International trade and migrant networks: Is It really about qualifications?*

Comercio internacional y redes de migrantes: ¿Se trata realmente de las cualificaciones?

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Abstract

Personal characteristics of migrants could help to strengthen the impact of migrant networks on bilateral trade. While most of the attention has been focused on immigrants' educational attainment, this paper focuses on the relevance of the tasks carried out by migrants. Our empirical results confirm that the existence of a large number of foreign-born workers with managerial duties is critical to explain the reduction of transaction costs caused by migrant networks.

JEL Codes: *F14, F22.*

Key words: *International trade, migration, networks, gravity equation.*

Resumen

Las características personales de los inmigrantes pueden reforzar el impacto de las redes de migrantes sobre el comercio bilateral. Si bien la mayor parte de la atención se ha puesto en el nivel educativo, este trabajo destaca la relevancia de los puestos de trabajo ocupados por los inmigrantes. Nuestros resultados confirman que la presencia de un número importante de trabajadores nacidos

* The authors thank financial support from the Spanish Ministerio de Educación ECO2011-27619 and Generalitat Valenciana Prometeo 2009/098. The paper benefitted from helpful comments of an anonymous referee.

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en el extranjero ocupando puestos de gestión es fundamental para explicar la reducción en los costes de transacción mediante las redes de migrantes.

Códigos JEL: *F14, F22.*

Palabras clave: *Comercio internacional, migración, redes, ecuación de gravedad.*

1. Introduction

Since the seminal paper of Gould (1994), there is wide consensus that migrant networks contribute to bilateral trade. There are two ways they can do it. The first one comes from strong preferences for products from their home countries, which would lead to increasing imports in the receiving countries. The second one is based upon the fact that there exist transaction costs in international trade; the higher information that migrants have regarding their home country could reduce them and, therefore, allow increasing both imports and exports with the receiving country. The former effect is usually referred as the *preference channel*, and the latter the *network channel*. Empirical literature has shown that both mechanisms usually work together (Head and Ries, 1998; Girma and Yu, 2002) though the network channel is stronger (Rauch 1999; Herander and Saavedra 2005).

Despite the consensus about the positive effect of the network channel on trade, there is less evidence about how this mechanism works. In the case of the preference channel, the number of immigrants in the host country is relevant, as it measures the market size for additional imports from their origin country. However, the network channel implies the creation of information exchanges between the two countries, where personal relations could be more important than the number of people involved. Thus, migrants' personal characteristics come to the forefront of the analysis, as they are likely to explain why they can participate in such exchange.

Traditionally, data availability has led to use educational attainment as the key variable to explore the role of personal characteristics in the trade-migration link. The usual assumption is that higher qualifications help migrants to take advantage of their more deep knowledge about their countries of origin. However, the existing evidence is somehow mixed. Using country-level data, Felbermayr and Jung (2009) find that the effect of high-educated migrants is positive but the one of medium-educated migrants is negative. Using firm-level data, Hatzigeorgiou and Lodefalk (2011) find that the impact of low-educated migrants is higher than that of the high-educated. In addition, migrants do not always accede to job positions in their countries of residence according to their training.[1] OECD's *International Migration Outlook* (2007) reports than immigrants (most of them coming from non-OECD countries) present rates of over-education systematically

[1] Different reasons can explain this circumstance, ranging from discrimination, lack of language proficiency or unobserved differences in the reliability of degrees depending on the country where they were achieved.

higher than native's, especially in those countries of recent immigration. In this sense, if immigrants suffer from poor skill transferability and skill downgrading (Chiswick and Miller, 2009), their occupation in the destination country, rather than their schooling, could be a better measure of their productive contribution and their role in enhancing trade.

We defend that occupation rather than education seems more suitable to explain the trade-migration nexus. It seems quite obvious that migrants, in order to take advantage of their social and institutional knowledge about their countries of origin, should be as near as possible of those jobs in which decisions about what and where to trade are taken. We turn, therefore, to managerial tasks, regardless of them being carried out by employees or entrepreneurs. One implication of this premise is that it is likely to weaken the link between education and the network effects on trade. The reason is that, although it could be easy to relate high-skills to managerial positions in the case of employees of big firms, the same relation does not always holds for entrepreneurs, mostly in small firms.[2]

