The Impact of Migration on Foreign Trade: A Developing Country Approach

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The Impact of Migration on Foreign Trade:
A Developing Country Approach *

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Summary

While the causal relationship between migration and trade has not been studied thoroughly, estimation results of gravity model approach suggest that important aspects determining trade volumes can be missed if additional factors, including migration, are not considered. The current paper aims at testing the impact of migration on foreign trade in a relatively closed small economy. We use the data of Bolivia, for the years 1990–2003. We apply gravity model, adding a migration variable to the explanatory variables. We test the impact of both, immigration and emigration on exports and imports and also on intra-industry trade. We use panel estimation including data of 30 trade partners (selected according to higher trade intensity with Bolivia). We control for the economic size and geographical location of trade partners, and for changes in terms of trade.

Previous studies show an increasing effect of immigration on both exports and imports elasticities. Some studies find larger exports elasticity compared to imports elasticity, some vice versa. We could not find any studies on emigration impact on trade. Our results show relatively similar impact of both immigration and emigration on foreign trade. Positive significant effect of immigration on exports and imports is confirmed also in Bolivia, even when the migration flows in Bolivia are not as high as in the case of most countries analyzed previously. We can conclude positive effect of migration flows also on intra-industry trade.

In the following analysis, we intend to control for the impact of trade agreements and openness of trade partners. We will also try to broaden the sample of trade partners used in the current estimation and to test the hypotheses on other developing countries.

1. Introduction

Several studies show that the structure of the national origin of the countries' population plays an important role for trade patterns (see below). For developing countries the relationship can be weaker, as those economies are in the process of structural changes. Still, taking into consideration the impact of the migration flows on trade, the migration policy can be formed more optimally to support the economic development of the country.

We test the hypothesis that the migration flows have significant impact on foreign trade in developing countries but the impact is smaller than in developed countries. We use quarterly data of migration, exports and imports of Bolivia for the years 1990–2003. Following previous studies we apply the methodology of gravity equation. The estimation of the migration data is based on an attrition coefficient for inflows and stocks of migrants. We control for GDP and for traditional trade cost variables: prices and distance and the adjacency of the trade partner. We compare our estimation results to the results of previous studies on developed countries.

The paper is structured as follows. First, the trade and migration linkages are discussed based on existing literature. Second, we describe migration and trade patterns in Bolivia. Third, we explain the methodology applied and the data used. Finally, we introduce the estimation results, followed by conclusions.

2. Trade and migration linkages: theory and empirical evidence

In the literature we can find description of linkages between migration and trade in both directions: 1) impact of foreign trade on migration flows and 2) impact of migration on foreign trade flows. As expected, the migration officials and researchers focus generally on the trade, especially foreign trade policy impact on migration (see e.g. *Morrison* (1982)). Economists, on the contrary, usually study the impact of migration, more precisely the impact of immigration on foreign trade flows (see e.g. *Wagner et al.* (2002) for an overview).

In empirical studies, the effect of migration to trade is more recognized compared to the other way round. *Parsons* (2005) claims that there is "a robust and positive relationship between immigration and bilateral trade flows", but the effect of foreign trade on migration is rather "indirect and not necessarily significant" (*Morrison* 1982, p. 7). *Globerman* (1995) questions the empirical strength of the relationship, as Canada's trade shares have not risen with two of

its sources of new immigrants, Hong Kong and India. Still, next, the migration and trade linkages are referred to as in the context of migration influencing foreign trade.

There are several mechanisms through which immigration might facilitate trade (see for discussion *Globerman* (1995)). Usually, the immigrants' role in expanding trade with their country of origin has been seen in their lower transaction costs, but also in their different preferences compared to non-immigrants. Generally, the following reasons for positive linkage from migration to trade are listed (*Head and Ries* (1998)):

1) Immigrants' superior knowledge of market opportunities,

2) Immigrants' preferential access to market opportunities,

3) Immigrants' preferences for particular varieties of foreign products (incl. their home countries).

As several studies show[3], not only transportation costs limit trade but also transaction costs. According to *Head and Ries* (1998), "immigrants may serve a role as trade intermediaries". Immigrants may have lower costs for international trade with their home countries and can therefore be more likely to trade compared to non-immigrants.

