertas Moraga (2013) and Bertoli and Fernández-Huertas Moraga (2012) find that visa requirements substantially reduce and divert migration flows. An additional restriction is constituted by mandatory licensing to work in specific professions. According to The Economist (2014c), approximately one-third of workers in the US today need a license, whereas only one in 20 needed it in the 1950s. In Sweden, there are at least 40 occupations that are regulated by law (UHR 2014).

⁵ Figures and tables that have prefix A are available in the appendix, and those with prefix B are available at http://www.oru.se/hh/magnus_lodefalk/.

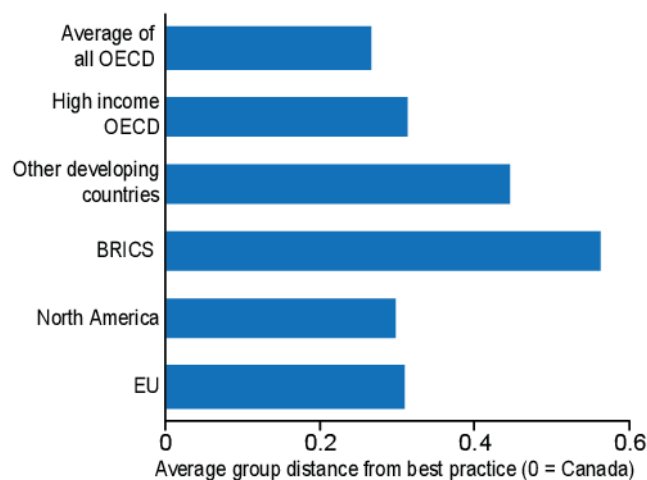


FIGURE 1. SERVICES TRADE RESTRICTIVENESS INDEX FOR MOVEMENT OF PEOPLE

Notes: Own computations of a GDP-weighted services trade restrictiveness index that measures how far countries are from the benchmark country using data from the OECD (2014).⁶

A. Previous literature

Previous studies on the nexus of movements of persons and trade have mainly focused on the bilateral impact of foreign-born immigrants, with a few exceptions, such as studies on temporary skilled worker permits, other foreign visitor policies and travel. Most studies adopt a gravity model of trade, and many employ bilateral panel data on the movement of persons and trade.

In a meta-analysis of the literature on migration and trade in merchandise, the immigration elasticity of trade to immigration is estimated to be approximately 0.15 on average (Genc et al. 2011). More recently, studies have emerged that use firm-level data on migrant employees and trade. These studies find the semi-elasticity of firm trade to immigrant employees to be 1-2 percent on average (Hatzigeorgiou and Lodefalk 2013, 2014, Hiller 2013).

⁶ The Services Trade Restrictiveness Index of the OECD is calculated for five policy areas and for individual service sectors. For each sector, policy areas are assigned different weights based on experts' judgment. We computed a single average across sectors of the weighted index values for the policy area "Movement of People". We then calculated its differences from "best practice" (min. value) as a proportion of "worst practice" (max. value) to attain a standardized (0,1) index, which was then weighted by GDP to compute the average of the country group. BRICS stands for Brazil, Russia, India, China, and South Africa.

Other studies examine the welfare impact of allowing labor to move internationally, using computable equilibrium models. These studies typically conclude that there would be large welfare gains from labor movement (Walmsley, Winters, and Ahmed 2011).

Less permanent movement is captured in studies on the visa policies of countries (Jansen and Piermartini 2009, Kapelko and Volchkova 2013, Neumayer 2010, Yasar and Lisner 2012). For example, Jansen and Piermartini (2009) exploit data on a skilled labor visa program (H1B) in the US and estimate its impact on US trade with the countries of origin of these workers. The visa program allows qualified workers to stay for as long as three years and at most two consecutive periods. The authors find a positive impact on both exports and imports. Yasar and Lisner (2012) argue that bilateral visa waiver programs between the US and certain other countries in the 1950-2003 period promoted US exports.

Another segment of the literature analyzes the role of travel for trade in goods. One recent study finds the elasticity of US exports to business travel to be 0.46 using data on trade with 21 countries in the 1996-2009 period (Riker and Belenkiy 2012).⁷ Temporary movement in the form of tourism may also promote trade, for example, through the discovery of new goods or services (e.g. Brau and Pinna 2013, Quinn 2009). Most recently, Brau and Pinna (2013) analyze the effect of moving people to move goods by regressing the exports of goods of the 25 countries of the European Union on international tourist arrivals in the 1998-2009 period. They find that tourism is positively associated with exports of consumption goods, with an elasticity of 0.05, but the link to non-final goods is small, negative and, in most cases, not statistically significant.⁸

⁷ Other studies include, e.g. Kulendran and Wilson (2000) and Poole (2013).

⁸ A related study examines the relation between international students and alumni networks on the foreign trade of the United Kingdom and finds positive but heterogeneous impacts (Murat 2014).

B. Our contribution

In light of the brief literature review above, the present study contributes by taking a business perspective throughout, including the use of firm-level data; accounting for the impact of temporary expats irrespective of their country of origin, including natives, who may also carry foreign experiences; and studying the effect on trade in services. We begin with a firm model of trade that incorporates insights from social network theory to arrive at hypotheses that are useful for analyzing the role of temporary expats in firms for firm exports in services and merchandise to the corresponding foreign country. Finally, we test the hypotheses by exploiting rich and comprehensive firm-level panel data for Sweden.

There are three reasons we use micro-level instead of macro-level data in this study. First, the confirmed effect of the movement of persons on trade is commonly interpreted as social networks in action, transferring tacit knowledge and matching firms with agents abroad (Aleksynska and Peri 2014). What defines social networks, generally, is that their agents know each other and are socially close to each other (“only a few referrals away”) (Granovetter 1973, Milgram 1967, Podolny and Page 1998). Knowledge and closeness, in turn, build on intensive interaction and social, and possibly spatial, proximity. Therefore, the business network effect on trade would be likely to operate most directly at the micro level, with “movers” affecting firms directly, for example, as employees, consultants or business partners.⁹ A foreign-born person A who is hired by a manufacturing firm in the host country would be expected to facilitate the trade of that firm with his country of origin more than would a fellow countryman B employed in the public

⁹ Herander and Saavedra (2005) demonstrate the importance of proximity for migrants’ effect on trade using state-level US data, whereas Aleksynska and Peri (2014) exploit detailed and pooled cross-sectional data at the macro-level to show that migrants in certain occupational groups that are expected to have more of an influence on business account for an additional effect on trade. More generally, social networks and proximity are considered conducive to knowledge transfer, as discussed by Inkpen and Tsang (2005) and empirically demonstrated by Head, Li, and Minondo (2014).

sector, another countryman C who is in the same profession but resides in a distant part of the country, or an unemployed countryman D who resides in the same state as the firm. Data at the micro level are therefore useful for identifying persons who are more likely to affect firm trade, as opposed to grouping them together with persons who are unemployed, retired, or employed in non-tradable sectors.¹⁰

Second, the use of micro-level data allows us to explore the relation between temporary expats and firm exports in detail and isolation. At this level, the relation can be explored with regard to the character of the expats associated with firms and with firm trade while controlling for confounding factors at more aggregate levels, including expats' home bias in demand. Third, even when temporary expats may not affect the relative size of industries' trade, they may affect the trade of firms within industries or even trade within firms, thereby influencing which firms or firm activities expand or contract. This influence may have potential welfare effects, further motivating micro-level analysis.

As noted above, our paper contributes by examining the impact of temporary expats on firm services trade. Because services are typically characterized as intangible, heterogeneous, and requiring joint production by the producer and consumer, we would expect tacit knowledge and relationships to be especially important for trade in services. It is therefore somewhat surprising that there are only two previous studies on this subject, and both study migration rather than the temporary movement of persons (Hatzigeorgiou and Lodefalk 2014, Foster-McGregor and Pindyuk 2013).¹¹

¹⁰ We hypothesize that temporary expats are akin to the “sociometric stars” of Milgram (1967) – persons who were particularly useful in linking to distant agents – but in the foreign exports context.

¹¹ The main explanation is likely to be that detailed statistics on trade in services have been absent until recently, and they are still relatively general in comparison with statistics on trade in goods.

C. Key findings

We find that employing temporary expats has a positive and statistically significant impact on the subsequent propensity and intensity of exports. The within-firm-destination-country association with export intensity is substantially larger for the export of services than for merchandise. The within-firm association with exports is negatively related to the distance from the country of departure of the temporary expats. That is, temporary expats from the subsequent export destination appear to be most strongly associated with exports there. The results seem to confirm the expectation that firms invest in temporary expats from a foreign country to promote subsequent exports there rather than to access scarce skills in general. As for the channels of mediation, our results suggest that the employment of temporary expats from a specific country enables firms to overcome informal and, in particular, informational barriers to trade with that country. The results are found to be robust to alternative specifications, estimators, and endogeneity concerns.

II. Conceptual and empirical framework

According to social network theory, social networks are “small worlds” in the sense that agents are locally clustered, yet the minimum social distance between them and other distant agents is short (Carayol and Roux 2009). From the empirical literature on firm trade, we know that firm trade networks are also clustered but short in the sense that most firms run business domestically, while a few firms overcome distance and trade internationally, and firms close to the trading firms are also more likely to trade.¹²

Hatzigeorgiou and Lodefalk (2014) explain the “small world property” of firm trade within a parsimonious heterogeneous firm framework of trade by modelling the endogenous preparatory investment behavior of

¹² For example, being part of a multinational corporation is positively associated with firm exports, which may at least partly be due to the international experience of the corporation.

firms and the free-riding of others.¹³ In their model, firms may prepare for exports by investing in costly direct links that shorten the informational and social distance to distant clusters and thereby reduce uncertainty in foreign trade. The investment in links is assumed to be specific to a foreign market. Through these links, the firm is able to attach a special appeal to the product of the firm in the eyes of consumers there such that export revenues increase.¹⁴ Other firms that are close to the first firm may benefit from the investment made by that firm and may choose not to invest or to invest less, but this behavior reduces their export revenues. The model of HL suggests the hypotheses that firms' own investments create trade partner-specific appeal, which promotes exports (H1), and that this investment discourages other related firms from investing as much, which therefore reduces their exports (H2).¹⁵ In their empirical application, HL use the hiring of immigrants as a proxy for investment in foreign networks.

