



Attribution–NonCommercial–NoDerivs 2.0 KOREA

You are free to :

- **Share** — copy and redistribute the material in any medium or format

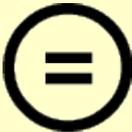
Under the following terms :



Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.



NonCommercial — You may not use the material for [commercial purposes](#).



NoDerivatives — If you [remix, transform, or build upon](#) the material, you may not distribute the modified material.

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation.

This is a human-readable summary of (and not a substitute for) the [license](#).

[Disclaimer](#) 

**Master's Thesis**

**Immigration – Trade Nexus:**

**the Case of the EU**

**이민과 무역 관계: EU 의 경우**

**August 2015**

**서울대학교**

**국제대학원 국제통상**

**Matsiuk Nadiia**



Immigration – Trade Nexus:  
the Case of the EU

이민과 무역 관계: EU 의 경우

Kim Chong Sup

Submitting a master's thesis of International Commerce

July 2015

Graduate School of Seoul National University

International Commerce, Graduate School of International  
Studies

Matsiuk Nadiia

Confirming the master's thesis written by Matsiuk Nadiia

June 2015

Chair Rhee Yeong Seop

Vice Chair Eun Ki Soo

Examiner Kim Chong Sup





## Abstract

# Immigration – Trade Nexus: the Case of the EU

Matsiuk Nadiia

International Commerce, Graduate School of International  
Studies

Graduate School of Seoul National University

Bearing in mind the intensification of international migration flows nowadays, this study contributes to the discussion on the reciprocity of international migration flows and the links between international migration and other aspects of globalization, namely international trade in goods. The empirical findings of the study concerning immigration and trade of the EU contribute to the notion of international migration and international trade being complementary phenomena.

The EU was chosen as a focus of this research, as in the last decades the region has been at the heart of immigration processes as well as policy developments. Besides, most of the previous studies on the relationship between migration and trade having been conducted on a single country basis, this study contributes to the literature by examining all the EU countries over the lengthy period of time.

Regression analysis of the gravity model of trade augmented with immigration variables that encompassed the countries of EU and their trading partners for the years 2000 to 2012 showed that immigration to the EU tends to have a trade-creating effect. All the models used in this study (OLS for pooled data, OLS for panel data with fixed and random effects, Poisson Pseudo Maximum Likelihood Estimation) showed consistent results (with all the variables being statistically

significant). However, PPML estimation was chosen as the least biased and more efficient estimator.

According to the findings, the trade-creating effect of immigration tends to be stronger for import from a migrant-sending country to a migrant receiving country, than for the export from the receiving to the sending country. This can be explained by the combination of network and preference effects.

The immigration elasticity of trade turned out to be higher for the EU-EU trade than for the EU-non-EU one. Liberalized movement of people had a bigger beneficial effect on intra-regional trade.

**Key words: international migration, international trade, EU, gravity model.**

**Student ID: 2013-23971**

## TABLE OF CONTENTS

---

---

List of tables.....	ii
List of figures.....	iii
I. INTRODUCTION .....	1
II. CURRENT TRENDS .....	6
1. Global trends in international migration .....	6
2. European Union as a migration destination .....	10
3. EU trade: main tendencies .....	22
III. INTERNATIONAL MIGRATION AND TRADE: THEORY .....	28
1. From substitutes to complementaries.....	28
2. Causal links between migration and trade augmentation.....	30
IV. TRADE-CREATING EFFECT OF MIGRATION: PREVIOUS STUDIES REVIEW .....	32
1. Conventional methodological approach .....	32
2. Mixed evidence on trade-creating effect of immigration.....	33
3. Studies focusing on the EU.....	36
V. IMMIGRATION AND TRADE NEXUS IN THE EU: GRAVITY MODEL ..	38
1. Hypotheses.....	38
2. Gravity model used in this study .....	39
3. Data and data preparation .....	43
4. Preliminary data analysis .....	45
5. Methodology.....	48
6. Findings and interpretation .....	54

7. Limitations of this study .....	61
VI. CONCLUSIONS.....	63
VII. BIBLIOGRAPHY .....	65
VIII. APPENDIX .....	71

## LIST OF TABLES

---

Table 1: International migration in context.....	6
Table 2: World migrant population by development regions.....	7
Table 3: World migration by geographical regions.....	8
Table 4: EU-28 by member-state: migration profiles .....	13
Table 5: The shares of native-born and foreign-born population by education level in selected EU countries in 2010-2011 .....	16
Table 6: Gravity models used in this study .....	42
Table 7: List of variables and their sources (data for years 2000-2012).....	43
Table 8: Summary statistics for the Flow model.....	46
Table 9: Summary statistics for the Stock model.....	46
Table 10: Correlation matrix for the immigrant Flow model.....	47
Table 11: Correlation matrix for the immigrant Stock model.....	48
Table 12: Pooled data OLS regression results.....	54
Table 13: Fixed time effect regression results.....	55
Table 14: The results of PPML estimation.....	57
Table 15: PPML estimation of the model for EU-EU countries trade and migration.....	59
Table 16: PPML estimation of the model for EU-non EU countries trade and migration.....	60

## LIST OF FIGURES

---

Figure 1: International migrant stock by geographical area.....	9
Figure 2: Migrant stock in the EU countries, 2004-2013.....	11
Figure 3: Net immigrant flow to the EU, 1995-2013.....	20
Figure 4: Net migration dynamics in the EU, 1995-2013.....	21
Figure 5: EU trade flows, 1999-2013.....	23
Figure 6: World share of EU trade, 1999-2013.....	24
Figure 7: Intra and extra-EU trade, 1999-2014.....	25



## I. INTRODUCTION

---

*“Migration is at the heart of the political debate in the EU and, for a few years now, is one of the strategic priorities of the external relations of the Union. Carefully managed, it can be a positive factor for growth and success of both the Union and the countries concerned.”*

*EU External Action Service<sup>1</sup>*

*“The EU can manage immigration better in order to benefit from increased mobility that a globalized world affords”*

*European Economic and Social Committee<sup>2</sup>*

While globalization is deemed a controversial issue, one particular aspect of it, international migration, spurs the most ardent debate. Unlike trade and global movement of capital, international migration affects not only economic sphere of societies involved, but it also bears a potential direct impact on the also socio-cultural one. Thus, the consequences of migration are deemed less predictable or less beneficial than those of international trade, for instance. Though the movement of people has been an intrinsic feature of the human history, under modern nation-state socio-economic setting it tends to be rather undesired, as opposed to the liberalization of movement of goods or international capital that marked the post-WWII period.

---

<sup>1</sup> EU External Action Service, Migration and Asylum in External Relation (policy introduction) <http://eeas.europa.eu/migration/>

<sup>2</sup> European Economic and Social Committee.

<http://www.eesc.europa.eu/?i=portal.en.events-and-activities-eu-immigration-policy>

Despite its controversy in the eyes of the nations and governments, migration flows are gaining momentum. According to the UN estimates, 213 million people (or 3.2% of world population) resided out of their country of birth in 2013<sup>3</sup>, with Europe, especially European Union, being the largest region of migrant concentration. In comparison, in 1990 the number of international migrants stood at 155 million.

Why are migration flows growing? The reasons behind this process are the same as those behind the other forms of globalizations (trade and capital movement), namely technological advancement and the resulting global interconnectedness. Nevertheless, while the majority of countries choose to participate in international trade and open their markets to international capital, international migration remains generally restricted and very conditional.

Why does the world witness such an opposition to international migration? International migration is often regarded to be a “one-way street” without positive effects for receiving countries (Hatton, 2006<sup>4</sup>). Thus, reciprocity is missing from international migration policy discourse that in turn narrows down the scope of its possible liberalization.

Leaving aside the socio-cultural considerations, another arguments in favor of restricting international migration has been the view that international migration displaces (or substitutes for) international trade. According to the factor-price equalization theorem goods trade substitutes for factor trade. As the relative prices

---

<sup>3</sup> UN, Department of Economic and Social Affairs, Population division.

<sup>4</sup> Based on the opinion survey of 25.000 individuals from 24 countries in 1995-1996. For more details see Hatton, T. (March 2006) Trade policy and migration policy: why the difference? Department of Economics, University of Essex. Available at: <https://www.tcd.ie/iis/documents/archive/seminar%20papers/HattonTradeMigration2.pdf>

for goods converge as a result of trade, the relative prices for capital and labor converge across trade partners. The above statement was challenged by proponents of the complementarity-type relationship between international migration and trade. The latter often start their criticism from the assumptions of factor-price equalization theorem.

Nevertheless, the substitution-type relationship view seems to prevail among the policy makers<sup>5</sup> (especially, those in developed countries facing immigration). As immigrant population is viewed as a burden to hosting countries, their most preferred approach to dealing with migration issues is to encourage economic development in sending countries by means of foreign aid, investment or free trade agreements. This is supposed to decrease the incentives of people from sending countries to migrate.

But is the reciprocity totally missing from the economic relationship incurred by international migration? Are international migration and trade substitutes or complementaries? These are the research questions of this thesis. Answers to them have a potential to influence policy outcomes and international migration discourse in general.

This study aims at answering the research questions by providing relevant empirical evidence for the region that is in the center of migration processes – the European Union.

The EU was chosen as the focus of this research due to several reasons:

- The EU is one of the biggest regions of net immigration, with nearly 33 million migrants in 2013 (20 million of which are citizens of non-EU countries). There is an increasing need for research on the ways immigration influences different spheres of social life in the countries of the Union.

---

<sup>5</sup> Nassar, Ghoneim, 2001.

- Unique feature of the Union is the dual migration policy: freedom of movement for EU countries citizens and restrictive regime for the others, especially for the citizens of developing countries. This feature is very useful because it allows for the comparison of the outcomes of opposite policy decisions.
- Availability of relevant data is another important reason. Many researchers of migration-related issue notice the scarcity of data on the matter. In case of the EU there is centralized collection of immigration data (Eurostat). Submission of this data has become obligatory for member-states since 2008.
- Though there is a considerable amount of literature of the relationship between migration and trade, most of it has been done for individual countries (in this case for individual member states). Thus there is space for contribution is one makes a larger scale research.

The objectives of this research are as follows:

- To summarize the theoretical debate on the relationship between international migration and trade.
- To examine the empirical relationship between immigration and trade in the EU context and to determine whether there is a positive relationship between trade and immigrant stock and flow, and if it is present whether it is more distinct on imports of the EU countries from immigrant sending countries or on exports from the EU to sending countries.
- To find out whether intra-EU migration or migration to the EU from non-EU countries tends to have a bigger trade-creating effect and whether the effect is stronger for the newcomers (immigrant flow) or immigrants that have stayed in country for a longer time (immigrant stock).
- To apply the findings to tackle the more general research questions.

This thesis utilizes a novel and most up-to-date Eurostat dataset, that includes immigration data for all the EU member-states and 155 partners (migrant-sending countries) over the last decade (2000-2012) to analyze migration-trade nexus with the help of gravity model. It is the first attempt to include all the EU countries and such a number of partners over a lengthy period in the relevant literature. Though EU member-states differ in terms of their migration profile (with majority being countries of net immigration, some are still experiencing net emigration), it is useful to group them into one category for this research. The guidelines of migration policy are now developed on the supranational level by the EU institutions. So, the optimal policy decisions should be taken on the basis of evidence for the EU as a whole.

The thesis opens with Chapter II that examines current trends in international migration, comprising both global trends and trends of migration and trade in the EU. Concerning the latter, migration flows and stock dynamics not only of the region, but also of individual countries are discussed. Migration regulation, policy debate and effect of recent economic slowdown on migration processes are also examined. Chapter III is a summary of the theoretical views on the migration and trade relationship. Chapter IV reviews previous empirical research on migration-trade nexus that involved gravity model methodology. Chapter V is dedicated to the analysis of augmented gravity model of trade for the EU countries and 155 partners over the years 2000-2012. It includes explanation of the statistical model, methods and data used in this research. Main findings of the thesis are summarized in the conclusions.

## II. CURRENT TRENDS

---

---

In this chapter the trends of international migration during the last two decades are examined. In Part I the dynamics of migration flows and migrant stocks worldwide is discussed to point out the central role of European region in these processes. In Part II migration trends in the European Union as one of the most important destinations are discussed. While migratory patterns of the EU as a whole and of 28 member-states separately are introduced, special attention is paid to migration-related regulation and controversy issues, as well as to the effects of the recent economic crisis on the inflow of people to the Union. The trends in the EU trade are briefly summarized in the end of the chapter. The trends are examined starting from the 90s.

### 1. GLOBAL TRENDS IN INTERNATIONAL MIGRATION

---

According to the UN, the scope of international migration has been increasing in the last decades to involve more than 200 million people (or 3,1% of world population) in 2010 and 232 million in 2013. However, the scope of international migration remains small in comparison with volumes of international trade and investment:

TABLE 1: INTERNATIONAL MIGRATION IN CONTEXT

Year	Number of international migrants worldwide		Volume of world exports		Global FDI (net inflows)	
	Total, persons	As % of world population	Total, trillion \$ <sup>6</sup>	As % of world GDP	Total, trillion \$ <sup>7</sup>	As % of world GDP
1990	155,518,065	2,9%	5,9	19,2%	0,20	0,9%
1995	165,968,778	2,9%	7,4	21,6%	0,32	1,1%
2000	178,498,563	2,9%	10,3	25,2%	1,32	4,0%

<sup>6</sup> Export of goods and services, BoP, current US\$, Word Bank: Development indicators.

<sup>7</sup> FDI, net inflows, BoP, current US\$. Word Bank Development indicators.

2005	195,245,404	3%	12,7	27,2%	1,36	2.9%
2010	213,943,812	3,1%	18,7	28,2%	1,77	2,71%
2013	231,522,200	3,2%	23,1	29,9%	1,75	2,30%

Sources: United Nations, ESA, Population Division; World Bank Database.

As we see from Table 1, the movement of goods and services is much more intensive than the movement of world population, but both processes intensify. The international community has taken a lot of action to eliminate barriers to trade (through multilateral agreements) and to a lesser extent capital. However, less enthusiasm applied to the movement of people, as often free trade and labor movement are seen as substitutes but not as complementaries.<sup>8</sup>

International migration has a distinct pattern that has become more pronounced in the last 20 years: people increasingly tend to move from the less and least developed areas into the more developed ones<sup>9</sup> (Table 2).

TABLE 2: WORLD MIGRANT POPULATION BY DEVELOPMENT REGIONS

Year	Migrants as % of population		
	More developed regions	Less developed regions	Lest developed regions
1990	7.2	1.8	2.1
1995	8	1.6	2.1
2000	8.7	1.5	1.6
2005	9.6	1.5	1.4
2010	10.3	1.5	1.3
2013	10.8	1.6	1.2

Source: UN, Department of Economic and Social Affairs, Population division.

The share of migrant population has been increasing in more developed regions, and steadily decreasing in both less and lest developed areas.

---

<sup>8</sup> The theoretical views on this are examined in detail in Chapter III.

<sup>9</sup> Definition of more, less and lest developed areas is given by the UN.

When it comes to more detailed distribution of migrants across the geographical regions, the relative share of migrants is higher in Oceania (estimated 20,7% in 2013) and Northern America (almost 15%), in absolute terms the European continent has the biggest stock of immigrants (circa 72,5 million persons in 2013 or 9,8% of total European population). Table 3 summarizes absolute numbers and relative shares of migrants in world regions from 1990-2013.

TABLE 3: WORLD MIGRATION BY GEOGRAPHICAL REGIONS<sup>10</sup>

International migrants: stocks and as % of population												
Year	Europe		Northern America		Asia		Africa		Latin America and the Caribbean		Oceania	
	Total, mln	As % of population	Total, mln	As % of population	Total, mln	As % of population	Total, mln	As % of population	Total, mln	As % of population	Total, mln	As % of population
1990	49,40	6.9	27,77	9.8	50,88	1.6	15,97	2.5	7,13	1.6	4,37	16.2
1995	54,72	7.5	33,60	11.2	48,79	1.4	17,92	2.5	6,23	1.3	4,73	16.3
2000	57,64	7.9	40,40	12.7	51,92	1.4	17,06	2.1	6,47	1.2	5,02	16.1
2005	64,40	8.8	45,60	13.6	55,13	1.4	17,74	1.9	6,87	1.2	5,52	16.4
2010	69,82	9.5	50,04	14.2	61,32	1.5	19,26	1.9	7,48	1.3	6,01	16.8
2013	72,45	9.8	53,09	14.9	70,85	1.6	18,64	1.7	8,55	1.4	7,94	20.7

Source: UN. <http://esa.un.org/migration/index.asp?panel=2>

Some helpful visualization of the migrant stocks is presented in Figure 1. The stock of immigrants in Europe exceeded that in Asia by 2013. Taking into account the populations of the regions, these dynamics emphasizes the intensity of migration processes in Europe.

---

<sup>10</sup> While the data for years 1990-2010 is based on population census, the data for 2013 is UN estimate.