The purpose of this paper is to compare the impact of different groups of immigrants on bilateral trade using these two alternative criteria: education and occupation. For that purpose we use a new database (OECD DIOC-E) with information about the distribution of immigrants by education attainment and type of occupation for a large number of countries in year 2000. The relevance of the study is twofold. Firstly, we add evidence contributing to identify the channels through the information provided by migrants help to promote bilateral trade. In particular we defend that the jobs that migrants are occupying provide a more sensible clue than their levels of education. Secondly, we examine the impact of migration by types of occupation for a large sample of countries, in contrast to previous empirical studies that focused on the case of a single country. Therefore, we can analyse whether the degree of integration or mutual knowledge across countries conditions the network effects that could arise at the individual level. Our results are important because they emphasize the need to identify correctly the kind of migrants that facilitate trade. In particular, the importance of managerial and professional occupations found in the paper provides support to the revision of the migration visa policies in terms of granting access to these type of workers, rather than mainly focusing in their level of education as an indicator of their potential contribution to the host economy development.

To summarize the findings, when we analyze educational attainments of migrants, our results show that both low and high-educated immigrants affect positively on bilateral trade flows, which is not very enlightening about whether education plays a key role in reducing transaction costs. But, when the type of occupation is introduced, we find that only those migrants that assume managerial duties contribute to bilateral trade. This empirical evidence holds regardless of the consideration of different subsets of countries or kind of goods.

The rest of the paper is organized as follows. Section 2 presents the econometric model and the data. Section 3 comments the empirical results. Section 4 concludes.

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[2] OECD's International Migration Outlook (2011) shows that about 21% of foreign-born entrepreneurs in OECD countries are low-educated, with shares for individual countries ranging from 6% in Hungary or 8% in Slovak Republic to 40% in Italy or 50% in Portugal.

2. Econometric specification and data

We use an extended-gravity model that includes different groups of migrants to explain bilateral exports from the host country to the country of origin of the migrants:

$$(1) \qquad Exp_{ij} = \beta_0 + \sum\nolimits_k \beta^k mig_{ij}^k + GRAVITY_{ij}'\delta + \gamma_i + \gamma_j + u_{ij}$$

where Exp_{ij} are the exports from origin country i to destination country j, mig_{ij}^k represents the number (stock) of i-country born people living in j into one educational or occupational category k. The cross-section nature of our analysis is determined by the structure of the DIOC-E Database (Dumont et al, 2010). This sample provides information for migrants who come from 191 different countries as origin of migrants and living in 71 possible host countries. Data are referred to year 2000 and allow characterising population living abroad either by their educational attainment level or by their occupation position. Some comments are needed about the data on the stock of migrants. With regard to the educational level, DIOC-E Database follows the Standard International Classification of Education (ISCED), distinguishing three different levels: *edu1* (ISCED 0/1/2: No education, completed primary and uncompleted secondary education), *edu2* (ISCED 3/4: Completed secondary education) and *edu3* (ISCED 5/6: Completed tertiary education). In the case of occupation, DIOC-E uses the standard 2-digit ISCO-88 classification for all but three countries (Argentina, Turkey and the United States).[3] In order to keep the United States in the sample, categories from ISCO-88 and US SOC 2000 were aggregated up to three wide groups: Non-qualified jobs (*occ1*), Non-managerial qualified jobs (*occ2*) and Managers (*occ3*). Appendix A shows the procedure followed to build up these three aggregates. The set of GRAVITY dyadic variables includes distance (*distance*), and a set of dummy variables for contiguity (*contiguity*), common language (*language*), colony (*colony*) and regional trade agreements (*RTA*). Finally, specific dummies for each country of origin and destination (i and j, respectively) are included to capture the multilateral resistance terms (Anderson and van Wincoop, 2004). Data on exports for 2005 come from BACI-CEPII and gravity variables come from CEPII gravity database.

With regard to the econometric specification, Silva and Tenreyro (2006) showed that the fixed effects OLS estimation of the log-linear gravity equation in [1], the most widely used estimator up to that moment, led to inconsistent estimates in the presence of heteroskedasticity "because the expected value of the logarithm of a random variable depends on higher-order moments of its distribution. Therefore, if the errors are heteroskedastic, the transformed errors will be generally correlated with the covariates." (Silva and Tenreyro, 2006; page 653).