Parsons (2005) refers to the studies of immigration on trade as "immigrant-link studies". We can find about ten published and available studies from 1990s and 2000s, exploring the impact of immigration on trade. More studies have been implemented on the United States and Canada (*Gould* (1994), *Dunlevy and Hutchinson* (1999, 2001) on the United States and *Head and Ries* (1998) and *Wagner et al.* (2002) on Canada), reflecting the relevance of the topic for countries with a strong immigrant inflow. Additionally, there are studies on UK (*Girma and Yu* (2002)), French departments (*Combes et al.* (2003)) and on the European Union (*Parsons* (2005)). There is only one study by *Rauch and Trindade* (2002), which integrates several (63) countries into a common network to explore the migration effects on trade (see Annex 1).

The focus of the studies varies across the articles, covering e.g. differentiated products only (*Gould* (1994), *Dunlevy and Hutchinson* (1999, 2001)) or all products, or discussing immigration heterogeneity (*Head and Ries* (1998)) or business networks (*Rauch and Trindade* (2002)). We can distinguish the studies exploring either cross-border (referring here to the national border) trade or migration or studies restricting to the intra-country flows, i.e. across

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[3] See e.g. *McCallum* (1995) for finding higher trade between Canadian provinces compared to equal distant states in the United States.

French departments (*Combes et al.* (2003)) and Canadian provinces (*Wagner et al.* (2002)). We could argue that the motives and processes occurring within a country differ significantly from the ones of cross-border character.

The impact of immigration on trade depends, among other factors, also on the composition on trade flows. In Canada, for example, the main export categories, natural resources and US-bound automotive goods, are not likely candidates for transaction cost reductions by immigrants, as the main share of immigrants originate from East Asian economies (*Head and Ries* (1998)). At the same time we can assume that migration flows can affect also the composition of trade flows, i.e. introducing new product flows or amplifying product flows with historically low importance.

The studies on immigration impact on trade use the methodology of gravity equation that has been a popular approach for estimating trade flows in general (especially in terms of actual vs. expected trade flows). In previous studies, the authors have added several specific explanatory factors, in addition to general "standard" gravity equation explanatory factors (GDP, population, distance).

The results, although estimated on several countries and for very different time periods, are quite homogenous. The exports and imports elasticities range from 0.01 to 0.47. In some studies the exports elasticities have been estimated to be higher that the imports elasticities (e.g. Gould (1994), *Combes et al.* (2003)), while in the others the results are the opposite (e.g. *Heas and Ries* (1998), *Dunlevy and Hutchinson* (1999, 2001)). The relative magnitude of the effect on exports and imports seems to vary across countries.
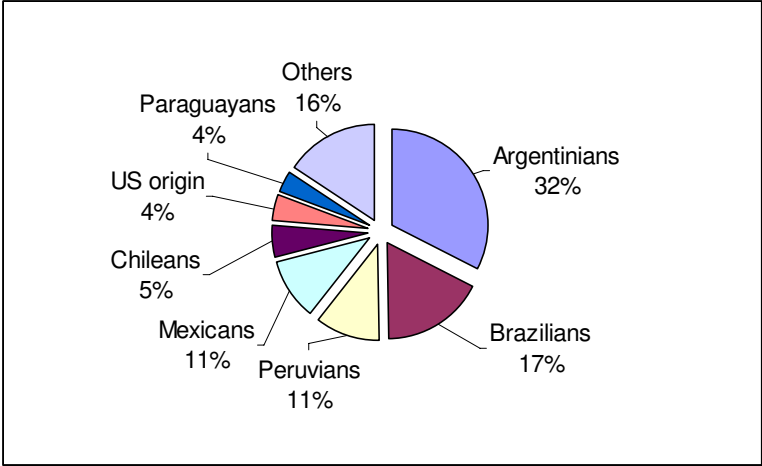

3. Cross-Border migration and trade patterns in Bolivia

3.1. Nation structure and migration flows in Bolivia

Bolivia is a very homogenous country with a small number of inhabitants having some other nationality. About one third of immigrants are from Argentina, followed by Brazil and Peru, i.e. from the neighboring countries of Bolivia (see Figure 1). A relatively large share of immigrants is also from Mexico, followed by Chile, the United States and Paraguay. The share of immigrants from the other countries in total foreign-born population remains below 2%.

Compared to National Census of Bolivia 1992 statistics, the general structure of foreign-born population has remained similar. The proportion of Chileans and Paraguayans has slightly increased, while that of Mexicans, Canadians (from 3% to 2%) and the United States origin people has slightly decreased.