## International migration stock by major area, 1990, 2000 and 2013, million persons

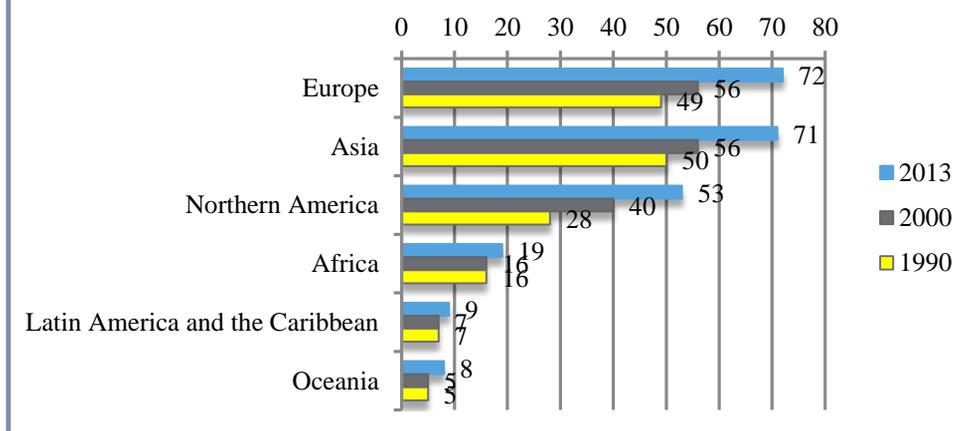


FIGURE 1: INTERNATIONAL MIGRANT STOCK BY GEOGRAPHICAL AREA<sup>11</sup>

With the USA being a separate country that receives the biggest absolute number of international migrants, most of the other countries with biggest absolute amounts of international migrants are situated in Europe (Appendix B). However, within Europe the distribution of immigrants is not uniform: most of them reside in Western, Northern and Southern parts (Appendix A). Eastern Europe has generally been the region of net emigration. More specifically, this applies to Eastern European EU-member states, citizens of which tend to move westwards under the free movement of people EU principle.

When it comes to the biggest immigrant sending countries worldwide, the top six senders in the last five years have been India (on average 2,3 million people emigrate from the country annually), Bangladesh (2 million persons), Pakistan (1,6 million), China (1,5 million) and Syria (1,5 million), Mexico (1,2 million). Those

<sup>11</sup> Source of data: UN, Migration Wallchart 2013.

countries are also the ones with the biggest population and in the case of Syria have experienced armed conflict.

## 2. EUROPEAN UNION AS A MIGRATION DESTINATION

---

The European region, particularly the EU, is an important center of migration flows and it is the focus of this study. This section opens with summarizing recent trends in migration stock and composition in the region. Migration regulation and policy debate as well as the effect of global financial crisis are examined subsequently.

### **2.1. Recent trends in migration stock**

The European region has a long history of migration flows. The processes of emigration from some European countries reversed into immigration by 1970s. The post-war socioeconomic development has induced large number of immigrants to the region, especially to Western European countries, and later to the European Union.

EU as a whole has experienced new immigration since the onset of its creation. Separate member-states showcase different tendencies: while Western, Northern and especially South European countries have been receiving large number of migrants, the opposite situation could be observed in Eastern European members (See Appendix C for detailed dynamics of the trends under discussion). Citizens of Eastern European states have always tended to migrate westwards, the process intensified after them joining the EU in 2004. Recent economic slowdown triggered by global financial crisis and sovereign debt crisis in some European member-states had a suppressing effect on those immigration flows. Indeed, many Eastern EU-members nationals returned to their home countries.

An important and unique development took place in EU in 2004. As a part of single market formation, the Union introduced the fourth freedom (in addition to

the free movement of goods, capital and services), the free movement of people<sup>12</sup>. Nationals of any member state can freely move, work, study (generally reside) in any other member state<sup>13</sup>. What is more, nowadays in the EU the term migrant applies only to non-EU nationals.

There are some other distinct intra-EU migration features. Some have noted the tendency of Northern European citizens to move to Southern Europe. Estimated 1 million UK nationals reside in Spain.

In 2013, approximately 33 million<sup>14</sup> of the foreign-born resided in European Union countries (20 million of whom are non-EU country nationals). The migrant stock in 2004-2013 has been growing (Figure 3), increasing by almost 10 million people (from 25 million in 2004 to 35 million in 2013). Much of this change is due to the intra-EU migration that intensified after 2004.

---

<sup>12</sup> Directive 2004/38/EC on the right to move and reside freely.

<sup>13</sup> Some EU member states used temporary limits on movement of people for newly admitted member states.

<sup>14</sup> Eurostat migration database.

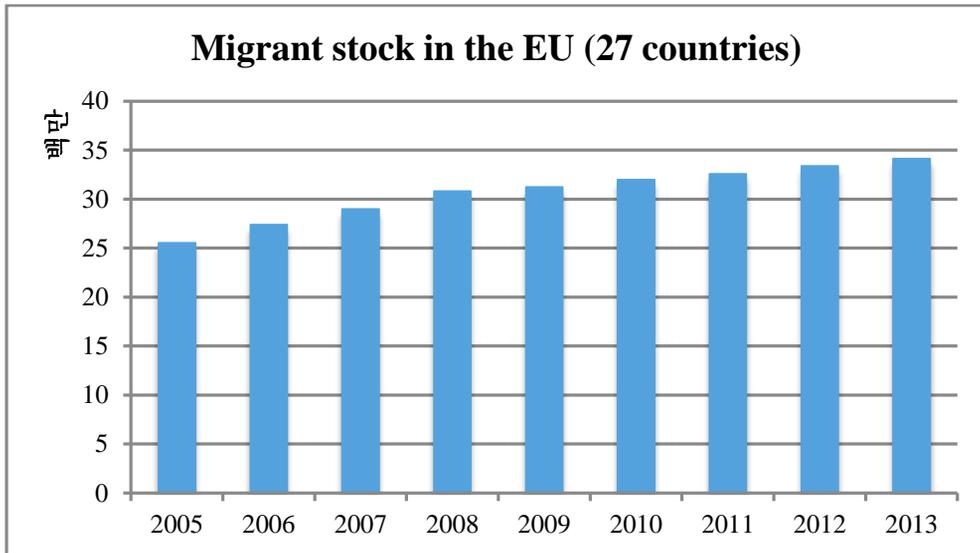


FIGURE 2: MIGRANT STOCK IN THE EU COUNTRIES, 2004-2013<sup>15</sup>

## 2.2. Migration profiles of EU-28 member states

The population of the EU amounting to 502 million, the share of foreign-born is 6,5% of total population. More specifically, the share of non-EU born residents is 4%. However, the share of foreign-born population differs greatly among the EU countries (Table 3), as well as the origin profiles of migrants residing in particular country.

The 5 biggest EU members (in terms of GDP and population), namely France, Germany, Spain, Italy and UK, have also the biggest immigrant stocks (Table 3), and net immigration rates (Appendix C).

---

<sup>15</sup> Source: Eurostat, Migration and migrant population statistics.

TABLE 4: EU-28 BY MEMBER-STATE: MIGRATION PROFILES

Country <sup>16</sup>	Stock of migrants, 2013 <sup>17</sup>		Average net immigration <sup>18</sup> , 2009-2013	Top-3 immigrant origin countries <sup>19</sup>
	Total, persons	As % of population		
EU-28	20,444,492	0.04	4,630,634	Turkey, Morocco, China
Belgium (founder <sup>20</sup> )	1,253,902	0.11	150,007	Italy, France, the Netherlands
Bulgaria (2007)	45,201	0.01	-50,000	Russia, Turkey, Ukraine
Czech Republic (2004)	422,280	0.04	199,999	Ukraine, Slovakia, Vietnam
Denmark (1973)	374,569	0.07	74,999	Turkey, Poland, Germany
Germany (founder)	7,696,413	0.09	549,998	Turkey, Poland, Italy
Estonia (2004)	197,141	0.15	0	Russia, Ukraine, Belarus*
Ireland (1973)	543,636	0.12	50,000	Poland, UK, Lithuania
Greece (1981)	862,381	0.08	49,996	Albania, Bulgaria, Romania*
Spain (1986)	5,072,680	0.11	599,997	Romania, Morocco, UK
France (founder)	4,089,867	0.06	649,998	Algeria, Morocco, Portugal*
Croatia (2013)	27,854	0.01	-20,000	Bosnia and Herzegovina, Slovenia, Macedonia*
Italy (founder)	4,387,721	0.07	900,000	Romania, Albania, Morocco
Cyprus (2004)	170,076	0.2	35,000	UK, Greece, Russia*
Latvia (2004)	315,414	0.16	-10,000	Russia, Belarus, Ukraine
Lithuania (2004)	22,224	0.01	-28,394	Russia, Belarus, Ukraine*
Luxembourg (founder)	238,844	0.44	25,602	Portugal, France, Belgium*
Hungary (2004)	141,122	0.01	75,000	Romania, Germany, China
Malta (2004)	22,466	0.05	4,512	UK, Australia, Canada*
Netherlands (founder)	714,552	0.04	50,006	Turkey, Poland, Germany
Austria (1995)	997,038	0.12	150,001	Germany, Turkey, Serbia
Poland (2004)	93,265	0	-38,090	Ukraine, Germany, Russia
Portugal (1986)	417,042	0.04	75,003	Brazil, Ukraine, Cape Verde
Romania (2007)	70,666	0	-44,999	Moldova, Turkey, China
Slovenia (2004)	91,385	0.04	22,000	Bosnia and Herzegovina, Macedonia, Croatia
Slovakia (2004)	72,925	0.01	14,999	Czech Republic, Hungary, Poland
Finland (1995)	194,250	0.04	50,001	Estonia, Russia, Sweden
Sweden (1995)	659,374	0.07	200,000	Finland, Poland, Iraq
UK	4,929,279	0.08	900,000	India, Ireland, Pakistan

\*- the data for these countries retrieved from sources, other than Eurostat. <sup>21</sup>

<sup>16</sup> Date a country joined the EU is indicated in the parenthesis.

<sup>17</sup> Excluding intra-EU migrants.

<sup>18</sup> Net migration is the net total of migrants during the period: the total number of immigrants less the annual number of emigrants, including both citizens and noncitizens. Data is five-year estimate. Source: World Bank.

<sup>19</sup> Origin is defined as a country of citizenship. The data (from Eurostat) is as of January 2013.

<sup>20</sup> Six founding states that signed the Treaty of Rome in 1957.

<sup>21</sup> Data for Greece, Estonia, Lithuania, Cyprus, Croatia, Luxembourg, Malta is for year 2010, source: World Bank, Bilateral migration matrix.

Sources of data: Eurostat, World Bank.

On average during 2009-2013 only 6 EU countries experienced net emigration (Baltic and Eastern European members). This number varies on a yearly basis. In 2012 13 countries reported net emigration, while 14 remained net immigration states.

### **2.3. Migrant stock composition by age, the purpose of arrival and education**

The immigrant population is on average much younger than the native population in the EU countries. The median age of EU member state citizens being 42 years (as of 1 January 2013), the median age of immigrants to the EU varied between 26 (UK) and 40 (Bulgaria) years old. Moreover, the foreign population residing in a EU member state (this includes both citizens of other EU and non-EU states) is younger than nationals residing in that state.

Thus, migration is often viewed as a means of tackling labor market shortages and the population ageing problem in the countries of the Union. If in 2012 old age dependency ratio in the EU was 4 people of working age for every person over 65, the projected ratio for 2060 is 2 people per 1 person over 65. International migration is seen by many as the only viable solution to the upcoming problem. Indeed, as of 2013, 78% of the non-EU nationals, residing in the EU are of working age (15-64 years old). For the yearly flows this share is even higher: 85% of newly arrived people were of age range 15-64 in 2012.

When it comes to the composition of immigration to the EU by purpose, according to Eurostat, in 2013 labor migration accounted for 23 % of all resident permits issued by EU member states. The biggest share of immigrants (32%) arrived on the

---

<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/0,,contMDK:22803131~pagePK:64165401~piPK:64165026~theSitePK:476883,00.html>

Data for France – from INED (Institut national d'études démographiques), for 2011; [http://www.ined.fr/en/everything\\_about\\_population/data/france/immigrants-foreigners/countries-birth-immigrants/](http://www.ined.fr/en/everything_about_population/data/france/immigrants-foreigners/countries-birth-immigrants/)

basis of family reunification. 22% arrived for educational purposes. Though EU receives big amount of applications of asylum seekers, only a small share of them get accepted. In 2013 the Union granted asylum to only 25,000 persons out of 435,000 applicants, in 2014 163,000 out of 626,000<sup>22</sup>.

Another aspect of migration in the EU is widespread illegal migration. No database accounts for clandestine migrant stocks and flows. According to some estimates from 1.8 to 3.9 million illegal migrants resided in the EU in 2008.<sup>23</sup>

The issue of illegal migration is multifaceted in the Union, as some countries (that do not share land or sea borders with non-EU countries) are less exposed to the influx of illegal immigrants. On the contrary, Southern EU member states predominantly deal with the biggest share of illegal migrants that cross the EU marine borders by ships. Immigrants tend to stay (legally or illegally) in the first country of arrival, and this raises concerns in those countries. The debate on burden sharing of illegal migration is ongoing in the Union<sup>24</sup>.

As we can see from Table 5, the education level of immigrants differs across the EU countries. However, as of 2010/2011 there was a trend that the share of the foreign-born population with tertiary education level was higher than the share among the native born (except for Spain, Greece, Italy, Germany, Slovenia, Belgium, Finland and Poland).

For some countries (Estonia, UK, Hungary, Ireland, Portugal) and for OECD on average the educational profile of foreign-born population is definitely higher than that of native-born: the shares of tertiary-educated immigrants are higher than those of the native-born, while the shares of low-educated immigrants being much lower. The difference is particularly striking for the UK: 46.6% of foreign-born

---

<sup>22</sup> Eurostat: Asylum Statistics. [http://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Asylum_statistics)

<sup>23</sup> Morehouse, Christal and Michael Blomfield. 2011. *Irregular Migration in Europe*. Washington, DC: Migration Policy Institute.

<sup>24</sup> Europe's huddled masses: Rich countries must take on more of the migration burden. The Economist, August 16, 2014. <http://www.economist.com/news/leaders/21612152-rich-countries-must-take-more-migration-burden-europes-huddled-masses>

have higher education degree compared to 26.7% of native-born. In the case of Portugal with a dominant share of the native-born being low-educated (71.6%), the share of low-educated immigrants is 47.8%.

TABLE 5: THE SHARES OF NATIVE-BORN AND FOREIGN-BORN POPULATION BY EDUCATION LEVEL IN SELECTED EU COUNTRIES IN 2010-2011

Country	Native population			Immigrant population		
	Share of low-educated <sup>25</sup>	Share of medium-educated	Share of high-educated	Share of low-educated	Share of medium-educated	Share of high-educated
Austria	23.6	60.9	15.5	33.2	48.3	18.5
Belgium	34.4	36.5	29.1	43.9	29.1	27.0
Czech Republic	18.4	67.3	14.3	29.0	51.7	19.3
Germany	18.8	58.1	23.1	38.8	41.6	19.6
Denmark	33.8	41.2	25.0	32.7	37.8	29.5
Spain	55.5	18.4	26.1	46.6	29.8	23.6
<b>Estonia</b>	21.3	48.7	30.0	18.2	42.3	39.5
Finland	32.1	39.8	28.1	51.1	27.1	21.8
France	35.6	40.8	23.6	47.5	28.9	23.6
<b>UK</b>	38.5	34.8	26.7	29.1	24.3	46.6
Greece	45.4	34.7	19.9	41.2	41.5	17.4
<b>Hungary</b>	31.1	51.5	17.3	23.4	49.1	27.5
<b>Ireland</b>	38.0	35.4	26.6	19.6	41.2	39.2
Italy	51.0	36.9	12.1	47.6	41.3	11.1
Luxembourg	33.7	47.7	18.6	39.7	29.7	30.6
Netherlands	35.4	38.9	25.8	40.1	33.8	26.0
Poland	23.8	57.8	18.4	37.8	44.4	17.9
<b>Portugal</b>	71.6	15.4	13.0	47.8	29.7	22.5
Slovakia	46.8	36.3	16.9	50.5	31.1	18.4
Slovenia	27.6	54.0	18.5	40.3	49.0	10.6
Sweden	24.9	50.4	24.7	27.0	44.0	29.0
OECD average	33.1	41.1	23.6	33.8	35.9	30.3

---

<sup>25</sup> Low-educated applies to persons with less than upper secondary education; medium-educated are the persons with upper secondary education; high-educated are the persons with tertiary education level.

Source of data: Arslan, C. *et al.* (2014), “A New Profile of Migrants in the Aftermath of the Recent Economic Crisis”, *OECD Social, Employment and Migration Working Papers*, No. 160, OECD Publishing.

<http://dx.doi.org/10.1787/5jxt2t3nnjr5-en>

Based on OECD DIOC database.

Concerning the evolution of educational profile of immigrants to the EU countries in 2010/2011 as compared to 2000/2001<sup>26</sup>, the share of immigrants with tertiary education level increased in all countries under examination (except for Ireland and Slovenia, where slight decrease took place).

To sum up, though the composition of foreign-born population by education profile varies across EU states, in some of them immigrant population is better educated than the native population. This can be viewed as a contribution of immigration to productivity growth, especially when immigrants’ occupations match their educational levels.

#### **2.4. Migration regulation and policy debate**

At the backdrop of dramatic increases of foreign population in the EU the need for adequate regulation of the new reality arouse. In addition, the desire to attract either low-qualified or high-qualified persons shaped the way regulation of migration evolved.

European Commission (Department of Home Affairs) that is the key policy maker in this sphere, issued a set of directives that regulate the issue, for example<sup>27</sup>:

---

<sup>26</sup> The educational profile of foreign-born populations in 2000-2001 compared to that of 2010-2011 is presented in Appendix D.

<sup>27</sup> European Commission: Migration and Home Affairs, Immigration in EU (infographics) [http://ec.europa.eu/dgs/home-affairs/e-library/docs/infographics/immigration/migration-in-eu-infographic\\_en.pdf](http://ec.europa.eu/dgs/home-affairs/e-library/docs/infographics/immigration/migration-in-eu-infographic_en.pdf)

- Researchers Directive from October 2005 (Council Directive 2005/71/EC). The document secures the fast-track EU admission procedure for researchers from non-EU countries.
- Blue Card Directive from May 2009 (Council Directive 2009/50/EC). This directive facilitates migration of high-qualified workers to the Union.
- Single Permit Directive from December 2011 (Directive 2011/98/EU of the European Parliament and of the Council of 13 December 2011). This document established uniform set of documents and procedures for non-EU workers and delineates their respective rights.
- Seasonal Workers Directive from February 2014 (Directive 2014/36/EU of the European Parliament and of the Council of 26 February 2014). This document is aimed at setting the framework for hiring and stating the rights of non-EU seasonal workers.