Our conceptual framework is based on the HL model but also considers anecdotal evidence noted in the introduction of this paper that firms might invest in expats for reasons other than the promotion of exports per se.¹⁶ First, persons with foreign experience may be hired or employed for their specific skills to improve the efficiency of the firm.¹⁷ Second, persons may be

¹³ The model incorporates features of Carayol and Roux (2009) into a firm model of trade, drawing heavily on Cristea (2011). The model is advantageous in considering the social embeddedness of the firm, which, in estimation, would otherwise introduce potential omitted-variable bias.

¹⁴ Alternatively, the specific appeal could be attached to the business relation.

¹⁵ The firm maximizes profits and arrives at the following log-linearized export revenue function: $\ln r_{ij}^*(\varphi) = \ln c_{ih} + \ln i_{ihj}^*(\varphi) + \ln \sigma - \ln \theta_h$, where r_{ij} is revenue from exports of the firm in country i , in sector h , to country j , c_{ih} is the unit cost of the service of links to foreign networks, i_{ihj} is the investment in services of links, σ is the CES between varieties of a product, and θ_h denotes informational frictions in sector h . In turn, i_{ihj} is negatively affected by investment by other firms in the vicinity of the firm under parameter assumptions in line with Carayol and Roux (2009).

¹⁶ Access to foreign social networks may be useful for reasons other than primarily fostering exports, such as acquiring skills, improving learning, or improving management (Podolny and Page 1998).

¹⁷ In addition to the potential importance of specific human capital from abroad, there is a small related body of literature that explores the impact of ethnic diversity on economic

brought in for their know-how, which can help to differentiate the firm's offers to attune to customer demand. When any of these actions pay off in terms of increased efficiency or demand, they are also expected to positively affect export revenues. Thus, we have two propositions that extend beyond HL: firms may invest in temporary expats to improve efficiency (H3) and/or to attune to customer demand (H4); both cases may promote exports. In this sense, we also improve upon HL because we consider all three channels of influence of temporary expats on firm exports (foreign networks, efficiency improvement, and attunement to customer demand). We thereby hope to further isolate the effect of investment in links (through temporary expats) on firm exports. We conceptualize temporary expats as persons who have arrived in the host country from abroad to work for a limited amount of time. Thus, we include both foreign-born persons and natives with international experience, which, from a business perspective, makes the most sense.

Finally, we hypothesize that temporary expats, through their "foreignness" relative to permanent expats, are more likely to promote firm exports of products that are especially dependent on up-to-date linkages to foreign markets, for example by assisting in the fine-tuning of the products of the firm and their distribution for the foreign market (Granovetter 1973, Jansen and Piermartini 2009). Therefore, we expect firms' hiring of temporary expats to have a larger effect on the export of services and heterogeneous products than the hiring of permanent expats (H5).¹⁸

performance in terms of productivity or innovation. The results are mixed (e.g. Parrotta, Pozzoli, and Pytlikova 2014a, Parrotta, Pozzoli, and Pytlikova 2014b, Alesina and Ferrara 2005, Peri 2012). Parrotta, Pozzoli, and Pytlikova (2014a) find that diversity is negatively linked to productivity in Danish firms with at least ten employees in the 1995-2005 period, with diversity measured in the form of a Herfindahl index that is based on statistics on the classification of employees as belonging to one of eight country groups. Parrotta, Pozzoli, and Pytlikova (2014b) use similar data and conclude that ethnic diversity is positively associated with firm innovation.

¹⁸ However, temporary expats are expected to be less integrated in the host country, which may reduce their ability to link agents. Nonetheless, such a negative bias is more primarily applicable to temporary expats who are entrepreneurs than for temporary expats who are employed in a host country firm, which has its own domestic network.

A. Data and descriptive statistics

To empirically examine our predictions, we match firm-level panel datasets for Sweden with detailed data on cross-border merchandise exports and services exports provided cross-border or through the movement of the consumer or producer of the services (GATS modes 1, 2 and 4).¹⁹ The panel of firms encompasses all Swedish firms with at least 10 employees and their trade with 176 countries over the 1998-2007 period. However, when we study trade in services, we focus on the union of all firms in the 1998-2002 period and firms continuously included by Statistics Sweden in their stratified survey on trade in services in the 2003-2007 period.

Next, we match the dataset with register data for Sweden on firms' hiring of expats and the country of birth, emigration, length of stay and skill level of the expats. Exploiting register data on firm hiring is currently the only feasible way to operationalize our concept of temporary expats at the micro-level. Other available datasets, such as those on business travelling or residency permits for purposes of remuneration, only contain aggregate numbers that are disconnected from specific firms.²⁰

We operationalize the concept of temporary expats as persons who arrive from abroad for work at a hosting firm, are registered as residents, and have been in Sweden less than four years.²¹ The operational definition is

¹⁹ The sources of the resulting dataset and definitions of variables are contained in Table A1 of the Appendix, and the countries included are in Table B1 of the Online Appendix. We note that underlying the dataset is a register-based linked employer–employee dataset, which has been aggregated to the firm level by Statistics Sweden for reasons of confidentiality.

²⁰ Another advantage of using population registers is that physical flows are captured, whereas data on permits capture approved applications that might never ultimately be used.

²¹ To be more specific with respect to the requirement of time in Sweden and the contractual relationship with a firm in Sweden, we expect to capture persons who have been in Sweden less than four years after their most recent arrival and for whom two additional conditions are fulfilled, as explained below. With regard to the time limit, to the best of our knowledge, firms consider postings or secondments for presence in the host country of less than four years, else regular employment. With respect to the additional conditions, first, expats need to be expected to stay in Sweden at least a year with some regularity, where regularity means the equivalent of a weekly stay-over during the rest of the year. Second, they must have been reported to Inland Revenue (IR). The first requirement is related to being registered as a resident in Sweden. Being registered as a resident is almost a necessity for a temporary expat

substantially broader than Mode 4 of the GATS, for example, in that it includes not only important categories such as intra-corporate transferees but also persons arriving for employment and natives returning home. However, the definition is narrower than Mode 4 to the extent that it excludes two categories of temporary expats: those who have been in Sweden less than a year and who plan to move from Sweden before one year has passed since arrival, such as business travelers and workers posted abroad for less than a year, such as contractual services suppliers; and those who are not reported to Inland Revenue by a hosting firm, such as independent professionals. Moreover, in our estimations, we exclude persons from countries of conflict because we are interested in the temporary movement of persons who are pulled to Sweden rather than those who are pushed to come because of conflicts in their home country. Countries of conflict are identified by merging our main dataset with information from three historical databases on conflicts.²²

Arguably, limiting our operational definition of temporary expats to those who stay somewhat longer is only a minor concern. First, persons who visit Sweden for a very short time might not have as much effect

in Sweden, even when the person only intends to stay for a relatively short time. The reason is that residency status qualifies a person to receive a personal ID number, which every native is automatically given at birth, including returning Swedish expats. Only with such a number is it possible to easily conduct everyday life in Sweden. The personal ID number is commonly needed when renting a car, collecting an item at the post office, renting a flat, opening a bank account, etc. (National Board of Trade 2013a). Consequently, firms in Sweden that host persons on secondment typically assist in the registration of these persons as residents, for example, as part of a reallocation agreement. The second requirement is fulfilled for persons who come to Sweden for employment and commonly for persons on secondment in Sweden. Persons on secondment retain their employment and often their salary (or part thereof) from abroad, but they are also registered as employees in the hosting firm. As employees, they are normally reported to IR by the hosting firm in Sweden and must be reported if a benefit of any kind is provided to them, such as accommodations or a business car.

²² Five of the top ten source countries of immigrants living in Sweden in 2007 were countries beset by conflict. We classify a country as a conflict country if at least 25 persons in the country have died in 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 (2014d, 2014c, 2014a, 2014b).

on firm performance as those who stay longer because they are not able to transmit or absorb as much information and because building relationships and trust takes time. Second, the conceptual framework motivates us to focus on temporary expats who stay somewhat longer because it views the hiring of persons with foreign networks as an investment, which is expected to take time to pay off. Third, the categories that we do capture are likely to account for a major share of the temporary movement of persons across borders.²³ In Sweden and in the rest of the EU, the majority of residence permits for purposes of remuneration to third-country nationals are for durations of 12 months or more (Eurostat 2012a, b).²⁴ Moreover, we note that approximately two-thirds of WTO members' commitments on market access in Mode 4 consist of intra-corporate transferees, executives, managers and specialists, and these are categories that we expect to capture (WTO 2009).

In Table 1, we provide a snapshot of our dataset in 2007. The sample contains approximately 30,000 Swedish firms and their 1.8 mn employees. Most firms are small, and most do not conduct business abroad or trade with foreign countries. The average number of temporary expats in the sample is one, whereas the average number of permanent expats is 10.²⁵ Corporate firms have access to a larger pool of expats, with a mean of four and 39 temporary and permanent expats, respectively. With respect to education, 37 percent of expats only have secondary education, but 46 percent

²³ Our discussions with businesses suggest that most temporary movers stay at least a year and that approximately 90 percent of them subsequently leave the country.

²⁴ In December 2012, 93 percent of valid residence permits were for purposes of remuneration, and 49 percent of the new permits issued during that year consisted of permits for 12 months or longer, with approximately half of the EU member states mostly issuing new permits for long durations. However, a caveat is that that information is lacking on the duration of EU professionals' stay in other member countries given that they do not need a work permit. However, for the reasons explained above, postings in Sweden normally imply the need for a personal identification number. Therefore, EU professionals are expected to register as residents and employees and thus are included in our dataset.

