The Economic Impact of Migration on the European Countries

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Declaration

This thesis is submitted to Oxford Brookes University in fulfillment of the requirements of the degree of Doctor of Philosophy. This thesis represents my original work towards this research degree, conducted under the supervision of Dr Dimitrios Asteriou and Dr Anna Rita Bennato. It contains no material which has been previously submitted for a degree or diploma at this university or any other institution; except where due acknowledgment is made.

I certify that all information sources and literature used are specified in this thesis.

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Abstract

International migration to the EU Member States has increased significantly over the past decades. Economists have tried to explain the effect of migration by looking at labour market outcomes such as income differentials and wage gaps between migrants and natives. However, few papers have investigated the impact of migration on economic growth. To address this gap, this thesis aims to make a contribution to knowledge by assessing whether there is any long-run relationship between migration and GDP per capita, and vice versa. In addition, this thesis examines the impact of migration on the European economies, taking into account their level of education and the effects of skill-based migration programmes on high-skilled migrants. First, to pursue these aims, we explore the long-run co-integration relationship as well as the short-run dynamics of 22 European countries by applying the ARDL bounding tests and the Granger causality tests. Results suggest that the associated equilibrium does not always confirm the existence of long-run relationship between GDP per capita and Immigration per capita. The direction of the relationship might be unidirectional and bidirectional depending on the European country examined, leading to high heterogeneity in the results regardless of the countries' common history, migration policies and geographical position. Second, taking into account the contribution in terms of human capital of both high-skilled native and foreign-born migrants, we estimate a Solow-Swan model for a total of 22 European countries for the years 1990-2018. In this analysis we also consider the migration policies adopted each year by selected European countries, to observe possible effects yielded by these forms of intervention. The novelty of this work is that we observe how different polices affect the contribution to economic growth of the high-skilled native and foreign-born migrants. With this aim, we construct four different indexes that capture the direction of change in the level of openness of European countries toward migrants (restrictiveness to all migrants, to irregular migrants, and to low-skilled and high-skilled foreign-born workers). Our results suggest that migrants foster economic growth and promote income convergence among our set of European countries.

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List of Abbreviations

A10 European accession countries 10, that entered the EU after the 2004 enlargement

A8 A set of the A8 countries, except to Cyprus and Malta

ADF Augmented Dickey-Fuller (unit root test)

AIC Akaike Information Criterion

AR Autoregressive

ARCH Autoregressive conditional heteroskedasticity

ARDL Auto-regressive Distributed Lag

CEE Central and Eastern Europe

CES Constant elasticity of substitution

CPI Consumer Price Index

CUMSUM cumulative sum of recursive residuals

CUMSUMSQ cumulative sum of recursive residuals sum of squares

DEMIG Determinant of International Migration

DF Dickey-Fuller (unit root test)

DF-GLS Dickey-Fuller- GLS (unit root test)

DIOC Database on Immigrants in OECD and non-OECD Countries

Dum Dummy

ECM Error Correction Model

ECT Error Correction Term

EEA European Economic Area

EMU European Monetary Union

EU European Union

FDI Foreign Direct Investments

FE Fixed Effects

Frontex Frontières extérieures (French: External Border). It is the European Border and Coast Guard Agency

GDP Gross Domestic Product

GLS Generalized Least Squares

GMM Generalized method of moments

GSP Gross State Product

HC Human Capital

ICT Information Communications Technology.

IMPALA International Migration Law and Policies Analysis

IMPIC Immigration Policy in Comparison Project

IT Information Technology

LFS Labour Force Survey

MAL Metropolitan Area of Lisbon

MS Member State

Obs Observations

OECD Organisation for Economic Co-operation and Development

OLS Ordinary Least Squares

PP Phillips and Perron (unit root test)

R&D Research and Development

RE Random Effects

RESET Regression Equation Specification Error Test

Restrict-High Restrictive migration policies towards high-skilled foreign-born migrants

Restrict-Irr Restrictive migration policies towards irregular migrants

Restrict-Low Restrictive migration policies towards low-skilled foreign-born migrants

SIC Schwarz Information Criterion

STEM Science, Technology, Engineering and Mathematics

SYS-GMM System Generalized method of moments

SYS-GMM1 System Generalized method of moments (in the second analysis, include in the estimation the human capital of native and foreign-born migrants)

SYS-GMM2 (in the second analysis, include in the estimation the human capital of native and foreign-born migrants and the ethnic-network of established migrants)

TFP Total Factor Productivity

TNC Third-Country National

UN United Nations

VAR Vector autoregression

VECM Vector Error Correction Models

WHO World Trade Organization

Chapter One

Introduction

1.1 Context and background

International migration is a phenomenon which continuously changes over time, as migration patterns modify according to historical and political events. The nature and composition of migration flows depend on the state of the economy of both the origin and receiving country (i.e. GDP per capita and employment opportunities) and on the type of migration policies adopted.

European countries share some geographical, economic and institutional similarities. In addition to their geographical proximity, European countries also enjoy high GDP per capita and share a common market allowing free trade among member states of the European Union (EU) and of the European Economic Area (EEA) countries like Iceland, Liechtenstein, Norway and Switzerland. Moreover, they share common institutional values and common policy frameworks especially among the member states, such as democracy, equality and freedom of expression and movement. Despite the similarities shared among European countries, there is also significant diversity between them and among the different regions within each country in terms of economic factors (Roses and Wolf, 2018), as for example employment rate and wage-levels (Höpner and Lutter, 2018), and migration policies (De Haas et al., 2019).

Trends in migration are influenced by the type of policies which regulate the movements of people coming from outside Europe, implemented, so far, differently across EU countries members. It follows that the EU countries, have registered different amounts of residence applications due to work, family or humanitarian reasons. In

the recent years we have witnessed a significant increase in the number of accepted applications for family reunification rather than work-related ones.[1] To fulfill the requests of the high-tech manufacture industry developing in Europe, countries implemented a common selective policy with the introduction of the *Blue Card*.

1.2 The research gap

The macroeconomic literature on migration and growth focuses primarily on the effects of migration on the unemployment of native workers in various Western countries, such as the work of Withers and Pope (1985), Marr and Siklos (1994), Kónya (2000). The effects of migration on the income of the host country have only modestly been investigated empirically, especially when we look at the nature of the causal relationship between immigration and income (Morley, 2006; Feridun, 2007; Boubtane et al., 2013).

To the best of our knowledge there are very few papers that deal with the impact of migration on the income of the host countries, especially in the European context. To this end, we will assess the causal relationship between GDP per capita of the European destination countries and the ratio of the immigration flows relative to the resident population. Although some papers have been able to investigate and determine the effects of migrations on the GDP per capita, there are much fewer papers that investigate also whether GDP per capita or other non-economic conditions can affect the inflows of migration. To this end, recent research has been focusing on the use of pseudo-gravity models to understand the impact of migrants. This branch of macroeconomic literature is related to the gravity model of trade, from which the concept of distance between two countries, both from a physical and cultural point of view (land borders, common language and colonial relationship), has been borrowed. Among the more relevant paper in this field of research we find the papers of Mayda(2010) and Ortega and Peri (2013) who show that over 25 year period in selected OECD countries, immigration does not affect GDP per capita. On the other hand, Aleksynska anf Tritah(2015) and Alesina et al.(2016) find that migrants impact differently on the productivity of the destination countries, as a result of their birthplace, cultural heritage and skills.
The remaining limited literature on this topic has attempted to measure the impact of the skill-composition of the migrants on the destination economies on the basis of

[1]Source: Eurostat. On-line data code: *migr-resvalid*

the neoclassical Solow growth models. With this regards, we take inspiration from Dolado et al. (1994), Piras (2013) and Boubtane et al. (2016), who observe the effects of the most skilled migrants on a set of OECD countries.

Following from the theoretical intuition provided by Piras (2013) and Boubtane, Dumont and Rault (2016) respectively on the Italian regions and OECD countries, we study the impact of both native and of foreign-born migrants on 22 European countries for the period 1990-2018. There is no evidence of a comparative analysis, using a Solow-Swan framework, among the European economies. In this context, we also look at the role played by migration policies dealing with both regular and irregular migrants, distinguishing them between low and high skilled workers, building on the work of (Mayda, 2010; Ortega and Peri, 2013).
To assess these effects, we adapt the neoclassical Solow model introducing a parameter that captures the restrictedness and selectivity of migration policies applied in our set of European countries. Finally, we test this model with different static and dynamic panel data methodologies.

1.3 The research aim and objectives

This thesis aims to investigate the role played by the migration flows in Europe. To this regard, the aim is to understand whether there is a long-run relationship between migration and economic growth, and to explore the demographic and skill impact of net-migration (foreign-born immigrants minus native-born emigrants) on the European economies. Particularly, our interest is to critically interrogate how the impact on the destination countries changes in line with the introduction of restrictive and selective policies by the European governments.
To achieve the previous aims, a series of objectives have been defined as follows:

1. To critically review and evaluate how the economic conditions can be a pivotal factor of attracting large quota of migrants and whether other non-economic conditions play a role in the migration process;

2. To evaluate whether migrants affect the economies of the destination countries by spurring productivity and, specifically, to quantify the impact of the highly educated native and foreign-born migrants;

3. To investigate the role of the migration policies implemented by the European countries and assess how their level of restrictiveness and selectivity can impact

on the human capital of the migrants and, therefore, on the economic growth of the destination countries;

4. To analyse the effects of migration inflows and outflows on the speed of income convergence among the European countries.

1.4 Contribution to knowledge

This PhD thesis takes important steps, by implementing both theoretical and applied frameworks, to understand the economic impact of migrants on the European countries, and also offers a comparative analysis on the effects of migration policies on economic growth. We contribute to the current state of economic research on migration as follows:

1. We investigate the nature of the casuality between economic growth and migration for a set of European countries;

2. We contribute theoretically to the neoclassical growth model by understanding the impact of native and foreign-born workers relative to the restrictiveness and selectivity of the migration policies implemented by the European governments;

3. We produce a unique dataset where we estimate the stock of native and foreign-born workers in the European countries from 1990 to 2018 for a set of 22 European Countries;

4. We provide a series of indexes on the level of tightness of the European policies implemented towards all migrants, both regular and irregular ones. Furthermore, we create an index that captures the level of selectivity of the European legal framework towards migrants;

5. We illustrate the effects of restrictive and selective migration policies on economic growth by applying static and dynamic panel data models. With regards to the dynamic models, we present the estimates produced by applying several System GMM models where we consider internal and external instruments. The common external instrument in all the System GMM regression models is the variable "ethnic-networks", which represents groups of migrants already settled in the destination countries. As a result, we not only contribute to the literature by effectively testing the impact of the migration policies on GDP per

capita, but also by understanding the implication of the non-economic factors considered in the framework;

6. Finally, we identify the impact of net-migration to the income convergence among a set of 22 European countries.

1.5 Thesis structure

This thesis is organised in six chapters, which will be outlines in this section. In the next chapter, we propose a review of the literature on migration. In particular, we look into the role played by the legal and irregular migrants in the labour market, welfare system and fiscal system along with the effects of the migration phenomenon on the economic growth and welfare of the destination countries.

In chapter 3, we present the econometric methods adopted to analyse empirically our research question. Firstly, we perform a time-series analysis on 22 European countries from 1990 to 2015. Secondly, we analyse the short-run and long run relationship between migration and economic growth using the ARDL model to co-integration. By applying this method of co-integration, we employ an error correction term to determine the direction of the relationship (unidirectional or bi-directional). When it is not possible to find any long-run equilibrium, then we test for the Granger-casuality to see whether there is at least a relationship in the short-run. In the second part of the empirical chapter, we analyse the impact of native-born emigration and foreign-born immigration on the economic growth of 22 European countries between 1990 and 2018 through a panel data analysis. Furthermore, for the same analysis, we describe the way in which we construct the indexes on the migration polices' level of restrictiveness and selectivity adopted in our panel data analysis.

In chapter 4 and 5, we discuss the results of the time-series and panel data analyses with the support of the relative theoretical and empirical literature. Finally, in chapter 6, we summarize our conclusions and we discuss the policy implications related to the new flows of migrants.

Chapter Two

Literature Review

2.1 Introduction

This chapter will review the principal literature related to the role of migrants (legal and irregular) into the labour markets and their impact on the social welfare. The economic impact of migration is a complex issue that both the academia and policy makers have been trying to understand. It represents a complex issue, full of contradictions, especially when it is examined within the European countries, for which few studies have been developed (Ruhs and Anderson, 2010*a*; Foged and Peri, 2016; Casarico et al., 2018). Instead, the majority of the investigations explore the same phenomenon in the United States where it has a great tradition on alternative form of migrations (Hanson and Spilimbergo, 1999; Card, 2001; Hazari and Sgro, 2003; Peri and Yasenov, 2015; Borjas, 2017).

To understand the best strategies that each country in Europe has, it is important to confine illegal migrations so to limit the effects on the public expenditures. The benefits that immigration brings as a demographic engine is critical in solving the ageing population problem in developed countries. Migrants might represent a net contribution, providing a young mobile workforce. In the analysis of this phenomenon, it is important to take into account other crucial aspects, namely the identification of the irregular migrant, the impact on irregular markets, the costs and the benefits brought to the fiscal system and the impact yield by the removal of the barriers to regularization (Ethier, 1986; Rowthorn, 2008; Dustmann and Frattini, 2014).

Irregular migrants or undocumented migrants are identified as those who enter a

country irregularly breaching the law or despite they legally live into the country, they engage in activities incompatible with the visa conditions. Alternatively, irregular migrants are those who have overstayed their permitted visa or have failed the asylum requirements and do not accept the decision of leaving the country (Ruhs and Anderson, 2010*b*; Casarico et al., 2018). In most of the recent studies on migration (Fasani, 2015; Mastrobuoni and Pinotti, 2015; Devillanova et al., 2018; Monras et al., 2018; Casarico et al., 2018) it has been found that the identification of their legal status is a difficult task, since for many irregular migrants a clear-cut distinction between refugees and asylum seekers is missing (Orrenius and Zavodny, 2016).