The character and content of the recent adopted regulation showcases that high-skilled migrants are most desired in the EU, as well as low-skilled workers. Regarding the former category of migrants, EU is actively participating in the global competition for talents. Such policy of the Union has caused a lot of criticism from developing countries, that experience increased brain drain as a result. Attracting the low skilled workers is aimed at reducing labor shortages in some industries, like construction and agriculture.

The main component of the European Statistical System, Eurostat<sup>28</sup>, collects migration-related information from the member states and compiles EU aggregates. Before 2008 the member states were sending the migration-related data voluntary. However, since the enactment of Regulation 862/2007 this kind of data is sent to Eurostat in an obligatory way. Though the coverage of data for separate member states is quite extensive, it is far from being full (for years prior to 2008). The Eurostat database does not provide data on emigration from EU, as it is

---

<sup>28</sup> Structurally Eurostat is a Directorate-General of the European Commission.

“particularly difficult to measure; it is harder to count people leaving a country than those arriving”<sup>29</sup>.

Immigration has become an issue of ardent debate on the EU level, especially in the 5 biggest EU countries. The main points of the ongoing discussions are:

- The effects of the liberalization of movement of people inside the union. The approving outcome of recent Swiss referendum on establishing quotas on migration of EU citizens to the country spurred an active debate on the viability of the free movement inside the Union.
- Establishment of the burden-sharing mechanism for irregular migration flows.
- The economic effects large-scale migration has on receiving countries. There are some common assumptions about effects of immigration that are often for political purposes. One of the most widespread concerns is that immigration has an adverse impact on wages and employment of native workers.

## **2.5. Effects of the global economic crisis on immigration to the EU**

Global economic crisis coupled with debt crises in several European states had adverse effects on the migration flows to the EU. As we see from Figure 3, net immigration flows to the EU were increasing (though they were quite volatile) and reached the peak in 2003 (1,7 million net immigrants in a year). Afterwards the trend was slightly decreasing, and plummeted in 2007 to reach 0,6 million with the onset of the crisis. In 2013 the net migration inflow almost reached the 2003 peak (1,6 million).

---

<sup>29</sup> Eurostat statistics explained: Migration and migrant population statistics.  
[http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration\\_and\\_migrant\\_population\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration_and_migrant_population_statistics)

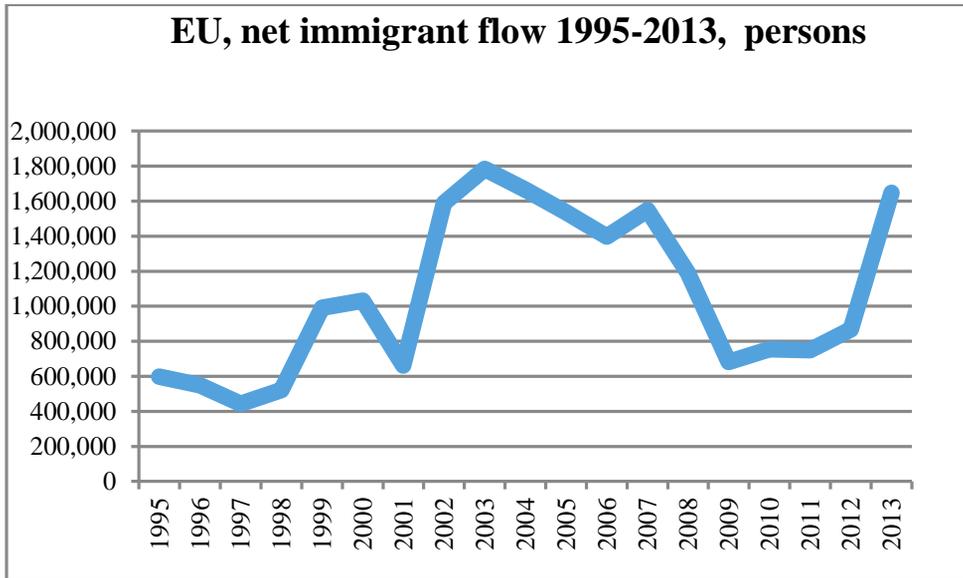


FIGURE 3: NET IMMIGRANT FLOW TO THE EU, 1995-2013<sup>30</sup>

The dynamics of the rate of net immigration as % of population (Figure 4) goes in line with the dynamics of absolute numbers (Figure 3). In 2003 immigrants constituted record 3,6% of total EU population. EU saw the reduction of this share to 1,4% as the crisis deepened. In 2013 their share was 3,3%.

---

<sup>30</sup> Source of data: Eurostat migration database.

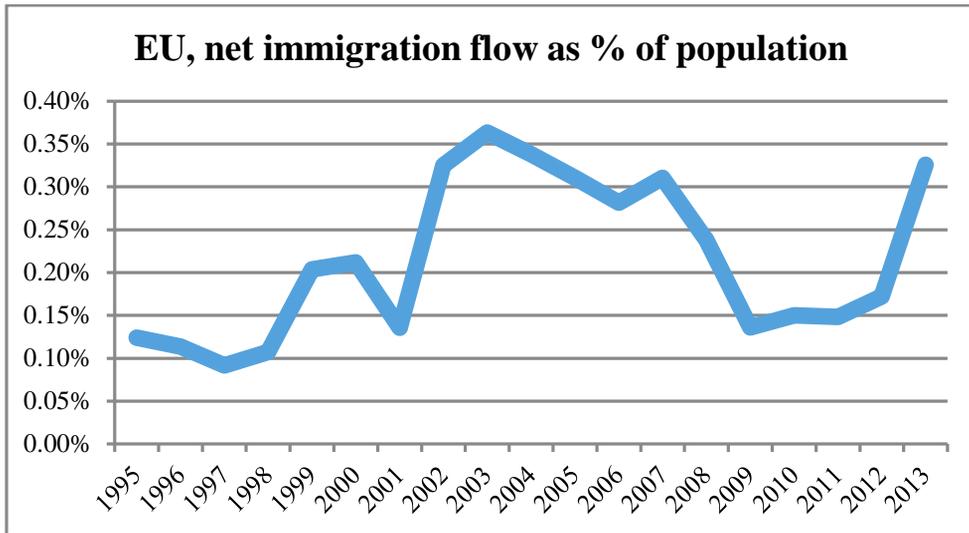


FIGURE 4: NET MIGRATION DYNAMICS IN THE EU, 1995-2013<sup>31</sup>

Provided that international migration is closely linked to the economic situation in receiving countries, the effects of the crisis on production, consumption and, consequently, labor market in the EU caused the steep decrease in migration.

According to the recent OECD report<sup>32</sup> on the effects of the global economic crisis on the international migration, migrant workers were hit more, than their home-country peers, as the former are usually less protected from job losses. It is worth noting, that the report draws the majority of its conclusions based on the detailed examination of the DIOC<sup>33</sup> data for the countries that were most hit by the recent crisis (Greece, Italy, Spain, Portugal, Ireland and UK etc.), that is, the EU countries.

<sup>31</sup> Source of data: Eurostat.

<sup>32</sup> Arslan, C. *et al.* (2014), “A New Profile of Migrants in the Aftermath of the Recent Economic Crisis”, *OECD Social, Employment and Migration Working Papers*, No. 160, OECD Publishing. <http://dx.doi.org/10.1787/5jxt2t3nnjr5-en>

<sup>33</sup> Database on immigrants in the OECD countries.

At the same time, the impact of the crisis was different for various migrant groups. In terms of origin country, the crisis suppressed emigration from Latin America to the greatest extent. In terms of skill level, low-skilled migrants suffered most job losses (especially those previously employed in construction sector), while high-skilled employment remained stable. Moreover, youth and male unemployment rates among immigrant in the OECD increased after 2007.

### 3. EU TRADE: MAIN TENDENCIES

---

As of 2013, European Union accounts for one sixth of the world trade in goods<sup>34</sup>. USA, China and Russia continue to be EU's major trading partners, followed by Switzerland and Norway.

If we examine the dynamics of the EU export and import during the 2000s (Figure 5), the disruption of increasing trends took place 2008 caused by the global financial crisis. By 2011 trade volumes recovered and even exceeded the 2007 peak to reach 1.7 trillion euros (import) and 1.6 trillion (export), but import decreased in 2012 (as a result of southern Eurozone crisis). This resulted in a current account surplus in the EU, first after a long time.

---

<sup>34</sup> Eurostat Statistics Explained: International Trade in Goods. Available at: [http://ec.europa.eu/eurostat/statistics-explained/index.php/International\\_trade\\_in\\_goods](http://ec.europa.eu/eurostat/statistics-explained/index.php/International_trade_in_goods)

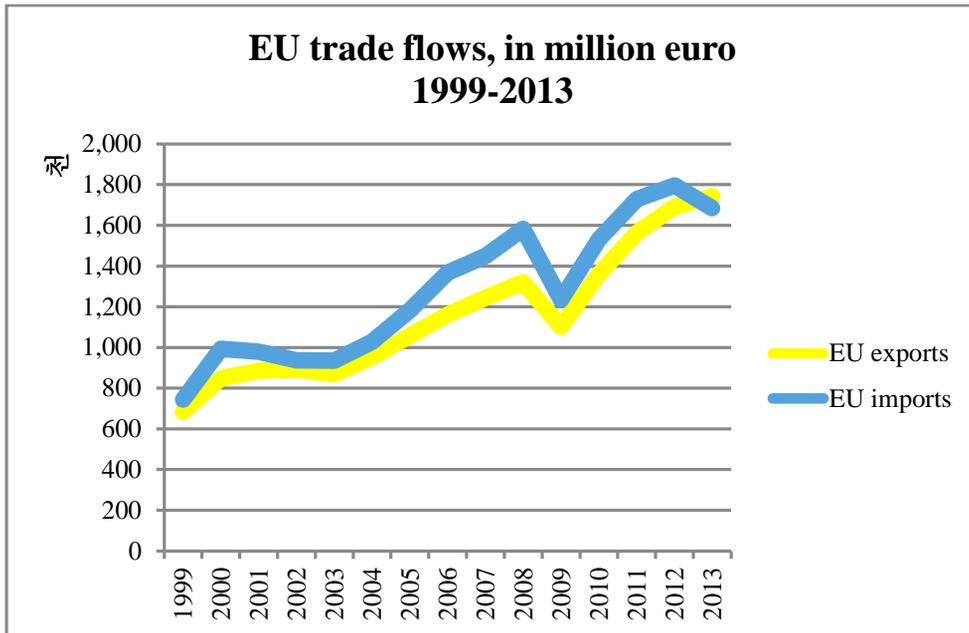


FIGURE 5: EU TRADE FLOWS, 1999-2013<sup>35</sup>

The relative shares of the EU trade volumes in total world trade (Figure 6) have been decreasing (as a result of emergence of developing countries, especially China as global trade players). If in 1999 both EU export and import shares in world export and import were 17.5% and 19.3% respectively, they have been consistently decreasing to reach 15.6% and 16.1% in 2012. Eurozone crisis contributed to exports share revival and further import share depression in 2013.

Trade in the EU continues to be predominantly intraregional, though its share decreased over the last years: 63.0% in 2014 compared to 69.1% in 1999 (Figure 7). Respectively, the extra-EU trade (measured as a share of EU members' exports to non-EU states) increased from 30% in 1999 to 37% in 2014.

---

<sup>35</sup> Source of data: Eurostat trade statistics.

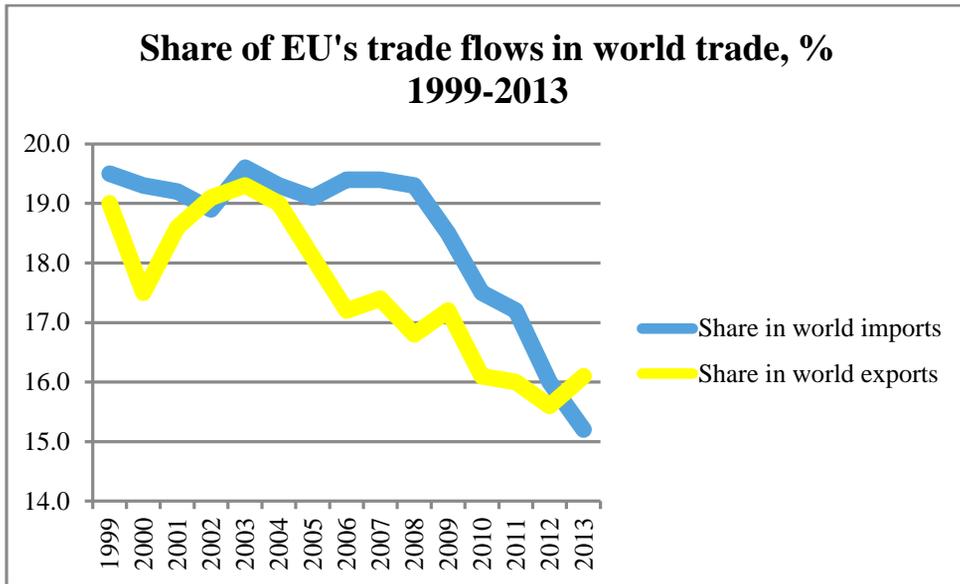


FIGURE 6: WORLD SHARE OF EU TRADE, 1999-2013<sup>36</sup>

---

<sup>36</sup> Source of data: Eurostat trade statistics

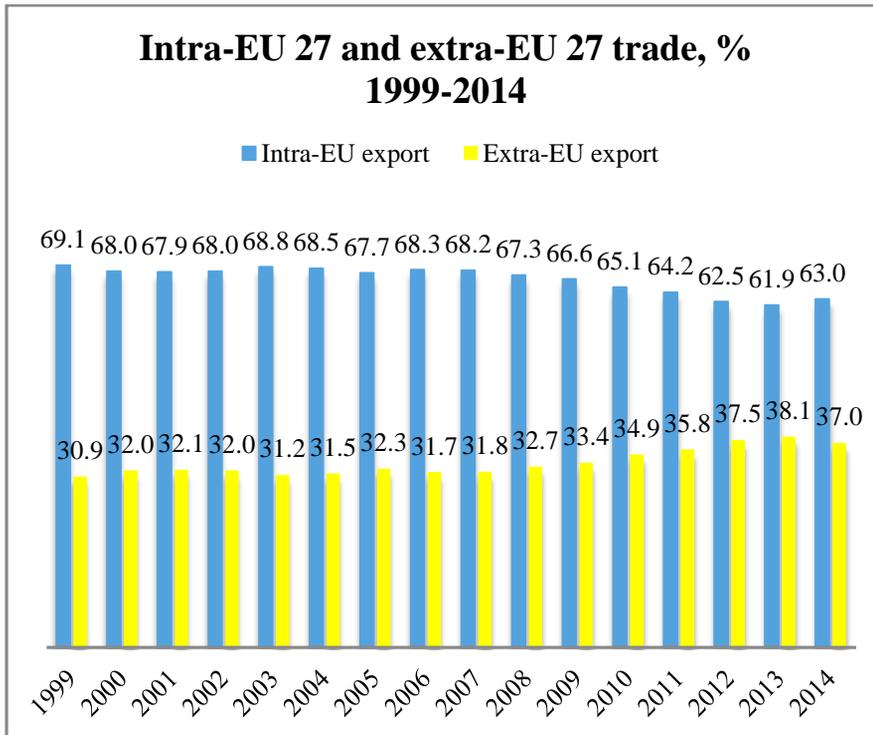


FIGURE 7: INTRA AND EXTRA-EU TRADE, 1999-2014<sup>37</sup>

**To sum up**, global migration processes show the tendency of intensification: both stocks and migration flows worldwide have been increasing during recent decades. However, global economic crisis had suppressing effect on the movement of people, as it had on the movement of goods and capital. However, as revealed by 2013 data, the migration flows are gaining momentum.

Europe, and especially highly developed countries of the EU, is one of the preferred destinations for international migrants.

---

<sup>37</sup> Source of data: Eurostat data, Intra-EU trade in goods.

[http://ec.europa.eu/eurostat/statistics-explained/index.php/Intra-EU\\_trade\\_in\\_goods\\_-\\_recent\\_trends](http://ec.europa.eu/eurostat/statistics-explained/index.php/Intra-EU_trade_in_goods_-_recent_trends)

There are some unique characteristics and policy developments in the recent 20 years when it comes to migration in EU, that make the Union particularly interesting for research:

- The issue of migration in the EU is gaining increasing public and academic attention, as the scope of the process increases. Thus, there is an avid discussion concerning the issue. While some view international migration as having negative effect on natives wages and employment, other regard it as a means of at least partially solving the EU problems, such as labor shortages, population ageing. There is a possibility to contribute to the debate, as the lack of rigorous research on primarily economic effects of migration on the EU countries is often noticed.<sup>38</sup>
- Since 2004 freedom of movement was introduced for the citizens of EU member states. Such unprecedented policy development that has been negotiated for decades constitutes a kind of natural experiment of international migration liberalization. The EU underwent a lengthy process of economic and political integration prior to migration liberalization. Nevertheless, this development gives an opportunity to examine the trade-creating effects of free (intra-European) and limited migration (migration to the EU from non-EU countries).
- Migration stocks of each EU country have unique composition and often reflect historic or language similarities between migrant-sending and migrant-receiving country. As a consequence, there is a lot of diversity in the origins of migrants and the resulting migrant networks incorporate a

---

<sup>38</sup> Blanchflower, D. G., J. Saleheen and C. Shadforth (2007): “The impact of the recent migration from Eastern Europe on the UK economy”, Bank of England Quarterly Bulletin, vol 47, no 1, pp 131–36.

variety of states from various continents. This characteristic of migration to the EU is extremely useful for studying the effects of migration on trade.

