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Social Interactions of Migrants and Trade Outcomes

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Abstract

This paper investigates the social interactions performed by immigrants in France. A framework for immigrant's choice of location is based on recent studies on non-market interactions which explains how migrants concentrate. Applying data on the distribution of immigrants in 95 French provinces, the social interactions are subsequently estimated. This "social component" of migration is then tested on international trade, providing a direct measure of the impact of social networks on the economy.

JEL classification: F10, F22.

Keywords: Social Interaction, Non-market interaction, International Trade, Migration

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1. Introduction

An anecdotic fact can illustrate the role of immigrant networks in their location and economic activities. I describe a family in Brazil that has been immigrating from China for four generations. People of each generation were born in China and moved to Brazil. The first generation immigrated to the city of Vitória in the Southeast Brazil. The second generation has chosen the economically booming city of São Paulo also in the Southeast Brazil. The network structure established from the first generation in Vitória facilitated the settlement in São Paulo, 882 km [1] from Vitória. The third generation divided between São Paulo and Curitiba due to São Paulo becoming saturated and business opportunities being sparse. In contrast, Curitiba had become a rapidly developing city in Brazil. Some 3230 km separate São Paulo from Curitiba, but the social interactions meant that this location choice was apt. The fourth generation immigrated at a very young age joining their parents in São Paulo.

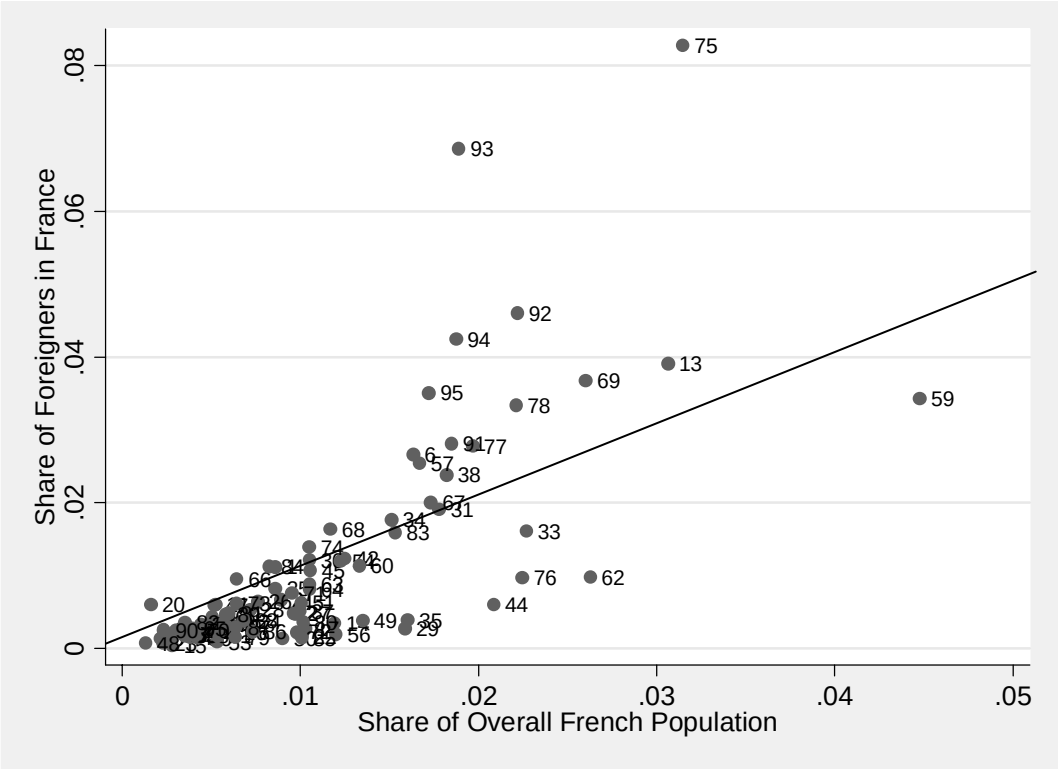
Some stylized facts can be drawn from this episode. Firstly, new immigrants depend on the compatriot's community, since they face barriers of language, habits and culture. Job, loans, associates and relationships are found in this specific community. Secondly and conversely, as time passes, and immigrants are more integrated into Brazilian culture, they become less dependent to a specific community. Generations born in Brazil become further disconnected to the Chinese community as can be seen in their choice of more diversified professions and lifestyle. Thirdly, the network effect determining location choice is robust with different economical contexts. Since the first migration in the beginning of the XXth century, Brazil has been experiencing increasingly diverse situations and has responded to particular economic, social and political shocks. Nevertheless, migration movements have remained constant due to an ever existing network of ties, bonds and connections.

These interdependences are reflected in the distribution of people. Immigrants have a tendency to cluster at higher densities relative to local population. Figure 1 shows the over-concentration of immigrants in France, in comparison to the French population as a whole: 70% of the foreigner population is more concentrated than the French population[2]. While there could be specific reasons within a region, this cannot provide a complete explanation for this over-concentration of immigrants.