Many of asylum seekers receive legal status and make use of the public services offered by the destination countries, crossing the borders illegally. During this phase when they attempt to reach their destination country of preference, migrants become irregular workers. To better understand this topic, we want to identify a large spectrum of violations related to the restrictions attached to their legal residence permits, creating a condition of semi legality or what it is known as "semi-compliance" (Ruhs and Anderson, 2010*a*). To this scope, for example in many European countries citizenship is based on the principle of *jus sanguinis* and not according to their birthplace (Orrenius and Zavodny, 2016). For this reason many children will be irregular migrants like their parents. Free mobility and absence of internal controls among the EU countries lead to increased levels of criticality (Casarico et al., 2018).

The European Commission sponsored project, "Clandestino" aims to provide data on the irregular migrant entering into all 27 European countries[1]. In most of the countries the figures show that the irregular population is a small group (less than 1%) compared to the total population (Vogel et al., 2011). However, it is possible to foresee a reversal of this trend considering the remarkable increase in asylum seekers in Europe after the Arab Spring spread since 2010. According to the OECD (2015) almost all of the asylum seekers in Europe in 2015 entered illegally, among them 500.000 were detected at the border, doubling in size compared to the data collected in 2014. These trends have generated a particular interest among academics and policy makers, due to possible impact that this new flow would generate on the hosting countries economies.

[1]The "Clandestino" project on irregular migrants is based on 27 European countries, excluded Croatia which was not part of the European Union at the time when the study was conducted, between 2007-2009.

Looking at the recent waves of migrations, the most preferred destination countries in Europe for the irregular migrants are Austria, Germany, the Netherlands, the United Kingdom and Sweden, but also Greece, Spain and Italy, which are geographically very close to the countries where those migrations take place. In this framework the responsibility lies in the fair sharing of the burdens among all EU countries. However, a common European policy on the migration is not still defined. The issue, which often comes up, is to look at the compliance that each state has in sharing the responsibilities. Countries are requested to offer financial and technical support, responding to the migration emergency in order to avoid that the costs of this humanitarian crisis will be faced by only some of the European countries.
In our analysis, we will take into consideration different factors that favor the presence of migrants, especially low-skilled and irregular migrants, in the EU. For example, the different level of rigidity of European labour markets, the booming shadow market and the increasing need for workers due to the ageing population. Those create a demand for young and flexible foreign workers, which are often fished among less skilled migrants (Orrenius and Zavodny, 2016).

The present literature review is organized as follows. Section 1 offers a description of the effects of legal/regular and irregular migration on the labour market with a focus on the role played toward wages and employment rate. Section 2 discusses the impact of the low-skilled and irregular migrants on the social welfare of the natives of the hosting countries.

2.2 The Effects on the Labour Market

In the neoclassical literature the difference in wages and employment rates are relevant elements that influence an individual's decision between remaining in the home country and moving to a better place (Harris and Todaro, 1970). However, it is important to understand the impact of immigrants considering their characteristics according to their level of education, work experience and region of origin.

The shortage of specific skills is a driver of the flow of immigration. It happens when in a country there is a high demand for those skills and the necessary supply is not available. The role of institutions and the conditions imposed on the labour markets such as rigidity of salaries is crucial in influencing the adjustment of employment and wages creating a condition in the labour market, yielding higher structural

unemployment. Boeri and Van Ours (2013) show that a shock in supply, caused by an increase in immigration flows is responsible for job losses of natives. The authors find out that these conditions are characteristic of many European countries for the issue of partial wage rigidity. It is verified when wages will adjust, but more slowly and not enough to reach the market clearing. This condition will inevitably create lower gain than in a competitive market or, at least, with respect to a more flexible labour market as in the United States. Moreover, among the pull factors of immigration (Lee, 1966) there is an interest from the productive sector in attracting these immigrants. Dustmann et al. (2013) and Chassamboulli and Palivos (2014) assume that irregular migrants are not paid as their real marginal productivity which represents a reduction of employment costs for firms who, therefore, have the incentive to hire them. The irregular migrants tend to accept worse conditions rather than native workers as, being in the country breaching the laws, they do not benefit of a bargaining position in wage settings or job condition (Ethier, 1986; Fasani, 2009; Chassamboulli and Peri, 2015). In order to understand if immigrants, in particular low-skilled and irregular immigrants, affect the wage of the natives, it is necessary to clarify if natives and immigrants are substitutes or complementary in the process of production (Borjas, 2003; Ottaviano and Peri, 2012; Manacorda et al., 2012).

In the literature related to the role of illegal immigration, it has been found that irregular migrants are considered in the literature as less skilled individuals and they are in competition with the native in the same part of the wage distribution (Palivos, 2009; Dustmann et al., 2013; Foged and Peri, 2016). The topic has raised opposite views where part of the literature considers migrants as substitute of the native workers, and some other in competition with the latter category. Furthermore, illegal migrants quite often are offered disadvantageous salaries, due to their illegal status affecting the labour market supply (Hazari and Sgro, 2003; Moy and Yip, 2006; Liu, 2010). Displacement effects and wage depressing effect have been verified (Palivos, 2009). These effects are evident when between low-skilled natives and immigrants there is a certain degree of substitution. However, in this case, an increase of migrants who are complementary in terms of skills to the skilled natives would produce a positive impact on the wage of the skilled-native workers (Ottaviano and Peri, 2012).

Chassamboulli and Palivos (2014) demonstrate that immigrants and natives with the same marginal productivity are imperfectly substituted in the market, because

immigrants have higher search costs in finding a job. The imperfect substitution between unskilled natives and unskilled workers is given by the fact that firms create origin-specific vacancies (different for immigrants and natives). The outcome of their research is that unskilled native workers will benefit from the increase of unskilled migrants. Firms will have the advantage to specialize in a labour-intensive sector, creating more vacancies for unskilled workers and even unskilled natives benefit from the increase in job positions and rises in wages. Moreover, skilled migrants (defined as who have at least a Bachelor's degree) see their market condition deteriorate because their marginal productivity decreases and their wages fall.

Grossman (1982) illustrates the U.S. labour market in the 1970s. He studies the relationship between natives, old immigration and new immigration. The wage effect of the increase of the immigration flows for the natives is slightly negative. Similarly the impact of the new immigration flows on the stock of the old migrants. This is justified by the fact that natives and old migrants are substituted for each other in the labour market. Grossman (1982) defined the labour market in terms of specific region (metropolitan area), comparing the wage outcomes of metropolitan areas that attract many migrants with the ones of the metropolitan areas which received few migrants. The result is that there is a weak correlation between native wages in a specific area and the size of the migration workforce. The merit of Grossman (1982) is to have introduced a new assumption that has influenced the following literature by introducing the concept of spatial correlation (as named subsequently by Borjas (2003)). His empirical contribution helps to understand the changes in the wages of natives on the relative changes of immigrants in a specific area (Borjas, 2014). However, the spatial correlation approach has been criticized for two reasons. Firstly, the immigrants tend to move to a city or region where there are positive labour demand shocks (Boeri and Van Ours, 2013; Borjas, 2014). Hence, the high wage of the natives in that specific area will impact on the composition of the immigrants. Secondly, the metropolitan area cannot be considered as an isolated entity and so can be affected by the general economic trends (Borjas, 2014). In the European framework where the impact of immigration on a European region has spillover effects on other regions of the EU. Migration flows cannot be analysed for a single Member State due to the fact that there is free movement of people and no control exists between internal borders. To solve this problem a quasi-natural experiments and the adoption of an instrumental variable method have been adopted to isolate the effects of immigration on employment and wages.

There are very few studies on migration that adopted natural experiments. One of the first works that used this approach and deals with undocumented migrants is the analysis of Card (2001). This work relies on an historical event that happened after Fidel Castro declared that all Cubans wishing to move to the United States were free to move, as overnight, about 125,000 Cubans, mostly unskilled workers decided to move to the U.S thus creating an unexpected increase in the Miami labour force. Card's analysis is relevant because it does not attribute the rise of the immigration flow to a causal factor such as a booming economy that attracts immigrants but to an endogenous political choice. Card (2001) analysis is based on a difference-in-difference methodology to understand the impact of this new workforce on the pre-existing workforce. He compares the effects caused by the unexpected increase of immigration in the control group, composed of four other major cities Atlanta, Los Angeles, Houston and Tampa-St. Petersburg. These cities are selected for the relatively large sample of Black and Hispanic population and for the fact that it presents a similar pattern of economic growth. The outcome of this analysis shows that any effects are drawn on the native wages; either belong to those of white or black ethnicity. In particular, the author looks at the wage distribution to see if the less skilled workers, observed as the lowest quartile of the skill distribution, are affected much more by the new immigration flows than the skilled natives. The result is that overall immigration does not impact negatively on the native population.

Borjas (2015) revisited the study of Card (2001). With his reappraisal (not quasi-natural experimental) Borjas (2015) found opposite results compared to Card's analysis with the application of a different analysis. The author notes that the composition of the Cuban immigrants' skills have not been considered in the previous analysis and he observes that 60% of them where unskilled. The difference of being skilled or unskilled immigrants depends according to the high school dropout rate.
Borjas (2015) measures the impact of the irregular Cuban migrants matching the skills of the immigrants with the ones of the previous native population and understanding how the skills of the migrants affect a specific group of natives with the same level of skills. The findings are that the irregular migrants, the Marielitos, have not impacted on the wage of high school graduates but they caused a significant drop in the wage of the workers who lacked a high school diploma. The former approach has been introduced by Borjas (2003) and has been adopted in the modern literature (Ottaviano and Peri, 2012; Manacorda et al., 2012) for the study of

migration. Borjas (2015) finds that the recent increase of immigrants has raised the high-school dropout in Miami by 20% and has worsened the relative economic status of the African-American population in Miami. Peri and Yasenov (2015) replicate Borjas's analysis by reassessing the effects on wage levels and employment rate of the Marielitos. The authors adopt the same age range used by Card (16-61 years old), differently from the age range (25-59) used by Borjas (2015), in order to include in the pool of the population studied even young people who are generally considered in the economic literature as more vulnerable. Peri and Yasenov (2015) find that this method can be useful to improve the analysis proposed by Card (2001). Indeed, this approach makes less "ad hoc" the choice of the control group obtaining findings simply by chance. However, they end up with the same results as Card (2001) confirming that the newly arrived irregular migrants, Marielitos, impact only on the wages and employment rates of the low skilled population with a high level of high school dropout rates. In the analysis of Peri and Yasenov (2015) the level of competitiveness in the destination market between migrants and natives is measured not by the level of education but by their wage potential.

The study of the impact of the immigration on the destination country observing the wage distribution has had a huge impact on the European framework for the analysis of Dustmann et al. (2013) on the UK market. They analyse the increase in the supply of immigrants between 1997 and 2005. The approach here used is different compare to that adopted in the other works that study the effect of immigration on the relative wages such as Ottaviano and Peri (2012) for the US and Manacorda et al. (2012) for the UK. These latter investigation studies the degree of substitution between natives and immigrants measured in age-skills groups, while Dustmann et al. (2013) observe the role played by migrants on wage distribution after they arrive in the UK (destination country). Unlike the previous analysis that pre-allocate the immigrant in specific skill-groups without looking at their real position in the distribution of wages. That would bring wrongly to the conclusion that immigrants are assimilated with the high skilled natives, creating bias issues in the estimation.

The contribution of Dustmann et al. (2013) analysis to the economic literature is of a particular importance because it demonstrates that immigrants downgrade upon their arrival. It is found that many immigrants that arrive in the UK are highly educated relative to the British natives they are competing against. However, they do not find an occupation that reflects their own skills as they do not have the same

communication skills (language) or information about the market when compared with the natives. As follows, the recent migrants, although they are often well educated, are found in the lower part of the wage distribution competing with the unskilled native population. This enables the immigrant to express in toto their human capital. Thus, adopting this approach Dustmann et al. (2013) understand the impact of immigration on the destination country according to the concept of "rank intensity" that captures the location of the immigrant in a specific rank (skill group in which the immigrant belongs) in the distribution of the wages. It is assumed that migrants can not change the assigned rank during the period observed. Besides, an increment in the stock of the immigrants is associated with a change in the wages for the variation in different spatial units. The results show that the density of immigrants in a specific region, where there are already other immigrants with a similar origin and socioeconomic conditions, facilitates networks among migrants.

Dustmann et al. (2013) found that negative effects of immigration will be experienced by natives who are located in the part of the wage distribution where the relative density of immigrants is higher in respect to the density of natives (20^{th} percentile of the wage distribution). However, immigrants have a positive effect on the mean wages of the skilled natives. In this way, natives gain from the immigration due to the complementarities between skilled and unskilled workers. This paper has a huge impact on the migration literature, especially within the EU countries, showing a positive impact of immigrants. Notably, the authors observe that immigrants impact at the bottom of the wage distribution due to their low level of skills.

Taking into account the complex current situation in Europe and the on-going refugees crisis, the findings of Dustmann et al. (2013) confirms that the pending or refused asylum seekers, who overstay in the destination countries working in the underground market, are in competition just with the unskilled European workers. It would happen even if they are skilled. Looking at the work of the OECD "Connecting with Emigrants - a global profile of Diasporas 2015", it is possible to see that the recent asylum seeking immigrants are more skilled than those from the Yugoslavia's wars in the 1990s. As it is illustrated in the data of the Database on Immigrants in OECD Countries (DIOC) and in non-OECD destination countries (DIOC-E or DIOC extended), many irregular immigrants come from countries where almost one

third of the population has a high level of education.[2] This positive change in the composition of the European immigration contributes to a rise in the level of migrant's integration. Policy maker should consider that having diversity in term of skills (Peri and Sparber, 2009; Peri, 2012; Lewis and Peri, 2015), different cultures and perspectives can produce positive externalities in the production sector (Docquier et al., 2013). In conclusion, the skills of these new waves of migrants, even undocumented ones, are a crucial factor for growth in European firms due to the contribution in productivity that they bring.

