A Cross Country View On South-North Migration And Trade

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Abstract

The aim of this paper is to analyse the relationship between North-South migration and trade. The evidence on the topic is mainly based on country case studies and is mixed. Trade data disaggregated by good typologies, together with a recent dataset on migrants in OECD countries from developing and transition economies, are used in a gravity model. The availability of migration data for three different years allows for panel data techniques. Moreover the estimation of the empirical model for each trade sector separately - besides overall imports and exports - highlights heterogeneous responses of trade to migration according to different good typologies.

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1 Introduction

The recent wave of globalization is characterized by the growing role of developing and transition economies in the international production networks. The trade integration process brought ahead in the 1990s by the Uruguay Round and by the spur of several Regional Integration Agreements between developed and developing nations has stimulated the overall growth of North-South trade in manufacturing products. Another feature of the current globalization wave is represented by the dramatic decrease in communication and transportation costs. Crossing borders has become easier, and despite the deepening of political and economic integration in Europe and America has aimed at limiting migration, the latter has actually increased. The prospect of higher real wages and the fall in "mobility" costs has allowed for the balance between the costs and the benefits of migration to lean in favor of migration from the South to the North and this is more so for educated workers (Iranzo and Peri, 2007).

Despite labor flows are less pronounced than trade flows, the former have proved to be substantial in the recent decades and may actually have had important consequences.

The aim of this paper is to use recently available data on migration into the OECD countries from developing and transition economies combining them with bilateral trade information in order to uncover possible complementarity/substitution relationships between trade and labor mobility.

The theory supports both kind of relations, the empirical evidence on the topic is mixed and mainly based on country case studies. The present study contributes in providing a cross country view on the relation between bilateral trade and migration, namely considering trade and migration between the industrial OECD countries and the rest of the world. A feature of novelty relies in the use of disaggregated trade data in order to allow for a possible different relation between trade and migration according to the good typology. Toniolo (1999) discusses the importance of distinguishing among good typologies when investigating the relationship between trade and migration: complementarity/substitutability can depend on the degree of technological content, sector specificities and cultural aspects and these features are not homogenous across goods.

Finally, the availability of three different years of observations on migration (1990, 2000, 2005) allows for investigating the link across time too.

The work is structured as follows: the second section deals with theoretical and empirical literature on this topic; section three describes and analyses the data on trade and migration into OECD; section four presents the em-

pirical model and discusses some estimation issues; section five exhibits the results and a final section deals with the conclusions from the work.

2 The theory and the evidence on trade and migration

From the Hecksher-Ohlin framework comes Mundell's (1957) result that trade and migration are substitutes. Trade is explained through the different relative returns to production factors at home and abroad and any impediment to trade allows for factor movements across the borders.

In a specific factor model, with skilled and unskilled labor being the specific factors and capital the mobile one, migration of skilled labor from the unskilled labor abundant country releases resources to the unskilled labor intensive sector thus fostering this country's specialization and exports in the unskilled labor intensive goods. On the other hand, the increase in the availability of skilled labor in advanced countries would foster production and exports in the skilled labor intensive sectors. The result is for a complementarity relationship between trade and migration.

In the same direction, Markusen (1983) shows that removing the original assumptions of the H-O model, trade and factor movements can be complements. Assuming identical factor endowments in both countries and removing the hypothesis of 1) identical technologies, 2) constant returns to scale, 3) perfect competition, 4) absence of domestic distortions, and 5) identical homothetic preferences, if a country is more advanced in the production of one of the two goods, trade will cause the country to export this good and the return to the factor intensively used in this sector will increase compared to the other country. This will generate the inflow of the factor from the trading partner and this will continue to expand trade.

Partially in this line, Iranzo and Peri (2007) extend a model of trade in differentiated products to analyse migration and trade jointly in a world where countries use different skill-specific technologies and workers have different skill levels. In this framework brain drain from the South expands production and trade thus benefiting all the partners, furthermore they calibrate their model on West- East trade and migration relationship in Europe and analyse the effects of reducing the barriers to labor mobility between the two regions when trade is free: mostly highly educated people would migrate to the West and thanks to this GNP would increase both in the West and in the East and this would also favor trade.

Venables (1999) further explores the relationship between trade and migration in models with increasing returns and cumulative causation and here the final outcome is for a full agglomeration of production in one of the two economies.

Finally, some relatively more recent contributions explore the network channel to explain the relation between migration and trade (Rauch and Trinidade, 2002; Rauch and Casella, 2003): migrants are very tied to their own culture and once abroad their demand for home products stimulates trade. The network effect could also involve industrial goods since the presence of migrants in the firm could make it easier for the owner to establish safer contacts with foreign firms and engage, for example, in the exchange of intermediate goods.

Empirical evidence on the topic is quite recent and mainly based on country studies which consider trade and migration flows between a single country and the rest of the world. What emerges is not a uniform pattern.

The pioneer work by Gould (1994) shows that immigrant links have historically been important in increasing bilateral trade flows with immigrants' home countries. On the contrary, Aguiar et al. (2007) use a gravity equation to empirically test the effect of bilateral trade on a subset of international permanent legal migration from 175 countries into the United States and their results show that bilateral trade flows do not significantly explain migration flows, while the traditional determinants do.

For Canada, Head and Ries (1998) document that the presence of immigrants fosters exports and imports to and from their country of origin, namely a 10% increase in immigrants is associated with a 1% increase in Canadian exports to the immigrant's home country and a 3% increase in imports. These results are confirmed more recently by Partridge and Furtan (2008), who estimate the effects of immigration waves on Canadian trade flows, by province. They find evidence that immigrants affect imports of goods from their home countries after 5-10 years from arrival, while it takes them approximately 10-15 years to affect exports from Canadian provinces to their home countries.