- In terms of migration-related data collection, there is an extensive database compiled and regularly updated by Eurostat. This database contains the data on immigrant stocks, flows, and countries of origins for all the EU states (with some exceptions for the years prior to 2008). The most recent available data is for 2012 and partially for 2013.

### III. INTERNATIONAL MIGRATION AND TRADE: THEORY

---

The central issue in the discussion of the links between international trade and migration is the following: are those phenomena substitutes or are they complementary? Policy outcomes are highly dependent on the answer one gives to this question. If one considers migration and trade to be substitutes, than (combined with cultural or social considerations) governments' policies of limiting migration can be justified. There can be many reasons to prefer free movement of goods to free movement of people. However, in case there is evidence that migration and trade are complementary phenomena with clarified causality links, the advocates of limiting migration might be losing the credibility of their arguments.

#### 1. FROM SUBSTITUTES TO COMPLEMENTARIES

---

Theoretical approach concerning the links between movement of goods and movement of people evolved as the volumes of international trade and migration had been increasing simultaneously.

Neoclassical Heckscher-Ohlin-Samuelson theory views the movement of labor and of goods as substitutes. According to the factor-price equalization theorem goods trade substitutes for factor trade. A labor-abundant country makes use of its abundant labor to produce and export labor-intensive goods. It imports capital-intensive goods instead. As the relative prices for goods converge as a result of trade, the relative prices for capital and labor converge across trade partners (Krugman et al. International Economics). Thus, the movement of labor can be offset by the movement of goods. Moreover, there should be less stimuli for people to migrate as the convergence of wages takes place. Empirical evidence shows that factor prices are not being equalized across the countries, for example the huge wage gap between the developed and developing world persists. However, the factor-price equalization theory offers its conclusions based on certain

assumptions, namely that technologies of production of the trading partners are the same; or that countries produce the same goods; or the perfect competition assumption. Mundell (1957) emphasized that migration is a substitute to trade only if the factor endowment between countries differs.

Markusen (1983) and Wong (1983) were among the first scholars to modify the assumptions of Heckscher-Ohlin-Samuelson theorem to allow for migration to take place in the model. By relaxing some of the assumptions of factor-price equalization theorem (namely, perfect competition and constant returns to scale), Markusen (1983) showed that international trade is not necessary leading to factor price convergence. On the contrary, wage differentials among countries cause international labor movement, which in turn can lead to export increase (if the newly arrived labor is employed in exporting sectors). Thus, migration and trade were interpreted as complementary phenomena.

New economic geography theory (developed in Krugman, 1991; Puga, 1999; Ottaviano et al. 2003) goes further in negating factor-price equalization to show that factor prices can be different even inside the countries. This happens in presence of returning scale industries that attract significant amounts of labor and capital, while the rest of national economy remains untouched by these processes. An example of such situation is Silicon Valley in the USA, the destination of many high skilled workers that has higher factor prices than other regions in the country. Another examples are movement of managers and capital from Western countries to Asian countries to stimulate export-based growth (Pang, Lim, 1996), or the establishment of export zones in Mexico. As we see, migration is often needed for the development of certain industries that work for export. In this case factor mobility leads to trade augmentation.

When it comes to gathering some empirical evidence concerning the relationship between migration and trade, the task is especially daunting (Genc et al, 2011). Relationship between trade and migration is not clear due to the amount of factors influencing it. Furthermore, many scholars notice scarcity of data related to this

issue, especially the data on migration flows and stocks across countries (Ghoneim, El-Deken, 2001).

A conventional approach to testing trade-migration nexus is to find a correlation between flows or stocks of migrants from country A to country B and trade volumes between the countries involved. If this relationship is confirmed, the complementarity conclusion can be reached. In case of absence of correlation or negative correlation, trade and migration are viewed as substitutes.

## 2. CAUSAL LINKS BETWEEN MIGRATION AND TRADE AUGMENTATION

---

The causality relationship between trade and migration, assumed prior to studying possible correlations, stems from both micro- and macroeconomic effects of migration on the receiving country. There are two widely discussed channels migration from country A to country B might cause the augmentation of trade between them:

1) On the micro-level:

Immigration leads to international trade due to the fact, that immigrants reduce certain trade barriers. Language proficiency, better knowledge of legal system as well as networking connections that immigrants possess can lead to flourishing of the foreign-born entrepreneurship in receiving countries. Both export and import of country B are augmented in this case (with prevalence of import increase effect). This effect is usually called network effect.

2) On the macro-level:

- As immigration raises production and aggregate demand in country B it also leads to an increased demand for goods, including the imported ones (especially, those originating from immigrants home countries). This is often referred to as preference effect.

- Subsequent demonstration effect (through ethnic shops or restaurants) might lead to even higher levels of import of goods from country A. One can expect a positive effect on import of country B from country A as a result.
- If immigrants tend to work in exporting sectors and drive the real marginal costs of production down (by accepting lower wages), this can result in the increases in export from B to the rest of the world, including country A. Let us refer to this channel as export sector employment effect.

Another issue related to trade and migration relationship is potential mutual causality. Trade (esp. through the network channel) might cause further migration. Some authors assume endogeneity of the migration variable (Hoada (2009); Egger et al, (2011)). However, there is a broader consensus on the fact that it is rather migration that encourages trade than vice versa.

The most frequently used model for studying the relationship between international migration and trade is gravity model, augmented with variables accounting for immigration (immigration flow or lagged immigrant stock etc.)

**To sum up**, potential relationship between trade and migration has long been discussed in the literature. The opinion of scholars evolved from viewing migration as a substitute to trade to assuming that the two phenomena are complementary. Empirical evidence is needed to contribute to the outcome of academic debate. Since 1994 gravity model of trade augmented with variables accounting for migration have been employed to study the possible effects of migration.

## IV. TRADE-CREATING EFFECT OF MIGRATION: PREVIOUS STUDIES REVIEW

---

In this chapter the review of previous studies on the link between migration and trade is presented. It opens with general methodological approach of previous studies. Researchers have predominantly used augmented gravity model of trade to measure the effect of immigration on trade flows. Mixed results of the relevant studies are discussed in Section 2. Section 3 summarizes the results of previous research centered on the EU countries, both individually and as a group. The contribution of this thesis to previous research is emphasized in concluding remarks.

### 1. CONVENTIONAL METHODOLOGICAL APPROACH

---

Trade-creating effects of immigration (as well as emigration) have been extensively discussed in the literature, with gravity model being the main analytical instrument to capture these effects.

The authors of the most recent meta-analysis of studies of migration-trade nexus (Genc et al. 2011) outline the standard gravity model equations used for evaluating it:

$$\ln M_{ij} = \alpha_0 + \alpha_1 \ln I_{ij} + \alpha_2 \ln Y_i + \alpha_3 \ln Y_j + \alpha_4 \ln D_{ij} + \sum_{k=0}^K \alpha_k \ln Z_{ij}^k + \varepsilon_{ij}$$
$$\ln X_{ij} = \beta_0 + \beta_1 \ln I_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \sum_{k=0}^K \beta_k \ln Z_{ij}^k + \delta_{ij}$$

where  $M_{ij}$  is import from migrant source country  $i$  to host country  $j$ ;

$X_{ij}$  is exports from migrant host country  $j$  into migrant source country;

$I_{ij}$  is the number of immigrants from country  $i$  living in country  $j$ ;

$Y_i$  is the GDP of a migrant-sending country;  
 $Y_j$  is the GDP of a migrant receiving country;  
 $D_{ij}$  is the distance between countries  $i$  and  $j$ ;  
 $Z_{ij}^k$  stands for  $k$  other explanatory variables;  
 $\varepsilon_{ij}$  and  $\delta_{ij}$  are the error terms;  
 $\alpha$  and  $\beta$  are the parameters of the model.

The most common estimation technique for this type of research has been log-linear panel data OLS estimation.

## 2. MIXED EVIDENCE ON TRADE-CREATING EFFECT OF IMMIGRATION

---

The findings of scholars searching for a relationship between international trade and migration have been mixed, with evidence of positive relationship prevailing.

Starting from Gould (1994) the gravity model has been employed as a means of analyzing the relationship between trade and migration. Gould found positive effect of net migration on the US trade (1970-1986, 47 trade partners). He distinguished between the types of goods traded and found that a 1% increase in immigrant stock of a particular sending nation increases US import from that nation by 0.01% and export to that nation by 0.02%. However, the author further assumed that one could expect diminishing immigration effect on trade in the long run.

Gravity model for evaluating influence of immigration on Canadian trade was used by Head and Ries (1998). The result was a significant positive correlation. For the case of Canada further studies (Wagner et al, 2002) estimated that a new immigrant attributes to a \$312 export increase to his home country and \$944 Canadian import increase.

Among more recent studies Qian (2007) examined trade-creating effect of immigration on New Zealand. He differentiated between immigrant stocks and

immigrant flows and between different types of migrants: students and workers. According to the results of his gravity model analysis recent migrants as well as immigrant from developing countries had a most prominent trade-creating effect. Bowen and Wu (2011) analyze panel data for 27 OECD countries between 1980 and 2009 and confirm enhancing relationship between immigration and trade (with special attention paid to gender composition of immigration).

An extensive study by White (2010) sheds light on the relationship between immigration to the US from 66 countries over 1992-2006 and respective impact on the trade flows. While confirming the positive relationship between the two phenomena, the author underlines the greater trade-enhancing effect of skilled immigrants, non-asylum seekers and those coming from more culturally diverse countries and recent immigrants.

Some researchers did not find a relationship between immigration and trade. For instance, Girma and Yu (2002) conducted a study for Great Britain and evaluated the effects two types of immigrants (Commonwealth and Non-Commonwealth) have on trade to find a positive relationship for the immigrants from the latter group of countries only. They included 48 trading partners of the UK over the years 1981-1993. An increase in non-Commonwealth immigration stock in Britain is estimated to raise its exports by 0.16% and imports by 0.1%. Probably, in the case of immigration from the Commonwealth countries (the history of which is longer) the positive effect of immigration ended. The authors interpret their findings by emphasizing that country-specific knowledge of language or commercial practices is a channel through which immigration leads to trade augmentation, rather than family or business ties that immigrants have with their countries of origin.

Bettin and Lo Turco (2009) did not find a significant effect of migration on trade for OECD countries and 212 trading partners (years 1995, 2000 and 2005). They differentiated the traded goods by consumption criterion, and even concluded that immigration can have negative effect on trade (especially, on export from OECD to developing countries).

Clarke and Hillbery (2009) examined bilateral trade of Australia between 1981 and 2006 (only the years of population censuses) to find whether immigration had effect on it. They employed the generalized method of moments and found no measurable effect. However, they worked with only 320-380 observation points.

The results of a meta-analysis conducted by Genc et al (2011) suggests that among 48 studies on the trade-creating effect of immigration with similar methodology (augmented gravity model) and estimation techniques (least squares for log-linear models) 30 presented positive effects. Among the remaining 18 papers only 4 found negative results.

So, the findings confirming the trade-enhancing effects of immigration prevail in the literature.

Some scholars investigated whether the trade-creating effect of immigration is diminishing with increasing stock of immigrants. Gould (1994) expressed this assumption. The trade-creating effect might wither away as the immigrant stock from a particular country increases as the local producers adapt to immigrant's consumption demands or immigrants themselves become similar to locals in their consumption preferences. This will diminish the preference effect of immigration on trade (boosting of the export of a sending country). Furthermore, the opportunities for conducting business with the home country might be exhausted. For instance, Egger et al (2011) employ generalized propensity score estimation to 27 OECD countries (and 130 immigrant sending partners) for the year 2000 and find diminishing effect of trade-creating effect of immigration stock: the bigger the stock the smaller the effect.

On examining immigrant stocks of 29 OECD countries from 163 sending countries for years 1990 and 2000, Foad (2009) concludes that there is a certain limit for trade-creating impact of immigrants in some cases: for immigrants from developed countries the increase in immigrant stock has diminishing trade-creating effect (probably, local producers learn to satisfy the demand of immigrants).

However, for immigrants from developing countries the effect increases with the growth of immigrant stock.

### 3. STUDIES FOCUSING ON THE EU

---

The majority of studies examine individual EU member states and the effect immigration has had on their bilateral trade.

For instance, Piperakis et al (2003) examined the effect of immigration on trade of Greece for the years 1981 and 1991 (circa 600 observations). They find significant positive effect on Greek export to migrant-sending countries, but no effect on imports.

Similar studies were conducted for other EU member states and produced various results, for example:

- Germany (Bruder, 2004: on examination of bilateral trade for the years 1970-1998 no trade-creating effect of migration was found).
- Sweden (Garmaza, 2011: significant positive effect of immigration on Swedish bilateral trade in 1980-2010 with migrant sending countries was confirmed, with bigger effect for Swedish exports).
- Italy (Bratti et al, 2012: years 2002-2009, Italian province level, significant positive effect for imports only).
- Spain (Blanes, 2005: stronger effect of immigration on intra-industry bilateral trade of Spain).
- UK (Ghatak et al., 2007: in the case of migration to UK from Central and Eastern European countries there is stronger evidence for export from a migrant-sending country to UK, than on import (both effects positive and significant, years 1996-2003).

There are much less studies on immigration and trade focusing on all the EU countries. The existing ones are quite recent. For instance, the effects of

immigration from Mediterranean and Eastern Europe on the EU countries are addressed in the study by Cagatay et al, (2013). The period under examination is 1998-2010. The authors use gravity model augmented with an immigrant stock variable. They find that a 1% increase in immigrant stock from a given country from regions under examination leads to 0.05% increase in exports, but migration from Eastern Europe is found to have adverse effect on exports. For imports no significant effect on import for Mediterranean was found, but significant positive effect for immigration from Eastern Europe was confirmed.

Casi (2011) examined the effect on immigration to 17 EU member states from 10 non-EU countries (major immigrant sending states) over the years 1997-2006 to find significant positive effect on EU countries export. This evidence was used to contradict conventional prejudice against immigration.

**To sum up**, out of the extensive body of research concerning the links between international migration and trade the studies that confirm trade-enhancing effects of the former prevail. While there are plenty of papers examining these effects for individual EU states, only a few focus on the whole EU region.

The contribution of this thesis to the academic discussion on the effects of immigration on trade has several dimensions:

- This study encompasses the data for all the available EU countries for an extensive period of time (2000-2012) and all the EU trading partners and is the first of such a scope in the literature.
- It employs both conventional and novel estimation techniques (Poisson Pseudo Maximum Likelihood estimation).
- Separate model for intra-EU migration and EU-non EU migration and trade are constructed to see in which case the trade-creating effect of immigration is bigger.

## V. IMMIGRATION AND TRADE NEXUS IN THE EU: GRAVITY MODEL

---

In this chapter the results of analyzing the trade-creating effect of migration in the case of EU countries are presented. It opens with introducing the hypotheses and methodological remarks on the augmented gravity model used in this study. Third section is dedicated to detailed description of the data as well as data sources and data preparation. Summary statistics and pairwise correlations of the variables are analyzed in Section 4. Theoretic background of four estimation methods used for analyzing augmented gravity model are explained in subsequent section. Section 6 summarizes the findings of econometric analysis. The chapter concludes with examination of possible limitations of this study and the restatement of main findings.

### 1. HYPOTHESES

---

The central question of this thesis is to explore the relationship between migration and trade using the latest available data<sup>39</sup> for European countries in order to contribute to the discussion whether migration has effect on trade.

The features of the data make it possible to distinguish between migrants from other European countries and non-EU countries. Comparing the privileges of inter-EU migrants (freedom to move, settle and work in any other member-state) with the situation of non-EU migrants, this empirical study can help answer the question: Which type of migration has a more distinct trade-creating effect, the liberalized EU-type one or the restricted one?

The ways migration can enhance trade were discussed in the previous chapter. In gravity model-based research they are often divided into two simplified categories:

---

<sup>39</sup> For the years 2000-2012.

preference effect and network effect. Preference effect stands for the fact that immigrants' consumption preferences might induce an increase in imports from their home country to the destination country. Network effect explains for the increase in both exports from the host country and imports from the home country, as newly arrived residents might effectively exploit their language and legal knowledge as well as personal connections with the sending countries in order to establish trading businesses. By comparing the extent to which immigration affects import and export one can assume which type of effect prevails.

The following hypotheses are to be tested by the model:

1. It is expected to find a positive relationship between trade and immigrant stock<sup>40</sup>, with network effect combined to preference effect producing a bigger effect on the home country exports than on the host country export (where mostly network effect is present).
2. Intra-EU migration is expected to have a bigger trade-creating effect than migration to the EU from non-EU countries.
3. The trade-creating effect from newcomers is expected to be stronger (immigration flow) than from those living in a country for a longer time (stock).

## 2. GRAVITY MODEL USED IN THIS STUDY

---

### 2.1. The gravity model of trade

The gravity model of trade found extensive application in international economics. Its logic follows the one of Newton's in classical mechanics: gravitational force between two objects is directly proportionate to the product of their masses and

---

<sup>40</sup> Due to the mechanisms described in Chapter III.

inversely proportional to the square of distance between the objects. In international trade, trade volume between two countries is considered proportional to the product of their economic masses (GDP is the most common proxy) and inversely proportionate to the square of distance between them.

As the Newton's law stemmed from an empirical observation of the actual properties of physical bodies, the gravity model of trade received wide recognition as it fits the actual trade data. Indeed, the theoretical explanation of why the model should describe trade flows came after the first attempts to analyze trade with the help of it.

The standard equation of the gravity model takes the following form:

$$T_{ij} = G \frac{Y_i^{\beta_1} * Y_j^{\beta_2}}{D_{ij}^{\beta_3}}$$

where  $T_{ij}$  represents the trade flow between countries  $i$  and  $j$ ;  $G$  is a constant,  $Y_i$ ,  $Y_j$  are respective GDPs and  $D_{ij}$  stands for the distance between  $i$  and  $j$ .

