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Immigrant-Trade Links:

Empirical Evidence from Sweden

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Abstract

Previous research suggests that immigrants can promote trade by lowering transaction costs, and by bringing with them preferences for goods produced in their native country. This paper examines the hypothesis that there is a positive relation between the number of immigrants from a given country and Swedish bilateral trade flows with that country. It further examines if the immigrant-trade link is stronger the more socially and/or institutionally dissimilar Sweden is to its trade partners. The present study is, to the best of our knowledge, the first to examine the immigrant-trade link using Swedish data. Cross-sectional OLS and fixed effects specifications have been utilised within the framework of an augmented gravity model of trade. The data sample includes an average of over 140 countries for the period of 1975 to 2005. Results suggest that larger immigrant stocks are associated with higher trade flows: a 10% increase in the number of immigrants will on average increase Swedish exports by 2.16%, while imports will increase by 2.68%, given that all other model variables are held constant. No results indicating that social and/or institutional dissimilarity increases immigrant-trade links were found.

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Table of Contents

1. Introduction

What is the effect of immigration on a nation's trade? Growing evidence has been found that immigration has positive effects on trade. Two possible mechanisms have been identified: First, immigrants may have an impact on imports of the immigrants' host country (i.e. the destination country for the migrant flow), owing to their preferences for specific goods from their native country. Second, they may have an impact on both the host country's imports and exports with their respective native country by providing information about, as well as contacts with, their former home economies.

"Immigrant-trade links", i.e. the influence that immigrants have on host country trade, have in most cases been documented for large and relatively closed economies. Consequently, it is interesting to extend the research area by studying small and globally integrated countries. Sweden is such a case. The present study is also, to the best of our knowledge, the first to examine the immigrant-trade link using Swedish data. Further, the analysis draws on an unusually rich data set - panel data from an average of more than 140 countries over 30 years - which enhances our ability to assess if the possible immigrant-trade link is robust over time and across a large number of countries.

Swedish history of immigration from the 1970's and forward has been characterised by large flows of refugees and immigrants' family members, while economic immigration has been small due to a restrictive labour immigration policy[1] (SOU 2005:50). Only when Sweden joined the European Union (EU) in 1994 did labour migration begin to increase. In 2008 new regulations were introduced which facilitated labour immigration from non-EU countries (*Arbetskraftsinvandring,* 2009). Given the composition of Swedish immigration over the last four decades it is of great interest to determine if there is evidence for a Swedish immigrant-trade link, and if that is the case, the strength of this link.

This study contributes to the research field by investigating if the immigrant-trade link theory is robust, in this case with regards to an open and export-dependent country where refugees and

[1] Among the individuals (except for residents from other Nordic countries) that were granted a resident permit 1985-2003, 15% had obtained it because of "protection needs", 21% because of humanitarian reasons, 41% because of family connections and 3% because of work (Gustafsson et al., 2004).

family members are a significant part of the immigrant stock.[2] Further, the study may contribute to Swedish policy-makers by giving indications on how immigration historically has affected bilateral trade flows.

1.1 Purpose and Delimitations

More specifically, the purpose of this study is to examine the relation between the number of immigrants in Sweden and Swedish bilateral trade flows with the immigrants' native countries. Our first hypothesis is therefore as follows:

H1: There is a positive relation between the number of immigrants from a given country and Swedish bilateral trade flows with that country.

According to previous research, social and/or institutional dissimilarity between trade partners increases trade costs between these countries (Girma and Yu, 2002). These trade costs appear because of information asymmetry regarding social and legal institutions, but can be reduced by immigrants' bringing market information and contacts from their native countries to the host country. Hence, immigrants from a country that is socially and/or institutionally dissimilar to Sweden have the ability to reduce initial trade costs to a higher extent than other immigrants can do. This implies that the influence of immigrants from countries that are relatively dissimilar to Sweden would be greater in magnitude compared to the influence of immigrants from countries that are similar to Sweden. Therefore, we also investigate if the strength of the immigrant-trade link varies with immigrants' region (continent) of origin, which is used as a proxy for social and institutional dissimilarity. Do for instance African immigrants influence Swedish trade more than European immigrants do, given that African countries are more dissimilar to Sweden than European countries? Our second hypothesis is as follows:

H2: The more socially and/or institutionally dissimilar Sweden is to its trade partners, the stronger is the immigrant-trade link.

A few delimitations are made. The time period considered spans over a thirty-year period, 1975-2005. This time period is relatively long compared to other studies on the immigrant-trade link, and was selected in order to assess if the possible immigrant effect on trade is robust over time. This delimitation is being discussed further in the "methodology and data" section. When it

[2] There are no detailed statistics on the total refugee or family member stock in Sweden. However, for the last 18 years these groups constitute 77% of all new residence permits granted (Gustafsson et al., 2004).

comes to trade volumes, we have focused on *total* trade flows of merchandise. Examining disaggregated trade data for different products would have raised the complexity of the data work substantially. We therefore only examine aggregate imports and aggregate exports of each trading partner.

1.2 Outline of the Thesis

In section two we address the theoretical underpinnings of the immigrant-trade link by discussing previous research on the subject and presenting the gravity model that is used for this study. In section three, we describe the Swedish immigration policy from 1970 and forward. In the fourth section we present our empirical specifications and data, and thereafter we present and analyse our empirical findings in section five. The research design is discussed within the unfolding of the analysis, but is summarised in section six. In this section we also provide some thoughts regarding future research. Finally, we provide a summary and conclusion in section seven.

2. Theory

Growing evidence has been found in support of the idea that immigration affects trade flows in a number of ways. In this section we present the theoretical arguments for the relation between trade and immigration and thereafter summarise previous research on the subject. Finally, we look at the gravity model which is commonly used for empirical research on trade patterns.

2.1 Theoretical Arguments for the Relation between Trade and Immigration

Most studies on the immigrant-trade link refer to Gould (1994), who describes the potential mechanisms of the immigrant-trade link. Gould discusses two different mechanisms that explain how immigration increases trade. First, immigrants may have an impact on imports of the host country owing to their preferences for specific goods from their native country. Second, they may impact both the host country's imports and exports with their respective native country due to superior knowledge of their former home economies. He argues that the latter mechanism is based upon the fact that foreign trade is usually associated with high transaction costs compared to domestic trade, due to information asymmetries. With better market information, contacts and a common language, immigrants have the ability to decrease these international transaction costs.

Immigrants may have better knowledge of their native countries' products and preferences, which decreases costs to obtain market information. They may also have better contacts in their native country compared to non-immigrants, which raises trust. This is specifically important for trade with developing countries, where institutions and law enforcement are less developed and trust is decisive in order to ensure payment and delivery. Finally, Gould also stresses that immigrants who are bilingual and share a common language with residents in both their host and native country, facilitate the communication for trading partners from the two countries and trading barriers therefore decrease.

The immigrants' knowledge of their native countries can for instance be exploited through entrepreneurial activities, through an immigrant employee at the trading firm, or through brokers or middlemen. Herander and Saavedra (2005) discuss Peng's (1998) survey of 195 export intermediaries indicating that 40% of export intermediary principals are foreign born and that the percentage of foreign born personnel exceeds 75% for over 20% of the organisations. Hence, immigrants lower the cost of international trade by using specific knowledge of the laws and customs necessary to conduct business with their country of origin, as stressed also by other authors (Wagner et al., 2002).

Theory on the immigrant-trade link is scarce. Rauch (1999) is one of the few that formalises a theoretical framework on the subject. According to his network/search view, traders will engage in a search for buyers or sellers until a "match" is achieved. This search is facilitated by proximity, common language and colonial ties, which decrease search/transaction costs. According to Rauch, this theory is primarily applicable to differentiated goods, for which search costs are high, while the theory is less applicable for goods with low search costs, i.e. goods traded through organised exchange or having a reference price (mostly homogenous goods).

An interesting parallel to the immigrant-trade link mechanisms can be drawn from the Uppsala Internationalisation Process Model, which attempts to explain firms' internationalisation strategy. According to this model, a firm's establishment of new operations in foreign countries is related to the psychic distance between the firm's home and host countries. Psychic distance is defined as all factors that prevent information to flow between the markets, such as different language, education, business practices, industrial development and culture. Firms begin by expanding to markets with short psychic distance, and the longer the distance, the less common

that operations are established (Johanson and Vahlne, 1977). This model is relevant when studying immigration, because immigration can be a way of shortening the psychic distance between countries, and that way increase trade and internationalisation. In his work on the network/search view Rauch (1999) also discusses the psychic distance, and uses the metaphor of "rings in the water" when describing how trade begins close to home and then expands as experience and confidence grows.

According to Gould (1994), the importance of the effect of immigration on trade also depends on how much information about a certain economy that already exists in the host country. The more information the host country disposes of, the less the value added of new immigrants. This should also imply that the first immigrants from a country have a larger effect on trade than immigrants arriving later from that country, i.e. that the effect of immigration on trade increases at a decreasing rate. Head and Ries (1998) develop Gould's idea on the mechanisms behind the immigrant-trade link by arguing that the type of immigrants may also play a role in the level of impact they have on trade. Refugees are less likely than economic immigrants to have a large impact on trade, due to the risk of their native countries being at war or due to the fear of persecution, which limits their possibilities to execute commercial transactions with these countries. Finally, Head and Ries (1998) argue that the level of education is likely to affect immigrants' impact on trade, where more educated immigrants are likely to possess better knowledge and contacts to increase bilateral trade flows.

2.2 Previous Research on Immigration and its Potential Effect on Trade

A number of case studies during the last two decades have provided suggestive evidence that immigration has a positive effect on trade flows. The ground-breaking study by Gould (1994) found a positive impact of immigration on US exports and imports, with the greatest effects on consumer manufactured exports. Head and Ries (1998) found that immigration also had a positive impact on Canadian trade, but with the greatest effect on imports. Refugees were also found to have less influence on trade than other immigrant groups. Later, similar immigrant-trade links have been found for the UK (Girma and Yu 2002), Spain (Blanes-Cristóbal, 2003), Greece (Piperakis et al., 2003), New Zealand (Bryant et al., 2004), Malaysia (Hong and Santhapparaj, 2006), Denmark (White, 2007a) and Australia (White and Tadesse, 2007). Ghatak and Piperakis (2007) and Ghatak et al. (2009) examined the impact of Eastern European

immigration on UK trade after the enlargement of the EU, and found a positive impact on UK imports but no impact on UK exports. Several studies have also assessed the impact of immigration on trade patterns of US states or regions (Co et al., 2004; Bardhan and Guhathakurta, 2004; Herander and Saavedra, 2005; Bandyopadhyay et al., 2006; Dunlevy, 2006) and Canadian provinces (Wagner et al., 2002). In these studies the authors found a positive relation between the number of immigrants in states/regions and these states'/regions' trade flows with immigrants' native countries. Combes et al. (2005) found that migrant-trade links exist internally within France, because of strong networks between regional migrants and their region of origin.