²⁵ In the period studied, on average, 52 percent of temporary expats were employed in firms that export.

of temporary expats have post-secondary education.²⁶ Most temporary expats are from Europe (Table A2). However, the US, Iraq and Thailand qualify as three of the top ten countries of origins for temporary expats in Sweden. Interestingly, and in line with what we would expect if firms hire to export, the top ten countries of origin are also major trade partners with Sweden. More specifically, six and seven out of the top 15 trade partners in services and merchandise, respectively, are among the top ten sources for temporary expats in Sweden.²⁷

²⁶ Table B2 of the Online Appendix.

²⁷ If only non-conflict countries are included, the top 10 source countries of temporary expats to Sweden are Poland, Norway, Germany, Finland, Denmark, France, the Netherlands, Australia, Lithuania, and Switzerland. Nine and eight of these countries are among the top 15 destinations for Swedish exports of merchandise and services, respectively. Seven of the source countries of temporary expats are also among the top source countries of permanent expats.

TABLE 1—A SNAPSHOT OF THE FIRM-LEVEL DATASET IN 2007

	<i>Mean</i>	<i>Median</i>	<i>Std. dev.</i>	<i>Min.</i>	<i>Max.</i>
Services export volume*	4,810.59	0	191,870.20	0	23,615,000.00
Services import volume*	4,805.07	0	175,948.50	0	21,520,566.00
Merchandise export volume	23,180.28	0	379,300.19	0	42,134,368.00
Merchandise import volume	17,455.89	0	239,570.89	0	25,257,506.00
Temporary expats in the firm	1.25	0	8.51	0	720
Permanent expats in the firm	9.54	2	68.22	0	4,710
Temporary expats in the rest of the corporation	3.50	0	23.18	0	768
Permanent expats in the rest of the corporation	38.84	0	228.00	0	5,002
No. of employees	60.12	19	355.02	10	na
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
Merchandise exporter	0.33	0	0.47	0	1
Merchandise importer	0.38	0	0.48	0	1
Services exporter**	0.13	0	0.13	0	1
Services importer**	0.14	0	0.15	0	1

Notes: 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 146 USD). One maximum values 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.

With regard to the correlation between temporary expats and firms' trade in services, we note that it is the strongest correlation between key variables and services trade and that the correlation is substantial for trade in merchandise, although it is dominated by other determinants of trade in merchandise, such as market size.²⁸ We take this finding as an indication that there might be a causal relation, as predicted by the framework presented, which merits further analysis.

To further consider whether firms prepare for exports by investing in foreign networks through the hiring of temporary expats, we explore the hiring pattern of firms around export entry. Figure 2 displays the number of firm-destination-country observations without previous trade

²⁸ Tables B3.1-2 of the Online Appendix.

experience and without previous hiring of temporary expats but where the firm then hires its first temporary expat around export entry. We find that the number of such observations increases sharply before export entry and subsequently declines. This finding suggests that firms prepare for exports by hiring temporary expats.²⁹

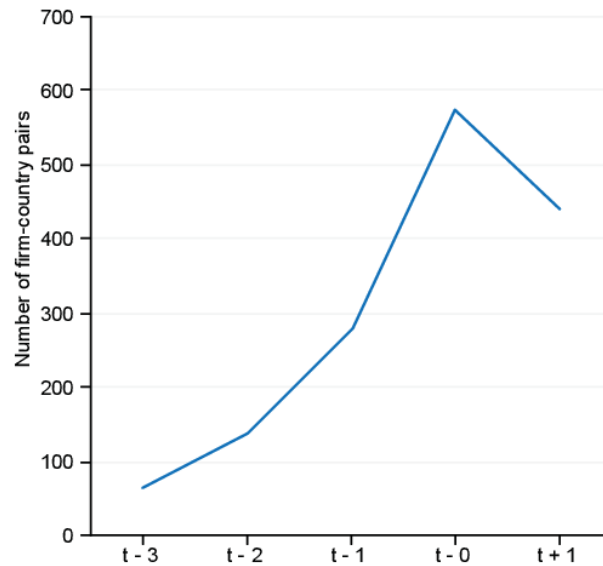


FIGURE 2. NUMBER OF FIRM-COUNTRY PAIRS HIRING THEIR FIRST TEMPORARY EXPAT AROUND SERVICES EXPORT ENTRY

Notes: The figure displays 14,826 firm-country dyads in the 1998-2002 period that experienced first entry into export of services and that hired their first immigrant from that country.

B. Econometric approach

To empirically go beyond descriptive statistics and test the hypothesized association between temporary expats and firm exports, we specify the following log-linear econometric model:

$$(1) \quad E(x_{fijt} | \mathbf{I}_{fijt-n}, \mathbf{G}_{fijt-n}, \mathbf{H}_{fijt}) = \mathbf{I}_{fijt-n} \boldsymbol{\beta}_I + \mathbf{G}_{fijt-n} \boldsymbol{\beta}_G + \mathbf{Y} \boldsymbol{\beta}_Y + \mathbf{H}_{fijt} \boldsymbol{\beta}_H,$$

²⁹ Looking at all firms, we discern a similar pattern in which the total number of temporary (and permanent expats) increases before and decreases after export entry.

where the expected conditional export revenue x_{fijt} of firm f in source-country i from export to destination-country j at time t is a function of investment in foreign links of row vector I_{fijt-n} at time $t-n$; time-variant firm-level gravity variables of row vector G_{fijt-n} (firm size, labor productivity, multinational status, previous export experience, human and physical intensities, destination-country GDP, destination-country population size, and source-country immigrant stock); year-specific shocks of row vector Y ; and heterogeneity at firm, industry, destination-country and firm-destination-country levels of row vector H_{fijt} .³⁰ The stock of immigrants from j is included to control for what White (2007) has coined the transplanted home bias in demand, which may also affect exports, as emphasized in Hatzigeorgiou and Lodefalk (2013).³¹

We proxy firm investment in links to a foreign market with the hiring of temporary expats. Temporary expats have arrived in Sweden from the foreign market, but they may have been born abroad or in Sweden. However, they all have in common that they have arrived in Sweden from the particular foreign market. More formally, based on our first hypothesis, we expect a temporary expat from country j to foster the subsequent trade of the employing firm to country j . The effect, if any, will be captured in column vector β_I as a semi-elasticity; that particular variable is not in logs because most firms do not have a temporary expat from a particular country.

Another investment variable is the number of temporary expats in the vicinity of the firm. These temporary expats may affect firm exports directly and indirectly through their effect on firm investment, which, in turn,

³⁰ Estimating the log-linear export revenue function of HL's theoretical model necessitates scarce data on information frictions and unit costs of the services of temporary expats across countries and industries while omitting known export determinants, such as firm size and multinational status. We therefore add fixed effects that capture variables for which data are scarce and key firm-level and gravity variables that are omitted from the parsimonious model of HL.

³¹ The variable corresponds to the idiosyncratic demand shock of HL's theoretical framework.

affects firm exports, according to our second hypothesis. We implement this by adding the number of temporary expats in other subsidiaries of the same corporation and its interaction with the firm investment variable. From our conceptual framework, we expect the semi-elasticity of temporary expats in the rest of the corporation to be positive but small compared with the one for in-house temporary expats. Moreover, we expect investment by other subsidiaries to reduce firm investment in the firm's own links to foreign markets, which is why exports of the firm decline, as captured by a negative coefficient of the interaction variable.

Although our focus is on temporary expats, we include the number of permanent expats from j in the firm and in the rest of the corporation as well as their interaction in vector I . This approach enables us to compare the association between temporary expats and exports with the association between permanent expats and exports, which is in line with our fifth hypothesis that temporary expats have a greater effect on export of services and heterogeneous products than permanent expats do. By including permanent expats, we also attempt to avoid omitted-variable bias related to the potential effect of their employment on firm trade.

The empirical specification has a lagged structure because gains from investment in foreign networks – for example, in the form of temporary expats – are likely to take time to materialize. It also takes some time for a temporary expat to familiarize herself with the firm and for the firm to absorb and begin to exploit her know-how and social networks abroad, creating trust in foreign business relationships and furthering exports. Specifically, we model exports as a function of investment in the previous year conditioned on covariates established two years prior.

We are aware that a regression of firm exports on investment in links to foreign networks and key confounding factors may remain inconsistent and biased for a number of reasons. For example, the managers of the firm may previously have strategically decided to only focus on the local,

regional or national market or to further penetrate a specific foreign market with which the firm has historic relations through trade, employment or even personal relations. The investment vector could also be endogenous to the error term if we omit country-pair affinity, for example, because of colonial relationships. To address these concerns, we exploit comprehensive panel data and focus on the within-firm-destination-country impact of investment on exports across time while controlling for heterogeneity at several levels, as specified above.³²

III. Results

A. Benchmark estimates

The role of trade partner-specific investment for exports through the hiring of temporary expats is estimated in Table 2. In Columns 1-2, we estimate the within-firm-destination-country association between investment in links to that foreign market and the probability to export to that market, whereas in Columns 2-3, we estimate the association to export values. We find that the coefficients of temporary expats are positive in the probit and OLS estimations and statistically significant in all but the probit estimation for export of services.³³

³² In the robustness analysis, we also add destination-country-year specific effects, which stretch the limits of the computational resources we access. One advantage of doing so is that, for example, this approach controls for the short-time movement of persons, such as business visitors from country i in country j .

³³ Key control variables have the expected signs in comparison with previous within-estimations of firm-level gravity models, which largely focus on trade in merchandise. A firm is more likely to export (and it exports more) the larger the market is, and firms export more the more efficient the firm is and the larger its workforce is. As for the negative sign of the indicator of multinational status, in Columns 1-3, the sign is related to the lagged structure of the specification and the inclusion of fixed effects. Additional analysis shows that becoming part of a multinational promotes the intensity of services exports in the current year, but not two years later. We interpret this finding to mean that firms gradually accommodate to their new opportunities of serving the foreign market through foreign affiliates, substituting it for other modes of delivery, which would seem to be particularly attractive for services sales. The results are in line with previous findings that becoming a multinational has heterogeneous effects on exports (e.g. Greenaway and Kneller 2007, Girma and Kneller 2008).