Figure 1. Structure of foreign-born population in Bolivia, 2001

Source: National Census of Bolivia, 2001

The arrivals and departures statistics by nationality shows that the number of immigrants in Bolivia is increasing (*National Statistical Office*). The largest number of people entering and not leaving the country was from Peru; the increase of immigrants from other countries (Ecuador, Argentina, and the United States) was much smaller.

Bolivia, like many developing countries, is affected by two types of emigration: the first is related to highly qualified people, including professionals and technicians, also called "brain flow", which has a low demographic effect but a great impact in human capital reduction terms. The other type is the emigration of less qualified people who generally move to the adjacent countries which has a bigger impact on the population growth of the home country. In general, most of the less qualified Bolivians move to Argentina. This is mainly because of the better conditions that this country had in the past, especially before the crisis of 2002.

The main reasons for people to move are related to better life and work expectancies in a foreign country, but also adverse economic, social and political conditions in the home country. Bolivia has faced difficult times over the last years: the unemployment rate has increased from 5% to 8% during the last 10 years and it is a country with the biggest informal employment sector in the region (over 60% of the employed are working in the informal sector).

There are two ways to estimate emigrants. The first is the use of data available from censuses of recipient countries. The data is provided by the Economic Commission for Latin American and Caribbean (ECLAC) at the United Nations. The second approach is to make estimations based on changes in the domestic population. The estimations of the National Statistical Office of Bolivia show that Bolivia has lost 155,000 inhabitants between 1980 and 1985, 103,000 people during the period 1985–1990, 50,000 more over the years 1990–1995, and 35,000 during 1996–2000 (Ministry of Sustainable Development 2004). The estimation for 2000–2005 is 30,000 people. The projections show that the country has lost highly qualified people and less qualified people as well, but at a decreasing rate over the last 20 years.

Most of the Bolivians have moved to the United States and Argentina. According to census data from Argentina, since 1969 the number of Bolivian immigrants has increased more than 1500%. Over the last period this growth rate has decreased but is still high. According to the *Ministry of Sustainable Development of Bolivia (MDS)* (2004), most of the Bolivian immigrants to Argentina are less qualified people (generally peasants, and people with only primary education) that end up working in low-paid jobs – a situation similar to Mexican migrants moving to the US.

The second biggest Bolivian migrants recipient is the United States, where the number of Bolivian migrants has increased considerably. Over the period 1970–1990 the number of people born in Bolivia but living in the US increased five times, and over the period 1970–2000 seven times. The difference between the migrants that move to the US and those leaving for Argentina is that the former are in general more qualified people. According to the *MDS* (2004), on average this group has a secondary or post-secondary education.

Regarding the Andean community, emigration to these countries from Bolivia has not been considerable, accounting for less than a half of the migrants to Argentina among all the Andean countries. because the reason could be that most of the Andean countries (Peru, Ecuador, Venezuela, Colombia) are perceived to offer similar conditions to the ones present in Bolivia, i.e. countries characterized by low average income.

There are no data available for Bolivian emigrants in European countries or other countries not mentioned above. Although the number of Bolivian emigrants in those countries is expected to be low compared to the Caribbean and Andean countries and the United States, the availability of currently missing data would still give some important information, especially for the countries with relatively intensive trade and other economic contacts with Bolivia.

3.2. Trade patterns in Bolivia

Bolivia is a relatively closed economy in terms of trade flows, the overall merchandise trade amounting to 60% of GDP in 2004. During the 1970s Bolivia was mostly a self-providing economy. International trade started to develop more at the end of 1980s after the adoption of a government decree that liberalized prices and favored the development of international trade of Bolivia, in 1985. The decree was applied as a package of policies after a hyperinflation period and helped to stabilize the economy following the Washington Consensus and started what is known in the country as the neo-liberal period. The commercial policy enabled to unify customs tariffs in order to promote exports.

The liberalization of foreign trade took place mainly in 1985–2000. The main increase of foreign trade resulted from the much stronger (15%) rise in imports compared to exports. At the beginning, the exports were not that much influenced by liberalization, due to weak policies and compensation mechanisms (*Antelo* (2000)). One reason for strong import growth was the deduction of import tariffs from 20% to 10%. The other reason why exports remained lower than the imports was the decline in export prices compared to import prices, i.e. the worsening of terms of trade.

