

Immigration and Trade Creation for the U.S.: Role of Immigrant Occupation

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Abstract

This study establishes that immigrants' occupation is an important indicator of the quality and effectiveness of immigrants' network in trade creation with their home-country. Using a sample of 63 U.S. trading partners that constitute the major immigrant sending countries over the years 1991 – 2000 and using instrumental variable estimation this paper finds that the immigrant trade elasticity varies with the share of the immigrants in various occupation groups. The share of professional immigrants significantly increases the immigrant trade elasticity for all types of trade due to their ability to effectively use their network for trade creation. This effect is strongest for the Rauch's differentiated imports where the immigrant specific home country information and immigrant demand for goods play a key role in increasing trade. In contrast, immigrants in service occupations do not have a significant effect on the immigrant trade elasticity for all types of goods and immigrants in the laborer group only have an effect on the imports of the differentiated goods. This paper highlights that the immigrants' effect on trade is not identical across all types of immigrants but it varies with the type of immigrants' occupation and trade.

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I. Introduction

The area of international trade and the immigrant Diaspora has recently seen many studies exploring the role of immigrant networks on the bilateral trade with the immigrants' home country. Beginning with the work of Gould (1995) there has been research establishing the pro trade effect of immigration on trade for different immigrant entry countries and for both exports and imports. Trefler (1995) points out that there is a case for home bias in consumption as a source for missing trade and Grief (1993) and Rauch and Casella (1998) have shown that business and social networks can help reduce informational trade barriers. Immigrant population living in a country provides the social and co-ethnic networks that facilitate trade with their home country by removing some informal trade barriers and lowering transactions cost to trade. The literature presents strong evidence that the immigrant based networks have a positive effect on bilateral trade for the U.S. (Gould 1994; Dunlevy & Hutchinson 1999; Rauch 1999; Dunlevy 2004; Herander and Saavedra 2005; Bandyopadhyay et al., 2008); for Canada (Head and Reis 1998) and for UK (Girma and Yu 2002), Piperakis (2007) for EU-15 countries to name a few. It is also well known that the effect of immigrants on trade varies with the type of good. Rauch and Trindade (2002) show that the ethnic Chinese populations increase bilateral trade between countries more for differentiated goods than for the homogeneous goods.¹

The literature exploring the effect of immigrant networks on trade have mainly focused on the size and not the quality of the immigrant networks. In addition to the effect of the immigrant network size measured by the immigrants stock, this paper looks into the effect of the immigrant network quality on trade by examining the role of the immigrants' occupation on trade with their home countries. By simply looking at the size of the immigrant stock, this paper argues that we might be underestimating the effect of immigrant networks on trade and the distribution of the immigrant network across immigrant occupation may have a significant effect on trade flows. This paper estimates the effect of immigrants' occupation on the U.S. bilateral trade flows with their home country using a sample of 63 trading partners over the period 1991 – 2000. During the period 1991 – 2000 immigration to the U.S. increased to 9 million from 7.3 million during the 1981 -1990 and with 70% of the immigrants for the year 2000 coming from Latin America and Asia.² In addition, we observe that the U. S. international trade with the

¹ According to Rauch (1999), goods are classified into organized exchange if they are traded and priced on organized exchange, whereas they are classified as reference priced if their prices are quoted in trade bulletins. Differentiated goods are not homogenous goods and cannot be listed on any organized exchange or have a reference priced printed in trade bulletins.

² From the U.S. Department of Homeland Security (formerly called the Immigration and Naturalization Service, INS).

immigrants' home country is on the rise. The value of U. S. exports in goods during the period 1990 – 2000 increased by 85% with Asia and by more than 200% with Latin America. During the same period U.S. imports increased by 58% with Asia and by more than 200% with Latin America.³

Few papers in the literature have looked beyond the size of the immigrant population while analyzing the impact of immigration on trade. Gould (1995), in addition to the size of the immigrant stock, controlled for the ratio of skilled to unskilled migrants. Contrary to the immigrant home link effect his findings show that immigrant skilled and unskilled ratio has a negative effect on both exports and imports, other than on the producer imports. Gould argues that skilled immigrants increase trade but they simultaneously create industries in the host country that might potentially lead to import substitution. However, this does not explain his finding of a negative effect of skilled to unskilled immigrant ratio on exports. Head and Ries (1998) have examined the role of the immigrant population on trade for Canada across different entry classes of immigrants. They find that the trade creating effect of the entrepreneur group of immigrants on trade is weaker than the group of family immigrants and is strong only when compared to the refugees. They argue that this is possibly due to the point system followed by Canada and that the independent classes of immigrants because of their capital or self employed status (many maybe artists) receive bonus points and may not necessarily be carrying enough market contacts or home market information facilitating trade. In Canada, moreover, entrepreneurs were discouraged from importing goods from their home country. However, U.S. does not follow any point system and in spite of a big family reunification and amnesty component to its immigration policy, immigration to the U.S. is primarily driven by individuals' occupation and skills. Also, there have been many policies promoting self employment among the immigrants to encourage their assimilation into the U.S. economy and society. Using education levels Felbermayr and Jung (2009) control for the low, medium, and high skilled immigrants in estimating the pro-trade effect of migrants on exports but they find that low and high skilled immigrants have a significant effect on exports but the medium skill migrants do not.

Contrary to the earlier findings in the literature, this paper measures the quality of the network by immigrant occupation in the U.S. Following 2000 Census immigrants are categorized into the following four categories of occupation: management, professional and related occupation (Professional); service, sales and office administration (Services); construction, precision workers, laborers and farming (Laborers); and No occupation (includes retired persons, students, and home-makers). This paper finds that the professional and executive

³ Author's calculation from the U.S. Census Foreign Trade data.

immigrants have a significant effect on trade creation between the U.S. and their home country compared to the immigrants with no occupation. This holds for both exports and imports and across Rauch's reference priced and differentiated goods. The immigrant trade elasticity ranges between 0.2 – 0.8 depending on the commodity and the trade type. This is similar to the earlier findings in the literature.⁴ This paper finds that the professionals from a country j further increase this trade elasticity for the U.S. by 0.002 to 0.006 times the share of the professional immigrants from home country j depending on the commodity and whether it is export or import. The highest effect is for the Rauch's differentiated imports.

This paper makes several contributions to the literature. First, it highlights that the pro-trade effect of immigrants on trade varies across the immigrant's occupation. . The key hypothesis of this paper is that in addition to the size of the immigrant network the distribution of the immigrant network across different occupations in the U.S. has a significant effect on trade flows. By examining only the effect of immigrant network size we are potentially underestimating the immigrant network effect on trade creation. Understanding the effect of immigration on trade is an important element for the overall economic effect of immigrants on their destination and their home countries. Significant pro trade effect of skilled immigrants may potentially mitigate the economic losses of the brain drain for the immigrant's home country. This paper contributes to this literature by establishing that the immigrant network sizes as well as the distribution of the immigrant population across various occupations are determining factors of the trade volume as well as the trade pattern.

Second, this paper examines the effect of immigrants' occupation on trade for both total exports and imports as well as across different commodity types, particularly Rauch's referenced price and differentiated group of commodities. The effect of immigration through various channels will have more effect on trade creation for consumer goods versus producer goods. It is well known that immigrants' knowledge of their home country market and home country language has a greater effect on trade creation of the differentiated goods rather than for reference goods where markets are centralized and prices are listed on trade bulletins. (Rauch 1999, 2002). This paper finds that professionals have the most effect on trade creation between their destination and sending countries and this effect is strongest for differentiated goods.

⁴ Table A1 in the Appendix gives the main findings in the literature on the immigrant trade elasticity for the U.S. and Canada where the focus is only on the total immigrant size,

The third contribution of this paper is that it takes into account the possible endogeneity of the immigrant network. To identify the effect of immigrant network on trade flows we use the historical immigrant networks and whether the home country allows a dual citizenship as well as the number of people injured and affected in the immigrant's home country in any disaster as our instruments. The literature has so far neglected to take into account the possibility that the immigrant stock and the trade flows might be endogenous, possibly through omitted variable or the reverse causality.⁵ Greater trade and openness in a country potentially brings in greater immigration so there is a possibility that trade effects immigration. This paper uses IV estimation to mitigate the effect of this reverse causality and estimate a consistent effect of immigrant stock on trade. Finally, this paper uses new data on U.S. immigrant stock across occupation groups for the U.S. over 1991 – 2000 calculated from 2000 census data and the annual data on the legal permanent residents across occupation from the the U.S. Department of Homeland Security. Annual data on immigrant stock across occupations and countries did not exist before.⁶

The plan of the paper is as follows; Section II puts forth arguments supporting the principal hypothesis of this paper that the effectiveness of the immigrant based network in stimulating bilateral trade is dependent on the immigrants' occupation in their host country. Section III discusses the data and presents the gravity empirical model. Section IV we discuss results and Section V presents our conclusion.

II. Immigration and Trade Creation – Role of Immigrant Occupation

Immigrants increase trade between the U. S. and their home country by providing home country information in the U. S. This information reduces informal trade barriers and stimulates trade between the U. S. and the immigrant's home country; immigrants in the U. S. provide co-ethnic networks and immigrant enclaves that help in trade. These ethnic and social networks provide strong pull for more immigration and helps in building a pool of home country information in the U. S. In the literature, it is well documented that the immigrant information reduces informal trade barriers through matching buyers and sellers and enforcement of trading contacts. There is a possibility that increased immigration from a certain region might over time remove formal trade barriers. Larger group of immigrants have enough political votes and a strong lobby that could possibly remove formal trade barriers by changes in the existing trade policy (Hatton and Williamson (2002); Lewer and Van den Berg (2009)).

⁵ In recent papers Peri and Requena (2012) and Vezina (2012) uses IV estimation to take account of the endogeneity of the immigrants while examining the effect of immigrant networks on Spain's exports and Swiss exports, respectively.