In line with the expectation that investment in foreign links is more important for trade in services, which is more sensitive to information barriers, the coefficient for export values of services is larger (44 percent) than the one for merchandise exports, Columns 3-4. The displayed coefficients are semi-elasticities, which imply that hiring another temporary expat is associated with 3.9 percent more merchandise exports and 5.6 percent more service exports.

Permanent expats are also positively linked to the propensity and intensity of exports. In fact, for firm export values of merchandise, the semi-elasticity of permanent expats is approximately as large as that of temporary expats, whereas for export values of services, it is substantially smaller than that of temporary expats.

Somewhat surprisingly, for multinational corporate firms, expats in other subsidiaries are not significantly linked to firm exports except for the propensity to export merchandise. This result seems to underline the role of proximity for the nexus between expats and trade. As for the interactions between firm investment in foreign links and investment in other parts of the same corporation, the associations are small, negative and statistically significant or mostly positive but statistically insignificant at conventional levels of significance.

The estimation results of Table 2 seem to confirm our first hypothesis that to promote exports, firms invest in trade partner-specific links by hiring expats. The stronger link of temporary expats to firm export values of services might imply that temporary expats play a particularly important role in tackling informational barriers to the export of services. Moreover, the fact that their link with the export of services is stronger than that of permanent expats seems to confirm our (fifth) hypothesis that temporary expats, due to their foreignness, are more important than permanent expats for the export of products that are especially dependent on up-to-date information and contacts, such as services. However, regarding the second hypothesis that

investment discourages others from investing and therefore affects their exports, the results confirm this case for permanent expats only, and the magnitude of the spillover is very small.

TABLE 2—TEMPORARY EXPATS AND FIRM EXPORT

	(1)	(2)	(3)	(4)
	P(Firm export)		Firm export (log)	
	<i>Services</i>	<i>Merchandise</i>	<i>Services</i>	<i>Merchandise</i>
Temporary expats	0.00490 (0.007)	0.0131** (0.006)	0.0558** (0.028)	0.0387*** (0.014)
Permanent expats	0.00733*** (0.003)	0.00766*** (0.003)	0.0397*** (0.014)	0.0370*** (0.012)
Country immigrant stock (log)	-0.0207** (0.008)	-0.000715 (0.003)	0.00125*** (0.000)	0.000182 (0.000)
Temporary expats in the corporation	-0.00176 (0.003)	0.0000648 (0.002)	-0.0137 (0.012)	-0.00336 (0.007)
Permanent expats in the corporation	-0.000356 (0.000)	0.000570* (0.000)	-0.00238 (0.002)	0.00143 (0.001)
Temp. expats in firm and corp. interaction	0.000725 (0.000)	0.000686 (0.000)	0.00316 (0.003)	0.00136 (0.001)
Perm. expats in firm and corp. interaction	-0.0000223*** (0.000)	-0.00000566 (0.000)	-0.0000718*** (0.000)	-0.0000311** (0.000)
Workforce (log)	0.00446 (0.017)	-0.0403*** (0.007)	0.0457*** (0.007)	0.111*** (0.004)
Multinational (0,1)	-0.130*** (0.022)	-0.0633*** (0.009)	-0.0323*** (0.008)	0.0157** (0.006)
Exporter (0,1)	1.569*** (0.012)	2.092*** (0.005)	1.265*** (0.068)	-1.001*** (0.031)
Labour productivity (log)	0.0126 (0.014)	-0.000704 (0.006)	0.0178*** (0.004)	0.0142*** (0.002)
Human capital intensity (log)	-0.0000373 (0.026)	-0.00306*** (0.001)	0.000143 (0.001)	0.000721*** (0.000)
Physical capital intensity (log)	-0.0251*** (0.003)	-0.00279** (0.001)	-0.000603 (0.001)	0.000506 (0.000)
GDP (log)	0.597*** (0.090)	-0.0572 (0.036)	0.259*** (0.018)	0.0509*** (0.009)
Population (log)	-0.388* (0.226)	1.327*** (0.084)	0.176*** (0.058)	0.702*** (0.033)
Obs.	1,871,391	10,958,130	1,883,765	10,958,130
Adjusted / Pseudo R^2	0.52	0.67	0.55	0.78

Notes: Robust and clustered standard errors in parentheses. Firm, destination-country, firm-destination-country, industry, and year fixed effects are included throughout. In columns 3-4, response variables are in logs (1e-7 added to avoid truncation). * p < 0.10, ** p < 0.05, *** p < 0.01

In general, our previous findings indicate a positive relation between temporary expats and the propensity to export merchandise but not

the propensity to export services to their source country. Nonetheless, it is possible that such a link to export of services exists for firms that are less experienced as exporters. In Table 3, we display the results for these firms. For firms that have exported neither goods nor services, there is no positive link between temporary expats and the propensity to export services. The same result applies to firms that have exported services, but not to country j . However, for firms that lack any experience in exporting services, there is a positive and weakly significant within-firm-destination-country association between temporary expats from country j and the subsequent propensity to export services to that country.

TABLE 3—THE ROLE OF TEMPORARY EXPATS FOR FIRMS WITHOUT EXPORT EXPERIENCE

	(1)	(2)	(3)
	P(Firm services export)		
	<i>Non-exporters</i>	<i>Non-services-exporters</i>	<i>Non-services-exporters to j</i>
Temporary expats	0.0104 (0.016)	0.0271* (0.016)	0.00392 (0.007)
Permanent expats	0.111*** (0.033)	0.0386*** (0.009)	0.0143*** (0.004)
Obs.	242,776	963,233	1,798,416
Pseudo R^2	0.34	0.32	0.30

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

B. Temporary expats for country-specific export or for general sales?

As discussed in the conceptual framework, firms may invest in temporary expats to link to foreign networks (H1-2), but they may also invest in expats to acquire particular skills that the firm regards as instrumental to improve firm efficiency (H3) or attune to general changes in customer demand (H4). For example, managers with logistical expertise may be hired by a manufacturing firm to improve the setup of a production line, or software engineers may be

hired to incorporate features such as long-distance monitoring of the industrial products that the firm manufactures.

To disentangle the first hypothesis from hypotheses three and four, we augment the investment vector of our main specification with the numbers of temporary expats from other parts of the same region as country j and those from the rest of the world. If the firm hires to increase efficiency or to adapt to general changes in customer preferences, then we would expect the country of origin of the temporary expat to be irrelevant. However, if the firm hires from country j to create trade partner-specific appeal that promotes exports to that country, then temporary expats from farther away should not affect exports to country j .

In Table 4, we present estimation results that are consistent with firms that invest in temporary expats to create trade partner-specific appeal rather than to primarily promote efficiency or adapt to general changes in customer preferences. In Table 4, the within-firm-destination-country magnitude of the relation between temporary expats and exports decreases with distance. The relation is strongest for temporary expats from country j , of medium strength for those arriving from other countries in the same region as country j , and weakest for temporary expats from other regions of the world.³⁴ Additional results show that the effect of distance on the link between expats and the export of services is substantially smaller for permanent expats.³⁵ This finding is in line with the underlying assumption of our fifth hypothesis that firms hire temporary expats to obtain up-to-date links to country j but may hire permanent expats only for entry into country j or for other reasons, such as to promote firm efficiency.

³⁴ However, it appears as if the level of statistical significance of the relation might be weakly and positively related with distance. One possible explanation may be that the more the expats' area of departure shrinks, the more the number of temporary expats declines.

³⁵ The results are available upon request.

TABLE 4—TEMPORARY EXPATS AS FACILITATORS FOR EXPORT, EFFICIENCY ENHANCERS, OR PROMOTERS OF CUSTOMER DEMAND

	(1)	(2)
	Firm export (log)	
	<i>Services</i>	<i>Merchandise</i>
Temporary expats from <i>j</i>	0.0441 [†] (0.029)	0.0193 [‡] (0.015)
Temporary expats from <i>j</i> 's neighbours	0.00718* (0.004)	0.0107*** (0.003)
Temporary expats from elsewhere	-0.00343*** (0.001)	0.00651*** (0.001)
Obs.	1,883,765	10,958,130
Adjusted R^2	0.55	0.78

Notes: Robust and clustered standard errors in parentheses. Firm, partner country, firm-partner country, industry, and year fixed effects are included throughout. Response variables are in logs (1e-7 added to avoid truncation). For brevity, other firm and gravity estimates are not reported. † $p < 0.20$, ‡ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

C. Skills of temporary expats and firm exports

If firms strategically hire temporary expats to promote exports through foreign networks, as hypothesized in HL, we would expect the impact to be particularly strong for skilled or highly educated expats (Gould 1994). Temporary expats with post-secondary education are likely to possess general skills associated with higher education beyond any relevant knowledge in the subject area of the firm, such as the general ability to easily absorb, apply and transmit knowledge. These general skills would assist the exchange of firm-specific and foreign-market-specific information between the individual and the firm. Finally, if temporary expats facilitate exports to a foreign country through their previous experience with that country, highly educated expats seem to be more likely to have relevant pre-knowledge and networks in that country, for example, through previous work there.

To analyze the impact of temporary expats with different levels of skills, we decompose our previous results by regressing firm export values

on temporary expats with and without post-secondary education. What emerges, in Table 5, is a pattern in which the semi-elasticities of skilled expats in relation to exports of services are substantially larger in comparison with those of unskilled expats, and only the semi-elasticity of skilled expats is statistically significant. Hiring another skilled temporary expat from country j is associated with approximately 14 percent more exports of services to that country. An inverted mirror image is displayed for exports of merchandise, in which only unskilled expats are associated with exports at any conventional level of statistical significance. In combination with the previous findings, the results suggest that the effect of temporary expats on exports of services is mediated through temporary expats with post-secondary education who assist firms in handling informational frictions in trade.