To face the problem of casuality, another approach adopted in the recent literature on the geographic concentration of migrants is the "structural skill-cell approach" introduced by Borjas (2003). That approach has represented the basis of one of the two landmarks studied in the modern policy of US and Europe analysis respectively of Ottaviano and Peri (2012) and Manacorda et al. (2012). The revolutionary point of view of the structural skill-cell approach is the analysis of the migration share according to the level of education and working experience on a national level basis and no more locally related. The purpose of the application of this approach is, on one hand, to estimate the effects of a particular migrant group which competes with native workers in a specific cell and, on the other hand, to analyse the cross effects between cells by looking at the impact of the wage of the other native workers. This approach exploits a specific production function, the nested constant elasticity of substitution (CES) function. The latter has the merit to reduce the size of parameter space and the estimation of the different parameters, summarising the technology in terms of elasticity of substitution between different skill groups.

The skill-cell correlation approach is similar to the one adopted by Card (2001) who assess the effect of the immigration flows for some cities in U.S during the 1990. Observing some big city in U.S such as New York, Los Angeles and Chicago characterized by high wages level for the native population, Card (2001) find that the increase of the immigration population by 10% depress the wage of natives by less than 1%.

[2]Almost 35% of the Syrian born population that have emigrated is high skilled and 29% are high-skilled women. Immigrants from Pakistan (38.8%), population that have emigrated is high skilled and Iran (51.5%) from Nigeria (54.3%) show a slightly higher percentage of the high-skilled population who are immigrants in the OECD and in the European countries. On the other hand, Iraq (29.3%) and Afghanistan (23%) have a lower per cent of skilled immigrants. Among those high-skilled immigrants it has been registered a feminization of immigration.

Assuming a constant elasticity of substitution (CES) technology, it is possible to allocate the native population in six different cells according to the level of occupation and skills. In this way, the impact of the immigration flows on different group of native works, increasing or decreasing the level of employment in each specific group conditioned to the economic condition of the city or region taken in account. However, using the previous analysis Borjas (2003) criticises the choices of the immigrants on the causality approach. Indeed, immigrants are selected according to specific skills relatively to the economic conditions of a specific region or city. In this way, the author notes that there are problems of underestimation of the wages and level of employments. Borjas (2003) assumed that the production process at the national level can be represented as a three-level nested CES production where the input are the skills group, each skill group will be characterized by formal education and work experience. Borjas (2003) observes that a rise in the immigration equal to 1% decreases the wage of the unskilled workers by 3%. This is because a migrant has similar education and working experience of the unskilled native workforce. Moreover, in this analysis it is underlined that both migrants and natives are not perfect substitute simply based on the level of education (Borjas, 2003; Liu, 2010), but their work experiences matters more.

Ottaviano and Peri (2012) and Manacorda et al. (2012) propose the existence of level of complementarity between natives and migrants, which before it has been underestimated in the literature. Ottaviano and Peri (2012) claim that there is a perfect level of complementarity between individuals with same skills (in the same skill-cell) and some substitutability within individuals with the same level of skills. The analysis is focused on the U.S labour market from 1990 to 2006. Following these previous guidelines on the adoption of a multi-level of CES function of production, the author differentiate workers for their education and working experience analysing four different models and different degree of substation among different skills.[3] Adopting same method of analysis adopted by Borjas, where the degree of substitution for the level of education is given according to the fact individual have o not a high-school diploma, the authors confirm that the lack of complementarity in that analysis bring to a bias in the estimation, registering a negative impact on the natives wages around -3.1%. However, allowing a separate estimation of the elasticity of substitution between broad education group- and narrow education group, it

[3]For example, they divide workers in two education group (high education and low education) or among different group of experience (broad experience and narrow experience).

can be seen how the immigrants impact positively on the wages of natives, increasing between 0.6% and 1.7%.

Similar to Ottaviano and Peri (2012), Manacorda et al. (2012) make use of simulation study the effect of the immigration on the UK labour market from 1975 to 2005. This work is very relevant for the European framework because find that the immigrant impact positively on the wage and level of employment of natives in the European destination countries (Dustmann et al., 2013; Docquier et al., 2014; Devillanova et al., 2018). Although the outcomes that they find are similar to Ottaviano and Peri (2012) the one found by in U.S, Manacorda et al. (2012) find that the immigrants in UK are better educated with respect to the natives (Dustmann et al., 2013). This rise in the percentage of the high school educated in the immigrants does not impact negatively on the wages of the natives, due to the fact that recent immigrants are far from being perfect substitute of the natives. Indeed, immigrants downgrade upon the arrival for the fact that in the destination country they will have to face institutional barriers, different language and different searching cost of the occupation. Their empirical results is that the immigrants do not raise too much the return of education of the natives, just for 0.4% as they lack in complementary skills, while immigrants increase the natives wages by 5.5%.

2.3 Temporary and Guest Workers Programs

Very recently the focus of attention of both policy makers and academia goes towards the investigation between the temporary migration program and guest worker programs and irregular migration. Guest workers programs are adopted by government to recruit temporary employers needed to cover the labour shortage in some segments of the labour market as a consequence of the problem of ageing population in the developed countries and the rapid economic growth of the emerging countries (Djajić and Mesnard, 2015).

Temporary migration programs have been a prominent recruiting system adopted by Western countries since the middle 1950s when the American Bracero Program was established to regularize the temporary Mexican labour force in U.S. Orrenius and Zavodny (2015) observe that foreign workers arrive in the host countries with a short-term contract previously contracted with the indigenous employers. Immigrants, who are attracted by the differential in wages in the destination country,

decide to immigrate because the estimated expected earning is so high that can compensate the non-monetary costs of the immigration such as a different language, being away from family and friends and adapting to a different culture. The author finds that destination countries are concerned for the ambiguous consequence of the temporary working program and they want to be sure that guest foreigners will leave the country when their contract has ended. In the analysis of the temporary migration of low skilled migrants some researchers try to address the notable gap in the undocumented migration. Pioneers in this field are Epstein et al. (1999) who investigated the mechanism where the foreign workers decide to change their legal status to overstay the permitted period in the destination country. The legal immigrants turn into irregular migrants and usually receive an offer of undocumented employment. The authors explore the connection that contractually links the two agents, employers and guest workers defining it as the *bond*. The bond is the amount of money that is deposited by the employers when they hire the immigrant. This is considered as a part of the total wage that foreign worker perceive during the duration of his working permit.

Epstein et al. (1999) find that the increase of such a *bond* will have a positive impact in the reduction of the undocumented population. The higher is the bond, the higher will be the loss for the temporary workers who would switch his employment conditions from a state of legally to an illegal one. This will incentive them to move in the informal economy only if the wage in the underground economy would be much higher to compensate for the loss of the bond. While, employees try to attract the legal foreign workers even because the cost of this bond will weigh even on the employer's total cost for the recruiting of the guest-workers. Otherwise, the decision of the guest-worker to leave the legal employment, at the moment when the contract is going to expire, will cause a double loss for the employers. Firstly, the employers have to increase, during the second period of the contract, the wage of the foreigner workers in order to be more attractive with respect to the irregular market where the migrants' probably could work for a longer period although breaching the law. Secondly, again they will lose the cost of the bond that has been supported. Therefore, the increase of the bond, on one hand, will reduce the irregular population; on the other hand will have an adverse effect of reducing the demand for legal work. Moreover, it is shown that the optimal choice of the permissible period to work in their own country has an impact on the reduction of the irregular population. The longer the period of the contract the more the migrants will be motivated to work in

the legal market by enjoying the protection of the workers in the legal market. Last but not least the possibility to receive training and acquire the know-how that they will use when they come back home.

In the same perspective of the previous work of Epstein et al. (1999), the modern study of Djajić and Mesnard (2015) identifies the condition that incentives the temporary workers to remain legal during their permanence in the destination country, considering the role of enforcement considered as a variable which affect the environment of the labour market and the behaviour of the agents in the market (guest-workers, employers and irregular workers). However, to solve the problem of labour shortage, different approaches are feasible which will not exclusively require the introduction of guest-workers programs. Indeed, there are different policies that can be alternatively adopted with respect to the former such as attracting the existent unemployed population, adjusting the minimum wage and improving the labour conditions (Ruhs and Anderson, 2010*b*).

2.4 The Social Welfare Impact

The phenomenon of the irregular immigration is a result of the combination of different restrictive policies that deny the possibility to live in a specific country, by imposing some barriers to the access to the labour market. The first pioneer in the economic literature of the illegal immigrant is Ethier (1986).
Inspired by the crime theory of Becker (1968), Ethier (1986) study the fiscal issues that a small host country can face in controlling the illegal migration flow through the rise in enforcement at the borders (indirect policy) or the introduction of random inspection at the workplace of the immigrants (direct policy) such as the imposition of a fine to the employers who hire illegal migrants in order to discourage them.
The author ends up with the proposal of an optimal policy composed of a mix of indirect and direct policies that reduce the costs in curbing illegal migrants without impacting negatively on the income of the native workers.

Similarly, Bond and Chen (1987) examine the illegal immigration impact on the natives welfare through an extension of Ethier (1986) analysis. They analyse a model with two countries, two specific factors (labour and capital) and with two different technologies and with the capital that is mobile between the two countries.

Unlike Ethier (1986), Bond and Chen (1987) do not consider the mix of enforcement policies an optimal policy for the reduction of the irregular migration, but identify the level of enforcement which would maximize the welfare of the destination country.

The gain in welfare is much more than the expected losses for the employees who have to pay a fine when they breach the law. The authors show two different cases that characterize a labour market with irregular migrants. In the first case, the employees are able to discern illegal migrants and are indifferent in hiring illegal migrants or legal ones or natives. Because there is a wage differential between the legal and illegal workers, there is a convenience for the firms to employ illegal migrants, although they will have to pay with a certain probability a fine when the illegal migrants is detected at the workplace. To have positive effect on the welfare this penalty has to be large enough to discourage firms in hiring foreign workers but the cost of the enforcement must to be enough low. The second case, employees do not have the ability of discernment on the legality of the worker. In that case, any level of enforcement would have negative impact on the welfare. However, firms and irregular migrants can gain from the immigration process when firms move their production abroad. Assuming mobility of capital between the two countries, firms can decide legally to pay the labour force abroad, when there is a convenience to invest there to avoid to paying the penalty at home, even when there is a tax on the capital exported. The immigrants will move back to their origin countries where they perceive higher wages and benefit of a better work position than the natives in the destination country where the domestic welfare is reduced. In order to avoid that natives lose because of the immigration, the governments can increase the level of welfare for the entire population capturing the surplus given by the taxation on the capital outflows.

Both Ethier (1986) and Bond and Chen (1987) investigate just the theoretical aspect of the impact of enforcement policies in order to curb the number of illegal immigrants. Pointing the imperfections in the application of the enforcement policies, Hillman and Weiss (1999) shows that the illegal immigration is not an accidental phenomenon which affects the destination countries, but it is a consequence of the inefficiency in the application of the migration policies. The authors support the idea that illegal immigration is the result of an unrevealed preference of the governments who choose a specific level of policy in order to select illegal markers in specific sectors. That is possible when there is a flexible and segmented labour market. The choices of the governments are conditioned by the preference of the voters who

are called to vote for the favourite level of illegal immigration to allow in the country.

Casarico et al. (2018) illustrate the process of the choice of the level of enforcement in a country that is the result of the interactions between different groups of agents (politicians, entrepreneurs, workers). In this interaction process all the agents act in order to maximise their utility. On one hand, observing the demand side of immigration policy, electors and pressure groups are against the increase in share of the immigrants because the latter are perceives as competitors. This is also true for the European public opinion. Natives show high level of concern toward immigrants even when the immigration impacts positively on the welfare of the native workers. On the supply side, according to Casarico et al. (2018), the policy makers have been elected according to the level of enforcement and targets on immigration they have chosen. To this regards, Hillman and Weiss (1999) show the median voters can be call to vote on the level of enforcement and involuntarily will choose the illegal immigration for their country. The voters will be called to vote on three different feasible policies: two of them would be in favour of more enforcement, even though in one of the cases an amnesty for the illegal migrants in the country would be included. No one of these two policies is chosen by the majority of the voters. The authors observe that the situation would change if there are two different production sectors with traded goods and non-traded goods in the economy considered. The effect of this selective enforcement would depend on which two of the sectors will be enforced. The segregation of the immigrants on sector one will cause the increase of output and, as a result, the price of the goods will decrease. This is a typical case of the temporary worker programme introduced by governments, in order to cover labour shortage in a specific labour market.

Hillman and Weiss (1999) assume that is possible to identify a non-tradable sector, where the immigrants are employed selectively. This case is preferred by the median voter because, if the illegal immigrants are segregated in the non-tradable sector, the price of the no-tradable goods will be lower. This means that voters will benefit in an increase in the level of consumes of non-tradable goods (services). The illegal migrants will tend to consume more basic food and clothing and will make use of a few services such as personal services. It means that they will consume only tradable goods produced by natives. Therefore, the welfare of the natives and legal workers in the tradable sector increase for the bias in consumption of the illegal immigrants and for the low price of the non-tradable goods. In conclusion, dur-

ing the resource allocation process, all the agents operating on the regular markets might prefer the existence of illegal immigrants that will become sectorial-specific factors of production. Nevertheless, there is a gap in understanding the behaviour of actors in the migration policy framework between the strong anti-immigration attitude of public opinion, the inadequate policy and the ineffective level of enforcement in crumbling illegal migrants. This gap can be solved by the application of the regularization programs and temporary immigration programs adopted by the countries in order to reduce the number of irregular migrants and the level of criminality caused by the social exclusion, the low earning and low skill premium of the immigrants (Becker, 1968; Mastrobuoni and Pinotti, 2015). As observed by Fasani (2009), Djajić and Mesnard (2015) Orrenius and Zavodny (2016) and Casarico et al. (2018) the introduction of this programme causes an inverse effect, which tends to increase the number of the undocumented workers due to the lack of adequate enforcement. This effect is stronger in countries like the U.S. and the European Union where there is a high interregional mobility, so a policy adopted in a country can affect the economy of the countries belonging to the same community.

Several regularization programs have been adopted in Europe, especially in the Southern countries as Italy, Greece and Spain. However, the frequent introduction of regularization in a country attracts a higher number of immigrants who do not satisfy the entrance requirements, but they could obtain a legal status with the successive amnesty. Although this scheme guarantees a temporary legal residency or work permit, it is adopted as a measure for an immediate reduction of the irregular population contributing to increase of the legal labour supply (benefit for the destination country) and, thereby allowing immigrants to be eligible for social assistance and not subject to the risk of deportation (migrants' benefit), it does not incentive immigrants to stay in the formal markets possibility improving their labour conditions. Following this, they will prefer to move to the shadow markets where they are attracted by the firms that will prefer them in terms of reduction of costs and more flexibility. In the literature of legalization and irregular immigration other approaches have been used to explain the benefits in terms of welfare for destination countries and immigrants.