⁶ This dataset is available from the author upon request.

This paper proposes that the social capital and co-ethnic networks created by the immigrants in the U.S. will vary according to their occupation. Dunlevy(2004) call the effect of matching between traders *information bridge*. *Information affect* is an important immigrant link on trade and will vary with the immigrants' occupation. Immigrants have information on traders and the type of goods available in the U. S. and their home countries; they help in promoting international trade between U. S. and their home country. For instance, Korean exports substantially increased since the early 1970s when a massive influx of Koreans to the U. S. began. By virtue of the advantages associated with their language and ethnic background, many Korean immigrants have established businesses importing merchandise from Korea (Min 1990). There is increasing evidence for the important role played by Indian business and social networking organizations (such as TiE, The Indus Entrepreneurs) in facilitating Indian immigrant entrepreneurs, particularly in the IT sector in the U.S. An Indian immigrant who is a homemaker or a student might not have the same social capital as entrepreneurs and will not be participating in the TiE's social and professional networking and entrepreneurship meetings and hence will have a lower information effect on trade than the Indian immigrant who is an engineer or a CEO. Moreover, the network size and quality of the immigrants' coethnic network in the U.S. will vary according to their occupation; engineers will tend to network more with other engineers and professionals from India. Greater exchange of ideas and innovation across managerial and professional immigrant groups will occur and this will have a greater potential in lowering informal trade barriers and increasing trade with their home countries.

In addition to the matching of buyers and sellers, immigrants bring information on how business is conducted in their home country. This interaction helps in the enforcement for trading contacts Dunlevy (2004) calls this the *cultural bridge*. As pointed out by Grief (1993), coethnic networks promote trade by preventing violation of trading contacts particularly when the legal environments are not well developed. This cultural bridge will also vary with immigrants' occupation in their destination countries.

In this paper we propose that what is important for trade building is the size and the quality of the immigrants' network and the individual immigrants' occupation is an important indicator of the quality and determinant of the effectiveness of immigrants' network in trade creation with the home-country, both via externality of the foreign market information and personal business contacts.

There is also increasing evidence of the important role played by export intermediaries in stimulating U.S. exports, particularly for the small exporters who rely on third parties more than the big multinationals that have in-

house export departments (Becker and Porter 1983; Peng and Ilinitch 1998). To increase competitiveness of the U.S. exports, the export intermediaries have to play an important role in mitigating the trade barriers for the U.S. firms (U.S. Small Business Administration 1989, 1991). Using a large mail survey Peng (1998) found that more than 50% of the export intermediaries in the U.S. specialize in the Asian and Latin American region, which are big trading partners for the U.S. as well as the major new immigrant sending countries. Peng also found that over 90% of the intermediaries in his sample had a in-house foreign language specialist and close to 40% of the personnel who worked in these intermediaries were immigrants, which made these export intermediaries expert in foreign regions and helped them to stimulate U.S. exports. Highlighting the role of immigrants as middlemen in trade promotion, Light et al. (2002) using census data also finds that entrepreneurship rates significantly increase U.S. exports but not U.S. imports.

Immigrant occupation in their destination countries will dictate to what extent immigrants are able to use their co-ethnic networks and personal information for trading. Not all occupation categories of immigrants will have a similar pro-trade effect on trade, particularly in building trading contacts and lowering transactions cost to trade, and the most significant and positive effect will be for the professional and high skilled immigrants. The immigrants who are in the executive and professional occupation will have a stronger immigrant network with fellow professionals from their country and are in a better position to provide stronger trade stimulus between the U.S. and their home country than other occupational group of immigrants. They will be using the home country knowledge and information in entrepreneurial activities opening new channels of trade with their home country; involved in a more efficient search of goods and buyers or sellers in the home country and better trade negotiations. A CEO and an engineer will utilize home country information and their networks in matching buyers and sellers with their home country more effectively compared to immigrants in production or in construction or in farming. On the other hand, if the immigrant is a homemaker or a retired person or is a construction worker or is in farming they might not have the kind of immigrant networks and the skills to leverage the networks to potentially increase trade via the information effect.

Managers, professionals, and executives will have a more significant effect on trade promotion with their home country than homemakers and retired personnel and this effect will be present both for the U. S. exports and U. S. imports. This effect will be present for all types of goods; though will be stronger for differentiated goods where the home market information carried by immigrants will play a significant role in matching buyers and sellers

and trade promotion. In contrast for homogenous good given that there is not much variety or differentiation in the product type and the prices are listed on the trading exchange the role of immigrant networks is not significant in trade creation. For instance immigrant information may play a larger role on trade creation in shoes, clothing and food products than in the trading of lead or some other mineral ore (Rauch 1999).

Similar to immigrants in the professional and executive group, immigrants in sales and services may also facilitate trade between the U.S. and their home country through trade negotiations and information effect. This will be more relevant for the referenced and differentiated priced goods where the arbitrage possibility exists for a profitable trading between the home country and the U.S. This group too will have more effect on the trading of differentiated goods than that of the homogenous goods. However, immigrants in sales and services possibly lack the business decision making of the managers and entrepreneur group and hence additional occupation effect over and above the immigrants' size effect might not be significant for this group.

Among the occupation groups immigrants who are laborers may have the least effect on trade creation through the information effect of matching buyers and seller and in raising financial capital for new businesses than professional immigrants. Though, this group does share information through its networks and introduce new goods among fellow immigrants and natives. For instance a Mexican house cleaner or a Jamaican nanny might tell their American employer about particular specialty goods available at a Mexican or a Jamaican grocery store. There is a possibility that they play a significant role in the trade creation through generating demand for goods from their home country and will have a larger effect on the U.S. imports than exports. Again this effect will be observed in the case of differentiated goods, which are mostly final consumer goods.

The immigrant group with no occupation is unable to leverage the home country information and their network for any potential increase in bilateral trade with their home country. This group consists of homemakers and retired personnel who might have a close knit network with their fellow compatriots but they lack the skill set and resources to increase trade. An Indian housewife may share information about new home products with other Indian homemakers or mothers but that information might not be new among the fellow immigrants. The same Indian housewife might introduce new goods to her native friends and possibly create a substantial demand for new goods but this trade creation may be narrow in scope given that she is not in the labor force her chances of meeting other natives are limited. One can argue that even if there is a potential for these group of immigrants to have a significant trade effect the scope of such trade creation is weak compared to other occupation groups. Many elderly

immigrants constitute a big part of the no occupation group in the U.S. They have often immigrated to the U.S. to be with their children and also due to the lack of caregiver in their home country. For instance, on Devon street of Chicago, one may see many elderly Indian and Pakistani immigrants interacting with similar compatriots and possibly reminiscing their life back home or discussing politics.(Bacon 1996). This group might create more demand for goods and potentially have an impact on the imports but their effect on the U.S. bilateral trade with their home country will be the weakest.

All immigrants, irrespective of their occupation, will have a positive effect on imports through their demand for goods from their home country, though possibly in different magnitudes. Entrepreneurs and professional immigrants will increase imports more than the exports through matching buyers and sellers as well as their demand effect. On the other hand, immigrants in services and laborers, as well as immigrants with no occupation, will be promoting trade more for imports than exports. This effect, however, will be less than that of the professional immigrant group. Similar is the case for immigrants with no occupation. However, there is an assimilation effect and a possible shift of tastes and preference away from the home goods among the immigrants. With rising income in the U.S. immigrants may be demanding less of the goods from their home country, particularly consumption goods. CEOs and professionals with rising income substitute their grocery shopping from ethnic stores to upscale American international grocery stores, such as Whole Foods. Whereas a laborer or construction workers with lower income and possibly less assimilation into the U.S. society and living in ethnic enclaves demands more goods from their ethnic grocery store rather than American or International Food stores. It is worth discussing, as one might wonder, whether immigrants' income maybe a proxy for their occupation, but not entirely. Even if the construction worker and an engineer might earn the same level of income, an engineer has an immigrant network that is more conducive to trade promotion than the construction worker.

III. Empirical Model and Data Description

A. Gravity Specification

The empirical model is based on the *gravity framework*, where the trade between the U. S. and its trading partners, who are also immigrant-sending countries, is explained by different economic factors in the U. S. and the home countries. A gravity equation has been very successful in explaining bilateral trade flows (Anderson, Bergstrand 1989; Deardorff 1995). We begin our specification with the basic gravity where the trade (F_{ij}) is

proportional to the product of GNP or GDP of the two countries (Y_i and Y_j) and inverse to distance between the two countries, D_{ij} Frankel (1997):

$$F_{ij} = \frac{Y_i Y_j}{D_{ij} X_{ij}} \quad (1)$$

To this multiplicative gravity equation we add product of per capita GNP, which takes into account the diverse stages of development of the two trading partners (Frankel 199 and 1997, Rauch 1999). The vector X_{ij} includes factors that assist or hinder trade through trading cost. In addition to the total income capturing the size of the economy and relative income accounting for the similarity between the U. S. and other countries, we include along the lines of Frankel, whether the U.S. and its trading partners are neighbors and whether both are English speaking countries. Trade flows between U. S. and its bordering countries, Canada and Mexico, is enhanced by a common border. The gravity model in (1) extends to

$$F_{USj} = (GNP_{US} GNP_j)^\alpha (PGNP_{US} PGNP_j)^\beta (Distance)_{USj}^{-\gamma} e^{-X_{USj}} \quad (2)$$

In equation (2), F_{USj} are U. S. exports to the immigrants' home country j in the export model and U. S. imports from the immigrants' home country j in the import model. $GNP_{US} GNP_j$ is the product of the U.S. and the home country nominal GNP; $PGNP_{US} PGNP_j$ is the product of the U.S. per capita GNP and the home country per capita GNP, $Distance_{USj}$ is the bilateral distance between the home country and the U.S. and

$X_{USj} = (Adjacency_{USj}, \ln(IMMSTOCK)_{USj})$. $Adjacency$ is a dummy variable which takes the value 1 if the U.S. and the home country are adjacent to each other (this captures the dummy for Canada and Mexico) and $\ln(IMMSTOCK)_{USj}$ is the immigrant stock in the U.S. and measures the size of the immigrant network from country j in the U.S. The econometric model after taking log on both sides of (2) and over time t is

$$\ln F_{USjt} = \rho + \alpha \ln(GNP_{US} GNP_j)_t + \beta \ln(PGNP_{US} PGNP_j)_t + \gamma \ln(Distance)_{USj} + \mu Adjacency_{USj} + \delta \ln(IMMSTOCK)_{USjt} + \varepsilon_{USjt} \quad (3)$$

where δ is the immigrant elasticity of trade and ε_{USj} is the usual *iid* error term. We include in the specification main trading agreement dummies such as EU and EFTA. Since we have data across trading partners we also include annual year dummy to control for year effect.⁷

⁷ In the literature both static and dynamic models have been used to examine the issue. For instance, Head and Reis (1998.) and Gould (.1994) have used the lag of the dependent variable in the gravity model to include a partial equilibrium specification, whereas Bandyopadhyay (2008) have used a static model.