[1] Source: Brazilian National Department of Transport Infra-Structure
http://www1.dnit.gov.br/rodovias/distancias/distancias.asp

[2] The foreigner population in France have a coefficient of geographical concentration G=0.24. This positive concentration coefficient equals 0 if foreigners are distributed exactly the same as the total population.
Chiswick, Lee and Miller (2002): *"Where the overseas born group has a distribution across regions the same as the total population, G equal to 0. Where the overseas born group is completely segregated, the upper bound of G will equal (100-GS), where GS is the percent of the total population accounted for by the specific birthplace group."*

Figure 1 – Foreigners share versus French share, by French "département"



This graph compares the total population of foreigners in France to the total French population. The data is from 1999 census. Eg: 8% of all the foreigners living in France resided in Paris whilst only 3% of French population as a whole did so in this year.

This paper attempts to formalize these kinds of social interactions within a community. Particularly, this study addresses the question of how social interactions can impact where immigrants choose to locate, and how these interactions can develop trade networks

Social networks provide a major explanation for the impact of immigrants on international trade. James Rauch and co-authors (1998, 1999, 2001, 2002, and 2004) have contributed much to this area of the literature demonstrating theoretical reasons and empirical evidence for this. However, the conception of social interaction itself is not based on a formal framework, and a direct measure of these networks is not provided. This study follows and extends the paper of Herander and Saavedra (2005) which outlines a conception of this immigration network based on states that share a common boundary.

Further studies have recently updated the literature on social interactions. Although not treating these interactions as determinant of an economical effect, Brock and Durlauf (2001, 2002) succeed in developing a theoretical model that integrates social relations. Head and Mayer (2008) have extended this work and have also provided empirical evidence which has confirmed that the choices that parents make in naming their offspring is influenced by the environment in which they are embedded.

The contribution of this paper to the literature is threefold. Firstly, by building on existing literature, it develops a framework for immigrants' social interactions which is then used on data on the

distribution of immigrants in France. Secondly, it proposes a functional form to the impact of distance on social interactions. Thirdly, the aforementioned analyses are applied to international trade and the economic impacts of social interactions are evaluated.

This paper is structured as follows. Section 2 analyses the relevant literature on social interactions as well as the nexus between migration and trade. Section 3 presents the theoretical framework while Section 4 describes the dataset and the variables used. Section 5 reports on the findings before some tentative conclusions are made in section 6.

2. Relevant Literature

2.1 Previous Literature on Social Interactions

Gary S. Becker has contributed vastly to the literature[3] on social interactions. The Nobel Prize winner of 1992 was awarded to him *"for having extended the domain of microeconomic analysis to a wide range of human behaviour and interaction, including non-market behaviour"*.[4] The book jointly written with Kevin M. Murphy (Becker and Murphy, 2000) provides a synthesis of existing academic thought in this field and the link between the social and economic realms is explored further. It acknowledges that the consumption of common goods can be influenced by a social dimension.

More recently, Brock and Durlauf (2001) have developed theoretical models for studying individual decisions, including social interaction effects, into the private utility. They model how the dynamics of a group can influence the decisions and actions of an individual. Building on the literature on discrete choice, Brock and Durlauf investigate for self-consistent equilibriums which presents a hyperbolic tangent shape such as found in some specific models in physics such as the Curie-Weiss model of magnetism.

Manski (1993) relates social interaction to the reflection phenomenon. He develops numerous models which take three main hypotheses: *"(a) endogenous effects, wherein the propensity of an individual to behave in some way varies with the behavior of the group; (b) exogenous (contextual) effects, wherein the propensity of an individual to behave as in some way varies with the exogenous characteristics of the group, and (c) correlated effects, wherein individuals in the same group tend to behave similarly because they have similar individual characteristics or face similar institutional environments."* The first hypothesis generates a social multiplier effect creating mimetic behavior in a group. The second

[3] Scheinkman (forthcoming) , Manski (2000) and Glaeser and Scheinkman (2003) provide surveys of the literature and discuss different approaches to define and model social interactions

hypothesis distinguishes exogenous and independent determinants of behavior whilst the third relates to correlated determinants of behavior.

Head and Mayer (2008) analyze the extent of non-market interactions and investigate the social transmission of parental preferences regarding the naming of their children. They argue that the frequency of existing child names in the neighborhood can influence parent's choice of what to name their son or daughter. Head and Mayer use data on the geographic distribution of names in France to explain the popularity of three types of names: Saints names, Arabic names and American names. They find that the importance of geographic distance declines over time while differences in class and national origins have increasing explanatory power.

Glaeser et al. (1996) present a model where, after controlling for economical and social conditions, social interactions explain the high variance of crime rates across cities. An index of social interactions is constructed using data from the FBI and the New York City Police Department. Where the crime is more serious such as in murder, social interactions are less likely to have played a major role in provoking a criminal act.

