WORKING PAPER

06/2011

Trade and Migration: Firm-Level Evidence (LONG VERSION)

Andreas Hatzigeorgiou and Magnus Lodefalk
Economics

ISSN 1403-0586

http://www.oru.se/Akademier/Handelshogskolan/Forskning/Publikationer/Working-papers
Örebro University
Swedish Business School
701 82 Örebro
SWEDEN

Trade and Migration: Firm-Level Evidence

(LONG VERSION)[1]

Andreas Hatzigeorgiou[2] and Magnus Lodefalk[3]

December, 2011

Migration has been associated with higher levels of trade. Previous studies interpret this as evidence of migrants' ability to lower trade costs. Nevertheless, no study has investigated the impact of migrants on firms' foreign trade. Thus, they fail to both provide evidence on the role that migrants may play in lowering firms' trade costs, and exactly through which mechanisms the impact is derived. This study, being the first to study in depth the impact of immigration on trade at the firm level, bridges this gap in research. It utilizes new and unique employer-employee data for 12,000 Swedish firms, for the period 1998-2007, in a firm-level gravity framework. It provides novel firm-level evidence, demonstrating a significant, positive, and robust impact of immigrants in raising firms' foreign trade. Migrants are found to increase trade both on the extensive and intensive product margin. Further, the study is able to conclude that the sustained effect mainly derives from lower information frictions through superior knowledge of foreign-markets, although contacts are also important.

JEL Classification: F22, F14, D22, D83
Key words: trade costs, information, trust, migration, heterogeneous firms, gravity, firm-level data, product margins.

[1] The findings, interpretations and conclusions expressed in this paper are entirely those of the authors. The Swedish Agency for Economic and Regional Growth has provided financial support.
[2] Department of Economics, Lund University. E-mail: ah@nek.lu.se.
[3] Department of Economics, Örebro University. E-mail: magnus.lodefalk@oru.se.

1. Introduction

Migrants can help lower trade costs for firms through information and trust channels that reduce friction and facilitate trade with respect to their country of birth.

To trade with foreign countries, firms need to acquire specific information about relevant markets. Such information can range from specifics about consumer preferences, competitors, legislation and regulation, to understanding economic, social and political conditions, norms of business behavior, culture and language. Furthermore, firms need to obtain a degree of trust with potential buyers or business partners in foreign markets. Lack of relevant information about foreign markets – or insufficient trust between sellers and buyers across different countries – increases uncertainty about foreign trade transactions. This will raise costs and impede trade.

Empirical evidence suggests that migrants may contribute to trade between their present countries of residence and country of birth. Gould (1994) carried out seminal work in this regard, and many more studies have been conducted since then, i.e. by Head and Ries (1998), Dunlevy and Hutchinson (1999), Dunlevy (2006), Hatzigeorgiou (2010), and others. However, these studies mainly focus on how migrants affect aggregate trade flows between countries, or groups of countries. A majority of the studies find a statistically significant and positive link between trade and migration, which is interpreted – most commonly by referring to work by Rauch (2001) – as evidence of migrants' ability to lower trade costs. But, since no study has been able to investigate in depth the impact of immigration on trade at the firm level, previous studies fail to both provide evidence on the role that migrants may play in lowering firms' trade costs, and exactly through which

mechanisms the impact is derived. Therefore, the lack of firm-level evidence constitutes a serious gap in research. Important dimensions in the link between trade and migration are yet unexplored.

This study bridges this gap. It assesses explicitly whether migrants raise trade of firms in which they are employed. This is done by utilizing new and unique employer-employee data from Sweden, which cover individual characteristics for 12,000 manufacturing firms and their workforce over a whole decade, which is merged with macro-level data for 176 countries. By matching information on firms from several databases, the study manages to exploit detailed statistics on the workforce of each Swedish manufacturing firm in the period 1998-2007, including information on the birth country of employees in each of the 12,000 firms included in the sample.

The choice by firms whether, and how much, to trade is modeled as a two-step decision within a firm-level gravity framework. This study also contributes by evaluating, for the first time, the impact of migration on trade at firm-level margins. The firm-level influence of migration is decomposed into its extensive and intensive margins at the finest product level. Characteristics of employees, firms, products, and trade partners are further included in the analysis as to determine whether these factors moderate or sustain the effect of migration.

The findings provide new and robust insights into the role of migration in international trade in general, and in specific into the role that migrants can play to lower trade-related transactions costs through their knowledge of foreign markets, access to networks, and capacity to infuse trust in business. The results demonstrate a clear and

positive impact of hiring foreign-born people on firms' trade with immigrant source countries. Further, skilled "new" migrants are shown to be most important in increasing firms' trade, which shows that up-to-date contacts and knowledge of source countries among migrants are important in lowering firms' trade costs. Thus, the study is able to conclude that the sustained effect mainly derives from reduced information frictions, whilst contacts are important, but for a limited period of time.

The paper is organized as follows. Section 2 briefly accounts for changes in international trade and migration. Section 3 provides a theoretical perspective on role for migration in trade. Section 4 reviews previous evidence. Section 5 discusses the experience of Sweden in regard to foreign trade and migration. Section 6 explains the empirical framework, including model, data, and estimation strategy. Results are discussed in section 7. Section 8 concludes and provides final remarks.

2. Developments in Trade and Migration

After the end of World War II, international trade in goods and capital flows increased substantially. Exports of manufactured goods from Western Europe grew by an average of some eight percent annually between 1950 and 1973. This meant that the growth of foreign trade outpaced economic growth. Exports also grew dramatically in other parts of the world during this period: by almost ten percent annually in Asia and around five percent annually in Africa (Maddison 2001). As a result of the dramatic growth in foreign trade, countries' dependence on foreign markets has increased markedly. In the global economy as a whole, export as a share of GDP has doubled between 1960 and 2009 (World Bank 2011). Imports have also increased substantially during this period.

The rapid development of international trade has many explanatory factors. As a result of advances in technology it is now possible to transport goods faster and cheaper than ever before. Trade liberalization has continued to reduce both tariffs and non-tariff barriers. The average applied customs tariff of manufactures in the developed countries is today at around two percent. Corresponding tariffs in high-income WTO members is around 1.6 percent (Hoekman et al. 2010). Moreover, as supply-chains have become global and integrated across countries trade has increased considerably.

In addition to the significant increase in international trade and capital flows, substantial cross-border movements of people also belong to one of the most important facets of globalization. Today, migrants – people who live in countries other than their countries of birth – make up about 3.1 percent of the world's population, or 214 million people (Keeley 2009). This is twice as high a proportion as in 1960. The increase is even more striking considering the fact that the global population has more than doubled over the same period, from 3 billion in 1960 to 6.8 billion in 2009.

The proportion of migrants has increased most dramatically in relatively developed countries. Yet, the bulk of international movements do not occur between developed and developing countries. Most migration occurs between countries that belong to the same category of development. This is partly explained by the fact that moving long distances is costly, 40 percent of all international migrants settle in a neighboring country (UNDP 2009).

International migration is driven by various factors. Social, political, and economic circumstances all play a major role. Further, people's decisions to migrate from their birth

country can be driven by both voluntary and forced reasons. The former category of so-called "pull factors" mainly aim at improving living standards, for instance through higher real wages. The latter category, which refers to various "push factors," entails circumstances of social and political nature in the source country, such as armed conflicts or prosecution by authoritarian states.

The decision to emigrate encompasses a complex process. It is not only the characteristics of the source and potential destination countries that matter. Different types of obstacles to migration are other factors at play, such as immigration policies. Beyond the macro-level, people that consider emigrating take into account various micro-level factors as well. To migrate is a big decision in many aspects, one that often affects the family, and in some cases even the larger community to which a person belongs. There are, in other words, externalities to migration that people are likely to consider before making the final decision to emigrate from their country of birth. Furthermore, if people have imperfect information about the benefits and costs involved, this will also impact the decision to migrate.

Since decisions by people to migrate entail a complex process, it does not exist one clear answer to the question why migration patterns have developed as they have during the last few decades. There is huge variation in the circumstances influencing international migration. However, some factors that have generally contributed to the rising trend in human movement have likely to do with technological advances in communication and transport, which has made it easier and possibly cheaper than ever before to move across national borders. Furthermore, the demographic shift in developed countries, towards an

older population, as well as continued population growth in developing countries, has increased the demand for migration (UNDP 2009).

The face of migration has changed over the years. Countries that were once typical emigration countries are now major recipients of immigrants born in other countries. The distribution of number of immigrants – like the number of emigrants – varies widely from country to country and region to region. Certain countries have a large number of immigrants but almost no emigrants or *vice versa* (Hatzigeorgiou 2010).

3. Can Migration Reduce Trade Costs? A Theoretical Perspective

In the neoclassical framework, using the Heckscher-Ohlin model, trade is driven by different relative endowments in capital and labor, which determines the domestic wage level of countries. With international labor mobility, higher wages in capital-abundant countries cause workers in labor-abundant countries to migrate. As a result, the labor supply in high-income countries expands, in turn suppressing wages in the receiving country. The opposite happens in the source country. As wages and commodity prices equalize across countries with different endowments in labor and capital, incentives for trade decrease. Therefore, with labor factor mobility, the cause for trade is weakened (Mundell 1957; Massey et al. 1993). This suggests that international migration is a substitute for trade, which means that if not for the rapid increase in cross-border movements of people, foreign trade flows would have been higher.

The neoclassical conclusion of substitutability between migration and trade does not hold up when relaxing some of the underlying assumptions, for instance, by allowing for non-identical technologies across countries. Then, even in a conventional factor

proportions setting, migration and trade can be complements (Markusen 1983; Schiff 2006).

Some trade-theoretical studies demonstrate how the link between migration and trade can be characterized either by substitutability or complementarily, even in the same theoretical framework, depending on factors such as the skill level of migrants and in which industry of the host country's economy migrants are employed (Panagariya 1992; Neary 1995).

As traditional barrier to trade continue to diminish, "behind-the-border" barriers become more important. Such barriers can be constituted by various laws, regulations and standards that impede foreign trade, but also by the lack of information about these implicit barriers and how to overcome them. Therefore, the relative importance of migration in regard to trade may increase. Despite of technological advances, vertical specialization, and successful waves of trade liberalization in multilateral, regional and bilateral trade agreements, foreign trade still involves considerable costs.

In this context, insufficient information about markets may deter a firm from engaging in foreign trade. It is often particularly difficult to obtain reliable information about foreign markets whose language, business culture, regulatory system and institutions differ from those of the home country. These information barriers can significantly drive up the costs of importing and exporting (Anderson and Van Wincoop 2004; Hummels and Klenow 2005).

Rauch (1991) expands this analysis in a Hecksher-Ohlin model, which incorporates both patterns of migration and trade, noting that migrants possess social capital that lowers

trade costs. More recently, work by Iranzo and Peri (2009) extends a two-country model of trade and factor mobility, as well as technological heterogeneity and skill differences. In addition to showing that countries may gain economically from migration via increased wage earnings for migrants and expanded output in certain industries of the economy, they show that migration results in increased trade.

Based on a production-theory approach, Kohli (2002) uses a joint revenue function with domestic output and exports. Immigration is found to stimulate imports and to shift the output mix towards non-trade goods, but there seems to be no strong relationship with exports.

Based on a similar methodology based on data from the United Kingdom, Hijzen and Wright (2010) treat immigrants and imports as intermediate inputs, and confirm complementarity with imports as regards high skilled immigrants. Unskilled immigrant workers, however, are found to be substitutes in production.

In regard to the influence of trade costs on firms' decisions to export or import, there are two main theoretical channels through which migration can lower firms' fixed and variable costs with respect to trade.

First, migrants may lower trade costs and increase trade through abundant and unique information about their country of birth. The information channel hypothesis derives from the fact that firms need to obtain market-specific information in order to succeed with trade. For example, exporters need information on how to best distribute and market the product abroad (Jansen and Piermartini 2009).[4] Such information can be costly,

[4] This includes overcoming home bias in demand that disfavors more distant products, along the lines of the literature on taste and statistical discrimination (Becker 1957; Phelps 1972).

especially with respect to markets whose language, business culture, regulatory system and institutions differ from those of the home country. Information costs also occur when firms need to adapt their products according to characteristics specific to a foreign market. Firms must learn about the rules, regulations, and institutions of the new market, as well as how to manage multiple such settings. Moreover, information costs can be derived to communication frictions associated with negotiating business deals and other agreements. Just language differences can complicate contacts and make trade transactions more difficult (Melitz 2008). Differences in norms and values also create friction in firms' relations with foreign partners and authorities. Reducing such tacit information barriers is likely to be important, but costly (Schneider 1988; Elsass and Veiga 1994; Hofstede 2001).

Migrants know demand and supply as well as norms and values both in their new country and their country of birth. Thus, migrants have the potential, *inter alia*, to help firms find niches abroad for their products. They can also help firms to adapt their products and marketing approaches in foreign settings, thereby reducing matching costs (Casella and Rauch 2002). Migrants are likely to be familiar with the political and social environment in both their country of origin and their present country of residence. Such familiarity reduces firms' costs for navigating in foreign markets. Finally, migrants have multiple communication skills. Especially sharing the same native language as distributors and other relevant actors in the foreign market can make migrants instrumental in lowering communication and negotiations costs.

Secondly, migrants can lower trade costs by infusing trust between sellers and buyers from different countries. In international business deals, contracts are more

difficult to enforce compared with in domestic ones. Institutional quality also influences the efficiency of trade transactions. Weak institutions raise trade costs and, indirectly, reduce business profits (Anderson and Marcouiller 2002). Especially in countries with high levels of corruption, trade costs can to a large degree be driven by uncertainty about contract enforcement. In this regard, trust between sellers and buyers can help to overcome problems concerning contract enforcement across national borders (Guiso et al. 2009).

Migrants have a special ability to foster trust in foreign business relations. In weak foreign institutional settings, they are more likely to be aware of ways to circumvent corruption. Migrants can also assist in contract enforcement, both by influencing the drafting of contracts and by limiting opportunistic behavior via participation in cross-national networks (Greif 1989; Rauch 2001; Herander and Saavedra 2005).

More generally, migrants reduce uncertainty in international trade through their knowledge and networks. Lowering the risk for future "bad news" is instrumental for firms to enter into foreign trade by taking the sunk costs involved (Bernanke 1983; Dixit 1989). It also makes investment decisions, like foreign trade participation, more elastic to changes in external conditions (Bloom 2007). Presumably, migrants can then be expected to reduce hysteresis in firms' trade. Within a policy context, Handley (2011) verifies that reducing uncertainty, by binding tariffs in the WTO, makes firms more willing to enter foreign markets.

The discussion above indicates that migration has the potential to reduce both fixed and variable trade costs. Consequently, both the extensive and intensive country and product margins of trade can be influenced. At the extensive margin, migrants can spur

trade by lowering fixed costs, such as costs related to finding a business partner in a foreign market. At the intensive margin, migrants can increase trade by reducing the variable costs associated with, for instance, perennial monitoring of changes in foreign-market demand.

Since migrants can help to overcome information frictions, and provide access to networks, firms that hire foreign-born workers should benefit the most in terms of reduced trade costs. Therefore, a firm that wants to enter into – or expand trade with – a certain country is relatively more likely to hire people from that country. Such an investment would be in line with preparatory firm behavior as suggested by recent heterogeneous firm trade models (e.g. Melitz and Constantini 2008). Purchasing such services is a less likely alternative, since migrants' skills are source and destination specific, as well as tacit in nature.[5] Finding trust-creating intermediate services such as those provided by migrants is likely to be particularly difficult (Casella and Rauch 2002). Possibly, there may be spillover effects from firms that employ foreign-born workers, but this is an indirect and consequently weaker impact channel. Finally, firms' trade with migrant source countries could increase because of a taste bias towards products from their country of birth. But, this so-called transplanted home bias effect is demand-driven and occurs foremost at the aggregate level (White 2007).

Therefore, any attempt to capture the cost-reducing potential of migration is preferably performed at the employer-employee level, while considering confounding factors at the macro-level. This is the most direct way to analyze in-depth the channels through which migration lowers trade costs.

[5] To find substitutes is arguably even more difficult for firms' trading in differentiated products.

4. Previous Macro-Level Evidence on Trade and Migration

Research confirms that immigration has been beneficial to US foreign trade. Gould (1994) finds a statistically significant link between immigration to the United States and trade with migrants' countries of origin. The study suggests that immigrants' contribution to US foreign trade is mainly derived from lower trade costs. It also looks at the importance of immigrants' length of stay and find that it matters for the immigrant link to bilateral trade with source countries; immigrants impact on exports tend to increase after a considerable time in the new country. Looking further back in history, between 1870 and 1910, Dunlevy and Hutchinson (1999) demonstrate that exports to countries from which the US had many immigrants increased to a greater extent than those to other countries, which is in part explained by the contribution of immigrants in lowering the trade costs between the US and immigrant source countries. However, the effect on trade during the latter part of the period was greatest for those countries with English as an official language, and those with a similar level of prosperity. It seems, however, that the connection with the level of prosperity in countries of origin has been reversed. The positive correlation between immigration and US foreign trade is now primarily driven by immigration from developing countries White (2007). Bandyopadhyay et al. (2008) provide further evidence; their results suggest that the ethnic-network effects on trade are much larger than previously estimated, at least for a subset of countries. Evidence also suggest that newer immigrants and those who are temporarily in the US have caused foreign trade to grow more than permanent immigrants, who usually have been away longer from their country of birth (Jansen and Piermartini 2009). Lately, studies have utilized more detailed data for US

states' exports, and stocks of immigrants residing in the states. The estimated immigrant elasticity with respect to trade ranges from around 0.15 to about 0.4 (Herander and Saavedra 2005; Dunlevy 2006).

Canada, a relatively small country in terms of population but with a large proportion of immigrants, has also been studied frequently in this context. As with the US, studies have established that people in the country who were born abroad have contributed to its current substantial level of foreign trade with countries from which large immigrant groups originate (Head and Ries 1998; Wagner, Head, and Ries 2002). These results have more recently been confirmed by studies that estimate immigrants' contribution to Canada's foreign trade on the provincial level (Partridge and Furtan 2008).

The UK is another example of a country where similar effects can be seen. However, studies primarily find a strong correlation for countries outside the former British Empire, but not for former colonies (Girma and Yu 2000). Spain's trade with former colonies seem to have benefited from immigration from those countries, but less than from other countries, probably for the same reasons as in the UK; the colonizer historically dominated leading positions and institutions. Migrants therefore did not contribute as much in lowering trade costs through new knowledge (Blanes 2008). Using data from Spanish provinces, Peri and Requena-Silvente (2010), find a positive relationship between immigration and foreign trade.