As mentioned previously we categorize immigrant stock in the U.S. based on the immigrant occupations. Following 2000 Census data we categorize immigrants into the following four categories of occupation: management, professional and related occupation (Professional); service, sales and office administration (Services); construction, precision workers, laborers and farming (Laborers); No occupation (includes retired persons, students, and home-makers). Our second model extends the model in (3) to vary the immigrant elasticity with the share of the population in different occupation categories as follows:

$$\ln F_{USjt} = \rho + \alpha \ln(GNP_{US} GNP_j)_t + \beta \ln(PGNP_{US} PGNP_j)_t + \gamma \ln(Distance)_{USj} + \mu Adjacency_{USj} + \delta \ln(IMMSTOCK)_{USjt} + \sum_{k=1}^3 \delta_k \ln(IMMSTOCK)_{USjt} * S_{USjkt} + \varepsilon_{USjt} \quad (4)$$

Where S_{USjk} is the share of the immigrants from home country j in the k -th occupation where k goes from 1 to 3 and no occupation is the reference category. The immigrant elasticity in equation (4) varies with the share of the immigrant population in the professional, services and labor occupation. In equation (4) δ captures the immigrant elasticity of trade when the occupation effect of the immigrant stock is not taken account of (comparable to the earlier literature). introduced. The effect of the professional group of immigrants in equation 4 is given by $\delta + \delta_1$, and the effect of services group is $\delta + \delta_2$, and the effect of the laborer groups is given by $\delta + \delta_3$. Since the reference category in equation (3) is the no occupation group, their effect on trade is given by δ - the overall elasticity of trade for the immigrant stock without any occupation effect (this is the effect of the overall immigrant size when the effect of occupation is not considered).⁸

B. Data

Our sample consists of 63 countries over the time period 1991 – 2000.⁹ The U.S. export and import data is obtained from the extension of the World Trade Database of Statistics Canada, which is a part of the NBER World Trade Database by Feenstra et al. (2005). Nominal GNP and population are taken from the Penn World tables 6.1 (Heston et al. 2006).¹⁰ Annual data on immigrants across occupation is from the Immigration Statistical Yearbook

⁸ An alternative specification could be breaking the immigrant size into various occupation groups though with this model it will be difficult to estimate the overall elasticity of total immigrant networks captured in the existing literature. Moreover, this specification does not capture the relative effect of the various occupation groups.

⁹ For list of the countries included please see Table A3. We add El Salvador and Nicaragua (due to significant immigration from these two countries to the U.S.) and remove Yugoslavia (due to scanty data) from the sample of countries used in Frankel (1997).

¹⁰ The trade data is downloaded from the Center for International Data at the UC Davis (<http://cid.econ.ucdavis.edu>) and the website for the Penn World Tables is <http://pwt.econ.upenn.edu>

from the Department of the Homeland Security and the data on distance and English language is obtained from Frankel.¹¹ The sample summary statistics across countries are presented in the Appendix Table A4.

C. The Immigrant Network Variable: across Occupation

Immigrant network is better measured by both the current and past immigration into the country and hence immigrant stock gives a better proxy for the immigrants' network. For the U.S. the only immigrant stock data source is the census every ten years. In order to calculate the annual immigrant stock across different occupation from the 63 origin countries over 1991 – 2000, we begin with the 2000 Census stock of foreign born non-citizen across different occupation groups and then use the annual data on legal permanent residents from the Homeland Security for every year to calculate the annual stock of immigrants across different occupation groups as follows:

$$\text{Stock of } Imm_{jkt-1} = \text{Stock of } Imm_{jkt} - Imm_{jkt}$$

where *Stock of Imm* is the stock of immigrants from country *j* in occupation *k* in year *t* and *Imm* is the annual flow of immigrants from country *j* in occupation *k* in the year *t*. The annual flow of immigrants for different country across occupation is the annual data on legal permanent residents from different countries.¹² This estimate of the immigrant stock is not exact and there is a possibility that we might be overestimating or underestimating the stock of immigrants. Overestimation is possible because the Census 2000 data includes all foreign born non-citizens in the U.S. from a country *j* whereas the annual permanent immigration flow data includes everybody who became a legal permanent resident in that particular year. However, there is also a possibility of underestimation because some legal permanent residents from the early 1990s might already be citizen in the year 2000 and are not included in the 2000 Census stock of foreign non-citizen. Given the lack of data the above methodology and these particular data sources have been used to calculate the immigrant stock at the national level as well as the state level for the U.S. (Dunlevy 2004; Herander and Saavedra 2005). Head and Reis (1998) also uses this methodology to calculate the immigrant stock for Canada, though because of better data availability on immigrant stock they were able to improve the annual immigrant stock by adjusting for annual attrition rate¹³ Since we are measuring the stock

¹¹ Distance is in Kilometers and for El Salvador and Nicaragua has been updated from "Direct-Line Distances", International Edition, Gary L. Fitzpatrick and Marilyn J. Modlin, Scarecrow Press, Inc. Metuchen NJ and London 1986.

¹² The Homeland Security collects this data from the Green card application from the year the individual becomes a legal permanent resident, though they might be in the U. S. from many years or they might have arrived to the U. S. that year as a Legal Permanent Resident.

¹³ Head and Reis (1998.) had a sample from 1980 – 1992 and data on immigrant population for 1981, 1986, and 1990 enabling a better measure of immigrant attrition.

backward for our sample potentially our stock measure suffers less from the mortality and the emigration of the immigrants.

If immigrant occupation plays a role in the trading opportunities, one would expect that the higher the proportion of executive and professional immigrants from a country, the higher will be their immigrant network effect. We will expect that immigrants in the management and professional occupation will have the most significant effect on trade compared to any other group. It is worth mentioning that a priori immigrants in services and sales may also be promoting trade with their home country using their foreign market information and personal business contacts, more than the immigrants in the laborer occupation and in the no occupation categories.

For the top 28 U.S. trading partners Figure 1 show the average trends for the total trade flows, immigrant stock, and the average proportion of immigrants in the professional executive, and management profession for the the period 1991 – 2000. More than half of the countries have more than 25% of their immigrants in the Management and Professional occupation. The general hypothesis proposed in this paper is that professional and executive immigrants from a country will have the highest effect on the bilateral trade of the U. S. with that country. But, there are some interesting exceptions, such as Mexico and Nigeria. Mexico is a major trading partner with the U.S. and has the highest immigrant stock, but only 5% of the immigrant population from Mexico is in the professional occupation category. Clearly it is not the skilled immigrants that are significant factors behind the trade between Mexico and the U.S., but the history, geography and the trading blocs like NAFTA. Another interesting exception is Nigeria; 43% of the Nigerian immigrant stock of 90,790 consists of the professional and executive profession yet Nigeria is not in the top 28 trading partner (see Table A2 in the Appendix for detail breakdown of immigrant network across occupations for all the countries). The reason behind that may be the difference in the per capita income levels between Nigeria and the U.S., the geographical distance with the U.S. (see the country summary statistics Table A3 in the Appendix).

From Table A3 we see that the proportion of immigrants in the professional occupation for Taiwan is 43% whereas for Mexico it is only 5%. On the other hand the proportion of immigrants in construction, production, laborers and farming from Mexico is 31% whereas from Taiwan it is only 4%. From Table A3 we further see that for some countries the average professional and services share are close, such as for Germany, Hong Kong, South Korea whereas for Brazil 34% are in services and sales and only 17% are in the professional and executive class. For India, with the second largest immigrant network 28% are in the professional and executive management

profession whereas only 7% are in the laborer group, whereas for Mexico with the highest size of immigrant 31% are in the laborers, forestry and farming occupation and only 5% are in the professional, management, and executive profession.¹⁴ This shows that there is a wide difference of the major occupation groups across different countries and so will be the quality of the immigrant network.

D. Rauch's Reference Priced and Differentiated Commodities

To further examine the immigrant trade elasticity across occupation, we classify commodities at the SITC 4 level into Rauch's reference priced and differentiated goods using 4 digit SITC trade data. Internationally traded goods are classified as referenced price if their prices are quoted in trade bulletins and differentiated goods are not listed on any organized exchange or have a reference price printed in trade bulletins. Immigrants' networks will be most effective in trade creation through their home country information effect of matching buyers and sellers in differentiated goods. The networks can also play an important role in matching buyers and sellers in the reference priced group and possibly increase trade with their home country. The models given in (3) and (4) are estimated for both the aggregate U.S. exports and imports as well as across Rauch's reference priced, and differentiated goods.¹⁵

Our main thesis is that the immigrants in the professional and executive profession will have a significant trade creation effect compared to the no occupation group of immigrants and this effect will be particularly strong for the differentiated goods. Immigrants in services and sales, even if weaker than the management and CEO and the entrepreneur group, might also have an important effect on trade creation compared to the laborer group of immigrants. This effect might be stronger for the reference priced goods, where there is an arbitrage possibility between the U.S. and the home country products without the immigrants required to have entrepreneurial human capital. A priori all immigrants have a significant effect on imports and again stronger for the differentiated imports.