Recent research has complemented the earlier findings by comparing different groups of countries and immigrants and their impact on trade. Girma and Yu (2002), White (2009) and White and Tadesse (2007) suggest, for the UK, the US and Australia, respectively, that social and/or institutional dissimilarity between host and native countries increases the immigrant-trade effect. They argue that an immigrant from an institutionally and socially dissimilar country is able to add more new information, which may facilitate trade, than an immigrant from a similar country. In addition, an immigrant from a socially dissimilar country will probably prefer different goods than those available in the host country, whilst an immigrant from a similar country will to a larger extent have his or hers preferences satisfied with host country goods. A related subject is explored by Dunlevy (2006) who suggests that the immigrant effect is greater on US trade when the political system of the origin country is more corrupt. Moreover, White (2007b) finds that immigrants from low-income countries have a stronger impact on US bilateral trade flows than high-income countries. Bandyopadhay et al. (2006) find results implying that immigrants in the US from specific countries are more prone than others to have strong ethnic networks and therefore promote trade to a higher extent. Further, Gould (1994) and Head and Ries (1998) find evidence, for the US and Canada respectively, in support of the hypothesis that the more skilled the immigrants are, the greater the probability that they will have the knowledge and contacts to increase trade flows.

Researchers such as White and Gould have looked closer at the nature of goods traded and their relationship to immigrant links. Gould's results (1994) suggest that the effect of immigrant-trade links is larger for consumer goods than for producer goods in the US, while White (2009) finds

that the impact of immigrants is strong on US trade with differentiated goods and small or zero on trade with homogenous goods.

Table 1 Summary of Selected Empirical Papers.

Study	Sample	Immigrant stock elasticity of exports	Immigrant stock elasticity of imports
Gould (1994)	US and 47 trading partners; 1970-1986	0.02b	0.01b
Head and Ries (1998)	Canada and 136 trading partners; 1980-1992	0.10	0.31
Dunlevy and Hutchinson (1999, 2001)	US and 17 trading partners; 1870-1910	0.08	0.29
Girma and Yu (2000)	UK and 48 trading partners; 1981-1993	0.16a	0.10a
Combes, Lafourcade, Mayer (2002)	95 French Departments; 1993	0.25	0.14
Rauch and Trindade (2002)	63 Countries; 1980, 1990	0.47b, e, g	0.47b, e, g
Wagner, Head, and Ries (2002)	5 Canadian regions and 160 foreign trading partners; 1992-1995	0.08	0.25
Blanes-Cristobal (2003)	Spain and 40 trading partners; 1991-1998	0.14	(0.05)c
Co, Euzent, Martin (2004)	US states and 28 trading partners; 1993	0.29d	
Bardhan and Guhathakurta (2004)	US east/weast coast states and 51 trading partners; 1994-1996	0.24 West/0.06c East	
Bryant, Genç, and Law (2004)	New Zealand and 170+ trading partners; 1981-2001	0.05	0.19
Bandhyopadhyay (2006)	US and 29 trading partners; 1990-2000	0.142	
Hong and Santhapparaj (2006)	Malaysia and 16 trading partners; 1998-2004	0.53f	0.89f
White (2007)	Denmark and 170 trading partners; 1980-2000	0.572d	0.328d
White and Tadesse (2007)	Australia and 101 trading partners; 1989-2000	0.46	0.18
White (2009)	US and 70 trading partners; 1980-1997	0.204e	0.05c, e

Notes: a: Non-commonwealth countries b: Calculations performed by Wagner et al., (2002) c: Insignificant at 10% d: High-income countries e: Differentiated goods f: ASEAN countries, skilled immigrants g: Calculated for total trade flow.

2.3 Gravity Model

The standard *gravity model* predicts that the bilateral trade volume between two countries is proportional to the product of their economic sizes (most often measured in GDP), and inversely proportional to the geographic distance between them (Feenstra, 2004). The former prediction is based on the assumption that larger countries tend to trade more with each other while the latter is based on the assumption that transport and transaction costs rise with distance. The model was first introduced by Tinbergen (1962) but several authors have contributed to this subject (such as Linnemann (1966), Anderson (1979), Bergstrand (1985), Helpman (1987) and Deardorff (1995)).

According to Feenstra (2004), the gravity model assumptions are that countries produce different varieties of a final product, that demand is identical across countries and that trade is costless. The implication of these assumptions is that products produced in country *i* are exported to all other countries in proportion to the importing country's share of the total world demand (country GDP relative world GDP). Hence, total exports from country *i* to country *j* are given by:

$$X_{ij} = s_j Y_i \qquad \text{where} \qquad s_j = \frac{Y_j}{Y_W}$$

where X is exports from country *i* to country *j*, and Y is GDP for countries *i, j* and for the world. This gives us the bilateral trade between two countries which thus is proportional to the product of their GDPs:

$$X_{ij} + X_{ji} = \frac{2}{Y_W} Y_i Y_j$$

However, if relaxing the assumption of costless trade, transportation and transaction costs affect the consumption patterns on an imperfect market. This yields the equations below:

$$s_n = \left(\frac{Y_n}{Y_W}\right) / \tau_{ij} \qquad \text{which gives us} \qquad X_{ij} + X_{ji} = \left(\frac{2}{Y_W} Y_i Y_j\right) / \tau_{ij}$$

where τ_{ij} reflects trade impediments between country *i* and country *j* (Head and Ries, 1998).

In addition to the variables of the standard gravity model, a number of studies consider other variables that are assumed to promote or hinder trade, which cause deviations from the basic relationships above. For instance, Frankel (1997) discusses variables such as dummies for openness to trade, common language, colonial ties and adjacent countries. The standard gravity model in combination with factors such as these is called an *augmented gravity model.*

The Gravity model is one of the most successful economic models and has proved its empirical strength (Frankel and Rose, 2002). It has also been proved to have a theoretical foundation in modern economic theories regarding trade in imperfect substitutes (Frankel, 1997).

3. Swedish Immigration in a Historical Perspective: from 1950 and Onwards

Swedish immigration has changed from being characterised by large inflows of labour immigration in the 1950's and 1960's, to instead consist primarily of refugee and family member immigration from the 1970's and onwards. We describe this development further in the sections below. There is no accepted definition of immigrants in Sweden, but Swedish authorities and statistics commonly define immigrants as foreign born individuals (Gustafsson et al., 2004). Accordingly, this definition is used for our study.

3.1 1950-1990: from Labour to Refugee and Family Immigration

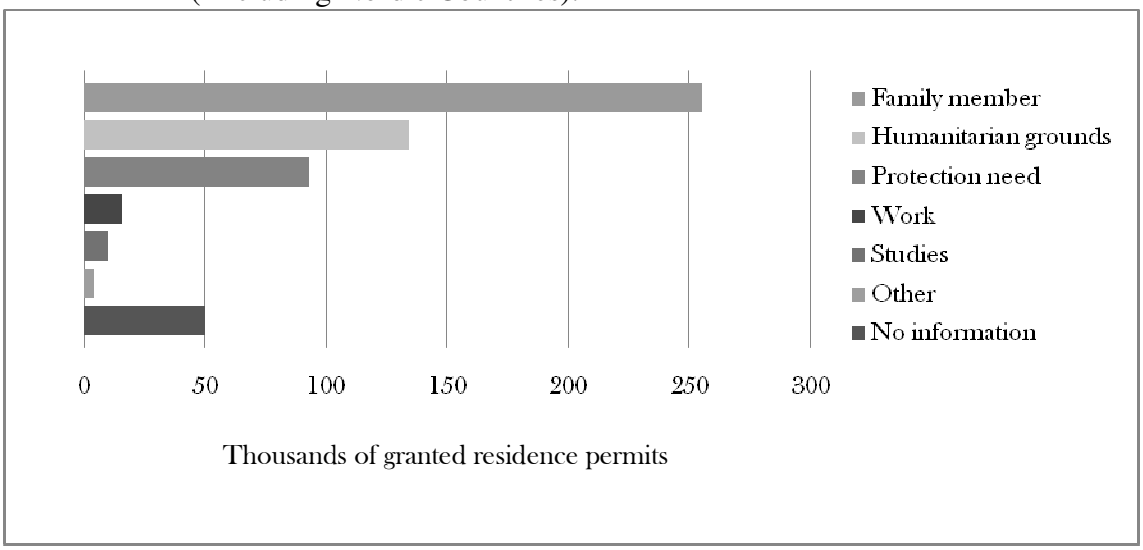
During the economic boom in the 1950's and the 1960's the Swedish immigration policy was generous and the country accepted large inflows of labour immigration from Southern European countries (Greece, Yugoslavia, Italy and Turkey). The immigration was partly organised by labour authorities, but most immigrants arrived without any assistance from authorities (*History of Swedish immigration*, 2007). By 1970, immigrants accounted for 7% of the Swedish population (Gustafsson et al., 2004).

In the late 1960's labour needs decreased, and the Swedish parliament decided to regulate immigration further. With the new regulations labour immigrants were requested to have a work permit and housing before immigration, which was verified by the authorities. Nordic citizens, refugees, and family members of Swedish citizens were exempted from this rule. Hence, since labour immigration was only accepted if there was an apparent Swedish demand for it, labour immigration from non-Nordic countries decreased drastically in the 1970's (*History of Swedish immigration*, 2007). However, the total immigration did not decrease because refugees arrived in increasingly large numbers, notably from South America in the 1970's as well as from Africa, the Middle East and Asia in the 1980's. The high number of refugees also led to increased immigration of immigrants' relatives from South America and the Middle East in the 1980's (Gustafsson et al., 2004).

3.2 1990-2009: Continued Refugee Immigration and a More Generous Labour Immigration Policy

In the 1990's the immigration pattern of the 1980's, with predominantly refugee immigration, persisted. Refugees and their relatives came in large numbers from the Balkan countries, the Middle East and Somalia due to political conflicts in these areas (Gustafsson et al., 2004). However, when Sweden joined the EU in 1994, the free mobility of EU citizens increased the labour immigration to some extent. By the year 2002, immigrants represented 12% of the Swedish population (Gustafsson et al., 2004).

Figure 1 Number and Type of Residence Permits Granted 1985-2003 in Thousands (Excluding Nordic Countries).



Note: Data for Nordic immigrants are missing.
Source: Nilsson (2004).

As shown in the figure above, labour immigration has been negligible in the last two decades. With an ageing population, the demand for labour will increase in the years to come. During recent years the Swedish immigration policy has therefore changed again. From the end of 2008 the labour immigration policy has been altered, to facilitate labour immigration of non-Europeans. With the new regulations, the employer can freely decide if he/she needs to employ foreign labour and work permits should be issued on that basis, rather than based on the judgment of migration authorities. Further, temporary work and residence permits are limited to six years and thereafter a permanent residence permit will be issued. Finally, guest students and asylum seekers have the right to apply for a work permit from inside of Sweden, which has not been possible earlier (*Arbetskraftsinvandring,* 2009). This will certainly have an effect on the type of immigration Sweden will experience in the future, and labour immigration will again become more common. In 2008, immigrants represented 14% of the Swedish population (SCB, 2009a).

4. Empirical Specifications and Data

This section presents the empirical specifications and the sensitivity analysis, followed by a presentation of the time-period studied and the variables including their sources.

4.1 Empirical Specifications

We follow previous research and use an extended gravity model for our study. We examine an unbalanced panel of bilateral exports and imports from a total of 166 countries from 1975 to 2005[3]. The data set is unbalanced since the set of countries in the world change over time (e.g. former Yugoslavia) and due to missing observations. We examine the relationship between immigrants and trade as pure cross-sections for the individual years. We also examine a panel regression where we use time fixed effects. As a robustness check, we use a specification with both time and country fixed effects.