Devillanova et al. (2018) have observed, firstly, that the "prospective" possibility that the undocumented migrants would be eligible to be regularized will increase the probability of be employed by 30% in the first year. When they are qualified for

the amnesty the immigrants become legal and they have higher job retention and a higher job rate. They can, indeed, improve the language and receive training and other form of human capital that they can acquire (Orrenius and Zavodny, 2016). Similar results have been found by a study on the American amnesty of the 1986 (Lozano and Sorensen, 2011).

In a study of Card et al. (2012) on the European public opinion show high level of concern due to the presence of migrants in their own country. The factors that drive the general negative attitude are not only related to economic factors, but also to different religions, culture diversity, language and other non-economic factors matter. Card et al. (2012) find that the level of crime is highly correlated with the economic indicators as wages and taxes. The orthodox literature of immigration and crime have explained crime rate through economical drivers. Becker (1968) work based the analysis on the return that the crime sector and formal legal market would give to an illegal migrant. The utility from working in the crime sector would be calculated by the probability to be caught, plus the expected sanction if caught. In this framework people without job are more likely to participate in crime.

Differences in characteristics among people influence their decisions on which sector they want to work. Indeed, a straight comparison of crime rates in the two sectors is not explained only by economic factors, but also by legal status, age, education, marital status (Alonso-Borrego et al., 2012; Bell et al., 2013; Baker, 2014; Mastrobuoni and Pinotti, 2015). In this regard, Baker (2014) found that the human capital and greater labour market opportunity are pivotal aspects to drop crime rates.

Likewise, Mastrobuoni and Pinotti (2015) underline that when the legal status is granted, it may reduce the propensity to choose criminal activity, although it increases the flows of other illegal migrants that would see an opportunity to obtain easily a legal status and decrease the probability to be deported. Their study is based on a quasi-experimental approach and it aims to understand how the introduction of the regularization contributes in reducing the crime rate of the immigrants' population. The authors focus on the recidivism rate for specific foreigner's countries in Italy, Romania and Bulgaria to explain how a restrictive policy can affect the welfare of the destination countries. Romania and Bulgaria are good examples to consider because both of these countries experienced a change of their legal status after the enlargement of the European Union in January 2007. The two authors explore

individual-level data of detainees realised after a collective clemency bill enacted in Italy in the July 2006, five months before the EU enlargement. That manoeuvre freed one-third of the total population (22,000 individuals) among which 9,642 were foreigners. Mastrobuoni and Pinotti (2015) adopt a difference-in-difference approach in recidivism rate of Romanians and Bulgarians before and after the legalization. In the analysis the new migrants from Romania and Bulgaria are selected as a natural treated group while the control group is composed of the EU candidate members.[4] The outcome of this analysis shows that after the legalization the propensity in crime drops because the immigrants have better economic opportunities. By controlling the effect of each specific group, the timing of the agreement and the criminal activity of the undocumented migrants before the enlargement, Romenians and Bulgarians are found to be less likely to commit violent crimes because on average they are younger and more educated than the irregular migrants from EU. Alonso-Borrego et al. (2012) confirmed that the incidence of specific characteristic for the irregular migrant in Spain, as education and cultural proximity, contribute to lower the level of criminality, even among regular migrants. Ethnic homogeneity is a very powerful mechanism that creates ties and trust with the native population, helping to avoid that irregular migrants are more prone in committing certain crimes. This is because immigrants become more aware of the local laws.

Baker (2014) studies the Hispanic crime rate in the U.S. after the application of the *Immigration Reform and Control Act* in the 1986. The author finds that the human capital and demographic characteristics of the immigrants are again the key to solve the issue of the level of criminality in the immigrant population. explains that this issue is due to the wage differential between legal and illegal migrants, which is the premium to be legal. Looking at the impact of the recent asylum seeker flows in the UK, Bell et al. (2013) investigate the possible crime effect in United Kingdom from two different immigration waves. Firstly, asylum seekers from the early 1990s entered after the fall of the Berlin Wall from Yugoslavia and 2000s entered after the war in Iran, Afghanistan and Somalia. The authors find both the asylum seekers and the A8 EU immigrants have in common low education rates respect to the natives even when A8 EU waves of immigrants are young and single individuals moving to the UK for economic reasons, whereas the asylum seekers are characterised by high

[4]The selected EU candidate member countries are Albania, Bosnia and Herzegovina, Croatia, Kosovo, Macedonia, Montenegro, Serbia and Turkey.

level of unemployment.[5] Beside, after this limit the benefits that they receive are lower than the level of welfare that a native receive.

Bell et al. (2013) note that the authorities casually assigned to them the accommodation in deprived areas with high crime rates. The proximity to this area creates less favourable labour market opportunity for asylum seekers who are more likely to commit crimes. The effects of welfare looking at the level of crime are as follow: a slightly negative impact of the asylum seekers for violent crimes which are more likely to engage violent crime rather than A8 EU countries. However, when the authors look at the property crime it is found that the asylum seekers do not commit this kind of crime, while negative effects from the A8 immigrants are registered. In conclusion, their results suggest that for specific group of irregular migrants, refugees and asylum seekers, the high crime rate are a consequence of the lack of attachment to the labour force.

Chassamboulli and Peri (2015) analyse the effect of the restrictive policies applied to reduce irregular migrant stock. The authors use a search and matching model between two countries (US and Mexico), two group of workers (legal and illegal), high skilled and low-skilled, overlooking the different implications that different policies have on the US firms' and workers' welfare. There is a complementarity in skills between legal and illegal works and skilled workers would benefit for the rise in skilled job position. To avoid that this condition widespread in the market harming the natives, police makers adopt restrictive measures in order to control the phenomenon of the irregular immigrations: border enforcement, deportation, self-deportation and legalization. The only restrictive policy that would bring positive benefits could be the legalization of the irregular migrants. Migrants in this way will increase the surplus of workers and, because the migrants reduce the costs of the firms, legalization encourages firms to create jobs and the natives will benefit as well (Chassamboulli and Peri, 2015).

The recent literature on migration and welfare considers the effect of the different skills brought by immigrants to the total factor productivity. Researchers have considered firms as a unit of analysis, looking at the way how they respond to the migrant skills and the related level of employment and wage.

[5]This is also because they are not allowed to work for at least six months after their arrival until they receive the permissions.

This has been possible thanks to the availability of firm-level data that identify the birth-place of the worker. The impact of the immigrants on the productivity for the firms is fundamental in terms of characteristics as education. Immigrants contribute to the productivity especially when the have an occupation in sectors that are related to science, technology, engineering and math (STEM). It means that these migrants have a particular role in the innovation and technological growth that is crucial to the global economy.

Docquier et al. (2013) show that the patterns on employment and wages of natives depend on the level of education of the immigrants. They looked at the elasticity of substitution across workers according their origin and education and at the elasticity of substitution of labour native and labour supply. The sign of wage effect on the high skilled native will depend on the level of complementarity and level of the externalities given by the level of college educated. In their analysis they reported three different scenarios depending on the elasticity of substitution: "high", "intermediate" or "low". Generally, when the elasticity of labour supply is relatively low the overall effect is small but positive, such as for many East European countries that receive quite low level of immigration (less than 1%). The skill-levels of migrants are determinant for guaranteing high level of externalities and even less educated natives will benefits from their complementarities.

Docquier et al. (2013) extended the model introducing the impact of the undocumented migrants. It is generally believed that irregular migrants are low educated and that they produce negative effects. The challenge, that the authors find, is constructing the stock of the immigrants. The authors find that the upper-bound estimates in some European countries is more than 20% (eastern European countries and southern countries), in the rest of the other countries this value would be not higher than 10%. This data underestimate the real stock of irregular migrants due to the fact this typology of migrants downgrade their skills (Dustmann et al., 2013), so, immigrants with high and intermediate level of education do not use all their human capital but they will find themselves working in typical occupations stuffed by low educated natives. If all these information[6] are considered, the final result

[6]Looking forward to find the right pool of irregular migrants in the OECD countries, the level of education is crucial factor that specify the number of immigrants and their contribution, the DIOC-E Databes (OECD 2010) offer the information of the distribution of foreign-born immigrants across occupation by country and level of education. In order to correct the official data regarding the previous hypothesis on the bias on immigrants information, to immigrants is assigned to a position to high and low-education group based on their occupational distribution, respect to more and less

of this analysis shows that the downgrading effect for the undocumented migrants will produced slightly negative effects for the loss of human capital. But, overall, the impact of the immigration is positive for the destination countries. Moreover, the impact of the immigrants on the productivity for the firms has been measured through the level of communication and manual ability (Peri and Sparber, 2009; Lewis and Peri, 2015; Foged and Peri, 2016).

Immigration can generate different levels of specialization, because immigrants with their different task contribute positively to the production. Immigrants are likely to have imperfect "communication" (language skills), but they have manual ability similar to the native-born workers. Hence, immigrants will have comparative advantages when they will develop tasks that require manual labour, conversely less skilled natives will be more favourites in jobs demanding communication skills. This condition will create a situation that permits native workers to specialize, leaving physically demanding occupations for language-intensive ones. Moreover, tasks that require higher level of "communication" have higher return in terms of earing. In conclusion, productivity gains from specialization and there are massive gains for the destination country in the long term. Then, there is not any negative adverse effect on the wages of the low skilled migrants.

Peri (2012) found that intensity of R&D, the adoption of computer and openness to the international trade (exports intensity) has no significant effect on the total factor productivity and on the skill bias of aggregate productivity, whereas task-specialization is the driver of the increase of firms productivity. The author assumes that production is affected by the skill intensively, between more and less educated (college and non-college workers) and that there is a constant elasticity of substitution in production. Peri (2012) find that college educated produce a positive effect, while non-college have any significant effect. Then, he adopts an instrumental variable approach, the distance between Mexico and United State, as predictor of the immigration. The results of this analysis are that the direct effect of immigration is the increase in employment and, due to the negative effect of immigration on the high skilled worker; immigration will reduce the number of high skilled workers. The positive effect on welfare will be that the immigrants do not crowding out employment of natives. Therefore, Peri (2012) confirms that in states where there is a high level of unskilled flows, natives leave the manual-intensive task to immigrant and

educated natives (Docquier, Őzden and Peri, 2011).

tend to specialize in communication-intense works. This change in specialization will explain the gap between TFP and skill-bias, resulting an overall gain in welfare.

Foged and Peri (2016) have contribute to the literature showing that the increase of refugees, attracted by the economic condition of the European destination countries, is related to the fact that the unemployment rate in a country fall (Hatton and Moloney, 2015). Similarly, Fasani (2009) in his empirical analysis of the enforcement policy toward undocumented migrants note that a positive shock in the local labour market attracts more undocumented workers in that region, experiencing a positive level of employment. Especially, in absence of direct measures of labour demand, they assume that expansion of employment for natives increase the demand of irregular migrants. Brown et al. (2013) observe that the presence of undocumented workers in Georgia increase the probability of the local firms to survive, because of the reduction of costs and firms exploit the immigrant weaker position.

More recently a new approach has been developed, considering the immigration flows as a contribution to the productivity looking at the distribution of alternative skilled and unskilled workers among cities and regions (Ottaviano and Peri, 2013). By focusing on productivity and labour market, it captures the different externalities produced by the flows of non-native at a local dimension (Lewis and Peri, 2015; Peri and Yasenov, 2015). Migration creates different distribution of skills, immigrants tends to occupy low skilled job and this create mechanism that pushes natives to specialize more complex, in order to exploit the degree of complementary between skill-cells; on the other hand, natives will move across skill-cells. Firms adapt their productivity in order to take advantage of the immigration skills, influencing the total factor productivity. Firms will pay the skills of workers equally their marginal productivity.

Foged and Peri (2016), contributing to the current literature with an innovative method, consider the large influx of refugees that moved from former Yugoslavia to Denmark since the 1990s, which represented the first important flows of non-EU immigrant in Denmark. The dispersal policy adopted by the government at that time has created the "ethnic enclaves" distributing the refugees in a way that is unrelated to the labour market. Therefore, the sequent flow of refugees[7] produced different

[7]The other flow of refugees include the immigrant are associated at the international crisis between 1995 and 2003 that hit Bosnia, Afghanistan, Somalia, Iraq, Iran, Vietnam, Sri Lanka and Lebanon.

effect to the existent supply of immigrants. The new approach exploits the dispersal policy as a quasi-experiment. Moreover, they use the firms-level data that collect the skills of immigrants. Foged and Peri (2016) found that the increase in refugees push less educated natives to specialize and the dynamic process of spill over between municipalities through the mobility of the natives. In this way there is a positive effect for the unskilled workers that specialize and improve their conditions, whereas due to the fact that there is complementarity between skilled and low skilled, even native with high skills will benefit from the increase of refugees.

2.5 Fiscal Impact and Irregular Migration

The discrepancy between the clear "permissible" irregular migration (Hillman and Weiss, 1999) and the ineffective enforcement policies creates a state of aversion and confusion in the public opinion. Exacerbated tones addressed to irregular migrants not only consider them as free-riders, a drain on tax payment system, but also net burdens Preston (2014). Similar to impact of immigration in the destination country on the welfare system, the assessment of the fiscal impact is driven mainly by preferences and the characteristics of the politicians and public opinion. Indeed, welfare and fiscal system are interconnected. The fiscal impact is measured by making a comparison of taxed paid and other revenue contributions by the migrants with the costs of goods and services that they benefit from. The study on how immigration affects the fiscal system has not the same emphasis in the literature as the wage and employment issues (Card, 2001; Angrist and Kugler, 2003; Dustmann et al., 2013). This is a complex issue because the differences among the migrants and their level of dependence on social benefits have to be assessed.