E. Endogeneity of the Immigrant Network: Instrumental Variable Estimation

¹⁴ Together with the immigrant stock, there is a possibility that the distribution of the immigrants across various occupation groups is endogenous. For instance, multinational corporations often responsible for increasing trade between the U.S. and the home country may send personnel to the U. S. from the home countries making the share of professionals endogenous to trade. Given the lack of data from various countries and the problem with weak instruments, which is particularly severe in the case of multiple endogenous variables, we tackle the endogeneity of the size of the immigrant stock in this paper (Bound et al. 1995; Stock et al. 2002). This problem might be less severe in my dataset because often these personnel are on a temporary visitor's visa or H1 (work visa) and are not included in the share of the legal permanent resident group data obtained from the Homeland Security.

¹⁵ We use Rauch's Liberal aggregation. For details on the commodity groups and the liberal and conservative aggregation please see Rauch (1999) and Rauch and Trindale (2002).

In equation (3) the immigrant stock may be endogenous due to the omitted factors such as cultural proximity, colonial history or common language that simultaneously affect the trade flows and the immigrant population size. In order to address the potential endogeneity of immigrant stock, we use instrumental variable methods in the estimation of equation (3) and equation (4) and use four instruments for the immigrant stock variable. The current immigrant stock will be strongly determined by the historic stock and so we use the 1980 census to calculate the historic immigrant size (*IMM 80*) and a dummy measuring whether the home country allows a dual citizenship (*Dual*) as our instrument for the immigrant stock.¹⁶ Our third and fourth instruments are the counts of affected and injured individuals in the migrant's country of origin following a national disaster (*i.e. affected, injured*).¹⁷ Our instruments are all chosen based on their high correlation with our endogenous variables and are the standard instruments for migration and immigration. In addition to being significantly correlated to immigrant size the proposed instruments need to be uncorrelated to the error term in the main regressions. Our identifying assumption is that our instruments do not affect bilateral trade flows between the U.S. and the home country other than the immigrant stock. Given that we have more than one instrument, we test for the exogeneity of our instruments from an econometric standpoint using standard over-identification test and confirm their suitability in that regard. The instruments have variation over time as well as across cross section.¹⁸ We test for heteroscedasticity and reject the null of "no heteroscedasticity" and therefore estimate equation (3) both by the OLS and by the instrumental variable GMM and correct the standard errors for heteroscedasticity.¹⁹ We also use an over-identification test that is robust in the presence of heteroscedasticity (Baum *et al.* 2003, 2007).

IV. Estimation Results

¹⁶ The data on dual citizenship is obtained from the U.S. Office of Personal Management Investigation Service (2001), "Citizenship Laws of the World".

¹⁷ These data come from EM-DAT, the OFDA/CRED International Disaster Database, Université Catholique de Louvain, Brussels (Belgium). EM-DAT is one of the core databases of CRED (Centre for Research on the Epidemiology of Disasters) and it provides standardized information and a basis for quantitative vulnerability assessments and rational decision-making in disaster situations. CRED collects standardized data for disasters' analysis. The data used in our empirical analysis have been downloaded from <http://www.emdat.be/database>. Disasters included in this database must fulfil the following characteristics: 10 or more people reported killed; 100 or more people reported affected; declaration of a state of emergency; and call for international assistance. Therefore, the definition considered by the EM-DAT includes situations or events overwhelming local capacity beyond a minimum threshold of damaged or affected people. The number of *affected* individuals corresponds to the count of people requiring immediate assistance during a period of emergency and it includes displaced or evacuated people. The number of *injured* individuals corresponds to the count of individuals suffering from physical injuries, trauma or an illness requiring medical treatment as a direct result of a disaster. The data are collected by country and by year and, as such, provide us with substantial variability.

¹⁸ The past immigrant stock has a correlation between 0.50 – 0.63 with the trade variables but the other three IVs have a low correlation ranging between 3-15 % and hence we think that the problem of weak instruments is not severe.

¹⁹ Often Tobit models are estimated for trade flows, but in our sample there is no zero value trade for any year.

The specification in equation (3) and (4) is estimated for the aggregate and Rauch's reference priced and differentiated products both using OLS and IV estimation methods. Before discussing our instrumental variable findings, we check that the instruments being used are significantly correlated to immigrant stock size and that they can be considered exogenous from an econometric standpoint. First-stage results for equation (4) are displayed in Table A2 in the appendix.²⁰ The two instruments we use in this specification are statistically significant at the 1 percent level and the over-identification test at the bottom of Tables A2 indicate that conditional on the other instrument being valid, our instruments can be considered exogenous.

The results from the estimation of model where immigrant elasticity of trade is not varying with occupation for the aggregate U.S. exports is given in Table 1 col(4) and for imports in col (9). We discuss the results from the IV models only. Similar to the previous literature we find that the size of the immigrant stock has a strong positive effect on both U.S. exports and imports.²¹ The export elasticity is around 0.2 and the import elasticity around 0.3. Col (5) and col (10) gives the results from equation (4) where we vary the immigrant trade elasticity with the different occupation groups. Since no occupation is the reference category the trade elasticity for this group is till 0.2 for aggregate exports and 0.3 for aggregate imports. The share of professionals relative to the no occupation group is the only occupation group which is significant at 5% in further increasing the trade elasticity. For U.S. exports the immigrant trade elasticity of U.S. with the home country j is approximately $0.2 + 0.002(\text{Share of professional immigrants from country } j)$ and for imports is $0.3 + 0.003(\text{Share of the professional from country } j)$.

The results for Rauch's reference priced goods are given in Table II. The estimation of equation (3) with only immigrant stock is given in cols (4) and (9) and we find that the overall immigrant elasticity without any occupation effect is still around 0.3 for exports but similar to previous findings is higher at 0.6 for imports and is significant at 1%. However, when we allow the immigrant trade elasticity to vary with the occupation it is around 0.22 for no occupation group for the exports and is 0.61 for imports. From col 4 we see that the share of professionals have a positive effect on exports and is significant at 5% but that is not the case for imports. For reference priced goods the professional immigrants promote trade of goods from the U.S. to their home countries by utilizing their home country information and knowledge of trading practices in their home country and the U.S. However, their home market information as well as their demand for the home goods is weaker for the import of the

²⁰ Detail first stage results for equation (3) holds and are available from the author upon request.

referenced priced goods. The service and laborer group of immigrants do not have any significant occupational impact on the trading of the referenced priced goods relative to the group with no occupation. Referenced priced goods are not highly differentiated with many different brands of the goods. Their prices are listed in the trade bulletins and there exists potentially specialized traders for these goods making the information effect of matching buyers and a seller is weak. The information effect of the professional immigrants is potentially better used in the exports of these goods to their home country than the import of the goods. The demand effect of the occupation of the immigrants for the referenced price goods is weak for all the immigrants and is not significant compared to the group with no occupation.

The results for Rauch's differentiated goods are given in Table III. The model with only trade elasticity of immigrant stock and no occupational effect is given in col (4) for exports and in col (9) for imports. We find that immigrant elasticity is still approximately 0.3 for exports but is higher at 0.8 for imports and both are significant at 1%. This is similar to previous findings in the literature (see Table). When we allow the immigrant trade elasticity to vary with the occupation, the immigrant trade elasticity for the no occupation reference group of immigrants is still 0.2 for exports and 0.8 for imports. Though, the overall effect of immigrant population on trade is now higher because the share of professionals have a strong pro trade effect on both exports and imports and is significant at 1%, see Table II (col 5) and col (10) respectively. For differentiated goods we also find a positive effect of the share of laborers relative to immigrants with no occupation on the imports and the effect is significant at 1%. The immigrant trade elasticity for exports if we only include the occupation groups that are significant in explaining is $0.254 + 0.002(\text{Share of professional from country } j)$ and for imports is $0.702 + 0.006(\text{Share of professional from country } j) + 0.004(\text{Share of laborers })$. This finding shows that the immigrant size and the share of the professional immigrants relative to the no occupation group are strongest for the differentiated goods. Unlike professional group of immigrants, our results across all types of goods show that immigrants in services do not have a significant trade creation relative to the immigrants with no occupation in the U.S.²²

In the IV model we find a significant positive effect of the share of laborers on the imports of the differentiated goods showing that the demand effect and the bias towards home goods are substantial among the

²² In this paper our focus is on the static model. For differentiated goods our results hold when we include one period lag of the dependent variable as an independent variable in the model. We thank an anonymous referee for this suggestion.

laborer immigrants in the U.S. However, we do not see this for the immigrant in the service occupation. Immigrants in services relative to the no occupation group do not show a significant positive effect on the differentiated exports as well as imports. This may possibly be due to the assimilation of the immigrants in the U.S. Immigrants in the service and sales are relatively more educated and in the higher earning group than the laborers and hence might have a positive income effect towards American made expensive substitutes of the home goods. For example with food consumption with higher income immigrants often moves away from their mostly ethnic cuisine to a more American cuisine.²³

Similar to previous findings in the literature, overall, we find that the immigrant trade elasticity is positive and significant for both exports and imports and is highest in magnitude for Rauch's differentiated imports. It is well known that the immigrant network effect and trade creation through various channels will be strongest for the differentiated goods. The contribution of this paper is that the immigrant trade elasticity significantly increases with the share of the professional immigrants for all types of goods for the U.S. (other than the imports for Rauch's reference priced imports) and is strongest for the Rauch's differentiated imports. In particular, the share of professional immigrants greatly increases the immigration trade elasticity for the U.S. across all types of goods relative to the group with no occupation. The immigrant trade elasticity for the no occupation group, which is the reference group when we allow the elasticity to vary with the occupation share, is equal to the immigrant stock elasticity when the occupation effect is not taken into account. Immigrants in services have no significant effect on trade compared to the no occupation group, whereas the share of laborers significantly increases imports of differentiated goods. These findings imply that by only taking into account the size of the immigrant network we are underestimating the effect of immigration on trade. The quality of immigrant network, here captured by immigrant's occupation, particularly the professional immigrants plays a significant role in trade creation.