Unfortunately, there is a lack of the necessary data for many individual developing countries, but a positive and significant link has been confirmed for Bolivia (Erlich and Canavire Bacarreza 2006).

A number of recent studies have attempted to estimate a more general correlation between migration and foreign trade. However, a lack of data, particularly concerning migration flows, has limited these studies to primarily investigating countries that are members of the OECD.

The studies conducted for groups of OECD countries confirm the positive trade effects of immigration (Lewer 2006; Felbermayr and Toubal 2008). As expected, the estimated trade effects vary between different groups of products and industries. These studies, like those for individual countries, suggest that the effect primarily stems from dissemination of information and increased confidence between business partners via transnational trade networks between migrants' host countries and countries of origin (Lewer and van den Berg 2009).

By looking at bilateral trade and migrant stocks for a large cross-country sample, including countries with vastly different characteristics, trade and migration have been shown to be strongly linked phenomena at the global level as well (Hatzigeorgiou 2010).

Most empirical studies investigating the relationship between trade and migration, whether conducted at intra-country regional, country, or cross-country level, do not distinguish between margins of trade. It is possible that the impact of migration differs across different types of trade barriers, for instance in regard to information frictions and lack of trust. Hence, migration could influence the extent to which trade occurs (extensive margin) differently from preexisting trade flows (intensive margin). Cletus and Wall (2011) disentangle the migration-trade relationship at the two margins, using data for 48

US states. Immigration is found to increase trade exclusively by increasing trade with countries with which US already trades, but not by opening up new channels of trade.

In sum, the macro-level evidence indicates that migrants increase trade between their present countries of residence and their countries of birth. The evidence can be found in settings that range from individual small countries to groups of large and developed economies, although the estimated relationship varies across individual countries. Estimations are usually different for imports and exports as well, and between different groups of products, industries, and sub-groups of migrants. Most studies find that an increase in the migrant stock by ten percent is associated with approximately 1-3 percent higher trade, although larger elasticities have been found for specific countries. The link with imports is generally stronger than for exports, and the influence on differentiated goods is typically bigger as well.

Studies infer that the positive influence of migration on foreign trade stems from factors such as increased access to networks, which improves confidence between firms and actors active in cross-border trade transactions, as well as the elimination of information frictions between countries, which reduces the costs of trade.

5. The Remarkable Case of Sweden

Sweden has long been a migration country. During a substantial part of its history, high levels of emigration characterized the country's development. The collection of statistics for external migration started in the year 1851. For the whole period up to the 1930s, Sweden experienced an extensive net outflow of migrants. Approximately 1.5 million Swedes decided to leave the country during this period. This meant that close to

approximately 20 percent of the Swedish males born in the latter half part of the 19th century choose to emigrate, and 15 percent of the women (Nilsson 2004).

The reasons for the large outflow of emigrants from Sweden for almost eight decades operated both through push and pull factors. Push factors varied from different laws that regulated the people's freedom, to natural disasters such as crop failures. Pull factors, especially for the majority of emigrants that moved to America, included possibilities of higher living standards through higher-paying jobs and better access to fertile lands for farming (Keeley 2009).

The historic turning point for Sweden in terms of going from an emigration country to a country of immigration came around the time of the Great Depression in the 1930s. First, the United States implemented more restrictive immigration policies in the late 1920s, which impeded the massive movements from Europe that had characterized the "Golden Age of Migration." Second, the economic downturn made the US less attractive as a destination country among Swedes. As a result, the emigration numbers fell drastically, which in turn lead to a situation where immigration, for the first time since migration data was collected, surpassed emigration. This was also the result of a large number of returning Swedish born people from America, many of who chose to return to their motherland during the depression (Lundh 2010).

Sweden's real shift, however, from an emigration to immigration country, took place after the end of the Second World War. Economic growth in Europe surged after the war. Since most of Europe's countries had participated in the war, and consequently been damaged severely, the production capacity on the continent could not fulfill rising demand.

Sweden, on the other hand, was neutral throughout the war. Its factories and infrastructure stood intact; in theory ready to switch into highest gear in order to meet the needs of Europe. But, many Swedish firms faced challenges in terms of adopting production to new circumstances. During the war, firms had been constrained by heavy regulations both domestically and abroad (Magnusson 1999). And, importantly, firms could not find enough labor.

In order to fill its rising demand for labor, Swedish firms started to recruit workers from abroad. The government liberalized immigration policy, and in 1954, a common Nordic labor market was established. Hence, the whole post-war period up until the 1970s became characterized by considerable net immigration to Sweden. The inflow of foreigners was driven by labor demand, mostly from other European countries with excess labor, such as Finland, Italy, Greece and the former Yugoslavia. When labor force immigration came to a halt in the 1970s due tighter rules and declining labor demand in export industries, immigration patterns changed in regard to source countries and reasons for immigration. Asylum seekers came to dominate the net inflow of immigrants, and source countries shifted to the Balkans in the 1990s, and later to countries outside Europe (Government of Sweden 2001).

Sweden has continued to be an important country of net immigration. Between 1998 and 2007, the population increased by approximately 242,000, immigration accounting for 77 percent of this increase. In fact, in 2007, the country experienced the largest number of incoming immigrants during a single year since measurements began some 150 years ago (Statistics Sweden 2011).

The percentage of migrants relative to the domestically born population has also increased over time. In the mid-19th century, less than three per thousand people living in Sweden were born in another country. In 1940, foreign-born people made up one percent of the total population, and in 1970, that figure rose to around seven percent. The current figure is about 14 percent. Table 1.1 contains information on Sweden's largest immigrant stocks.

— Table 1.1. Sweden's Largest Immigrant Groups —

Immigration increased in parallel with a substantial rise in foreign trade. In 1975, Sweden's imports and exports of goods together amounted to approximately USD 21 billion. A decade later, in 1985, total foreign trade of goods totaled USD 72 billion, and in the year 2000, that number had almost tripled. In 2010, despite a financial and economic crisis, Sweden imported goods for USD 152 billion. Exports amounted to USD 162 billion.

In one decade, from the year 2000 to 2010, imports of goods increased by close to 60 percent, while exports rose by 41 percent. During the same period, the total number of foreign-born persons rose by about 380,000 people, or 38 percent. Figure 1.1 shows the fitted relationship between Sweden's immigrant stocks and the level of exports with respect to immigrant source countries.

— Figure 1.1. Immigrants to Sweden and Exports to Source Countries —

Previous analyses mainly investigate how immigration affects trade in large countries. Nevertheless, Sweden is a particularly interesting case for which there is also strong macro-level evidence of the trade creating effect of migrants. With its export-oriented economy, where foreign trade constitutes 95 percent of GDP, the country is a

paragon of the small open economy. Further, it has been an important host of immigration since the 1930s.

Hatzigeorgiou (2010a) provides evidence showing that people in Sweden who have been born abroad have a positive relationship with the country's foreign trade. The study suggests that during 2002-2007, a period that saw the largest number of foreign-born people settling in Sweden since measurements began in 1875, immigration influenced positively bilateral imports and exports with immigrant source countries. The study also shows that foreign-born people in Sweden have a stronger link with exports of differentiated goods than with those of homogenous goods. The former category generally consists of highly processed goods, which receive special treatment in the market on the basis of various characteristics, such as origin, brand or manufacturing process. Since the market differentiates among the goods by interpreting each product as unique, the result is that prices differ from one product to another.

6. Empirical Framework

6.1 The Gravity Model

The gravity model of international trade is the "industry standard" for quantifying determinants of international trade, such as migration. In its simplest form, the model postulates that the volume of trade between countries (objects) is determined by the economic size (mass) of the countries, the distance between them, and the gravitational constant.

The first economic application of the typical gravity law is ascribed to Tindbergen (1962). Anderson (1979), Helpman & Krugman (1985) and Bergstrand (1989) contributed

to strengthening the theoretical foundations of the model. The general assumptions were: complete product specialization between countries, consumer preferences of CES type, and symmetrical trade costs between trading partners. More recently, others have shown that gravity models can be justified in a wider sense as well. Deardorff (1998) derives the model on the basis of a factor proportion explanation. Anderson & Van Wincoop (2003) justifies the model on the basis of assumptions of monopolistic competition and product differentiation. They also emphasize the importance of controlling for bilateral trade costs relative to trade partners' average trade transaction costs in regard to the rest of the world, so-called multilateral trade resistance (MTR). From this they derive a model similar to

$$T_{ij} = \alpha + \phi(1-\sigma)\ln d_{ij} + \ln Y_j + \ln Y_i + \omega_k(1-\sigma)\sum_{k=1}^{K} \ln z_{ijt}^{k} + (1-\sigma)\ln P_i + (1-\sigma)\ln P_j$$

where T_{ij} represents bilateral trade from country i to country j. Most studies agree that the geographical location and characteristics of countries affect trade costs and foreign trade. The farther away two countries are geographically, the higher are bilateral trade costs. Therefore, d_{ij} is the geographical distance between i and j. To proxy for the economic mass of countries, Y_i and Y_j correspond to each country's GDP. z_{ij}^{k} represents additional variables that beyond distance and economic mass that affect trade costs, usually geographical and historical information about the countries and the relationship between them. Language is another important factor, since countries that share a language avoid some trade costs associated with communication problems, such as translation of necessary documents (e.g. Melitz 2008). Countries that have a shared history can also escape indirect trade costs in various ways (e.g. Rauch 1999). P_i and P_j represent countries' aggregate

multilateral price indices and σ stands for the Armington assumption, meaning that traded products are differentiated by origin country.

The gravity equation, following the Anderson and van Wincoop (2003) theoretically justified model with country-specific fixed effects, is usually log-linearized and estimated by

$$\ln T_{ij} = \alpha + \beta_1 \ln d_{ij} + \mathbf{G}\gamma_i + \mathbf{H}\delta_k + \eta_i im_i + \xi_j ex_i + \varepsilon_{ij}$$

The column vectors typically contain a number (*i*) of geographical variables, such as indicators for whether the countries share a national border, have the same official language, have access to a coastline of their own, and a number (*k*) of historical and cultural variables, indicating whether the countries have a colonial relationship, share the same language, and so forth. im_i and ex_j are importer and exporter fixed effects that control for MTR in absence of observable and reliable price indices. ε_{ijt} is the Gaussian error term.

The gravity model has been used to empirically analyze factors that, beyond geography, culture, history and economic "mass", affect international trade relationships. In line with these research questions, the model has been used to assess, *inter alia*, the impact of regional and multilateral trade agreements, most importantly GATT/WTO membership (e.g. Rose 2004; Subramanian & Wei 2007; Liu 2009; Balding 2010).

To capture the hypothesis that migrants can facilitate foreign trade, studies have extended the model by including a variable for the number of people born in country *j* but resident in country *i*. But, assuming that migration impacts trade flows by lowering trade costs of firms via the infusion of human capital, this approach misses important aspects

surrounding the relationship between migration, trade costs, and firms' trade. Moreover, application at the aggregate level may be confounded by other consequences of migration, such as the transplanted home bias effect. Therefore it is necessary to carry out the assessment at the level of the firm.

6.2 Heterogeneous Firm Models

The empirical trade literature at the level of the firm establishes that traders are different from non-traders (Bernard and Jensen 1995 and 1999; and Bernard et al. 2007). This has resulted in the development of new models that highlight firm differences in productivity (e.g. Bernard et al 2003 and Melitz 2003). Usually, productivity in these models is exogenously determined, and since trade is associated with fixed and variable costs, firms that trade are assumed to have higher productivity than non-traders. Reducing trade barriers will lower the productivity threshold above which firms trade but raise the productivity threshold for firms' existence. New firms enter into export as the potential profit from it rises and existing exporters' market share increases as well. The least productive of the non-exporting firms are forced to exit as a result of increased domestic competition.

More recently, models that endogenize exporters' pre-entry productivity premiums have been developed (e.g. Melitz & Constantini 2008). In these models, expectations of future trade liberalization influence firms' propensity to innovate among firms, which implies that firms may deliberately raise productivity before they begin to export.

Empirical studies based on this heterogeneous-firm trade framework have also demonstrated that other factors, beyond sunk-costs and productivity, can influence trade

(e.g. Greenaway & Kneller 2007). Firm size, age, relative capital-intensity, ownership status, as well as human capital help to explain why some firms export and others do not.[6]

6.3 The Firm-Level Gravity Model

Summing up, a firm's trade behavior is influenced by both its own individual and destination specific characteristics, such that the better firms go abroad and gravitate towards rich and open countries. Ignoring this, by exclusively relying on gravity or firm level determinants, may bias the empirical results. Drawing on recent trade models that integrate firm and market characteristics as determinants of export behavior (e.g. Chaney 2008; and Greenaway et al 2008), we specify a gravity firm-level trade model. In pursuit of the line of argument that migration adds to human capital, which lowers firms' trade costs, we augment the model with the share of foreign-born employees. Hence, the benchmark specification to be estimated is

$$x_{fjt} = \beta_0 + \beta_1 m_{jft} + \sum_k \beta_k z_{kft} + \sum_h \beta_h g_{hjt} + \eta_i H_i + \rho_r R_r + \tau_t T_t + \varepsilon_{fjt}$$

where x_{fjt} represents the logged trade volume of firm f to country j at time t. The number of people born in country j as share of firm f's work force at time t is represented by m_{fjt}.[7] A set of K explanatory firm-specific supply side factors is included in z_{kjf}. These are firm

[6] As regards overcoming trade barriers through information and networks, there are two somewhat related papers. Chaney (2011) tries to account for portions of the heterogeneity in trade behavior not explained by productivity, by focusing on the role of international networks for the extensive margin of trade. In his theoretical model, firms need at least one contact in a country to be able to export there. Firms may search for contacts randomly or use existing networks. Once a firm has a contact it may more easily get in touch with others. Therefore, firms with many contacts have an advantage in foreign trade. Ahn, Khandelwal and Wei (2010) use Chinese and Ghanaian data to analyze the role of intermediaries. They find that intermediaries facilitate trade and that the effect is positively related to the distance and negatively related to the migrant stock of the foreign market and to firm size. Neither of the papers analyze the role of migrant employees.

[7] The absolute number of employed migrants is arguably less relevant a measure; e.g. hiring one extra migrant in a large MNE has supposedly a minor effect compared to it in a small firm.

size, productivity, ownership status, previous trade experience, as well as human and physical capital intensities, with all continuous variables in logs.

As clearly shown by the bulk of empirical studies focusing on international commercial exchange, geographic, and cultural barriers influence trade costs. Therefore g_{hjt} not only includes economic "mass", measured in terms of GDP, but also a set of H-1 explanatory covariates to control for characteristics that affect bilateral trade resistance: population size; distance; contiguity; access to coasts; and English as official language. H_i, R_r, and T_t represent indicators to capture industry-specific, regional export-destination, and year effects respectively. ε_{fjt} is an idiosyncratic error term.

Our ability to identify effects of migration on trade benefits from adding region fixed effects, as proxies for tastes, and gravity variables, as a proxy for cultural affinity. Cultural affinity and similarity in taste can arguably affect both migration and trade. Including region fixed effects is also motivated to control for multilateral trade resistance (Anderson and van Wincoop 2003). More generally, region-specific and industry-specific effects control for unobserved time-invariant variables and year-specific effects for unobserved time-variant variables.

6.4 Data and Stylized Facts[8]

The study is able to create a new and unique dataset consisting of detailed economic information on all Swedish manufacturing firms, their foreign trade, and the country-of-birth of their employees. Employer-employee data come from Statistics Sweden and cover all Swedish manufacturing firms with at least ten employees in the years 1998-2007.

[8] Details concerning data are found in Appendix.

Economic data include information on firms' economic and external trade characteristics. Using several different databases, core firm-level data is matched and supplemented with detailed information on workers' country of birth, as well as the number of years a foreign-born employee has resided in Sweden, and his or her skill level.

Firm and destination specific trade data are included at the Combined Nomenclature 8-digit (CN8) level. However, before using this data we consider the numerous and substantial changes to the nomenclature into account. For the US, Pierce and Schott (2011) show that failure to do so can substantially inflate trade expansion at the extensive margin of trade and deflate it at the intensive margin of trade. To avoid that pitfall, a detailed concordance of the CN8 between 1997 and 2011 is constructed and matched with trade data. The concordance is constructed by applying to the EU context the new algorithm developed by Pierce and Schott (2011) for the 10-digit US nomenclature.[9]

Information on the GDP and population of trading partners comes from the World Bank's World Development Indicators. The geographical indicators come from the Centre d'Etudes Prospective et d'Informations Internationales (CEPII). Information on trade barriers comes from the Heritage Foundation.

In 2007, the full sample contains detailed economic and migration data of 6,855 Swedish firms and their exports to 220 trading partners. The sample also includes information on macroeconomic, geographic, historic, and cultural factors of 176 partner countries. This results in about 12 million observations over ten years.

— Table 2.1. Snapshot of Swedish Manufacturing Firms —

[9] The procedure involves assigning synthetic "family" identifiers to revised codes that belong together, and through these identifiers being able to follow families over time. For further information on this procedure, see Appendix.

As shown in Table 2.1, most of the approximately 6,900 firms active in 2007 are small or medium-sized companies with an average workforce of 87 employees and a median workforce of 24 employees. Only ten percent of small firms with up to 49 employees export, whereas 65 percent of firms with more than 250 employees export. Close to one third of all firms in the sample is part of a multinational enterprise. Approximately one third of the domestically owned companies export, as compared to 41 percent of the multinational firms. Not only is exporting more common among large and multinational firms, they also export more as share of their total sales and export to more markets.

— Table 2.2. Trade and Diversity in Swedish Manufacturing Firms —

In regard to migration, firms employ on average 12 foreign born workers. Half of all firms employ three or more foreign-born workers. However, the extent to which manufacturing firms depend on immigrant workers varies heavily across companies. Exporting is more common among firms in which foreign-born workers constitute 12 percent or a higher share of the workforce, and they export to more markets. On the other hand, they have lower export intensity and export fewer products on average.

— Table 2.3. Immigrants across Firms according to Size and MNE Status —

There is a positive and important pair-wise correlation between the presence of foreign-born people in the workforce and trade volumes with regard to migrant source countries. In line with previous research, multinational companies, as well as larger firms, have higher trade intensity. Productivity and capital ratios are also related to more trade with immigrants' source countries.