Girma and Yu (2002) show that immigration from non-Commonwealth countries plays a significant export-enhancing role for the U.K. economy. On the other hand, immigration from Commonwealth countries is found to have no substantial impact on exports; they read these contrasting results as evidence that the immigrant-link is not universal since its enhancing effects on bilateral trade work mainly through immigrants' personal and business contacts with home country. Concerning imports, the study reveals a pro-import effect of immigration from the non-Commonwealth countries, while immigration from the Commonwealth appears to be reducing imports, per-

haps reflecting trade-substituting activities by immigrants.

A developing country approach is followed by Ehrlich and Canavire Bacarreza (2006), who analyse the impact of migration flows on foreign trade in a relatively closed small economy using a gravity model for Bolivia over the period 1990-2003. They test the impact both of immigration and emigration flows on imports, exports and also on intra-industry trade. Estimations show a positive and significant effect of both immigration and emigration on Bolivian trade flows; the effect on intra-industry trade is still positive but smaller in size.

Lewer (2006) focuses on the topic in a cross country framework: the relation of bilateral migration and trade flows is analysed within OECD and the results confirm that bilateral trade is fostered by migration flows.
The sample of OECD countries is considered also in Felbermayr and Toubal (2008). They undertake an attempt to separately quantify the two channels through which migration flows affect trade, namely the reduction in trade costs and the creation of additional demand for goods from their source countries. Results show that the total pro-trade effect of migration is driven mostly by the latter effect; however, the trade cost channel results stronger for differentiated goods and when high-skilled migrants are taken into account. In another paper, Felbermayr and Jung (2008) analyse the pro-trade effect of the brain drain, finding a positive relationship between bilateral migration and trade. When the different levels of migrants' skills are taken into account, results show that high- and low-skilled migrants positively affect trade, while medium-skilled migrants have either insignificant or even a negative effect on trade volumes.

Finally, Morgenroth and O'Brien (2008) add to the existing evidence specifying a non-linearity between trade and migration and taking endogeneity of right hand side variables into account. Their results support the complementarity between migration and trade flows, even if the negative sign on the squared migration variable shows that the marginal returns to immigration for trade diminish as immigrants' communities grow.

As previously mentioned, a distinguishing feature of the present work is the main focus on North-South trade and migration, which is more general than a single country case study and still more specific than a worldwide one. Our main contribution especially relies in the adoption of the "end-use" disaggregation of trade data allows for modelling heterogeneous responses of Northern exports and imports to migration from the South according to the different good typologies.
Finally, the observation of migration and trade in three different years (1990, 2000 and 2005) allows for the identification of the relationship between the two through time (Collins et al., 1999).

3 Data and evidence on migration and trade

Migration data are from the World Bank database, recently released by Docquier and Marfouk (2004), which provides new estimates of workers' emigration stocks towards OECD countries for year 1990 and 2000. Sending countries include both developing and industrial countries (170 countries in 1990 and 190 countries in 2000). Being interested in the interaction between the South and the North of the world, we will consider as reporters/destinations OECD countries excluding the ones that may not be considered as advanced industrial countries: Czech Republic, Hungary, Mexico, Poland, Slovenia, Korea and Turkey. We will keep them, together with all the other developing countries, as partners/origins.
Docquier and Marfouk (2004) also distinguish migrants'stocks by level of educational attainment: primary education(0-8 years of schooling), secondary education (9-12 years), tertiary education (13 years and above).

As just said, this dataset unfortunately is limited to 1990 and 2000, therefore we merge it with data for 2005 from another database released by Ratha and Shaw (2007) for the World Bank[1].
Since this last dataset does not provide data on migrants' stocks disaggregated by educational level we are forced to analyse just total stocks.
The complete list of receiving and sending countries (reporters and partners, respectively) is available in Appendix A.

Data on trade flows are from the WITS-COMTRADE database. Reporters are OECD countries and data concern bilateral imports and exports with 212 partners. We employ BEC (Broad Economic Categories) classification that arranges commodities according to "end-use" classes: final consumption, intermediate consumption, and capital formation. We use this classification in order to distinguish goods according to their complexity and position in a general production chain[2] and for the estimation we aggregate the original 2 digit sectors in five main groups:

- Food and Beverages, Primary and Processed;
- Industrial Supplies, Primary and Processed;

[1]They update and augment the bilateral migration matrix previously built by the Development Research Centre on Migration, University of Sussex, covering 212 countries, of which 24 are OECD countries, 34 are other high-income countries and 154 are low- and middle-income countries. Data are obtained by applying weights based on bilateral migrant stocks (from population censuses of individual countries) to the UN Population Division's estimates of total migrant stocks in 2005. Again we consider OECD industrialized countries as receiving countries and developing countries as sending countries.

[2]As an example the production of final goods can be considered more standardized and less complex than the production of capital goods or transport equipment.

- Capital Goods and Transport Equipment;
- Parts and Accessories of Capital Goods and Transport Equipment;
- Final Goods.

Many empirical works on international trade use the weel-known dataset collected by Feenstra et al. (2005). Since it does not include data regarding the year 2005 and provides information on trade flows classified according to the 4 digit SITC (Standard International Trade Classification) that is not suitable for our purposes, we opt for the WITS-COMTRADE dataset for our basic estimations. Nevertheless we use the aggregate flows (overall imports and exports) from Feenstra et al. (2005) for some robustness checks.

Before presenting the model to estimate, it is useful to analyse briefly the characteristics of our sample, with a specific focus on migration and trade data.