4.1.1 OLS versus Fixed Effects

Although almost all authors are using an augmented gravity model, there is neither a standard for the regression specification nor for the choice of variables. Consequently, previous studies have differed notably from each other on these points. Most authors have used pooled cross-sectional specifications when investigating the immigrant-trade link. However, Bandyopadhyay et al (2006) executed a country fixed effects model and emphasised the fixed model as statistically superior to a pooled cross-section analysis. As Cheng and Wall (2005), they argue that OLS analyses of gravity models are unreliable due to the absence of (unobserved or not included) between-countries heterogeneity – heterogeneity which might account simultaneously for the level of exports between country *i* and *j* as well as the number of residents in *i* that were born in j. It is probable that this absence act as a specification error, leading to upward biased estimations. For instance, similar cultures in Norway and Sweden may be leading both to high trade volumes and to large immigrant flows. Hence, the authors argue that earlier research with pooled cross-sectional specifications has been overstating the importance of immigrant-trade links and that this bias is corrected by using fixed effects.

On the other hand, other authors on similar topics have argued for the cross sectional method, pointing out that fixed effects may underestimate the importance of immigrant-trade links. Heckman and Leamer (2007) refer to Griliches (1986) who shows that fixed effects can increase the "noise to information" ratio in the data and aggravate measurement errors. This will lead to downwardly biased estimates. Several authors have also stressed the loss of important variables when applying fixed effects. Due to the disagreement on this subject, we have decided to explore

[3] See Appendix A for the countries included in the data set.

variants of both methods since there obviously are both advantages and disadvantages connected to each method.

4.1.2 Time Fixed Effects versus Country Fixed Effects

When running the regression with the entire data set we use fixed effects controlling for time. These account for time specific effects (such as macroeconomic fluctuations and policy changes). The time fixed effects method will result in that variables fixed across countries for a given year, such as GDP for Sweden, cannot be included in the analysis due to perfect multicollinearity. The effects of these variables are instead captured by the intercept for each year respectively. This model has been used by authors such as White (2007a) as well as Bardhan and Guhathakurta (2004).

Some authors use country fixed effects but this specification hinders the possibility of estimating the effects of time invariant variables, such as distance (which is one of the variables in the original gravity model), separately from the intercept. Variables that are fixed over time but which differ across countries become perfectly collinear with the cross-sectional fixed effects, and the intercept will therefore be required to absorb these variables. Disdier and Head (2008) present a mean distance elasticity of 0.9, indicating that on average bilateral trade is nearly inversely proportionate to distance. This finding highlights the importance of distance in the model. Moreover, Wagner et al. (2002) argue that if a country fixed effects model does not include year dummies or a time trend the result partially captures the simultaneous growth in immigrant population and trade. Head and Ries (1998) also argue that it is inappropriate to use a country fixed effects model when data points are missing over time which makes a within estimation (estimation over time) difficult. Identification through within estimation would be difficult also in our case. This is due to the relatively short time series for many countries, caused by the set of countries changing over time or/and missing data (the sample increases from 122 countries in 1975 to 160 countries in 2000 and 2005). However, we complete our tests by performing a robustness check, similar to recent authors such as White (2007a), based on a fixed effects controlling for both country and time. This will allow for both changes along time and country heterogeneity.

4.1.3 Regression Equations

We use a baseline gravity model augmented with variables for the immigrant stock from Swedish trade partners, the trade partners' openness to trade, a dummy for zero-migration cases and dummies concerning a country's participation in FTA and WTO/GATT. For the regressions investigating the immigrant-trade link per region we also use continent dummies.

Our specifications are thus:

Regressions on total immigrant-trade link effect

Time fixed effects regressions reported in column a. in *Table 5*:

$$ln(Trade_{ij} + 1) = \beta_0 + \beta_1 lnGDP_j + \beta_2 lnDistance_{ij} + \beta_3 lnImm\_Stock_{ij} + \beta_4 Zero\_Mig_{ij} + \beta_5 lnOpenness_j + \beta_6 FTA_{ij} + \beta_7 WTO\_GATT_j + FE_t + \varepsilon_{ij}$$

OLS regressions reported in columns b., c., and d. in *Table 5*:

$$ln(Trade_{ij} + 1) = \beta_0 + \beta_1 lnGDP_j + \beta_2 lnDistance_{ij} + \beta_3 lnImm\_Stock_{ij} + \beta_4 Zero\_Mig_{ij} + \beta_5 lnOpenness_j + \beta_6 FTA_{ij} + \beta_7 WTO\_GATT_j + \varepsilon_{ij}$$

Country and time fixed effects regressions reported in *Table 6*:

$$ln(Trade_{ij} + 1) = \beta_0 + \beta_1 lnGDP_j + \beta_2 lnImm\_Stock_{ij} + \beta_3 Zero\_Mig_{ij} + \beta_4 lnOpenness_j + \beta_5 FTA_{ij} + \beta_6 WTO\_GATT_j + FE_t + FE_j + \varepsilon_{ij}$$

Regressions on immigrant-trade link effect divided per continent

Time fixed effects regressions reported in *Table 8*:

$$ln(Trade_{ij} + 1) = \beta_0 + \beta_1 lnGDP_j + \beta_2 lnImm\_Stock_{ij} \cdot Africa_j + \beta_3 lnImm\_Stock_{ij} \cdot Asia_j + \beta_4 lnImm\_Stock_{ij} \cdot Europe_j + \beta_5 lnImm\_Stock_{ij} \cdot North\_America_j + \beta_6 lnImm\_Stock_{ij} \cdot Oceania_j + \beta_7 lnImm\_Stock_{ij} \cdot South\_America_j + \beta_8 Zero\_Mig_{ij} + \beta_9 lnOpenness_j + \beta_{10} FTA_{ij} + \beta_{11} WTO\_GATT_j + FE_t + \varepsilon_{ij}$$

where:

$Trade_{ij} = Swedish\ exports\ or\ imports\ to\ country\ j, depending\ on\ regression,$

$GDP_j = GDP\ of\ country\ j,$

$Distance_{ij} = Distance\ between\ Sweden\ and\ country\ j\ ,$

$Imm\_Stock_{ij} = Stock\ of\ immigrants\ from\ country\ j\ in\ Sweden,$

$Zero\_Mig_{ij} = Dummy\ variable\ for\ cases\ \ when\ Immigrant\ Stock\ is\ equal\ to\ zero,$

$Openness_j = \ Total\ trade\ of\ country\ j\ /\ GDP_j,$

$FTA_{ij} = Dummy\ variable\ for\ Free\ Trade\ Agreement\ between\ Sweden\ and\ country\ j,$

$WTO\_GATT_j = Dummy\ variable\ for\ WTO/GATT\ membership\ of\ country\ j,$

$FE_t = Fixed\ effect\ for\ time\ t,$

$FE_j = Fixed\ effect\ for\ country\ j,$

$Continent_{kj} = Dummy\ variable\ for\ continent\ k\ of\ trade\ partner\ j, where\ k\ is\ Africa, Asia, Europe, North\ America, Oceania\ or\ South\ America,$

$\varepsilon_{ij} = Error\ term.$

The regressions were estimated in PASW (former SPSS).

4.2 Sensitivity Analysis

For each of the OLS regressions and the fixed effects regressions, both import and export equations are tested for multicollinearity and heteroscedasticity.

We do not find any strong signs of multicollinearity in any of the regressions. Although we detect simple correlation around 0.5 among some of the explanatory variables, variance inflation factors (VIF) range from 1.059 to 3.851. Since none of the coefficients have VIF values in excess of 10, or a tolerance (1/VIF) below 0.1, we can be reasonably confident that there is no multicollinearity in our regressions.

Several of the estimated regressions show signs of heteroscedasticity when tested with White's general heteroscedasticity test.[4] In order to correct for the observed heteroscedasticity in the data set, we use the "Bootstrapping" procedure in PASW. It is often used in linear regression analysis to obtain variance estimates of the linear parameters' ordinary least squares estimators (Cribari-

[4] The regressions with signs of heteroscedasticity are presented in Appendix B.

Neto & Zarkos, 2004). Hence, it is a method for deriving robust estimates of standard errors and confidence intervals for estimates such as regression coefficients.

4.3 Data

In the following part, we present the time period and variables used. *Table 2* displays the basic descriptive statistics of our data. The zero values for minimum Exports, Imports and Lagged Immigrant Stock are not missing values, but zero value observations in the data sample. For instance, Sweden had zero imports from a number of developing countries in the period of 1975 to 2005.[5]

Table 2 Descriptive Statistics of Panel Data 1975-2005.

Variable	No. Obs.	Minimum	Maximum	Mean	Standard deviation
$Exports_{ij}$ (MSEK)	983	0	102 797	3 066	10 314
$Imports_{ij}$ (MSEK)	983	0	146 657	2 617	10 016
GDP_j (MUSD)	983	80	12 376 100	156 137	711 122
$Distance_{ij}$ (km)	983	379	17 373	6 224	3 449
Lagged Immigrant $Stock_{ij}$	983	0	251 342	5 002	20 411
$Openness_j$	983	0.06	9.87	0.63	0.54
FTA_{ij}	983	0	1	0.17	0.38
$WTO / GATT_j$	983	0	1	0.71	0.45
Zero $Migrants_{ij}$	983	0	1	0.024	0.15

Note: See Appendix C for descriptive statistics for all years.

4.3.1 Time Period

We have limited the time period to using data between 1975 and 2005. We have chosen this period based on the increasing flow of immigrants during the 1970's. A reason for not going even further back is that Swedish trade data before 1969 is not available free of charge. We have also been restricted due to incomplete immigration data, forcing us to limit the analysis to every fifth year, and one observation period falls out when lagging the Immigrant Stock variable.

[5] The countries in question are Angola, Benin, Bhutan, Cape Verde, Central African Republic, Chad, Comoros, Equatorial Guinea, Guyana, Lesotho, Mauritania, Mongolia, Niger, Rwanda and Solomon Islands.

4.3.2 Dependent Variables

The dependent variables in our analysis are the current values of Swedish exports, $Export_{ij}$, and imports, $Import_{ij}$, for our observed countries, in thousands of SEK. Since the model is in natural logarithm, the trade values must not be equal to zero or else the variable will be undefined. A selection bias would probably occur if the zero observations simply were to be excluded. Consequently, we adopt the approach of Eichengreen and Irwin (1995) and Co et al. (2004) and add the value of one to the exports and imports values in order to avoid this problem. For a zero-trade value ln(1 + trade) then equals zero. For large values of trade, ln(1 + trade) ≈ ln(trade) and the constant elasticity relationship is preserved. The data are collected from Statistics Sweden (SCB, 2009b). Although the values are in nominal terms, this does not pose any problem since price variation is accounted for via the time effects.

Due to missing data for a number of countries, we have been forced to exclude them from the data set. The countries in question are predominantly small, with populations under 500 000, and have modest trade relations with Sweden. Consequently, our "total trade" value should be relatively close to Sweden's actual total trade.

In *Table 3*, Sweden's largest trade partners (exports and imports) are displayed for three selected years.

Table 3 Sweden's Largest Trading Partners 1975, 1990 and 2005.

No.	1975	1990	2005
1.	Federal Republic of Germany	Germany	Germany
2.	United Kingdom	United Kingdom	Norway
3.	Norway	United States	Denmark
4.	Denmark	Norway	United States
5.	Finland	Denmark	United Kingdom
6.	United States	Finland	Finland
7.	France	France	Netherlands
8.	Netherlands	Netherlands	France
9.	Belgium and Luxembourg	Italy	Belgium and Luxembourg
10.	Italy	Japan	Italy

Source: SCB (2009b).

4.3.3 Independent Variables

The following variables are explanatory to Sweden's trade volume and are selected based on economic theory and previous research.