Since 1989, Bolivia has been participating in GATT and is a member of WTO. In order to improve access to export markets, Bolivia has signed several regional trade agreements and has improved the existing agreements. During the 1990s, Bolivia signed several partial integration agreements through the Latin American Integration Association (LAIA): Peru (1992), Chile (1993) and MERCOSUR (1997), and a free trade agreement with Mexico (1995). Moreover, Bolivia is a beneficiary country of the Andean Trade Preference Act (1991) of the United States and the Andean Generalized System of Preferences (1990) of the European Union. Both agreements granted preferential tariffs as a support for the Andean Community's war on drugs, under the principle of shared responsibility. Recently, Bolivia signed a partial integration agreement with Cuba (2000) and is a beneficiary country of the Andean Trade Promotion and Drug Eradication (ATPDEA).

During the period 1991–1997, trade policies concentrated on expanding the export markets for Bolivian goods by signing trade agreements with the main trading partners. Bolivia signed agreements with Chile, Mexico and MERCOSUR and became a full member of WTO in 1995. Both imports and exports grew strongly during the period of increased integration. For example, both imports and exports increased significantly right after signing the agreements with MERCOSUR in 1997 mainly owing to manufacturing and gas.

A major accomplishment during the 1990s was the approval of the Export Tax Law in 1993, which compiled and consolidated a range of previous rules regarding exports. The law stipulates: 1) free exports and imports without any license or permission, and 2) government guarantees for international export financing. Moreover, the government created six free trade zones (FTZs). Currently, FTZs exist in the three main cities and in three cities on the borders of Brazil and Peru. They have not yet proven attractive for investors, though, because of the lack of roads and other basic infrastructure.
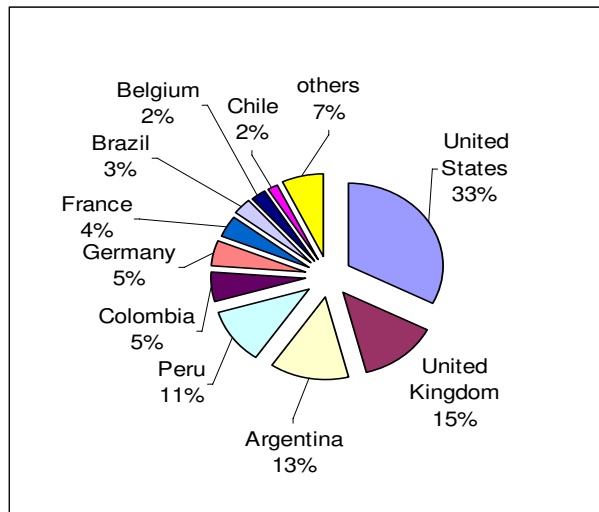
The performance of trade grew steadily until 1998, when the level of trade started decreasing as a result of external shocks and the implementation of the Customs Law in 1999. The latter had the objective of decreasing illegal imports and increasing the recollection of import tariffs. The period 1998–2002 was characterized by economic recession and the government implemented several temporary policies so as to revive the economy. Among these were tariff reductions on capital goods from 10% to 5% and tax exemptions for exporters.

In 2004, the exports and imports constituted close to 60% of nominal GDP, compared to around 50% in the preceding decade. In Bolivia, imports exceeded exports in 1990s, achieving the highest level in 1998. In 1999, a new customs law was applied which had a direct adverse impact on imports, even though the objective of the law was to control illegal imports and collect more import tariffs. After the decline in 1999–2001, imports have stabilized at around 1.8 billion USD in recent years. Exports were more stable in 1990s, starting to increase significantly in 2003 and exceeding imports in 2004.

Compared to 1985, foreign trade with South American countries has increased from 36% to 46% in 2004. The main trade partners both in terms of exports and imports are in South America and in Europe. The volumes of imports and exports are comparable with those of South American trade partners. The imports from North America and Europe differ remarkably; after the abolishment of the embargo the imports from Asia has increased from 2.6% to 7.3%.