[3] Given the purpose of the paper, it is worthwhile to emphasize two issues regarding these categories. First, ISCO-88 categories are defined by the skills required for each job regardless of the way those skills were acquired. Second, the categories are referred to the tasks associated to the job, not to the employer/employee status of the person carrying them out.

Besides, the use of log-linear specifications has made a problem out of the existence of zero observations in the dependent variable. In order to deal with this issue, two alternative procedures have been proposed in the last years. Silva and Tenreyro (2006) propose a Poisson pseudo-maximum-likelihood estimator, PPML henceforth, which allows keeping the zero observations; this estimator is robust under heteroskedastic error terms. The alternative Helpman, Melitz and Rubisntein (2009) estimator, HMR henceforth, is based on a two steps procedure. The first step consists of estimating a probit model for all zero and non-zero observations; in the second step a log-linearized gravity model is estimated after dropping the zero values. However, the way the selectivity bias is treated and the strong distributional assumptions which are needed in HMR (and very unlikely accomplished by international trade data) lead to inconsistent estimates (Silva and Tenreyro, 2009). These reasons and the possibility of inconsistency of estimates due to an incidental parameters problem because of the inclusion of fixed effects in the probit estimation led us to choose the PPML estimator to perform our analysis.

Another problem that could arise in the estimation of equation (1) comes from the relation between trade flows and migration that could likely encompass some degree of endogeneity. This possibility is explored, for instance, in Felbermayr and Jung (2009), who exploit the panel nature of their data to check it. Briant et al (2009), Peri and Requena (2010) and Bratti et al (2011) use historical immigrant enclaves (i.e. lagged stock of immigrants) as instrument in their analysis of the migration-trade link for the regions of Italy, Spain and France, respectively. Comparing the IV estimates and OLS estimates, and based on the similarity in the magnitude of the immigration coefficients using IV and OLS, the three papers conclude that the positive impact of immigration on trade is not driven by a reverse causality or an omitted variable bias. In our case, our migration data is referred to a single year, which prevents us from using the same method. Besides, there are no clear options for instrumental variables, as the natural election (lags in the migrant variables) is not available. Therefore, we turn to use trade data from 2005 as dependent variable and migrant data from 2000 as explanatory variable –a pre-determined explanatory variable- to alleviate a possible endogeneity problem.

3. Empirical results

Table 1 presents the main results of estimating Eq. (1). In column (1), our indicator (*mig*) encompasses all migrants. The estimated coefficient for the aggregated indicator confirms the existence of a positive and significant impact of migration on bilateral trade. The value of 0.138 falls in the range of usual estimations (for a meta-analysis, see Genc *et al.,* 2011). With regard to the control variables, distance plays a discouraging role for trade, sharing a common land border or a common language helps to promote bilateral trade, and being members of any type of regional trade agreement enhances bilateral trade. The existence of colonial ties does not have any significant effect in our estimations.

In columns (2), (3) and (4), each educational group (*edu1*, *edu2* and *edu3*) is included as the only migrant's indicator. All three educational levels display a positive and statistically significant impact on bilateral trade. The impact in-