The gravity model of trade has been introduced in 1962 by Dutch economist Jan Tinbergen<sup>41</sup>. Since then the researchers have been introducing additional variables to it in order to increase its explanatory power for complicated socio-economic processes.

The gravity model of trade augmented by a variable that accounts for migration will be used in this study in order to quantify the relationship between two phenomena.

## **2.2. Theory behind the model**

Gravity model has been long considered a good approximation to real world trade processes without any theoretical foundation. However, a lot of successful attempts

---

<sup>41</sup> Tinbergen, Jan. 1962. *Shaping the world economy: Suggestions for an international economic policy*. New York: Twentieth Century Fund.

to derive gravity model type equation for trade from the theoretical foundations have been undertaken by researchers.

The simplest intuitive justification for gravity model of trade is presented in Deardorff (1998). The fact that trade flow is negatively related to the distance between two countries should be justified by the presence of transportation costs. Positive dependence of trade on income stems from the fact that country's size limits its ability to export and import, thus smaller countries should trade less in absolute terms. As the size of either country becomes zero, trade must become zero as well. This explains the multiplicative form of the equation.

Some scholars have derived the equation of the gravity model from the respective economic theories. Most of those derivations assumed that each product is produced by only one country (Anderson, 1969; Bergstrand, 1985). Second generation of derivations included the assumption of monopolistic competition (Bergstrand 1989; Helpman, Krugman, 1985).

Deardorff tried to derive gravity equation from Heckscher-Ohlin<sup>42</sup> model having claimed that "just about any plausible model of trade would yield something very like the gravity equation"<sup>43</sup>. He examined two extreme cases of Heckscher-Ohlin model: a case with zero trade costs, and a case with trade barriers. In the first case (assuming identical preferences among countries) a country would not differentiate between its own products and foreign ones, thus trade flows would be randomly distributed to reach great volumes. However, the model will exclude distance in this case.

In the case of the existence of trade barriers, (and consequently no factor-price equalization), Deardorff assumed the one country-one good specialization and derived the gravity-like trade prediction equation in terms of country's GDPs and

---

<sup>42</sup> The model assumes the existence of comparative advantages of trading partners, perfect competition etc.

<sup>43</sup> Deardorff, Alan V. 1998. Determinants of Bilateral Trade: Does Gravity Work in a Neoclassic World? In Jeffrey A. Frankel, eds, *The Regionalization of the World Economy*, p 12. University of Chicago Press.

trade barriers. Assuming that consumers in each country have uniform preferences that are Cobb-Douglas<sup>44</sup>, and thus they spend a fixed percentage of their incomes on goods produced in country  $i$  ( $\beta_i$ ), the following equation of the country's  $i$  income ( $Y_i$ ) was introduced:

$$Y_i = P_i X_i = \sum_j \beta_j Y_j = \beta_i Y_w$$

where  $P_i$  and  $X_i$  are respectively the price and quantity of goods produced in country  $i$ ;  $Y_j$  is income of any other country,  $Y_w$  is income of the world.

Consequently,  $\beta_i = \frac{Y_i}{Y_w}$ .

Trade volume between  $i$  and  $j$  could be presented with the following equation (simple frictionless gravity model):

$$T_{ij} = \beta_i Y_j = \frac{Y_i Y_j}{Y_w}$$

By making more complex assumptions on good preferences in trading countries, more complicated forms of gravity equations can be derived.

To sum up, there have been remarkable studies aimed at linking empirically successful gravity model with economic theory that rendered persuading results.

### 2.3. Specifications of the models used in this study

The gravity model of trade augmented with a variable accounting for immigration was used in this study (namely, immigrant stock and immigrant flow). The summary of basic model used is presented in a table:

TABLE 6: GRAVITY MODELS USED IN THIS STUDY

	Augmented with immigrant stock variable	Augmented with immigrant flow variable
--	--	---

---

<sup>44</sup> They are derived from a Cobb-Douglas utility function for the  $x_1$  and  $x_2$  quantities of goods 1 and 2:  $u(x_1, x_2) = x_1^\alpha x_2^\beta$ . A drawback of this assumption is that expenses on trade should decline (for example with distance).

Export	$E_{ij}$ $= Immst_{ji} * \frac{Y_i^{\beta_1} * Y_j^{\beta_2}}{D_{ij}^{\beta_3}}$	$E_{ij}$ $= Immfl_{ji} * \frac{Y_i^{\beta_1} * Y_j^{\beta_2}}{D_{ij}^{\beta_3}}$
Import	$I_{ij}$ $= Immst_{ji} * \frac{Y_i^{\beta_1} * Y_j^{\beta_2}}{D_{ij}^{\beta_3}}$	$I_{ij}$ $= Immfl_{ji} * \frac{Y_i^{\beta_1} * Y_j^{\beta_2}}{D_{ij}^{\beta_3}}$

Where  $i$  is a migrant-receiving EU-country;  $j$  is migrant-sending EU or non-EU country.

$E_{ij}$  is the amount of export from EU country to a migrant-sending country;

$I_{ij}$  is the amount of import from EU country to a migrant-sending country;

$Immst_{ji}$  – is the stock of immigrants from country  $j$  residing in country  $i$ ;

$Immfl_{ji}$  – is the flow of immigrants from a sending country  $j$  to a receiving country  $i$ ;

$Y_i$  and  $Y_j$  are the respective GDPs;

$D_{ij}$  is a measure of distance between the countries.

### 3. DATA AND DATA PREPARATION

More specific information on the variables that were used for the statistical model as well as their sources is summarized in Table X.

TABLE 7: LIST OF VARIABLES AND THEIR SOURCES (DATA FOR YEARS 2000-2012)

Name	Definition	Source	Notes
Export	From a EU country to a migrant-sending country	UN Comtrade data	Total commodities, HS as reported Extracted on 20.03.2015
Import	From a migrant-sending country to a EU country	UN Comtrade data	Total commodities, HS as reported. Extracted on 20.03.2015

Immigrant stock (immigrants from EU or non-EU country to a EU country)	Number of immigrants (on the basis of country of birth) living in a EU member state in a given year (an estimate based on population censuses).	Eurostat migration database Dataset: Population on 1 January by five year age group, sex and citizenship [migr_pop1ctz]	27 EU countries and 200 partner countries. Though prior to 2009 the relevant data was collected based on a gentleman's agreement, its submission was mandatory therefrom. Extracted on 29.02.2015
Immigrant flow (from a sending EU or non-EU country to a receiving EU country)	Number of immigrants (persons that arrive to a member-state with a view of permanent residence for longer than 12 month) that arrive to a EU country in a given year.	Eurostat migration database Dataset: Immigration by five year age group, sex and country of previous residence [migr_imm5prv]	27 EU countries and 200 partners (migrant-sending countries). Though prior to 2008 the data on immigrant flows was collected based on a gentleman's agreement, since 2008 EU members were required to submit it. Extracted on 17.03.2015
GDP ( $Y_i$ , $Y_j$ )	Nominal GDP of 200 countries in a respective year	UN data (Original source: World Development Indicators, World Bank)	Current US dollars Extracted: 17.03.2015
Distance ( $D_{ij}$ )	Distances between country pairs are measured as distances between their capital cities.	The database of University of Essex professor K. Gleditsch, file capdist.csv <sup>45</sup>	Accessed on 18.03.2015

---

<sup>45</sup>Link to the source: <http://privatewww.essex.ac.uk/~ksg/data-5.html>

Examination of an extensive time period and a big number of countries (28 EU member-states vs. all the countries of the world) resulted in a total of more than 70,000 observations (for each of the models), out of which 27347 were actually used in the analysis of the Flow model and 28943 for the Stock model (as they did not have missing or zero values).

One of the most challenging tasks in the course of this research was the tedious process of compiling the necessary data together into one file and converting it to the form that can be used by Stata or other statistical software.

Among the recurring problems discrepancies in names of the same country in different sources of data were a big issue. Thus, there was a need of converting all the names to three-digit ISO country codes.

Another issues to be solved were different properties of the data for the variables: while some sources of data used commas as a decimal separator (for example, GDP values), others were not. Statistical programs would not recognize the numbers separated with commas as numeric values. This issue required recoding.

The missing data points were indicated differently for all the variables (either N/A, or by empty space or by two dots “..”). This discrepancy had to be resolved as well.

#### 4. PRELIMINARY DATA ANALYSIS

---

In this section the results of preliminary data analysis are presented. In order to understand the properties of the data summaries of main statistics for both Flow and Stock model were compiled. Pairwise correlation matrices for the variables used in statistical models were used to check the presence of multicollinearity. The scatter plots of variables were used to determine the general direction of the relationship between the variables<sup>46</sup>.

---

<sup>46</sup> Pairwise scatter plot matrices are presented in Appendix E.

TABLE 8: SUMMARY STATISTICS FOR THE FLOW MODEL

Variable	Flow model				
	Freq.	Mean	St dev	Min	Max
Export from EU country to a migrant-sending country, US dollars	27347	1.14e+09	5.70e+09	1	1.43e+11
Import from a migrant-sending country to a EU country, US dollars	27347	1.14e+09	5.30e+09	1	1.06e+11
Immigrant flow (from a sending EU or non-EU country to a receiving EU country in a given year), persons	27347	876	4338	0	163643
GDP of a EU country, US dollars	27347	5.75e+11	7.72e+11	3.92e+09	3.75e+12
GDP of a migrant-sending country, US dollars	27347	3.52e+11	1.33e+12	2.02e+08	1.62e+13
Distance ( $D_{ij}$ ), km	27347	5536.744	3670.391	62	19835

TABLE 9: SUMMARY STATISTICS FOR THE STOCK MODEL

Variable	Stock model				
	Freq.	Mean	St dev	Min	Max
Export from EU country to a migrant-sending country, US dollars	28943	1.39e+09	6.66e+09	1	1.43e+11
Import from a migrant-sending country to a EU country, US dollars	28943	1.34e+09	5.98e+09	1	1.14e+11
Immigrant stock (persons with non-EU country)	28943	7591.022	51113.38	0	2053564

citizenship residing in a EU country), persons					
GDP of a EU country, US dollars	28943	6.40e+11	8.59e+11	3.92e+09	3.75e+12
GDP of a migrant-sending country, US dollars	28943	3.54e+11	1.33e+12	2.02e+08	1.62e+13
Distance ( $D_{ij}$ ), km	28943	5570.608	3690.404	62	19835

As we see from Tables 10 and 11, there are 27347 observations in both Flow models and 28943 observations for the Stock models.

It is important to note, that the data for 22 EU member states is represented in the Flow model, while for the Stock model the data for 25 member states is represented (detailed description on the countries covered and their respective shares can be found in Appendix F).

TABLE 10: CORRELATION MATRIX FOR THE IMMIGRANT FLOW MODEL

	Immigrant flow	GDP <sub>EU</sub>	GDP <sub>All</sub>	Distance	Import	Export
Immigrant flow	1					
GDP <sub>EU</sub>	0.27*** (0.0000)	1				
GDP <sub>All</sub>	0.14*** (0.0000)	0.00 (0.8131)	1			
Distance	-0.07*** (0.0000)	0.02*** (0.0000)	0.00 (0.9010)	1		
Import	0.40*** (0.0000)	0.25*** (0.0000)	0.34*** (0.0000)	-0.16*** (0.0000)	1	
Export	0.38*** (0.0000)	0.24*** (0.0000)	0.32*** (0.0000)	-0.17*** (0.0000)	0.90*** (0.0000)	1

\* 10% significance level, \*\* 5% significance level, \*\*\* 1% significance level.

TABLE 11: CORRELATION MATRIX FOR THE IMMIGRANT STOCK MODEL

	Immigrant stock	GDP <sub>EU</sub>	GDP <sub>All</sub>	Distance	Import	Export
Immigrant stock	1					
GDP <sub>EU</sub>	0.22*** (0.0000)	1				
GDP <sub>All</sub>	0.07*** (0.0000)	0.003 (0.6148)	1			
Distance	-0.10*** (0.0000)	0.01* (0.0442)	-0.05 (0.4057)	1		
Import	0.28*** (0.0000)	0.26*** (0.0000)	0.35*** (0.0000)	-0.18*** (0.0000)	1	
Export	0.30*** (0.0000)	0.25*** (0.0000)	0.33*** (0.0000)	-0.19*** (0.000)	0.91*** (0.0000)	1

\* 10% significance level, \*\* 5% significance level, \*\*\* 1% significance level.

The correlation matrices show that there is no multicollinearity among the examined variables (except for the one between export and import, but this is not a problem, as these two variables were used in two separate regressions).

The general direction of the relationship between variables gave some insights into the data (consistent with expectations): export and import are negatively and significantly correlated with distance between the countries. Furthermore, immigrant flow and immigrant stock are positively correlated to GDPs of countries and negatively correlated to the distance between them.

Scatter plots in Appendix E show the above relationship graphically.

## 5. METHODOLOGY

Four methods were used in this study in order to estimate the gravity model. They include Ordinary Least Squares (OLS) for pooled data, OLS for panel data with fixed time effects, OLS for panel data with random effects and Poisson Pseudo Maximum Likelihood estimation. The motivation behind the choice of the methods is presented in this section.

## 5.1. OLS for cross-sectional data

The most common estimation methods (OLS) for gravity models of trade have been based on its log-linear conversion.

In this model all the data points from 2000 to 2012 are pooled together and time effects are left unaccounted for.

As zero values pose a problem for log-linear estimation, they were eliminated.

Thus, total of 21956 observations were analyzed for the Flow model and 27072 for the Stock one.

Immigrant-stock augmented gravity model was estimated in the following form:

$$\ln Export_{ij} = \alpha_{ij} + \beta_1 \ln Immigrant\ stock_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij}$$

$$\ln Import_{ij} = \alpha_{ij} + \beta_1 \ln Immigrant\ stock_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij}$$

In the second specification of the model immigrant flow is used instead of immigrant stock in order to test Hypothesis 3 on the effects new-comers have on trade:

$$\ln Expo_{ij} = \alpha_{ij} + \beta_1 \ln Immigrant\ flow_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij}$$

$$\ln Import_{ij} = \alpha_{ij} + \beta_1 \ln Immigrant\ flow_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij}$$

The OLS for pooled data was used rather as an exploratory exercise in this study as it has two major problems: zero values are left unaccounted for. Besides, the times effect is not taken into account this way.

## 5.2. OLS for panel data with fixed time effect

Panel data enables analyzing the data across time. The panel form of data is advantageous for researchers as makes it possible to identify and estimate effects

that cannot be observed in cross-section or time series data<sup>47</sup>. In general, it is more flexible in usage due to its structure.

Under fixed effect model it is assumed that some features of an entity in the research (GDP, immigrant stock etc) can influence the dependent variable as well and there is a need to control for these effects. The basic assumption of the model is the existence of correlation between independent variables and between entity error terms. Thus, the model eliminates the time-invariant unobserved effects.

Fixed effect model can be understood as a within transformation: the sample averages of variables are calculated, then the difference between the values and those averages are regressed instead of values themselves. But this transformation can leave out the variables that are constant in time (like distance).

Fixed time effect model with panel data follows the same logic, only that it is assumed that part of variation is explained by the time trend. What we do is eliminating this trend. This model is equivalent to pooled data model with adding year dummies. Each dummy absorbs effects specific to each year. Basically, 13 groups are to be created based on 2000-2012 years and the respective within-group variation will be used to estimate regression coefficients.

In the case of this research the panel data used was unbalanced (not all the data points were available for all countries across the years 2000 to 2012). The within-country pair fixed effects model caused for the distance to be dropped-out, so only time fixed effect was accounted for in further estimations.

OLS estimation of unbalanced panel data with fixed time effect was used for both Immigrant flow and Immigrant stock models.

---

<sup>47</sup> Baltagi, Badi H. (2008). *Econometric Analysis of Panel Data* (Fourth ed.). Chichester: John Wiley & Sons.

### 5.3. OLS for panel data with random effects

The key assumption of random effect model is that “variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model”<sup>48</sup>. Thus, it is assumed that between-entity error terms are not correlated with independent variables. However, the estimation coefficients include both within and between-entity effects.

In order to choose between fixed effects and random effect models Hausman test is to be conducted. Basically, the test checks whether between entity errors are correlated with independent variables (null hypothesis is that they are not correlated, that model is with random effects). In most of the situations of econometric analysis the error terms and independent variables are correlated (there is some unobserved variance caused by factors others than independent variables), so fixed effect models are preferred<sup>49</sup>.

In our case, GDP of the countries as well as migration stocks were most probably changing with time in similar direction (increase during the high growth 2000s and suppression with onset of crisis). Furthermore, as the amount of entities (country pairs) studied is very big, the random effect model that accounts for within-entity errors ends up to include almost 3000 additional variables that negatively influence the degrees of freedom and the reliability of the model. So, random effect model in this study is run for the purpose of comparison.

---

<sup>48</sup> Torres-Reyna O. December 2007. Panel Data Analysis: Fixed and Random Effects Using Stata. Princeton University Data and Statistical services Tutorials  
<http://dss.princeton.edu/training/Panel101.pdf>

<sup>49</sup> As above

#### **5.4. Poisson Pseudo Maximum Likelihood estimation (PPML)**

The above OLS estimates of gravity models have been extensively criticized in econometric literature. Because of the log-linear estimation form, in the presence of heteroscedasticity<sup>50</sup> the estimation of the standard error terms is going to be misleading (though the OLS estimator remains reliable, the confidence intervals are not)<sup>51</sup>.

An alternative estimator was suggested by Santos Silva and Teneyro in 2006<sup>52</sup> specifically for gravity model of trade and has become widely used in international trade research. Santos Silva and Teneyro argue that the Poisson Pseudo Maximum Likelihood estimation is a more reliable (thus less biased) and efficient estimation method, especially in the presence of heteroscedasticity (as conditional variance is assumed to be proportional to the conditional mean, and the error's variance is accounted for more efficiently).