Bolivian foreign trade is relatively strongly concentrated with the three main trade partners constituting over 50% of exports (see Figure 2) as well as imports (see Figure 3). As to exports, the concentration is somewhat higher compared to imports.
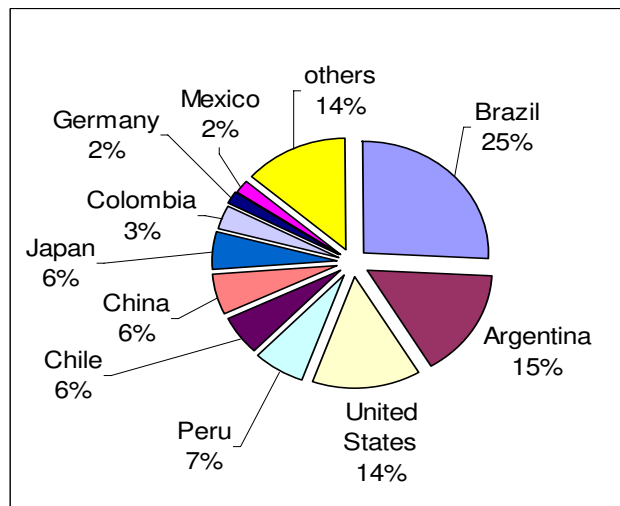
Figure 2. Exports and imports (right panel) partners of Bolivia, 2004

Source: National Statistical Office of Bolivia

Among the main trade partners we find adjacent neighbors of landlocked Bolivia. Out of five adjacent countries, Brazil and Argentina have been among the main trade partners over the observed 15 years. The trade with Chile and Peru has been somewhat less intensive, still constituting a significant part of Bolivian trade. The ranking and the share in total exports and imports of the adjacent countries vary across years, but they have always been among the top ten trade partners of Bolivia in terms of volumes. Trade with the remaining neighbor of Bolivia, Paraguay, is less important, accounting for less than 2% of the total trade.

Figure 3. Imports partners of Bolivia, 2004

Source: National Statistical Office of Bolivia

Among the overseas countries, the United States is one of the three main trading partners, both in exports and imports. Over the years, trade with Germany has also been relatively

important. In exports, the United Kingdom has remained one of the most important partners whereas the share of Belgium has somewhat decreased. In imports, Japan has been a relatively important partner, and in recent years also China.

Before 1990s, Bolivia could have been characterized as a mono-exporter, as its main export articles were minerals. Since 1990, mining has been partly substituted by soya, wood, natural gas and jewelry that are dependent on the fluctuation of world prices. On the other hand, the imports structure has not changed considerably. Bolivia is an importer of processed products and in a low scale material prima. These two categories account for over 75% of imports.

4. Methodology and data

For the measurement of the migration impact on trade flows we apply the traditional gravity model approach (see e.g. *Bergstrand* (1985)), as was done also in the studies referred to in the first chapter. In addition to generally used variables in gravity equation – GDP, prices, distance and adjacency of the trade partner –, we add a migration variable. We estimate separate models for exports and imports.

We estimate three sets of models. The first two test the impact of migration on exports and imports of Bolivia, and the third focuses on the impact on intra-industry trade. First, we estimate the impact of immigration on exports and imports (see equations 1 and 2, respectively) and second, the impact of emigration on exports and imports (see equations 3 and 4, respectively):

$$\ln EXP_{it} = c + \beta_1 * \ln GDP_{it} + \beta_2 * CPIM_{it} + \beta_3 * \ln DIST_i + \beta_4 * ADJ_i + \beta_5 * IMMI_{it} + \varepsilon_{it}, \quad (1)$$

$$\ln IMP_{it} = c + \beta_1 * \ln GDP_{it} + \beta_2 * CPIM_{it} + \beta_3 * \ln DIST_i + \beta_4 * ADJ_i + \beta_5 * IMMI_{it} + \varepsilon_{it}, \quad (2)$$

$$\ln EXP_{it} = c + \beta_1 * \ln GDP_{it} + \beta_2 * CPIM_{it} + \beta_3 * \ln DIST_i + \beta_4 * ADJ_i + \beta_5 * EMI_{it} + \varepsilon_{it}, \quad (3)$$

$$\ln IMP_{it} = c + \beta_1 * \ln GDP_{it} + \beta_2 * CPIM_{it} + \beta_3 * \ln DIST_i + \beta_4 * ADJ_i + \beta_5 * EMI_{it} + \varepsilon_{it}. \quad (4)$$

The notations c and $\beta_1 \ldots \beta_5$ denote parameters, ε denotes the residual, i and t denote countries and years, respectively. The explanation of acronyms is given in Annex 2.