— Table 2.4. Pair-Wise Correlations for Exports —

— Table 2.5. Pair-Wise Correlations for Imports —

6.5 Estimation Strategy

The key concern in estimating the main specification is that many firms do not engage in trade with other countries, and that most firms do not trade with a randomly selected country. Hence, zeros are abound in trade. Practical approaches to zero trade flows in the literature have been to either disregard zeros, to replace them with a small value, or use estimation methods appropriate when the response variable can be zero, such as a limited dependent variable or Poisson pseudo maximum likelihood estimation (Eaton and Tamura 1994; and Santos Silva and Tenreyro 2006). None of these approaches, however, are ideal for this study. Disregarding non-trade means that estimation is done based on a non-random sample. Thus, the estimated coefficients, conditional on being sampled, are biased, which thereby disables inference to the population. Replacing zeros with a small number introduces further unpredictability, where results may hinge on the number to replace zeros (King 1988). Limited dependent variables estimators, such as Tobit, would be appropriate only if censoring is the main cause for zeros or missing values. Poisson pseudo maximum likelihood estimation would also be a valid approach, as long as zeros do not abound (Martin and Pham 2008). However, in this study, zeros do abound. They account for 94 percent of the observations, simply because most firms in the sample do not trade with a particular country.[10] Selection permeates the data-generating process.[11]

[10] Non-zero trade is in our case depending on the values of other parameters, such as firm productivity.

Therefore, the process behind non-zero trade is modeled by recognizing that firms make two decisions: First, whether to trade, and second, how much to trade. The two decisions are addressed by using a Heckman selection model (Heckman 1979). This approach is consistent with the few other existing studies employing a firm-level gravity model (e.g. Greenaway et al. 2008; Gustafsson-Tingvall 2011). Additionally, this model is well suited for this study as it decomposes migrants' postulated impact on trade into extensive and intensive margins.[12]

The Heckman two-step procedure includes a selection and a levels equation. Factors that influence the selection process may also impact levels, i.e. both in regard to trade entry and trade volumes. These factors are allowed to have different effects on the two outcomes. If this is true, and selection is disregarded in estimation, then levels estimates will be biased.[13] The Heckman selection model deals with this problem by estimating the probability of non-trade (the inverse mills ratio, IMR) on the full sample. The ratio is computed for traders and then included as a regressor in the main equation. The Heckman selection approach assumes errors to be exogenous with respect to regressors, and jointly normally distributed.[14]

[11] However, OLS is unbiased and consistent under the following conditions: factors that affect the decisions if and how much to export are identical; they the same sign and magnitude; and there are no important omitted variables.
[12] It should be underlined that the preferred method of estimation – Heckman full maximum likelihood – is extremely computationally burdensome. Therefore, by necessity, the preferred estimation on the full sample is executed for a limited number of specifications. Additional analysis is carried out by conventional OLS regression analysis. As shown by the sensitivity analysis, the sign and statistical significance does not differ considerably between these methods.
[13] In addition, any omitted variables that affect both entry and volumes cause the error terms to be correlated, which further strengthens the case for accounting for selection.
[14] The latter is particularly restrictive for small samples.

Application of the Heckman selection model calls for an instrument, which should explain exclusion from trade rather than trade volumes (Wooldridge 2002).[15] The instrument is added to the selection equation, which in turn provides input to the levels equation. Preferably, the exclusion criterion is justified by theory (Bushway et al. 2007). Based on a heterogeneous firms model of trade, Helpman, Melitz, and Rubinstein (2008) advocate for a criterion related to trade barriers that influence fixed costs exclusively. Their preferred instrument uses information on trading partners' regulatory costs for starting a business. Although the validity of this criterion is confirmed, data are only available for one year, and for a non-random subset of their sample. Therefore, an alternative criterion is applied, namely common religion across trading partners.

We are not completely convinced that common religion and other criteria used in the literature are appropriate, such as trade experience or the share of white-collar workers, even if shown practically useful. Common religion reduces the cultural distance between countries, thereby implying lower bilateral fixed trade costs. But, sharing the same belief system may also facilitate for daily interactions, which would lower variable costs as well.[16] Having traded before makes new trade entry less costly, which reduces variable costs since knowledge of the foreign market accumulates and thus lowers regular trade costs over time. Neither is hiring white collar or services workers a suitable criterion. This is not directly related to trade costs, and in any case does not seem to influence trade propensity (Bernard and Jensen 1999; Lodefalk 2011).

[15] Without an exclusion criterion, identification in the levels equation is weaker and hinges on regressors' values being widely dispersed; this since the non-linear Probit of the selection equation is linear for mid-range values of regressors (Vella 1998). Put simply, without a criterion, the IMR may be so correlated with regressors of the levels equation that key coefficient estimates become statistically insignificant.

[16] Moreover, in the current application common religion primarily affects trade volumes.

Instead, in the spirit of Helpman et al. (2008), a fixed cost measure of the regulatory burden imposed on business abroad is constructed. This is based on annual surveys done by the World Bank (2011) for 173 countries, which gather information on policy-related start-up and closedown costs for business, as well as concerning protection of investors, and contractual obligations. This particular measure is motivated by the fact it accounts for sunk costs associated with entry into a foreign market, as well as uncertainty surrounding entry costs. For instance, weaker protection of investors increases uncertainty around the investment, which discourages firms from entering the foreign market at hand. Likewise, higher bankruptcy costs also raise uncertainty and make firms less willing to enter.

Data are available for four out of ten years in the panel. Missing year are covered by extrapolation, which is valid in this case since countries' overall business environment, and perceptions about it, do not change rapidly over short time periods like thise. The resulting indicator, therefore, well captures the effect of fixed costs on trade entry over the relevant period.[17] In our opinion, it constitutes the presently best available exclusion criterion.[18]

Standard errors from Heckman estimation are known to be downward biased, since an estimated regressor is added to the levels equation.[19] Further, there is reason to expect a second moment misspecification. As a solution, standard errors are clustered by firm-

[17] The indicator affects trade propensity, but barely trade intensity.
[18] Helpman et al. (2008) also correct for bias introduced by asymmetric shares of exporting firms. Such correction would be superfluous in the case of this study, though, since detailed firm-destination level data are available, which makes it possible to directly analyze extensive margins of trade.
[19] They are upward biased when an exclusion criterion is absent in the selection equation.

destination, and heteroscedasticity is addressed by adopting the Huber/White/sandwich variance-covariance estimator.

If trade leads to increased familiarity between trading partners, this could theoretically influence the cost of migration. Potential endogeneity of migration arising from reverse causality with respect to trade would imply a correlation between the number of foreign-born workers in a certain firm and unobserved factors that influence trade decisions with respect to immigrants' source countries. Assuming firms are more likely to hire workers born in countries with which they already do business, a positive relationship between the incidence of foreign-born workers and trade would then suggest something different than a trade-creating effect of migrants. Simply, it would imply that trade leads to more immigrant workers.

Reverse causality is not viewed to be a serious problem in this study. From a theoretical standpoint, at least to our knowledge, there is no study where firms' hiring decisions is seen as driven by existing trade relationships. It is not logically convincing to believe that firms are systematically more inclined to hire workers from countries with which they have established trade relations. By theory, then, a significant link between trade and the incidence of foreign-born workers in firms is more likely to reflect a direction of causation running from migrants to trade, rather than *vice versa*. Empirically, using a gravity approach and bilateral trade data for the US and 175 trading partners, Aguiar, Walmsley and Abrevaya (2007) find that migration is not driven by trade, but rather by other determinants.

In any case, the potential problem of reverse causality is addressed empirically in several ways, for instance by imposing a lagged structure. The use of a lagged variable approach in this study is also motivated by the possibility that firms' consider hiring migrants as an investment decision. This would entail structural adjustments and future pay-offs. For example, it takes time for firms to utilize the human and social capital added by migrants in terms of increased trade.

7. Firm-Level Results on Migration and Trade

7.1 Benchmark Estimates

The first column in Table 3.1 provides an estimate of the role of conventional firm-level characteristics using pooled ordinary least squares. A larger workforce, being a multinational enterprise, having higher labor productivity and physical capital intensity is positively associated with firm export volumes. Based on the this generic firm-level model of trade, the share of foreign-born employees in the workforce is positively and significantly related to higher export volumes to immigrants' source countries, as suggested by the estimates provided in the second column. Traditional estimates of the link between trade and migration use the gravity equation and country-level data. The third column provides estimates based on a similar model, but with firm-level information on the number of immigrants employed as share of the total workforce: there is strong association between the share of migrants in firms born in a specific country and exports to that country. Further, the partner country's GDP has a positive and significant influence on the export intensity of firms with respect to immigrants' source countries. The distance from Sweden is negatively linked to exports. On average, firms export more to countries

that share a border with Sweden, and with countries that have English as official language. The estimates are intact after all partner countries from the European Union are dropped.

— Table 3.1. Benchmark Results from OLS Estimation for Exports —

The results from the regressions conducted based on the full benchmark model are provided in the fourth column. This specification takes into account both firm-level controls and typical gravity factors that influence bilateral trade relationships. The incidence of foreign-born workers is statistically significant and positively related to higher exports to immigrant source countries. Every percentage unit increase in the share of foreign-born workers is associated with on average two percent higher exports to immigrant source countries. The link is statistically significant at conventional significance levels.

Traditional estimates of the gravity equation using macro-data on country pairs generally find that migrants facilitate both for exports and imports. The impact on imports is conventionally attributed to a bias among immigrants in favor of products from their countries of birth. Nevertheless, there is no reason to believe that the potential capacity of migrants to reduce information frictions and enhance trust levels is restricted to exports. Therefore, regressions are conducted for firms' imports. These estimates, provided in Table 3.2, demonstrate that a higher share of foreign-born workers is associated with more imports. One percentage unit more of employees born abroad, as share of the total workforce, is linked to an average increase of imports by 2.7 percent.

— Table 3.2. Benchmark Results from OLS Estimation for Imports —

7.2 Non-Linearity and Interaction Effects

The relationship between the share of foreign-born workers and firms' exports can be non-linear. To control for this potential feature, the benchmark model is augmented by a quadratic and a cubic term of the migrant share variable. The first and second columns in Table 3.3 provide estimates of these terms. The share of foreign-born workers is still significantly and positively related to trade with immigrant source countries, but the relationship is non-linear. The results in the second column suggest that the relationship exhibit characteristics following a third degree polynomial; firms hiring of foreign-born workers is associated an initial increase of exports, but the relationship is diminishing and turns negative up to a certain point, after which a higher share of foreign-born employees again is linked to more exports.

— Table 3.3. Estimation with Non-Linear and Interaction Terms for Exports —

If the hypothesized effect of migration on trade derives from lower trade costs for firms' that hire foreign-born workers, either via the information channel or through access to networks and increased trust levels, or both, it is possible that the effect may vary across source countries. For example, the migrant effect on trade costs could be influenced by countries' level of development and geographical location. To control for these aspects, the immigrant stock variable is interacted with:

- a variable which indicates if the firm is a multinational enterprise;
- the weighted distance between Stockholm and the most populous city of the partner country;

- an indicator variable which is unity if English is the official language of the partner country;
- and finally, a variable which is unity if the partner country is a low-income country.

The third column provides estimates when both non-linearity and interaction effects have been incorporated. Non-linearity of the relationship is confirmed, suggesting that the share of foreign-born people in the workforce is more substantially related to higher exports than previously estimated by the benchmark model. Increasing the immigrant share by one percentage unit is suggested to increase exports by ten percent. However, these results could be biased due to selection of firms into export markets. Therefore, the fifth column provides estimates using the Heckman selection procedure.

As indicated by these results, accounting for sample selection does not change the key results. The point estimates of the migrant share variables have the expected signs and are statistically significant at the one percent level. After controlling for both selection of firms into export markets, as well as non-linearity and interaction terms, it is clear that the incidence of immigrants in the workforce is significantly related to more exports. The link is economically substantial, too. Increasing the share of foreign-born people in the workforce by one percentage unit is associated with nine percent higher exports on average.

Further, estimates indicate that the link between the share of foreign-born people in the workforce and exports is on average stronger for multinational firms. On the other hand, the relationship is on average smaller for firms that hire workers from countries

distant to Sweden. It should be noted, however, that this is relative to the estimated relationship for countries that are geographically closer to Sweden. Firms' with higher shares of foreign-born workers export more, but the relationship tends to be weaker in regard to more distant trading partners. As is seen in Table 3.4, a similar – yet marginally larger – tendency is found for imports.

— Table 3.4. Estimation with Non-Linear and Interaction Terms for Imports —

7.3 Firm Size Matters

It is probable that the link between firms' trade and the incidence of foreign-born workers, even if substantial and statistically significant for all firms, differs between small, medium, and large firms. Migrants are thought to lower trade costs for firms by adding human and social capital, but because these factors consist of experiences, contacts, and access to networks, it is likely that the ability of firms to utilize these potentially trade increasing elements differ depending on the size of the firm. Larger firms are likely to have better capacity to absorb migrants' human and social capital with the aim of lowering trade costs. The *ex ante* variation with respect to foreign-born workers across firms depending on their size is, however, ambiguous. In light of the fact that fixed trade costs are usually particularly cumbersome for smaller firms, it is logical to expect that foreign-born workers are relatively stronger linked to more trade for smaller firms in specific.

To control for these aspects, separate regressions are conducted for firms divided into three categories depending on their size, defined as number of employees. Small firms are defined as having a fewer than 50 employees, medium sized firms having between 50-249 employees, and large firms as having at least 250 employees. Columns 1 to 3 in Table

3.5 and Table 3.6 demonstrate that the link between trade and the share of foreign-born workers is strongest for larger-firms. Taking non-linearity and interaction terms into account, the link between the share of immigrants in the workforce and exports is 15 times stronger for larger firms relative to small firms, and 4.5 stronger than for medium sized firms. The trend is similar in regard to imports. Increasing the share of foreign-born employees in the workforce is associated with approximately six percent higher exports and four percent higher imports for small firms, 18 percent higher exports and 22 percent higher imports for medium firms, and 82 percent higher exports and 126 percent higher imports for large firms.

— Table 3.5. Foreign-born Workers and Trade Influence across Firm Size for Exports —

This association could be explained by better absorption capacity of immigrants' human and social capital among larger firms. But, it can also be a result of an existing cluster effect since a percentage increase in the share of foreign-born workers for large firms imply a larger number of immigrants employed relative to a percentage increase for smaller firms. This suggests that the absolute number of foreign-born workers could have an impact on the overall link between the share of immigrants in firms and their foreign trade.

For exports, distance weakens the link with exports only for medium sized firms. The geographic distance from Sweden does not statistically influence the link for foreign-born workers in small firms and large firms in regard to firms' export destination markets. However, for countries that have English as official language, the link is substantially stronger for medium sized and especially for large firms. Similar tendencies are found for

imports, although distance interacts negatively with imports and the share of foreign-born workers also for large firms. Further, firms with higher shares of workers born in poor countries tend to trade less with these countries than in general. This is especially true for larger firms.

— Table 3.6. Foreign-born Workers and Trade Influence across Firm Size for Imports —

7.4 Inter-Regional Impact

Table 3.7 provides estimates when taking into account which geographic region foreign-born workers come from. The purpose is to assess whether the link between trade and hiring foreign-born workers depends on the regional location of the partner country. Countries are divided into nine regions listed in Appendix. Immigrants from the Americas, East Asia and the Pacific, as well as from the rest of Europe (excluding East Europe and Central Asia) are particularly linked to higher trade. Immigrants from the Americas exhibit the strongest relationship with firms' exports to this region. For imports, the same is true for immigrants from the rest of Europe.

— Table 3.7. Foreign-born Workers and Trade Influence across Source Regions —

7.5 The Role of Skills and Time since Migration

The time migrants have been away from their country of birth, which is closely related to the time residing in the new country, may matter for the extent they are able to impact on trade costs. Nevertheless, the impact is ambiguous by theory. Integration in the destination country can be important for how well a migrant's human and social capital is absorbed by firms as to lower trade costs. Following this logic, time since immigration influences positively the extent to which migration impacts trade. But, since foreign-born workers are

hypothesized to influence trade by providing access to contacts via networks, and because human relations tend to fade if not actively sustained, time away from the source country instead weakens the trade facilitating impact of migrants in the workforce.

As discussed, the capability of foreign-born workers to lower trade costs for firms' in which they are employed may depend on their knowledge in areas relevant to foreign trade, and the skill of communicating as well as transforming this knowledge into real trade opportunities for firms in which they are employed. Higher skills are therefore expected to positively influence the trade facilitating impact of immigrants.

The detailed data available for this study allows testing the underlying impact channels through which migration is hypothesized to influence trade. Skills are mainly presumed to influence via the information channel, whilst time in the destination country, or time away from the source country, primarily impacts via the trust channel.

Foreign-born workers are divided into three groups depending on the time a foreign-born person has resided in Sweden. Two groups are created based on skill level, where people with post-secondary education are considered skilled.

Table 3.8 and 3.9 provides a matrix of estimates taking into account both the time aspect and skill level. Workers that have resided at most three years in Sweden on average demonstrate the strongest impact on high trade. Up-to-date contacts in the source country, are clearly important for firms' trade costs.

Newly arrived immigrants have the strongest impact on exports irrespective of skill level. In fact, unskilled immigrants have a stronger impact on exports than do skilled immigrants that have lived in Sweden for longer than ten years.

Nevertheless, the results indicate that contacts and access to networks quickly fade with time away from the source country. Time in Sweden is systematically related to a lower trade impact, and integration into the destination country does not seem to be able to compensate for the loss of contacts and weaker access to networks. For unskilled immigrants, the trade link appears negative after four years. Integration into the new country of residence is able to compensate in part for the loss of contacts, but not to the extent as to turning the relationship positive.

— Table 3.8. The Role of Skills and Time since Migration for Exports —

These results confirm the hypothesis that the impact of migration on trade derives from lower information costs and enhanced trust in business through contacts via networks. Both skills and time away from the source country is of essence. Weaker contacts can completely undermine the trade enhancing effects for unskilled immigrants. As time is mainly important for contacts, whereas skills are relevant for knowledge, the fact that skilled immigrants are positively related to higher exports irrespective of time in Sweden is interpreted as the migrant impact mainly working through the information channel.