Immigrant Stock in Sweden

The variable, Imm_Stock_{ij}, measures the immigrant stock in Sweden (*i*) per country of origin (*j*), and the data are collected from Statistics Sweden (SCB, 1996; SCB, 2009a; SCB, *Folk- och bostadsräkningen,* various issues, 1970-1990). The data are in natural logarithm and lagged since some time is required in order to fully explore the immigrant linkage possibilities. We assume that a five year period after settlement is sufficient for an immigrant to obtain language skills and host country knowledge etc. required to be able to influence trade. Since the variable is in natural logarithm, the variable's regression coefficient can be interpreted as the Immigrant Stock elasticity on exports and imports respectively. We only estimate one coefficient per regression, which thus represent average immigrant elasticities on trade. These elasticities are expected to be positive.

Swedish authorities and statistics commonly define immigrants as foreign born individuals (Gustafsson et al., 2004). Accordingly, this definition is used for our study. One can however argue that foreign born individuals are an incomplete measure of the immigrant stock since Swedish inhabitants with foreign parents are not included. Hence, we lose out on the group of people with strong ties to a foreign country but born in Sweden, often referred to as second generation immigrants. However, there are no Swedish data on this group. One can discuss how strong ties a second generation actually encompasses. However one can also argue that a second generation is more integrated in the Swedish society and can therefore better take advantage of their ties to their parents' country of origin. The foreign born data also includes foreign born individuals with entirely Swedish parents. This group can however be netted out against the assumed larger group of Swedish born with foreign parents. Since the variable is only a proxy, which is understated to the actual number of people that may dispose of networks to their native countries or their parents' native countries, the risk of overstating the effect of the immigrant stock will arise. This risk arises because trade caused by Swedish born with foreign parents also will be included in the coefficient.

Moreover, since there are no data of time of stay, we cannot be certain that the immigrants arriving five years ago are still living in Sweden. In an extreme case this would mean that all immigrants arriving to Sweden in t=0 have gone abroad in t=1 while new immigrants arrive but who will not influence trade until t=2. Even though the immigrant stock is identical over time the turnover could theoretically be high, resulting in that the immigrant would not have time to

develop and exploit immigrant-trade links. Nevertheless, it is likely that a majority stays and that values of immigrant stock are a reasonable proxy.

Data for 1995 is unfortunately incomplete since a few countries have been pooled together in the source data into a single observation. We have approached this problem by taking a mean of the 1990 and 2000 values for each country and adjusting these for Push and Pull effects. The immigrant flow cannot be assumed to have a smooth development over time but is very sensitive to changes in social conditions in the home country and in the destination country. Push factors are conditions that drive people to leave their home country, i.e. war, political and/or religious persecution and poverty. Pull factors, on the other hand, attract people to a new country, as employment, good living standards etc. (Guttesen, 1984). Finally, Swedish data on immigrant stock is defined according to country of birth, even if the country in question does not exist anymore. This causes two problems with two different solutions. In the case of merging countries, such as East and West Germany, we have added the sum of the countries' immigrant stock values. This sum is then added to the immigrant stock for the unified country for the years after unification. In the case of a partition into two or several countries, which for instance took place in former Yugoslavia and the USSR, we divide the group of immigrants born in the former country according to the share of the population living in each of the new countries.[6] This problem of incomplete data can be causing a small deviation in the coefficient.

In *Table 4*, Sweden's largest immigrant groups' origins are displayed for three selected years.

Table 4 Sweden's Largest Immigrant Source Countries for the Years 1975, 1990 and 2005.

No.	1975	1990	2005
1.	Finland	Finland	Finland
2.	Denmark	Norway	Iraq
3.	Norway	Denmark	Bosnia and Herzegovina
4.	Federal Republic of Germany	Yugoslavia	Iran
5.	Yugoslavia	Iran	Poland
6.	USSR	Germany	Norway
7.	Greece	Poland	Denmark
8.	Poland	Chile	Germany
9.	United States	Turkey	Serbia and Montenegro
10.	Hungary	USSR	Turkey

Sources: SCB, *Folk- och bostadsräkningen,* various issues, 1970-1990; SCB, 2009a.

[6] See Appendix D for list of countries which have an estimated Immigrant Stock figure.

Trade partner's GDP

GDP_j, measures the trading partner *j*'s economic size in US dollars and the data are collected from the United Nations (UN) Statistical Division (2008). The values are in nominal terms, but this does not pose any problem since price variation is accounted for via the time effects in the fixed effects models. We expect this variable to have a positive coefficient in accordance with the gravity model – trade volume between two countries is proportional to the product of their economic sizes. The variable is in natural logarithm.

Geographical distance

The variable $Distance_{ij}$ is defined as the distance in kilometres between countries' economic centres, which we have identified as the capitals. This variable captures international transaction costs which may affect trade. We expect this variable to have a negative coefficient in accordance with the gravity model – trade volume between two countries is inversely proportional to the geographical distance between them. Distance impedes both flows of information and products, increasing upfront search costs and transportation costs (Rauch, 1999). The values are calculated, using the great circular method, from the capitals' longitude and latitude coordinates which are collected from the CIA World Fact Book (2009). The variable is in natural logarithm.

Openness

The variable, $Openness_j$, expresses a country's integration in the world economy and is calculated as a country's total trade with the world divided by its GDP. This demonstrates a country's overall propensity for external trade since countries tend to trade more with partners that are highly integrated with the world economy (Head and Ries, 1998). Consequently, we expect a positive coefficient. The variable is in natural logarithm.

Trade partners' free trade agreements

The dummy variable, FTA_{ij}, takes the value of one if the trading partner has a free trade agreement with Sweden (through the EU and the European Free Trade Association), and zero otherwise. We expect a positive coefficient of this variable. The data are collected from the World Trade Organisation (WTO) (*Regional trade agreements,* 2009).

WTO and GATT

The dummy variable, WTO_GATT_j, takes the value one if the trading partner is/was a member of WTO and/or the General Agreement on Tariffs and Trade, and zero otherwise. A positive coefficient of this variable is expected. The data are collected from WTO (*WTO members and observers*, 2008).

Zero migrants

Since the Immigrant Stock variable is in natural logarithms, the variable will be undefined when the number of immigrants equals zero. Simply excluding zero-cases could create a selection bias. Wagner et al. (2002) approach this problem by introducing a dummy variable called Zero Migrants, $Zero\_Mig_{ij}$, that takes a value of one when there are no migrants (and zero otherwise) while $ln\ Imm\_Stock_{ij}$ is set to zero. The Zero Migrants coefficient shows the change in trade that occurs when Sweden has exactly one migrant from a country rather than none. In theory, the estimate should be close to zero (Bryant et al., 2004). In our data set zero cases exist in every year except in 2005.

Continent dummies

The dummy variables, $Africa_j$, $Asia_j$, $Europe_j$, $North\ America_j$, $Oceania_j$ and $South\ America_j$ are used as a proxy for institutional and social dissimilarity. They take the value of one when trade partner j belongs to any of the continents. The dummy is interacted with the Immigrant Stock variable which allows us to examine the immigrant-trade link across continents.

Institutional and social dissimilarity is difficult to measure, and previous studies use various approaches to handle this issue. White (2009) employs per capita income as a proxy for the similarity to the US, while White and Tadesse (2007) use a dummy for nations favoured by the Australian preferential immigration policy as a proxy for similarity to Australia. Girma and Yu (2002) study the UK and employ a dummy for commonwealth and non-commonwealth countries as proxies for similarity and dissimilarity respectively. We are aware that the continent proxy is an imperfect measure but due to the lack of suitable, well established measures we use it as a first attempt to quantify the influence of institutional and social dissimilarity on the Swedish immigrant-trade link.

Variables accounted for in intercept

Since we are running cross-sectional OLS and time fixed effects regressions, variables that are fixed between countries, such as Swedish GDP, will not be included through specific variables but through the intercept, β_0. In the case of the time and country fixed effects regression, variables that are fixed over time, such as distance, will also be included in the intercept.

4.3.4 Discussion Regarding the Data

An analysis is no better than the quality of the raw data. Consequently, we have focused on reliable sources such as the UN Statistical Division and WTO but some remarks can still be made on our selection of collected data. Since data on GDP is a collection of country reported GDP it might not be perfect, despite the supervision of the International Monetary Fund. Further, transit nations such as Holland and Singapore, which have large trade flows, may give the impression that Sweden trades relatively more with these countries than it actually does when taking production origin into account. We consider it highly unlikely however that measurement errors are grave enough to have important effects on our results.

5. Analysis

In the following sections we first present and analyse the results from our regressions which investigate the total immigrant effect on trade. Thereafter we present and discuss the results obtained when we investigate the immigrant effect per immigrant region (continents).

5.1 Total Immigration Estimation Results

In the following sections we test our *first hypothesis*, i.e. that there is a positive relation between the number of immigrants from a given country and Swedish bilateral trade flows with that country. We begin by presenting the results from the time fixed effects specification, followed by the results from the cross-sectional OLS regressions. In 5.1.3 we verify the robustness of our results by employing a country and time fixed effects specification and by re-estimating our original specifications with a smaller data set. Finally we analyse and discuss the obtained results.

5.1.1 Time Fixed Effects Specification

Estimates generated using a time fixed effects specification with aggregated imports and exports as dependent variables are reported in column a. of *Table 5* below. The natural logarithm functional form of the estimation equation permits interpretation of estimated coefficients as elasticities. We find a positive immigrant-trade link for both exports and imports. The estimated elasticity is positive, statistically significant, and within the typical range in the literature: a 10% increase in the number of immigrants will on average increase exports by 2.16%, while imports will increase by 2.68%, given that all other model variables are held constant.

The remaining coefficients provide additional interesting results. The GDP coefficient is significant at the 1% level for both exports and imports and has the expected sign according to theory. Distance reduces trade in line with theoretical expectations, as shown by the coefficient for Distance, although the coefficient is only statistically significant for exports. The coefficient for Openness is significant at the 1% level and confirms that Sweden trades more with countries that have high trade to GDP ratios. The FTA variable is also significant and shows the expected sign, suggesting that Sweden trades more with countries that it shares a free trade agreement with. The WTO/GATT elasticity on imports is positive and significant at the 5% level, whereas the elasticity on exports is negative and insignificant. The Zero Migrants coefficient is neither significant for exports nor for imports.

Table 5 Time Fixed Effects and Cross-Sectional OLS Estimates.

	Time fixed effects		Cross-sectional OLS					
	a.		b. 1975		c. 1990		d. 2005	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
ln GDP_j	0.980*	1.280*	0.923*	1.358*	0.935*	1.050*	0.941*	1.223*
	(0.024)	*(0.047)*	*(0.067)*	*(0.145)*	*(0.068)*	*(0.114)*	*(0.053)*	*(0.091)*
ln $Distance_{ij}$	-0.192*	-0.075	0.113	0.329	-0.220	-0.157	-0.521*	-0.714*
	(0.058)	*(0.109)*	*(0.174)*	*(0.314)*	*(0.194)*	*(0.324)*	*(0.107)*	*(0.231)*
ln lag Immigrant $Stock_{ij}$	0.216*	0.268*	0.301*	0.196*****	0.257*	0.288*	0.248*	0.430*
	(0.022)	*(0.048)*	*(0.059)*	*(0.140)*	*(0.057)*	*(0.095)*	*(0.071)*	*(0.118)*
ln $Openness_j$	0.808*	0.778*	1.141*	1.311*	0.853*	0.807*	0.555*	0.586***
	(0.073)	*(0.125)*	*(0.143)*	*(0.282)*	*(0.157)*	*(0.264)*	*(0.215)*	*(0.344)*
FTA_{ij}	0.730*	1.158*	0.803**	1.266*	0.780***	1.152****	0.034	0.269
	(0.103)	*(0.195)*	*(0.369)*	*(0.428)*	*(0.450)*	*(0.754)*	*(0.269)*	*(0.440)*
$WTO / GATT_j$	-0.024	0.453**	-0.417**	0.054	-0.047	0.508*****	0.799**	1.646*
	(0.098)	*(0.177)*	*(0.186)*	*(0.388)*	*(0.230)*	*(0.386)*	*(0.398)*	*(0.581)*
Zero $Migrants_{ij}$	0.375	-0.329	0.005	-0.644	-0.167	0.831	...	...
	(0.331)	*(0.842)*	*(0.405)*	*(1.390)*	*(0.719)*	*(1.205)*	...	...
R^2	0.866	0.741	0.880	0.750	0.849	0.726	0.866	0.797

Notes: "*", "**", "***", "****" and "*****" denote significance at the 1%, 5%, 10%, 15% and 20% levels, respectively. Standard errors are in parentheses. The estimated coefficients for the year fixed effects are suppressed to save space.