For intra-industry trade, we estimate similar equations with the immigration and emigration variable (see equations 5 and 6). As a measure of intra-industry trade, we use the traditional Grubel-Lloyd index (*GL*) as an endogenous variable:

$$GL_{it} = c + \beta_1 * \ln GDP_{it} + \beta_2 * CPIM_{it} + \beta_3 * \ln DIST_i + \beta_4 * ADJ_i + \beta_5 * IMMI_{it} + \varepsilon_{it}, \qquad (5)$$

$$GL_{it} = c + \beta_1 * \ln GDP_{it} + \beta_2 * CPIM_{it} + \beta_3 * \ln DIST_i + \beta_4 * ADJ_i + \beta_5 * EMI_{it} + \varepsilon_{it}. \qquad (6)$$

Intra-industry trade is trade in similar products, i.e. a country exports and imports very similar heterogeneous products. The higher the share of intra-industry trade in the total trade of a country, the more integrated are the economies of the trade partners (see for discussion e.g. *Borkakoti* (1998)). For the Grubel-Lloyd index we use the original approach (*Grubel, Lloyd* (1975)). The index enables to measure the ratio of matching (overlapping) trade flows (numerator) in the total trade (denominator) with each trade partner:

$$GL_n = \frac{(X_n + M_n) - |X_n - M_n|}{X_n + M_n}, \qquad (7)$$

where *X* denotes exports and *M* imports of each product category *n* traded. Complete intra-industry trade can be concluded, if *GL*=1 and complete inter-industry is measured, if *GL*=0. If there is some overlapping of exports and imports (existence of two-way trade flows), the value of index remains within the range of 0…1. The *GL*-index is calculated for each product group for each trade partner. For calculating the total *GL* index across all product groups for each trade partner, *GL* indices are summed after weighting each GL_n by the share of trade of product group *n* in the total trade with the respective trade partner:

$$GL_i = \sum_{n=1}^{N} \left(\frac{X_n + M_n}{X_i + M_i} * GL_n \right), n = 1....N. \qquad (8)$$

Gravity model is explicitly multiplicative in form. Therefore, we estimate the model described in previous equations in a logarithmic way with pooled regression across countries *i* and years *t*. The data availability limitations restrict our estimation period to 1990–2003; we use annual merchandise trade data available from the National Statistical Office of Bolivia. We use data of 30 trade partners, excluding countries with low trade intensity with Bolivia. In order to capture the trade effects arising from heterogeneous products we exclude the trade in natural resources.

For immigration we have census population data for Bolivia for 1992 and 2001 from national statistics, which includes the nationality structure of population. In addition, we have data on people entering and leaving the country by nationality for 2002 and 2003 from the national statistical office. Based on the arrival data of 2002 and 2003 we calculate the annual immigrant stocks for the years 1990 and 1991, 1993–2000 and 2002–2003, i.e. for the years

when there was no census data. In calculations of immigrant stocks we follow the approach of the attrition coefficient applied in *Head and Ries* (1998).

For emigration we have census population data for the population born in Latin America and Caribbean by the country of residence according to the country of birth, covering 20 countries, provided by the Economic Commission for Latin American and Caribbean program of Latin American International Migration. The census years vary across countries; for some countries data are available only until 1996. For the emigration variable we also use the data on people entering and leaving the country by nationality for 2002 and 2003 and the approach of attrition coefficient to calculate stocks Bolivians in Latin-American and Caribbean countries and in United States and Canada for each year in 1990–2003.

To calculate the *GL*-indices, we use trade data across 7-digit product group codes, amounting to 18,745 possible product groups for each country. However, the number of product groups traded varies remarkably across years. The number of product groups exported is much smaller than that of product groups imported, automatically reducing the possibilities for intra-industry trade (trade overlap, two-way trade).

Instead of the actual consumer price index often added to gravity equations, we use the ratio of consumer price index in trading partner to consumer price index in Bolivia, denoted with the acronym *CPIM*. Using the ratio, we can control for the impact of depreciation of national currency.

We expect the trade flows to be positively influenced by the migration flows. We assume one of the essential factors of driving the foreign trade to be the differences of the product range available in the different countries. To follow the consumption preferences formed in the country of origin, migrants tend to look for the import possibilities from their home country. Intensions to export from the host country to the home country are expected to be somewhat weaker as the exported goods need to be introduced first in the migrants' home country. Therefore the impact of migration on the exports of the host country is expected to be smaller compared to the impact on imports.

5. Estimation results

Comparing regression results across three different specifications of models, it is necessary to denote different samples included in estimations. The samples are different due to the availability of data for emigrants.

Pooled data estimation of the models explained above gives results broadly in line with expectations. Control variables, GDP, distance and adjacency measures are statistically significant and with expected direction of impact (sign of coefficient; except for adjacency variable in the intra-industry model with the emigration variable) (see Table 1).