To understand the net impact of the immigration on the destination countries, it is important to take into account an intertemporal approach to quantify the contribution of the second generation. This is another limit of the irregular immigration phenomenon, especially in Europe because not in all the Member States all the sons of the irregular migrants, who are born in the destination countries, are recognised as citizens (*jus sanguinis*). As in Dustmann et al. (2013) and Preston (2014) migrants are seen as the future labour force, generating fiscal contributors also to the natives (in the long-term), even though they will increase the costs for education in short-term. The sign of the contribution of the second immigrant generation will depend if the former will exceed the latter in amount. This type of analysis on benefits and

costs is based on a dynamic model where different generation overlap during the same period, which is fundamental in the construction of the budget constraint of the state. In this way it is possible to evaluate the fiscal contribution of the migrants during their lifecycle.

To perform this kind of analysis, the first step that has to be taken is to identify the skills the gender, age and origin of the migrants. On the base of that, it is possible to consider the consumption path of an individual during three phases. Firstly, the young individual will just consume and not contribute and, in terms of fiscal impact, it will contribute to the growth of the educational costs. Secondly, the children of the migrants will grow up, thereby, entering in the working age together with the children of the elderly population. In this phase, the migrants will contribute as taxpayers to the pension system of the immigrants in the pension age and two generations ago of the migrant population. Thirdly, the latter are the third phase of the overlapping generation process (Preston, 2014). A pitfall for the European dataset Labour Force Survey (LFS)[8], most adopted in immigration analysis, is the inability to trace the impact of the children of immigrants when they start to work. Indeed, it is possible to identify the children (in order to assess their costs of education in the destination country) only by associating them with of the parents. Because of the fact that when children enter the job market, they become independent and that make it impossible to identify the origin of the parents. Thus, it follows that there is an underestimation of the contribution of this hidden population in many analyse.

Dustmann and Frattini (2014) adopted this approach to understand the impact of migration on the UK public exchequer, with the aim is to understand how have the immigrants who arrived after 2000 have contributed to the fiscal system. The effect of migrants on the economy depends on the sector of activity where they work. Migrants contribute differently to the pension system and level of consumption, depending if they come from EEA or non-EEA countries. The EEA-migrants contribute more than native and non-EEA migrants to the UK total expenditures and to the revenues/expenditure ratio relative to natives between 1995-2011. Differently, after 2000 the estern European countries[9] migrants contributed like the EEA migrants. In conclusion the natives gain from immigration in terms of reduction of

[8]Survey conduct on the European Union Member states and other four non-EU countries (Iceland, Norway and Switzerland), which offer information on employment circumstance of individuals.

[9]This set includes Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia and Romania

the costs and increase in revenue. Immigrants mostly reduced the fiscal burden of the British natives between 1995 and 2011. Especially, recent migrants contribute much more than the natives to the governments' budget when the marginal cost of the public goods and services are entirely supported by the natives, because at the end they do not share the revenues with the migrants. This is particularly evident when the immigrant education is observed.

It is important to consider that most of the cost of education is supported by the country of origin of the immigrants. This is translated in saving for the costs of education for the natives. As it has been seen in the welfare analysis, the different skills of the immigrants (high or low level of education) are fundamental drivers for the growth of the host economies. At the same time, the costs of education of the immigrants' children are not wasted. This means investments in human capital for the destination countries, due to the fact that most of them will not return to the countries of origin of the parents. This approach is quite different from the classic static approach which computes the prevision costs of goods and various revenues, such as taxes and duties, only in a short time period (*atemoporal effect*).

Overall, the fiscal impact of immigration on the immigration is positive in a long time perspective. Immigrants contribute more than they use public services, especially irregular migrants who can have access to many services. Usually, education and medical care are offered to them. Moreover, among the new waves of refugees many children without parents are claiming the right to be accepted as refugees. They are an important factor for the growth of the EU countries where, on one hand, they indicated skills and rise in fertility rates and, on the other hand, in terms of more taxpayers and contributors to the pension system. Then, many people that migrate into Europe are coming for economic reasons and as the literature shows they are attracted by the positive economic conditions relative to their home countries. Many of them come temporarily in order to accumulate savings to invest in their home countries or to send back as remittence to their families in order to support the education of their children and medical care, not provided by their governments. Looking at the upward trends of the immigrants' contribution to the Western fiscal system, it would be interesting to understand if the increase of the rate of return of the immigrants could be an additional gain for the destination countries. This is due to the fact that most of them will not claim back the fiscal contributions paid and, due to the fact that most of them seem less likely to depend on cash transfers or

will make less use of benefits with respect to natives. In addition, the impact of the irregular migrants on the governments' budget it has to be considered for the costs of the regularization which have to be included in the expenditures of immigration.

Finally, there is a debate on which policy states have been adopted in order to succeed in the fiscal system (Ethier, 1986; Bandyopadhyay and Pinto, 2017) that is still going on. Bandyopadhyay and Pinto (2017) considered four different institutional arrangements from a full centralized level of enforcement to a total decentralized one in order to reduce the level of illegal immigration. Moreover, the authors assume that there is a trade–off in the choice between the level of internal enforcement policy and border enforcement. Given this assumption, Bandyopadhyay and Pinto (2017) that the institutional arrangement will be optimal when the centralized enforcement system is adopted and there is free mobility of people among the states of a federation. Thus, it follows that in a community of states such as Europe if the decision of the level of enforcement is decided by each single state, the country on the borders would have to be able to doubling the costs with respect to the others. Therefore, adding the costs of the border enforcement to that of the internal enforcement in order to curb the irregular migrants. European countries should harmonize policy and practise in the management of the increasing flows of migrants to avoid the increase of the irregular population.

2.6 A Macroeconomic Impact of Migration in Destination Countries

Several macroeconomic papers have explored the relationship between economic growth and migration (Dolado et al., 1994; Orefice, 2010; Boubtane et al., 2016). Migration is one of the main determinants of economic growth (Barro, 2001). The other determinants are: i) the level of real GDP per capita; ii) the level of education attainment (measured at the beginning of each period); iii) the government consumption; iv) the openness ratio; v) the ratio of investment to GDP; vi) the lagged values of inflation rate; vi) the total fertility rate, and as last but not least vii) the average of the trade growth (export over import prices).

International migration contribute to the human capital accumulation of the destination countries yielding a net gain as the host country did not invested in migrants education. So far the economic literature has considered irregular migrants as unskilled workers (Liu, 2010), considering them as an exogenous shock, producing variations in the employment level of the hosting countries. However, selective policies in the Western countries has created new channels for migration in favour of the more skilled one. This phenomenon yields a displacement effect (Liu, 2010) that is domestic workers might not be able to upgrade their skills competing with the new workers, which present more advanced expertise (Foged and Peri, 2016). This substitution effect might generate consequence on the employment rate of the domestic workers. Early studies show that migration flows yielded a small rise in the unemployment rate of the domestic workers (Hunt, 1992; Angrist and Kugler, 2003). However, these results are not confirmed by other researches, which, instead, demonstrate different outcomes (Friedberg, 2001). Reassessing the role of the most recent refugee waves, more details have been considered, adding an extra piece of information to the previous works.

By focusing on a specific group of workers, having low skills, Borjas et al. (2008) highlight that the effect of migration on the domestic labour market depends on the difference in term of skills between native and migrant workers. These recent contributions accentuate the importance of considering a complete picture avoiding biased assessment. By correcting the method of analysis previously explored, in a recent paper, Clemens and Hunt (2019) are able to reconcile the old with the new approaches, proving essential insights about the role of new migration flows, for which

in some cases no detrimental effects are identified.

Going beyond the effects on the labour market, the Solow-Swan growth model can be used to analyse the effects of migration growth rates to the level of native population of the European destination countries. This approach also includes in the estimation of the productivity function the level of the human capital of the immigrants, in addition to the population growth. The idea to focus on the impact of migration on GDP growth comes from the most relevant studies in this area of Dolado et al. (1994) and Boubtane et al. (2016). This approach has been motivated by the most recent political events, where migrants are seen not as a source of labour, but instead as a threat for the hosting countries.

The assumption in the literature of the relationship between human capital and growth has origin from the paper of Mankiw et al. (1992) that developed a standard augmented Solow neoclassical model where it is explained how the rise of immigration can harm the long-term growth of the GDP per capita. However, considering the impact of the migrant in terms of human capital, it is possible to investigate possible counter-effects which could counterbalance the effects on the population growth (Dolado et al., 1994). Moreover, because immigrants are generally younger than the native population, they might have a valuable contribution to the productivity of a country. It follows that the increase in migration can have a significant effect on the aggregate savings and total factor productivity growth. Hence, the adoption of this model helps to identify the contribution of the human capital, which happens through the skills conveyed by migrants onto the host economies. Therefore, the selection of the migrants according to skill-based programmes, which prefer highly educated migrants, is instrumental for a rise of technological progress in the destination countries. Immigrants become a factor in innovation. The current new structure of this investigation aims to disentangle the causal relationship between migration and economic growth.

One of the main questions that have puzzled researchers is whether or not migration flows towards the destination countries affect the economies. Two effects are determinant in the study of the phenomenon: the *scale effect*, which refers to the size of immigration flows, and the *composition effect*, which takes into account the migrants' human capital endowment. Barro (2001) emphasises the impact of the school quality in terms of educational attainment on economic growth, though this is valid

only when it takes into account the secondary and tertiary educational attainment levels, as primary educational levels are insignificant for growth.

Using a neoclassical augmented model, Dolado et al. (1994) find that the positive contribution of the human capital brought by migrants in the destination countries might compensate the *capital dilution effect* caused by migrants as they contribute to increasing the population which affect the per capita GDP variations negatively. Analysing a panel of OECD countries between the 1960-1985, Dolado et al. (1994) found that migrants were contributing negatively to the income growth of the destination countries. Boubtane et al. (2016) have spotted that the negative effect is related to the typology of migration characterising the period under investigation. Indeed, during the observed period immigrants moving toward the OECD countries were mainly unskilled. Generally, if migrants are more skilled than the average of the natives, then newcomers will speed-up the per capita convergence income (Barro et al., 2004).

According to Braun (1994), the speed of convergence can be slowed down by the lower level of labour mobility in presence of elevated migration costs, as people would be not inactivated by the costs of moving when they compare their utility levels between the destination countries and the countries that they come from.
One of the disincentives could be the fact that newcomers lack in complementary skills such as communication skills (Dustmann et al., 2008; Peri and Sparber, 2009). With this regards, Barro et al. (2004) show that the contribution in the human capital of internal migration is more significant than that of international migrants. However, the same authors in another paper found that the conditional convergence rates across the regions of countries are not so different from those across countries (Barro and Sala-i Martin, 1992).

2.7 The Endogenous Growth Model with Migration

The endogenous growth models, emerged in the 1980s, are an alternative to the neoclassical theory. The novelty of these models is to assume the technological change as endogenous, using technological differences to explain the cross-countries income differences. In this type of models technological progress is the engine of the economic

growth. Population changes do not create the negative *dilution effect* of the physical capital, as in the exogenous growth models; whereas, they translate into increase in technological progress due to greater economies of scale. Specifically, although growth remains dependent to the capital accumulation, the technical progress grows in line with capital accumulation (Romer, 1986) or, in a more sophisticated version where human capital is distinguished from physical capital, with the growth of human capital (Lucas, 1988). The endogenous technological progress is also associated to the research and development (R&D) and innovation (Romer, 1986; Grossman and Helpman, 1991, 1994).

The role of migrants in the models above is related to their level of skills. Indeed, more skilled migrants will bring more innovative ideas and facilitating the long-term growth through "learning-by-doing" and "knowledge spillover" (Romer, 1986), that eliminate the diminishing returns of capital. The diminishing return to capital states that even when capital is growing, the increase in output will be increasing at a decreasing rate. Instead, Romer (1986) assumes that the stock of technology or knowledge produces spillovers across firms in terms of physical capital, differently from Lucas (1988) who attributes the spillovers to the changes in human capital. However, both these economists find out that the increase in knowledge produce positive externalities on capital accumulation and economic growth through the increase in investments in a specific sector and share of experience among firms and workers,"learning by doing". This is possible when ideas are *non-rival* as the idea used by an industry can be used by other. However, the potential profit that can come from the introduction of an innovative product, due to the new ideas put some limits to the concept of non-rivalry of the technology. Potential profit are the driving force of technological change.

Within this framework, Ehrlich and Kim (2015) recognize that the endogenous growth literature on migration can be divided in two sections according to the contribution of migrants: the innovative R&D sectors and to the human capital formation in the destination countries. Drinkwater et al. (2007) adopt a three-sectors endogenous models: traditional goods, high-technology manufacturing and R&D sectors with an exogenous migration variable. Employment in R&D is assumed to be relatively more skilled than in other sectors. In this work, the density of *new product varieties* is an engine of growth. This factor is used as proxy of the population and represents the ratio of the new products relative to the population in that country,

which is named as “knowledge gap”. The results of this analysis show that there are net benefits in employing skilled foreigners in R&D activities. Conversely, there are negative effects when the migrants are low skilled. Therefore it founds that high skilled migrants enhance the long-term growth of the destination countries, while unskilled migrants reduce the growth rate.

Similarly, Lundborg and Segerstrom (2000, 2002) develop an open economy model in the framework of the ”quality ladder model”. The model considers with two trading countries (North- North; North-South) that compete to become leaders in the market trying to produce high quality product. Immigrants help the receiving country compete as they increase the labor force size. The authors allow for differences across countries. Workers migrate from South to North, where a restrictive policy to migration is applied. The decrease in population in the South implies a reduction of consumer expenditure and therefore fewer workers earning wage income. This drop is reflected also in reduction of demand for goods from the North (exports), also Norther workers earn a lower relative wage. In conclusion, the South benefits from the decrease of the relative wage of the Northern workers, as the resulting decrease of Northern CPI, makes product imported to the South cheaper. This gain offsets the decrease in utility levels. Similar effects are found when a tax on migrants income is imposed and those revenues are transferred to natives. Differently, when there are no restriction to migration flows, the decrease in wages in the South makes R&D more attractive to the North (migration increase utility and GNP growth). At the end, the South also gains from the improvement of goods quality in the North.