5.1.2 OLS Specification

Estimates generated using an OLS specification with aggregated imports and exports as dependent variables for the years 1975, 1990 and 2005 are reported in column b., c., and d. of *Table 5* presented above.[7] In the same way as for the time fixed effects model, the natural logarithm functional form of the estimation equation permits interpretation of estimated coefficients as elasticities. We find that all of the estimated Immigrant Stock elasticities on imports and exports are positive and statistically significant, except for the elasticities on imports 1975 and 1995 which are not significant. The estimates are within the typical range in the literature for all regressions. If immigration increases with 10%, exports will increase on average within a span of 2.00% to 3.01% and imports will increase on average within a span of 1.96% to 4.30%, given that all other model variables are held constant. The results are also consistent with the time fixed effects specification, which indicates that we have robust results concerning cross-sectional variation.

[7] Estimates for the entire data set (every five years 1975-2005) can be found in Appendix E.

The estimated coefficients of the other variables generally have the expected signs and are significantly different from zero. The GDP coefficient is significant at the 1% level for both exports and imports and has the expected positive sign. The coefficient for Distance, however, is negative and statistically significant only for 2000 and 2005. For the earlier years, the coefficient is not significant and of varying sign. The coefficient for Openness is positive and significant, except for imports in 2000, and thus validates that Sweden trades more with countries that have high trade to GDP ratios. The FTA elasticity is significant in most cases and always shows the expected sign, suggesting that Sweden trades more with countries that it shares a free trade agreement with. The WTO/GATT elasticity varies in significance and sign over the years. The Zero Migrants coefficient is only significant for year 1995 and for imports 1985, and drops out in the 2005 estimations because the immigration data does not comprise any zero values.

5.1.3 Robustness Check

We test the robustness of our previous results in two ways. First, we run a country and time fixed effects regression and check if our parameter estimates are robust with a different specification. Second, we remove the five largest immigrant countries and run the original specifications again to investigate if the Immigrant Stock coefficients' significances are driven by the entire data set or only by the largest immigrant source countries.

Country and time fixed effects

Testing for robustness, we estimate a specification allowing for both time and country fixed effects, hence allowing for both changes along time and country heterogeneity. As mentioned earlier, a problem arises if unobservable influences affect trade between Sweden and native countries, and these influences at the same time are correlated with immigrant stocks. For instance, strong cultural ties between Finland and Sweden are a specific unobserved influence that may be leading both to high trade volumes and to large immigrant flows. The estimated immigrant-trade effects may then be biased and inconsistent if these influences are not accounted for (White, 2007a). By running the country fixed effects specification, we test the robustness for both the OLS regressions and the time fixed effects model. It investigates the risk of the time series not being able to drive the development in trade, i.e. that the trend over time may not be sufficiently strong to drive any significance.

Table 6 Country and Time Fixed Effects.

	Country and Time Fixed Effects	
	Exports	Imports
ln GDP_j	1.126**	1.468***
	(0.166)	*(0.278)*
ln lag Immigrant $Stock_{ii}$	0.045	-0.006
	(0.061)	*(0.115)*
ln $Openness_j$	0.604**	1.030***
	(0.148)	*(0.318)*
FTA_{ij}	0.303**	0.847***
	(0.135)	*(0.253)*
$WTO / GATT_j$	-0.184	-0.290
	(0.137)	*(0.331)*
Zero $Migrants_{ij}$	0.183	0.079
	(0.261)	*(1.066)*
R^2	0.933	0.860

Notes: "*", "**", "***", "****" and "*****" denote significance at the 1%, 5%, 10%, 15% and 20% levels, respectively. Standard errors are in parentheses. The estimated coefficients for the year and country fixed effects are suppressed to save space.

As shown in *Table 6* above, the only coefficients significant at a five percent level are GDP, Openness and FTA, all for exports. The same coefficients are all significant at a ten percent level for imports. The GDP elasticity on exports is somewhat stronger here than in the previous specifications, while Openness is within the interval of our earlier results. The FTA elasticity (both on import and export) is of the expected sign but lower than for the significant results in previous specifications. This leaves the coefficients of Immigrant Stock, Zero Migrants and WTO/GATT insignificant. WTO/GATT is of less concern since it rarely has been consistent in our study, neither regarding sign nor significance. The estimates of the Immigrant Stock elasticities however are a concern. The estimates are in both regressions insignificant and weaker than in previous specifications. For imports the estimate is slightly negative.

Time fixed effects and cross-sectional OLS specifications excluding Sweden's largest immigrant source countries

A second robustness check is performed by removing Sweden's five largest immigrant source countries from the data set and estimating the original specifications again. Since several of Sweden's major immigrant source countries also are very similar to Sweden (i.e. Finland, Norway and Denmark), it is possible that there is a causality problem regarding our previous

results. For instance, similar cultures in Norway and Sweden may result both in high trade volumes and large immigrant flows, without the immigrant flows being the cause of the high trade volumes.

By estimating the regressions without the largest immigrant source countries, we test if it is only these countries that are driving the significance of the Immigrant Stock coefficient, which would indicate that a causality problem may be present. If the coefficient remains significant and of similar size, we can be confident that the whole data set is driving the significance and size of the Immigrant Stock variable.

Table 7 Estimated Coefficients for Immigrant Stock Including and Excluding Sweden's Five Largest Immigrant Source Countries.

	Time fixed effects		Cross-sectional OLS					
	a.		b. 1975		c. 1990		d. 2005	
ln lag Immigrant	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
$Stock_{ij}$ w/o largest 5	0.208* *(0.023)*	0.254* *(0.050)*	0.283* *(0.062)*	0.166 *(0.147)*	0.251* *(0.060)*	0.267* *(0.100)*	0.259* *(0.075)*	0.489* *(0.114)*
R^2	0.855	0.723	0.869	0.731	0.835	0.702	0.861	0.799
ln lag Immigrant $Stock_{ij}$	0.216* *(0.022)*	0.268* *(0.048)*	0.301* *(0.059)*	0.196***** *(0.140)*	0.257* *(0.057)*	0.288* *(0.095)*	0.248* *(0.071)*	0.430* *(0.118)*
R^2	0.866	0.741	0.880	0.750	0.849	0.726	0.866	0.797

Notes: "*", "**", "***", "****" and "*****" denote significance at the 1%, 5%, 10%, 15% and 20% levels, respectively. Standard errors are in parentheses. The estimated coefficients for remaining variables are suppressed to save space.

Selected results from the regressions are shown in the table above.[8] Excluding the largest immigrant source countries does not alter the significance level of the estimated Immigrant Stock elasticities, except in four cases (the 1975, 1985, 1995 and 2000 OLS coefficients on imports). However, only in one out of the four cases has the coefficient turned from being significant, with the earlier specification, into not being significant. Further, the Immigrant Stock elasticities on both exports and imports are relatively similar for both data sets. They are slightly lower when removing the largest immigrant countries both for the time fixed effects specification and the OLS regressions, with the exception of the OLS results for 2005, where they instead are slightly higher.

[8] OLS Immigrant Stock estimates for the entire data set (every five years 1975-2005) can be found in Appendix F.

5.1.4 Analysis of the Results

Our estimation results show a strong immigrant-trade link for two of our three specifications. We estimate significant elasticities on exports of 0.216 in the time fixed effects model and spanning from 0.200 to 0.301 in the OLS models, and significant elasticities on imports of 0.268 in the time fixed effects model and spanning from 0.267 to 0.430 in the OLS models. The Immigrant Stock elasticity is higher on imports than on exports in all regressions except for the OLS regression for 1975. This is in line with theory outlined in section two, i.e. that imports are influenced by both mechanisms behind the immigrant-trade link while exports are influenced only by one. Imports are influenced both by immigrants' preferences for native country products and by their superior knowledge of their native country's market conditions, language and business climate, whereas exports are influenced only by the latter. We do not observe any trends in the elasticity development over time.

The country and time fixed effects model used as a robustness check give unclear results regarding the immigrant-trade link. The Immigrant Stock elasticity on exports is positive but not significant, while the elasticity on imports is slightly negative and not significant. These results demonstrate that the immigrant time series variation is not able to drive any development in trade. However, the requirement of the model to show an immigrant-trade link over merely five years time is set high. This is especially true for Sweden which has a large share of refugee immigration. For instance, refugees arriving from Chile in the 1970's had a limited ability to trade with their native country up until 1990 when the dictatorship was abolished. In a similar way, Yugoslavian refugees could not exploit their native country links to the full extent until peace was re-established. As long as the reason for refugee flows persists, this will dampen the immigrant effect on trade. The second robustness check, performed by excluding the five largest immigrant groups' native countries, gives us supportive results. The Immigrant Stock coefficients in general remain significant and of similar size, which indicates that the entire data set is driving the explanatory power of the Immigrant Stock variable.

The remaining coefficients provide additional interesting results. The GDP elasticity on trade is significant at the 1% level in almost all regressions.

It is surprising that the OLS estimated Distance coefficient is negative and statistically significant only for the OLS regressions 2000 and 2005. In the earlier years, the coefficients are

not significant and of varying sign. Yet when the Immigrant Stock variable is removed from the model, the Distance coefficient becomes significant and of negative sign. The reason for this may be due to the relatively high correlation between the Distance and Immigrant Stock variables, which is decreasing over time. For 2000 and 2005 the correlation is lower than previously, and both coefficient estimates are significant. The change in correlation demonstrates that Swedish immigration has shifted from being primarily from nearby countries, to also being from more distant countries.

The FTA coefficient is significant and positive in the time as well as in the time and country fixed effects regressions, while it displays varying significance levels for the OLS regressions. The coefficient is significant and increases up until 1990 and then decreases and becomes insignificant in several cases. This change of trend may be explained by Sweden joining the EU, which might have had an effect on how FTAs impact Swedish trade. It is probable that Sweden originally had FTAs with its natural trading partners, but when joining the EU, Swedish FTAs extended beyond these natural partners. The increase in FTAs, from 15 in 1990 to 30 in 1995, consisted of agreements with countries from the Middle-Eastern and Eastern European regions, which Sweden had weaker trade relationships with compared to its older Western European partners. This could have decreased the importance of FTAs in determining Swedish trade flows. An additional motivation for a declining FTA coefficient is the liberalization of trade around the world, which decreases the overall importance of FTAs. Subramanian and Wei (2003) discuss WTO's effect on the FTA coefficient. A reason for joining the WTO would be that a country gets the benefit of most-favoured-nation treatment and enjoys better export access to other WTO markets. The reduction in average of most-favoured-nation tariffs, brought about by liberalisation under the WTO, reduces the value of preferential access under free trade agreements. Hence, this could be another reason for the decline in the FTA coefficient.