In order to understand the magnitude of our findings we calculate the immigrant stock trade elasticity with the occupational share for Mexico and India – two countries with very different distribution share of immigrants across various occupation groups.. Mexico has 5% of its immigrants in the professional occupation and 31% are in the laborer group whereas 5% of the Indian immigrants are laborers and 28% are in the professional occupation. If there are no new additions to immigrant stock and all Mexican immigrants who are laborers become professionals

²³ A more detail analysis of this issue is a future research question.

the immigrant trade elasticity for aggregate exports at the mean will go up by 0.093 and for aggregate imports by 0.078. For the Rauch's differentiated commodity the change in the export elasticity is 0.07 and for import is 0.06. Since India already has a large share of immigrants in the professional occupation this exercise results in a lower increase in the trade elasticity. If 5% of the Indian share of laborers becomes professionals the aggregate export and import elasticity only goes up by 0.01, both for the aggregate and Rauch's differentiated commodity group.

The findings for the other gravity variables are as expected. We find that the product of the log of GNP and per capita GNP are highly significant and have the expected positive sign. Greater the geographical distance between the U.S. and the home country lower is the trade, though we find that the adjacent dummy for Canada and Mexico is significant for the aggregate and Rauch's differentiated goods. If we drop from our sample the two neighboring countries for the U.S., Mexico and Canada, who are large trading partners as well as large immigrant sending countries, our findings are still robust. When we vary immigrant trade elasticity with occupation, English dummy loses its significance in explaining aggregate bilateral trade flows for the U.S. Under OLS as well as IV estimation we find that the Adjacent dummy, capturing the two U.S. neighbors have a more significant effect on the U.S. exports than imports.

IV. Conclusions

This paper examines the role of the immigrant's occupation in generating trade with their home country via their co-ethnic immigrant network in the U.S. for the period 1991 – 2000. Following 2000 Census, immigrants are categorized into the following four categories of occupation professional, services, laborers, and no occupation. This paper finds that the effect of immigrant networks across various immigrant occupations has different effects on trade and it also varies with the type of goods and whether trade is an export or import.

An important finding of this paper is that the proportion of professional immigrants are the most successful in stimulating trade with their home country compared to the no occupation group via the *information effect* and through potential networking with other fellow immigrants and natives. The immigrant trade elasticity for the no occupation group, which is the reference group, ranges between 0.2 – 0.6 depending on the commodity and the trade type. This finding is similar to the earlier findings in the literature where the focus has mostly been on the size of the immigrant network. This paper finds that the professionals further increase this trade elasticity by (0.002 – 0.003) times the share of the professional immigrants from their home country for both exports and imports,

whereas, this effect is highest at 0.006 times the share of the professionals for Rauch's differentiated imports. By varying the immigrant trade elasticity across the occupation groups, we find that the professional immigrants significantly increase immigrant trade elasticity for both the U.S. exports and imports for Rauch's Referenced priced and differentiated commodity types. This is where one will see the most significant effect of immigrant network on trade creation. Clearly professional immigrants are in a better position to have a significantly stronger network effect and a greater effect on trade creation compared to the no occupation group and this effect is the strongest for the differentiated commodities.

As far as other occupation groups, we find that immigrants in services do not have any significant effect on trade creation compared to the immigrants with no occupation. However, the share of immigrants in the laborer occupation have a significant positive effect on the trade flows of the differentiated imports relative to the group with no occupation possibly through their demand for home country goods being the strongest among the immigrants in various occupation groups. This finding points towards an assimilation effect of immigrants in the U.S. Immigrants in services and professional occupations with rising income and higher rate of assimilation into the U.S. society might be demanding less of the cheaper home products compared to the laborer occupation groups.²⁴ Our results are robust across various products and models and even after taking into account the endogeneity of the immigrant network size.

The literature on the impact of immigrant networks on trade has identified a larger effect of immigration on imports than exports. This is because the home country information affects both exports and imports whereas the demand affects only the imports. We find that the effect immigrants is the strongest for the differentiated imports even when we vary the effect of the immigrant size across occupation points towards immigration having an adverse effect on the trade balance of the differentiated products. Increasing immigration flows in any country has a significant positive effect on the openness for the differentiated goods, though possibly creates an adverse effect on the trade balance with the home country given that the effect on imports is larger than exports (exports – imports). Adverse impact of immigration on the trade balance should not be considered a negative effect of immigration. Because of immigration, we are able to enjoy spices from India, authentic Chinese foods, different salsa from

²⁴ Though this calls for further future research into the issue of the effect of immigrant assimilation on the U.S. trade.

Mexico or caviar from Russia. There is benefit of variety in consumption not accounted for when we simply look at the trade balance.

The findings of this paper show that the occupation of the immigrants in their network effect is important in trade creation. If we only focus on the immigrant network size, we are underestimating the effect of immigration on trade. The pro trade effect of professional and high skilled immigrants also has important implications for mitigating the welfare loss of brain drain for their home country. The quality of immigrant network, here captured by immigrant's occupation, particularly the professional immigrants, play a significant role in trade creation and it is important to understand the full economic impact of immigration on the host and the home country of the immigrants. The results of the paper should not be interpreted as if we advocate that all immigrants allowed in a country have to be CEOs and entrepreneurs. There are tremendous and well established positive impacts on the growth of some sectors of the economy from unskilled immigration.

This paper not only makes an important contribution in understanding the role of immigrants' occupation in bilateral trade across different commodity groups while taking into account the endogeneity of the immigrant network size, but also highlights the positive impact of high-skilled emigration on the exports and potentially economic growth and development of the country of origin.

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Figure 1: Average Trade and Share of Professional Immigrants for 28 Largest U.S. Trading Partners over 1991 - 2000

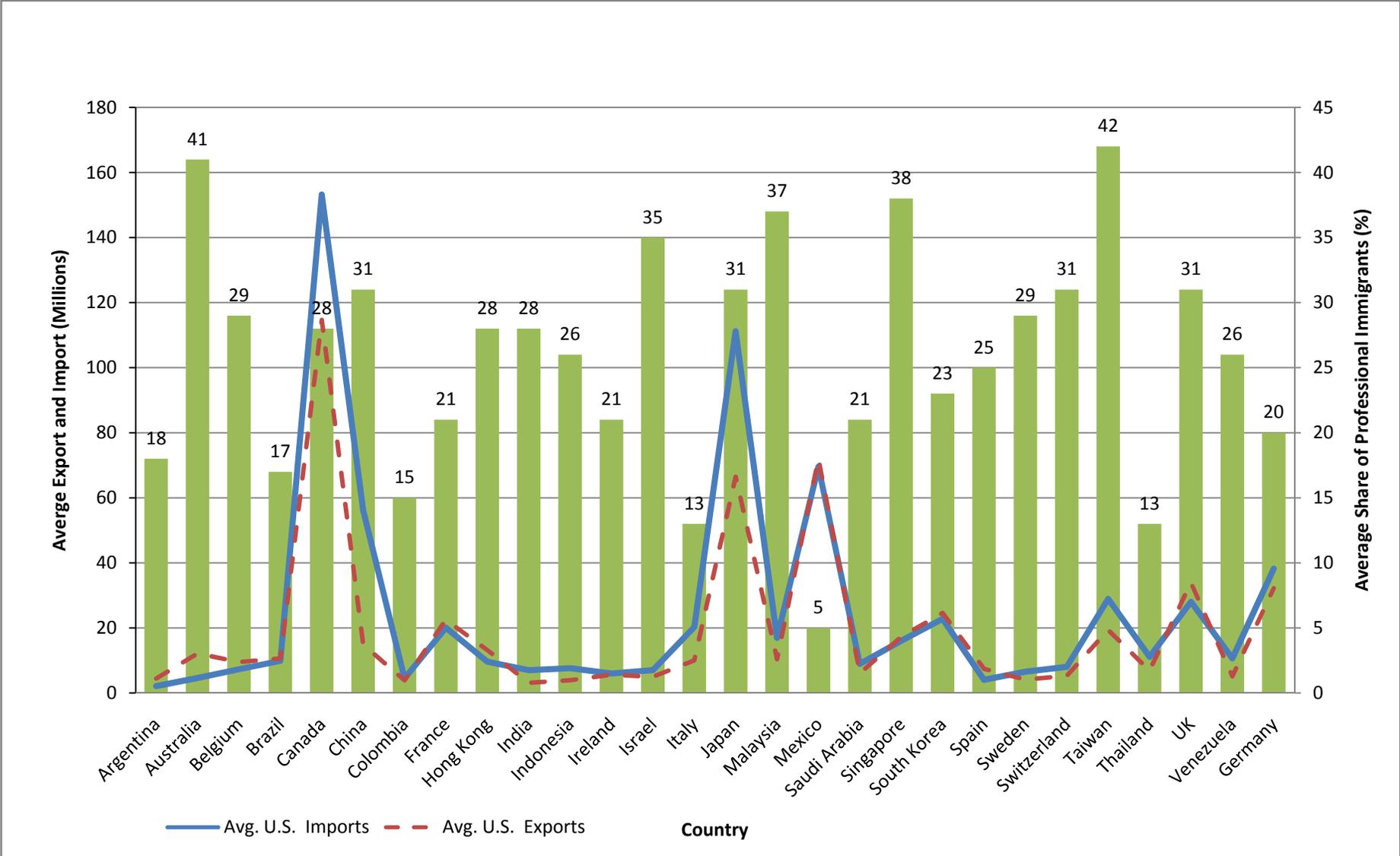


Table I: Effect of Immigrant Stock and Immigrant Occupation on Aggregate U.S. Trade