Considering OECD countries as a whole, the share of immigrants' stock from developing countries on total immigrants increases over time from 50.9% in 1990 to 61.3% in 2005 (see Table 1). In 2005, more than 60% of immigrants come from the South in 16 out of 25 OECD countries considered here. In Japan this share is over 90%. The increasing trend is generalized with a few exceptions: Denmark, Italy, Portugal, United Kingdom and United States, where the share of migrants from developing countries decreases on average of 2 percentage points between 2000 and 2005.

To grasp the idea of the importance of migrants in labor markets it can be useful to analyse the stock of migrants in relation with the size of the overall labor force in destination countries[3].
In 10 out of 25 OECD countries (column 4, Table 1), the stock of immigrants from developing countries is large as more than 10% of the labor force. Austria is the country where this percentage is the highest (18.3% on average) followed by Canada and United States. The share is lower in Japan (1.9%) and in Northern Europe.

Finally, as far as the region of origin is concerned, the last column shows that in 2005 people from Eastern Europe and Central Asia represent the bulk of migrants, not only for EU countries but also for Canada and Australia. It is interesting to note that past colonial ties play a crucial role in determining migration flows: Africa is the main origin for immigrants in France (74%) and Belgium (52%), almost half of immigrants who live in Spain come from South America while one third of immigrants in UK is from South Asia.

[3]Labor force data are from the World Development Indicators.

Table 1: Incidence of migrants from South on total migrants and labor force in OECD countries, and main region of origin

	Incidence of Southern migrants:				
	on total migrants (by year)			on total labor force	on total Southern migrants (by region of origin)
COUNTRY	1990	2000	2005		
Australia	35.0%	42.0%	44.3%	14.9%	ECA (33%)
Austria		72.8%	77.0%	18.3%	ECA (91%)
Belgium		31.0%	43.2%	6.4%	AFR (52%)
Canada	46.0%	60.3%	61.8%	16.3%	ECA (29%)
Denmark	56.5%	68.6%	65.7%	5.1%	ECA (38%)
Finland	33.4%	67.0%	63.9%	2.2%	ECA (66%)
France		56.7%	65.8%	12.0%	AFR (74%)
Germany	62.8%	65.2%	71.0%	10.4%	ECA (79%)
Greece	54.4%	61.8%	81.4%	6.5%	ECA (88%)
Iceland	17.3%	34.4%	38.4%	3.3%	ECA (66%)
Ireland		15.0%	19.4%	3.9%	ECA (35%)
Italy		82.4%	81.5%	5.4%	ECA (39%)
Japan	93.2%	93.9%	93.4%	1.9%	EAS (74%)
Luxembourg		1.1%	16.9%	7.8%	ECA (54%)
Netherlands		74.5%	77.2%	13.0%	ECA (38%)
New Zealand	29.7%	45.7%	45.6%	11.6%	OCE (32%)
Norway		53.0%	61.2%	6.3%	ECA (31%)
Portugal	93.5%	87.9%	71.2%	5.6%	AFR (76%)
Spain	39.6%	68.6%	69.4%	8.0%	SAM (47%)
Sweden		51.1%	61.9%	11.6%	ECA (44%)
Switzerland	31.8%	33.7%	41.7%	12.4%	ECA (65%)
UK		65.2%	63.0%	9.2%	SAS (35%)
USA		84.1%	82.5%	15.9%	CAM (56%)
Total	50.9%	58.1%	61.3%	9.0%	

ECA: Europe and Central Asia. CAM: Central America. SAM: South America. AFR: Africa. MEA: Middle East. EAS: East Asia. SAS: South Asia. OCE: Oceania.

From this quick descriptive analysis, we get hints that the South-North migration phenomenon has become larger and more relevant since 1990 and is destined to reconfirm as one of the main features of globalization.

The analysis in greater detail of the evolution of international trade over time reveals that the share of trade between OECD and developing countries, measured as the sum of imports plus exports, has increased with respect to the total trade of OECD with the world. Table 3 shows that this trend is common to all kind of goods with the exception of food and beverages sector, where the share of trade with the South remains essentially unchanged.

To get some hints on countries' specialization we consider Northern overall normalized trade balance in Table 3.

From the table OECD countries appear as specialized in Industrial Supplies, Capital Goods and Transport Equipment and Parts and Accessories while Southern countries are specialized in Food and Beverages and Final

Table 2: Share of trade with the South on trade with the world (means)

Sectors/Year	1990	2000	2005	Total
Food and beverages Primary - Processed	22.2%	22.2%	23.3%	22.7%
Industrial Supplies Primary - Processed	17.8%	22.3%	24.8%	22.6%
Capital Goods and Transport Eq.	9.9%	19.3%	24.1%	19.8%
Parts and Accessories Capital and Transp. Eq.	10.9%	20.8%	24.4%	20.7%
Final Goods	20.2%	27.3%	28.9%	26.8%
Totals	17.7%	23.4%	26.7%	23.8%

Goods. In general the overall normalized balance declines through time in favor of a more active role of developing countries in export markets and, from the Table, this is true for all the branches of goods.

4 The empirical model and estimation issues

The gravity equation emerged a long time ago as the most powerful tool to explain bilateral trade flows (Fratianni, 2007) and can be considered the most suitable empirical model to test the relationship between trade and migration. Then, the basic specification of the empirical model to estimate is the following:

$$f_{ijt} = \alpha + \beta Y_{ijt} + \gamma Migrants_{ijt} + \delta_i + \eta_j + \theta_{ij} + \tau_t + \epsilon_{ijt} \quad (1)$$

f_{ijt} represents the log of the "Northern" country i's import/export flow from/to country j at time t. Y_{ijt} is equal to $ln(GDP_{it} {}^{*} GDP_{jt})$ so it represents the economic size of the two countries in terms of nominal GDPs.