Under PPML method gravity models are estimated in the non-linear form (actually, it is the same as non-linear least squares<sup>53</sup> but with specific assumption about the error terms) and the variables do not need to have a Poisson distribution. Though PPML estimation technique is most often used for data count, the dependent variable does not need to be an integer.

---

<sup>50</sup> Heteroscedasticity is a characteristic of the variability of a dependent variable that applies when the variance of the latter is not uniform and its pattern depends at the variance of some of the independent variables. If the variance of the dependent variable remains the same regardless of the values of independent variables, they are referred to as homoscedastic. Heteroscedasticity is very likely to occur in most of the cases of econometric research. The main concern about OLS in the presence of heteroscedasticity is that OLS regression does not estimate all the range of values of dependent variable with the same accuracy. For example, it can predict smaller values of dependent variable better than the bigger ones. After all, OLS assumes that the variables are homoscedastic.

From Barreto H, F. M. Howland. Introduction to Econometrics. Chapter 19. Cambridge University Press. 2001.

<sup>51</sup> As above.

<sup>52</sup> Santos Silva, J., and S. Teneyro. 2006. "The Log of Gravity." *Review of Economics and Statistics*, 88(4): 641-658.

<sup>53</sup> The method is based on approximation of a model to a linear one, but then the parameters are refined by successive iterations.

An important feature of PPML estimator is that it takes into account zero values of the dependent variable as the model is estimated in its non-linear form.

In the case of PPML estimation the gravity model takes the following forms.

For Immigrant stock model:

$$Export_{ij} = \exp(\alpha_{ij} + \beta_1 \ln Immigrant\ stock_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij})$$

$$Import_{ij} = \exp(\alpha_{ij} + \beta_1 \ln Immigrant\ stock_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij})$$

For Immigrant flow model:

$$Export_{ij} = \exp(\alpha_{ij} + \beta_1 \ln Immigrant\ flow_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij})$$

$$Import_{ij} = \exp(\alpha_{ij} + \beta_1 \ln Immigrant\ flow_{ij} + \beta_2 \ln Y_i + \beta_3 \ln Y_j + \beta_4 \ln D_{ij} + \varepsilon_{ij})$$

Usually the results of the PPML estimation of gravity models differ from that of the log-linear OLS estimation in the following ways<sup>54</sup>:

- more observations are analyzed;
- the coefficients for GDPs and distance are smaller (this might result from accounting for heteroscedasticity).

As PPML estimation possesses a lot of benefits especially for gravity models of trade, there is a strong argument in the literature to use it<sup>55</sup>.

---

<sup>54</sup> Shepherd B. The Gravity model of International Trade: A User Guide. Chapter 4: Alternative gravity model estimators. UNECAP, United Nations Publication, 2013. <http://www.unescap.org/sites/default/files/tipub2645.pdf>

<sup>55</sup> As above.

## 6. FINDINGS AND INTERPRETATION

---

The main models of this study being OLS with fixed time effects and eventually PPML estimation, the results of these regressions are emphasized. The estimates of gravity model coefficients obtained from pooled data OLS are discussed in the beginning of this section (as an exploratory exercise). The results of OLS for panel data with random effects are presented in the Appendix, as Hausman test (results presented in Appendix as well) showed that there is correlation between error terms and independent variables. Thus, in our case fixed effects model was considered to be more appropriate than the random effects one.

### 6.1. Pooled data OLS

This estimation having been made for rather exploratory purposes, all the data points were pooled together and considered as referring to the same point of time. The resulting coefficients had the expected signs and the model fitted the data quite well.

However, heteroskedasticity was found to be present (homoscedasticity hypothesis was rejected by Breusch-Pagan/Cook-Weisberg test). Consequently, though coefficients of this regression are quite reliable, the confidence intervals obtained from this OLS estimation are rather dubious.

Nevertheless, even looking at the results of this exercise, we find significant results. Both immigrant stock and immigrant flow are significant in explaining trade patterns. What is more, the immigration coefficients (elasticities) are bigger for import, than export. Comparing the Flow and the Stock model, we see that the immigrant flow tends to have a bigger trade creating effect than the immigrant stock.

TABLE 12: POOLED DATA OLS REGRESSION RESULTS

Independent variables	Dependent variables			
	Flow model		Stock model	
	ln (Import)	ln (Export)	ln(Import)	ln(Export)

ln(GDP <sub>EU</sub> )	0.77*** (0.013)	0.88*** (0.008)	0.83*** (0.013)	0.87*** (0.007)
ln(GDP <sub>Migrant-sending country</sub> )	1.04*** (0.007)	0.78*** (0.004)	1.07*** (0.008)	0.81*** (0.004)
ln(Distance)	-0.91*** (0.0162)	-1.04*** (0.009)	-0.86*** (0.016)	-1.04*** (0.009)
ln(Immigrant flow)	0.30*** (0.008)	0.21*** (0.005)	-	-
ln(Immigrant stock)	-	-	0.25*** (0.007)	0.19*** (0.004)
Constant	-22.78*** (0.439)	-17.00*** (0.0025)	-25.22*** (0.413)	-17.4*** (0.229)
No of obs	21956	21956	27072	27072
R <sup>2</sup>	0.70	0.84	0.69	0.84
Heteroscedasticity test <sup>56</sup>	3005.66***	3392.90***	3351.27***	4196.48***

\* 10% significance level, \*\* 5% significance level, \*\*\* 1% significance level.

## 6.2. OLS with fixed time effect

This estimation technique allows us to look at the model without the time trend.

Under this model (the equivalent to the introduction of time dummies) the data was divided into 13 groups and within, between and overall R<sup>2</sup> were calculated.

TABLE 13: FIXED TIME EFFECT REGRESSION RESULTS

Independent variables	Dependent variables			
	Flow model		Stock model	
	ln(Import)	ln(Export)	ln(Import)	ln(Export)
ln(GDP <sub>EU</sub> )	0.87*** (0.014)	0.92*** (0.008)	0.98*** (0.014)	0.93*** (0.008)

<sup>56</sup> Breusch-Pagan/Cook-Weisberg test (“hettest” command in Stata), Ho: Constant covariance (homoscedasticity). If chi2 value is big and Prob>chi2=0.0000 then heteroscedasticity is present.

ln(GDP Migrant-sending country)	1.11*** (0.008)	0.81*** (0.005)	1.15*** (0.008)	0.84*** (0.004)
ln(Distance)	-0.93*** (0.016)	-1.05*** (0.009)	-0.90*** (0.016)	-1.06*** (0.009)
ln(Immigrant flow )	0.25*** (0.008)	0.19*** (0.005)	-	-
ln(Immigrant stock)	-	-	0.19*** (0.07)	0.17*** (0.004)
Constant	-26.35*** (0.456)	-18.4*** (0.258)	-30.59*** (0.433)	-19.75*** (0.242)
No of obs	21956	21956	27072	27072
No of groups	13	13	13	13
R <sup>2</sup>				
Within	0.71	0.84	0.70	0.84
Between	0.78	0.97	0.76	0.97
Overall	0.70	0.84	0.69	0.84
Heteroscedasticity test <sup>57</sup> (chi2)	54.64***	44.89***	118.78***	18.85 (0.128)

10% significance level, \*\* 5% significance level, \*\*\* 1% significance level.

Though the data shows the presence of heteroscedasticity (except for the case of the Stock model for export), the general results of this regression are as follows:

- The coefficients having the expected signs and values, the effects of immigration on import from the sending country to the migrant-receiving country are stronger than those on export for both the Stock and Flow models.
- However, the effects of the immigrant stock are bigger than those of the immigrant flow (that goes against expectations).

---

<sup>57</sup> Modified Wald test for group-wise heteroskedasticity in fixed effect regression model. Ho:  $\sigma(i)^2 = \sigma^2$  for all i (homoscedasticity). If  $\text{Prob} > \chi^2 = 0.0000$ , Ho is rejected.

### 6.3. PPML estimation

Finally, the results of Poisson Pseudo Maximum Likelihood Estimation are discussed. This estimation technique being less biased and quite efficient<sup>58</sup>, the results of this model are considered in making conclusions concerning the hypotheses.

TABLE 14: THE RESULTS OF PPML ESTIMATION

Independent variables	Dependent variables			
	Flow model		Stock model	
	Import	Export	Import	Export
ln(GDP <sub>EU</sub> )	0.59*** (0.017)	0.60*** (0.015)	0.60*** (0.015)	0.63*** (0.013)
ln(GDP <sub>Migrant-sending country</sub> )	0.65*** (0.008)	0.65*** (0.009)	0.68*** (0.008)	0.68*** (0.008)
ln(Distance)	-0.63*** (0.014)	-0.76*** (0.014)	-0.64*** (0.013)	-0.76*** (0.012)
ln(Immigrant flow)	0.2098*** (0.010)	0.2066*** (0.008)	-	-
ln(Immigrant stock)	-	-	0.1703*** (0.008)	0.1624*** (0.007)
Constant	-8.47*** (0.519)	-7.60*** (0.503)	-9.34*** (0.484)	-9.38*** (0.456)
No of obs	21956	21956	27072	27072
Pseudo-R <sup>2</sup> <sup>59</sup>	0.89	0.92	0.90	0.93

\* less than 10% significance level, \*\* less than 5% significance level, \*\*\* less than 1% significance level.

<sup>58</sup> Santos Silva, J., and S. Tenreyro. 2006. "The Log of Gravity." *Review of Economics and Statistics*, 88(4): 641-658.

<sup>59</sup> Pseudo-R<sup>2</sup> in PPML is McFadden's pseudo-R<sup>2</sup> that takes into account maximum likelihood estimates. It is calculated as one minus the ratio of log maximum likelihoods of full (fitted) model to the log maximum likelihood of intercept model. Pseudo-R<sup>2</sup> cannot be interpreted as goodness of fit and thus cannot be directly compared to the OLS R<sup>2</sup>. It is interpreted as an improvement from null model to fitted model. The closer its value is to one, the better the fitted model is over the intercept model. It is called pseudo-R<sup>2</sup> as it was designed to look similar to OLS R<sup>2</sup>.

From IDRE UCLA website, FAQ: What are pseudo-R-squareds?

[http://www.ats.ucla.edu/stat/mult\\_pkg/faq/general/Pseudo\\_RSquareds.htm](http://www.ats.ucla.edu/stat/mult_pkg/faq/general/Pseudo_RSquareds.htm)

The coefficients of independent variables proved smaller than those returned by OLS regressions (this was expected and discussed in Section 5.4). Nevertheless, their signs are consistent with general expectations. A 1 % increase in GDP of a EU member state would result in 0.6% increase of import (or export) from migrant sending country to a EU country for both the Flow and Stock models. A 1% increase in partner's GDP would lead to 0.65% increase in import (or export) for the Flow model, and 0.68% increase in import or export flow for the Stock model. The elasticity of trade flows for distance is different for import and export (but similar across the models): a 1% increase in distance tends to decrease import by 0.63-0.64%, and export by 0.76%.

When it comes to the immigrant flow, it is positively and significantly related to trade flows. A 1 % increase in the immigrant flow would result in 0.2098% increase in import of a EU member from a migrant sending country and 0.2066% increase of exports from a EU state to migrant sending country.

The elasticity coefficients are smaller for the immigrant stock variable: a 1% increase in the stock of immigrants from a given country to a EU country would lead to 0.1703% increase of imports from the former, and to 0.1624% increase in export from the EU country to the sending country.

Concerning the pseudo- $R^2$ , it shows the improvement of fitted model from the intercept model. With its value being quite high, the fitted model is much better than the null one.

As immigrant flow has a bigger trade-creating effect than the stock, this supports Hypothesis 2.

As we observe the trade-creating effect of immigrant stock and flow, in both cases the effect for import is bigger, which supports the assumption about preference and network effects (Hypothesis 1).

In order to test Hypothesis 3 (on trade-creating effect immigration to a EU member from other EU states vs. immigration from non-EU members), the data

was divided into two parts: EU-EU countries and EU-non-EU countries. Two resulting groups of models were analyzed.

TABLE 15: PPML ESTIMATION OF THE MODEL FOR EU-EU COUNTRIES TRADE AND MIGRATION

Independent variables	Dependent variables			
	Flow model		Stock model	
	Import	Export	Import	Export
ln(GDP <sub>EU</sub> )	0.545*** (0.023)	0.547*** (0.018)	0.505*** (0.019)	0.523*** (0.025)
ln(GDP <sub>Migrant-sending country</sub> )	0.624 *** (0.014)	0.600*** (0.016)	0.577*** (0.013)	0.575*** (0.013)
ln(Distance)	-0.700*** (0.024)	-0.768*** (0.025)	-0.673*** (0.020)	-0.716*** (0.020)
ln(Immigrant flow )	0.216*** (0.016)	0.224*** (0.013)	-	-
ln(Immigrant stock)	-	-	0.208*** (0.012)	0.214*** (0.010)
Constant	-5.991 *** (0.792)	-4.948*** (0.717)	-4.09*** (0.678)	-4.22*** (0.567)
No of obs	3884	3884	4978	4978
Pseudo-R <sup>2</sup>	0.903	0.905	0.89	0.91

\* less than 10% significance level, \*\* less than 5% significance level, \*\*\* less than 1% significance level.

The EU-EU model (immigration and trade takes place between EU member states) has 3884 observations and all the independent variables are significant. The elasticities of trade for GDPs and distance are similar to those of the model with all observations. The elasticities of trade depending on changes in the immigrant flow are still higher than those for stock. However, in this case the trade creating effect of immigration (both flows and stocks) is bigger for export than import (both models).

TABLE 16: PPML ESTIMATION OF THE MODEL FOR EU-NON EU COUNTRIES  
TRADE AND MIGRATION

Independent variables	Dependent variables			
	Flow model		Stock model	
	Import	Export <sup>60</sup>	Import	Export
ln(GDP <sub>EU</sub> )	0.676*** (0.021)	0.673*** (0.0004)	0.746*** (0.020)	0.848*** (0.018)
ln(GDP <sub>Migrant-sending country</sub> )	0.663*** (0.009)	0.678*** (0.0002)	0.741*** (0.010)	0.779*** (0.008)
ln(Distance)	-0.541*** (0.021)	-0.717*** (0.0002)	-0.633*** (0.020)	-0.802*** (0.015)
ln(Immigrant flow )	0.194*** (0.013)	0.187*** (0.0002)	-	-
ln(Immigrant stock)	-	-	0.132*** (0.010)	0.092*** (0.008)
Constant	-11.803*** (0.635)	-24.593*** (0.0109)	-14.87*** (0.650)	-17.090*** (0.570)
No of obs	18072	18072	22094	22094
Pseudo-R <sup>2</sup>	0.87	0.92	0.86	0.91

\* less than 10% significance level, \*\* less than 5% significance level, \*\*\* less than 1% significance level.

In case of EU-non EU countries model, the trade-creating effects of both immigration flow of citizens from non-EU country to a EU country and their migrant stock is bigger for import than for export.

By comparing the elasticities of trade on immigration variables for both models, we can conclude that the effects are stronger in the EU-EU trade and migration case. Thus, Hypothesis 3 is supported. One possible explanation of this effect is closer economic integration and internal trade in the EU. However, liberalization of

---

<sup>60</sup> In this particular case the Stata command “poisson” encountered a problem in finding a minimum for the estimation function (the convergence could not be achieved and it continued calculating iterations). This problem is often encountered if Poisson estimation is applied for dependent variables with big values (like export in our model). In order to simplify the process the value of export was rescaled. More precisely, it was divided by 100000. This change did not affect the coefficients of independent variables, but affected the coefficient of constant and standard errors.

the movement of people inside the Union is another side of the same integration process. Our results suggest that more liberal regime of international migration might result in trade benefits, at least for both receiving and sending country.

## 7. LIMITATIONS OF THIS STUDY

---

Though the data on immigration in the EU is quite extensive and is collected in a centralized and obligatory manner (since 2008), it is still not fully inclusive. The data for periods prior to 2009 has a lot of missing values. However, this study used all the available data starting from 2000.

The data also does not take into account illegal migrants that are present at a large scale in the countries of the EU (according to the Europol<sup>61</sup> estimates, half a million persons enter the EU illegally every year). On the other side, there are some grounds to believe that illegal migrants that often struggle with financial hardship have less effect on trade flow between their home and host countries. For example, as they have much less opportunities to establish their own businesses because of the clandestine nature of their stay. However, in the case of researching remittance flows both legal and illegal immigrants should be accounted for.

**To sum up**, regression analysis of the gravity model of trade augmented with immigration variables that encompassed the countries of EU and their trading partners for the years 2000 to 2012 showed that immigration from one country to another tends to have a trade-creating effect. All the models used in this study showed consistent results. However, PPML estimation was chosen as the least biased and more efficient estimator. According to our findings, the trade-creating

---

<sup>61</sup> From <https://www.europol.europa.eu>

effect of immigration tends to be stronger for import from a migrant-sending country to a migrant receiving country, than for the export from the receiving to the sending country. This can be explained by the combination of network and preference effects.

The immigration elasticity of trade turned out to be higher for the EU-EU trade than for the EU-non-EU one. Liberalized movement of people had a beneficial effect of intra-regional trade. Thus this finding can be used an argument for more liberalized migration.

As for the immigrant flow and immigrant stock variables, the trade-creating effect from the former was found to be bigger. This confirms the assumption on the diminishing effects of immigration on trade.

## VI. CONCLUSIONS

---

---

This thesis aimed at contributing to the academic debate concerning the nature of the relationship between international migration and international trade. In modern world trade is rather viewed as a substitute for migration by policy makers who desire to curb migration flows by establishing free trade agreements. The thesis examined the effect of immigration on the receiving country's trade on the example of the European Union. In the last decades the region has been at heart of immigration processes as well as policy developments. As most of the previous studies on the relationship between migration and trade were conducted on a single country basis, this study contributes to the literature by examining all the EU countries (for which the data was available) since 2000 to 2012.