The Openness elasticity on exports and imports is positive and significant at a 10% level for all regressions, except the OLS elasticity on imports in year 2000, indicating that Sweden trades more with countries open to trade. The size of the elasticity has however a decreasing general trend looking at the OLS estimates, declining by more than half from 1975 to 2005. This may be

a result of Sweden's increasing trade with the BRIC[9] countries, which has affected the Openness coefficient downwards. The average openness for Sweden's ten top trading partners in 2000 was 0.67 and 0.68 in 2005, while the average openness for the BRIC countries were 0.37 and 0.44 in 2000 and 2005, respectively. Consequently, the Openness variable becomes less important the more Sweden trades with relatively closed countries.

The WTO/GATT elasticity varies in significance and sign across specifications and time periods. Although this result is somewhat surprising, recent literature suggests that the impact of a WTO/GATT membership on trade is either inexistent or unevenly distributed across types of countries (industrial/developing) and sectors, which could help to explain the unexpected sign of this variable (Subramanian and Wei, 2003).

The Zero Migrants coefficient is of varying sign and only significant at a 10% level in three of the regressions. Although this estimate is rarely significant we choose to include it following the approach used by Wagner et al. (2002).

5.2 Trade Estimation Results per Region

In this section we test our *second hypothesis*, i.e. that the more socially and/or institutionally dissimilar Sweden is to its trade partners, the stronger is the immigrant-trade link. We begin with presenting estimation results from the regression taking immigrant native regions into consideration, and subsequently analyse and discuss the obtained results.

5.2.1 Time Fixed Effects Specification – Immigrant Effect per Region

Estimates generated using a time fixed effects specification, similar to the one in *5.1.1* but with immigration effects divided per region, are reported in *Table 8.* We find positive Immigrant Stock elasticities, all significant at the 1% level. The highest Immigrant Stock elasticity for exports belongs to Oceania while the lowest elasticity for exports belongs to Asia: a 10% increase in the number of immigrants from Oceania will on average increase exports to that region by 3.41%, while exports to Asia will only increase on average by 1.73% if the immigrants are Asian, given that all other model variables are held constant. In the case of imports, the

[9] Brazil, Russia, India and China which are defined as fast growing developing countries. For instance, the growing importance of the Chinese economy is demonstrated by the fact that 20% of the Swedish exports to Asia during 2008 had China as destination (*Asien och Oceanien,* 2009).

highest Immigrant Stock elasticity belongs to Europe (0.359) while the lowest elasticity belongs to Asia (0.212).

We use an independent two-sample t-test in order to test if the Immigrant Stock elasticities are of different size. All elasticities are of different size at a 5% significance level, except for the African and Asian Immigrant Stock elasticities on imports.[10]

Table 8 Time Fixed Effects Estimates with Continent Dummies.

	Time fixed effects	
	Exports	Imports
ln GDP_j	1.016*	1.285*
	(0.024)	*(0.051)*
ln $Distance_{ij}$	-0.327*	0.173
	(0.093)	*(0.184)*
ln lag Immigrant $Stock_{ij}$ * Africa	0.281*	0.217*
	(0.028)	*(0.055)*
ln lag Immigrant $Stock_{ij}$ * Asia	0.173*	0.212*
	(0.024)	*(0.054)*
ln lag Immigrant $Stock_{ij}$ * Europe	0.196*	0.359*
	(0.026)	*(0.053)*
ln lag Immigrant $Stock_{ij}$ * North America	0.227*	0.289*
	(0.028)	*(0.061)*
ln lag Immigrant $Stock_{ij}$ * South America	0.249*	0.275*
	(0.024)	*(0.049)*
ln lag Immigrant $Stock_{ij}$ * Oceania	0.341*	0.231*
	(0.038)	*(0.074)*
ln $Openness_j$	0.866*	0.772*
	(0.076)	*(0.127)*
FTA_{ij}	0.663*	0.827*
	(0.101)	*(0.172)*
$WTO / GATT_j$	-0.103	0.289***
	(0.098)	*(0.180)*
Zero $Migrants_{ij}$	0.490****	-0.464
	(0.327)	*(0.839)*
R^2	0.871	0.746

Notes: "*", "**", "***", "****" and "*****" denote significance at the 1%, 5%, 10%, 15% and 20% levels, respectively. Standard errors are in parentheses. The estimated coefficients for the year fixed effects are suppressed to save space.

The GDP coefficient has the expected sign according to theory and is significant at the 1% level for both exports and imports. As in the previous time fixed effects specification the distance

[10] See Appendix G for further details.

coefficient is only statistically significant for exports. Additionally, only the coefficient for exports is negative in the region specification. Both the coefficients for Openness and FTA are significant at the 1% level and have positive signs in line with theory. The WTO/GATT elasticity follows our previous results with time fixed effects specification: it is positive and significant for imports, here at the 10% level, whereas the elasticity on exports is negative and insignificant. The Zero Migrants coefficient is as earlier not significant.

5.2.2 Analysis of the Results - Regions

The regression estimates demonstrate strong immigrant trade-links overall, but of varying power depending on the region. As shown in *Table 9*, Oceania and Africa have the strongest immigrant-trade links for exports. African immigrants' strong effect is in line with our hypothesis and can be explained by the social and institutional dissimilarity between the countries in the region and Sweden, resulting in high transaction costs. Hence, there is an information deficit which makes additional information and contacts on these markets very valuable in order for Sweden to engage in trade with the region. African immigrants in Sweden can therefore boost exports to their native region by reducing these information barriers, i.e. transaction costs, to a greater extent than immigrants from countries more similar to Sweden can do. For more similar countries, for instance in Europe or in North America, additional market information and contacts are not needed to the same extent in order to engage in trade, which makes the immigrants' impact on trade smaller. The argument discussed for Africa also holds for South America. The elasticities for North America and Europe have, as expected according to our hypothesis, a low ranking due to cultural and institutional similarities and already well established trade relations.

The Asian immigrants' low elasticity contradicts our hypothesis, assuming that Asian countries are relatively dissimilar to Sweden. This low elasticity may however be explained by the transaction costs being offset by the significantly cheaper Asian products. What is even more surprising is to see Oceania having the strongest elasticity, which contradicts our hypothesis that the immigrant-trade link should be the highest for continents that are socially and institutionally different from Sweden. The dominant countries in Oceania, i.e. Australia and New Zeeland, are industrial countries which should be relatively socially and institutionally similar to Sweden.

Table 9 Ranking of the Immigrant Stock Elasticities per Continent.

No.	Exports		Imports	
1.	Oceania	0.341	Europe	0.359
2.	Africa	0.281	North America	0.289
3.	South America	0.249	South America	0.275
4.	North America	0.227	Oceania	0.231
5.	Europe	0.196	Africa	0.217
6.	Asia	0.173	Asia	0.212

The Immigrant Stock elasticities on imports are higher than on exports, which is in line with theory since immigrants pose two effects on imports compared to one on exports (in addition to the usual trade creation, the immigrants favour their home products, boosting imports even further). Only for two regions are the values for imports lower than for exports – Oceania and Africa – which has resulted in them climbing down the ranking for imports. In addition, the relatively low elasticity for African immigrants seems to contradict our second hypothesis, given that Africa is institutionally and socially different from Sweden. A possible explanation for the elasticities for Oceania and Africa being among the lowest involves the traded products' characteristics. Both Oceania and Africa primarily trade homogenous commodity goods that are traded on the spot market or at least have a reference price (*Australian Government's Fast Facts about Trade,* 2008). According to Rauch's (1999) network/search theory, increased knowledge of one's trading partner decreases trade costs more for differentiated goods than for homogenous goods. One can thus assume that immigrant-trade links are more important for differentiated products. A number of empirical papers confirm this, showing that the immigrant-trade link is stronger for differentiated goods, for which search costs are high, while homogenous goods which are traded on organised exchanges or reference-priced have lower transaction costs and do not benefit as much from country-specific trade information.[11] Hence, it is in line with theory and empirical findings that immigrants from primarily commodity exporting countries in Oceania and Africa have a smaller impact on Swedish imports as compared to immigrants from countries exporting primarily differentiated goods.

The elasticities on imports for Europe and North America are the strongest elasticities although the continents are considered culturally and institutionally similar to Sweden. This does however

[11] White (2009) finds that the immigrant-trade link is stronger for differentiated goods than for homogenous, and Gould (1994) finds that consumer goods have a stronger immigrant-trade link than producer goods, which he qualifies as less differentiated .

not have to be interpreted as a contradiction to the second hypothesis, due to the composition of Oceanian and African trade. African and Oceanian exports are primarily homogenous goods, which are less effected by immigrant-trade link. The high ranking of Europe and North America may therefore be due to Oceania and Africa sliding down the list rather than the elasticities for the former continents being particularly strong. Nevertheless, the relatively low ranking of South American immigrant effect contradicts our hypothesis under the assumption that Europe and North America are more similar to Sweden than South America is. As in the case of Asian elasticity on exports, the Asian immigrants' elasticity on imports is ranking the lowest, contradicting our hypothesis. As stated above, this low elasticity may however be explained by the transaction costs being offset by the significantly cheaper Asian products.

The coefficients for the remaining variables are significant and have the expected signs, except for the coefficients for Distance on imports, WTO/GATT on exports and Zero Migrants on imports. However, these elasticities were not significant for the original time fixed effects specification either.

In the light of these somewhat contradicting results we must reject our *second hypothesis*, i.e. that the more socially and/or institutionally dissimilar Sweden is to its trade partners, the stronger is the immigrant-trade link. It is however possible that a more precise test of the hypothesis may yield other results. The difficulty in measuring social and institutional dissimilarity has led us to use continents as a proxy, which is a relatively imprecise measure for these dissimilarities. By identifying a more exact proxy, it is possible to obtain more reliable results. Further, examining the immigrant-trade link for only differentiated goods would increase precision and comparability between countries, since homogenous goods trade is less likely to be affected by immigration and will therefore bias the results.

6. Discussion and Suggestions for Further Research

In this section we first summarise the discussion on the chosen research design. Thereafter, we discuss the welfare implications of our findings and finally suggest areas for further research.

6.1 Chosen Research Design: Limits and Effects

The research design has been discussed in detail throughout the study, however we summarise the key issues in this section.

As earlier mentioned, lack of data has been one of the largest obstacles in writing this paper. Due to lack of data on second generation immigrants, our Immigrant Stock variable may be underestimated which may lead to an upwardly biased Immigrant Stock elasticity on trade. Further, missing data on immigrant stocks have obliged us to make estimations which may bias the Immigrant Stock elasticity in both directions. An additional issue regarding the variables is the lack of a precise measure regarding social and institutional dissimilarity, which has affected both the validity and the reliability of our results.

Furthermore, there is no evident choice regarding which empirical specification to use for our study, and there exist both advantages and disadvantages with every method. The OLS specification is supposedly overestimating the immigrant-trade link, while the fixed effects specification may underestimate the link.

6.2 Welfare Implications of our Findings

The findings presented in this study provide valuable information for public and political debates on immigration policy. However, the implication of our findings is not clear. Whether in the form of imports or exports, increased trade is assumed to raise overall welfare. In addition to positive effects on host country trade, immigrants may also affect their native countries' welfare through the mechanism of trade creation. Nonetheless, if immigration causes an increase in trade deficits, it may result in currency depreciation, which lowers real incomes for the host country (Head and Ries, 1998). Given that the immigration effect on trade is higher on imports than on exports, possible trade deficit increases is an aspect to take into account.