— Table 3.9. The Role of Skills and Time since Migration for Imports —

7.6 Test of the Information Channel Hypothesis using Disaggregate Trade

The results show a strong and positive correlation between the share of foreign-born people in firms and their trade with the countries from which immigrant employees originate. As explained, the theory is based on the assumption that this effect derives from the superior inherent knowledge that foreign-born people possess about their former home

countries, which lowers and eliminates information frictions between the countries, as well as contacts and access to networks, which enhance trust levels. This in turn leads to lower trade costs and trade. If this is so, it is reasonable to assume a stronger migrant effect for trade in goods that are particularly dependent on low information barriers and trust between sellers and buyers. Such goods are distinguished by unique qualities. For example, they lack a reference price, i.e., the price of the goods cannot be determined without reference to more detailed information about brand, origin, producer, and other characteristics.

To test the strength of the hypothesis that the positive migrant effect on trade operates through the knowledge and contacts, trade data are divided – following Rauch (1999) – into three categories: differentiated goods, reference-priced goods, and homogeneous goods. The latter two groups are assumed here to be homogeneous.[20] Regressions are performed separately for these groups. If the theory is correct, a larger migrant effect will be expected for trade in differentiated goods than for trade in homogeneous goods. The results are presented in Table 3.10.

— Table 3.10. Differentiated versus Homogenous Goods —

The results confirm that it is primarily via knowledge and contacts that migration influences firms' trade. For exports, the migrant effect is significant and positive for differentiated goods, whereas no statistically significant impact is found for homogenous goods whatsoever. The size of the impact on exports of differentiated goods is comparable with the estimated effect found using the preferred specification and estimation method; an

[20] Bastos and Silva (2010) confirm the validity of such a binary classification, using firm-product-destination data for Portugal in 2005. Export unit values differ substantially more within a product category at the 8-digit CN level for differentiated goods.

increase of the immigrant share in a firm's workforce with one percentage unit could increase exports of differentiated goods by eleven percent, relative to nine percent for aggregate exports.

7.7 Extended Results

Migration has the potential to reduce both fixed and variable trade costs and therefore to influence both the extensive and intensive product margins of trade. At the extensive margin, migrants can spur trade by lowering fixed costs, while at the intensive margin spur trade by reducing the variable costs. In other words it is not necessarily the case that migrants' impact on entry trade costs via knowledge and contacts influences is identical to their impact on costs that determine the intensity of existing trade relationships.

In order to differentiate between effects on different product margins, separate regressions are performed based on the number of products exported and imported by each firm, as to evaluate the migrant impact on the extensive margin, as well as for the intensity of trade flows with specific immigrant source countries. As demonstrated in Table 3.11, the share of foreign-born workers employed in Swedish firms enhance trade with source countries by encouraging more products to be traded and by intensifying existing trade. In turn this confirms that migration has a role to play in lowering both entry costs to trade as well as variable trade costs.

— Table 3.11. Extensive versus Intensive Product Margins —

Some of the possible trade enhancing factors inhibited by migrants may not be specific to source countries. Knowledge of business culture and other norms relevant for international trade could be useful for more than one country. This is true for contacts and

networks as well, and especially in regard to countries of regions that share a common history and culture.

The first two columns in Table 3.12 provide estimates of this so called "neighborhood effect." In addition to the main specification, another explanatory variable is included, which consists of the total number of immigrants from the surrounding region employed in the firm, as share of the workforce. This test does not change the main results – the share of migrants from the specific country in question is strongly associated with more trade – but it clearly indicates that hiring immigrants from neighboring countries influence trade positively, too. Increasing the share of foreign-born workers from a specific country may not only spur trade with that country by up to 8-10 percent, but could also raise trade with neighboring countries by an additional two percent. This confirms the hypothesis that information and contacts are not completely nation-specific, which implies that people can contribute to firms' trade with countries neighboring to their own country of birth.

— Table 3.12. Extended Results: Neighborhood Factors and Transplanted Home Bias —

As discussed, there are two main channels through which migration is relevant for trade costs. Previous studies have not been able to isolate these effects from the transplanted home bias, which has nothing to do with trade costs, but instead results in more trade due to an inherent bias among immigrants in favor of goods produced in their country of birth. In this study, transplanted home bias is not considered a serious problem to the main findings. Exports cannot, by definition, be driven by transplanted home bias among immigrants to Sweden. To check whether transplanted home bias drives the results

in regard to imports, a control variable is included comprising of immigrant stocks of different source countries in Sweden. As seen in columns 3 and 4 of Table 3.12, the previous findings are robust to the inclusion of the immigrant stock of country *j*. While the total immigrant stock is significant and positive for imports, which confirms existence of transplanted home bias, there is no statistically significant influence on exports, Importantly, however, this strengthens the finding that it is mainly through the information and contact channels that migration spur firms' trade when it comes to exports. Furthermore, the estimates demonstrate that it is via the presence of foreign-born people in firms' that migration influences exports. There is no measurable impact of immigration at large on manufactures exports.

7.8 Robustness

The results presented thus far demonstrate a clear and strong relationship between foreign-born workers and firms' trade with immigrant source countries. The relationship exhibits a non-linear formation, where the share of foreign-born employees in the company increases with a decreasing rate, tends to fall back at a certain threshold, yet turning strongly positive once a critical mass of foreign-born employees has been reached. Larger firms demonstrate to be particularly receptive of foreign-born workers in regard to increased trade. Individual characteristics of immigrants do matter. Immigrants' ability to lower trade costs depend on up-to date knowledge and contacts in source countries, which is likely to why "new" or "temporary" skilled migrants display the strongest association with higher trade.

But, how robust are these results? In order to check the sensitivity of the findings, several regressions are performed in Table 3.13 and Table 3.14. In the first and second

columns, Sweden's top five immigrant countries and the top five largest trading partners are dropped from the sample. The estimates indicate neither that the largest source countries, nor the largest trading partners, drive the main results. Rather, the largest immigrant countries tend to weigh down on the trade-link. Regressions were also conducted without EU countries, since foreign trade with the EU countries is treated differently in statistics than trade with the rest of the world. This did not change the results. Furthermore, firms with fewer than 50 employees were dropped from the data in order to check whether the higher risk of truncation for small firms affect the results. This did not affect the results either, which shows that truncation in data does not pose a serious challenge to the empirical analysis.

A lagged structure is implemented in the third and fourth columns. The predictor variable is lagged by one and two time periods respectively. Naturally, the lagged approach leads to fewer observations. Still, the key results are robust to the inclusion of lags, indicating that the direction of the causation may in fact go from migration to trade, and not *vice versa*. The main results are further intact to the implementation of a partial adjustment model, in which the dependent variable lagged by one period is included as a control in column five.

Countries' trade policies influence the costs borne by exporters and importers. With the aim of controlling for the openness to foreign trade among Sweden's trading partners, the main estimation model is augmented with a control variable that includes data on tariffs and non-tariff barriers. As shown in column five, the main results are robust to this inclusion as well.

— Table 3.13. Robustness Tests for Exports —

While all of the main and extended results are based on the model that includes time, industry, and region fixed effects, a regression was also performed containing a model with industry and year interactions. The results from this test did not change the key results, thus ruling out that migrant-induced trade is driven by industry-time specific shocks.

— Table 3.14. Robustness Tests for Imports —

8. Conclusions and Final Remarks

Previous research has found a positive link between trade and migration. The focus has been on bilateral trade relationships, using either cross-sectional country data, or at best information at the provincial level in specific countries. Findings have been interpreted as evidence of the hypothesis that migrants raise trade by lowering information costs, and by enhancing trust between sellers and buyers across countries.

This is the first study to study in depth the role of migration in facilitating firms' international trade. It contributes both to the literature on trade and migration, as well as to the literature on the determinants of firms' foreign trade, by investigating directly how foreign-born people influence firms' trade with immigrant source countries. Unlike previous studies, this study is able to draw inference on the underlying impact channels. This is done by, *inter alia*, investigating how the skill-level and time since immigration impact the influence foreign-born workers have on firms' trade.

The results demonstrate a clear and positive impact of hiring foreign-born people on firms' trade with immigrant source countries. The impact is economically substantial,

too. Increasing the share of foreign-born workers in a firm with one percentage point could spur exports by nine percent on average, and imports by 12 percent. The effect is bigger for larger firms, and for multinationals.

An additional important contribution of this study is that it investigates the relative importance of the underlying impact channels through which migration is thought to lower trade costs. The study shows how skilled "new" migrants increase firms' trade the most. This clearly shows that up-to-date contacts and knowledge of source countries are essential determinants for migrants' trade facilitating abilities. Contacts and networks fade quickly, however, whereas the impact through migrants' knowledge of foreign markets is what drives the sustained positive effect on firms' trade. Consequently, in contrast to previous studies, this study is able to demonstrate more directly that it is mainly through the information channel that migrants lower trade costs. On the other hand, this study also shows that integration into the new country can compensate to some degree for diminishing contacts and weaker access to networks.

In sum, the findings of this study provide new and robust insights into the role of migration in international trade in general, and in specific into the role that migrants can play to lower trade-related transactions costs through their knowledge of foreign markets, which lowers information frictions, and access to contacts via networks, which infuses trust in business.

References

Aguiar, A., Walmsley, T. & Abrevaya, J., 2007. Effects of bilateral trade on migration flows: the case of the United States, *GTAP Resource 2408*, Draft paper presented at the 10th Annual Conference on Global Economic Analysis, Purdue University, USA.

Ahn, J., Amit K., K. & Wei, S-J., 2011. The role of intermediaries in facilitating trade. *Journal of International Economics*, 84(1), pp.73-85.

Anderson, J. & Van Wincoop, E., 2003. Gravity with gravitas: a solution to the border puzzle. *The American Economic Review*, 93(1), pp.170–192.

Anderson, J. & Van Wincoop, E., 2004. Trade costs. *Journal of Economic Literature*, 42(3), pp.691–751.

Anderson, J., 1979. A theoretical foundation for the gravity equation. *The American Economic Review*, 69(1), pp.106–116.

Balding, C., 2010. Joining the World Trade Organization: what is the impact? *Review of International Economics*, 18(1), pp.193-206.

Bandyopadhyay, S., Coughlin, C. & Wall, H.J., 2008. Ethnic networks and US Exports. *Review of International Economics*, 16(1), pp.199–213.

Bastos, P. & Silva, J., 2010. Identifying vertically differentiated products. *Economics Letters*, 106, pp. 32-34.

Becker, G., 1957. *The economics of discrimination*, Chicago: University of Chicago Press.

Bergstrand, J., 1989. The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The Review of Economics and Statistics*, 71(1), pp.143–153.

Bernanke, B., 1983. Irreversibility, uncertainty, and cyclical investment. *The Quarterly Journal of Economics*, 98(1), pp.85-106.

Bernard, A. & Bradford Jensen, J., 1995. Exporters, jobs, and wages in U.S. manufacturing: 1976-1987. *Brookings Papers on Economic Activity*.

Bernard, A. & Bradford Jensen, J., 1999. Exceptional exporter performance: cause, effect, or both? *Journal of International Economics*, 47, pp.1-25.

Bernard, A. et al., 2007. Firms in international trade. *The Journal of Economic Perspectives*, 21(3), pp.105–130.

Bernard, A., Eaton, J., Bradford Jensen, J. & Kortum, S., 2003. Plants and productivity in international trade. *American Economic Review*, 93, pp.1268-1290.

Blanes, J.V., 2008. Characteristics of immigrants and bilateral trade. *Revista de Economía Aplicada*, pp.133–159.

Bloom, N., 2007. Uncertainty and the dynamics of R&D. *American Economic Review*, 97(2), pp.250-255.

Casella, A. & Rauch, J., 2002. Anonymous market and group ties in international trade. *Journal of International Economics*, 58(1), pp.19-47.

Chaney, T., 2008. The intensive and extensive margins of international trade. *American Economic Review*, 98(4), pp.1707-1721.

Chaney, T., 2011. The network structure of international trade. *National Bureau of Economic Research*, Working Paper No. 16753.

Cletus, C. & Wall, H., 2011. Ethnic networks and trade: intensive versus extensive margins. *Economics Letters*, 113, pp.73-75.
Deardorff, A., 1998. Determinants of bilateral trade: does gravity work in a neoclassical world? In J. Frankel, ed. *The regionalization of the world economy*. Chicago: Chicago University Press.
Dixit, A., 1989. Entry and exit decisions under uncertainty. *Journal of Political Economy*, 97(3), pp.620-638.
Dunlevy, J. & Hutchinson, W., 1999. The impact of immigration on American import trade in the late nineteenth and early twentieth centuries. *The Journal of Economic History*, 59(4), pp.1043–1062.
Dunlevy, J., 2006. The influence of corruption and language on the protrade effect of immigrants: evidence from American states. *Review of Economics and Statistics*, 88(1), pp.182-186.
Eaton, J. & Tamura, A., 1994. Bilateralism and regionalism in Japanese and US trade and direct foreign investment patterns. *Journal of the Japanese and International Economies*, 8(4), pp.478–510.
Elsass, P. & Veiga, J., 1994. Acculturation in acquired organizations: a force-field perspective. *Human Relations*, 47(4), pp.431-431.
Erlich, L. & Canavire Bacarreza, G., 2006. The impact of migration on foreign trade: a developing country approach. *Latin American Journal of Economic Development*, 6, pp.125–146.
Felbermayr, G. & Toubal, F., 2008. Revisiting the trade-migration nexus: evidence from new OECD data. Mimeo.
Girma, S. & Yu, Z., 2000. The link between immigration and trade: evidence from the UK. Mimeo.
Gould, D., 1994. Immigrant links to the home country: empirical implications for US bilateral trade flows. *The Review of Economics and Statistics*, 76(2), pp.302–316.
Government of Sweden, 2001. *Sweden in 2000 – A country of migration: past, present and future*, Stockholm: Ministry for Foreign Affairs.
Greenaway, D. & Kneller, R., 2007. Firm heterogeneity, exporting and foreign direct investment. *The Economic Journal*, 117(517), pp.F134–F161.
Handley, K., 2011. Exporting under trade policy uncertainty: theory and evidence. Stanford University, Mimeo.
Hatzigeorgiou, A., 2010a. Does immigration stimulate foreign trade? Evidence from Sweden. *Journal of Economic Integration*, 25(2), pp.376–402.
Hatzigeorgiou, A., 2010b. Migration as trade facilitation: assessing the links between international trade and migration. *The B.E. Journal of Economic Analysis & Policy*, 10(1), p.Article 24.
Head, K. & Ries, J., 1998. Immigration and trade creation: econometric evidence from Canada. *The Canadian Journal of Economics*, 31(1), pp.47–62.
Helpman, E. & Krugman, P., 1985. *Market structure and foreign trade*, Cambridge, MA: MIT Press.
Helpman, E., Melitz, M. & Rubinstein, Y., 2008. Estimating trade flows: trading partners and trading volumes. *Quarterly Journal of Economics*, 123(2), pp.441–487.

Herander, M. & Saavedra, L., 2005. Exports and the structure of immigrant-based networks: the role of geographic proximity. *Review of Economics and Statistics*, 87(2), pp.323–335.
Hijzen, A. & Wright, P., 2010. Migration, trade and wages. *Journal of Population Economics*, 23(4), pp.1189-1211.
Hoekman, B., Martin, W. & Mattoo, A., 2010. Conclude Doha: it matters! *World Trade Review*, 9(03), pp.505–530.
Hofstede, G., 2001. *Culture's consequences: comparing values, behaviors, institutions, and organizations across nations*, 2nd edn, Thousand Oaks, CA: Sage Publications.
Hummels, D. & Klenow, P., 2005. The variety and quality of a nation's exports. *American Economic Review*, 95(3), pp.704–723.
Iranzo, S. & Peri, G., 2009. Migration and trade: theory with an application to the Eastern-Western European integration. *Journal of International Economics*, 79(1), pp.1–19.
Jansen, M. & Piermartini, R., 2009. Temporary migration and bilateral trade flows. *The World Economy*, 32(5), pp.735–753.
Keeley, B., 2009. *International migration: the human face of globalization*, Paris: OECD.
Kohli, U., 2002. Migration and foreign trade: further results. *Journal of Population Economics*, 15(2), pp.381-387.
Lewer, J. & van den Berg, H., 2009. Does immigration stimulate international trade? Measuring the channels of influence. *The International Trade Journal*, 23(2), pp.187–230.
Lewer, J., 2006. The impact of immigration on bilateral trade: OECD results from 1991-2000. *Southwestern Economic Review*, 33(1), pp.9–22.
Limão, N. & Venables, A., 2001. Infrastructure, geographical disadvantage and transport costs. *The World Bank Economic Review*, 15(3), pp.451–479.
Liu, X., 2009. GATT/WTO promotes trade strongly: sample selection and model specification. *Review of International Economics*, 17(3), pp.428–446.
Lodefalk, M., 2011. Services and Export Intensity. Örebro University, Mimeo.
Lundh, C., 2010. *Invandringen till Sverige*, 2nd edn, Stockholm: SNS Förlag.
Maddison, A., 2001. *The world economy: a millennial perspective*, Paris: OECD.
Magnusson, L., 1999. *Sveriges ekonomiska historia*, 2nd edn, Stockholm: Prisma.
Markusen, J., 1983. Factor movements and commodity trade as complements. *Journal of International Economics*, 14(3-4), pp.341–356.
Massey, D. et al., 1993. Theories of international migration: a review and appraisal. *Population and Development Review*, 19(3), pp.431–466.
Melitz, M. & Constantini, J., 2008. The dynamics of firm-level adjustment to trade liberalization. In E. Helpman, D. Marin, & T. Verdier, eds. *The organization of firms in a global economy*. Cambridge, MA: Harvard University Press.
Melitz, M., 2003. The impact of trade on intra-industry reallocations and aggregate industry productivity. *Econometrica*, 71, pp.1695–1725.
Melitz, M., 2008. Language and foreign trade. *European Economic Review*, 52(4), pp.667–699.
Mundell, R., 1957. International trade and factor mobility. *The American Economic Review*, 47(3), pp.321–335.