Variables	Log of Exports					Log of Imports				
	OLS			IV		OLS			IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\ln(GNP_{us}GNP_j)$	0.724*** (0.033)	0.521*** (0.043)	0.470*** (0.053)	0.562*** (0.056)	0.521*** (0.059)	0.809*** (0.051)	0.594*** (0.065)	0.545*** (0.079)	0.625*** (0.080)	0.559*** (0.097)
$\ln(PGNP_{us}PGNP_j)$	0.654*** (0.055)	0.761*** (0.054)	0.739*** (0.054)	0.768*** (0.061)	0.743*** (0.055)	0.686*** (0.078)	0.794*** (0.081)	0.767*** (0.079)	0.625*** (0.080)	0.600*** (0.095)
$\ln(DISTANCE)$	-0.604*** (0.183)	-0.062 (0.156)	-0.185 (0.137)	-0.348* (0.192)	-0.599*** (0.143)	-0.792*** (0.215)	-0.211 (0.240)	-0.298 (0.203)	-0.385 (0.309)	-0.634** (0.254)
ENGLISH	0.409*** (0.118)	0.302** (0.116)	0.101 (0.169)	0.286** (0.129)	0.133 (0.150)	0.660*** (0.185)	0.550*** (0.189)	0.295 (0.290)	0.432* (0.220)	0.129 (0.291)
ADJACENT	0.347 (0.463)	1.130*** (0.395)	0.897** (0.382)	0.636 (0.462)	0.157 (0.384)	0.043 (0.591)	0.895 (0.599)	0.832 (0.124)	0.848 (0.736)	0.446 (0.683)
$\ln IMM$		0.316*** (0.046)	0.320*** (0.054)	0.223*** (0.073)	0.203*** (0.063)		0.336*** (0.065)	0.301*** (0.077)	0.275*** (0.101)	0.266*** (0.1004)
$\ln IMM$ *Share Professional			0.002*** (0.008)		0.002** (0.001)			0.003** (0.001)		0.003** (0.001)
$\ln IMM$ *Share Services			-0.0003 (0.001)		0.008e-04 (0.001)			-0.0004 (0.001)		0.0001 (0.0009)
$\ln IMM$ *Share Laborers			0.001 (0.001)		-0.0001 (0.001)			0.002*** (0.001)		0.0005 (0.001)
Constant	-25.367*** (2.027)	-24.690*** (1.832)	-20.953*** (2.367)	-23.399*** (1.812)	-18.881 (2.468)	-29.250*** (2.877)	-28.493*** (2.748)	-22.310*** (3.634)	-23.310*** (2.656)	-19.185*** (3.922)
R ²	0.62	0.66		0.65	0.65	0.48	0.50		0.46	0.45
F-Statistic	326.15	378.29	407.99	294.74	658.73	152.64	153.25	891	101.22	560.46
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	595	592	592	478	478	606	592	592	487	487

All the models include a EU and EFTA dummy and annual year effect. Proportion of immigrants with *No Occupation* proportion is the reference category. Robust standard errors are reported in the parenthesis. *** Significant at 1%. ** Significant at 5%. *Significant at 10%

Table II: Effect of Immigrant Stock and Immigrant Occupation on the *Rauch's Reference Priced U.S. Trade*

Variables	Log of Exports					Log of Imports				
	OLS			IV		OLS			IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\ln(GNP_{us}GNP_j)$	0.809*** (0.036)	0.557*** (0.049)	0.512*** (0.059)	0.617*** (0.064)	0.597*** (0.070)	0.913*** (0.055)	0.485*** (0.068)	0.394*** (0.077)	0.483*** (0.095)	0.559*** (0.097)
$\ln(PGNP_{us}PGNP_j)$	0.678*** (0.061)	0.812*** (0.061)	0.783*** (0.061)	0.770*** (0.070)	0.742*** (0.066)	0.775*** (0.093)	1.011*** (0.098)	0.993*** (0.093)	0.993*** (0.086)	0.600*** (0.095)
$\ln(DISTANCE)$	-0.726*** (0.197)	-0.052 (0.174)	-0.129 (0.150)	-0.360* (0.214)	-0.506*** (0.165)	-0.786*** (0.236)	0.393 (0.242)	0.193 (0.236)	0.267 (0.222)	-0.634** (0.254)
ENGLISH	0.618*** (0.134)	0.480** (0.132)	0.224 (0.187)	0.423** (0.148)	0.193 (0.187)	0.683*** (0.188)	0.385* (0.178)	0.035 (0.215)	0.268 (0.165)	0.129 (0.291)
ADJACENT	-0.248 (0.512)	0.723* (0.437)	0.711* (0.409)	0.265 (0.512)	0.161 (0.435)	0.127 (0.636)	1.892*** (0.601)	1.454** (0.595)	1.857*** (0.515)	0.446 (0.683)
$\ln IMM$		0.392*** (0.052)	0.352*** (0.061)	0.283*** (0.084)	0.215*** (0.077)		0.672*** (0.071)	0.702*** (0.076)	0.576*** (0.095)	0.605*** (0.091)
$\ln IMM$ *Share Professional			0.003*** (0.001)		0.003** (0.001)			0.003** (0.001)		0.002 (0.001)
$\ln IMM$ *Share Services			0.0004 (0.001)		0.0004 (0.001)			-0.001 (0.001)		-0.0001 (0.001)
$\ln IMM$ *Share Laborers			0.002*** (0.001)		0.002 (0.001)			0.001 (0.001)		-0.002 (0.001)
Constant	--31.3*** (2.027)	--24.7*** (1.832)	--21.0*** (2.367)	--28.94*** (2.072)	--26.4 (2.911)	--38.7*** (3.168)	--37.8*** (2.791)	--37.8*** (3.448)	--23.3*** (2.656)	--28.7*** (3.841)
R ²	0.61	0.66	0.67	0.64	0.64	0.48	0.57	0.57	0.56	0.57
F-Statistic	293.82	334.36	407.99	249.93	485.32	107.98	125.93	125.12	116.65	280.27
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	594	591	591	477	477	585	582	582	472	472

All the models include a EU and EFTA dummy and annual year effect. Proportion of immigrants with *No Occupation* proportion is the reference category. Robust standard errors are reported in the parenthesis. *** Significant at 1%. ** Significant at 5%. *Significant at 10%

Table III: Effect of Immigrant Stock and Immigrant Occupation on the *Rauch's Differentiated U.S. Trade*

Variables	Log of Exports					Log of Imports				
	OLS			IV		OLS			IV	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\ln(GNP_{us}GNP_j)$	0.699*** (0.034)	0.476*** (0.045)	0.407*** (0.053)	0.509*** (0.056)	0.521*** (0.059)	1.045*** (0.055)	0.537*** (0.068)	0.429*** (0.071)	0.475*** (0.078)	0.559*** (0.097)
$\ln(PGNP_{us}PGNP_j)$	0.713*** (0.059)	0.830*** (0.061)	0.802*** (0.059)	0.843*** (0.066)	0.743*** (0.055)	0.610*** (0.089)	0.888*** (0.089)	0.822*** (0.094)	0.845*** (0.088)	0.600*** (0.095)
$\ln(DISTANCE)$	-0.551*** (0.188)	0.046 (0.153)	-0.127 (0.144)	-0.203* (0.182)	-0.599*** (0.143)	-0.490*** (0.279)	0.892*** (0.234)	0.725*** (0.201)	1.119*** (0.262)	-0.634** (0.254)
ENGLISH	0.318*** (0.122)	0.202* (0.121)	-0.057 (0.158)	0.190 (0.132)	0.133 (0.150)	0.480** (0.194)	0.159 (0.179)	-0.439** (0.216)	-0.194 (0.186)	0.129 (0.291)
ADJACENT	0.667 (0.486)	1.528*** (0.396)	1.176*** (0.402)	1.093** (0.447)	1.093** (0.447)	1.224* (0.733)	3.236*** (0.591)	3.206*** (0.539)	3.942 (0.623)	0.446 (0.683)
$\ln IMM$		0.347*** (0.048)	0.362*** (0.055)	0.270*** (0.073)	0.254*** (0.066)		0.347*** (0.048)	0.706*** (0.061)	0.818*** (0.097)	0.702*** (0.083)
$\ln IMM$ *Share Professional			0.003*** (0.001)		0.002** (0.001)			0.007** (0.001)		0.006*** (0.001)
$\ln IMM$ *Share Services			-0.0005 (0.001)		-0.0001 (0.001)			0.0002 (0.001)		0.0004 (0.001)
$\ln IMM$ *Share Laborers			0.001 (0.001)		-0.0002 (0.001)			0.005*** (0.001)		0.004*** (0.001)
Constant	-26.0*** (2.027)	-24.690*** (1.832)	-20.953*** (2.367)	-24.2*** (1.878)	-18.1*** (2.518)	-44.8*** (3.131)	-43.6*** (2.565)	-36.4*** (3.303)	-45.5*** (2.539)	-35.3*** (3.663)
R ²	0.63	0.68		0.65	0.68	0.56	0.68	0.72	0.68	0.70
F-Statistic	333.83	389.17	407.99	316.10	586.71	178.39	219.7	237.17	175.04	798.97
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	594	591	591	477	477	598	595	595	481	481

All the models include a EU and EFTA dummy and annual year effect. Proportion of immigrants with *No Occupation* proportion is the reference category. Robust standard errors are reported in the parenthesis. *** Significant at 1%. ** Significant at 5%. *Significant at 10%

Appendix

Table A1.- Main Findings on Average Immigrant Trade Elasticity (Network size) in the Literature for U.S. and Canada

Paper	Data	Exports	Imports
Gould (1994)	U.S. Aggregate Trade with 47 trading partners over 1970-86	0.02 ^a	0.01 ^a
Head and Ries (1998)	Canadian Aggregate Trade with 136 trading partners over 1980-92	0.13 ^b	0.39 ^b
Dunlevy and Hutchinson (1999)	U.S. Aggregate and Disaggregated Trade with 17 trading partners over 1870-1910	0.08	0.29
Wagner et al. (2002)	Canadian provinces over 1992-95	0.013	0.092
Herander and Saavedra (2005)	U.S. State Exports with 36 trading partners over 1993 - 1996	0.18	
Bandyopadhyay et al. (2008)	U.S. State Exports with 29 trading partners for the years 1990 and 2000	0.266 ^c	

^a Calculated for the year 1986.