$Migrants$ is a measure of migrants from country j to country i, then γ is our parameter of interest. We use the logarithm of total migrants defined as:

$$Migrants_{ij} = ln(Total\, Stock\, of\, Migrants\, from\, j\, to\, i) \quad (2)$$

In the above equation, δ_i, η_j, θ_{ij} and τ_t respectively represent reporters', partners and pair specificities, while τ_t refers to common time effects. Finally, ϵ_{ijt} is an idiosyncratic shock affecting bilateral trade.

Table 3: Normalized trade balance for OECD countries

Sectors/Year	1990	2000	2005	Total
Food and beverages Primary - Processed	-0.31	-0.05	-0.07	-0.08
Industrial Supplies Primary - Processed	0.20	0.10	0.09	0.10
Capital Goods and Transport Eq.	0.67	0.17	0.18	0.21
Parts and Accessories Capital and Transp. Eq.	0.65	0.30	0.27	0.30
Final Goods	-0.12	-0.24	-0.19	-0.21
Totals	0.00	-0.15	-0.20	-0.17

Some specific issues related to the empirical setting and the estimation technique need to be addressed in order to get a consistent estimate of our parameter of interest.

Before pursuing any further investigation, we run a test of "poolability" between the 1990-2000 sample and the 2005 one and the test fails to reject the null of an equal slope parameter for the two sub-samples[4].

Secondly, we address the role of relative trade costs and the issue of the correct measurement of the gravity variables. The theoretical grounding of the gravity equation[5] has been recently enriched by the contribution of Anderson and Van Wincoop (2003) who highlight the role of relative more than absolute trade costs in explaining bilateral trade in a CES expenditure system: apart from bilateral absolute trade costs, trade between countries i

[4]We conducted a Wald test for the equality of the γ between the 1990-2000 sample and the 2005 one. We used overall exports and overall imports and included reporter, partner and time dummies together with dummies for common official and ethnic language, colonial relationship and for being in North-South Regional Trade Agreement. The test statistic for total imports is $\chi_1 = 0.55$ and for total exports is $\chi_1 = 2.11$. In both cases we fail to reject the null of equal parameters for the two sub-periods. Even when including further controls to the basic specification, the test result does not change.

[5]Anderson (1979) firstly theoretically founded the gravity equation in a model with CES preferences and goods differentiated by region of origin. More recently, some extensions preserve the CES structure and allow for the gravity equation to origin from models of monopolistic competition (Bergstrand, 1989) or from a Heckscher-Ohlin framework (Deardorff, 2001). Evenett and Keller (2002), in fact, find evidence for both factor proportions differences and increasing returns to scale as determinants of the extent of specialization and international trade flows. The complete specialization versions of both models however are not supported by the data.

and j is explained by the resistance that the exporter faces in general on other markets and the resistance that the importer poses towards overall trade partners. Then, any empirical specification which omits the multilateral resistance terms bears biased estimates of any bilateral impediment to trade.

In the same direction, Baldwin and Taglioni (2006) extend the model in Anderson and Van Wincoop (2003) to allow for panel data and classify the most common mistakes of empirical studies using the gravity equation. What they define as golden medal mistake refers to the omitted variables correlated with trade costs and the proposed solution is to use time-varying country dummies with pair fixed effects[6]; the silver medal mistake is related to the uncorrect averaging of imports and exports in some empirical studies which take the log of the average of exports and imports instead of the average of the log; finally, the bronze medal mistake refers to the inappropriate deflation of nominal trade values by the US aggregate price index and the proposed solution is to regress nominal trade on nominal GDPs and to use time dummies to control for international price changes.

We try to avoid them all keeping nominal flows (together with time dummies), using exports and imports separately and controlling for reporter, partner and pair fixed effects by means of the estimation technique (see below). We also add the reporter's and the partner's logarithm of Real Exchange Rate[7] (Soloaga and Winters, 2001; Carrere, 2006) to the basic specification in Equation 1 to control for further reporter and partner's time varying factors likely to affect bilateral trade.

The model controls also for the trade effect of the most important North-South Regional Trade Agreements: a dummy taking value 1 in 2000 and 2005 for partners in the EU enlargement process and in the North American Free Trade Agreement (NAFTA) and taking value 0 otherwise is added to the basic specification, thus allowing for a different level of bilateral trade when in a Noth-South RTA[8]. To proxy for the deepening of globalization,

[6]Another solution proposed by Carrere (2006) is to treat pair unobserved heterogeneity as random and estimate the empirical gravity equation using the Hausman-Taylor estimator.

[7]The inclusion of the real exchange rates is thought to capture the degree of competitiveness of the trade partners.

[8]Several empirical studies on the trade effect of RTAs (Soloaga and Winters, 2001; Carrere, 2006; Fratianni and Ho, 2007) suggest to capture trade diversion effects by means of a dummy taking value 1 when reporters/partners are in another RTA. In our sample, reporters are always part of a RTA different form the North-South one under analysis. As an example, the industrial European countries, besides their involvement in the enlargement process, are all members of the EU. The same goes for the United States and Canada which enjoy several agreements around the world. Then, if this is the case, the trade diversion dummy would always equal one for each reporter and would be collinear

we also include the time dummies and their interaction of bilateral distance with time dummies.

Thirdly, the likely endogeneity of migration is thought to affect the consistency of the estimate of our parameter of interest and an instrumental variable estimator would be preferred. For their cross-section data, Morgenroth and O'Brien (2008) use the fertility rate of the sending country which seem to prove helpful in their empirical setting. Building on their findings we proceeded analyzing a set of possible instruments as the ratio between reporters and partners' fertility rates, birth rates, life expectancy, unemployment rates, public spending in education and health; however, all of these instruments proved very weak, possibly leading to biased results.