Furthermore, several empirical studies point out to the phenomenon of immigrant's concentration. Bartel (1989) finds that U.S. immigrants are geographically concentrated at higher densities compared to the American population as a whole. Bartel found that education was significant in explaining the distribution these immigrants, with increased dispersion being associated with higher levels of education. Moreover, immigrants were found to internally migrate more frequently relative to the native population. This finding is confirmed by other studies as Chiswick and Miller (2004), Chiswick, Lee and Miller (2002), Funkhouser (2000) and Gonzalez (1998). These authors find numerous determinants that explain the reasons for the existence of ethnic enclaves. Furthermore, these studies show that the inter-generational transmission of culture and lifestyles choices is strengthened when there are higher densities of immigrant populations. Quoting Funkhouser (2000, page 489): *"The geographic concentration of immigrants is an important part of the assimilation process, allowing immigrants to maintain some cultural ties to their country of origin"*. This network externality causes migrants to follow the culture and habits of their home country rather than the country in which they presently live.

Theoretical work from the field of New Economic Geography has provided certain explanations for the concentration of immigrants. The theoretical Core-Periphery model (Fujita et al. 2000 and Baldwin et al. 2005) describes a self-reinforcing mechanism of agglomeration. On the one hand, firms in the presence of transport costs and economies of scale, choose regions where the demand for

[4] Definition from the Nobel Prize Foundation

consumer goods is higher. On the other hand, individuals look for a wide range of commodities and a low cost of living due to lower transport costs. Furthermore, the market crowding effect considers a dispersion mechanism which reflects the fact that imperfectly competitive firms have a tendency to locate in regions with relatively few competitors. Crozet (2004) and Poncet (2006) apply models from New Economic Geography models to empirically discover that market access is significant in explaining the degree of regional immigration. This approach explains the agglomeration by pure economical reasons for an entire population, but it overlooks the fact that a concentration of immigrants is related to non-market reasons as well.

2.2 The Impact of Migration on Trade

The impact of migration on trade has been attested by many studies in the literature[5]. Several mechanisms have been presented to justify this association, such as preference and network effects.

Most of the literature treats the preference effect as immigrants' consumption of home-country products. Nonetheless, Bowles (1998) considers migration as a way to transmit preferences through the exposure to different cultures. Tai (forthcoming) also endorses the idea of a cultural transmission effect through migration, and argues that the personal consumption of immigrants does not fully explain the implied amounts of trade. The relative impact of preferences and networks on trade has been covered elsewhere (Tai, forthcoming) and is outside the scope of this paper, which instead will focus on the network effect.

Another major mechanism underpinning the impact of migration on trade is the network effect. It relies on two fundamental concepts. Firstly, immigrant communities have the potential to deter violations of informal contracts. Secondly, immigrants benefit from privileged information on the home-country and host-country markets.

Existing literature commonly uses the quantity of migrants to ascertain the impact of this network. Rauch (2002) innovatively used the probability that in any two given countries, both individuals will be Chinese in origin.

This immigrant's network can be an analysis of the interaction of immigrants amongst themselves in the host-country as well as acquaintances in the home-country, as Rauch (2002) tests. However, what is neglected in this paper is an appreciation that networks can also operate within the host-country. Immigrants living in a certain province have the ability to interact with compatriots living in other provinces located in the same country. Herander and Saavedra (2005) analyze the impact of immigrant networks on trade within each state of United States of America. For example, for

Colorado, the authors have estimated how the compatriots residing in the neighboring states of Wyoming, Nebraska, Kansas, Oklahoma, New Mexico and Utah have an influence on the trade of Colorado. Yet noteworthy is that this impact is not as great as the effect induced by within-state immigrants and confirms that intra-national networks do have a significant effect. This effect is reduced by distance, since immigrants who are located further away from each other have a lower effect on trade. Nonetheless Herander and Saavedra do not consider a framework or any empirical support for explaining these networks. Moreover, their concept of a network is limited in that it only accounts for immigrants residing in neighboring states. Using a specific framework and empirical evidence, this paper attempts to underpin the eminence of immigrants' networks thereby extending the overly simplistic concept of a network that only exists between states that share a common border.

3. Social Interaction Framework

For the sake of clarity time subscripts are omitted. In this theoretical section geographic location is referred to by the word "region", responding to either a French *"département"* or region[6].

3.1 Social Interactions Term

The potential social interaction of an individual *k* can be defined by:

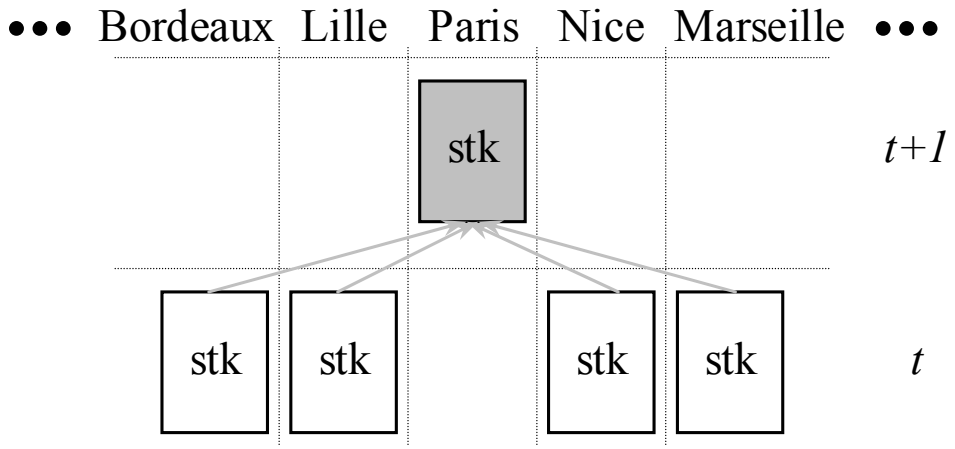
$$S_{ij}^{k} = \ln\left(\sum_{r\neq j}^{J} v_{jr} s_{ir}\right) \tag{1}$$