^b With no immigrant heterogeneity.

^c When common network is assumed for all the trading partners.. When the ethnic network effect is varied across countries the elasticity is significant only for 5 trading partners and ranges between -0.581 to 1.090.

Some of the elasticity calculations are from Wagner et al. (2002)

Table A2: First Stage Results for the IV Estimation

	Instruments	Aggregate Exports	Aggregate Imports	Rauch's Reference Priced		Rauch's Differentiated	
				Exports	Imports	Exports	Imports
In <i>IMM</i>	In <i>IMM</i> 80	0.864***	0.862***	0.864***	0.840***	0.864***	0.7860***
	In <i>IMM</i> 80*Share Professional	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***	-0.004***
	In <i>IMM</i> 80*Share Services	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	In <i>IMM</i> 80*Share Laborers	-0.002	-0.002	-0.002***	-0.002***	-0.002***	-0.002***
	Dual	-0.225***	-0.233***	-0.225***	-0.235***	-0.225***	-0.229***
	Affected	2.85e-09***	3.21e-09***	2.87e-09***	3.31e-09***	2.87e-09***	3.28e-09***
	Injured	-1.53e-06**	-1.66e-06***	1.52e-06**	-1.61e-06***	-1.52e-06**	1.65e-06***
<i>Regression Fit Statistic: F-statistic (p-value)</i>							
		552(0.0000)	583(0.000)	552 (0.000)	558(0.000)	552(0.000)	583(0.000)
<i>Correlation of the Instruments with the Endogenous Variable</i>							
	F-Statistic (p-value)	209(0.000)	211 (0.000)	209(0.000)	202(0.000)	209(0.000)	210(0.000)
In <i>IMM</i> *Share Professional	In <i>IMM</i> 80	-4.304***	-4.397***	-4.305***	-5.022***	-4.305***	-4.386***
	In <i>IMM</i> 80*Share Professional	1.019***	1.021***	1.019***	1.018***	1.019***	1.021***
	In <i>IMM</i> 80*Share Services	0.026***	0.025***	0.026***	0.022**	0.026***	0.026***
	In <i>IMM</i> 80*Share Laborers	-0.011***	-0.009	-0.011**	0.004***	-0.011	-0.01***
	Dual	-4.901***	-5.271***	-4.899***	-5.638***	-4.899***	-5.281***
	Affected	4.79e-08**	5.87e-08**	4.79-08***	5.76e-08**	4.79e-08**	5.82e-08**
	Injured	-0.00005**	-0.00005***	-0.00005**	-0.0001***	-0.00005**	-0.0001***
<i>Regression Fit Statistic: F-statistic (p-value)</i>							
		5530(0.000)	5642(0.000)	5527(0.000)	5483(0.000)	5527(0.000)	5063(0.000)
<i>Correlation of the Instruments with the Endogenous Variable</i>							
	F-Statistic (p-value)	2898(0.000)	2816(0.000)	2877(0.000)	2470(0.000)	2877(0.000)	2681(0.000)
In <i>IMM</i> *Share Services	In <i>IMM</i> 80	-5.207***	-5.202***	-5.220***	-5.709***	-5.220***	-5.273***
	In <i>IMM</i> 80*Share Professional	-0.123***	-0.123***	-0.123***	-0.127***	-0.123***	-0.124***
	In <i>IMM</i> 80*Share Services	1.195***	1.195***	1.195***	1.193***	1.195***	1.195***
	In <i>IMM</i> 80*Share Laborers	-0.055**	-0.055***	-0.055**	-0.046*	-0.055**	-0.055***
	Dual	-5.028***	-5.146***	-5.006***	-5.190***	-5.006***	-5.051***
	Affected	7.46e-08***	8.42e-08***	7.50e-08***	8.65e-08***	7.50e-08***	8.62e-08***

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	Injured					
<i>Regression Fit Statistic</i> F-statistic (p-value)	-0.00004**	-0.00004**	-0.00004**	-0.00004**	-0.00004***	-0.00004**
	2054(0.000)	2077(0.000)	2194(0.000)	2005(0.000)	20510.000)	2045(0.000)
<i>Correlation of the Instruments with the Endogenous Variable</i>						
F-Statistic (p-value)	1517(0.000)	1529(0.000)	1517(0.000)	1452(0.000)	1517(0.000)	1513(0.000)
In <i>IMM</i> *Share Laborers						
In <i>IMM</i> 80	-2.948***	-2.920***	-2.957***	-2.796***	-2.958***	-2.986***
In <i>IMM</i> 80*Share Professional	-0.055***	-0.055***	-0.055***	-0.056***	-0.055***	-0.056***
In <i>IMM</i> 80*Share Services	0.057***	0.056***	0.057***	0.058***	0.0568***	0.057***
In <i>IMM</i> 80*Share Laborers	1.046***	1.046***	1.046***	1.043***	1.046***	1.046***
Dual	-2.137***	-2.067***	-2.120***	-1.844**	-2.120***	-1.992**
Affected	3.72e-08***	4.20e-08***	3.75e-08***	4.40e-08***	3.75e-08***	4.39e-08***
Injured	-3.86e-06	-5.61e-06	-3.73e-06	-4.47e-06	-3.73e-06	-5.40e-06
<i>Regression Fit Statistic</i> F-statistic (p-value)	3039(0.000)	3103(0.000)	3036(0.000)	2959(0.000)	3036(0.000)	3072(0.000)
<i>Correlation of the Instruments with the Endogenous Variable</i>						
F-Statistic (p-value)	2329(0.000)	2320(0.000)	2326(0.000)	2250(0.000)	2326(0.000)	2299(0.000)
<i>Overidentification Test</i>						
Hansen J statistic (p-value)	1.447(0.695)	5.605(0.133)	3.597(0.309)	9.024(0.029)	2.674(0.445)	3.798(0.284)
No. of Observations	478	487	477	472	477	481

In addition to the instruments all the independent variables in equation (3) are included in the first-stage. Detail results on the first stage including the standard errors can be obtained from the author.

*** Significant at 1%. ** Significant at 5%. *Significant at 10%

Table A3.- Average Immigrant Network Size and Distribution of Immigrant Network across Main Occupation Groups over the Period 1991 – 2000 by Country

Country	Management and Professional and Related Occupation (%)	Services, Sales and Office Occupation (%)	Construction, Production, Laborers, and Farming (%)	No Occupation (Homemaker, Students, Unemployed or Retired persons) ²⁵ (%)	Total Immigrant Stock	Country	Management and Professional and Related Occupation (%)	Services, Sales and Office Occupation (%)	Construction, Production, Laborers, and Farming (%)	No Occupation (Homemaker, Students, Unemployed or Retired persons) ²⁶ (%)	Total Immigrant Stock
Algeria	12	11	6	71	17316	Japan	31	25	6	38	244368
Argentina	18	15	8	59	173060	Malaysia	37	25	7	31	41003
Australia	41	21	7	32	47568	Mexico	5	22	31	43	7525353
Austria	21	16	6	58	60523	Morocco	28	38	12	22	22396
Belgium	29	18	6	46	29838	Netherlands	28	18	8	45	86539
Bolivia	19	32	17	32	4184	New Zealand	40	24	11	26	18224
Brazil	17	34	16	34	166742	Nicaragua	11	32	17	40	170062
Canada	28	19	8	45	706962	Nigeria	43	30	12	14	90790
Chile	5	41	18	36	489079	Norway	22	13	6	58	29627
China	31	23	10	37	940412	Pakistan	29	30	16	24	139464
Colombia	15	30	17	38	408677	Paraguay	21	35	17	27	6961
Denmark	26	19	7	48	28286	Peru	16	33	18	32	211877
Ecuador	10	27	24	40	249212	Philippines	26	32	12	31	1096818
Egypt	19	15	6	60	140903	Poland	14	22	21	43	377587
El Salvador	6	30	26	38	692755	Portugal	11	21	28	40	190983
Ethiopia	10	19	9	62	99580	Saudi Arabia	21	20	7	52	10516
Finland	20	12	5	63	28271	Singapore	38	19	4	39	16794
France	21	14	4	62	200486	South Africa	47	24	6	24	46387
Germany	20	21	9	50	651135	South Korea	23	28	10	40	708049
Ghana	15	22	8	55	81736	Spain	25	23	10	41	80228
Greece	13	14	8	64	235955	Sudan	15	31	28	26	10327
Hong Kong	28	29	7	35	178989	Sweden	29	19	6	45	42322
Hungary	19	15	10	55	85641	Switzerland	31	17	5	47	36415
Iceland	19	15	5	61	7476	Taiwan	42	19	4	35	274140
India	28	11	5	56	1355335	Thailand	13	22	38	26	170617
Indonesia	26	22	8	44	62601	Tunisia	27	21	10	42	5304
Iran	34	25	8	33	232667	Turkey	26	19	12	43	62609
Ireland	21	19	11	49	139186	UK	31	21	7	41	593700
Israel	35	25	8	32	88291	Uruguay	20	28	19	33	22377
Italy	13	17	12	57	458896	Venezuela	26	28	11	35	76292

²⁵ This category in the INS data includes children.