From the previous discussion we then decided to use the Within Group estimator to control for any time invariant source of heterogeneity (e.g. multilateral resistance terms and bilateral time invariant specificities likely to affect bilateral trade) and we further tested for the exogeneity of migration which always turns out to be strictly exogenous[9]. Recently, Baier and Bergstrand (2007), analysing the effects of free trade agreements (FTAs) on trade flows, address the likely endogeneity of FTAs using instrumental variable techniques, control-function techniques and panel-data techniques; they demonstrate that while the first two approaches do not account properly for endogeneity, a panel-data approach does.

Furthermore, the choice of OLS on time-demeaned data (Within Group), can be considered a suitable choice to address one more issue in the estimation of the gravity equation: the presence of unreported trade flows below a certain threshold. As a matter of fact, the COMTRADE database is truncated below 1000 U.S.$. Recently, Linders and de Groot (2006) compare the performance of several ways to deal with zero flows: apart from the option to omit the zero flows from the sample, various extensions of Tobit estimation, truncated regression, probit regression and substitutions for zero flows have been suggested and in their results the sample selection model appears to fit both considerations best. Eventually, their results suggest that the simplest solution of omitting zero flows from the sample often leads to acceptable results.

In the present context, considering total exports and imports, together with the re-aggregation of the finer BEC categories into broader ones as indicated in the previous section, makes the presence of zero flows less of a problem, especially for exports[10]. Then, we proceed estimating the empirical

with the country fixed effect.

[9]See Wooldridge (2002), page 285.

[10]As a matter of fact, these observations respectively concern less than 1% and 5% of overall exports and imports, while for disaggregated flows the highest incidence of zeros

model above by means of Ordinary Least Squares (OLS)[11] on time demeaned (Within Group) data omitting zero flows.

We are aware of the fact that using Fixed Effects we give up accounting for the large between-country variation in our sample, but since the set of instruments tested until now didn't perform well and OLS results on the pooled model are most likely to be biased because of endogeneity, we find preferable to concentrate on the time variation of the phenomenon, identifying how the effects of migration flows on trade between each pair of countries change over time.

The origin of the data is the World Bank Development Indicators database for countries' GDP and the Penn World Table 6.2 for the real exchange rates. The CEPII data set is used, instead, for the measure of bilateral distance (in kms)[12] and the country pair dummy variables for common language, colonial status, etc. which we include in the specification when testing for random effects. Appendix B provides summary statistics for the variables of interest.

5 Results

This section present the results from the estimation of Equation 1. As specified below each table, all specifications include time specific effects and their interaction with distance, the RTA dummy and the real exchange rates of the partner and the reporter. A number of statistics and tests are reported: the correlation between fixed effects and explanatory variables, the F statistics for the significance of the pair effects, the P-values of the Hausman test for random effects[13], of the test for strict exogeneity of migration variable and of the Wald test for the equality of coefficients on migration between the 1990-2000 sample and the whole sample.

Table 4 shows the results respectively using total imports (column 1) and exports (column 2) as dependent variables. As it clearly emerges from the negative sign of migration in column 2, an increase in total migration from

concerns northern imports of food, intermediates and capital and transport equipment (25% of observations are zeros).

[11]The same method is used also in Guiso et al. (2007).

[12]Data for seven countries in our dataset, American Samoa, Czechoslovakia (before 1993), Guam, Monaco, Mayotte, Virgin Islands, West Bank and Gaza, are not available from CEPII. Therefore we chose to make an approximation identifying them with the nearest and most similar country, e.g. France for Monaco.

[13]As previously mentioned, in this case we also included a dummy for contiguity, common official and ethnic language, for colonial status of the partner with respect to the reporter and partner and reporter dummies to account for remoteness (Baldwin and Taglioni, 2006).

Table 4: Total North-South Imports and Exports I

	[1] Imports	[2] Exports	[3] Trade
Y_{ij}	0.989***	0.790***	0.862***
	[0.085]	[0.061]	[0.060]
$Migrants_{ij}$	-0.019	-0.023***	-0.016*
	[0.013]	[0.008]	[0.008]
Observations	7627	7961	8131
$Corr(u_i, Xb)$	0.24	0.32	0.36
F-test all $u_i = 0$	3.10	2.99	2.88
Hausman test	0.00	0.00	0.00
F-test of strict exogeneity	0.77	0.51	0.59
Wald test 1990-2000	0.77	0.79	0.54
Number of pair	3402	3495	3533

Legend: $^{*}p < .10$;$^{**}p < .05$;$^{***}p < .01$. Robust standard errors in brackets. All the specifications include the RTA dummy the time dummies and their interaction with the log of distance.

the South is related to a decrease in total Northern exports toward Southern countries. Total imports, on the other hand, seem not to be affected at all by migration flows from the South. Coherently with the empirical literature on gravity models, the economic size of countries i and j in terms of nominal GDP affects positively and significantly both total imports and total exports.

To closely compare our findings to the results already existing in the literature, in column 3 we report the regression results when the dependent variable is bilateral trade measured as the geometric average of imports and exports (Baldwin and Taglioni, 2006). The effect of migration on trade is negative and significant at 10% level. The evidence so far contrasts with a pro trade effect of migration emerging from recent contributions (Lewer, 2006; Morgenroth and O'Brien, 2008) and goes in favor of a substitution between exports to the South and migration.

When splitting total flows by good category, Panel A in Table 5 confirms the previous results: as a matter of fact, imports, regardless of the product category, are in general not affected by the presence of migrants. The migration variable turns out not to have statistically significant effects on any of the different good typologies.