Table 1. Gravity equation estimates

Explanatory Variables	Number of the model estimated with the respective endogenous variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	EXP	*IMP*	*EXP*	*IMP*	*GL*	*GL*
Constant	35.713***	16.544***	37.702***	18.814***	0.187*	0.140***
	(2.957)	(2.349)	(2.942)	(2.300)	(0.108)	(0.037)
GDP	1.923***	1.386***	1.644***	0.112***	0.012**	0.008***
	(0.088)	(0.070)	(0.143)	(0.102)	(0.005)	(0.002)
CPIM	-0.514***	-0.425***	-0.471***	-0.376***	-0.010*	-0.009**
	(0.156)	(0.124)	(0.154)	(0.121)	(0.006)	(0.004)
DIST	-6.610***	-3.001***	-6.423***	-2.779***	-0.045***	-0.164***
	(0.452)	(0.144)	(0.454)	(0.356)	(0.017)	(0.033)
ADJ	-4.598***	-0.839**	-4.997***	-1.309***	0.034*	-0.032***
	(0.504)	(0.400)	(0.526)	(0.411)	(0.019)	(0.005)
IMMI	0.083***	0.089*				0.006***
	(0.024)	(0.049)				(0.002)
EMI			0.030***	0.035***	0.037**	
			(0.118)	(0.009)	(0.019)	
R2	0.756	0.773	0.762	0.785		
No. of observations	192	192	192	192	192	360

Note: Significant at (*) 10 percent (**) 5 percent (***) 1 percent, standard deviations in brackets

The estimated coefficients of GDP vary relatively much ranging from lower coefficients in the intra-industry models (0.008 and 0.012) to 1.923 in the exports model with the immigration variable. Interestingly, the impact of the size of the economy of the trade partners affects more exports than imports. As expected, distance reduces trade and adjacency increases trade (for adjacency not confirmed by the intra-industry model with the emigration variable). Somewhat surprisingly, the distance of a trade partner has a bigger effect on exports than on imports.

The effect of the depreciation variable *CPIM* is statistically significant in all models but has somewhat unexpected direction. According to the estimation results, the depreciation of a

national currency would raise exports, but surprisingly it would have the same effect on imports.

Concerning the main focus of the paper some surprising facts have been found. The coefficients of all migration variables, both emigration and immigration, are positive, indicating the increasing effect of both types of migration on foreign trade. According to the estimation results, both migration variables (emigration and immigration) have a statistically significant increasing effect on all types of trade observed: exports, imports and intra-industry trade.

Elasticities of immigration show that a 10 percent increase in the stock of immigrants would increase both imports and exports by about 0.80...0.90 percent (models 1 and 2). Immigrant knowledge lowering transactions costs has an almost equal effect on imports and exports. The result that the elasticity of imports is higher than of exports is consistent with the theory and empirical evidence since the knowledge of the home market may serve to increase both imports and exports, but preferences for home-country goods increases only imports. Comparing these results with the ones presented in developed countries like Canada, we see that in Bolivia the exports elasticity of immigration is nearly similar (in Canada 1 percent) while imports elasticity is much higher in developed countries.

Numerical results of the elasticities of emigration again show a relatively equal impact on exports and imports, but the values of coefficients are somewhat lower, indicating that a 10 percent increase in the stock of emigrants in a respective country would increase both imports and exports with that country by about 0.30 percent (models 3 and 4). Also, similarly to immigration results, emigration has a slightly bigger effect on imports somehow showing the home bias that exists on the consumption of goods. It can be expected that the emigrants have a bigger impact on net trade.

We could conclude that both immigration and emigration support trade flows. We cannot draw conclusions based on the comparison of numerical values of elasticities of immigrants and emigrants, as the coefficient values can be affected by sample size differences. We could still argue that the impact of immigration may be bigger, due to the fact that most Bolivian emigrants are less qualified people and their possibilities of trade creation are reduced since they move to other countries to earn and save money, whereas the immigrants in Bolivia are generally more qualified people with capital which increases the possibilities of trade creation. This can be also seen by the exports elasticity of immigrants, which is almost the same as for developed countries with a higher share of immigrants.

Regarding intra-industry trade (models 5 and 6) we can also conclude that both emigration and immigration increase intra-industry trade as they support the overall trade development. The impact of emigration is estimated to be of comparable size with the impact on the overall exports and imports while the impact of immigration is much lower. This opposite result compared to the impact on overall exports and imports and needs to be analyzed further.