6.3 Suggestions for Further Research

Our results are consistent with the theory that immigration lowers transaction costs and thus generates gains from trade that would not have been realised otherwise. The study has been designed to be comparable to earlier studies, which have predominantly focused on total trade and total immigrant stocks. However, in order to confirm our results, further research is required.

In addition, it would be interesting to study the Swedish immigrant-trade relationship more in-depth.

Few studies on the immigrant-trade link have been made on small and open countries. Hence, in order to generalise our results, additional studies on countries similar to Sweden are required. There are also few studies examining the immigrant-trade link for developing countries. This type of study would not only extend the research field, but would also test the robustness of the immigrant-trade link theory.

Another area for further research would be to divide trade into differentiated and homogenous goods. Following Rauch (1999) reasoning, it would be interesting to investigate if the immigrant-trade link in Sweden, as well as in other small and open countries, is stronger for differentiated trade than for homogenous.

It would also be interesting to study if different types of immigration have different impacts on trade. First, it would be of value to identify a more precise proxy for institutional and social dissimilarity. Second, further investigation of the immigrant-trade link for economic immigration versus refugee immigration, or skilled versus unskilled immigration, would give a better picture of how immigration policy impacts trade. This is specifically interesting for Sweden, given the country's small economic immigration. The results could be an interesting contribution to the topical debate on labour immigration and its effects in Sweden. However, no categorisation of Swedish immigrant data of this kind exists at present.

A variable that would be interesting to include is one controlling for politically unstable zones, since refugee immigration from unstable zones will not influence trade to the same degree as other types of immigration. As long as the reason for refugee flows persists, this will dampen the immigrant effect on trade. Hence, a variable controlling for this would give a more precise estimate of the Immigrant Stock coefficient. As mentioned earlier, this is specifically important for Sweden that has a relatively large part of refugees among its immigrants. However, identifying unstable zones raises the complexity of the data work substantially and is also often a matter of interpretation, which may bias the results.

7. Conclusion

What is the effect of immigration on Swedish trade?

The purpose of this paper has been to investigate the relation between the number of immigrants in Sweden and Swedish bilateral trade flows with the immigrants' native countries. Consequently, our *first hypothesis* states that there is a positive relation between the number of immigrants from a given country and Swedish bilateral trade flows with that country. The hypothesis was tested with an augmented gravity model on Swedish data from 1975 to 2005, using OLS and fixed effects specifications. All specifications except for the country and time fixed effects model failed to reject the first hypothesis. We estimated significant elasticities on exports suggesting that a 10% increase in the number of immigrants will on average increase exports by 2.16% in the time fixed effects model and within the span of 2.00% to 3.01% in the OLS models, given that the other model variables are held constant. For imports, the significant elasticities show that a 10% increase in immigrants will on average increase imports by 2.68% in the time fixed effects model and within the span of 2.67% to 4.30% in the OLS models, given that the other model variables are held constant. These findings thus support our hypothesis that there is a significant positive relation between the number of immigrants in Sweden and Swedish bilateral trade flows.

Previous research findings show suggestive evidence that immigrant-trade links are stronger for trade with countries that are socially and institutionally dissimilar to the host country. Hence, our *second hypothesis* proposes that the more socially and/or institutionally dissimilar Sweden is to its trade partners, the stronger is the immigrant-trade link. This hypothesis was also tested with an augmented gravity model using Swedish data from 1975 to 2005. We employed a time fixed effects specification with continent dummies, which were employed as a proxy for social and institutional dissimilarity. In this case, we did not obtain any concluding results and we must therefore reject our second hypothesis. However, a more precise test of the hypothesis, applying a better measure of institutional and social dissimilarity as well as focusing on differentiated goods, would possibly yield other and more reliable results.

Earlier research has mostly focused on large, relatively closed economies and on studying relatively short time periods with a limited number of trading partners. This study has extended the existing research field. Our results, confirming the strength of immigrant-trade links also for

small and open countries, over a longer time span with a larger set of trading partners, are important as they have assessed the general robustness of the immigrant-trade link. In light of these results, it would be of value to perform further research on the effects of different types of trade and immigration, in order to benefit both research and policy.

8. References

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9. Appendix

A. List of Countries Included in the Data Set

Afghanistan	Ghana	Paraguay
Albania	Greece	Peru
Algeria	Guatemala	Philippines
Angola	Guinea	Poland
Argentina	Guinea-Bissau	Portugal
Armenia	Guyana	Qatar
Australia	Haiti	Romania
Austria	Honduras	Russian Federation
Azerbaijan	Hong Kong SAR of China	Rwanda
Bahrain	Hungary	Saudi Arabia
Bangladesh	Iceland	Senegal
Belarus	India	Serbia and Montenegro
Belgium and Luxembourg	Indonesia	Sierra Leone
Benin	Iran, Islamic Republic of	Singapore
Bhutan	Iraq	Slovakia
Bolivia	Ireland	Slovenia
Bosnia and Herzegovina	Israel	Solomon Islands
Botswana	Italy	South Africa
Brazil	Jamaica	Spain
Bulgaria	Japan	Sri Lanka
Burkina Faso	Jordan	Sudan
Burundi	Kazakhstan	Suriname
Cambodia	Kenya	Swaziland
Cameroon	Korea, Democratic People's Republic of	Switzerland and Liechtenstein
Canada	Korea, Republic of	Syrian Arab Republic
Cape Verde	Kuwait	Tajikistan
Central African Republic	Kyrgyzstan	Tanzania, United Republic of
Chad	Lao People's Democratic Republic	Thailand
Chile	Latvia	Timor-Leste
China, People's Republic of	Lebanon	Togo
Colombia	Lesotho	Trinidad and Tobago
Comoros	Liberia	Tunisia
Congo	Libyan Arab Jamahiriya	Turkey
Congo, Democratic Republic of the	Lithuania	Turkmenistan
Costa Rica	Macedonia, The Former Yugoslavian Republic of	Uganda
Côte d'Ivoire	Madagascar	Ukraine
Croatia	Malawi	United Arab Emirates
Cuba	Malaysia	United Kingdom of Great Britain and Northern Ireland
Cyprus	Mali	United States of America
Czech Republic	Mauritania	Uruguay
Czechoslovakia (Former)	Mauritius	USSR (Former)
Denmark	Mexico	Uzbekistan
Dominican Republic	Moldova, Republic of	Venezuela, Bolivarian Republic of
Ecuador	Mongolia	Vietnam
Egypt	Morocco	Yemen
El Salvador	Mozambique	Yugoslavia (Former)
Equatorial Guinea	Myanmar	Zambia
Eritrea	Namibia	Zimbabwe
Estonia	Nepal	
Ethiopia	Netherlands	
Ethiopia (Former)	New Zealand	
Fiji	Nicaragua	
Finland	Niger	
France	Nigeria	
Gabon	Norway	
Gambia	Oman	
Georgia	Pakistan	
Germany	Panama	
Germany, Federal Republic of	Papua New Guinea	

Note: Depending on time-period, some of the countries drop out due to missing data.

B. Signs of Heteroscedastic Error Terms for Different Models and Specifications

Specification	Dependent Variable	Total Immigrant Effect Large Data Set: Heteroscedasticity	Total Immigrant Effect Restricted Data Set: Heteroscedasticity	Immigrant Effect per Continent: Heteroscedasticity	Regression Method
Time Fixed Effects	Exports	Yes	Yes	Yes	BOOTSTRAP
	Imports	Yes	Yes	Yes	BOOTSTRAP
Country and Time Fixed Effects	Exports	Yes	Yes	Yes	BOOTSTRAP
	Imports	Yes	Yes	Yes	BOOTSTRAP
Cross sectional 1975	Exports	No	No	No	OLS
	Imports	Yes	Yes	Yes	BOOTSTRAP
Cross sectional 1980	Exports	Yes	Yes	Yes	BOOTSTRAP
	Imports	Yes	Yes	Yes	BOOTSTRAP
Cross sectional 1985	Exports	No	No	No	OLS
	Imports	Yes	Yes	Yes	BOOTSTRAP
Cross sectional 1990	Exports	No	No	No	OLS
	Imports	No	No	No	OLS
Cross sectional 1995	Exports	Yes	Yes	Yes	BOOTSTRAP
	Imports	Yes	Yes	Yes	BOOTSTRAP
Cross sectional 2000	Exports	No	No	No	OLS
	Imports	Yes	Yes	Yes	BOOTSTRAP
Cross sectional 2005	Exports	Yes	Yes	Yes	BOOTSTRAP
	Imports	Yes	Yes	Yes	BOOTSTRAP

C. Descriptive Statistics for the Years 1975 to 2005

Year	Variable	No. Obs.	Minimum	Maximum	Mean	Standard deviation
1975	$Exports_{ij}$ (MSEK)	122	0	8 032	580	1 472
	$Imports_{ij}$ (MSEK)	122	0	14 366	602	1 768
	Lagged Immigrant $Stock_{ij}$	122	0	235 453	4 377	22 471
	GDP_j (MUSD)	122	149	1 624 000	51 147	173 769
	$Distance_{ij}$ (km)	122	398	17 373	6 159	3 410
	$Openness_j$	122	0.10	2.60	0.54	0.42
	FTA_{ij}	122	0	1	0.11	0.32
	WTO / $GATT_j$	122	0	1	0.63	0.48
	Zero $Migrants_{ij}$	122	0	1	0.07	0.25
1980	$Exports_{ij}$ (MSEK)	132	0	16 103	982	2 609
	$Imports_{ij}$ (MSEK)	132	0	23 779	1 049	3 083
	Lagged Immigrant $Stock_{ij}$	132	0	222 147	4 164	20 676
	GDP_j (MUSD)	132	131	2 768 900	87 707	290 267
	$Distance_{ij}$ (km)	132	398	17 373	6 316	3 401
	$Openness_j$	132	0.12	3.70	0.61	0.50
	FTA_{ij}	132	0	1	0.11	0.32
	WTO / $GATT_j$	132	0	1	0.62	0.49
	Zero $Migrants_{ij}$	132	0	1	0.06	0.24
1985	$Exports_{ij}$ (MSEK)	137	0	30 550	1 878	5 448
	$Imports_{ij}$ (MSEK)	137	0	43 861	1 736	5 688
	Lagged Immigrant $Stock_{ij}$	137	0	251 342	4 567	22 559
	GDP_j (MUSD)	137	80	4 187 500	92 699	390 832
	$Distance_{ij}$ (km)	137	398	17 373	6 427	3 444
	$Openness_j$	137	0.09	2.78	0.54	0.39
	FTA_{ij}	137	0	1	0.12	0.32
	WTO / $GATT_j$	137	0	1	0.62	0.49
	Zero $Migrants_{ij}$	137	0	1	0.02	0.15
1990	$Exports_{ij}$ (MSEK)	137	0	34 358	2 087	5 886
	$Imports_{ij}$ (MSEK)	137	0	28 080	1 835	5 362
	Lagged Immigrant $Stock_{ij}$	137	0	228 361	4 333	20 492
	GDP_j (MUSD)	137	133	5 757 200	139 503	576 528
	$Distance_{ij}$ (km)	137	398	17 373	6 484	3 409
	$Openness_j$	137	0.06	3.74	0.57	0.50
	FTA_{ij}	137	0	1	0.11	0.31
	WTO / $GATT_j$	137	0	1	0.68	0.47
	Zero $Migrants_{ij}$	137	0	1	0.02	0.15