Moving to disaggregated exports, Panel B shows that the negative relationship between total exports and migration flows has to be mainly ascribed to what happens for intermediate and final goods. Northern exports of such goods seem to decrease as migration from the South increases, while no role is left for migration in influencing exports of food and beverages, industrial

supplies and capital goods. The growing presence of foreign workers in industrial countries helps these countries de-specialization in less skill intensive productions of final and intermediate goods and then is related to a reduction in exports of these categories.

By the same token, the importance of more developed export markets for skill intensive goods also explains why this changing specialization pattern is not reflected in the growth of exports of these same goods towards the South. On the other hand, the lack of a significant effect of migration on imports from the South might be possibly due to the direction of Southern production towards several final export markets different from the Northern partners receiving migrants.

Table 5: North-South Imports and Exports by Category I

	[1] Food & beverages Primary - Proces.	[2] Industrial Suppl. Primary - Proces.	[3] Capital Goods & Transport Eq.	[4] Parts & Accessories Capital & Transp. Eq.	[5] Final Goods
Panel A: Imports					
Y_{ij}	0.492***	0.801***	0.859***	0.640***	0.647***
	[0.096]	[0.101]	[0.128]	[0.108]	[0.098]
$Migrants_{ij}$	-0.007	-0.007	0.001	-0.001	0.014
	[0.018]	[0.017]	[0.022]	[0.020]	[0.015]
Observations	6190	6628	5528	5558	6562
$Corr(u_i, Xb)$	0.28	0.29	0.17	0.39	0.39
F-test all $u_i = 0$	2.79	2.74	1.69	1.95	2.13
Hausman test	0.00	0.00	0.00	0.00	0.00
F-test of strict exogeneity	0.94	0.91	0.25	0.48	0.18
Wald test 1990-2000	0.40	0.43	0.77	0.27	0.73
Number of pair	2934	3105	2865	2877	3135
Panel B: Exports					
Y_{ij}	0.720***	0.954***	0.782***	0.862***	0.903***
	[0.085]	[0.075]	[0.067]	[0.071]	[0.074]
$Migrants_{ij}$	-0.020	0.002	-0.004	-0.047***	-0.033***
	[0.015]	[0.011]	[0.012]	[0.011]	[0.011]
Observations	6499	7508	7381	7365	7138
$Corr(u_i, Xb)$	-0.06	0.11	0.29	0.25	0.10
F-test all $u_i = 0$	2.83	2.72	2.23	2.40	2.63
Hausman test	0.00	0.00	0.00	0.00	0.00
F-test of strict exogeneity	0.74	0.23	0.98	0.92	0.52
Wald test 1990-2000	0.07	0.22	0.43	0.90	0.63
Number of pair	3054	3377	3359	3346	3279

Legend: $^{*}p < .10$;$^{**}p < .05$;$^{***}p < .01$. Robust standard errors in brackets.
All the specifications include the log of Partner's and Reporter's real exchange rates, the RTA dummy the time dummies and their interaction with the log of distance.

The results from the tests in the bottom part of the tables show a strong rejection both for the F test on fixed effects and for the Hausman specification test. On the other hand, in each specification we fail to reject the null of strict exogeneity of migration and of equal parameters with respect to restricted 1990-2000 sub-sample, thus confirming what previously stated in terms of the opportunity to pool observation from different sources for the two sub-periods 1990-2000 and 2005. All this set of results thus makes the validity of our finding more robust.

We repeated the estimation for each of the categories using total trade instead of differentiating between imports and exports and the migration coefficient proves to be non significant in all of the cases. What we can infer therefore concerning bilateral trade flows as a whole is that certainly there is no evidence in favour of a pro trade effect of migration, specifically a pro *bilateral* trade effect.

6 Robustness

Since the sample of countries considered here is wide and variegated, to check the robustness of the results obtained so far we run again estimations on a subsample that considers only large economies, excluding therefore all the small countries. This procedure in our case could also be helpful to reduce the presence of zero flows in the original sample.
The definition of large economies adopted concerns population's size and we decided to exclude countries below the 25th percentile of the ditribution of total population. In this way we consider countries with at least 2 millions inhabitants in the sample.

Table 6 and 7 generally confirm the results shown in the previous section. It is worth noting that the negative effect of migration on Northern total exports towards the South is still significant at 1%; moreover, some evidence regarding imports from the South emerges. As far as larger economies are concerned, overall imports result negatively affected by migration and also this effect is significant at 1%. The result on bilateral trade (column 3 of Table 6) shows once again that even when considering the average of exports and imports the effect of migration on trade is negative, and the coefficient is here significant at 1% level compared to 10% in Table 4. As far as imports by category are considered (Table 7, Panel A), once again there seems to be no significant effect, while migration affects negatively export flows of final and intermediate goods (columns 4 and 5, Panel B) from the North to the South. Results hold also if we exclude countries with less than 7 millions inhabitants (50th percentile of the ditribution).

A further test of robustness has been made using the dataset on trade flows by Feenstra et al. (2005), as already mentioned before. The substitution between trade and migration still holds and the negative coefficient is significant regardless we consider imports, exports or trade. Results are also confirmed if we include zero flows in the sample[14].

Table 6: Total North-South Imports and Exports II

	[1] Imports	[2] Exports	[3] Trade
Y_{ij}	0.845***	0.768***	0.782***
	[0.087]	[0.059]	[0.058]
$Migrants_{ij}$	-0.036***	-0.025***	-0.033***
	[0.013]	[0.008]	[0.009]
Observations	5895	5996	6109
F-test all $u_i = 0$	3.51	2.94	3.20
$Corr(u_i, Xb)$	0.37	0.37	0.46
Hausman test	0.00	0.00	0.00
F-test of strict exogeneity	0.09	0.90	0.20
Wald test 1990-2000	0.80	0.98	0.83
Number of pair	2574	2607	2630

Legend: $^{*}p < .10;^{**}p < .05;^{***}p < .01$. Robust standard errors in brackets. All the specifications include the RTA dummy the time dummies and their interaction with the log of distance.