TABLE 5—TEMPORARY EXPATS AND POST-SECONDARY EDUCATION

	(1)	(2)
	Firm export (log)	
	<i>Services</i>	<i>Merchandise</i>
Skilled temporary expats	0.144*** (0.055)	0.0323 (0.028)
Unskilled temporary expats	0.0455 (0.042)	0.0510*** (0.020)
Skilled permanent expats	0.195*** (0.031)	0.0331* (0.019)
Unskilled permanent expats	0.00924 (0.013)	0.0380** (0.015)
Obs.	1,883,765	10,958,130
Adjusted R^2	0.55	0.78

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

D. Does country of birth matter?

Given that the present study focuses on the temporary movement of persons and exports, we consider not only expats born in the export destination but also native expats returning home and expats born elsewhere. In this regard, the study differs fundamentally from previous studies on the nexus between migration and trade and on visa policies and trade. We reason that what matters for export facilitation is the knowledge and contacts that persons have rather than their country of birth or citizenship. As an illustrative extreme case, consider a Swede who has worked in Chile for five years and temporarily returns home to work at the head-office and a person who was born in Chile but was adopted and raised by a family in Germany and who now temporarily works for a Swedish firm. In this case, it might be presumed that the native expat would be more useful for a Swedish firm wanting to connect to the Chilean market than the expat from Germany. However, in less extreme cases, it could be the case that expats who are born in and arrive from the export destination country to work in the host country have more profound foreign linkages and therefore affect firm exports more than other expats.

To explore whether the impact of temporary expats differs across groups of expats according to their country of birth, we rerun the regressions of Table 2 but with temporary expats split into the following groups: those born in country j , Swedish expats, and other expats. The estimation results in Table 6 show that, in general, expats born in country j are positively associated with the propensity and intensity of exports, whereas other expats have heterogeneous links to exports according to the group to which they belong. Temporary expats born abroad are linked to the export of services but not to the export of merchandise, with the strongest link to the export of services for temporary expats born abroad. By contrast, the coefficients of temporary expats from Sweden are only positive and statistically significant for firm export of merchandise, whereas the coefficients of permanent expats from Sweden are only positive and statistically significant for firm export of

services. The finding that only temporary expats from abroad seem to affect firm export of services might sustain the assumption that more in-depth knowledge is acquired by being born in and arriving from country j or by being (most likely) born in the same region and arriving from country j to Sweden than by being a Swedish expat arriving from country j .

TABLE 6—TEMPORARY EXPATS BORN IN THE DESTINATION-COUNTRY, SWEDEN, OR ELSEWHERE

	(1)	(2)	(3)	(4)
	P(Export)		Firm export (log)	
	<i>Services</i>	<i>Merchandise</i>	<i>Services</i>	<i>Merchandise</i>
Temporary expats born in j	0.0153** (0.007)	-0.000172 (0.009)	0.123*** (0.037)	0.00277 (0.017)
Temporary expats born in Sweden	-0.0132 (0.0205)	0.0556*** (0.016)	-0.0489 (0.066)	0.100*** (0.031)
Temporary expats born elsewhere	0.0497 (0.0360)	0.0298 (0.031)	0.292*** (0.110)	0.0752 (0.054)
Permanent expats born in j	0.00526** (0.003)	0.00448* (0.002)	0.0265** (0.013)	0.0376*** (0.014)
Permanent expats born in Sweden	0.0397*** (0.012)	0.00831 (0.012)	0.168*** (0.044)	0.0287 (0.024)
Permanent expats born elsewhere	0.0363922 (0.023)	0.0322 (0.027)	0.0795 (0.066)	0.0678 (0.057)
Obs.	1,871,391	10,958,044	1,883,765	10,958,130
Adjusted / Pseudo R^2	0.52	0.67	0.55	0.78

Notes: Robust and clustered standard errors in parentheses. Firm, destination-country, firm-destination-country, industry, and year fixed effects are included throughout. In columns 3-4, response variables are in logs (1e-7 added to avoid truncation). For brevity, other firm and gravity estimates are not reported. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

E. Temporary expats and the heterogeneity of exports

We also examine whether the link between temporary expats and exports is larger for more heterogeneous goods and services. Informational frictions are likely to obstruct the trade of heterogeneous products more than the trade of

homogeneous products that are traded on organized exchanges; therefore, trade in some products is likely to be more relationship intensive (Rauch 1999, Nunn 2007). Therefore, temporary expats who are hired by a firm can be expected to be particularly instrumental in promoting exports by creating trade partner-specific appeal that distinguishes the firm's products from those of other firms. Table 7 displays estimation results that seem to confirm this expectation.³⁶ Temporary expats are positively associated with the export of heterogeneous services and merchandise at the one percent level of statistical significance. By contrast, the relation to exports of homogenous products is not statistically significant at any conventional levels.

As shown in Columns 1 and 3 of Table 7, temporary expats are more strongly associated with the export of heterogeneous services and merchandise than are permanent expats.

TABLE 7—TEMPORARY EXPATS AND THE HETEROGENEITY OF EXPORTS

	(1)	(2)	(3)	(4)
	<i>Firm export (log)</i>			
	Services		Merchandise	
	<i>Heterogeneous</i>	<i>Homogeneous</i>	<i>Heterogeneous</i>	<i>Homogeneous</i>
Temporary expats	0.0744*** (0.027)	-0.0244 (0.019)	0.0435*** (0.015)	0.0215 (0.013)
Permanent expats	0.0281** (0.012)	0.0304** (0.012)	0.0374*** (0.013)	0.0326*** (0.011)
Obs.	1,883,821	1,883,858	10,958,130	10,958,130
Adjusted R^2	0.53	0.58	0.77	0.72

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

³⁶ In the classification of merchandise as heterogeneous, we follow Rauch (1999), whereas for services, we draw on industry classifications that consider occupational composition in industries and their corresponding skill requirements (O'Mahony and van Ark 2003, Peneder 2007). Presumably, heterogeneous services are predominantly produced by employees in occupations that require high skills.

These results further strengthen the confirmation above of our fifth hypothesis. We therefore conclude that temporary expats, due to their foreignness, seem to be more apt than permanent expats to promote firm export of products that are especially dependent on up-to-date linkages to foreign markets.

F. Mechanisms of influence

So far, our results have demonstrated a positive within-firm-destination-country association between temporary expats and subsequent exports. The association is stronger for expats arriving from the export partner country, for skilled expats, for trade in services, and for trade in heterogeneous products. However, to further our understanding of the mechanisms of this influence, we explore the potential heterogeneity in the effects of temporary expats across trade barriers.

We augment the main specification with three indicators of trade barriers and their interaction with the temporary expat variable. The time-variant indicator of formal trade barriers encompasses tariff and non-tariff barriers for trade (Heritage Foundation 2014).³⁷ The measure of informal barriers to trade consists of the cultural distance between Sweden and the export destination country and an indicator of whether at least one-fifth of the population speaks English (Mayer and Zignago 2011, Tadesse and White 2010).³⁸ In Table 8, we display the results. The largest coefficient among the interactions and the only one that is statistically significant, for services, and closest to significance, for merchandise, is the one between temporary expats and cultural difference. The coefficient is positive, indicating that the more

³⁷ In brief, the indicator is the difference between a measure of the relative absence of weighted tariff levels above the world minimum and a measure of the absence of non-tariff measures for goods and services.

³⁸ Unfortunately, these indicators of informal barriers, like most other such indicators currently available, are cross-sectional and limited in terms of country coverage. As a result, in this estimation, we are only able to keep 38 countries and we must replace destination country-specific effects with region-specific effects to consider unobserved destination-specific heterogeneity.

culturally different the destination country is from the host country of the exporting firm, the more strongly temporary expats are associated with export.³⁹ These results seem to suggest that temporary expats are primarily instrumental in overcoming informal trade barriers between Sweden and the export destination country, at least for the export of services, but do not appear to assist firms in handling formal trade barriers, such as tariffs and technical rules.⁴⁰

TABLE 8—TEMPORARY EXPATS AND COUNTRY BARRIERS TO TRADE

	(1)	(2)
	Firm export (log)	
	<i>Services</i>	<i>Merchandise</i>
Temporary expats	0.155*** (0.0397)	0.0833*** (0.0219)
Temp. expats * Trade freedom (log)	-0.0364 (0.450)	-0.215 (0.257)
Temp. expats * Cultural difference (log)	0.113*** (0.031)	0.0326 (0.0239)
Temp. expats * English language (log)	-0.0624 (0.076)	-0.00411 (0.0456)
Obs.	706,436	4,108,570
Adjusted R^2	0.49	0.77

Notes: Robust and clustered standard errors in parentheses. Firm, industry, destination-region and year fixed effects are included throughout. Response variables are in logs (1e-7 added to avoid truncation). For brevity, other firm and gravity estimates are not reported. The first row displays semi-elasticities, taking interactions into account. * p < 0.10, ** p < 0.05, *** p < 0.01

³⁹ The associations between temporary expats and trade freedom and the English language are negative, as expected, but the coefficients are not statistically significant at any conventional levels.

⁴⁰ In additional estimations, we also find a negative interaction between the temporary expat regressor and an indicator of trust in the foreign market. However, because there is a strong and negative correlation between the measures of trust and cultural difference (-0.69) and the trust measure is available for fewer countries, we have chosen to mainly use the latter measure in the main estimations on the mechanisms of influence.