Mayda (2010) using a OECD database for destination country investigate the determinant of migration for the migrants looking at the migrants according their country of origin during the time-span going from 1980 and 1995 use some weights in the computation of the average of income per capita of the destination country. The author introduces another constraint to immigration: the binding quota in the destination countries. Indeed, even though the individual decides to immigrate, the migrant can not really decide to move not. Therefore, Mayda (2010) use a dummy variable for both destination and source country specific-effect, country-pair fixed effect, to controlling for the unobserved country-specific effect known as the multilateral resistance term. This country-pair fixed effect is identified with the change in immigration policies in the destination country, with can be more or less binding. Indeed, the author create a index, which takes the value of migration policy in that

country. By considering different level of openness to migration of a country, Mayda (2010) produces asymmetries between the "push" and "pull" effects. Those asymmetries were already identified by Hunt (2006), who analyses the German labour market after the unification of East and West Germany in 1990. Hunt (2006) finds that young people, who generally have a higher propensity to migrate, were less keen to do so due to rises in wages (pull factor) in the eastern part of Germany. The positive pull factors (higher wages) were able to prevent migration, despite a substantial rise in unemployment rates (push factor).

To quantify the size and the sign of those push and pull effects and the impact of the migrants, Mayda (2010), firstly, observe the effect produced on the per worker GDP in the destination country by *geographical or demographic control variables* (as for example, the distance between of the two countries or share of young people in the origin countries). This is true, although the increase of the distance between origin and destination countries have a negative impact, conversely to the demographic variables which affect positively the dependent variable. Secondly, the average of education attainment is a factor that influences the individual choice of migrating, as the high capital-labour ratio or higher level of skilled migrants in the destination countries can affect differently the income of immigrants on average. The author found that the average skill levels in the origin country affects positively the emigration rate, vice versa is true in the destination country.[10] Finally, Mayda (2010) studies the implication of a change in the endogenous migration quota. The results is that a policy change toward a lower level of restrictiveness produce a positive effect on pull factors and negative one on push factors.

Also Ortega and Peri (2013) adopt a gravity model[11] to study the role of the immigration policies and assume that the level of attractiveness for the migrants depends on the costs of migration and tightness of entry law. The results are quite straightforward, the geographical factors are expected to reduce the bilateral migration flows while the rest of other factors increase the same migration flows.
In a previous work, Ortega and Peri (2009) introduced an indicator of *tightness of entry law* to capture the impact of a change of immigration laws over the bilateral

[10]This results is confirmed by Borjas (1987) who suggests that in the process of emigration individuals skills level are affected by the level of income inequality in the source country with respect to the destination one. As an increase of inequality in the source country produces a disincentive for those who are more wealthy and educated with respect to the rest of the population, which instead might prefer to look abroad at better economic opportunities.

[11]This model is based on the Newton law (see among others Anderson and Van Wincoop (2003).

migration flows between pairs of countries. This new index is quite a novelty as it captures each year change in the receiving country policy and it is constructed collecting data from the statistical office in each host country. This indicator captures the specific immigration law and not its implementation, the dimension of the policy captured is the *change in tightness of a entry law*. Finally, Ortega and Peri (2009) in a growth framework evaluate the impact of migration on the GDP of a destination country looking at the employment times total hour worked (labour input), the share of physical capital and the total factor productivity.

Migrations are considered endogenous as they are causally related to the wage changes between destination and source countries, where employment, capital and productivity are determinant of wages. Namely, there is causal relationship between migration and labour. More migrants might potentially mean more workers. Depends on the employment rate or hour worked migrants can displace natives in the labour market. In a model with endogenous capital accumulation, the positive variation of labour force due to a migration shock can increase the return to capital and produce more capital investments. Additionally, the total factor productivity can rise as a consequence of more specialization in the market with more skilled migrants (Peri and Sparber, 2009) or can decrease as more unskilled migrants are working in the destination country, hence, leading to the adoption of labour-intense technologies that require less productive skills.

To investigate the impact of migration on productivity, Ortega and Peri (2014) observe the level of human capital of migrants looking their education attainment levels. The skilled migrants are those who have at least a college education. The latter are considered more productive rather that the low skilled who do not have college education. The contribution of the skills of migrants to the productivity of the destination have been largely confirmed by the literature, especially at micro level (Peri et al., 2015; Ottaviano and Peri, 2012; Manacorda et al., 2012; D'Amuri and Peri, 2014). However, following the Hall and Jones (1999) it is possible to assess the contribution of the human capital to the productivity level by providing a decomposition of the output per worker, as an additional year of school increases the human capital of worker. The higher number of skilled workers tend to be more open to international trade and have more benefit from openness toward migration, the author use the predicted immigration share and let interact with the variables which capture the *high* (above the median) and *low* endowment levels of human capital.

The outcomes of the analysis confirm what was predicted, migrants contribute more in countries where the workers are more skilled. This might be because education promote openness towards diversity and enhance the beneficial effects produced by different composition of migrant human capital. When the latter is associated with knowledge and ideas, then migrant become a vehicle of innovation spurring productivity.

Docquier et al. (2018) examining the impact of migration on the US economy between 1960-2010, support the thesis that there are substantial gains from open the border to skilled migrants coming from countries that differ from the destination countries both for cultural and economical factors, as migrants bring with them not only diversifies skills but also new social values and way of thinking. Similarly, Aleksynska and Tritah (2015) and Alesina et al. (2016) have emphasized the role of the skills and the diversity of migrants are determinant for the economic prosperity of the destination countries. Also Aleksynska and Tritah (2015) adopt a decomposition approach to the factor of production to look at the human and physical capital, total factor productivity and employment. However, in a former regression they introduce also the ration of immigration over the native population by age group. Using a cross-country approach they observe the characteristics of immigrants in 20 OECD countries from 1960 to 2005, splitting the share of migrants over three age groups. They implemented their estimation by using the immigrants origin-country factors of migrations (push factors) as and instrument in their analysis. The authors noted that the change in economic and demographic conditions of source countries influence the results.

The peculiarity of this study stands in the exploitation of the immigrant distribution through different ages to understand the impact produced by the *exogenous shock* of migrants skills and their heterogeneous composition. Specifically, migrants take the decision for human capital accumulation and migration is taken by the individual during their young age, 20-29 years old. Wherever the migrants are complementary to natives of the same age, then their increase rise the contribution to productivity. However, it has been seen that immigrants are more substitute of natives, if this is the case, then it is expected that the increase of immigrants negatively impact the employment and income rate. The increase in the number of newcomers should have only negative effects in the short-run. The long-run impact of migrants on the total factor productivity is attributed to the older migrants, also called *prime-aged*

workers, as they might have increased their experience and composition of country-destination human capital during the year of residence in the destination country. Hence, the latter group could have higher employment opportunity than the first group. Moreover, as the former group have the disadvantage of not being eligible for unemployment benefits and, generally, for other welfare programs. This increases the settlement costs for young migrants which decreases with time as they become more complementary. Since the young migrants undertake less skilled jobs, favor the task specialisation of natives (Peri et al., 2015), specifically of the women as new migrants will replace them in the household and child-care tasks (Cortes and Tessada, 2011; De La Rica et al., 2013) also them have a positive impact on productivity and employment in the host countries. The question whether or not there is a reverse causality between different channel of migration and economic prosperity has been argument of debate among researcher. Cultural, ethnic and linguistic diversity are both positively and negatively associated to the changes in GDP per capita. Indeed, diversity associated to high levels of skills and new ideas yield to higher productivity, whereas large migrations might lead to ethnic fractionisation or conflicts among different ethnic and linguistic groups which might offset the aggregate contribution of newcomers.

Alesina et al. (2016) contribute to this debate by the use of an indicator for *birthplace diversity* which collects the effective benefits that more diversity coming from abroad. Differently from other indexes such as the "ethnic-linguistic fractionalisation" or "polarisation" indexes (Bove and Elia, 2017). To predict the magnitude of the diversity impact, the authors adopt a gravity-model splitting the diversity measure in diversity "between" and "within". By "between" component it is intended to capture the diversity between immigrants and natives, whereas for "within" component is for the diversity within immigrant groups. When Alesina et al. (2016) specifically looks at immigration flow coming from richest countries, they found largest productive effect produced by birthplace diversity.

In the vast spectrum of papers related to the economic impact of immigration to the receiving countries, a growing body of literature has investigated the relationship between immigration, unemployment and economic growth through co-integration test and Granger causality test. Among those who study the relationship between unemployment and immigration, we can find Withers and Pope (1985) who using Australian quarterly data from 1948 to 1982 running a Granger causality test they

find a significant effect of unemployment on immigration, not vice versa. Differently, moving to a Canadian study, it has to be mentioned the paper of Marr and Siklos (1994) who using annual data from 1926 to 1992 with a Granger causality test observe that the past immigration had previously affected the level of unemployment, instead it has been seen a surge in unemployment which caused a reduction in immigration.

Another study conducted in Australia by Kónya (2000) testing Granger-causality test between 1981 and 1998 shows the presence of unidirectional causality relationship from immigration to long-term unemployment but not viceversa, conversely to the results of Withers and Pope (1985) according to which unemployment Granger-causes migration. Moreover, Feridun et al. (2004) analysed the causality relationship between immigration and unemployment in Finland concluding that during the 1982 and 2002 time span increases in immigration does not generate an increase in unemployment. Repeating the same analysis for Norway, Feridun et al. (2005) found that for this European country immigration does not impact on unemployment. Additionally, the author looking for a causality relationship between immigration and GDP per capita observes merely a unidirectional Granger causality running from immigration to GDP per capita.

Islam (2007) examined the relationship between unemployment and immigration in Canada spanning a period from 1961 to 2002. The study found no adverse effect on the unemployment rate due to immigration both in the short run and in the long run; although in the short-run the immigrants contribute to the unemployment. A recent paper of Latif (2015) analyse the impact of the migration in 10 Canadian provinces between 1983 and 2010. The results of his study suggest that in the short run, immigration has a significant positive effect on the unemployment rate, which increase more for the new migrants. However, empirical evidence illustrate that recent immigrants in Canada represents a high group of unemployment and they face difficulties once they enter in the job market Yssaad (2012).

A very relevant paper on the causality relationship between migration and GDP per capita is the one of Morley (2006) who investigates whether or not there is a relationship between immigration and GDP in Australia, Canada and the United States from 1993 to 2002 using ARDL bounds tests. The results say that there is a long-run causality relationship that goes from GDP per capita to immigration,

although this relationship is not valid considering the opposite direction.

Similarly, Boubtane et al. (2013) using a Panel VAR approach figure out the migration have positively contributed to the economy (GDP per capita) of 22 OECD countries, concluding that the causal relationship between the two migration and GDP per capita is bidirectional. The authors find also a bidirectional negative relationship between total unemployment and migration, although migrants do not affect negatively the unemployment rates of the natives. Nevertheless, the authors attribute the negative unemployment effects caused by migrations to the not appropriate migration policies of the destination countries. Finally, Feridun (2007) found strong evidence of bidirectional causality between GDP per capita and immigration in Sweden between 1980 and 2004, although there is no evidence of a causal effect of migrants on the unemployment in the destination countries.

2.8 Summary and Gaps of the Literature Review

In this chapter, we have produced an extensive review of the microeconomic and macroeconomic papers about the impact of migration on the destination economies. Both microeconomic and macroeconomic literatures divide migrants into two main groups: irregular and regular migrants. Regular migrants are further divided into high-skilled and low-skilled.

In the microeconomic papers, the classification of the migrants depends on their position in the labour market. Generally, it is illustrated how an unexpected increase of migrants in the economy can generate a series of effects, such as displacement. The displacement effect yields a substitution of natives with the newcomers, which, due to their skills and experience, or their level of flexibility and of contractual power, are preferred by the employers. Therefore, it can be argued that the increase of foreign-workers in the domestic makers can lead to an increase in unemployment rate of the native population (Hunt, 1992 or Angrist and Kugler, 2003). However, as put forward by Friedberg (2001),this is not always true. The recent change in the type of migrants, due to the increase in the refugees waves moving from some Arabic countries and the increase in more skilled migration (STEM) changed this picture.

It is worth to also mention the "area-analysis" or "spatial correlation" analyses on the labour market, which underlines the presence of correlation between the wages

and the employment rates due to migrants across local markets. Borjas (2003) suggests that an increase in migration of 10% would produce a decrease in wages of the natives of 1%. However, critics of this methodology argue that it leads to misleading results. This is due to the fact that the author estimates the effects of migrations on the labour market by using a small sample of the foreign-workers. This assumption leads to a spurious positive correlation between foreign-workers and incomes in the regions with higher income levels.

Other microeconomic studies, try to solve the problem of endogeneity through the use of "quasi-natural experiments" which attribute the increase in the inflows of migrants to political factors than to economic ones. One of the most relevant work in this field of research belongs to Card (1990) who studies the effects of the Mariel Boatlift, irregular migrants (known as "Mariellitos") from Cuban moving to Miami in the 1980s, following a "political" decision of Fidel Castro. The effects produced by the "Mariellitos" on the Miami labour market have been also conducted by other researchers as Borjas (2015), Peri and Yasenov (2015) and Clemens and Hunt (2019). The common results coming from the analysis of the latter show that only low-skilled natives are marginally affected by these irregular migrants.
Different microeconomic studies, looking at the wage distribution of the destination countries, find that the impacts of migration change depending on the level of substitutability and complementarity between migrants and resident population. However, the results can change depending on the methodology adopted.

Ottaviano and Peri (2012) and Manacorda et al. (2012) pre-allocate the migrants to a specific skill cell, according their previous work experience and level of education, on the other hand, Dustmann et al. (2013) conduct a similar analysis where, instead of pre-allocating migrants in specific skill-cell, they observe their real position on the wage distribution, after finding their position in the labour market. Those papers analyse the UK and US labour market finding that migrants are not perfect substitute of natives.

Finally, another group of papers, studying the welfare impact of migrants, illustrate that there is a correlation between migration and theirs attachment to the labour market. With this regards, Mastrobuoni and Pinotti (2015) and Foged and Peri (2016) show that the legal status of the migrants is key to understand the effects of foreign workers produced on the destination economies. The more the migrants

are allowed to work and be integrated in the labour market, the higher is the contribution to domestic economies, and the lower will be the probability that the migrant will commit crimes. This is also explained by Devillanova et al. (2018), who illustrate that the "propensity" of regularising the migrants spurs their productivity levels.