Neary, J.P., 1995. Factor mobility and international trade. *The Canadian Journal of Economics*, 28(1), pp.4–23.
Nilsson, Å., 2004. Efterkrigstidens invandring och utvandring. *SCB Demografiska rapporter*, 5.
OECD, 2007. *Policy coherence for development 2007: migration and developing countries*, Paris: OECD.
Panagariya, A., 1992. Factor mobility, trade and welfare: a North-South analysis with economies of scale. *Journal of Development Economics*, 39(2), pp.229–245.
Partridge, J. & Furtan, H., 2008. Immigration wave effects on Canada's trade flows. *Canadian Public Policy*, 34(2), pp.193–214.
Phelps, E., 1972. The statistical theory of racism and sexism. *American Economic Review*, 62(4), pp.659-661.
Rauch, J., 1991. Reconciling the pattern of trade with the pattern of migration. *The American Economic Review*, 81(4), pp.775–796.
Rauch, J., 1999. Networks versus markets in international trade. *Journal of International Economics*, 48(1), pp.7–35.
Requena-Silvente, F. & Peri, G., 2010. The trade creation effect of immigrants: evidence from the remarkable case of Spain. *The Canadian Journal of Economics*, 43(4), pp.1433–1459.
Rose, A., 2004. Do WTO members have more liberal trade policy? *Journal of International Economics*, 63(2), pp.209–235.
Schiff, M., 2006. Migration, trade and investment: complements or substitutes? The World Bank, Mimeo.
Schneider, S., 1988. National vs. corporate culture: implications for human resource management. *Human Resource Management*, 27, pp.231–246.
Silva, J. & Tenreyro, S., 2006. The log of gravity. *The Review of Economics and Statistics*, 88(4), pp.641–658.
Statistics Sweden, 2011. Online statistical database Available at: http://www.scb.se [Accessed October, 2011].
Subramanian, A. & Wei, S.-J., 2007. The WTO promotes trade, strongly but unevenly. *Journal of International Economics*, 72, pp.151–175.
Tadesse, B. & White, R., 2010. Does cultural distance hinder trade in goods? A comparative study of nine OECD member nations. *Open Economies Review*, 21(2), pp.237-261.
Tindbergen, J., 1962. *Shaping the world economy*, New York: The Twentieth Century Fund.
UNDP, 2009. *Overcoming barriers: human mobility and development*, New York: Palgrave Macmillian.
Wagner, D., Head, K. & Ries, J., 2002. Immigration and the trade of provinces. *Scottish Journal of Political Economy*, 49(5), pp.507–525.
White, R., 2007. Immigrant-trade links, transplanted home bias and network effects. *Applied Economics*, 39(7), pp.839–852.
Wooldridge, J. M., 2002. *Econometric analysis of cross section and panel data*. London: MIT Press.

World Bank, 2011. World Development Indicators. Available at: http://data.worldbank.org/data-catalog/world-development-indicators. [Accessed September, 2011].
Zukang, S., 2009. International migration trends. Presented at Contribution of migrants to development: trade, investment and development linkages. UNCTAD, Geneva

Tables and Figures

1. Stylized Facts

Table 1.1. Sweden's Largest Immigrant Groups

	Source country	Stock 2000	Stock 2010	Δ 2000-2010	Δ % 2000-2010	Share of population 2000	Share of population 2010
1	Finland	195	170	-26	-13%	2.20%	1.80%
2	Iraq	49	122	72	147%	0.56%	1.29%
3	Yugoslavia	72	71	-1	-2%	0.81%	0.75%
4	Poland	40	70	30	75%	0.45%	0.75%
5	Iran	51	62	11	22%	0.58%	0.66%
6	Bosnia-Herzegovina	52	56	5	9%	0.58%	0.60%
7	Germany	38	48	10	26%	0.43%	0.51%
8	Denmark	38	46	7	19%	0.43%	0.48%
9	Norway	42	43	1	2%	0.48%	0.46%
10	Turkey	32	43	11	33%	0.36%	0.45%
11	Somalia	13	38	25	189%	0.15%	0.40%
12	Thailand	10	31	21	203%	0.12%	0.33%
13	Chile	27	28	2	6%	0.30%	0.30%
14	Lebanon	20	24	4	20%	0.23%	0.26%
15	China	8	24	16	194%	0.09%	0.25%
16	UK	15	21	6	43%	0.16%	0.22%
17	Syria	14	21	7	47%	0.16%	0.22%
18	Romania	12	20	8	68%	0.13%	0.21%
19	India	11	18	7	61%	0.13%	0.19%
20	USA	14	17	3	19%	0.16%	0.18%
21	Russia	7	16	9	138%	0.07%	0.16%
22	Hungary	14	15	1	9%	0.16%	0.16%
23	Vietnam	11	15	4	34%	0.12%	0.15%
24	Afghanistan	4	14	10	236%	0.05%	0.15%
25	Ethiopia	12	14	2	16%	0.13%	0.15%
26	Greece	11	11	1	5%	0.12%	0.12%
27	Columbia	7	11	3	44%	0.08%	0.11%
28	South Korea	9	10	1	13%	0.10%	0.11%
29	Eritrea	3	10	7	237%	0.03%	0.11%
30	Pakistan	3	10	7	231%	0.03%	0.11%

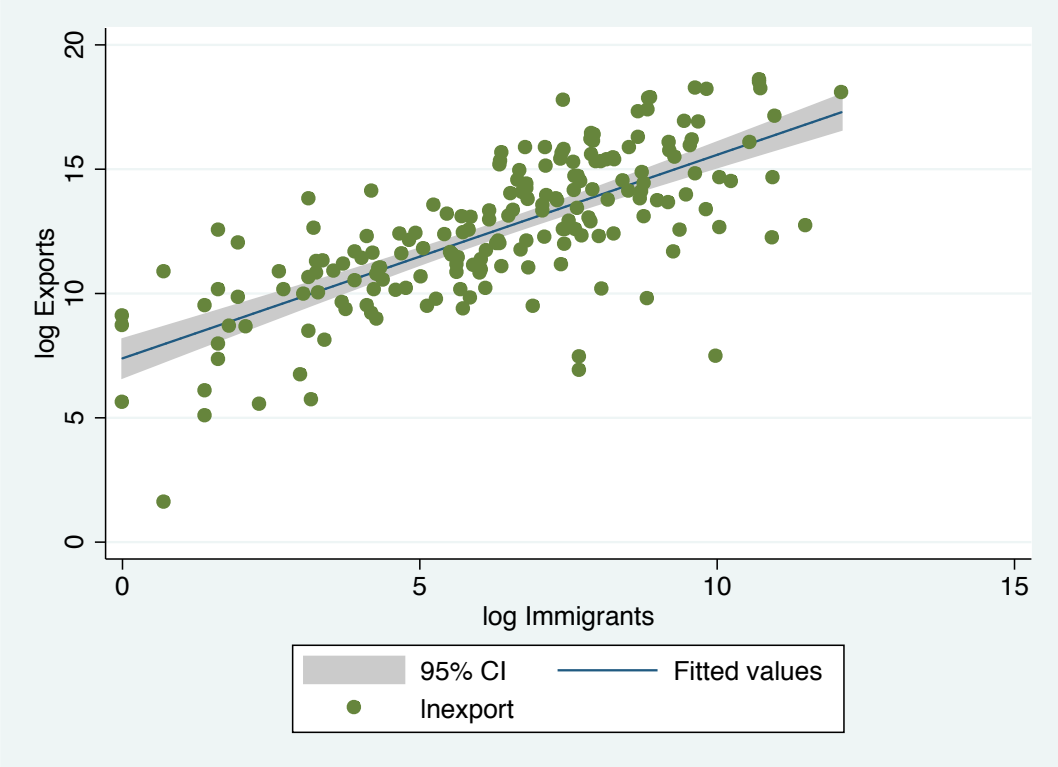
Note: Immigrant stocks in thousands.
Source: Statistics Sweden; authors' calculations.

Table 1.2. Immigration to Sweden and Foreign Trade across Regions

	Number of Immigrants			Exports			Imports		
Region	1998	2007	*Change (%)*	1998	2007	*Change (%)*	1998	2007	*Change (%)*
World	81,417	83,652	*2.7*	538,869,376	794,332,224	*47.4*	208,098,656	336,671,200	*61.8*
Americas	4,953	5,561	*12.3*	74,337,096	102,197,672	*37.5*	20,766,830	19,321,916	*-7.0*
East Europe & Central Asia	21,007	28,471	*35.5*	26,645,788	71,433,160	*168.1*	9,652,585	34,312,952	*255.5*
East Asia and Pacific	4,381	6,007	*37.1*	48,247,664	67,837,632	*40.6*	10,956,463	22,279,536	*103.3*
East & Southern Africa	1,291	1,985	*53.8*	4,464,744	9,779,962	*119.0*	721,452	1,411,980	*95.7*
Middle East	4,892	8,424	*72.2*	9,563,514	19,111,680	*99.8*	573,966	665,375	*15.9*
North Africa	496	672	*35.5*	3,840,879	8,662,397	*125.5*	236,082	329,088	*39.4*
Rest of Europe	42,808	30,148	*-29.6*	364,504,448	494,627,776	*35.7*	163,699,328	255,911,056	*56.3*
South Asia	1,158	1,789	*54.5*	2,135,230	13,353,008	*525.4*	305,540	1,460,444	*378.0*
West Africa	407	561	*37.8*	717,904	4,620,797	*543.7*	97,237	22,364	*-77.0*

Note: Immigrant stocks in thousands. Exports and imports refer to manufacturing trade in thousands of SEK.
Source: Statistics Sweden; authors' calculations.

Figure 1.1. Immigrants to Sweden and Exports to Source Countries



Note: Fitted relationship based on export and immigrant data covering 196 countries in 2007.
Source: Statistics Sweden; authors' calculations.

2. A Glance at the Data

Table 2.1. Snapshot of Swedish Manufacturing Firms

	Mean	Median	Std. dev.	Min.	Max.
Export volume	115,876	596.24	1,304,951	0	58,327,956
Import volume	49,113	177.56	563,868	0	32,599,168
Export intensity	0.18	0.02	0.28	0	1
Import intensity	0.09	0.01	0.17	0	1
Number of migrants	12.20	3.00	97.68	0	n/a
Share of migrants	0.12	0.09	0.13	0	1
No. of employees	87.43	24	507.26	10	n/a
Labor productivity	643.03	559.08	416.38	0	12,427
Human capital intensity	0.17	0.13	0.16	0	1
Physical capital intensity	293.55	161.80	490.16	0	11,681
Multinational status	0.32	0	0.47	0	1
Exporter	0.19	0	0.39	0	1
Importer	0.20	0	0.40	0	1

Note: Data refer to the year 2007. Number of firms is 6,855. Number of observations in the 1998-2007 period is 15,020,024. Monetary values are in 1,000 SEK (approximately 148 USD). Only merchandise trade is considered. Two maximum values are not disclosed for confidentiality reasons.

Table 2.2. Trade and Diversity in Swedish Manufacturing Firms

	Number of firms	Share of all firms	Share of exporters, within the group	Average export value (intensive margin)	Share of exports in sales (export intensity)	Number of export destinations[a]	Number of export products (extensive margin)	Share of immigrants in employment
Small firms	5,052	74%	10%	10,132	17%	88	3,326	14%
Medium firms	1,436	21%	39%	32,846	33%	120	3,349	14%
Large firms	367	5%	65%	128,716	39%	175	3,566	14%
Non-multinational firms	4,672	68%	9%	16,300	17%	86	3,135	15%
Multinational firms	2,183	32%	41%	122,472	39%	175	4,499	13%
Firms with lower diversity	4,272	62%	17%	79,785	38%	127	4,086	7%
Firms with higher diversity	2,583	38%	22%	70,917	32%	175	3,906	21%
All firms	6,855	100%	19%	122,227	35%	175	4,931	14%

Notes: Data refer to the year 2007. Monetary values are in 1,000 SEK (approx. 148 USD). Only merchandise trade is considered, at the 8-digit level (approx. 9,772 products). Higher/lower diversity is defined as above/below-mean share of foreign-born workers. [a] The maximum number of destinations for any firm in the group.

Table 2.3. Employment of Immigrants across Firms according to Size and MNE Status

	Number of Immigrants			Share of Immigrants (%)		
	1998	2007	*Change (%)*	1998	2007	*Change (%)*
Small firms	11,327	14,697	*29.8*	10.7	13.8	*28.2*
Medium-sized firms	17,738	19,921	*12.3*	11.4	13.9	*21.6*
Large firms	52,352	49,034	*-6.3*	13.3	14.1	*6.0*
Swedish firms	25,439	26,599	*4.6*	11.3	15.2	*35.4*
Multinationals	55,978	57,053	*1.9*	13.0	13.4	*3.1*

Note: Average number of immigrants. Classification of firms with less than 50, 50-249, and 250 employees as small, medium-sized, and large. Multinationals include both Swedish and foreign multinationals established in Sweden.
Source: Statistics Sweden; authors' calculations.

Table 2.4. Pair-Wise Correlations for Exports

	Export volume	Share of migrants	No. of employees	Multinational	Exporter	Labor productivity	Human capital int.	Physical capital int.	GDP	Population	Distance	Contiguity	Landlocked	English	Low income
Export volume	1														
Share of migrants	0.0642	1													
No. of employees	0.2131	0.0035	1												
Multinational	0.1603	0.0017	0.5214	1											
Exporter	0.9906	0.062	0.2038	0.1576	1										
Labor productivity	0.0666	-0.002	0.1271	0.1514	0.064	1									
Human capital int.	0.0806	0.0057	0.2999	0.2459	0.0805	0.1079	1								
Physical capital int.	0.0353	-0.0016	0.1124	0.0642	0.0334	0.1288	0.0164	1							
GDP	0.2621	0.0568	-0.0009	0.0012	0.2603	0.0105	0.0044	-0.0012	1						
Population	0.126	0.0456	-0.0001	0.0003	0.1254	0.0017	0.0007	-0.0001	0.7508	1					
Distance	-0.2463	-0.1134	0	0	-0.2418	0	0	0	-0.3348	-0.1712	1				
Contiguity	0.2224	0.183	0	0	0.2163	0	0	0	0.1156	0.0039	-0.295	1			
Landlocked	-0.0432	-0.0255	0	0	-0.0422	0	0	0	-0.1624	0.1085	-0.0253	-0.0459	1		
English	-0.0378	-0.0379	0	0	-0.0375	0	0	0	-0.2153	-0.3082	0.3187	-0.063	-0.0959	1	
Low income	-0.1282	-0.0323	0.0004	-0.0007	-0.1273	-0.0047	-0.0019	0.0004	-0.3753	0.2579	0.2161	-0.1085	0.2562	-0.1015	1

Note: All variables in logs, except dummy variables and the share of migrants.

Table 2.5. Pair-Wise Correlations for Imports

	Import volume	Share of migrants	No. of employees	Multinational	Importer	Labor productivity	Human capital int.	Physical capital int.	GDP	Population	Distance	Contiguity	Landlocked	English	Low income
Import volume	1														
Share of migrants	0.0645	1													
No. of employees	0.1539	0.0035	1												
Multinational	0.1103	0.0017	0.5214	1											
Importer	0.991	0.0624	0.1488	0.1089	1										
Labor productivity	0.0392	-0.002	0.1271	0.1514	0.0381	1									
Human capital int.	0.0557	0.0057	0.2999	0.2459	0.0559	0.1079	1								
Physical capital int.	0.0209	-0.0016	0.1124	0.0642	0.0197	0.1288	0.0164	1							
GDP	0.2351	0.0568	-0.0009	0.0012	0.2355	0.0105	0.0044	-0.0012	1						
Population	0.1107	0.0456	-0.0001	0.0003	0.1109	0.0017	0.0007	-0.0001	0.7508	1					
Distance	-0.2304	-0.1134	0	0	-0.2273	0	0	0	-0.3348	-0.1712	1				
Contiguity	0.2106	0.183	0	0	0.2137	0	0	0	0.1156	0.0039	-0.295	1			
Landlocked	-0.0291	-0.0255	0	0	-0.0282	0	0	0	-0.1624	0.1085	-0.0253	-0.0459	1		
English	-0.0273	-0.0379	0	0	-0.0261	0	0	0	-0.2153	-0.3082	0.3187	-0.063	-0.0959	1	
Low income	-0.1152	-0.0323	0.0004	-0.0007	-0.1153	-0.0047	-0.0019	0.0004	-0.3753	0.2579	0.2161	-0.1085	0.2562	-0.1015	1

Note: All variables in logs, except dummy variables and the share of migrants..