G. Robustness checks

The results above demonstrate a positive but heterogeneous association between temporary expats and export across temporary expats and export products, and the displayed heterogeneity is supported by theoretical considerations in the present study and in the previous literature. However, despite this finding and our efforts to control for known confounding factors, the results may still be biased to the extent that we have failed to include important variables, to the extent that there is sample selection or to the extent that causality goes from export to temporary expats rather than vice versa.⁴¹

Regarding the omission of important covariates, we take some comfort from the inclusion of permanent expats and the immigrant stock as well as from the extensive use of fixed effects. Including permanent expats is important because they also might be hired by firms to link to foreign markets. Disregarding them would thus bias estimates. With respect to the immigrant stock, we include it to proxy for any transplanted home bias effect of temporary expats, permanent expats and other immigrants on trade. Without its inclusion, immigrants' preferences in demand for products from their country of emigration may partly drive trade. In previous studies, this has motivated a focus on immigrants' impact on exports rather than imports. However, immigrant preferences may also have an indirect effect on host country supply, including exports (Hatzigeorgiou and Lodefalk 2013). Therefore, we include the immigrant stock to attempt to control for any transplanted home bias effect on exports. The results from the OLS estimations in this vein are presented in Column 1 of Table 9, where we also control for destination country, year and industry-specific effects.

⁴¹ Other potential sensitivities of the specification and the dataset are analyzed in additional estimations using alternative specifications and subsamples, with results available in Table B4 of the Online Appendix. Throughout, the results seem to corroborate a positive and statistically significant link between temporary expats and exports.

TABLE 9—ROBUSTNESS ESTIMATIONS

Panel A. Services exports					
	(1)	(2)	(3)	(4)	
	<i>OLS</i>	<i>Extended within specification</i>	<i>Panel Selection</i>	<i>GMM</i>	
Temporary expats	0.421*** (0.031)	0.0545** (0.028)	0.0471** (0.0235)	3.472*** (0.776)	
Obs.	1,883,765	1,891,160	20,895	1,842,853	
Adjusted R^2	0.28	0.55	0.33		
F -statistic				31.26	
Kleibergen-Paap LM (p)				0.0000	
Kleibergen-Paap Wald (F)				20.510 [†]	
Hansen J (p)				0.4397	
Panel B. Merchandise exports					
	(1)	(2)	(3)	(4)	(5)
	<i>OLS</i>	<i>Extended within specification</i>	<i>Panel Selection</i>	<i>GMM</i>	
Temporary expats	0.268*** (0.018)	0.0387*** (0.014)	0.227*** (0.0242)	4.558*** (1.221)	4.788*** (1.226)
Obs.	10,958,130	11,000,779	293,903	10,535,308	10,535,308
Adjusted R^2	0.58	0.78	0.39		
F -statistic				32.14	32.12
Kleibergen-Paap LM (p)				0.0000	0.0000
Kleibergen-Paap Wald (F)				26.304 [†]	49.466 [†]
Hansen J (p)				0.0153	-

Notes: In Panel A and B, the response variable is firm exports of services and merchandise, respectively. Exports are in logs (1e-7 added to avoid truncation), except for in Columns 3. Robust and clustered standard errors in parantheses. For brevity, other firm and gravity estimates are not reported. Destination-country, industry, and year fixed effects are included throughout. Column 1 contains OLS estimates. In Columns 2-4, firm and firm-destination-country fixed effects are also included. In Column 2, we add destination-country-year fixed effects, while replacing the country immigrant stock with the regional immigrant stock. Column 3 contains the marginal effect in the target equation of a two-step panel selection model. In Column 4, GMM estimates are presented, with instruments being liquidations in the industry and the industry average of temporary expats in other firms of the industry. In Column 5 of Panel B, the instrument is the industry average of temporary expats in other firms of the industry. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, [†] > Stock-Yogo critical values, suggesting rejection of the null of weak ID.

We also would like to control for any remaining time-invariant heterogeneity. More specifically, we augment the specification with fixed effects at the level of the firm and firm-destination country and year. In this way, we capture omitted or unobserved variables that are likely to affect firm exports, such as the historical attachments of firms or the country of Sweden to the destination country and industry characteristics. In addition, we control

for destination country-year heterogeneity, such as changes in foreign country economic policies, by adding destination-year fixed effects.

The estimates in Column 2 of Tables 9 are substantially different from the OLS estimates in Column 1, underlining the importance of controlling for omitted and unobserved factors to attain unbiased estimates of the effect of temporary expats on exports. When additional heterogeneity is controlled for, the large coefficients for temporary expats are less than one-sixth of the coefficients in the OLS estimations. However, the estimates are very similar to the main ones, which have been presented in Table 2 above.

Next, in Column 3, we consider the potential concern that there may be non-random sample selection.⁴² Therefore, our estimation strategy is to model both the selection into export and the intensity of export while exploiting the panel structure of the data.⁴³ In the first selection step, we run yearly probits, with fixed effects similar to Mundlak (1978). In the second target step, we augment the within-firm-partner country specification with interactions between the yearly inverted Mill's ratios from the first step and year-specific effects. To assist in identification, we include an exclusion restriction, drawing on theoretical considerations in Helpman, Melitz, and Rubinstein (2008). The exclusion restriction attempts to capture the fixed regulatory cost of doing business abroad and its interaction with the size of the firm. Data for the exclusion restriction come from country surveys of the World Bank (2011) on the costs associated with starting and terminating business as well as on contractual obligations and the protection of investors.⁴⁴ The estimation results in Column 3 display a positive and statistically significant coefficient for temporary expats but are larger for the export of merchandise than in Column 2, where sample selection is disregarded. This

⁴² Full estimation results for the target equation and the preceding 16 yearly selection equations are displayed in Tables B6.1-2 of the Online Appendix.

⁴³ Additionally, we control for heterogeneous effects of temporary expats across industries.

⁴⁴ Hatziogeorgiou and Lodefalk (2013) describe the construction of the measure in detail.

finding suggests that the main specification may underestimate the association between temporary expats and the export of merchandise.⁴⁵

In spite of the empirical approach and the robustness checks presented above, our results may be biased to the extent that exports induce the firm to hire temporary expats from the export destination rather than vice versa.⁴⁶ To consider this, we adopt a generalized method of moments (GMM) estimator and two detailed industry-level instruments for the potentially endogenous variable or temporary expats. The first instrument exploits time-variant and disaggregated industry-level information on liquidations, whereas the second one augments the time-variant industry-level employment of temporary expats.

What motivates our first instrument is that the lower the rate of liquidations is in an industry, the more likely firms in an industry are to hire labor, including temporary expats. As demand for labor increases in the industry, temporary expats and labor in general are attracted to it. Furthermore, the demand for temporary expats is assumed to be especially elastic to changes in the labor demand of industries because they are more likely to be on short-term contracts compared to other labor. Meanwhile, an increase in liquidations in an industry may result from a weak home market or a slump in exports, but it is not likely to be driven by changes in a single foreign country. This is why we consider the number of liquidations to be an appropriate instrument.

⁴⁵ We have confirmed that the key results with respect to exports of services in the 1998-2007 period are robust to the change in the services trade data collection method in 2003, with results available upon request.

⁴⁶ Hatzigeorgiou and Lodefalk (2013) provide a brief overview of previous findings in the migration and trade literature on the issue as well as a new survey. Additionally, a recent natural experimental study on bilateral data suggests a causal effect of migration on trade (Parsons and Vézina 2014). Together, this evidence seems to indicate that the relation goes from migration to trade and, at the very least, from migration to realized trade flows. Finally, it can be noted that a system of tax cuts for scarce labor (such as business leaders, experts and researchers) was introduced in Sweden during the period of time that we study, stimulating the temporary movement of persons to Sweden for work and potentially affecting subsequent exports, rather than vice versa.

More specifically, the first instrument is

$$(2) \quad instr_{ht} = \left[\left(1 - \left(\frac{liquid_{ht}}{max_h} \right) * scalar \right) \right],$$

where $instr_{ht} \in [0,1000]$ is the instrument in two-digit industry h at time t , $liquid_{ht}$ is the number of liquidated firms, and max_h is the maximum number of liquidations in the industry in the 1998-2007 period. The resulting measure is zero when the industry experiences the maximum number of liquidations in the time period and 1,000 when there are no liquidations in the industry.

The second instrument is simply the average number of temporary expats employed in other firms in the same three-digit industry as firm f .⁴⁷ We assume that the more temporary expats from the same country there are employed in the industry in general, the more likely it is that firm f also employs an expat from that country. One reason for this, we argue, is that the employment pattern of an industry with respect to temporary expats from a country j is likely to reflect the extent to which the educational and occupational profiles of expats from that country match the demand for labor in the specific industry. Consequently, if temporary expats from a certain country are especially attracted to an industry because of the specific demand of that industry, then the average firm of that industry is also likely to hire temporary expats from that country. Such industry hiring patterns vis-à-vis a certain country are not likely to directly affect the exports of firm f to that country, which is why we consider it to be an appropriate second instrument.

In the remaining columns of Tables 9, we display the GMM estimation results. The coefficients of the temporary expat variable are substantially larger than in Column 2 while remaining statistically significant at the one percent level. As for validity, the tests performed indicate identification and strong partial correlation between the instrument and the potentially endogenous variable. As for the exogeneity of the instruments, for

⁴⁷ This instrument has previously been employed by Hatzigeorgiou and Lodefalk (2013) and Hiller (2013).

the export of services, the Hansen J -test of Column 4 in Panel A of Table 9 does not lead us to reject the hypothesis that the instruments are exogenous to the error term. However, for the export of merchandise, for which results are presented in Columns 4-5 in Panel B of Table 9, we do reject exogeneity at the five percent level of statistical significance. Therefore, we perform an additional estimation for the export of merchandise in which we only use the second instrument. We argue that the industry average of temporary expat employment is exogenous to the error term, whereas the first instrument is possibly more sensitive to joint industry-firm trends in exports. In Column 5, we display results that are only marginally different from those of Column 4. We therefore conclude that the findings suggest a robust and positive association between the investment of firms in temporary expats and firm exports.

IV. Concluding remarks

This study contributes to the emerging literature on the temporary movement of people and trade by taking a business perspective, both conceptually and empirically, which assists identification and analysis; by focusing on temporary expat workers irrespective of their country of birth; and by considering the effects on trade in services, which, in general, are more reliant on the exchange of tacit knowledge between the producer and the consumer.