TABLE 1
MAIN RESULTS. DEPENDENT VARIABLE: TOTAL BILATERAL EXPORTS IN 2005
(N = 5663). ESTIMATION METHOD: PPML

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln (mig)	0.138***	–	–	–	–	–	–	–	–
	[0.0148]								
Educational attainment of migrants									
ln(mig_edu1)		0.0513***	–	–	0.0276*	–	–	–	–
		[0.0100]			[0.0167]				
ln(mig_edu2)		–	0.0567***	–	0.00698	–	–	–	–
			[0.0109]		[0.0186]				
ln(mig_edu3)		–	–	0.113***	0.0925***	–	–	–	–
				[0.0294]	[0.0227]				
Job positions occupied by migrants									
ln(mig_occ1)		–	–	–	–	0.0563***	–	–	–0.0188
						[0.0110]			[0.0141]
ln(mig_occ2)		–	–	–	–	–	0.101***	–	0.0407
							[0.0152]		[0.0359]
ln(mig_occ3)		–	–	–	–	–	–	0.162***	0.143***
								[0.0155]	[0.0283]
Gravity variables									
ln(distance)	–0.87***	–0.935***	–0.937***	–0.923***	–0.898***	–0.940***	–0.887***	–0.871***	–0.871***
	[0.0386]	[0.0387]	[0.0386]	[0.0449]	[0.0382]	[0.0389]	[0.0384]	[0.0369]	[0.0369]
Contiguity	0.186***	0.267***	0.266***	0.197***	0.182***	0.277***	0.183***	0.201***	0.186***
	[0.0606]	[0.0635]	[0.0633]	[0.0612]	[0.0621]	[0.0640]	[0.0600]	[0.0582]	[0.0599]
Language	0.149**	0.174**	0.146**	0.151**	0.143**	0.166**	0.146**	0.113*	0.118**
	[0.0604]	[0.0677]	[0.0636]	[0.0639]	[0.0631]	[0.0671]	[0.0617]	[0.0581]	[0.0577]
Colony	0.0362	0.124	0.122	0.120	0.0709	0.116	0.0498	0.0284	0.0326
	[0.0910]	[0.0981]	[0.0971]	[0.1000]	[0.0941]	[0.0986]	[0.0917]	[0.0884]	[0.0899]
RTA	0.241***	0.263***	0.266***	0.272***	0.259***	0.254***	0.233***	0.250***	0.249***
	[0.0694]	[0.0720]	[0.0720]	[0.0700]	[0.0689]	[0.0722]	[0.0699]	[0.0681]	[0.0681]
R-squared	0.970	0.968	0.968	0.971	0.971	0.967	0.970	0.972	0.972

Notes: All regressions include origin and destination country dummies. Standard errors in brackets (*** p < 0.01, ** p < 0.05, * p < 0.1), clustered by country pair. *edu1:* Primary Studies; *edu2:* Secondary Studies; *edu3:* Graduate Studies. *occ1:* Non-Qualifed Jobs; *occ2:* Non-managerial Qualified Jobs; *occ3:* Managers; *RTA:* Regional Trade Agreements; *mig:* All migrants.

creases with the level of qualification; the effect for tertiary-educated migrants is being almost twice the other two. When the three educational groups are included (column 5), there is a significant impact only for primary and tertiary educated migrants, the latter being more than three times the former, in line with Felbermayr and Jung (2009) (who use a different database for years 2000 and 2010), despite they obtained a significant but negative impact of secondary-educated migrants on trade.

Columns (6), (7) and (8) replicate the estimation procedure for *occ1*, *occ2* and *occ3*, separately. Again we find a positive and significant effect on trade for all three categories. Notice that each occupational category does not imply an improvement with regard to the preceding one, but represent a different type of task carried out by migrants. Notwithstanding this, it is interesting to confirm that the coefficients of managerial jobs (*occ3*) are greater than those of non-managerial jobs (*occ1, occ2*). More interestingly, managers carry out all the impact of migrants on trade when all three indicators are included simultaneously (column 9). This latter result supports our hypothesis that migrants promote trade when they occupy managerial positions.

Our analysis can be extended in two directions either examining different groups of exporting country or focusing on the type of exported goods. With regard to the former, it is usually accepted that the impact of migrant networks is higher the less the firms know about the foreign markets. We can assume that firms exporting to developed countries (i.e. OECD countries) have easier access to information than those exporting to less developed countries (Hausman and Rodrik, 2003). Therefore, as a natural extension of the results of Table 1, we replicate those estimates searching for a specific impact of migrants from non-OECD countries, which we expect to be higher.

The second extension follows Rauch (1999), which showed that accessibility to international markets is not the same for all types of goods. Some goods have reference prices and/or are traded on organised exchanges, so firms willing to export have access to basic information easily; other goods, mostly differentiated ones, are often referred to varieties which are demanded at local or regional level and require information which may be difficult to access.

Table 2 presents the results for the two extensions. First, we have included a dummy variable *NoOECD* taking value 1 for non-OECD exporters – which are also the origin country of immigrants- interacting with all our migration indicators. These additional variables allow us to test whether the impact of migrants on trade is different for this subset of exchanges. Second, two additional variables for the exports corresponding to differentiated goods or homogeneous/referenced goods are used as dependent variables. As no substantial variation in the estimates for the control variables was found, only the outcome corresponding to the migration indicators is displayed.