This social component is based on the actual number of resident compatriots at a particular point in time. Assuming the inverse relationship between distance and social interaction, the framework used in this paper takes the function *v* for calculating the extent of the network. Figure 2 illustrates the interactions within a network of foreigner for the periods t and $t+1$. In this example the stock of immigrants living in Paris at the period $t+1$ is determined by a pre-existent network of immigrants residing in other French *"départements"* at the period t.

[5] See Rauch (2001) and Wagner (2002) for a synthesis of literature in this area.

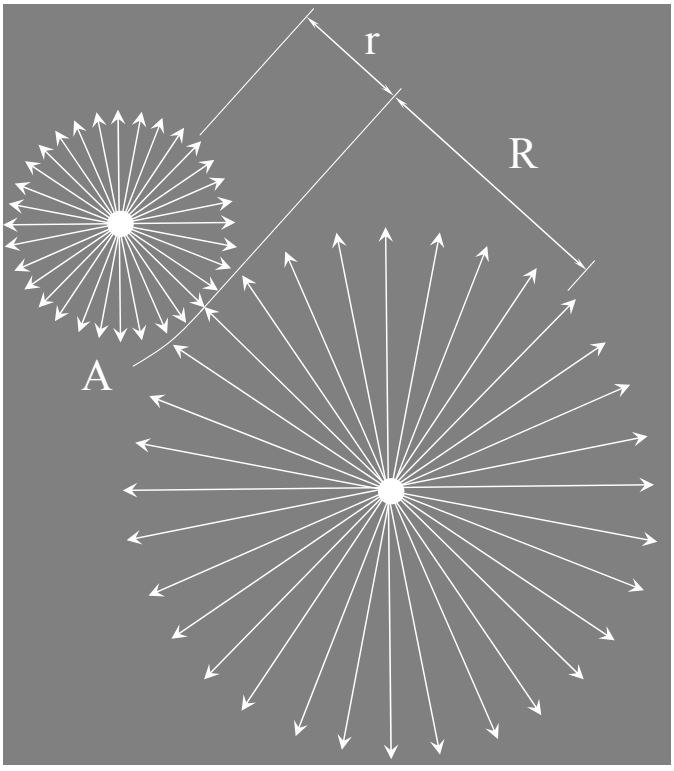
[6] This is necessary because while migration data is available at *"département"* level, trade is only available at a regional level.

Figure 2 – Spatial-Time Interactions of Immigrants



The social component of utility is obtained by summing together the weight *v* of each immigrant. The choice to use the inverted distance follows the same functional form of many applications in economics, such as the market potential. Taking this into account, it can be considered that each immigrant has the potential to interact with his or her immediate surroundings normalized to 1. The potential level of interaction is spread along a line that measures 2π times the distance from an immigrant. Figure 3 shows a point (point A) between two immigrants where $1/2\pi r + 1/2\pi R$ is the total sum of possible interactions that can occur at this locality.

Figure 3 – Spatial Interactions of Migrants



3.2 Migration Function

Adapting Docquier's model[7], a framework for migration can be conceived by considering self selection based on utility differences perceived in both home and host countries.

The costs of migration for an individual *k* migrating from country of origin *i* to region *j* is a function of moving costs (d_{ij}), the possibility of social interactions (S_{ij}) and characteristics of the home-country (z_i). The idea is that a new immigrant could lower his or her costs of installation through the help of a installed social network, such as support offered for housing, language and bureaucracy. I assume C^k_{ij} homogeneous of degree 1 on S_{ij}.

$$C^k_{ij} = c(d_{ij}, S_{ij}, z_i) \tag{2}$$

where $c'_d < 0$ and $c'_S < 0$

The average probability this individual, *k*, having an income in the host country is a function of the possibility of social interactions (S_{ij}) and the characteristics of the destination region (z_j). Resident compatriots offer a wider variety and more extensive opportunities for job and business development than the national population. I assume Π^k_{ij} homogeneous of degree 1 on S_{ij}.

$$\prod^k_{ij} = \pi(S_{ij}, z_j) \tag{3}$$

where $\pi'_S > 0$

Social impacts have a positive impact:

$$\frac{\partial \ln \Delta s_{ij}}{\partial S_{ij}} = \pi'_s - c'_s > 0 \tag{4}$$

The utility of an individual *k* of nationality *i* living in region *j* is:

$$U^k_{ij} = \prod^k_{ij} w_j - C^k_{ij} + \varepsilon^k_{ij} \tag{5}$$

[7] This model was presented by Frédéric Docquier at the "Seventh Summer School in International and Development Economics" of the Marie Curie Research Training Network on "Transnationality of Migrants" (TOM). The original version also accounts for skill differentiation.