[14]Estimations with data from Feenstra et al. (2005) and with zero flows have not been reported here for brevity but are available from the authors upon request.

Table 7: North-South Imports and Exports by Category II

	Imports of:				
	[1] Food & beverages Primary - Proces.	[2] Industrial Suppl. Primary - Proces.	[3] Capital Goods & Transport Eq.	[4] Parts & Accessories Capital& Transp. Eq.	[5] Final Goods
Panel A: Imports					
Y_{ij}	0.495***	0.800***	0.766***	0.591***	0.632***
	[0.095]	[0.107]	[0.136]	[0.112]	[0.102]
$Migrants_{ij}$	-0.024	-0.012	-0.016	-0.001	0.011
	[0.019]	[0.017]	[0.024]	[0.021]	[0.016]
Observations	5012	5352	4472	4502	5276
$Corr(u_i, Xb)$	0.30	0.29	0.31	0.42	0.40
F-test all $u_i = 0$	3.04	2.91	1.72	2.04	2.09
Hausman test	0.00	0.00	0.00	0.00	0.00
F-test of strict exogeneity	0.93	0.95	0.80	0.81	0.64
Wald test 1990-2000	0.06	0.66	0.76	0.25	0.58
Number of pair	2304	2428	2252	2261	2439
Panel B: Exports					
Y_{ij}	0.743***	0.923***	0.834***	0.914***	0.907***
	[0.096]	[0.076]	[0.073]	[0.074]	[0.081]
$Migrants_{ij}$	-0.022	-0.009	-0.013	-0.054***	-0.032**
	[0.018]	[0.012]	[0.012]	[0.013]	[0.012]
Observations	5091	5770	5689	5670	5540
$Corr(u_i, Xb)$	-0.01	0.18	0.27	0.25	0.18
F-test all $u_i = 0$	2.64	2.79	2.03	2.33	2.51
Hausman test	0.00	0.00	0.00	0.00	0.00
F-test of strict exogeneity	0.53	0.16	0.76	0.98	0.96
Wald test 1990-2000	0.12	0.77	0.35	0.95	0.58
Number of pair	2361	2552	2542	2534	2505

Legend: $^{*}p < .10$;$^{**}\ p < .05$;$^{***}\ p < .01$. Robust standard errors in brackets.
All the specifications include the log of Partner's and Reporter's real exchange rates, the RTA dummy the time dummies and their interaction with the log of distance.

7 Conclusion

This paper has addressed the empirical question on the relationship between trade and migration in a thorough North-South cross-country framework, where initial differences in factor endowments and technology can let South-North migration help the shaping of trade specialization.

From the descriptive analysis, migration is clearly a growing phenomenon, particularly relevant when past colonial ties are present. Migrants represent an increasing share of industrial countries' labor force, and most of them are high-skilled with tertiary education. At the same time, developing countries have a growing role in manufacturing generally considered, although their vocation is mainly related to primary goods and final products. Northern countries are specialized in more complex goods such as capital goods and transport equipment and industrial supplies.

From the estimation of the empirical model, migration seems to be detrimental for bilateral trade, when the effect is significative, and the results is especially valid for North-South exports: total exports, exports of final and of intermediate goods. Imports on the other hand are generally not influenced, however when an effect emerges the latter is negative and involves total imports and confirms results from Girma and Yu (2002) who find a negative effect of migration from Commonwealth partners on UK imports from the same countries. Then the results we get do not show any evidence of a pro trade effect of migration, either considering total trade flows or differentiating between imports and exports and the various good typologies.

Summing up, migration seems to affect Northern export capability more than the South one, but when overall trade is considered the effect of migration is negative either we consider exports and imports separately or average trade.

These empirical results can be interpreted as a substitution, more than complementarity, between migration and bilateral trade and would evoke the basic prediction of the H-O model. Factor movements, reducing differentials in the relative rates of return of production factors, negatively affect bilateral trade and this is exactly what we observe looking at the overall flows of imports and exports, and overall trade.

The narrowing of relative factor prices in particular erodes Northern comparative advantage in the more capital intensive among the final and intermediate goods. These good typologies are actually the ones that more easily have been transferred from Northern to Southern countries for production. Such a dynamic could therefore account for the substitution effect between labour inflows from the South and Northern exports (towards the South) of final and intermediate goods.

These considerations lead to further developments of the present piece of research in analysing the trade migration nexus not only at aggregate cross-country level but also at firm level, where empirical evidence is still quite scarce.

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Appendix A: Sample of countries