Table 2.6. Data Description and Sources

Variable	Definition	Sources
Exports/Imports	Merchandise trade in 1,000 SEK (approx. 148 USD)	Statistics Sweden, FTS
Migrant share	Number of foreign born employees in firms	Statistics Sweden, RAMS and PS
Employees	Number of employees (full-time equivalents)	Statistics Sweden, SBS
Multinational	Multinational status dummy; unity if a firm is part of an enterprise with firms abroad, zero otherwise	Statistics Sweden, EGR
Exporter (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	Partner's GDP calculated in constant prices	World Bank
Population	Partner's size of population	World Bank
Distance	Distance in kilometers between Stockholm and partner's capital (weighted by the two cities' populations)	CEPII
Adjacency	Unity if partner shares a national border with Sweden, zero otherwise	CEPII
Landlocked	Unity if partner is landlocked, zero otherwise	CEPII
English	Unity if English is official language in partner country, zero otherwise	CEPII
Low income country	Unity if partner country has GDP per capita below $3,000	World Bank
Trade openness	Index based on partner's trade-weighted average tariff, plus the incidence of non-tariff barriers to trade (0-100, where higher values correspond to freer trade)	Heritage Foundation
Business burden	Index of cumbersome business environment (0-1, where a higher value correspond to a more cumbersome business environment)	World Bank; authors' calculations
Common religion	Unity if partner is mainly Christian, zero otherwise	CIA World Factbook

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

3. Regression Results

Table 3.1. Benchmark Results from Estimation for Exports

	Dependent variable: Exports (log)			
	(1)	(2)	(3)	(4)
	Generic firm level	Migrant firm level	Gravity firm level	Migrant firm level gravity
Migrant share		9.529***	5.339***	2.024***
		(0.321)	(0.683)	(0.235)
Employees (log)	0.174***	0.175***		0.242***
	(0.002)	(0.002)		(0.002)
Multinational (0,1)	0.0530***	0.0535***		0.0858***
	(0.002)	(0.002)		(0.003)
Exporter (1,0)	17.85***	17.82***		16.94***
	(0.021)	(0.021)		(0.021)
Labor productivity (log)	0.0859***	0.0866***		0.118***
	(0.002)	(0.002)		(0.002)
Human capital intensity (log)	-0.000438***	-0.000534***		-0.000147
	(0.000)	(0.000)		(0.000)
Physical capital intensity (log)	0.00256***	0.00261***		0.00354***
	(0.000)	(0.000)		(0.000)
GDP (log)			0.480***	0.116***
			(0.003)	(0.001)
Population (log)			-0.161***	-0.0297***
			(0.003)	(0.001)
Distance (log)			-1.429***	-0.407***
			(0.014)	(0.005)
Adjacency (0,1)			5.308***	1.440***
			(0.082)	(0.029)
Landlocked (0,1)			0.211***	0.0387***
			(0.008)	(0.003)
English (0,1)			0.311***	0.0856***
			(0.008)	(0.003)
Obs.	12,151,884	12,151,884	12,153,184	9,838,463
Adjusted *R*2	0.663	0.664	0.170	0.674
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
P. region FE	No	No	Yes	Yes

Regressions performed using OLS (1e-7 is added to the dependent variable to avoid truncation).
Robust and clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.2. Benchmark Results from Estimation for Imports

	Dependent variable: Imports (log)			
	(1)	(2)	(3)	(4)
	Generic firm level	Migrant firm level	Gravity firm level	Migrant firm level gravity
Migrant share		7.655***	6.052***	2.714***
		(0.279)	(0.593)	(0.231)
Employees (log)	0.104***	0.104***		0.144***
	(0.001)	(0.001)		(0.002)
Multinational (0,1)	0.0273***	0.0275***		0.0408***
	(0.002)	(0.002)		(0.002)
Importer (1,0)	17.20***	17.17***		16.34***
	(0.029)	(0.029)		(0.030)
Labor productivity (log)	0.0384***	0.0388***		0.0527***
	(0.002)	(0.002)		(0.002)
Human capital intensity (log)	-0.000510***	-0.000592***		-0.000641***
	(0.000)	(0.000)		(0.000)
Physical capital intensity (log)	0.00113***	0.00117***		0.00151***
	(0.000)	(0.000)		(0.000)
GDP (log)			0.274***	0.0665***
			(0.002)	(0.001)
Population (log)			-0.0711***	-0.00794***
			(0.002)	(0.001)
Distance (log)			-1.240***	-0.395***
			(0.011)	(0.004)
Adjacency (0,1)			3.271***	0.675***
			(0.072)	(0.026)
Landlocked (0,1)			0.304***	0.0653***
			(0.006)	(0.002)
English (0,1)			0.250***	0.0642***
			(0.006)	(0.002)
Obs.	12,151,884	12,151,884	12,153,184	9,838,463
Adjusted $R2$	0.614	0.614	0.142	0.623
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
P. region FE	No	No	Yes	Yes

Regressions performed using OLS (1e-7 is added to the dependent variable to avoid truncation).
Robust and clustered standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.3. Estimation with Non-Linear and Interaction Terms for Exports

	Dependent variable: Exports (log)				
	OLS			Heckman selection	
	(1)	(2)	(3)	(4)	(5)
dy/dx w.r.t. Migrant share	**4.742*** **	**9.858*** **	**10.223*** **		**8.874*** **
	(0.381)	**(0.579)**	**(0.602)**		**(1.613)**
Migrant share	4.756***	9.920***	8.773***	-9.431***	29.41***
	(0.383)	(0.583)	(2.816)	(1.049)	(5.400)
Migrant share^2	-11.55***	-57.92***	-50.39***	-6.870***	-75.22***
	(1.536)	(4.524)	(5.073)	(1.540)	(8.425)
Migrant share^3		57.99***	57.39***	6.285***	116.7***
		(5.798)	(6.475)	(1.608)	(12.813)
Migrant share *x* Multinational (0,1)			17.20***	0.434**	3.175***
			(0.711)	(0.214)	(0.764)
Migrant share *x* Distance (log)			-0.617*	1.574***	-2.739***
			(0.347)	(0.151)	(0.784)
Migrant share *x* English (0,1)			7.044***	-1.190*	3.135
			(1.384)	(0.687)	(2.894)
Migrant share *x* Low income (0,1)			-2.144***	-0.148	1.596
			(0.563)	(0.381)	(1.654)
Employees (log)	0.242***	0.242***	0.242***	0.221***	0.709***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.006)
Multinational (0,1)	0.0858***	0.0857***	0.0750***	0.221***	0.246***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.015)
Exporter (1,0)	16.94***	16.94***	16.93***	2.371***	3.177***
	(0.021)	(0.021)	(0.021)	(0.004)	(0.017)
Labor productivity (log)	0.118***	0.118***	0.118***	0.165***	0.483***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.015)
Human capital intensity (log)	-0.000172	-0.000204	-0.000122	0.0341***	0.0309***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)
Physical capital intensity (log)	0.00355***	0.00356***	0.00352***	0.00844***	0.0312***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)
GDP (log)	0.116***	0.116***	0.125***	0.164***	0.409***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.012)
Population (log)	-0.0302***	-0.0306***	-0.0398***	-0.00180	-0.0344***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.013)
Distance (log)	-0.405***	-0.403***	-0.407***	-0.271***	-0.845***
	(0.005)	(0.005)	(0.005)	(0.004)	(0.018)
Adjacency (0,1)	1.424***	1.408***	1.373***	0.405***	0.186***
	(0.029)	(0.029)	(0.030)	(0.008)	(0.029)
Landlocked (0,1)	0.0397***	0.0403***	0.0421***	-0.0768***	-0.539***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.023)
English (0,1)	0.0856***	0.0856***	0.0863***	0.0237***	0.165***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.022)
Low income country (0,1)			0.0323***	-0.230***	-0.0921***
			(0.004)	(0.006)	(0.030)
Business burden				-0.373***	
				(0.013)	
IMR (λ)				0.682***	
				(0.009)	
Obs.	9,838,463	9,838,463	9,838,463	9,150,777	
Adjusted $R2$	0.674	0.674	0.674		
Rho				0.287 (0.003)	
Log-likelihood				-1,684,030	

For OLS 1e-7 is added to the dependent variable to avoid truncation. dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.4. Estimation with Non-Linear and Interaction Terms for Imports

	Dependent variable: Imports (log)				
	OLS			Heckman selection	
	(1)	(2)	(3)	(4)	(5)
dy/dx w.r.t. Migrant share	**5.345*** **	**10.178*** **	**9.382*** **		**12.136*** **
	(0.348)	**(0.559)**	**(0.575)**		**(2.155)**
Migrant share	5.359***	10.24***	18.81***	-14.02***	25.71***
	(0.349)	(0.563)	(2.798)	(1.244)	(6.391)
Migrant share^2	-11.18***	-54.98***	-51.20***	-7.235***	-50.91***
	(1.433)	(4.570)	(5.181)	(1.822)	(10.766)
Migrant share^3		54.78***	56.62***	5.834***	54.36***
		(5.741)	(6.638)	(1.925)	(16.777)
Migrant share *x* Multinational (0,1)			14.64***	0.881***	5.820***
			(0.674)	(0.239)	(1.038)
Migrant share *x* Distance (log)			-1.726***	2.366***	-2.045**
			(0.348)	(0.185)	(0.951)
Migrant share *x* English (0,1)			5.677***	-3.536***	1.420
			(1.437)	(0.753)	(3.039)
Migrant share *x* Low income (0,1)			-2.345***	-1.298***	2.506
			(0.562)	(0.497)	(2.267)
Employees (log)	0.144***	0.144***	0.144***	0.248***	0.567***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.009)
Multinational (0,1)	0.0408***	0.0406***	0.0314***	0.185***	0.195***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.020)
Importer (1,0)	16.34***	16.33***	16.31***	2.192***	3.699***
	(0.030)	(0.030)	(0.030)	(0.006)	(0.030)
Labor productivity (log)	0.0528***	0.0528***	0.0530***	0.134***	0.286***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.018)
Human capital intensity (log)	-0.000666***	-0.000697***	-0.000624***	0.0260***	0.00157
	(0.000)	(0.000)	(0.000)	(0.001)	(0.004)
Physical capital intensity (log)	0.00152***	0.00153***	0.00150***	0.00559***	0.0130***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.004)
GDP (log)	0.0668***	0.0669***	0.0972***	0.214***	0.178***
	(0.001)	(0.001)	(0.001)	(0.004)	(0.023)
Population (log)	-0.00838***	-0.00877***	-0.0393***	0.00996**	0.254***
	(0.001)	(0.001)	(0.001)	(0.004)	(0.023)
Distance (log)	-0.393***	-0.392***	-0.402***	-0.536***	-1.113***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.028)
Adjacency (0,1)	0.659***	0.644***	0.575***	0.207***	-0.836***
	(0.026)	(0.026)	(0.027)	(0.008)	(0.036)
Landlocked (0,1)	0.0663***	0.0669***	0.0711***	0.0675***	-0.521***
	(0.002)	(0.002)	(0.002)	(0.006)	(0.034)
English (0,1)	0.0642***	0.0642***	0.0699***	0.0858***	0.0217
	(0.002)	(0.002)	(0.002)	(0.006)	(0.032)
Low income country (0,1)			0.110***	-0.210***	-0.502***
			(0.003)	(0.009)	(0.065)
Business burden				-0.295***	
				(0.019)	
IMR (λ)				1.020***	
				(0.018)	
Obs.	9,838,463	9,838,463	9,838,463	9,150,777	
Adjusted $R2$	0.623	0.623	0.623		
Rho				0.408 (0.006)	
Log-likelihood				-992,917.9	

For OLS 1e-7 is added to the dependent variable to avoid truncation. dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.5. Foreign-born Workers and Trade Influence across Firm Size for Exports

	Dependent variable: Exports (log)		
	(1)	(2)	(3)
	Small firms	Medium firms	Large firms
dy/dx w.r.t. Migrant share	**5.584*** **	**18.354*** **	**83.022*** **
	(0.571)	**(2.157)**	**(12.773)**
Migrant share	0.911	33.94***	55.56*
	(2.564)	(8.703)	(30.434)
Migrant share^2	-22.09***	-157.8***	-1039.2***
	(3.840)	(19.620)	(166.955)
Migrant share^3	23.85***	260.5***	2972.2***
	(4.062)	(39.715)	(630.066)
Migrant share *x* Multinational (0,1)	11.07***	12.93***	29.96***
	(0.864)	(1.394)	(11.164)
Migrant share *x* Distance (log)	0.182	-2.691**	-0.281
	(0.312)	(1.099)	(3.690)
Migrant share *x* English (0,1)	5.914***	20.55***	98.11**
	(1.446)	(6.344)	(42.596)
Migrant share *x* Low income (0,1)	-1.339***	-11.56***	-41.47***
	(0.423)	(1.878)	(8.114)
Employees (log)	0.116***	0.192***	0.798***
	(0.002)	(0.007)	(0.015)
Multinational (0,1)	0.133***	0.116***	-0.0817***
	(0.003)	(0.005)	(0.026)
Exporter (1,0)	15.71***	16.55***	16.73***
	(0.033)	(0.034)	(0.052)
Labor productivity (log)	0.0735***	0.169***	0.323***
	(0.002)	(0.007)	(0.018)
Human capital intensity (log)	0.00508***	0.0775***	0.318***
	(0.000)	(0.003)	(0.021)
Physical capital intensity (log)	0.00271***	0.00866***	0.0246***
	(0.000)	(0.001)	(0.004)
GDP (log)	0.0770***	0.242***	0.522***
	(0.001)	(0.004)	(0.012)
Population (log)	-0.0336***	-0.0773***	-0.0820***
	(0.001)	(0.004)	(0.011)
Distance (log)	-0.295***	-0.792***	-1.101***
	(0.004)	(0.012)	(0.033)
Adjacency (0,1)	1.537***	1.837***	1.359***
	(0.034)	(0.069)	(0.144)
Landlocked (0,1)	0.0378***	0.0931***	0.0493**
	(0.002)	(0.007)	(0.021)
English (0,1)	0.0552***	0.169***	0.297***
	(0.002)	(0.007)	(0.021)
Low income country (0,1)	0.0460***	0.0582***	-0.178***
	(0.003)	(0.010)	(0.032)
Obs.	7,024,343	2,231,563	582,557
Adjusted *R*2	0.606	0.689	0.727

Regressions performed using OLS (1e-7 is added to the dependent variable to avoid truncation). dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.6. Foreign-born Workers and Trade Influence across Firm Size for Imports

	Dependent variable: Imports (log)		
	(1)	(2)	(3)
	Small firms	Medium firms	Large firms
dy/dx w.r.t. Migrant share	**3.677*** **	**21.615*** **	**126.475*** **
	(0. .530)	**(2.065)**	**(15.461)**
Migrant share	4.974**	70.83***	190.6***
	(2.352)	(9.638)	(28.770)
Migrant share^2	-14.45***	-195.5***	-1215.2***
	(3.738)	(22.333)	(159.145)
Migrant share^3	15.18***	312.3***	3115.0***
	(3.870)	(46.090)	(606.041)
Migrant share *x* Multinational (0,1)	7.985***	7.018***	21.90***
	(0.789)	(1.404)	(7.960)
Migrant share *x* Distance (log)	-0.311	-6.553***	-14.42***
	(0.293)	(1.198)	(3.502)
Migrant share *x* English (0,1)	2.899**	27.53***	267.8***
	(1.418)	(5.752)	(55.740)
Migrant share *x* Low income (0,1)	-1.846***	-9.142***	-58.97***
	(0.408)	(2.168)	(8.697)
Employees (log)	0.0743***	0.136***	0.424***
	(0.002)	(0.005)	(0.011)
Multinational (0,1)	0.0582***	0.0517***	-0.0325
	(0.002)	(0.004)	(0.020)
Importer (1,0)	15.15***	15.88***	15.65***
	(0.047)	(0.048)	(0.071)
Labor productivity (log)	0.0384***	0.0719***	0.105***
	(0.002)	(0.005)	(0.013)
Human capital intensity (log)	0.00217***	0.0265***	0.158***
	(0.000)	(0.002)	(0.017)
Physical capital intensity (log)	0.00156***	0.00295***	0.00922**
	(0.000)	(0.001)	(0.004)
GDP (log)	0.0578***	0.185***	0.471***
	(0.001)	(0.003)	(0.010)
Population (log)	-0.0259***	-0.0797***	-0.173***
	(0.001)	(0.003)	(0.009)
Distance (log)	-0.253***	-0.788***	-1.436***
	(0.004)	(0.011)	(0.029)
Adjacency (0,1)	0.556***	0.964***	1.099***
	(0.027)	(0.068)	(0.152)
Landlocked (0,1)	0.0394***	0.143***	0.386***
	(0.002)	(0.006)	(0.018)
English (0,1)	0.0416***	0.126***	0.310***
	(0.002)	(0.005)	(0.018)
Low income country (0,1)	0.0763***	0.229***	0.321***
	(0.002)	(0.007)	(0.024)
Obs.	7024343	2231563	582557
Adjusted *R*2	0.546	0.647	0.703

Regressions performed using OLS (1e-7 is added to the dependent variable to avoid truncation). dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.7. Foreign-born Workers and Trade Influence across Source Regions

	Exports	Imports
	(1)	(2)
Americas	12.385***	10.479***
	(1.121)	(1.008)
East Europe and Central Asia	10.137***	8.123***
	(0.710)	(0.731)
East Asia and Pacific	12.148***	11.751***
	(1.156)	(1.103)
East and Southern Africa	4.773***	3.849***
	(1.264)	(1.049)
Middle East	7.637***	8.658***
	(0.836)	(1.008)
North Africa	5.035***	5.700***
	(1.513)	(1.233)
Rest of Europe	10.429***	12.535***
	(1.012)	(1.062)
South Asia	3.425**	4.685***
	(1.510)	(1.366)
West Africa	1.854	1.624
	(1.732)	(1.299)
Obs.	9,838,463	9,838,463
Adjusted *R*2	0.6745	0.6235

Regressions performed using OLS (1e-7 is added to the dependent variable to avoid truncation). dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.8. The Role of Skills and Time since Migration for Exports

	Dependent variable: Exports (log)	
	(1)	(2)
	Unskilled	Skilled
Short time (0-3 years)		
dy/dx w.r.t. Migrant share	**0.424*** **	**0.770*** **
	(0.075)	**(0.085)**
Migrant share	0.0183	0.153
	(0.236)	(0.210)
Migrant share^2	-0.0374***	-0.0723***
	(0.006)	(0.009)
Migrant share^3	0.000482***	0.00166***
	(0.000)	(0.000)
Medium time (4-10 years)		
dy/dx w.r.t. Migrant share	**-0.118*** **	**0.284*** **
	(0.040)	**(0.067)**
Migrant share	0.629***	0.0613
	(0.145)	(0.214)
Migrant share^2	0.000493***	-0.00895***
	(0.000)	(0.002)
Migrant share^3	-7.89e-7***	0.0000756**
	(0.000)	(0.000)
Long time (>10 years)		
dy/dx w.r.t. Migrant share	**-0.027*** **	**0.135*** **
	(0.010)	**(0.033)**
Migrant share	0.0456**	-0.272***
	(0.023)	(0.100)
Migrant share^2	-0.0000257***	-0.00104***
	(0.000)	(0.000)
Migrant share^3	1.75e-08***	0.00000357**
	(0.000)	(0.000)
Obs.	9,150,777	
Rho	0.274 (0.003)	
Log-likelihood	-1,682,750	

Regressions performed using Heckman selection estimation. dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Firm-level and gravity control estimates not reported due to space limitations. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.9. The Role of Skills and Time since Migration for Imports

	Dependent variable: Imports (log)	
	(1)	(2)
	Unskilled	Skilled
Short time (0-3 years)		
dy/dx w.r.t. Migrant share	**0.276****	**0.521*****
	(0.113)	**(0.102)**
Migrant share	0.173	0.561**
	(0.307)	(0.269)
Migrant share^2	-0.0437***	-0.0805***
	(0.013)	(0.011)
Migrant share^3	0.000831**	0.00202***
	(0.000)	(0.000)
Medium time (4-10 years)		
dy/dx w.r.t. Migrant share	**-0.095***	**0.294*****
	(0.053)	**(0.089)**
Migrant share	0.679***	-0.133
	(0.247)	(0.280)
Migrant share^2	0.000957***	-0.00815**
	(0.000)	(0.004)
Migrant share^3	-0.00000189***	0.0000886*
	(0.000)	(0.000)
Long time (>10 years)		
dy/dx w.r.t. Migrant share	**0.007**	**-0.042**
	(0.012)	**(0.041)**
Migrant share	0.107***	0.165
	(0.030)	(0.117)
Migrant share^2	-0.0000904***	-0.000259
	(0.000)	(0.001)
Migrant share^3	5.38e-08***	0.00000228
	(0.000)	(0.000)
Obs.	9,150,777	
Rho	0.378 (0.003)	
Log-likelihood	-991,911.3	