Adopting the appropriated distribution of errors, the share of new immigrants choosing a region j is expressed by a multinomial logit function:

$$\Delta s_{ij} = P(U_{ij}^k = \max_l U_{il}^k) = \frac{e^{\pi_{ij}^k w_j - C_{ij}^k}}{\sum_l e^{\pi_{il}^k w_l - C_{il}^k}} \tag{6}$$

While multinomial logit functions are a conventional way to estimate location choices, I follow Guimarães et al. (2003) with the application of a Poisson estimator. This procedure provides a more tractable model, avoiding the problem of non-linearity.

Then, considering the quantity of immigrants from country i to region j:

$$q_{ij} = P_{ij} \times q_j = \frac{e^{\pi_{ij}^k w_j - C_{ij}^k}}{\sum_l e^{\pi_{il}^k w_l - C_{il}^k}} \times FE_i \tag{7}$$

with $q_j = \sum_j^J q_{ij}$

The idea is to estimate these quantities using a Poisson model:

$$E(q_{ij}) = e^{\pi_{ij} w_j - C_{ij} + \alpha D_i} \tag{8}$$

The Poisson model's likelihood is expressed as:

$$L_p = \sum_{i=1}^{I} \sum_{j=1}^{J} \left[-\exp(\pi_{ij} w_j - C_{ij} + \alpha D_i) + q_{ij}(\pi_{ij} w_j - C_{ij} + \alpha D_i) - \log n_{ij}! \right] \tag{9}$$

Considering the first order conditions with respect to α_g:

$$\frac{\partial L_p}{\partial \alpha_g} = \sum_{j=1}^{J} \left(q_{ij} - e^{\alpha_g + \pi_{ij} w_j - C_{ij}} \right) = 0 \quad \Rightarrow \quad \alpha_g = \log \left(\frac{q_j}{\sum_{j=1}^{J} e^{\pi_{ij} w_j - C_{ij}^k}} \right) \tag{10}$$

Linking equation (10) to equation (9), the Poisson likelihood becomes:

$$L_p = \sum_{i=1}^{I}\sum_{j=1}^{J} q_{ij} \log\left(\frac{e^{\pi_{ij}^k w_j - C_{ij}^k}}{\sum_l e^{\pi_{il}^k w_l - C_{il}^k}}\right) - N + \sum_{g=1}^{G} q_j \log q_j - \sum_{i=1}^{I}\sum_{j=1}^{J} \log n_{ij}! \qquad (11)$$

The last two terms of equation (11) are constants. The first term is the log-likelihood of the conditional logit. Estimated coefficients are the same in both models. Estimated regressions are proceeded to be done using the Poisson model with quantities as the dependent variable. Independent variables are taken in logarithmic format to provide elasticities.

However substituting the social term S_{ij} into the migration equation leads to a complex function. Nonetheless, some algebraic manipulation can simplify this expression in order to obtain an estimable equation. Social terms can be separated from all other terms because of the homogeneity assumption.

Then the estimate equation becomes:

$$q_{ij}^t = \exp\left[\beta_1 \sum_{j\neq r}^{J} \ln\left(v_{jr} * q_{ir}^{t-1}\right) + \beta_2 \ln(distance_{ij}) + \Omega_{jt} + \Omega_{it} + Mills + cte\right] \qquad (12)$$

Where Ω_{jt} and Ω_{it} are fixed effects for region-time and country-time.

While country of origin *i* may be any country in the world, destination regions *j* are all restricted to one country, in this case France. This implies a selection bias since each immigrant who had chosen region *j* had previously chosen France as a destination country. This bias is corrected by a probit estimator. The variable *Mills* is the inverse of the Mills ratio which has been estimated from the first stage probit[8] estimator, following the Heckman (1976) method.

The compatriot's network is hypothesized to capture the structure that resident immigrants can offer to a new one, such as assistance with bureaucracy, language, housing, employment and business opportunities, access to home produce and leisure. This phenomenon can operate at a distance from one region to another, assuming that the new location is either deemed to be more attractive or less saturated.

[8] The selection variable is the distance between the countries of origin and France. Other independent variables of the first step probit are: the log of origin GDP, the log of origin population, dummies for common border, common language and colonial links and fixed effects for "*départements*" and time.

4. Data and Variables Conception

4.1 Data

The migration data used in this paper comes from the French census of 1968, 1975, 1982, 1990 and 1999. These provide information on the stock of immigrants living in each French region[9] in that particular year. The total French populations are obtained from Insee (*Institut National de la Statistique et des Etudes Economiques*)[10].

Using this data, a "Jacobin" model of migration integration can be used to understand how foreigners interact within a country. The French model of integration particularly reinforces the need that new immigrants should incorporate French moral values. This is seen to be more important than any consideration into the demographic characteristics of an individual such as ethnicity, sex or religion. This ideal contrasts, for example, with the American model which is based on ethnic diversity where the rhetoric is that of a "nation of nations" (Schain, 2004). Further research needs to be done in other countries in order to provide comparisons.