Though previous research on the relationship between migration and trade produced mixed results, this research confirms trade-creating effect of international migration. The ways migration influences trade between the migrant-sending and migrant-receiving countries can be summarized into network effect and preference effect. Network effect arises due to the immigrant's country-specific knowledge and home contacts that decreased cost of having business. It can have a boosting effect on both receiving country's import and export. Preference effect appears due to increased demand for sending country's consumer goods in a given receiving country when the immigrant stock of the sending country increases. This effect will lead to an increase in import from migrant sending to migrant-receiving country.

Regression analysis of the gravity model of trade augmented with immigration variables that encompassed the countries of EU and their trading partners for the years 2000 to 2012 showed that immigration from one country to another tends to have a trade-creating effect. All the models used in this study (OLS for pooled data, OLS for panel data with fixed and random effects, Poisson Pseudo Maximum Likelihood Estimation) showed consistent results. However, PPML estimation was chosen as the least biased and more efficient estimator. According to the findings, the trade-creating effect of immigration tends to be stronger for import from a

migrant-sending country to a migrant receiving country, than for the export from the receiving to the sending country. This can be explained by the combination of network and preference effects.

The immigration elasticity of trade turned out to be higher for the EU-EU trade than for the EU-non-EU one. Liberalized movement of people had a bigger beneficial effect of intra-regional trade.

As for the immigrant flow and immigrant stock variables, the trade-creating effect from the former was found to be bigger. This confirms the assumption on the diminishing effects of immigration on trade.

As for the implications of this thesis for the debate on international migration, it provides an argument (and an answer to the first research question) for the notion of migration bearing reciprocal benefits for migrant-receiving countries. For the latter the benefits are channeled through augmented trade flows. Furthermore, migration and trade can be viewed as complementary phenomena: increased migration does not inhibit trade, as would happen in the factor-price equalization theorem world.

The findings of this thesis should be viewed as a part of a much broader discourse on economic effects of international migration prior to giving any policy advice. Though migrant-receiving countries may benefit from international migration through trade channel (as in the case of the EU), other ways migration influences native economy and society should be examined to make final conclusions. As for economic effects of international migration, both its microeconomic and macroeconomic influences should be examined.

Global migration processes are intensifying. Even though global economic crisis had suppressing effect on the movement of people, it is revealed by 2013 data that the migration flows are gaining momentum. By trying to curb international migration countries might be even losing in terms of trade or international capital movement, as all these sides of globalization are interconnected.

## VII. BIBLIOGRAPHY

---

Anderson, James E. (1979) "A theoretical foundation for the gravity equation".

*American Economic Review* 69:106-16.

Arslan, C. *et al.* (2014) "A New Profile of Migrants in the Aftermath of the Recent Economic Crisis", *OECD Social, Employment and Migration Working Papers*, No. 160, OECD Publishing. <http://dx.doi.org/10.1787/5jxt2t3nnjr5-en>

Baltagi, Badi H. (2008) "Econometric Analysis of Panel Data" (Fourth ed.).

Chichester: John Wiley & Sons.

Barreto H, F. M. Howland (2001) "Introduction to Econometrics" Chapter 19.

Cambridge University Press.

Bergstrand, Jeffrey H. (1989). "The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade". *Review of Economics and Statistics* 71:143-53

Bergstrand, Jeffrey H. (1985). "The gravity equation in international trade: Some micro- economic foundations and empirical evidence". *Review of Economics and Statistics* 67:474-81.

Bettin, Giulia and Lo Turco, Alesia (2009). "A cross country view on South-North migration and trade" Hamburg Institute of International Economics Publication.

Blanchflower, D. G., J. Saleheen and C. Shadforth (2007): "The impact of the recent migration from Eastern Europe on the UK economy", Bank of England Quarterly Bulletin, vol 47, no 1, pp 131–36.

Blanes, J. 2005. "Does Immigration Help to Explain Intra-Industry Trade?" Evidence for Spain. *Review of World Economics* 141 (2), 244-270.

Bowen, Harry and Jennifer P. Wu (2011), "Immigrant Specificity and the

Relationship between Trade and Immigration: Theory and Evidence”, Discussion Paper No. 2011-01, McColl School of Business, Queens University of Charlotte.

Bratti M., L. De Benedictis, G. Santoni. (2012) “On the Pro-Trade Effects of Immigrants” IZA DP No. 6628. Available at: <http://ftp.iza.org/dp6628.pdf>

Bruder, Jana (2004), “Are Trade and Migration Substitutes or Complements? - The Case of Germany, 1970-1998”, University of Rostock, mimeo.

Cagatay S., M. Genc, O. Koska. (2013) “The Impact of Immigration on International Trade in Europe: The Case of the EU-Mediterranean-Eastern Europe Zone”. Presented at the 2<sup>nd</sup> Multidisciplinary Academic Conference in Prague. Available at: [http://www-sre.wu.ac.at/ersa/ersaconfs/ersa13/ERSA2013\\_paper\\_00376.pdf](http://www-sre.wu.ac.at/ersa/ersaconfs/ersa13/ERSA2013_paper_00376.pdf)

Card, D. (1990): “The impact of the Mariel Boatlift on the Miami labor market”, *Industrial and Labor Relations Review*, vol 43, no 2, pp 245–57.

Card, D. (2005): “Is the new immigration really so bad?”, *Economic Journal*, vol 115, no 507, pp F300–23.

Casi, Laura (2011), "Enhancing Trade Through Migration: A Gravity Model of the Network Effect", ISLA-Bocconi, mimeo.

Clarke, Andrew J. and Russell H. Hillberry (2009), “Immigration and Trade in Recent Australian History”, University of Melbourne. Available at: <http://spot.colorado.edu/~kellerw/courses/9999f09/Hillberry.pdf>

Coppel, J., Dumont, J.-C., and Visco, I. (2001). “Trends in immigration and economic consequences”. OECD Economics Department Working Paper, (284).

Deardorff, Alan V. (1998) “Determinants of Bilateral Trade: Does Gravity Work in a Neoclassic World?” In Jeffrey A. Frankel, eds, *The Regionalization of the World Economy*, p 7-32. University of Chicago Press.

- Egger P., M. Von Ehrlich, D. Nelson (2011) “Migration and Trade”. CESifo Working Paper Series No. 3467. Available at: <https://ideas.repec.org/p/ces/ceswps/3467.html>
- Foad, Hisham S., (2009) “A Threshold Model for the Migration-Trade Link”. Available at SSRN: <http://ssrn.com/abstract=1424608>
- Garmaza V. (2011) “The Impact of Immigration on Trade: the Case of Sweden”. Södertörns Högskola, Department of Economics. Available at: <http://www.diva-portal.org/smash/get/diva2:482601/FULLTEXT01.pdf>
- Genc M., M. Gheasi, P. Nijkamp, J.Poot (2011) “The impact of immigration on international trade: a meta-analysis”. NORFACE Migration, Discussion Paper No. 2011-20
- Ghatak S., M. Pop-Silaghi, V. Daly. (2009) “Trade and migration flows between some CEE countries and the UK”. *The Journal of International Trade & Economic Development: An International and Comparative Review*. Volume 18, Issue 1.
- Girma, S. and Yu, Z. (2002). “The link between immigration and trade: Evidence from the United Kingdom”. *Weltwirtschaftliches Archiv*, 138(1), 115–130.
- Gould, D.M. (1994). “Immigrant links to the home country: empirical implications for US bilateral trade flows”. *Review of Economics and Statistics*, 76(2), 302–316.
- Hatton, T. (March 2006) “Trade policy and migration policy: why the difference? Department of Economics, University of Essex”. Available at: <https://www.tcd.ie/iis/documents/archive/seminar%20papers/HattonTradeMigration2.pdf>
- Head, K. and Ries, J. (1998), “Immigration and trade creation: econometric evidence from Canada”, in *Canadian Journal of Economics*, vol. XXXI, n. 1, pp. 47-62.

- Helpman, El., and P. Krugman (1985) “*Market structure and foreign trade*”. Cambridge: MIT Press.
- Krugman, P. (1991). "Increasing returns and economic geography". *Journal of Political Economy*, 99(3): 483-499.
- Markusen, J.R. (1983), “Free Movements and Commodity Trade as Complements”, *Journal of International Economics*, No. 14, pp. 341-356.
- Markusen, J.R., (1983), "Factor movements and commodity trade as complements", *Journal of International Economics*, 14: 341-356.
- Morehouse, C. and M. Blomfield (2011) “Irregular Migration in Europe”. Washington, DC: Migration Policy Institute.
- Mundell, R.A. (1957) "International Trade and Factor Mobility", *American Economic Review*, 47: 321-335.
- Nickell S. (2010). “Immigration: Trends and Macroeconomic Implications”, BIS Working paper 50,. [http://www.bis.org/author/stephen\\_nickell.htm](http://www.bis.org/author/stephen_nickell.htm)
- Ottaviano, G., Thiesse, J.F. (2003) “Agglomeration and economic geography”, CEPR Discussion Paper No.3838
- Pang E.F., Lim, L.Y.C. (1996) "Structural change in the labour market, regional integration and international migration", in *Migration and the Labour Market in Asia, Prospects to the year 2000*, OECD Documents, Paris, 61-72.
- Piperakis A., Milner C., Wright P. (2003) “Immigration, Trade Costs and Trade: Gravity Evidence for Greece”. *Journal of Economic Integration* 18(4), December 2003.
- Qian, Mingming (2007), "Economic Relationship between Trade and Immigration in New Zealand", 178.799 Research Report, Massey University, Albany November

2007.

Santos Silva, J., and S. Tenreyro (2006) “The Log of Gravity.” *Review of Economics and Statistics*, 88(4): 641-658.

Shepherd B. (2013) “The Gravity model of International Trade: A User Guide. Chapter 4: Alternative gravity model estimators” UNECAP, United Nations Publication

Torres-Reyna O. (December 2007) “Panel Data Analysis: Fixed and Random Effects Using Stata” Princeton University Data and Statistical services Tutorials <http://dss.princeton.edu/training/Panel101.pdf>

Wagner D., K. H. and Rias, J. (2002). Immigration and the trade of provinces. *Scottish Journal of Political Economy*, 49(5), 507–525.

White R. (2010) “Migration and International Trade: The US Experience since 1945” 232p. Edward Elgar Publishing, Inc.

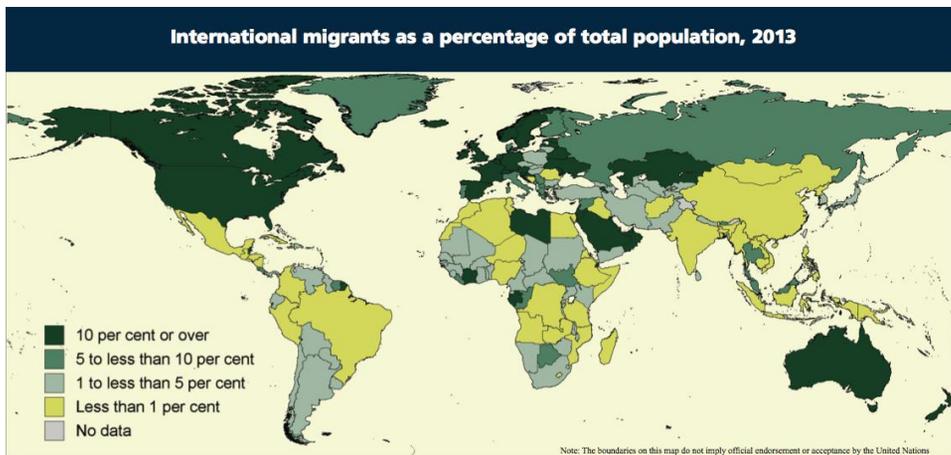
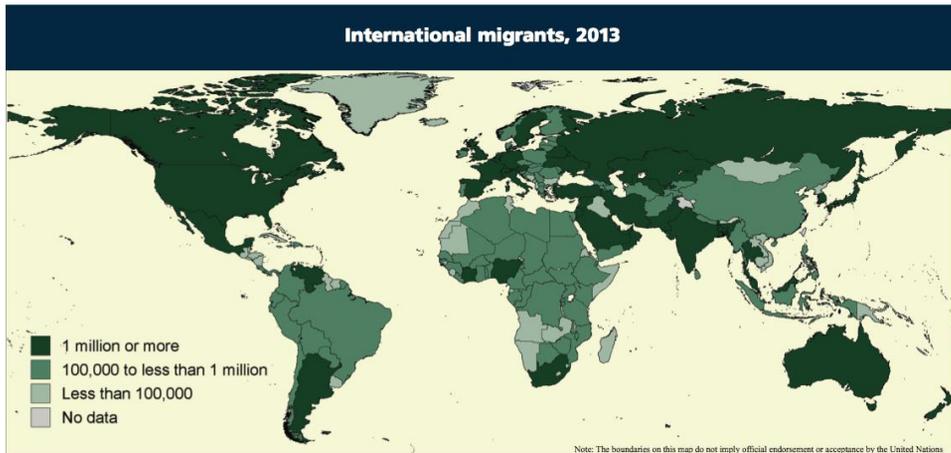
Wong, K-Y. (1983), “On Choosing Among Trade in Goods and International Capital and Labor Mobility: A Theoretical Analysis”, *Journal of International Economics*, No. 14, pp. 223-250.

### Sources of data

1. On the EU legislation: Access to European Union Law <http://eur-lex.europa.eu>
2. World GDP, Export, FDI: World Development Indicators  
<http://databank.worldbank.org/data/views/variableselection/selectvariables.aspx?source=world-development-indicators#>
3. Export, import for EU countries and partners: UN Comtrade.  
<http://comtrade.un.org>
4. Immigrant stock and flow to the EU countries by citizenship of immigrants: Eurostat migration database, datasets [migr\_imm5prv] and [migr\_pop1ctz].  
[http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration and migrant population statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration_and_migrant_population_statistics)
5. Distances: The database of University of Essex professor K. Gleditsch.  
<http://privatewww.essex.ac.uk/~ksg/data-5.html>
6. Yearly and quarterly data on inflation and unemployment in Spain, Italy, France, Germany and the UK: World Bank database. <http://data.worldbank.org>

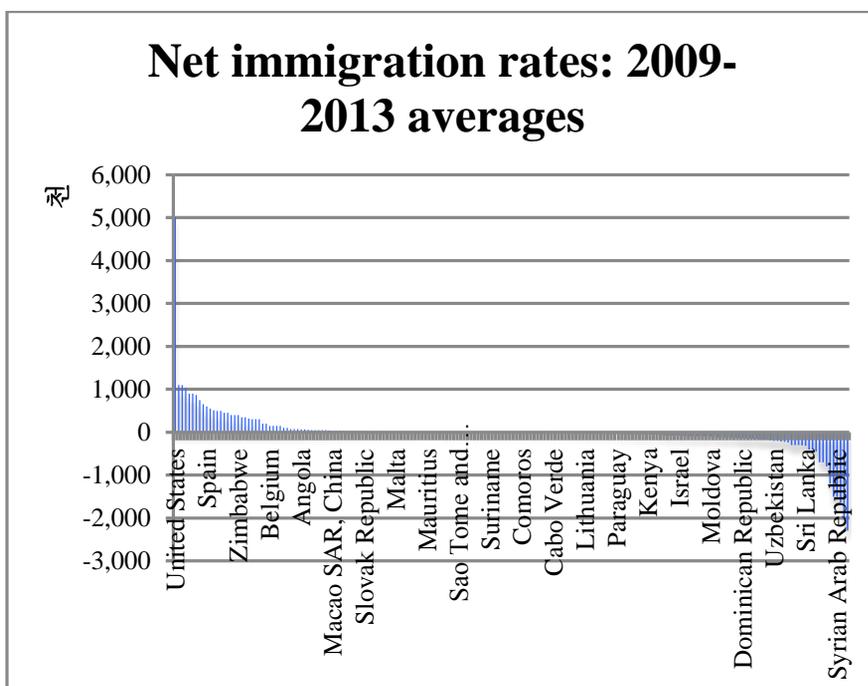
## VIII. APPENDIX

- A. Maps depicting the absolute and relative amounts of international migrants around the world in 2013 according to the UN estimates.

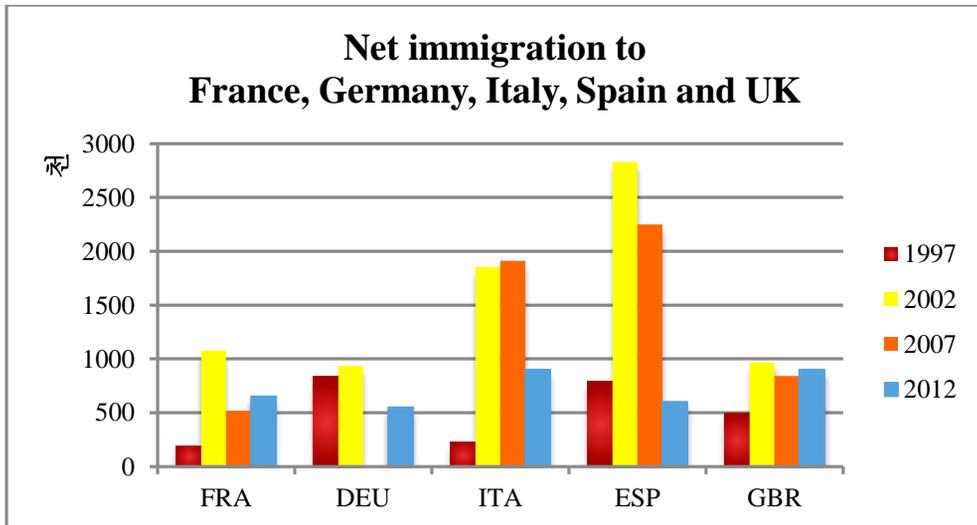
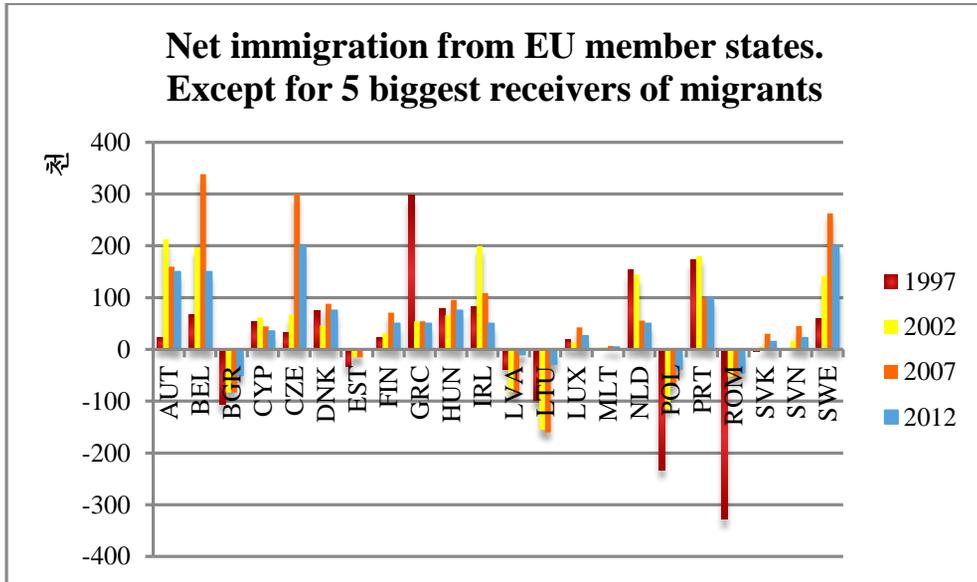


Source: UN, Department of Economic and Social Affairs, Population division.  
International migration Wallchart 2013.