In Table 2 we regress exports of all goods (column 10), differentiated goods (column 11) and non-differentiated goods (column 12) against the total number of migrants. For all goods, the estimated coefficient is basically the same as in Table 1 column 1 (0.139) and we cannot reject the null of an equal impact of migrants on exports between OECD and non-OECD countries. More interestingly, we find that the impact of migrants is higher in the case of differentiated products only for exports from their non-OECD home countries. This outcome suggest that, as most developing countries do not have internal markets as open

TABLE 2
ROBUSTNESS ANALYSIS. DEPENDENT VARIABLE: TOTAL BILATERAL EXPORTS IN 2005 (N=5663). ESTIMATION METHOD: PPML

Variables	Total Exports	Diff Prod	No Diff Prod	Total Exports	Diff Prod	No Diff Prod
	(10)	(11)	(12)	(13)	(14)	(15)
ln (mig)	0.139***	0.121***	0.164***			
	[0.0203]	[0.0211]	[0.0281]			
*ln (mig)*NoOECD*	–0.00119	0.0297*	–0.0467*			
	[0.0171]	[0.0173]	[0.0240]			
ln(mig_occ1)				0.000219	0.00897	–0.00603
				[0.0515]	[0.0610]	[0.0644]
ln(mig_occ2)				0.0154	–0.0190	0.0631
				[0.0675]	[0.0776]	[0.0867]
ln(mig_occ3)				0.152***	0.163***	0.131***
				[0.0316]	[0.0339]	[0.0392]
*ln(mig_occ1)*NoOECD*				–0.0168	–0.00063	–0.0344
				[0.0516]	[0.0617]	[0.0647]
*ln(mig_occ2)*NoOECD*				0.0262	0.0529	–0.00834
				[0.0590]	[0.0695]	[0.0789]
*ln(mig_occ3)*NoOECD*				–0.0123	–0.0287*	–0.00084
				[0.0176]	[0.0165]	[0.0305]
R-squared	0.970	0.976	0.936	0.972	0.978	0.937

Notes: See Table 1. Coefficients on the gravity variables are omitted. *mig:* All migrants; *occ1:* Non-Qualifed Jobs; *occ2:* Non-managerial Qualified Jobs; *occ3:* Managers.

to trade as the OECD countries, it is not unlikely that this relative un-openness translates into national consumer's preference for very specific goods and/or varieties, and firms' little knowledge about other countries' tastes. Therefore, the additional information provided by migrants is relatively more helpful in promoting bilateral trade.

The distinction of migrants by occupations is introduced in columns (13) to (15). First, only migrants in managerial occupations display a significant impact on trade, for both differentiated and non-differentiated goods, being the impact greater for the former ones (24%), as one would expect. Second, the impact of managers is smaller for trade in differentiated goods if they come from non-OECD countries. The explanation for this result is likely to come from the size structure of firms led by migrants. The relative high share of migrants which can be considered small entrepreneurs (in most of OECD countries, more than 90% of total foreign-entrepreneurs operate in firms with ten or less workers) could affect negatively the impact of their networking activities on the total volume of trade. Assuming that most non-OECD born managers would be included in this category, there are two reasons for this likely smaller impact: first, the potential volume of exports involved is smaller for firms of such size; second, a high share of self-employed managers are primary- or secondary-educated (21% and 43%

on average for OECD countries, respectively, according to OECD International Migration Outlook, 2011), which potentially could affect their ability to exploit all the trade opportunities at glance.

4. Concluding remarks

This paper deals with the importance of the personal characteristics of immigrants (by education and by occupation, separately) on the pro-trade effect of migration. Our results for a large sample of countries show that distinguishing by education levels does not shed light about the way migrants affect bilateral trade. Since empirical evidence suggests that migrants of all educational levels are horizontally distributed in all types of job positions, we examined instead the role of the occupation of immigrants.

When we distinguish by migrants' occupation, the results are much clearer. The only job category that systematically gets a positive impact on trade is *managerial* occupations, which includes all foreign workers occupying positions that encompass decision-taking duties, regardless of the personal status of migrants in reference to ownership of the firm or the size of the firm itself. Other tasks carried out by migrants are less relevant for enhancing trade or, most of the times, not statistically significant. The importance of managerial occupations remains significant after distinguishing types of countries (OECD v No-OECD) and types of products (Differentiated v non-differentiated). Our findings support the hypothesis that managerial occupations are more closely related to business activities and therefore this kind of migrants are more likely to stimulate trade. We would like to continue this line of research using a new database that allows to examine jointly how different migrants' occupation affect trade after controlling for their level of education. In particular we would be interested in examining whether education is relevant on the positive link found between immigrants in management positions and host country's exports.

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