Data on French trade at a regional level is available[11] from the French Ministry of Ecology, Energy, Sustainable Development and Town and Country Planning[12]. This data is available online for a restricted sample of countries from 2003 to 2004. Namely, these countries are Australia, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Lithuania, Latvia, Malta, The Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom. The year 2004 is chosen for this study as it is close to the year 1999, which is the last year that migration data is available for France and also it is more of a complete dataset compared to that of 2003.

Geographical variables such as “common border” (a dummy variable set to 1 for pairs of countries that share a border) and “common language” (dummies equal to one if both partners share a language) are extracted from the CEPII database[13].

The data on Gross Domestic Product and national population are taken from the World Bank “World Development Indicators”.

[9] The French regions considered are: Alsace, Aquitaine, Auvergne, Basse-Normandie, Bourgogne, Bretagne, Centre, Champagne-Ardenne, Franche-Comté, Haute-Normandie, Ile-de-France, Languedoc-Roussillon, Limousin, Lorraine, Midi-Pyrénées, Nord-Pas-de-Calais, Pays de la Loire, Picardie, Poitou-Charentes, Provence-Alpes-Côte d'Azur, Rhône-Alpes. Corse and non-metropolitan region are not considered

[10] French institute of statistics. Source: http://www.insee.fr/fr/themes/tableau.asp?ref_id=NATnon02145&reg_id=0

[11] http://www.statistiques.equipement.gouv.fr/rubrique.php3?id_rubrique=402

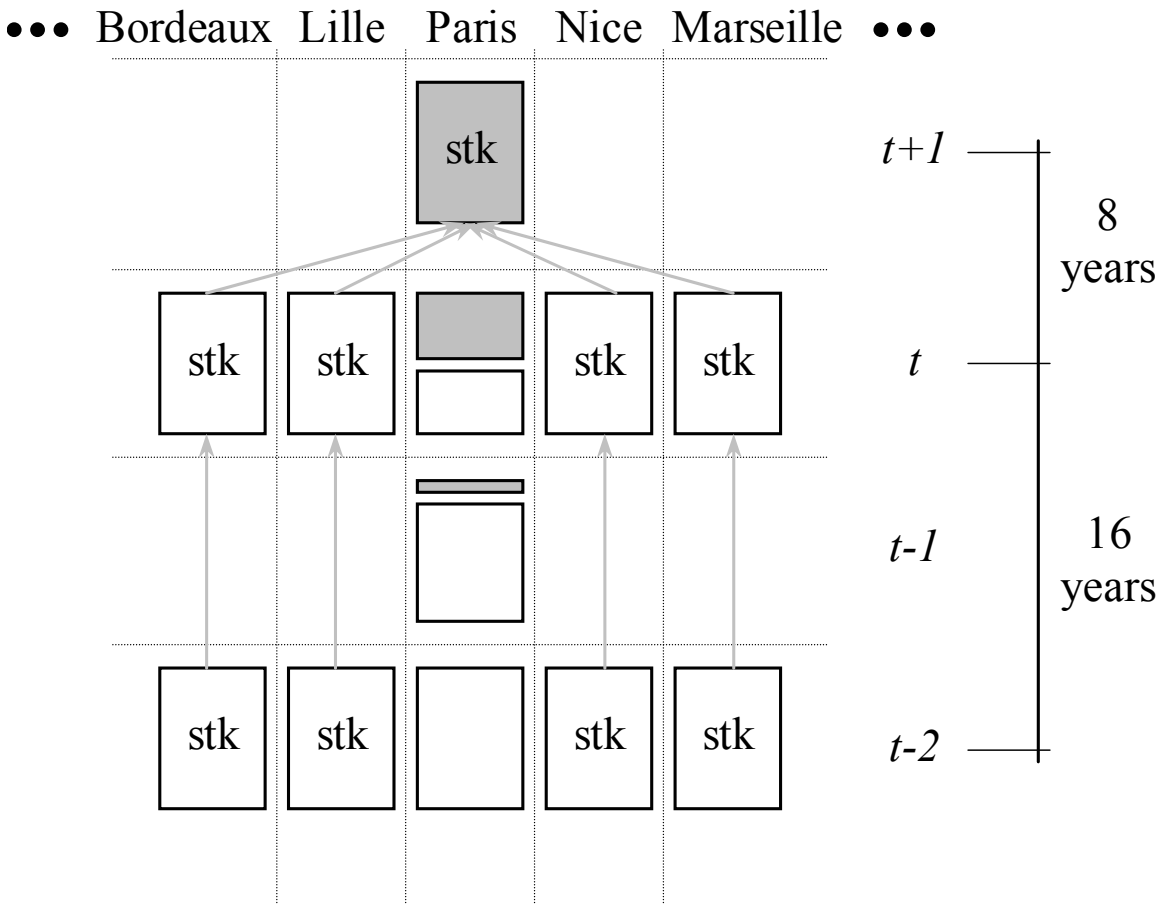
[12] Ministère de l'Écologie, de l'Energie, du Développement durable et de l'Aménagement du territoire