Year	Variable	No. Obs.	Minimum	Maximum	Mean	Standard deviation
1995	$Exports_{ij}$ (MSEK)	135	0	72 909	3 942	10 895
	$Imports_{ij}$ (MSEK)	135	0	90 495	3 137	10 548
	Lagged Immigrant $Stock_{ij}$	135	0	217 942	5 204	20 423
	GDP_j (MUSD)	135	135	7 342 300	210 672	820 644
	$Distance_{ij}$ (km)	135	398	17 373	6 523	3 411
	$Openness_j$	135	0.13	9.87	0.66	0.90
	FTA_{ij}	135	0	1	0.22	0.42
	WTO / $GATT_j$	135	0	1	0.80	0.40
	Zero $Migrants_{ij}$	135	0	1	0.01	0.09
2000	$Exports_{ij}$ (MSEK)	160	0	85 781	4 901	13 844
	$Imports_{ij}$ (MSEK)	160	0	111 910	4 004	13 291
	Lagged Immigrant $Stock_{ij}$	160	0	205 710	5 768	18 682
	GDP_j (MUSD)	160	202	9 764 800	195 018	884 196
	$Distance_{ij}$ (km)	160	379	17 373	5 887	3 521
	$Openness_j$	160	0.15	2.94	0.69	0.43
	FTA_{ij}	160	0	1	0.24	0.43
	WTO / $GATT_j$	160	0	1	0.77	0.42
	Zero $Migrants_{ij}$	160	0	1	0.01	0.08
2005	$Exports_{ij}$ (MSEK)	160	0	102 797	5 962	16 738
	$Imports_{ij}$ (MSEK)	160	0	146 657	5 048	16 499
	Lagged Immigrant $Stock_{ij}$	160	2	195 447	6 176	18 388
	GDP_j (MUSD)	160	301	12 376 100	276 310	1 109 893
	$Distance_{ij}$ (km)	160	379	17 373	5 887	3 521
	$Openness_j$	160	0.21	3.59	0.75	0.47
	FTA_{ij}	160	0	1	0.26	0.44
	WTO / $GATT_j$	160	0	1	0.82	0.39
	Zero $Migrants_{ij}$	160	0	0	0	0

Note: The zero values for minimum Exports, Imports and Lagged Immigrant Stock are not missing values, but zero value observations in the data sample.

D. List of Countries with Estimated Immigrant Stock Values

Countries with Estimated Immigrant Stock Values due to Missing Values for the Year of 1995	Countries Proclaimed Independent 1975-2005 with Estimated Immigrant Stock Values
Bahrain	Armenia
Benin	Azerbaijan
Bhutan	Belarus
Botswana	Bosnia and Herzegovina
Burkina Faso	Croatia
Burundi	Czech Republic
Cameroon	Eritrea
Central African Republic	Estonia
Tchad	Ethiopia
Comoros	Georgia
Korea, Democratic People's Republic of	Kazakhstan
Equatorial Guinea	Kyrgyzstan
Fiji	Latvia
Gabon	Lithuania
Guinea	Republic of Moldova
Haiti	Russian Federation
Lesotho	Serbia and Montenegro
Madagascar	Slovakia
Malawi	Slovenia
Mali	Tajikistan
Mauritania	TFYR of Macedonia
Mongolia	Turkmenistan
Myanmar	Ukraine
Namibia	Uzbekistan
Niger	
Oman	
Papua New Guinea	
Qatar	
Rwanda	
Solomon Islands	
Suriname	
Swaziland	

E. Cross-Sectional OLS Estimates for the Years 1975 to 2005

	Cross-sectional OLS							
	1975		1980		1985		1990	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
ln GDP_j	0.923*	1.358*	0.874*	1.230*	0.904*	1.061*	0.935*	1.050*
	(0.067)	*(0.145)*	*(0.070)*	*(0.179)*	*(0.060)*	*(0.153)*	*(0.068)*	*(0.114)*
ln $Distance_{ij}$	0.113	0.329	-0.063	0.387	-0.034	0.408	-0.220	-0.157
	(0.174)	*(0.314)*	*(0.161)*	*(0.383)*	*(0.175)*	*(0.312)*	*(0.194)*	*(0.324)*
ln lag Immigrant $Stock_{ii}$	0.301*	0.196*****	0.253*	0.302***	0.255*	0.382*	0.257*	0.288*
	(0.059)	*(0.140)*	*(0.051)*	*(0.157)*	*(0.051)*	*(0.126)*	*(0.057)*	*(0.095)*
ln $Openness_j$	*1.141**	1.311*	0.790*	0.724***	0.709*	0.557***	0.853*	0.807*
	(0.143)	*(0.282)*	*(0.185)*	*(0.392)*	*(0.152)*	*(0.337)*	*(0.157)*	*(0.264)*
FTA_{ij}	0.803**	1.266*	0.999*	1.500**	1.116*	1.765*	0.780***	1.152****
	(0.369)	*(0.428)*	*(0.291)*	*(0.589)*	*(0.380)*	*(0.512)*	*(0.450)*	*(0.754)*
$WTO / GATT_j$	-0.417**	0.054	-0.563**	-0.162	-0.460**	0.695***	-0.047	0.508*****
	(0.186)	*(0.388)*	*(0.230)*	*(0.441)*	*(0.193)*	*(0.412)*	*(0.230)*	*(0.386)*
Zero $Migrants_{ij}$	0.005	-0.644	0.837*****	-0.484	0.368	-3.910***	-0.167	0.831
	(0.405)	*(1.390)*	*(0.661)*	*(1.531)*	*(0.632)*	*(2.662)*	*(0.719)*	*(1.205)*
R^2	0.880	0.750	0.841	0.694	0.869	0.730	0.849	0.726

	Cross-sectional OLS					
	1995		2000		2005	
	Exports	Imports	Exports	Imports	Exports	Imports
ln GDP_j	1.044*	1.482*	1.053*	1.414*	0.941*	1.223*
	(0.055)	*(0.115)*	*(0.058)*	*(0.092)*	*(0.053)*	*(0.091)*
ln $Distance_{ij}$	-0.224	-0.284	-0.525*	-0.766**	-0.521*	-0.714*
	(0.190)	*(0.412)*	*(0.165)*	*(0.279)*	*(0.107)*	*(0.231)*
ln lag Immigrant $Stock_{ii}$	0.200*	0.217****	0.207*	0.267**	0.248*	0.430*
	(0.068)	*(0.139)*	*(0.057)*	*(0.131)*	*(0.071)*	*(0.118)*
ln $Openness_j$	0.843*	0.680**	0.584*	0.578	0.555*	0.586***
	(0.154)	*(0.310)*	*(0.161)*	*(0.458)*	*(0.215)*	*(0.344)*
FTA_{ij}	0.574***	0.478	0.481****	0.468	0.034	0.269
	(0.305)	*(0.746)*	*(0.321)*	*(0.456)*	*(0.269)*	*(0.440)*
$WTO / GATT_j$	0.477**	1.042**	0.684*	0.682*****	0.799**	1.646*
	(0.270)	*(0.523)*	*(0.234)*	*(0.476)*	*(0.398)*	*(0.581)*
Zero $Migrants_{ij}$	-0.714***	2.831*	0.008	-0.401	...	...
	(0.308)	*(0.687)*	*(1.148)*	*(0.748)*	...	...
R^2	0.906	0.813	0.880	0.764	0.866	0.797

Notes: "*", "**", "***", "****" and "*****" denote significance at the 1%, 5%, 10%, 15% and 20% levels, respectively. Standard errors are in parentheses.

F. Cross-Sectional OLS Estimates for Immigrant Stock Including and Excluding Sweden's Largest Immigrant Source Countries for the Years 1975 to 2005

	Cross-sectional OLS							
	1975		1980		1985		1990	
ln lag Immigrant	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
$Stock_{ij}$ w/o largest 5 countries	0.283* *(0.062)*	0.166 *(0.147)*	0.240* *(0.056)*	0.282*** *(0.159)*	0.244* *(0.053)*	0.367** *(0.138)*	0.251* *(0.060)*	0.267* *(0.100)*
R^2	0.869	0.731	0.822	0.672	0.856	0.708	0.835	0.702
ln lag Immigrant $Stock_{ij}$	0.301* *(0.059)*	0.196***** *(0.140)*	0.253* *(0.051)*	0.302*** *(0.157)*	0.255* *(0.051)*	0.382* *(0.126)*	0.257* *(0.057)*	0.288* *(0.095)*
R^2	0.880	0.750	0.841	0.694	0.869	0.730	0.849	0.726

	Cross-sectional OLS					
	1995		2000		2005	
ln lag Immigrant	Exports	Imports	Exports	Imports	Exports	Imports
$Stock_{ij}$ w/o largest 5 countries	0.180* *(0.070)*	0.144 *(0.154)*	0.202* *(0.061)*	0.237**** *(0.148)*	0.259* *(0.075)*	0.489* *(0.114)*
R^2	0.899	0.799	0.872	0.751	0.861	0.799
ln lag Immigrant $Stock_{ij}$	0.200* *(0.068)*	0.217**** *(0.139)*	0.207* *(0.057)*	0.267** *(0.131)*	0.248* *(0.071)*	0.430* *(0.118)*
R^2	0.906	0.813	0.880	0.764	0.866	0.797

Notes: "*", "**", "***", "****" and "*****" denote significance at the 1%, 5%, 10%, 15% and 20% levels, respectively. Standard errors are in parentheses.

G. T-test Calculations on Regional Immigrant-Trade Links

To test if the Immigrant Stock per region coefficients are of different size, we use an independent two-sample *t*-test for equal sample sizes and assume that the two distributions have equal variance.

Our test equation is the following:

$$\begin{aligned} ln(Trade_{ij} + 1) &= \beta_0 + \beta_1 lnGDP_j + \beta_2 lnImm\_Stock_{ij} \cdot Africa_j + \beta_3 lnImm\_Stock_{ij} \cdot Asia_j \\ &+ \beta_4 lnImm\_Stock_{ij} \cdot Europe_j + \beta_5 lnImm\_Stock_{ij} \cdot North\_America_j \\ &+ \beta_6 lnImm\_Stock_{ij} \cdot Oceania_j + \beta_7 lnImm\_Stock_{ij} \cdot South\_America_j \\ &+ \beta_8 Zero\_Mig_{ij} + \beta_9 lnOpenness_j + \beta_{10} FTA_{ij} + \beta_{11} WTO\_GATT_j + FE_t + \varepsilon_{ij} \end{aligned}$$

To test if the regression coefficients β_x and β_y are different, where x= 2, 3....,7 and y=2, 3...7, we test the following hypothesis:

*H*0: $\beta_x - \beta_y = 0$

*H*1: $\beta_x - \beta_y \neq 0$

$\alpha = 0.05$

We use the following test statistic:

$t = \frac{\beta_x - \beta_y}{S_{\beta_x \beta_y} \cdot \sqrt{\frac{2}{n}}}$ which follows a student's t distribution with n-2 = 963 degrees of freedom.

where:

$S_{\beta_x \beta_y} = \sqrt{\frac{S_{\beta_x}^2 + S_{\beta_y}^2}{2}}$ and $S_{\beta_x \beta_y}$ is the pooled standard deviation for the two coefficients.

Critical limits:

We reject *H*0 if $| t_{obs} | > t_{crit}$ (963 d.f.)