We begin with a conceptual framework that incorporates aspects of social network theory and arrive at testable conjectures about the effect of firm investment in temporary expats on exports and spillovers. In this framework, we also examine other reasons firms may have for investing in temporary expats, such as the acquisition of scarce competencies to promote efficiency or attunement to customer demand.

Empirically, our main identification strategy is to exploit variation in the employment of temporary expats – irrespective of their country of birth – and export within firm and export destination-country dyads

across time. In addition to being closer to the theoretical underpinnings of the migration and trade literature, this approach is advantageous in identification because it operates closer to the level at which temporary expats and firms interact. In this way, it assists us in controlling for observed and unobserved heterogeneity at the micro, meso and macro levels. Moreover, the empirical framework facilitates analysis of the underlying mechanism through which temporary expats may affect exports, including inter-firm spillovers. To ameliorate concerns about endogeneity, we employ a lagged approach and perform additional instrumental variable estimations. The dataset that we use is an unbalanced panel of all private firms in Sweden with at least 10 employees in the 1998-2007 period that includes detailed trade, employee, and migration information.

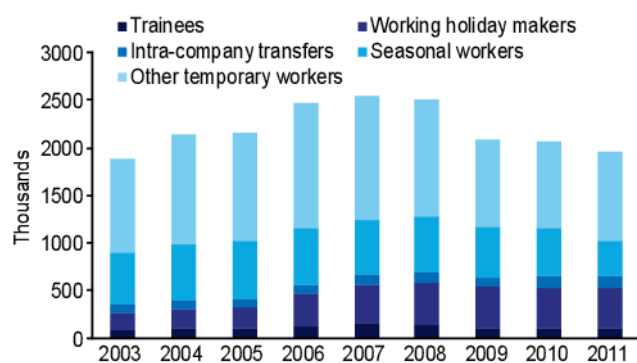
We find that among firms that start to export to a specific country, an increasing number hire their first temporary expat from that country in advance of export entry. Furthermore, the econometric results suggest a positive and statistically significant effect of employing temporary expats on the subsequent propensity and intensity of export. The within-firm-destination-country association with export intensity is substantially larger for the export of services than for merchandise and larger for the export of heterogeneous services and merchandise than for homogeneous export. To disentangle the hiring of temporary expats for subsequent export from the hiring of, for example, supply-chain managers and software engineers to access scarce skills or from international transfers more generally, we augment our specification with temporary expats who arrive from other countries in the same region as the export destination and with those who arrive from the rest of the world. The association with export is negatively related to the distance from the country of departure of the temporary expats. Moreover, we find that temporary expats, in comparison with permanent expats, are more strongly associated with the export of services and heterogeneous products, both of which are particularly dependent on up-to-date linkages.

Together, these novel results seem to confirm our hypothesis that firms invest in temporary expats from a foreign country to promote subsequent exports there. Heterogeneity in hiring temporary expats is therefore likely to be a reason for heterogeneity in foreign trade participation in addition to the productivity of the firm. As for channels of mediation, our results provide an indication that the employment of temporary expats from a specific country may allow firms to overcome informal and, in particular, informational barriers to trade with that country.

Overall, our econometric results from firm-level panel estimations indicate the importance of the temporary movement of persons for firm exports. The robust findings are in line with anecdotal evidence in the business literature, in surveys and in consultations with firms themselves. Many firms view the temporary movement of persons as key to their operations, including foreign trade. These views are held despite the benefit of access to modern information technology, which, for example, facilitates the initial matching of suppliers and customers. Firms commonly stress the need to acquire very specific information and establish personal business relationships. Against this background, it is surprising that there is such a wide disparity in the openness of rich countries for the temporary movement of people.

We can only speculate, but we would expect the lack of specific and up-to-date foreign market information and other informal trade barriers to become more important as trade intensifies in intermediates and in heterogeneous products, such as services or merchandise that incorporates services. Such a development would imply that temporary expatriation would become even more important for the export competitiveness of firms in the future. Taking into account the political economy considerations that have hampered Doha Round negotiations in this area, this finding seems to call for new approaches to facilitate the liberalization of the temporary movement of persons.

Appendix



**FIGURE A1. TEMPORARY LABOR MIGRATION IN OECD COUNTRIES
2003-2011**

Notes: Authors' calculations based on OECD (2013, 2010). These series overlap for the years 2006-2008, where there is a small discrepancy in the data.

TABLE A1—DATA DESCRIPTION AND SOURCES

<i>Variable</i>	<i>Definition</i>	<i>Sources</i>
Export (Import)	Exports (imports) in 1,000 SEK (approx. 146 USD)	Statistics Sweden, FTS
Temporary expats	Number of employees with foreign experience and a maximum of three years length of stay in Sweden	Statistics Sweden, RAMS and PS
Permanent expats	Number of employees with foreign experience and a minimum of four years length of stay in Sweden	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 (Importer)	Unity if the firms exports (imports), 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	Destination's GDP calculated in constant prices	World Bank
Population	Destination's size of population	World Bank
Trade freedom	Index based on destination's trade-weighted average tariff, plus the incidence of non-tariff barriers to trade (0-100, where higher values correspond to freer trade)	Heritage Foundation
Business burden	Index of cumbersome business environment (0-1, where a higher value correspond to a more cumbersome business environment)	World Bank; authors' calculations

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

TABLE A2—TOP SOURCES OF TEMPORARY EXPATS AND THEIR CORRESPONDING TOP EXPORT DESTINATION STATUS

<i>Source country</i>	<i>Stock</i>	<i>Top 15 export destination ranking</i>	
		<i>Services</i>	<i>Merchandise</i>
1 Poland	3,392		12
2 Serbia and Montenegro	2,827		
3 Norway	2,332	8	2
4 Germany	2,235	6	1
5 United Kingdom	2,130	2	4
6 Finland	1,568	4	9
7 United States of America	1,530	1	3
8 Denmark	1,278	7	6
9 Iraq	1,116		
10 Thailand	992		

Notes: Main source countries of temporary expats in Swedish firms, in 2007, and the corresponding status as top 15 export-destination-country of Sweden.

Source: Statistics Sweden; authors' calculations.

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Temporary Expats for Exports: Firm-Level Evidence

ONLINE APPENDIX

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Date of this version: October 6, 2014

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TABLE B1—COUNTRIES AND REGIONS OF THE SAMPLE

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

Notes : Authors' aggregation.

TABLE B2—EXPATS ACROSS DURATIONS AND SKILLS

	<i>Expats</i>	<i>Temporary expats</i>	<i>whereof Skilled</i>	<i>whereof Unskilled</i>	<i>Permanent expats</i>	<i>whereof Skilled</i>	<i>whereof Unskilled</i>
Share (%)	100	19	46	54	81	35	65
Number of persons	152,569	28,526	13,240	15,286	124,043	42,918	81,125

Notes : Displayed are the number of expats employed by firms in Sweden in 2007, using the classification based on the UCDP.

TABLE B3.1—PAIRWISE CORRELATIONS FOR SERVICES EXPORTS

	Services export volume	Temporary expats in the firm	Temporary expats in the corporation	Permanent expats in the firm	Permanent expats in the corporation	Country immigrant stock	Workforce	Multinational	Services exporter	Labor productivity	Human capital int.	Physical capital int.	GDP	Population
Services export volume	1.0000													
Temporary expats in the firm	0.1570	1.0000												
Temporary expats in the corporation	0.0900	0.1260	1.0000											
Permanent expats in the firm	0.1298	0.3082	0.0658	1.0000										
Permanent expats in the corporation	0.0672	0.0578	0.3413	0.1902	1.0000									
Country immigrant stock	0.0281	0.0299	0.0355	0.0329	0.0400	1.0000								
Workforce	0.0913	0.0750	0.0565	0.0785	0.0490	-0.0003	1.0000							
Multinational	0.0493	0.0246	0.0524	0.0252	0.0493	-0.0007	0.3986	1.0000						
Services exporter	0.9951	0.1418	0.0867	0.1218	0.0665	0.0281	0.0913	0.0494	1.0000					
Labor productivity	0.0239	0.0046	0.0113	0.0049	0.0090	0.0063	0.0871	0.1633	0.0237	1.0000				
Human capital int.	0.0206	0.0132	0.0158	0.0108	0.0135	0.0029	0.2429	0.2220	0.0207	0.1218	1.0000			
Physical capital int.	0.0090	-0.0003	-0.0014	0.0036	0.0008	-0.0015	0.0635	0.0067	0.0089	0.1661	-0.0473	1.0000		
GDP	0.0563	0.0397	0.0479	0.0353	0.0396	0.6262	-0.0005	0.0002	0.0560	0.0091	0.0045	-0.0019	1.0000	
Population	0.0262	0.0263	0.0320	0.0237	0.0265	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 expats variable.