Regressions performed using Heckman selection estimation. dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Firm-level and gravity control estimates not reported due to space limitations. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.10. Differentiated versus Homogenous Goods

	Exports		Imports	
	(1)	(2)	(3)	(4)
	Differentiated	Homogenous	Differentiated	Homogenous
dy/dx w.r.t. Migrant share	**10.960*** **	**2.249**	**14.679*** **	**13.989*** **
	(1.870)	**(3.662)**	**(2.593)**	**(3.645)**
Migrant share	25.31***	38.19***	6.337	41.08***
	(6.052)	(13.174)	(6.944)	(10.088)
Migrant share^2	-77.91***	-75.91***	-55.77***	-78.39***
	(9.521)	(16.851)	(14.959)	(14.148)
Migrant share^3	112.3***	123.1***	60.45**	99.00***
	(13.256)	(24.445)	(24.398)	(21.713)
Migrant share *x* Multinational (0,1)	1.661*	5.356***	3.622***	7.991***
	(0.980)	(1.594)	(1.212)	(1.533)
Migrant share *x* Distance (log)	-1.919**	-4.077**	0.886	-3.916***
	(0.894)	(1.924)	(1.044)	(1.510)
Migrant share *x* English (0,1)	1.552	-8.730	-1.666	2.584
	(3.005)	(8.308)	(3.461)	(5.388)
Migrant share *x* Low income (0,1)	1.848	-0.751	0.0223	4.825*
	(1.839)	(3.156)	(2.714)	(2.748)
Employees (log)	0.690***	0.567***	0.596***	0.485***
	(0.007)	(0.012)	(0.010)	(0.016)
Multinational (0,1)	0.250***	0.0965***	0.222***	0.126***
	(0.017)	(0.032)	(0.022)	(0.036)
Exporter (1,0)	3.062***	2.652***	3.580***	2.749***
	(0.021)	(0.034)	(0.034)	(0.060)
Labor productivity (log)	0.420***	0.522***	0.247***	0.354***
	(0.016)	(0.030)	(0.019)	(0.033)
Human capital intensity (log)	0.0306***	0.0481***	0.0101**	-0.0114*
	(0.003)	(0.007)	(0.004)	(0.007)
Physical capital intensity (log)	0.0182***	0.0479***	-0.000320	0.0315***
	(0.003)	(0.006)	(0.004)	(0.006)
GDP (log)	0.416***	0.324***	0.199***	0.119***
	(0.014)	(0.024)	(0.024)	(0.046)
Population (log)	-0.0557***	0.0649***	0.273***	0.271***
	(0.014)	(0.025)	(0.026)	(0.047)
Distance (log)	-0.790***	-0.794***	-1.248***	-0.543***
	(0.021)	(0.035)	(0.032)	(0.051)
Adjacency (0,1)	0.215***	-0.245***	-0.850***	-0.664***
	(0.033)	(0.056)	(0.039)	(0.059)
Landlocked (0,1)	-0.520***	-0.540***	-0.310***	-0.816***
	(0.026)	(0.047)	(0.038)	(0.065)
English (0,1)	0.174***	0.0537	0.118***	-0.184***
	(0.025)	(0.042)	(0.034)	(0.056)
Low income country (0,1)	-0.0844**	-0.267***	-0.667***	-0.355***
	(0.034)	(0.059)	(0.070)	(0.128)
Obs.	9,150,777	9,150,777	9,150,777	9,150,777
Rho	0.298 (0.004)	0.320 (0.007)	0.460 (0.007)	0.370 (0.014)
Log-likelihood	-1,486,513	-683,691.5	-873,316.2	-457,018.8

Regressions performed using Heckman selection estimation. dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.11. Extensive versus Intensive Product Margins

	Exports		Imports	
	(1)	(2)	(3)	(4)
	Extensive	Intensive	Extensive	Intensive
dy/dx w.r.t. Migrant share	**7.146*** **	**9.351*** **	**6.874*** **	**8.537*** **
	(0.424)	**(0.564)**	**(0.423)**	**(0.528)**
Migrant share	-3.955**	10.32***	4.659**	16.83***
	(1.889)	(2.625)	(1.980)	(2.596)
Migrant share^2	-30.59***	-47.08***	-32.77***	-46.80***
	(3.326)	(4.614)	(3.591)	(4.708)
Migrant share^3	35.58***	52.78***	37.25***	51.51***
	(4.137)	(5.902)	(4.532)	(6.021)
Migrant share *x* Multinational (0,1)	11.49***	15.18***	10.08***	13.30***
	(0.493)	(0.643)	(0.457)	(0.611)
Migrant share *x* Distance (log)	0.840***	-0.809**	-0.150	-1.515***
	(0.237)	(0.324)	(0.247)	(0.322)
Migrant share *x* English (0,1)	4.233***	6.494***	4.990***	4.704***
	(0.975)	(1.344)	(1.077)	(1.357)
Migrant share *x* Low income (0,1)	-2.180***	-1.993***	-2.423***	-2.230***
	(0.400)	(0.528)	(0.407)	(0.529)
Employees (log)	0.176***	0.211***	0.109***	0.132***
	(0.001)	(0.002)	(0.001)	(0.001)
Multinational (0,1)	0.0739***	0.0855***	0.0312***	0.0362***
	(0.002)	(0.002)	(0.002)	(0.002)
Exporter (1,0)	12.79***	16.23***	12.50***	15.52***
	(0.015)	(0.020)	(0.022)	(0.028)
Labor productivity (log)	0.0835***	0.110***	0.0399***	0.0504***
	(0.002)	(0.002)	(0.001)	(0.002)
Human capital intensity (log)	0.00123***	0.000988***	0.0000879	-0.000151
	(0.000)	(0.000)	(0.000)	(0.000)
Physical capital intensity (log)	0.00230***	0.00369***	0.000993***	0.00157***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP (log)	0.0980***	0.121***	0.0883***	0.0923***
	(0.001)	(0.001)	(0.001)	(0.001)
Population (log)	-0.0305***	-0.0372***	-0.0385***	-0.0360***
	(0.001)	(0.001)	(0.001)	(0.001)
Distance (log)	-0.292***	-0.391***	-0.308***	-0.382***
	(0.003)	(0.004)	(0.003)	(0.004)
Adjacency (0,1)	1.161***	1.171***	0.691***	0.540***
	(0.020)	(0.027)	(0.020)	(0.024)
Landlocked (0,1)	0.0373***	0.0396***	0.0712***	0.0683***
	(0.002)	(0.002)	(0.002)	(0.002)
English (0,1)	0.0625***	0.0827***	0.0656***	0.0654***
	(0.002)	(0.002)	(0.002)	(0.002)
Low income country (0,1)	-0.00935***	0.0275***	0.0895***	0.0952***
	(0.003)	(0.003)	(0.002)	(0.002)
Obs.	9,838,463	9,838,463	9,838,463	9,838,463
	0.658	0.669	0.609	0.616

Regressions performed using OLS (1e-7 is added to the dependent variable to avoid truncation). dy/dx denotes the average marginal effect of the migrant share on trade. Robust and clustered standard errors in parentheses. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.12. Neighborhood Factors and Transplanted Home Bias

	Neighbor Factors		Transplanted Home Bias	
	Exports	Imports	Exports	Imports
	(1)	(2)	(3)	(4)
dy/dx w.r.t. Migrant share	**10.075*** **	**9.266*** **	**10.130*** **	**8.394*** **
	(0.602)	**(0.574)**	**(0.631)**	**(0.595)**
dy/dx w.r.t. Total region share	**2.388*** **	**1.918*** **		
	(0.073)	**(0.062)**		
dy/dx w.r.t. Total migrant stock			**-0.933**	**12.504*** **
			(1.316)	**(1.139)**
Migrant share	8.961***	18.97***	5.801*	16.71***
	(2.819)	(2.804)	(2.989)	(2.985)
Migrant share^2	-49.99***	-50.89***	-49.74***	-46.45***
	(5.068)	(5.183)	(5.258)	(5.137)
Migrant share^3	56.98***	56.30***	57.24***	52.92***
	(6.467)	(6.638)	(6.752)	(6.531)
Migrant region share	2.704***	2.172***		
	(0.082)	(0.070)		
Total migrant stock			-0.933	12.50***
			(1.316)	(1.139)
Migrant share *x* Multinational (0,1)	17.15***	14.60***	16.87***	14.50***
	(0.711)	(0.674)	(0.730)	(0.680)
Migrant share *x* Distance (log)	-0.645*	-1.750***	-0.228	-1.654***
	(0.348)	(0.349)	(0.375)	(0.374)
Migrant share *x* English (0,1)	7.013***	5.657***	7.573***	6.442***
	(1.385)	(1.437)	(1.409)	(1.496)
Migrant share *x* Low income (0,1)	-2.262***	-2.441***	-3.029***	-1.833***
	(0.565)	(0.565)	(0.706)	(0.675)
Employees (log)	0.239***	0.141***	0.247***	0.148***
	(0.002)	(0.001)	(0.002)	(0.002)
Multinational (0,1)	0.0738***	0.0305***	0.0754***	0.0330***
	(0.003)	(0.002)	(0.003)	(0.002)
Exporter, Importer (1,0)	16.92***	16.31***	16.96***	16.32***
	(0.021)	(0.030)	(0.022)	(0.031)
Labor productivity (log)	0.119***	0.0533***	0.128***	0.0556***
	(0.002)	(0.002)	(0.003)	(0.002)
Human capital intensity (log)	-0.000461***	-0.000897***	-0.0000894	-0.000673***
	(0.000)	(0.000)	(0.000)	(0.000)
Physical capital intensity (log)	0.00364***	0.00160***	0.00351***	0.00134***
	(0.000)	(0.000)	(0.000)	(0.000)
Obs.	9,838,463	9,838,463	8,608,859	8,608,859
Adjusted *R*2	0.675	0.624	0.676	0.625

Regressions performed using OLS (1e-7 is added to the dependent variable to avoid truncation). dy/dx denotes the average marginal effect of the migrant share on trade. Robust and clustered standard errors in parentheses. Gravity control estimates not reported due to space limitations. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.13. Robustness Tests for Exports

	Dependent variable: Exports (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Excluding top five immigrant countries	Excluding top five trading partners	Dependent variable lag (*t*-1)	Dependent variable lag (*t*-2)	Partial adjustment model	Trade policy control
dy/dx w.r.t. Migrant share	**13.185*** **	**8.393*** **	**9.989*** **	**9.856*** **	**7.395*** **	**8.752*** **
	(1.267)	**(0. 556)**	**(0.623)**	**(0.703)**	**(0.467)**	**(1.552)**
Migrant share	45.68***	24.70***	7.350**	3.748	0.136	29.72***
	(4.036)	(3.057)	(2.883)	(3.315)	(2.066)	(5.411)
Migrant share^2	-62.44***	-54.35***	-47.81***	-47.57***	-33.31***	-75.33***
	(17.240)	(5.142)	(5.254)	(5.870)	(3.516)	(8.434)
Migrant share^3	77.61***	58.50***	53.98***	54.40***	37.78***	117.0***
	(29.464)	(6.421)	(6.620)	(7.606)	(4.376)	(12.823)
Migrant share *x* Multinational (0,1)	30.49***	16.73***	17.80***	18.00***	11.41***	3.197***
	(1.491)	(0.734)	(0.718)	(0.762)	(0.517)	(0.765)
Migrant share *x* Distance (log)	-4.955***	-2.546***	-0.497	-0.0490	0.373	-2.786***
	(0.481)	(0.371)	(0.359)	(0.423)	(0.258)	(0.786)
Migrant share *x* English (0,1)	4.543***	-0.160	7.182***	7.950***	4.668***	3.342
	(1.484)	(1.168)	(1.382)	(1.591)	(1.144)	(2.899)
Migrant share *x* Low income (0,1)	-3.439***	-0.445	-2.295***	3.743***	-2.086***	1.382
	(1.020)	(0.576)	(0.612)	(0.846)	(0.440)	(1.660)
Employees (log)	0.234***	0.228***	0.242***	0.248***	0.173***	0.710***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.006)
Multinational (0,1)	0.0691***	0.0612***	0.0749***	0.0700***	0.0856***	0.243***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.015)
Exporter (1,0)	16.87***	16.49***	16.93***	16.97***		3.163***
	(0.023)	(0.024)	(0.021)	(0.023)		(0.017)
Labor productivity (log)	0.113***	0.113***	0.118***	0.150***	0.0916***	0.485***
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.015)
Human capital intensity (log)	-0.000331**	-0.00113***	-0.000114	-0.000260	0.00207***	0.0306***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Physical capital intensity (log)					0.00298***	0.0309***
					(0.000)	(0.003)
$Exports_{t-1}$					0.802***	
					(0.001)	
Trade openness						0.000624
						(0.001)
Obs.	9,562,284	9,562,308	9,838,463	7,983,070	9,838,463	7,666,042
Adjusted *R*2	0.671	0.639	0.674	0.680	0.712	
Rho						0.282 (0.003)
Log-likelihood						-1,668,374

Columns 1-4 performed using OLS. Columns 5-6 performed using Heckman selection estimation. dy/dx denotes the average marginal effect of the migrant share on exports. Robust and clustered standard errors in parentheses. Gravity control estimates not reported due to space limitations. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.14. Robustness Tests for Imports

	Dependent variable: Imports (log)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Excluding top five immigrant countries	Excluding top five trading partners	Dependent variable lag (*t*-1)	Dependent variable lag (*t*-2)	Partial adjustment model	Trade policy control
dy/dx w.r.t. Migrant share	**12.121*** **	**6.992*** **	**9.149*** **	**9.201*** **	**7.148*** **	**12.068*** **
	(1.088)	**(0.510)**	**(0.615)**	**(0.695)**	**(0.463)**	**(2.107)**
Migrant share	52.26***	24.56***	19.87***	18.78***	6.876***	27.68***
	(3.870)	(2.972)	(2.815)	(3.227)	(2.186)	(6.447)
Migrant share^2	-53.17***	-45.33***	-48.59***	-45.04***	-35.96***	-51.07***
	(15.056)	(5.034)	(5.474)	(6.086)	(3.866)	(10.774)
Migrant share^3	65.51**	48.88***	51.94***	48.42***	40.15***	54.88***
	(25.917)	(6.106)	(6.983)	(7.908)	(4.848)	(16.810)
Migrant share *x* Multinational (0,1)	28.62***	13.76***	14.84***	15.42***	10.47***	5.780***
	(1.424)	(0.690)	(0.687)	(0.724)	(0.496)	(1.037)
Migrant share *x* Distance (log)	-5.605***	-2.575***	-1.888***	-1.859***	-0.366	-2.337**
	(0.456)	(0.365)	(0.356)	(0.415)	(0.272)	(0.959)
Migrant share *x* English (0,1)	2.282	0.539	5.640***	8.098***	4.271***	1.895
	(1.624)	(0.997)	(1.482)	(1.644)	(1.258)	(3.041)
Migrant share *x* Low income (0,1)	-4.771***	-0.707	-2.312***	-2.596***	-2.479***	2.924
	(0.995)	(0.540)	(0.637)	(0.847)	(0.463)	(2.268)
Employees (log)	0.135***	0.122***	0.144***	0.147***	0.113***	0.569***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.009)
Multinational (0,1)	0.0290***	0.0186***	0.0316***	0.0304***	0.0361***	0.197***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.020)
Importer (1,0)	16.27***	15.74***	16.31***	16.31***	0.0451***	3.694***
	(0.032)	(0.037)	(0.030)	(0.032)	(0.002)	(0.030)
Labor productivity (log)	0.0508***	0.0433***	0.0530***	0.0622***	0.000366***	0.287***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.000)	(0.018)
Human capital intensity (log)	-0.000629***	-0.00109***	-0.000617***	-0.000787***	0.00130***	0.00160
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)
Physical capital intensity (log)						0.0129***
						(0.004)
$Imports_{t-1}$					0.780***	
					(0.001)	
Trade openness						0.0123***
						(0.002)
Obs.	9,562,284	9,562,308	9,838,463	7,983,070	9,838,463	7,666,042
Adjusted *R*2	0.623	0.573	0.623	0.628	0.662	
Rho						0.408 (0.006)
Log-likelihood						-990,191.9

Columns 1-4 performed using OLS. Columns 5-6 performed using Heckman selection estimation. dy/dx denotes the average marginal effect of the migrant share on imports. Robust and clustered standard errors in parentheses. Gravity control estimates not reported due to space limitations. Year, industry, and region specific fixed effects included in all regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.0$

APPENDIX

1. Detailed Data Description

1.1 Employer-Employee Data

Matched employer-employee-level data come from Statistics Sweden. The unbalanced micro-level panel database encompasses all manufacturing firms and their employees in Sweden (ISIC 10-37) that were active during the years 1998-2007.

Financial information comes from the Swedish Structural Business Statistics (SBS), which is based on data from the Swedish Tax Authority. For some firms the SBS data is supplemented by information from surveys.

A firm is generally defined as the smallest legal entity. There are, however, some 50 so called "composite firms" that report for more than one legal entity within the same enterprise group.[1] Information on industry affiliation of firms and entities comes from the Swedish Business Register, which is based on the Swedish Standard Industrial Classification (SNI 2002). SNS 2002 corresponds to NACE (rev. 1.1) up to 4-digit level, and to ISIC (rev. 3) up to the 2-digit level.

Information on enterprise affiliation comes from the Swedish Enterprise Group Register (EGR). These data are collected by Statistics Sweden in collaboration with the private corporation PAR AB. An enterprise group is defined as a group consisting of a mother firm and at least one more firm in which the mother holds the absolute (at least 50 percent or more) – and hence controlling majority – of the shares in the enterprise.[2]

Information about the highest education attained for each employee aged 16-74 comes from the register based labor market statistics (RAMS), operated by Statistics

[1] In 2006, 55 "composite firms" enclosed 1,071 other legal entities.
[2] In 2006, approximately 70 percent of firms in the EGR belonged to Swedish-only groups, 17 percent to foreign ones, and 13 percent to Swedish multinationals.

Sweden. Since 2001 RAMS also contains the occupation of employees and their remuneration.

Migration data come from the employment register (1997-2008), included in RAMS, and from the immigration and emigration register (1968-2008), which is included in Population Statistics (PS), also operated by Statistics Sweden. Because of the sensitivity of this information, Statistics Sweden only provides access to data for firms with at least 10 employees.