The macroeconomic literature looks at the effects on the labour market by analysing and quantifying the effects of demographic changes on variables, such as GDP per capita and unemployment. These papers focus on the causal relationship between unemployment and migration and try to understand whether migrants can reduce the employment of the resident population by producing displacement effects in the market. On the other hand, they explore whether both migration policies and labour market dynamics can be a "pull" or "push" factors for the incoming flows. Instead, there are few papers that have examined the impact of migration on economic growth with respect to the skills composition of the migrants. As there is a difficulty in determining the economic outcome based on theory, it would be more effective to adopt an empirical model that captures the Granger-casuality relationship between variables. Generally, these macroeconomic papers tend to observe only the effects of migration on the GDP per capita of the destination countries, however, it is interesting to study whether GDP per capita or other non-economic factors cause the inflows of migration. This area of macroeconomic research has been rarely explored, the most relevant papers on the causality between migration and GDP per capita are the ones of Feridun et al. (2005) and Feridun (2007) respectively on Norway and Sweden, Morley (2006) on Australia, Canada and United States and Boubtane et al. (2013) on a set of 22 OECD countries.

To the best of our knowledge there are no papers on this topic which aim to analyse a set of European countries, therefore, we decided to produce an analysis on the causality relationship between migration and GDP per capita among these countries. By taking this approach it is also possible to address any endogeneity coming from the interaction between the variables which might be caused by economic factors such as differences in wages between the origin and destination countries of the migrants or non-economic factor such as the migration policies adopted by each country. The novelty of this approach is that it allows us to understand if migration is determined by the past and present conditions of the economy or viceversa.

Likewise, another branch of the macroeconomic papers based on "pseudo-gravity"

models wants to identify the causes of migration related to the geographical and cultural distance between two countries, thus looking at land borders, common language and colonial history. Moreover, the gravity models take also into account the different level of tightness of the migration policies (Mayda, 2010; Ortega and Peri, 2013). These papers exploit bidirectional panels, which allow to include in the analysis both the origin and destination countries at the same time. As follows, this methodology does not suit the scope of our analysis, which is to analyse selected European countries and then compare the results with the rest of the countries analysed. This suggests that it is suitable for us to adopt a panel data approach.
Moreover, we have also seen that migrants with their education impact on the productivity levels in the destination countries; in particular, Alekskynska and Tritah(2015) and Alesina (2016) find a positive impact of the birthplace on productivity due to the increase of skills among the labour force. Generally the research papers that take into account the skills of migrants as source of new ideas and innovation are based on a endogenous growth model. However, we also notice that the research of migration based on a neoclassical growth model is limited (Dolado et al., 1994; Piras, 2013; Boubtane et al., 2016).
These papers paper try to disentangle the *scale effect* generated by migrants due to the increase of population, thus increases the capital dilution, and the *composition effect* in terms of the accumulation of different skills that each migrants can bring. The skills brought by migrants might be considered as a net-gain as the destination countries can enjoy the contribution of migrants to the economic growth without having to pay the cost for their formation. Also in this case, there is no evidence of a research based on the European countries. With this regards, in the second analysis of this thesis we want to fill the gap in the literature by exploring whether the impact f migration in Europe is positive.

One limitation of the neoclassical analysis on migration, that we want to overcome in this thesis, is considering the migration as an exogenous phenomenon. Morley (2006) finds that this is a controversial issue. Indeed, when we take into account the migration policies in the destination country, migrations become an exogenous factor. Morley (2006) explain that when GDP per capita Granger-causes migrations, but not vice versa, results can be influenced by migration policies. Specifically, the author suggests that the reason why the causal relationship goes from the GDP per capita to migration, might be due to the fact that the migration polices adopted by the governments have not work effectively to curb the inflow of foreigner work-

ers. Due to their importance, migration policies are becoming a growing area of study. Therefore, in line with the recent trends we decided to include them in our analysis by considering migration policies as one of the main drivers of migration phenomenon. Taking inspiration from the model of Mayda (2010) and Ortega and Peri (2013), a series of indexes on the level of selectivity and restrictiveness of the migration policies were created as part of the thesis to overcome this gap on the literature. By adopting thee policies in our model we are able to endogenise the flow of foreign workers moving to Europe.

In conclusion, after a careful review of the economic literature on migration, we identify the following research gaps:

1 Analysis on the causality relationship between migration and GDP per capita both in the short and long-run;

2 Analysis on the impact of migration on the European economies, taking into account the skills of the migrants;

3 Inclusion of migration policies indexes into a neoclassical growth model framework.

2.9 Research questions and hypothesis

Following the identification of the gaps in the literature, this thesis aims to investigates the role played by migration flows in Europe by exploring the most pivotal "pull" factors attracting the larger quota of migrants. To better understand the most important aspects of the migration flow towards Europe, this thesis addresses the following three broad questions:

- To what extent are the economic conditions of the European countries a determinant of migration?
- Does migration spur the productivity of the destination country? To what extent does the level of education of migrants enhance the economic growth of destination countries? How have European migration policies affected actual migration flows?
- How does the concentration in terms of population affect the income distribution of the hosting country? Does it favor income convergence across the European countries, reducing income inequality?

Specifically, it wants to answer to the following hypotheses:

- Is GDP per capita a determinant for migrations?
- Do migration impact GDP per capita?
- Are tertiary-educated migrants producing a net-contribution to the economies in Europe?
- Are tertiary-educated migrants, with their contribution to the economies, incrementing the pace of income convergence among all the European countries?
- Are migrants and their contribution to the European economic growth being affected by the selectiveness and restrictiveness of the migration policies?

Chapter Three

Data and Methodology

This chapter provides a detailed description of the data that we have adopted for the two analysis produced in this thesis. Specifically, we explain the variables used in the thesis and the computation methods adopted with a description of the sources used. We also show some descriptive statistics to better explain the data. In the second part of this chapter, we provide a presentation of the data to illustrate the estimation techniques adopted in this thesis. The first analysis is set up in a time series framework where we adopted a co-integration approach to explain the Granger causality relationship between *Immigration per capita* and *GDP per capita*.
In the second analysis, we use a series of panel data models to explore any possible contribution of high-skilled native and foreign-born migrants on the European economies. In the following section, we will illustrate different static and dynamic panel data models suitable to our analysis.

3.1 Dataset

3.1.1 The Dataset for Time Series Analysis

In the fist analysis, we have used annual data over the period 1990-2015 for the 22 European countries. The immigration data counts the immigration flows toward the European countries each year from 1990 to 2015. This data describes migrants present in the territory as those who established their usual residence in a territory of the European State at least for 12 months. *GDP per capita* is obtained, by dividing the GDP on the total population and for each county. The data are taken from the European statistic office, Eurostat and the World Bank Database. According to the definition provided by the Statistical Office of the European Union, it is not possible

to detect if the migrant were previously resident into another Member State or a third country. To understand better the changes in the European migration pattern, we have used the flows of migrations rather than the stocks, as these statistics are collected in a specific period, one year. Flow statistic tend to be more sensitive to the change in migration patterns. Indeed, European governments attitude is focused on implementing the measurements to better collect changes in migration flows (Fassmann et al., 2009). The shortcoming in the analysis of the migration phenomenon in Europe is that there is a lack of data. Namely, the lack of a standard legal definition of different categories of migrants among the European countries makes more challenging the data collection for comparative statistical analysis; especially for the period before 2007 when the European Commission has implemented a regularisation on the harmonization of data collection for migration statistic. Data on migration are mainly sourced from the Eurostat dataset; however, for some countries we encounter the issue of missing values at the beginning of the time series. Therefore, to overcome to the issue of missing values, we have integrated our dataset with the International Migration Database provided by the Organization for Economic Cooperation and Development (OECD). For those countries that are not included in the OECD group we produced a linear interpolation and extrapolation methodology using the Eviews package.

Legal immigration, denoted as *li*, is measured with the logarithm of the ratio immigration inflows to the total population for each European Member State. The total population is also obtained from the Eurostat database. Migration is measured as a portion of the total population as it plays a vital role in the annual population growth of the European countries. Therefore, the intention is to understand the changes that migration brought to the population of the destination countries.
Indeed, the inflow of immigrants in Europe is composed of people that are generally younger than the native population (Dustmann and Frattini, 2014), which affects the age composition of the labour force, particularly in periods of low population growth. Hence, considering the ageing issue affecting the labour markets and fiscal systems of most European Member States (such as France, Italy and Germany), migration becomes an optimal solution by increasing the scarce labour-force and contributing to the social security system (Bandyopadhyay and Pinto, 2017).

Economic growth, denoted as *ly*, is measured with the logarithm of GDP per capita calculated as the ratio of GDP to the total population. Data for the GDP are sourced

from the World Bank database and are measured in current U.S. dollars.

3.1.2 The Dataset for Panel Data Analysis

For the second analysis, we collect data for a total of 22 European countries[1] covering the period between 1990 and 2018. Specifically, we split the sample period into six subperiods with 5 years observations for the first 5 subgroups and 3 for the last one. Since some data on the human capital of the net migrants are missed our panel is unbalanced. Moreover, we loose the last period when we observe the changes in tightness of the migration policies, from 2015 to 2018. The first variable adopted is the *Real GDP* (constant prices expressed in dollars, the reference year is 2011) which is used to measure the output y. This comes from the *Penn World Tables 9.1* database, Feenstra et al. (2015). As we use the *Real GDP per worker* to compute the impact of the migrant workers on the European economies, we take the Real GDP and divided by the (native and foreign-born) population in working-age (aged 15-64). Data on labour force, L, are from Eurostat database.

Data on net-migration are provided from OECD and Eurostat databases. The net-migration is the differences between the inflows and the outflows of migrants, although the net-migration data can not be considered always accurate as in many countries the outflows are partially recorded. Moreover, these figures do not consider the unauthorised migrant flows which in some of the *peripheral* European countries are significant. The OECD database produces the data on the total net-migration on the basis of the vital statistics and the estimates depends on the total annual arrivals minus departures. These estimations are preferred as eliminate short-run adjustments produced by temporary movements of people which causes problems in the comparability of data across differen countries. As all the European countries are not part of the OECD group of countries, the remaining information of the net-migration are collected for the Eurostat adjusting the estimates on the population

[1]The countries taken into account into this analysis are the following: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, the United Kingdom. The European countries excluded from the sample analysis are the Central East European Bulgaria, Croatia, Estonia, and Hungary, one Balkan country, Slovenia, and one Southern-East European country, Cyprus due to lack of data availability. All of those countries acceded to the European Union between 2004 and 2007. These countries are characterised by smaller economic size with respect to the old European Member State and lower development levels, once joined the EU these group of countries had to adopt specifically fiscal policy, price stability and structural reforms to support macroeconomic stability to accelerate income convergence.

change with the natural change of the population. The information on the number of native-born emigrants and foreign-born immigrants is scarce. Therefore, we compute these figures by following the approach proposed by Boubtane et al. (2016). To this end, we have used the data on the population according the country of birth from the Eurostat Database together with the data of the native and foreign-born population from the United Nations Population Division. Talking into account the number of native-born population as the stock of the population the year before that adds up to the natural decrease or increase of the population between two periods and emigration flows. This is synthesized with the following equation:

$$NBPOP_{t+1} = NBPOPt + Bt - t + 1 - Dt - t + 1 + Et - t + 1 \tag{3.1}$$

By rearranging equation 3.1, it is possible to compute the emigration flow that occurs between two consecutive years, as:

$$E_{t-t+1} = NBPOP_{t+1} - NBPOP_t - (B_{t-t+1} - D_{t-t+1}) \tag{3.2}$$

where *NBPOP* is the number of native-born population. These data are few. The *Trend in International Migration Stock: the 2013 revision* suggests that when there are at least two data it is possible to overcome the issue of missing data by delivering interpolations and extrapolations.

The B_{t-t+1} is the number of births occurred between the period t and $t+1$, which by definition refers to the individuals born in the reporting country. Data are sourced by the Eurostat database. Data on the deaths, D_{t-t+1}, are also considered between two periods. Differently to the data on births, the deaths figures include both the native and the foreign-born individuals. The number of total deaths come from the *World Health Organisation(WHO) Mortality* database. To compute the number of the deaths of the natives we correct the data with the share of the native-born population to the total population more than 15 year aged. Since the net-migration is the difference between the foreign-born migrants and native-born migrants, it is possible to obtain the number of foreign born (M) by subtracting the number of the native-born expatriates (E) to the total number of net-migration. Once obtained the values for E and M, we compute the share of native and foreign-born migrants, respectively e and m, dividing them by the population in the ages between 15 and 64. The share of investment in physical capital, *sk*, is approximated to the share of investment of Real GDP. The data are from *Penn World Tables 9.1.* While, the

share of investment in human capital, *sh*, is measured with the gross enrollment ratio of tertiary educated population. This means the percentage of the population that have successful completed the secondary education and that have been enrolled to the university.

Data on tertiary enrolment are collected from the UNESCO Institute of Statistics according to the International Standard Classification of Education (ISCED), to ensure comparability of the education programmes across countries.
Specifically, as *tertiary enrollment rates* it is compute by taking into account the ISCED 2011 from education level 5 to level 8.[2] We measure the skills of the migrants according the percentage of those with tertiary education. We use as proxy of migrants human capital the number tertiary-educated migrants. Specifically, we do a distinction between the outflow of human capital of the native-born migrants and the inflow of human capital brought by the foreign-born migrants. The human capital of the native-born expatriates is take as the ratio of the native-born tertiary-educated (h_e) over the average of the resident population in the country with the same level of education ($\hat{h}$).
This ratio is defined with the variable k_e and can be interpreted as the relative endowment of human capital of the natives' emigrants with respect to the resident population. One of the most extended dataset that collects the information of the migrant education over time is produced by Brücker et al. (2013) which covers 20 OECD destination countries and 195 migrant's origin countries over the period 1980 and 2010.[3]

Data of the average population with tertiary education ($\hat{h}$) come from the Lutz

[2]Previous work studies have used the secondary education data as a proxy of human capital, however, Gemmell (1996) explains that taking the percentage of tertiary-educated population as a proxy of human capital in more developed countries explain better the impact of this factor to the growth. According the UNESCO Glossary the tertiary education includes academic education but also advanced vocational or professional education.