B. Migrant sending and migrant receiving countries, net average immigration 2009-2013, World Bank estimates.



C. Net immigration flows from EU member states.

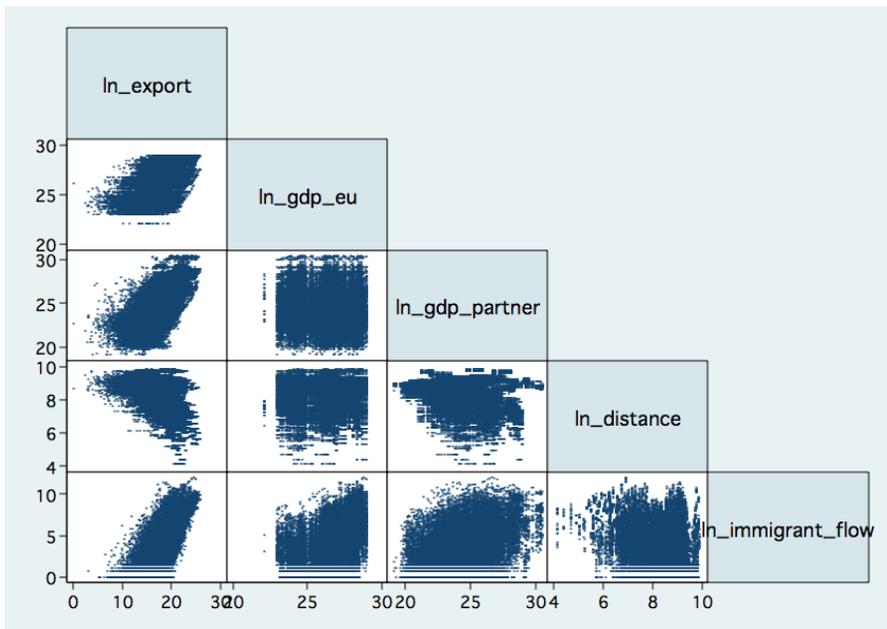
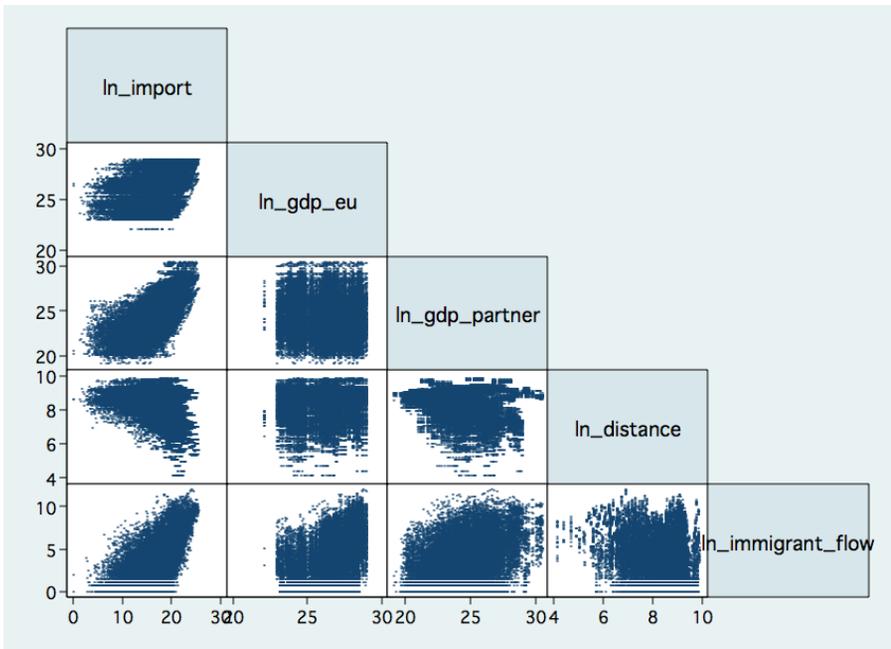


Source of data: World Bank

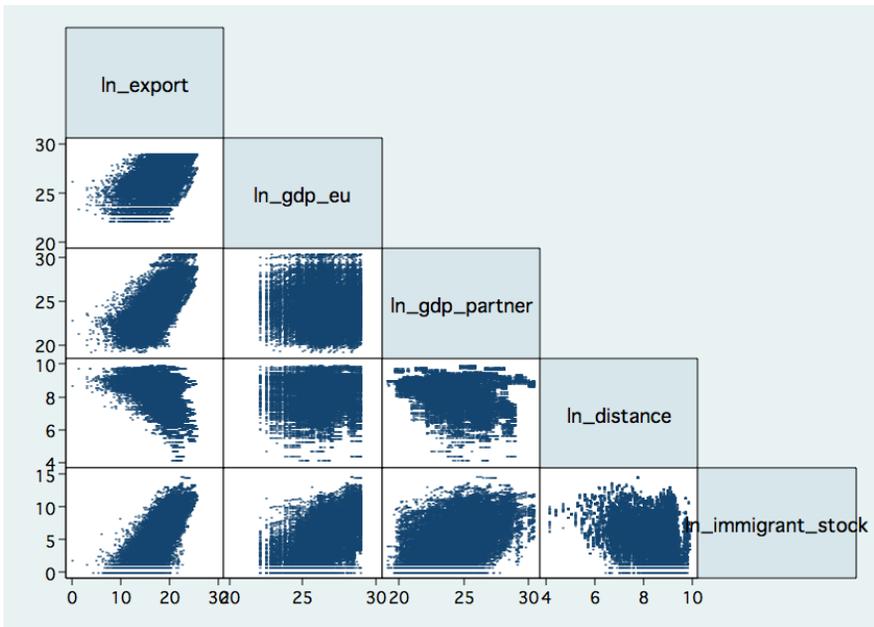
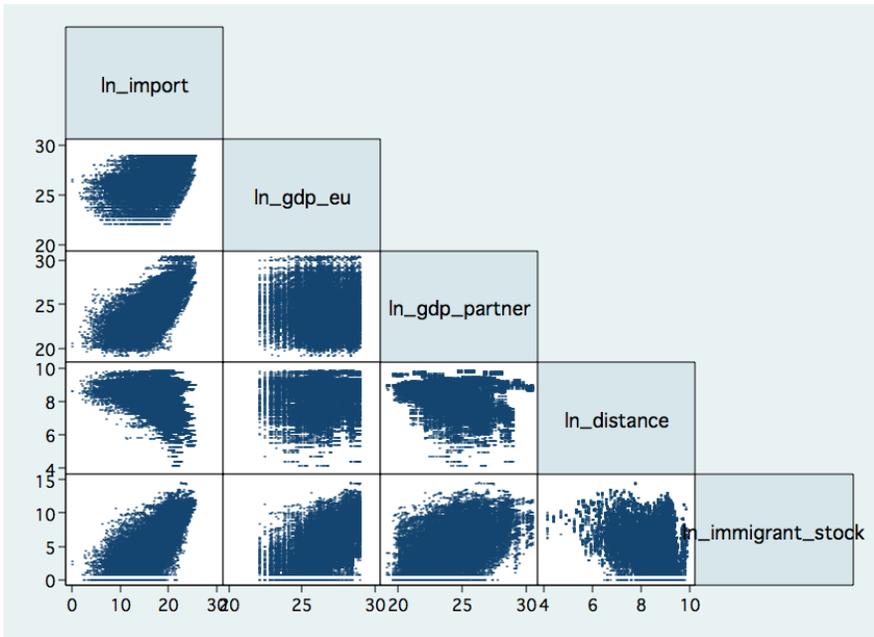
C. Composition of native-born and foreign-born population by education levels in EU member states.

Country	2000/2001			2010/2011		
	Share of low-educated	Share of medium-educated	Share of high-educated	Share of low-educated	Share of medium-educated	Share of high-educated
Austria	49.4	39.3	11.3	33.2	48.3	18.5
Belgium	53.3	23.8	23.0	43.9	29.1	27.0
Czech Republic	38.6	48.7	12.8	29.0	51.7	19.3
Germany	46.5	39.6	14.0	38.8	41.6	19.6
Denmark	36.9	39.2	23.9	32.7	37.8	29.5
Spain	56.3	32.5	21.1	46.6	29.8	23.6
Estonia	29.8	39.2	31.1	18.2	42.3	39.5
Finland	52.6	28.5	18.9	51.1	27.1	21.8
France	54.8	27.2	18.1	47.5	28.9	23.6
UK	40.6	24.5	34.8	29.1	24.3	46.6
Greece	42.7	41.4	15.9	41.2	41.5	17.4
Hungary	41.1	39.1	19.8	23.4	49.1	27.5
Ireland	29.6	29.3	41.1	19.6	41.2	39.2
Italy	54.3	33.5	12.2	47.6	41.3	11.1
Luxembourg	36.7	41.6	21.7	39.7	29.7	30.6
Netherlands	49.2	31.7	19.2	40.1	33.8	26.0
Poland	47.9	40.3	11.9	37.8	44.4	17.9
Portugal	54.8	25.9	19.3	47.8	29.7	22.5
Slovakia	29.3	55.0	15.6	50.5	31.1	18.4
Slovenia	37.9	50.9	11.2	40.3	49.0	10.6
Sweden	29.5	46.2	24.3	27.0	44.0	29.0
OECD	41.5	33.8	24.7	33.8	35.9	30.3

D. Scatter plots of variables, Flow model



### Scatter plots of variables: Stock models



E. EU member-states the data for which is represented in statistical models

1. Stock model

25 EU countries are represented in the Stock model (together with 158 partners):

	Country	Frequency	Percent
1	Austria	1504	5.20
2	Belgium	1360	4.70
3	Bulgaria	822	2.84
4	Czech Rep.	1857	6.42
5	Germany	1984	6.85
6	Denmark	1958	6.77
7	Spain	1976	6.83
8	Estonia	108	0.37
9	Finland	1881	6.50
10	France	304	1.05
11	UK	401	1.39
12	Greece	138	0.48
13	Hungary	1699	5.87
14	Ireland	916	3.16
15	Italy	1670	5.77
16	Lithuania	111	0.38
17	Luxembourg	231	0.80
18	Latvia	900	3.11
19	Malta	194	0.67
20	Netherlands	1981	6.84
21	Poland	561	1.94
22	Portugal	1428	4.93
23	Slovakia	1281	4.43
24	Slovenia	1754	6.06
25	Sweden	1924	6.65
	Total	28943	100

## 2. Flow model

22 EU countries are represented in the Flow model (as well as 155 partners):

	Country	Frequency	Percent
1	Austria	1,606	5.87
2	Belgium	457	1.67
3	Bulgaria	270	0.99
4	Cyprus	932	3.41
5	Czech Rep.	1,037	3.79
6	Germany	1,076	3.93
7	Denmark	1,947	7.12
8	Spain	1,967	7.19
9	Estonia	1,083	3.96
10	Finland	1,877	6.86
11	UK	1,024	3.74
12	Croatia	1,005	3.67
13	Ireland	1,054	3.85
14	Italy	1,817	6.64
15	Lithuania	1,473	5.39
16	Luxembourg	468	1.71
17	Malta	25	0.09
18	Netherlands	1,969	7.20
19	Poland	925	3.38
20	Slovakia	1,663	6.08
21	Slovenia	1,756	6.42
22	Sweden	1,916	7.01
	Total	27,347	100.00

F. Results of GLS for panel data with random effects

Independent variables	Dependent variables			
	Flow model		Stock model	
	ln(Import)	ln(Export)	ln(Import)	ln(Export)
ln(GDP <sub>EU</sub> )	0.53*** (0.021)	0.78*** (0.012)	0.45*** (0.020)	0.71*** (0.011)
ln(GDP <sub>Migrant-sending country</sub> )	0.768*** (0.014)	0.66*** (0.008)	0.71*** (0.013)	0.70*** (0.01)
ln(Distance)	-1.09*** (0.044)	-1.22*** (0.025)	-1.06*** (0.043)	-1.20*** (0.026)
ln(Immigrant flow )	0.17*** (0.010)	0.11*** (0.006)	-	-
ln(Immigrant stock)	-	-	0.23*** (0.012)	0.15*** (0.007)
Constant	-7.75*** (0.610)	-9.70*** (0.354)	-5.02*** (0.576)	-8.58*** (0.333)
No of obs	21956	21956	27072	27072
No of groups	2818	1818	3321	3321
R <sup>2</sup>				
Within	0.13	0.38	0.10	0.39
Between	0.70	0.84	0.71	0.84
Overall	0.68	0.82	0.67	0.83

\* 10% significance level, \*\* 5% significance level, \*\*\* 1% significance level.

G. Hausman test results (stata command “hausman fixed random”)

1. Flow Model: Fixed effect regression vs Radom effects regression for panel data,

Import as a dependent variable.

Ho: difference in coefficients not systematic (random effects; there is no correlation between error terms and independent variables)

$$\text{chi2}(4) = 487.33$$

$$\text{Prob}>\text{chi2} = 0.0000$$

As a result, Ho is rejected: heteroscedasticity is present. Fixed effect model should be preferred.

2.Flow Model: Fixed effect regression vs Radom effects regression for panel data,

Import as a dependent variable.

Ho: difference in coefficients not systematic (random effects; there is no correlation between error terms and independent variables)

$$\text{chi2}(4) = 177.13$$

$$\text{Prob}>\text{chi2} = 0.0000$$

As a result, Ho is rejected: heteroscedasticity is present. Fixed effect model should be preferred.

3.Stock Model: Fixed effect regression vs Radom effects regression for panel data,

Import as a dependent variable.

Ho: difference in coefficients not systematic (random effects; there is no correlation between error terms and independent variables)

$$\text{chi2}(4) = 448.18$$

$$\text{Prob}>\text{chi2} = 0.0000$$

As a result, Ho is rejected: heteroscedasticity is present. Fixed effect model should be preferred.

4. Stock Model: Fixed effect regression vs Radom effects regression for panel data,

Export as a dependent variable.

Ho: difference in coefficients not systematic (random effects; there is no correlation between error terms and independent variables)

$\chi^2(4) = 1173.84$

Prob> $\chi^2 = 0.0000$

As a result, Ho is rejected: heteroscedasticity is present. Fixed effect model should be preferred.

## 국문초록

# 이민과 무역 관계: EU의 경우

유럽연합내에서의 이민과 교역에 관한 이 연구의 경험적 발견은 국제적 이주와 교역이 상호보완적 현상이라는 개념형성에 기여한다.

우리는 이 연구를 위해 지난 10년간 이민과 정책발전의 중심지인 유럽연합을 선택하고 연구의 초점을 두었다.

더불어, 대부분의 이주와 교역에 관한 기존 연구들은 하나의 국가에 국한되었지만, 이 연구는 모든 유럽연합내 국가에 대한 충분히 긴 시간동안의 자료를 바탕으로 문헌자료를 구축하는데 기여한다.

우리는 유럽연합국과 그 교역상대국에 대한 2000년에서 2012년 사이의 자료를 바탕으로 이주변수를 고려한 교역중력모델의 회귀분석을 통해 이주가 교역량을 증가시키는 경향을 보인다는 사실을 밝혀냈다.

이 연구에 사용된 다양한 모델들은 (OLS for pooled data, OLS for panel data with fixed and random effects, Poisson Pseudo Maximum Likelihood Estimation) 모두 일관된 결과를 보여준다.

하지만, PPML분석이 가장 적은 바이어스를 갖고 있는 효과적인 추정자로 선택되었다.

우리의 결과에 따르면, 이주에 따른 교역량 증가의 효과는 이민자의 이민국에서의 이민자의 출신국으로의 수출보다 이민자의 출신국에서 이민자의 이민국으로의 수입이 증가하는 방향으로 나타났다.

이것은 “network”와 “preference” 효과의 조합으로 설명이 가능하다.

교역의 이주탄력성은 유럽연합내의 교역이 유럽연합과 유럽연합이 아닌국가와의 교역보다 높다는 것으로 밝혀졌다.

사람들의 자유로운 이주가 역내 교역에 더 크게 이로운 효과를 끼친다.

핵심되는 말: 국제적 이주 (**international migration**), 국제교역 (**international trade**), 유럽연합 (**EU**), 중력모델 (**gravity model**).