[13] http://www.cepii.fr/anglaisgraph/bdd/distances.htm

4.2 A Description of the Instrumental Variables

There are two main problems concerning endogeneity. The first one is due to the use of "stocks of immigrants" as a dependent variable. As Figure 4 shows, part of this stock (the grey colored square) is already present at the period *t*. Then, the network variable based on the stocks of neighbor "*départements*" at *t* has a reverse causality relationship with the dependent vector. This would lead to over-estimated coefficients for the network variable. This endogeneity is corrected by the instrumental variable method with the two lags of the network variable. This corresponds to 16 years[14] and, based on the data, there is no intersection between the stock of immigrants at *t+1* and the stock of immigrants at *t-2*[15].

Figure 4 – Endogeneity and the Stock of Immigrants



[14] Migration data is obtained from the French census of 1968, 1975, 1982, 1990 and 1999. Each lagged variable corresponds to 8 years difference on average.

[15] This conclusion is made based on data from the Institut National d'Etudes Démographiques, from France (http://www.ined.fr/): The sum of immigration flows from 1999 to 2005 is 119 422, the respective difference in the stocks is 652906. Of the total population of immigrants in 2005 (4 959 000) 31.98% were not in France in 1999. On average, each year from 1999 to 2005 6% of the population is composed of new immigrants (immigrants who arrived in the current year).

The second issue is that the network variable does not take into account the stock of immigrants for the reference "*département*". In the Figure 4, the network variable does not sum the immigrants living in Paris at the period *t*, which could cause an over-estimation by a missing agent. However, since the reverse causality is controlled for, this effect captures the impact of immigrants living in the reference "*département*" at period *t* who do not live there at the next period (the white square underneath the grey square). Instead, these immigrants are part of the resident network and should henceforth be accounted for. This second issue allows an improvement of the estimation as it partially considers the network within the region.

Another predicament is that of endogeneity, which is due to not considering explanatory variables that may have a significant effect. However, this is mitigated by using origin and destination fixed effects, which can be interacted with time fixed effects.

5. Results

This section investigates how and to what extent immigrants interact with each other, providing some significant results. Two outcomes are considered: the location choice of new migrants and the international trade.

5.1 Location of immigrants

A first issue in the empirical analysis is to control for agglomeration forces other than social interactions. For example, Paris is a very centralizing city in France, as confirmed by many studies cited in section 2. Exogenous economical factors or some amenities could explain a huge concentration of immigrants in this region. I control it by origin country fixed effects interacted with years fixed effect.

Regression (1) verifies the positive impact of the Compatriot's Network on the immigrant's location. Even controlling for all specific geographic effects over time, the quantity and the proximity of pre-existing people from the same nationality determine the distribution of immigrants. This kind of agglomeration offers benefits to communication, housing, job and business possibilities, access to home produce, and leisure. These effects are analyzed by some recent studies (eg. Chiswick and Miller, 2004) that point to evidence of a large concentration of immigrants in contrast to the national population.

Table 1 – Location Choice of Immigrants

Regression	(1)	(2)	(4)
Specification	PPML Probit		IV PPML Probit
Dependent Variable	Stock of Immigrants *t+1*		
Ln Compatriot's Network	1.17***	0.28***	0.27***
	(0.08)	(0.03)	(0.08)
Ln Distance	-0.88***		-0.56***
	(0.13)		(0.07)
Nonselection Hazard	-0.35	-0.46***	-7.35**
	(3.05)	(0.11)	(3.43)
Country, "département", year F.E.	Yes	Yes	Yes
Country and "département" interacted with year F.E.	Yes	No	No
Country-region F.E.	No	Yes	No
Observations	39805	30292	29165

Note: Robust standard errors in parentheses with *, ** and *** respectively denoting significance at the 1%, 5% and 10% levels.

Regression (2) introduces country-"*département*" fixed effects. This method controls for all effects that are specific to each pairing of a country and "*département*". Geographical fixed effects are not interacted with time fixed effects in this regression because of technical limitation. The coefficient of the network measures the impact within each geographical pair considering just the time variation of the network variable. If the quantity of resident immigrants of a given nationality, living close to a reference "*département*", raise 10% each year, or if the same quantity concentrates 39.8 km each year (if each immigrant moves 39.8 km closer to the reference "*département*"), the quantity of immigrants living in the reference "*département*" raises 2.8% .

Regression (3) corrects for endogeneity applying lagged[16] variables for networks with two steps IV method. This regression includes the 16 years lagged variable, what is in fact 24 years lagged to the dependent variable. This period of time is more than enough to control for the endogeneity, as discussed in section 4.2. The coefficient is smaller than before, but still positive and significant. Taking column (5), a 10% increase in the network close to a reference "*département*" implies an increase of 2.7% in the stock of immigrants of this "*département*". These regressions confirm the existence of social interactions of migrants above any specific effect or endogeneity. An immigrant counts on the network of compatriots when deciding a location in the host country. This natural choice implies economic consequences, since the network assistance includes not only help in the moving process, but also business and job developments. The next section analyzes the trade output resulting from these interactions.