1.2 Foreign Trade Data

Foreign trade data are collected from the Swedish Foreign Trade Statistics (FTS). These include values of export/import – in SEK – as well as information on destination/source country. With respect to merchandise, trade is reported at the 8-digit so-called Combined Nomenclature (CN8) level. The CN is the European Union classification system for merchandise. Basically it adds two additional digits to the conventionally used 6-digit Harmonized Commodity Description and Coding System (Harmonized System), developed by the World Customs Organization. For non-EU member countries, merchandise trade data come from compulsory registration conducted by Swedish Customs. Regarding intra-EU merchandise trade, data cover the transactions of all firms with an annual import/export of at least 2.2/4.5 million SEK (approximately 317,570/649,580 USD).[3]

The product classification changes over time, and sometimes there are wide-ranging variations. Some codes merge, others split, and while some disappear altogether, others reappear after having been gone for some time. In order not to confuse this with product margin changes, revisions of classification have to be correctly managed (Pierce and Schott 2011). In order to do so, a detailed concordance of the CN8 between 1997 and 2011 is constructed and matched with trade data for the relevant years.[4] Applying, in the EU context, a new algorithm developed by Pierce and Schott for the 10-digit US nomenclature,

[3] The earlier limit for exports and imports covered was 1.5 million SEK, or about 216,530 USD (1998-2004). Concerning trade via another EU member, information on the actual sender or receiver is unavailable.
[4] Our CN8-concordance for 1997-2011 is available upon request, for further use.

creates the concordance over time. Yearly concordances from Eurostat are used as inputs in the algorithm.[5] Basically, this procedure involves assigning synthetic "family identifiers" to revised codes that belong together, and through these identifiers follow the families over time. The merging and splitting of product codes may be thought of as individual codes that either marry or get divorced. Divorce can result in a code that joins another family. Individuals that do not stay single will be part of one or more families, forever or for a while. Those who have been in a relationship with another individual, in any year, will still be considered related to that individual, and indirectly to that individual's previous or subsequent partners. The aim is then to keep track of changes in family status, and to assign a single synthetic time-invariant identifier to all related individuals.

1.3 Gravity Data

Information on the GDP and population of trading partners comes from the World Bank's World Development Indicators. The geographical indicators come from the Centre d'Etudes Prospective et d'Informations Internationales. Data on countries' openness to foreign trade come from the Heritage Foundation. Information on the main religion of the partner country comes from CIA World Factbook.

GDP is calculated in constant prices. A country is considered to be low-income if its GDP per capita is $3,000 USD or below. Geographical indicators include adjacency, which indicates whether the trading partner is sharing a border with Sweden. A country is considered English spoken if this is the official language, or one of the official languages in cases there are several.

Instead of using crow flight distance, a weighted distance measure is used. Weights are created using city-level data to incorporate information on the geographic distribution of population inside trading partners. Thus, distance between Sweden and a trading partner is not simply the distance between Sweden's capital, Stockholm, and the trade partner's

[5] Eurostat provides yearly CN-concordances through their Reference and Management of Nomenclatures (RAMON) server, available from the main website ec.europa.eu/eurostat.

capital, but is calculated using the distance between Stockholm and the most populous city weighted using the share of these cities' populations of the total population of the country. This approach follows Mayer and Zignago (2006).

Trade openness is an index based on countries' trade-weighted average tariff ($_{tj}$) plus the incidence of non-tariff barriers to trade (n_j) expressed as

$$\tau_j = \left[\left(\frac{\hat{t}_j - t_j}{\hat{t}_j - \tilde{t}_j}\right) \cdot 100\right] - n_j$$

where $\hat{t}_j$ and $\tilde{t}_j$ represent the upper and lower bounds of the partner country's tariffs in per cent; $t_j > 0$ and $t_j < 0.5$. Using both qualitative and quantitative measurements, n_j is estimated for product groups and services over various sectors in country j. The existence of non-tariff barriers to trade leads to a lower degree of freedom of trade. This variable is a more direct and therefore better measure of a country's economic openness to the world around it than, for example, an indicator variable for WTO membership. Freedom of trade is measured on a scale ranging from 0 to 100, and the coefficient for this variable is therefore expected to be positively related to trade between Sweden and the partner country concerned.

1.4 The Heckman Exclusion Criterion

A valid exclusion criterion must be created for the identification in the Heckman selection model. The criterion created constitutes a fixed cost measure of the regulatory burden imposed on business abroad. It is based on information for 173 countries from annual surveys by the World Bank (2011) in the so-called Doing Business project, which mainly draws on laws and regulations, and partly from public schedules of fees. The respondents in this survey are either relevant professionals or government officials. Practitioners also provide information, for example on the amount of time and costs involved in dealing with construction permits.

Seven out of the nine main topics in the Doing Business project are included in the construction of the criterion. Five out of those focus on costs associated with business start-ups, as well as closedowns. The remaining two topics focus on protection of investors

and contractual obligations. The excluded topics are tax and trade policy-induced barriers, which impose variable rather than fixed costs on business. Thus, the included topics are:

- Starting a business: the number of procedures, time as well as costs involved in starting a new business (Djankov et al. 2002).
- Dealing with construction permits: the number of procedures, time and costs involved in building a warehouse (World Bank 2011).
- Registering property: the number of procedures, time and costs involved in registering a property that an entrepreneur wants to buy (World Bank 2011).
- Getting credit: coverage, accessibility, and depth of credit information registries, as well as laws on collateral and bankruptcy that facilitate lending (Djankov et al. 2007).
- Protecting investors: transparency of manager transactions, liability of the director, and the extent to which shareholders can sue management for damaging the company (Djankov et al. 2008a).
- Enforcing contracts: the number of procedures, time and costs involved in enforcing contracts, based on a sales dispute case (Djankov et al. 2003).
- Closing a business: the bankruptcy recovery rate and the time and costs involved in bankruptcy (Djankov et al. 2008b).

For each indicator of a topic, a country's performance is ranked and grouped together with similar countries in percentiles based on their individual ranking. After this is done for all indicators of the topic, the mean percentile ranking is computed. The simple average across topics becomes the overall measure, whose percentile ranking is used as the meta-indicator for the ease of business in the country. This overall "business burden" indicator ranges between zero and one; the lower its value, the lower are the policy-related fixed cost imposed on business.

Data are available for four out of ten years in the panel. Extrapolation is therefore necessary to cover missing years. However, a country's overall business environment, including perceptions about it abroad, is unlikely to vary much from one year to another.

Thus, the business burden indicator well captures the role of fixed costs for entry into trade. This is arguably the best presently available exclusion criterion.

1.5 A Note on Countries

Sweden is the reporter. Data on merchandise trade are available for 220 partner countries. Out of those, gravity data are available for 195 partner countries. Matching current trade data with gravity and migration data for the period 1968-2007 is hobbled by problems, mainly in regard to the appearance of new countries as a result of the break-up of the Soviet Union, Yugoslavia, and Czechoslovakia.

To address this issue, former Yugoslavia is treated as one entity (under the heading of Serbia), and former Czechoslovakia as another entity (under the heading of the Czech Republic). One advantage of this approach is that it facilitates for panel data analysis, since partner countries are consistent over the years covered in the study (1998-2007). Further, this approach simplifies aggregation of trade flows.

Migrants from the former Soviet Union, which disintegrated before the period covered in our data set, are re-classified as being born in Russia and consequently matched with Sweden's trade with Russia. This is somewhat dissatisfactory, but due to the fact that we lack information about which part of the Soviet Union they come from. Consequently, employees born in the USSR will only be able to potentially affect trade with Russia, not with independent countries that were once republics in the Soviet Union.

Finally, to make data on trade and migration consistent with gravity data, trade and migration information of Belgium and Luxembourg is merged, as is Liechtenstein and Switzerland.

The resulting panel of firms includes information about their relation with 195 countries. If the business burden exclusion criterion is included, the panel includes a total of 168. Using the trade policy variable the panel ends up with 131 countries.

Table 1.1. Countries and Regions included in the Sample

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

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

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

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

NORTHERN AFRICA
Algeria
Djibouti
Egypt
Libya
Morocco
Tunisia

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

SOUTHERN ASIA
Bangladesh
Bhutan
India
Maldives
Nepal
Pakistan
Sri Lanka

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

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

2. Descriptive Statistics

Table 2.1. Trade and Immigrants across Groups of Firms

	Number of firms	Share of all firms	Share of exporters	Intensive margin	Export intensity	Number of export destinations	Extensive margin	Diversity
Small firms	5,052	74%	493	10,132	17%	88	3,326	14%
Medium firms	1,436	21%	566	32,846	33%	120	3,349	14%
Large firms	367	5%	240	128,716	39%	175	3,566	14%
Non-multinational firms	4,672	68%	403	16,300	17%	86	3,135	15%
Multinational firms	2,183	32%	896	122,472	39%	175	4,499	13%
Firms with lower diversity	4,272	62%	731	79,785	38%	127	4,086	7%
Firms with higher diversity	2,583	38%	568	70,917	32%	175	3,906	21%
All firms	6,855	1	1299	122,227	35%	175	4,931	14%

Data are for 2007. Monetary values in thousands of SEK. Only merchandise trade is considered. Diversity is defined as the share of immigrants in employment. High/low diversity is defined as less than or equal to mean/above the diversity mean. Intensive margin is the average export value in the group. Export intensity is the average value of exports as share of sales. Extensive margin is the number of export products.

Figure 2.1. Immigrant Employees' based on Source Region

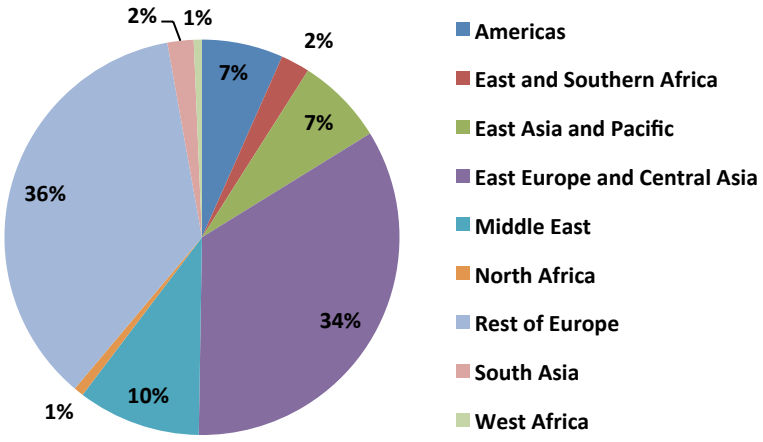


Figure 2.2. Immigrant Employees' based on Level of Education and Time in Sweden

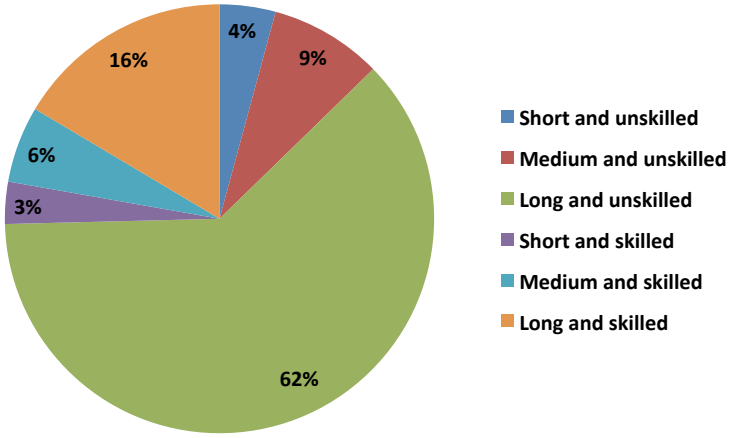


Figure 2.3. Immigrant Employees based on Skill Level across Groups of Firms

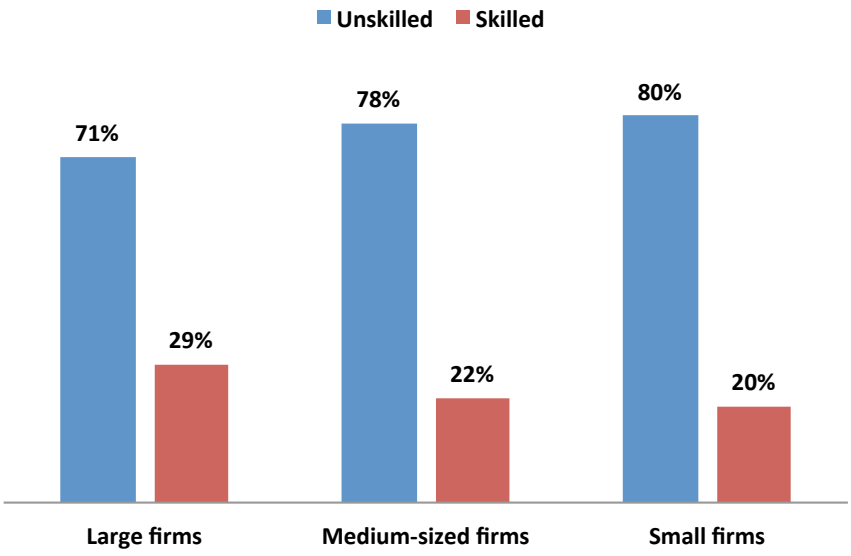


Figure 2.4. Immigrant Employees based on Time in Sweden

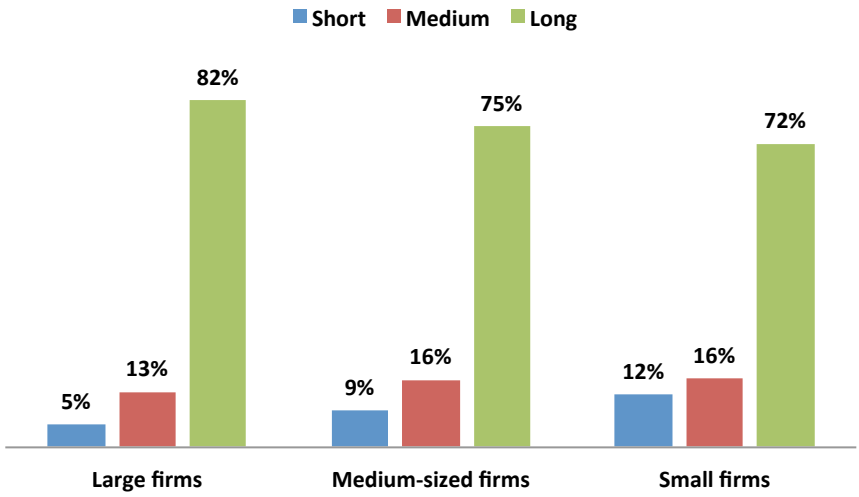


Figure 2.4. Immigrant Employees based on time in Sweden across Groups of Firms

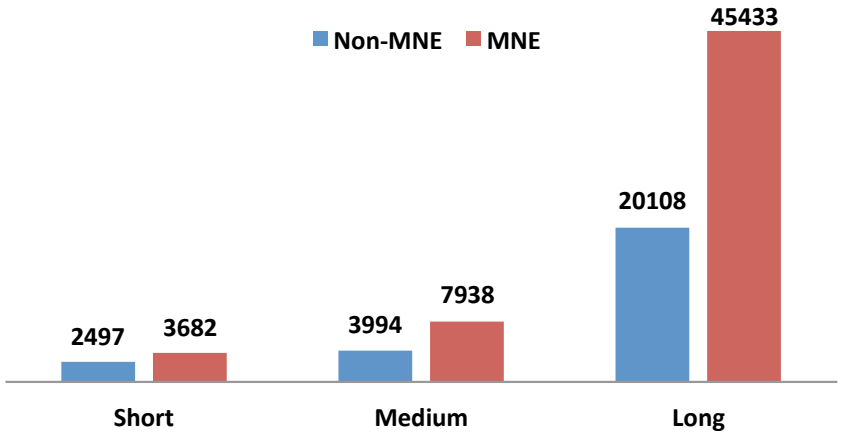
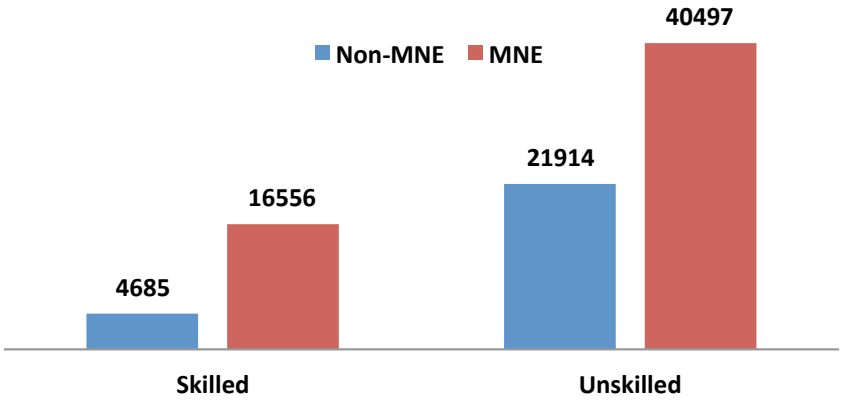


Figure 2.4. Immigrant Employees based on Skill Level across Groups of Firms



References

Djankov, S., La Porta, R., Lopez-de-Silanes, F. & Shleifer, A., 2002. The regulation of entry. *The Quarterly Journal of Economics*, Vol. CXVII(1), pp.1-37.

Djankov, S., La Porta, R., Lopez-de-Silanes, F. & Shleifer, A., 2003. Courts. *The Quarterly Journal of Economics*, 118(2), pp.453-517.

Djankov, S., McLiesh, C. & Shleifer, A., 2007. Private credit in 129 countries. *Journal of Financial Economics*, 84(2), pp.299-329.

Djankov, S., La Porta, R., Lopez-de-Silanes, F. & Shleifer, A., 2008a. The law and economics of self-dealing. *Journal of Financial Economics*, 88(3), pp.430-465.

Djankov, S., Hart, O., McLiesh, C. & Shleifer, A., 2008b. Debt enforcement around the world. *Journal of Political Economy*, 116(6), pp.1105-1149.

Mayer, T. & Zignago, S., 2006. Notes on CEPII's distance measures. Mimeo, Centre d'Etudes Prospective et d'Informations Internationales.

Pierce, J. R. & Schott, P. K., 2011. Concording U.S. harmonized system categories over time. *Journal of Official Statistics*, forthcoming.

World Bank, 2011. Doing Business database. Available at: http://www.doingbusiness.org [Accessed August, 2011].