TABLE A4: Mean of the Variables Across Country over 1991 - 2000													
Country	Exports				Imports				GNP	Per capita	Distance	English	Adjacent
	Aggregate	Organized	Reference	Differentiated	Aggregate	Organized	Reference	Differentiated	Billions	GNP	km		
		Exchange	Priced			Exchange	Priced						
Algeria	1042735	387253.3	111066.9	506972.3	2061313	661914.8	1394783	4605.6	126	4456.15	7443.797	0	0
Argentina	4427402	74803.6	781106.6	3514115	2108456	852590.3	526859	725158.2	353	10028	9018.504	0	0
Australia	1.22E+07	128245.4	1387102	1.06E+07	4593533	1256338	1421770	1875373	395	21628.23	14891.26	1	0
Austria	2829651	54421.2	152696.3	2611484	2169431	35824.7	2354020	1823530	169	21034.42	7547.519	0	0
Belgium	9510636	421744.4	2453826	6411254	7284365	439183.1	428918.3	4081915	217	21365.03	6667.144	0	0
Bolivia	238827.7	23448.44	23665.11	190877.3	227601.3	95976.5	28452.8	114581.6	18.9	2493.814	6799.874	0	0
Brazil	1.06E+07	448754	2323245	7489538	9864688	1942658	1972378	5865660	1040	6468.468	8415.819	0	0
Canada	1.15E+08	2894157	1.54E+07	9.52E+07	1.53E+08	1.83E+07	3.07E+07	1.02E+08	660	22331.28	1037.087	1	1
Chile	3115578	120829.6	466147.6	2889788	2403534	633522.7	1322827	445603.1	117	8107.533	8562.195	0	0
China	1.49E+07	1493857	3972334	9274427	5.62E+07	615723.4	2039920	5.33E+07	3390	2788.806	11382.24	0	0
Colombia	3880005	383865.6	897435.5	2578218	4509604	2805581	235660.7	1233519	199	5078.742	4362.457	0	0
Denmark	1916673	91386.5	197908.9	1622657	2253212	143376	463348.6	1636186	122	23328.11	6847.418	0	0
Ecuador	1057357	111615.3	208465.6	731285.6	1954264	1127463	603465.1	186312.8	39	3367.956	4774.828	0	0
Egypt	3028857	876024.3	244186.6	1858290	630856.3	205072.3	44522.5	381244.3	219	3702.185	9870.113	0	0
El Salvador	1046331	160888.2	144341.1	735686.4	1030249	127249.5	53532.8	848762.2	23	3977.809	3127	0	0
Ethiopia	162260.6	44804.22	14881.33	102468.4	80478.5	23753.7	5121.714	7132.5	32.6	558.7572	12167.11	0	0
Finland	2022646	69340.55	234599.9	1686568	2692077	166916.8	908881.7	1189521	97.5	19055.72	7134.292	0	0
France	2.25E+07	497155.3	2333522	1.94E+07	2.00E+07	361074.3	3483638	1.62E+07	1210	20330.34	6654.992	0	0
Ghana	196018.4	37877	27902.89	127640.4	195934.8	53678.1	103803.4	23193.6	21.5	1233.522	9391.247	1	0
Greece	983151.8	92204.3	93632.1	789213.5	945502.2	118959.7	154133.6	220359.7	137	13122.82	8751.961	0	0
Hong Kong	1.32E+07	555505.9	2169241	7053908	9601936	16546.8	219491.1	1.02E+07	158	25109.39	12551.08	1	0
Hungary	655690.9	26225.3	52409.1	573563.1	1018158	25666.6	130277.7	876389.1	87.9	8621.923	7753.49	0	0
Iceland	174711.1	4023.333	18780.22	148288.3	349657.8	6679.3	210538	33950.9	5.77	21379.51	4756.557	0	0
India	3127919	289075.1	851851.8	1933952	6989396	417347	2282348	4008709	1920	2025.963	12035.81	1	0
Indonesia	3902186	542241.6	922552.2	2393323	7628441	1638912	1031149	5226757	667	3388.176	15810.23	0	0
Iran	269734.1	71227.71	31235.22	212810.2	65997.67	93400.67	2076	38049	314	5253.658	10448.95	0	0
Ireland	5609931	84009.2	697220.1	4772319	5980803	23565.5	2922901	3134409	61.3	16765.33	5896.468	1	0
Israel	4953501	357341.8	689236.7	3864846	7025089	40363.6	3120777	3717850	87.8	15512.31	9966.193	0	0
Italy	1.00E+07	712498.9	1583869	7306394	2.03E+07	619780.3	1974026	1.56E+07	1140	19955.51	7746.845	0	0

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Japan	6.65E+07	8947565	1.36E+07	4.32E+07	1.11E+08	198898.5	5680585	1.15E+08	2970	23616.72	10142.37	0	0
Kenya	141550.8	27026.33	22183	92078.56	144088.1	29743.7	3919.556	66229	32.5	1182.772	12894.02		0
Kuwait	1115471	23381.4	105089.3	982587.6	2240875	1433254	14208	58091	41.4	25321.26	10886.55	0	0
Libya	47242		2002	68699.5	2659747				30.9	6138.36	8436.447	0	0
Malaysia	1.04E+07	284599.8	855983.2	9235081	1.69E+07	490036.8	423193	1.54E+07	252	7769.425	14931.87	0	0
Mexico	7.20E+07	4700349	1.01E+07	5.66E+07	6.96E+07	8467095	5308830	5.87E+07	524	6028.844	2728.521	0	1
Morocco	574320.6	206710.1	78351.9	259911.2	471174.4	16649.2	36443.4	193548.4	125	6290.162	6847.966	0	0
Netherlands	1.37E+07	987193.6	2293261	1.01E+07	6685138	321098.3	1992744	4713516	260	19091.65	6616.295	0	0
New Zealand	2187008	34435.2	306361.4	1826774	2639532	499589.1	654619.2	475802.9	46.1	12396.02	13462.87	1	0
Nicaragua	225136	45587	26328.44	150720.4	311861	83913.9	70509.6	150644.6	24.5	1269.459	3298	0	0
Nigeria	797511.6	200559.2	79212.44	514945.8	5629717	5705516	178097	19712.2	80.7	4897.6	9622.191	1	0
Norway	2339818	75243.9	143083.3	2096608	3110650	1935073	698475.1	629077.1	108	18333.78	6505.226	0	0
Pakistan	963687.9	356732.2	244212.5	390320	1319359	39240	142523.4	1199198	176	2191.239	12160.72	1	0
Paraguay	631073.6	980	64946.11	564566.1	185023.4	7804.1	16106.7	26066.6	35.2	4431.892	8085.237	0	0
Peru	1676382	247758.2	254182.1	1161685	1482301	732675.4	234087.8	408085.6	107	3679.941	6099.956	0	0
Philippines	5237960	572103.3	510333.9	4129877	8248199	415529.9	193964.9	7950577	254	3506.498	13096.15	0	0
Poland	1292571	86960.4	145319	1056182	675749.3	29741.4	167724.7	486345.1	237	7400.656	7515.786	0	0
Portugal	1011025	156875.8	173269.3	613404.3	2348108	106949.6	106344.5	879893.2	156	15588.17	6429.297	0	0
Saudi Arabia	6014930	360249.9	552508.6	5065789	8940435	9300673	504277	141244.2	266	14008.46	11267.29	0	0
Singapore	1.73E+07	351874.8	1517146	1.54E+07	1.60E+07	203320	655415.4	1.58E+07	121	20366.68	15092.24	1	0
South Africa	3047713	177417.9	435827.5	2391042	3002483	936633.4	1047890	662258.3	262	6449.91	13977.51	1	0
South Korea	2.46E+07	2970837	4178830	1.71E+07	2.28E+07	240905.1	1496043	2.25E+07	541	12159.27	10518.28	0	0
Spain	7413176	975092.8	1015369	5211986	4046428	387809.5	750347.7	3132861	670	16853.81	6733.445	0	0
Sudan	42277.78	11553.33	7488.667	23072	201935.7	3166	2533.667	15535.38	28	893.8417	11176.4	1	0
Sweden	4104163	85681.2	360164.8	3599795	6524063	174486.6	797166.1	5718027	164	19819.49	6885.214	0	0
Switzerland	5251588	251523.7	815702.5	4105024	8028079	202557.3	1386473	6209942	191	26963.31	7056.792	0	0
Taiwan	1.94E+07	2210040	3645890	1.33E+07	2.89E+07	31348.1	820400.6	3.03E+07	115	2285.667	12003.36	0	0
Thailand	6891729	458909	914401	5447890	1.11E+07	519040.3	1640257	9422570	278	5554.765	13785.76	0	0
Tunisia	340070.8	109044.1	34672.5	195928.6	81265.9	21025.4	10151.1	32111.4	88.7	5110.096	7947.622	0	0
Turkey	3293275	715692.3	532642.2	1951411	2897276	321486	323086.5	1343006	489	8039.569	9129.032	0	0
UK	3.39E+07	799002.8	3477976	2.93E+07	2.80E+07	3009855	4073820	2.27E+07	2040	19870.92	6359.868	1	0
Uruguay	355778.3	8652.444	55726.44	290496.1	775898.8	66748.6	34820.9	144727.5	47.7	8211.478	9126.43	0	0
Venezuela	5108059	402891.8	811297.5	3855786	1.07E+07	9989681	792669.6	625415	378	8077.747	4035.429	0	0
Germany	3.22E+07	1239622	3294537	2.75E+07	3.82E+07	55080.5	5036970	3.51E+07	1470	18098.03	6838.921	0	0