REPORTERS	PARTNERS			
Australia	Afghanistan	Djibouti	Lesotho	Senegal
Austria*	Albania	Dominica	Liberia	Serbia & Mont.
Belgium*	Algeria	Dominican Rep.	Libya	Seychelles
Canada	Angola	Ecuador	Lithuania	Sierra Leone
Denmark	Antigua & Barb.	Egypt	Macao	Singapore
Finland	Argentina	El Salvador	Macedonia	Slovak Rep.
France*	Armenia	Equat. Guinea	Madagascar	Slovenia
Germany	Azerbaijan	Eritrea	Malawi	Solomon Islands
Greece	Bahamas	Estonia	Malaysia	Somalia
Iceland	Bahrain	Ethiopia	Maldives	South Africa
Ireland*	Bangladesh	Fiji	Mali	Sri Lanka
Italy*	Barbados	Gabon	Malta	St. Lucia
Japan	Belarus	Gambia	Mauritania	St. Vincent & Gren.
Luxembourg*	Belize	Georgia	Mauritius	Sudan
Netherlands*	Benin	Ghana	Mexico	Suriname
New Zealand	Bhutan	Grenada	Micronesia	Swaziland
Norway*	Bolivia	Guatemala	Moldova	Syria
Portugal	Bosnia & Herz.	Guinea	Mongolia	Tajikistan
Spain	Botswana	Guinea-Bissau	Morocco	Tanzania
Sweden*	Brazil	Guyana	Mozambique	Thailand
Switzerland	Brunei	Haiti	Nepal	Togo
UK*	Bulgaria	Honduras	Nicaragua	Tonga
USA*	Burkina Faso	Hong Kong	Niger	Trinidad & Tob.
	Burundi	Hungary	Nigeria	Tunisia
	Cambodia	India	Oman	Turkey
	Cameroon	Indonesia	Pakistan	Turkmenistan
	Cape Verde	Iran	Palau	Uganda
	Central Afr. Rep.	Iraq	Panama	Ukraine
	Chad	Israel	Papua N.G.	Un. Arab Emir.
	Chile	Jamaica	Paraguay	Uruguay
	China	Jordan	Peru	Uzbekistan
	Colombia	Kazakhstan	Philippines	Vanuatu
	Comoros	Kenya	Poland	Venezuela
	Congo Dem. Rep.	Kiribati	Qatar	Vietnam
	Congo Rep.	Korea, South	Romania	Yemen
	Costa Rica	Kuwait	Russia	Zambia
	Cote d'Ivoire	Kyrgyzstan	Rwanda	Zimbabwe
	Croatia	Laos	Samoa	
	Cyprus	Latvia	S. Tome & Princ.	
	Czech Rep.	Lebanon	Saudi Arabia	

* Reporter countries not covered in 1990.

Appendix B: Summary Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
Imports of:							
Food and Beverages	overall	6.88	3.35	-6.91	16.06	N =	6890
Primary and Processed	between		3.38	-6.91	15.84	n =	3331
	within		0.98	1.43	12.21	T-bar =	2.07
Industrial Supplies	overall	7.27	3.73	-6.91	17.35	N =	7500
Primary and Processed	between		3.77	-4.83	16.91	n =	3567
	within		1.10	0.26	12.68	T-bar =	2.10
Capital Goods and	overall	5.57	3.75	-4.83	18.17	N =	6258
Transport Eq.	between		3.62	-4.83	17.63	n =	3284
	within		1.20	-0.86	11.25	T-bar =	1.91
Parts and Accessories	overall	5.23	3.79	-6.91	17.39	N =	6320
Cap. Goods and Trans. Eq.	between		3.70	-6.91	17.18	n =	3324
	within		1.08	0.21	9.45	T-bar =	1.90
Final Goods	overall	6.04	3.86	-5.52	18.53	N =	7510
	between		3.86	-5.52	18.22	n =	3643
	within		0.99	0.01	10.74	T-bar =	2.06
Total Imports	overall	8.43	3.80	-5.12	19.36	N =	8830
	between		3.86	-4.71	18.92	n =	4016
	within		1.03	2.27	14.69	T-bar =	2.20
Exports of:							
Food and Beverages	overall	7.05	2.84	-4.61	15.76	N =	7405
Primary and Processed	between		2.83	-4.61	15.57	n =	3519
	within		0.92	0.50	12.19	T-bar =	2.10
Industrial Supplies	overall	7.68	3.21	-4.51	17.49	N =	8661
Primary and Processed	between		3.24	-4.51	17.38	n =	3956
	within		0.84	0.82	12.28	T-bar =	2.19
Capital Goods and	overall	7.72	3.19	-6.91	16.85	N =	8488
Transport Eq.	between		3.19	-4.20	16.83	n =	3923
	within		0.99	2.10	13.34	T-bar =	2.16
Parts and Accessories of	overall	7.07	3.25	-2.78	17.41	N =	8469
Cap. Goods and Trans. Eq.	between		3.26	-2.55	17.41	n =	3908
	within		0.94	0.13	11.06	T-bar =	2.17
Final Goods	overall	6.65	3.16	-5.30	16.11	N =	8238
	between		3.22	-4.14	15.94	n =	3844
	within		0.84	1.21	11.84	T-bar =	2.14
Total Exports	overall	9.00	3.17	-3.00	18.57	N =	9299
	between		3.19	-2.35	18.51	n =	4145
	within		0.82	1.77	16.22	T-bar =	2.24
$Migrants_{ij}$	overall	4.67	3.51	0.00	16.15	N =	9056
	between		3.35	0.00	15.91	n =	4064
	within		1.32	-3.63	10.87	T-bar =	2.23
Y_{ij}	overall	49.43	2.55	41.44	58.59	N =	8460
	between		2.50	41.96	58.15	n =	3681
	within		0.59	47.16	51.51	T-bar =	2.30
Exchange Rate	overall	3.59	3.24	-19.85	14.17	N =	8635
Reporter	between		2.97	-6.93	13.76	n =	3661
	within		1.28	-12.67	16.52	T-bar =	2.36
Exchange Rate	overall	1.01	1.73	-0.60	5.90	N =	9461
Partner	between		1.44	-0.60	5.90	n =	4165
	within		0.92	-2.79	4.36	T-bar =	2.27
RTA Dummy	overall	0.04	0.21	0.00	1.00	N =	9541
	between		0.21	0.00	1.00	n =	4212
	within		0.05	-0.62	0.38	T-bar =	2.27
Distance	overall	8.77	0.70	4.09	9.88	N =	9504
	between		0.72	4.09	9.88	n =	4182
	within		0.00	8.77	8.77	T-bar =	2.27