[16] Because data are provided by 1968, 1975, 1982, 1990 and 1990 census, one lag represents 8 years in average.

5.1 Trade

Table 2 report results from a trade analysis. A limited sample is available which includes the following countries: Australia, Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Lithuania, Latvia, Malta, The Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

These regressions follow the last advancements in trade literature. The Poisson Pseudo Maximum Likelihood estimator is applied (Santos Silva and Tenreyro, 2006) and specific country and region effects are controlled by fixed effects. Exports and imports are regressed separately.

Regression (1) and (2) estimates the impact of the Compatriot's Network on exports and imports, respectively. In these regressions, the distance shows an expected coefficient (Disdier and Head, 2008). Immigrants' network presents a positive impact on trade. Its coefficient is significant at the 99% level of confidence. In addition, as Tai (forthcoming), the impact of migration on imports is higher than the impact on exports. Following this reference, the reason for this is that France imports less differentiated products than exports. Immigrants act as a medium for the betterment of the trade of less differentiated products because they do not need specific knowledge. Alternatively, these products are easily replaceable and therefore more sensitive to a positive shock in their preferences.

Regression (3) and (4) apply the instrumental variable method. This corrects for a potential endogeneity between trade flows and migration. This bias is already mitigated by the use of Immigrant's stock instead of flows. However, the instrumental variable with a lag of 8 years can offer a more accurate result. Coefficients are positive and significant at the 99% level of confidence. Magnitudes rarely change and the coefficient for imports remains higher than the coefficient for exports.

Table 2 – Trade Regressions

Regression	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Specification	PPML		PPML - IV							
Ln Compatriots' Net	0.67***	1.12***	0.85***	1.66***	0.97**	1.96***			0.81***	1.28***
	(0.14)	(0.19)	(0.24)	(0.40)	(0.40)	(0.72)			(0.28)	(0.46)
Ln Immig Stk within Region					-0.06	-0.15	0.17**	0.39***		
					(0.13)	(0.24)	(0.07)	(0.13)		
Ln Immig Stk Neighboring Regions									0.04	0.68**
									(0.15)	(0.29)
Ln Distance	-0.46***	-0.47***	-0.77***	-0.49**	-0.79***	-0.54***	-0.86***	-0.64***	-0.76***	-0.129
	(0.08)	(0.16)	(0.12)	(0.19)	(0.12)	(0.19)	(0.12)	(0.18)	(0.13)	(0.25)
Constant	11.46***	14.34***	14.78***	18.22***	15.73***	20.66***	10.24***	6.18***	6.77***	14.36***
	(0.76)	(1.00)	(1.39)	(3.13)	(2.81)	(4.98)	(1.39)	(2.23)	(1.87)	(2.69)
Observations	525	523	525	523	525	523	525	523	525	523

Note: Robust standard errors in parentheses with *, ** and *** respectively denoting significance at the 1%, 5% and 10% levels. IV variables are the networks variables lagged once, which corresponds to 8 years averagely.

Regressions (5) to (10) provide a comparison to other studies of the impact of migration on trade. Regressions (5) to (8) introduce the quantity of compatriots living in the reference region. It is exactly the approach normally used in this kind of literature: the total quantity of immigrants living in a country determines the trade of this country. From these estimations it is clear that this kind of procedure is missing a key part. In columns (5) and (6), the stock of migrants presents a non significant coefficient when the Compatriot's Network is controlled. This means that the network variable incorporates more information that the stock variable. Regressions (7) and (8) do not control for the Compatriot's Network. Even there, the coefficients are smaller than the ones of the network.

Regressions (9) and (10) apply the quantity of compatriots living in regions that share a common border. This approach is the same of Herander and Saavedra (2005). One can see that this variable is significant just for imports and at the 95% level of confidence. By contrast, the Compatriot's Network variable remains significant at the 99% level of confidence for exports and imports. Yet again, the method for counting immigrants' network proposed in this study seems to give a better explanation on the impact of these networks on trade.

6. Conclusion

This paper investigates the extent to which social interactions impact location decisions and develop trade networks. Empirical evidence strongly supports this conclusion. Data from French census allows for immigrants to be accounted for by their nationality, in the "*département*" level (95

"*départements*"), for five years[17]. Results prove that the location choice of an immigrant depends strongly on the residing network from which he or she can benefit, even when destination region, origin country, and time specific factors are controlled.

A function for the role of the distance on social interactions is presented and empirical outputs show that these interactions diminish following the inverse of the distance between two immigrants. Therefore, an immigrant benefits from the compatriot's network of destination region and also from the network installed in other regions of the country.

Social interactions get ease the immigrant's settlement, but also provide business opportunities that are verified by a very significant impact of networks on international trade. The trade of a certain region is determined not only by the social interactions of immigrants within the region, but also by the social interactions of the whole network of immigrants living in the country. This measure of network is more robust than those measures in previous research.

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[17] These data are aggregated by regions (21 regions) to correspond to trade data

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