TABLE B3.2—PAIRWISE CORRELATIONS FOR MERCHANDISE EXPORTS

	Merchandise export volume	Temporary expats in the firm	Temporary expats in the corporation	Permanent expats in the firm	Permanent expats in the corporation	Country immigrant stock	Workforce	Multinational	Merchandise exporter	Labor productivity	Human capital int.	Physical capital int.	GDP	Population
Merchandise export volume	1.0000													
Temporary expats in the firm	0.0803	1.0000												
Temporary expats in the corporation	0.0691	0.1260	1.0000											
Permanent expats in the firm	0.0819	0.3082	0.0658	1.0000										
Permanent expats in the corporation	0.0610	0.0578	0.3413	0.1902	1.0000									
Country immigrant stock	0.0915	0.0299	0.0355	0.0329	0.0400	1.0000								
Workforce	0.1415	0.0750	0.0565	0.0785	0.0490	-0.0003	1.0000							
Multinational	0.1287	0.0246	0.0524	0.0252	0.0493	-0.0007	0.3986	1.0000						
Merchandise exporter	0.9696	0.0697	0.0639	0.0720	0.0561	0.0931	0.1392	0.1294	1.0000					
Labor productivity	0.0425	0.0046	0.0113	0.0049	0.0090	0.0063	0.0871	0.1633	0.0424	1.0000				
Human capital int.	0.0463	0.0132	0.0158	0.0108	0.0135	0.0029	0.2429	0.2220	0.0471	0.1218	1.0000			
Physical capital int.	0.0305	-0.0003	-0.0014	0.0036	0.0008	-0.0015	0.0635	0.0067	0.0304	0.1661	-0.0473	1.0000		
GDP	0.1560	0.0397	0.0479	0.0353	0.0396	0.6262	-0.0005	0.0002	0.1584	0.0091	0.0045	-0.0019	1.0000	
Population	0.0725	0.0263	0.0320	0.0237	0.0265	0.6500	-0.0001	0.0002	0.0739	0.0015	0.0007	-0.0003	0.7507	1.0000

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

TABLE B4—ADDITIONAL ROBUSTNESS ESTIMATIONS

Panel A. Services exports		(1)	(2)	(3)	(5)	(7)	(8)
		<i>Quadratic</i>	<i>Lagged model (t-3)</i>	<i>Partial adjustment model</i>	<i>Excluding top five export destinations</i>	<i>Excluding top five temporary expats' origin</i>	<i>Excluding top five immigration sources</i>
Temporary expats		0.0606 [‡] (0.038)	0.0494* (0.027)	0.0413* (0.024)	0.0492* (0.028)	0.0558** (0.028)	0.0696 (0.046)
Temporary expats ²		0.0000211 (0.000)					
Export _{t-1}				0.221*** (0.004)			
Obs.		1,883,765	1,797,455	1,883,652	1,839,619	1,883,765	1,773,413
Adjusted R ²		0.55	0.55	0.58	0.55	0.55	0.55
Panel B. Merchandise exports		(1)	(2)	(3)	(5)	(7)	(8)
		<i>Quadratic</i>	<i>Lagged model (t-3)</i>	<i>Partial adjustment model</i>	<i>Excluding top five export destinations</i>	<i>Excluding top five temporary expats' origin</i>	<i>Excluding top five immigration sources</i>
Temporary expats		0.0522*** (0.019)	0.0431** (0.017)	0.0352*** (0.013)	0.0360* (0.020)	0.0387*** (0.014)	0.0616*** (0.016)
Temporary expats ²		-0.000387 (0.000)					
Export _{t-1}				0.105*** (0.002)			
Obs.		10,958,130	9,929,994	10,958,130	10,187,793	10,958,130	10,701,343
Adjusted R ²		0.78	0.78	0.78	0.53	0.53	0.52

Notes: In Panel A and B, the response variable is firm services and merchandise exports, respectively, in logs (1e-7 added to avoid truncation). All results are from fixed effects (within) estimation. Robust and clustered standard errors are in parentheses. Firm and gravity estimates are not reported due to space limitations. Firm, destination-country, firm-destination-country, industry, and year fixed effects are included throughout. Column 3 adds the first lag of the response variable as a covariate. ‡ p < 0.15, * p < 0.10, ** p < 0.05, *** p < 0.01

TABLE B5—FULL GMM ESTIMATION RESULTS

	(1)	(2)	(3)
	Firm export (log)		
	<i>Services</i>	<i>Merchandise</i>	<i>Merchandise</i>
Temporary expats	3.472*** (0.776)	4.558*** (1.221)	4.788*** (1.226)
Country immigrant stock (log)	-0.000408 (0.000)	-0.0000562 (0.000)	-0.0000397 (0.000)
Export experience	0.218*** (0.004)	0.105*** (0.002)	0.105*** (0.002)
Workforce (log)	-0.000935 (0.011)	0.0728*** (0.008)	0.0713*** (0.008)
Multinational (0,1)	-0.0331*** (0.008)	0.0115* (0.006)	0.0108* (0.006)
Labour productivity (log)	0.00968*** (0.004)	0.0106*** (0.002)	0.0106*** (0.002)
Human capital intensity (log)	-0.000278 (0.001)	0.000546*** (0.000)	0.000558*** (0.000)
Physical capital intensity (log)	-0.00111 (0.001)	0.000172 (0.000)	0.000160 (0.000)
GDP (log)	0.0996*** (0.021)	0.0204* (0.011)	0.0209* (0.011)
Population (log)	-0.0801 (0.059)	0.661*** (0.032)	0.672*** (0.033)
Obs.	1,842,853	10,535,308	10,535,308
<i>F</i> -statistic	31.26	32.14	32.12
Kleibergen-Paap LM (<i>p</i>)	✓ 0.0000	✓ 0.0000	✓ 0.0000
Kleibergen-Paap Wald (<i>F</i>)	✓ 20.510	✓ 26.304	49.466 [†]
Hansen J (<i>p</i>)	✓ 0.4397	✓ 0.0153	-

Notes : The response variable is firm export in logs (1e-7 added to avoid truncation). Robust and clustered standard errors in parantheses. 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. In Columns 1-2, instruments are liquidations in the industry and the industry average of temporary expats, and, in Column 3, the industry average of temporary expats. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, [†] > Stock-Yogo critical values, suggesting rejection of the null of weak ID.

TABLE B6.1—PANEL SELECTION ESTIMATION RESULTS FOR SERVICES EXPORTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Selection equation estimation								Target equation estimation
<i>dy/dx w.r.t. Temporary expats</i>									0.0471** (0.0235)
Temporary expats	0.0730* (0.0435)	0.0459 (0.0363)	-0.0362 (0.0239)	-0.0139 (0.0247)	0.0671 (0.0437)	0.108** (0.0383)	-0.0136 (0.0460)	-0.0894** (0.0421)	0.0521 (0.089)
Country immigrant stock (log)			-0.0417*** (0.00748)	-0.00859 (0.0167)	-0.0236 (0.0351)	-0.00206 (0.0364)	-0.0644** (0.0270)	-0.00289 (0.0515)	-0.0136 (0.055)
Business burden	-1.142*** (0.221)	-0.814*** (0.188)	-1.0570*** (0.199)	-0.151 (0.261)	-0.447* (0.262)	-0.383 (0.319)	-1.160*** (0.320)	-0.311 (0.257)	
Business burden * Workforce (log)	0.243*** (0.0454)	0.197*** (0.0402)	0.191*** (0.0412)	0.0476 (0.0410)	0.0529 (0.0415)	0.0351 (0.0478)	0.203*** (0.0469)	0.0563 (0.0397)	
λ_{2000}									-0.334*** (0.109)
$\lambda_{2001} * I_{2001}$									0.000 (0.000)
$\lambda_{2002} * I_{2002}$									1.012*** (0.096)
$\lambda_{2003} * I_{2003}$									0.202** (0.095)
$\lambda_{2004} * I_{2004}$									0.0992 (0.093)
$\lambda_{2005} * I_{2005}$									0.0175 (0.095)
$\lambda_{2006} * I_{2006}$									-0.0777 (0.097)
$\lambda_{2007} * I_{2007}$									0.00402 (0.101)
Obs.	277,870	286,873	286,271	269,547	276,373	270,449	261,073	256,947	20,895
Adjusted / Pseudo R^2	0.68	0.66	0.62	0.69	0.72	0.75	0.75	0.70	0.33

Notes: In the selection equations and target equation, the response variable is the propensity and intensity in firm export of services, respectively. Columns 1-8 contains yearly (selection) probit within-firm-destination-country estimates for the 2000-2007 period and Column 9 the corresponding (target) OLS estimates. Robust and clustered standard errors in parentheses. Firm, destination-country, firm-destination-country, industry, and year fixed effects are included throughout. For brevity, other firm and gravity estimates are not reported, but are available upon request. * p < 0.10, ** p < 0.05, *** p < 0.01

TABLE B6.2—PANEL SELECTION ESTIMATION RESULTS FOR MERCHANDISE EXPORTS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Selection equation estimation								Target equation estimation
<i>dy/dx w.r.t. Temporary expats</i>									0.227*** (0.0242)
Temporary expats	0.0123 (0.0447)	-0.0572* (0.0305)	-0.0557* (0.0287)	-0.0594** (0.0270)	0.0445 (0.0476)	0.0284 (0.0520)	0.0873* (0.0476)	0.0000201 (0.0514)	2.536*** (0.864)
Country immigrant stock (log)			-0.0269*** (0.00758)	-0.0525*** (0.00604)	0.0154 (0.0408)	0.00665 (0.0155)	0.0431** (0.0171)	0.0358 (0.0226)	-0.160*** (0.023)
Business burden	-1.0948*** (0.0847)	-1.0305*** (0.0860)	-1.265*** (0.0856)	-0.8759139*** (0.0855)	-1.295*** (0.0860)	-2.500*** (0.106)	-1.962*** (0.0869)	-1.938*** (0.0811)	
Business burden * Workforce (log)	0.286*** (0.0190)	0.251*** (0.0196)	0.274*** (0.0200)	0.229*** (0.0207)	0.296*** (0.0208)	0.435*** (0.0233)	0.415*** (0.0198)	0.460*** (0.0184)	
λ_{2000}									2.196*** (0.096)
$\lambda_{2001} * I_{2001}$									0.000 (0.000)
$\lambda_{2002} * I_{2002}$									-0.846*** (0.092)
$\lambda_{2003} * I_{2003}$									-0.754*** (0.092)
$\lambda_{2004} * I_{2004}$									-0.646*** (0.091)
$\lambda_{2005} * I_{2005}$									-0.521*** (0.085)
$\lambda_{2006} * I_{2006}$									-0.441*** (0.087)
$\lambda_{2007} * I_{2007}$									-0.313*** (0.091)
Obs.	1,398,967	1,465,946	1,515,969	1,563,968	1,584,071	1,614,594	1,646,017	1,704,292	293,903
Adjusted / Pseudo R^2	0.81	0.82	0.82	0.82	0.8207	0.81	0.80	0.78	0.39

Notes: In the selection equations and target equation, the response variable is the propensity and intensity in firm export of merchandise, 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. * p < 0.10, ** p < 0.05, *** p < 0.01