6. Conclusions

While the impact of migration on trade in developing countries has not been analyzed previously the current estimation results confirm the existence of statistically significant positive effect of both immigration and emigration on trade flows in a relatively closed economy of Bolivia. In comparison to developed countries, migration can have a weaker effect on a country going through extensive structural changes that is also evident from the estimation results. Bolivia is one of the poorest countries in Latin America and the Caribbean but it has witnessed an increase in its exports during the last ten years that has been favored by trade agreements signed by the country and the discovering of important resources. The data shows an increase in the level of immigrants in Bolivia; most of them are qualified people who try to make business and take advantage of the potentialities of the country, which encourages the increase of bilateral trade. Flows of emigrants have increased, too.

For the estimation of the impact of migration on trade we use gravity models following the approach of previous studies in the field. Supporting the hypothesis raised, migration has a significant positive impact on Bolivian bilateral trade, both in terms of exports and imports and by immigration and emigration. The estimated coefficients indicate that a 10 percent increase of immigrants leads to 0.8…0.9 percent increase in imports and exports, which is similar compared to the results obtained in previous studies, e.g. for Canada. For the emigration effect we get smaller magnitudes.

We also tested the impact of migration on intra-industry trade. The results also showed a positive effect, though in a smaller magnitude in the case of immigration. The results are compatible with the economic content as intra-industry trade usually develops after traditional trade relations are exploited. Therefore, first the overall trade needs to increase after which intra-industry trade starts to grow more significantly.

Taking into account the differences in development and in the size of migration population between Canada and Bolivia, it is important to point out that in both countries the effect of

migration on exports is similar. This has policy implications since the effect of immigration in Bolivia has a positive effect on trade, especially to support the exports of commodities increasing the revenues for the country and therefore also the GDP. Unfortunately, due to social and political problems this potential is not being exploited sufficiently in Bolivia. Security policy and the advantages of immigrants would help to increase trade with a special impact on exports since the impact difference on exports and imports is negligible.

The next steps of the research include the inclusion of more trade partners in the sample, the inclusion of dummy variables for trade agreements to control for trade creation and trade diversion in trade patterns. Additionally, we intend to test the potential impact of migration by commodity groups and countries.

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Annex 1. Previous studies on trade and migration linkages

Authors	Sample and period	Additional complexities of interest	Export elasticity[*]	Import elasticity
Gould (1994)	US and 47 partners, 1970–86	Differentiated products	0.02	0.01
Head and Ries (1998)	Canada and 136 partners, 1980–92	Canadian immigration policy – i.e. immigrant heterogeneity	0.10	0.31
Dunlevy and Hutchinson (1999, 2001)	US and 17 partners, 1870–1910	Differentiated products	0.08	0.29
Girma and Yu (2002)	UK and 48 partners, 1981–93	Individual vs. non-individual effects	0.16	0.10
Combes et al. (2003)	95 French Departments, 1993	Intra- i.e. separate departments	0.25	0.14
Rauch and Trindade (2002)[***]	63 countries, 1980, 1990	Business networks, differentiated and homogenous products	0.47	0.47
Wagner et al. (2002)[**]	5 Canadian provinces, & 160 partners, 1992–95	Common Language and random encounter specification	0.16	0.41
Parsons (2005)	EU-15 & 15 EU-expansion countries, 1994–2001	none	0.12	0.14

Sources: Wagner et al. (2002) and Parsons (2005)

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[*] Trade elasticities with respect to immigration.
[***] Estimation with differentiated products.
[**] Estimation without fixed effects.

Annex 2. Acronyms and data used in estimations

Acronym	Data	Unit	Source
EXP	Exports from Bolivia to country *i*	national currency	National Statistical Office
IMP	Imports from country *i* to Bolivia	national currency	National Statistical Office
GDP	GDP of country *i*	PPP$	World Development Indicators (World Bank)
DIST	Distance from capital of Bolivia to the capital of country *i*	km	CEPII
IMMI	Migrants from country *i* to Bolivia	person	National Statistical Office
EMI	Migrants from Bolivia to country *i*	person	National Statistical Office
ADJ	Dummy variable for adjacency of country *i; ADJ*=1, if the country *i* is adjacent to Bolivia and *ADJ*=0 otherwise		Own
CPIM	Ratio of a consumer price index for country *i* to consumer price index of Bolivia $CPIM=CPI_i/CPI_{bol}$	index	World Development Indicators (World Bank)