[3]The emigration rate is computed by weighting the total number of emigrants born from a specific origin country($E_{i,t}$) by the total population over 25 year old ($R_{i,t}$) which is added up to the number of migrants ($E_{i,t}$). All the variables refers to individuals with a the same education levels. The relative equation is the following:

$$e_{i,t} = \frac{E_{i,t}}{R_{i,t} + E_{i,t}} \tag{3.3}$$

with i country and t period.
The reason why the emigration rate is computed in this way is because it provides the loose in the labour market in the origin country when part of their tertiary-educated population emigrates.

et al. (2007) and Lutz et al. (2018) datasets. These provide information on the population of country in 5 years periods, for different age groups and for four education groups: no schooling, primary, secondary and tertiary education. From these two dataset we observe the share of a country's population in working-age and with a tertiary education and we multiply this by the country total population. Other datasets, such as Cohen and Soto (2007), Barro and Lee (2013) and De la Fuente and Doménech (2006), provide a measure of human capital in a set of countries.

To calculate the relative contribution of the foreign-born human capital to the host economies (K_m), we take the percentage of the foreign-born educated population (h_m) over average population with tertiary education ($\hat{h}$). Data of foreign-born educated migrants are from Eurostat database.[4]
Additionally, due to the presence of missing value in h_m series for the period before 2004, we replace it by exploiting the data of Boubtane et al. (2016) for some of the European countries.[5]

[4]The Eurostat dataset is the *population by education attainment level, sex, age, country of birth and degree of urbanisation,* edat-lfs-9915.

[5]The countries are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

Table 3.1: Description of the Variables Adopted in the Second Analysis

Variables		Description	Sources
Dependent			
	y_{it}	Real GDP per worker	*Penn World Tables 9.1*, Eurostat
Independent			
	$y_{i,t-1}$	GDP per worker at it initial level	*Penn World Tables 9.1*, *Eurostat*
	$sk_{i,t}$	Share of investment of Real GDP	*Penn World Tables 9.1*
	$sh_{i,t}$	School enrolment rates of tertiary educated	*UN database*,
	$n_{i,t}$	Population growth rate, 15-64 years old	*UN database*
	$m_{i,t}$	Foreign-born immigrant rate	*Eurostat UN Statistic Division Database OECD*
	$e_{i,t}$	Native-born emigrant rate	*Eurostat UN Statistic Division Database OECD*
	δ	depreciation rate	Mankiw et al. (1992)
	g	rate of technical progress	Mankiw et al. (1992)
	$K_{m\,i,t}$	Tertiary educated immigrants relative to the average of the total tertiary-educated resident population in the destination country	*Eurostat*, *Lutz et al. (2007, 2018)*
	$K_{e\,i,t}$	Tertiary educated native-born emigrants relative to the average of the total tertiary-educated rest of the resident population in the country	*Brücker et al. (2013)*, *Lutz et al. (2007, 2018)*
	μ	Index on the restrictiveness and selectivity levels of the migration policies in the European countries	*DEMIG database*

3.2 Time-series

3.2.1 Unit-root Tests

To investigate on the impact of the immigration on the economic growth we apply an Autoregressive Distributed Lag (ARDL) co-integration analysis . Specifically, the co-integration method is used to determine any long-run relationship between two or more variables. The assumption of stationarity of time-series process lies at the basis of the co-integration analysis. Macroeconomic variables often show trends over time, which means that the mean, variance and covariance may differ from different subperiods. This indicates that the time-series are non-stationary. To be sure that the time-series are stationary we need to have mean, variance and covariance constant over time. Therefore, in presence of non-stationarity, the series are 'trended'. It is to examine possible this issue graphically by observing whether the correlogram is downward and upward trended over time as the number of the lags of the variable increase. To correct for non-stationarity, we need to apply a de-trending process through a differentiation procedure. After a first or more differentiation, the time-series become stationary. At this stage, the series are defined integrated of order d (d denotes the time the series need to be differenced in order to become stationary). Most macroeconomic data such as GDP, income, consumption and price levels are typically trended.

Thus, it is important to check and determine the order of integration and the stationarity condition of the variables used in our study. Therefore, we need to test for the presence of unit roots for the *GDP per capita* and the *Immigration per capita* variables. To begin, we say that a time series is stationary (integrated of order zero or I (0)) when it has no unit root. In this case, the shock which affects the series dissipates in the short-term. Therefore, this shock does not affect the mean which revert to a long-run mean levels. The easier way to examine the 'unit root' in a series is to observe if it correlogram (the graph which plot the serial correlation and the lags) the die out quickly. However, this method is rather imprecise. To investigate the stationarity of the variables, we adopt a series of unit root test which take into account any possible breakpoints in the series, specifically we have used the following tests: 1) Zivot and Andrew (1992); 2) Perron (1997); and 3) Lee and Strazicich (2003). The popular procedure to test for the stationarity is based on the investigation of a set of critical value for testing the hypothesis, in a simple AR (1) model, that the coefficient of the lagged dependent variable is equal to one. In other

words, there is a unit root.

3.2.2 The ARDL Approach to Co-integration

One of the issues that arises with the use of co-integration is that one should be certain about the level of integration of the variables, namely the variables in the model have to be I(1). However, as the level of integration is given from the unit root tests and considering their low power, it would be preferable to adopt a methodology that allows to test for co-integration when one is not sure if the variables are I(0) or I(1).

In order to overcome to this issue Pesaran et al. (2001) suggest to use an Autoregressive Distributed Lag (ARDL) model for the estimation of the error correction approach, also called as *bound test* of co-integration. We should also say that the ARDL co-integration test is not valid if the time series are I(2). This test have the distinguished feature that can be used to see if there are long-run relationships even when the variables are stationary. The basic form of the model specification of the ARDL (p,q) is the following:

$$\Delta y_t = \alpha + \sum_{i=1}^{p-1} \beta_i \Delta y_{t-i} + \sum_{i=0}^{q-1} \gamma_{i1} \Delta x_{1,t-i} + \sum_{i=0}^{q-1} \gamma_{i2} \Delta x_{2,t-i} + \delta_1 y_{t-1} + \delta_2 x_{1,t-1} + \delta_3 x_{2,t-1} + u_t \tag{3.4}$$

where u_t is the error term (white noise) and Δ represents the first difference operator. The model presented in 3.4 is very similar to the Error Correction Model. The difference stands in the presence of the Error Correction Term instead of $\delta_1 y_{t-1} + \delta_2 x_{1,t-1} + \delta_3 x_{2,t-1}$ terms and in the non imposition of restrictions to the δ coefficients. Indeed, 3.4 is defined by Pesaran et al. (2001) as an *unrestricted ECM*.

The ARDL model have the characteristic of indicating both the long-run and short-run relationships between variables in a single-equation time series setup. According to Romilly et al. (2001), this is the reason why the ARDL is more efficient for testing small samples with respect to traditional cointegration tests such as the Johansen and Juselius (1990). Indeed, the latter is set up in a multivariate system and tends to use a relatively large number of degrees of freedom. In order to select the appropriate values of the maximum lags p, q_1 and q_2, we apply one or more *information criteria*, such as the AIC (Akaike Information Criterion) or the Schwarz Criterion (SC) and the Hannan Quinn (HQ) Criterion, which are based on the values of the

log-likelihood function. The F-statistics are used under the null hypothesis of no co-integration among all the variables:

$$H_0 : \delta_1 = \delta_2 = \delta_3 = 0 \tag{3.5}$$

against the alternative hypothesis that are all different than zero:

$$H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq 0 \tag{3.6}$$

The authors have tabulated specific critical value bounds which differ on whether or not there is a trend in the estimated regression. Those critical values are asymptotically distributed and consist of a lower bound value (assume that variables are $\sim I(0)$) and an upper bound value (assume that the variable are $\sim I(1)$). Pesaran (2015) states that it is possible to decide if results are conclusive, without knowing the order of integration, by using the following rules:

- If $Stat > U$, then the null hypothesis is rejected, then we can conclude that there is a long-run relationship between all the variables;
- If $Stat < L$, then there is not any co-integrating relationship between the variables;
- If $L < Stat < U$, then the inference is inconclusive.

here $Stat$ is the estimated statistics, while L and U are the lower and upper critical value bounds.

In conclusion, the ARDL model allows us to increase the dynamism in the model specification by introducing the lags of the dependent variable and a series of lags of the variables in levels or differences. The advantage of the ARDL model is that it offers both long-run and short-run coefficients. Furthermore, through a simple linear transformation between the long-run equilibrium and short-run coefficients, it provides an error correction term (ECT), called also "feedback effect", which shows how much of the disequilibrium in the previous period is being corrected during the current one. This adjustment takes place within one period. If the results of the ECT is negative, it means that there is a convergence to the long-run equilibrium; whereas the opposite is true in the case that ECT is positive. Finally, we are aware of the possible issues of reliability of data when the sample size is small, which could lead to spurious regression issues. However, due to the characteristic of the ARDL

model (Wickens and Breusch, 1988; Romilly et al., 2001), we consider as one of the most appropriate model to be used.

3.3 The Granger (non) Causality Test

In the cases when it is not possible to apply a co-integration test as variables are integrated of order I(0), we can still test the existence of any relationship between the variables and the direction of the relationship with the Granger (non) causality test proposed by Granger (1969). Similarly to the previous methodology, the Granger (non) causality test is crucial to determine whether *Immigration per capita* causes *GDP per capita*, and see how much of the current GDP per capita can be explained by the past values of the same variable. Moreover, it helps also to understand whether the inclusion of previous lags could improve the explanation of the independent variables on the dependent one.

The same is valid for the opposite relationship when *GDP per capita* causes *Immigration per capita*. However, the Granger (non) causality test measures the positive or negative relationship between the two variables only in the short-term. The simultaneous equation that we test are the following

$$ly_t = \alpha_1 + \sum_{i=1}^{n} \alpha i \, ly_{t-i} + \sum_{i=1}^{n} \beta i \, li_{t-i} + u_t \tag{3.7}$$

$$li_t = \alpha_2 + \sum_{i=1}^{n} \alpha i \, ly_{t-i} + \sum_{i=1}^{n} \beta i \, li_{t-i} + u_t \tag{3.8}$$

where *ly* is the logarithm of the *GDP per capita* and *li* is the logarithm of the *Immigration per capita*. The null hypotheses of the Granger (non) causality tests for eq (3.7) and eq (3.8) are H_0: all the βs are $= 0$ against H_1: at least some of the βs are $\neq 0$, but also H_0: all the αs are $= 0$ against H_1: at least some of the the αs are $\neq 0$, respectively. We reject the null-hypothesis and, therefore, find that the independent variable Granger cause the dependent one, when the F-statistic test is bigger than the F-critical values.

3.4 Panel Data Analysis

In this section we describe the panel data methodology that we adopt for the second analysis. The panel data modelling is considered a very efficient analytical methodology which is a combination of time series and cross sectional analysis models. Therefore, a panel dataset, also known as *longitudinal dataset*, has the characteristic of taking into account a group of individuals, countries or firms at several points in time. The results, obtained by pooling all the data together, produce a common cross-country parameter that is constant over time and a variable that is characteristic for each cross-section. According to Asteriou and Hall (2015), there are some evident advantages for using a panel data methodology:

1. The increase of the sample size pooling together time series and cross-sectional information, allows to obtain better estimates;
2. It controls for individuals or countries but also time specific heterogeneity;
3. It can deal with problems of omitted variables, and solve also the issue of endogeneity in a dynamic set up.

Following in this chapter we analyse a variety of models for panel data.

3.4.1 Linear Panel Data

A panel dataset contains N cross-sections which are observed over different periods of time T.
Specifically, a simple linear model takes the following form:

$$Y_{it} = a + \beta_i' X_{it} + u_{it} \tag{3.9}$$

where a is a constant and β is a vector of coefficients of the explanatory variable X. It should be observed that the dependent variable Y and the explanatory variable X have both as subscript i and t for $i = 1, ...N$ countries or individuals and $t = 1, ...T$; time periods.
Whether the a variable-intercept is constant or not it will be determinant to understand the specification of the panel model (Hsiao, 2003). In the case when it is not constant, there are some heterogeneity bias created across the cross-sections and the intercept-variable will be included in the disturbance term. Both of the

intercept–variable and the error term constitute the composite error, as follows:

$$v_{it} = a_i + u_{it} \tag{3.10}$$

In this case, the intercept-variable a_i is assumed to collect the effects of the omitted variables, and is considered as a random variable. Therefore, it has to be uncorrelated with the rest of the exogenous explanatory variables (Greene, 2018).

$$E\left(v_{it}|x_{i1}, \ldots, x_{iT}\right) = 0 \tag{3.11}$$

Additionally, another feature of the linear panel dataset is that it can be either *balanced* or *unbalanced*. A *balanced* dataset consist of a cross-sections with a constant time-span, whereas the dataset is *unbalanced* when a some of the observations are missed, due to the data unavailability.

3.4.2 Static Panel Models

In general panel data sets can be estimated using three different panel data approaches. These three approaches are been adopted in this thesis to describe the behaviour of individuals across 22 European countries in the period of time between the 1990 to the 2018. The three approaches are: common constant or pooled-OLS , fixed and random effects model.

3.4.2.1 The Pooled-OLS Model

The Pooled regression method assumes the classic properties of the Ordinary Least Squares (OLS) regression estimator for which the coefficients has to be unbiased and efficient. Hence, the OLS pooled regression, if correctly specified, assumes the following properties:

- Covariates are exogenous: $E\left[u_{it}|x_{i1,}\ x_{i2}, \ldots, x_{iT}\right] = 0$;
- Homoskedastic error: $Var[[u_{it}|x_{i1,}\ x_{i2}, \ldots, x_{iT}] = \sigma^2$;
- Serial independence: $Cov\left[u_{it},\ u_{js}|x_{i1,}\ x_{i2}, \ldots, x_{iT}\right] = 0 \quad if\ i \neq j\ \ and\ t \neq s$

This model is also called 'common constant' model as the variable-intercept is supposed to be homogeneous and constant for all the cross-sections. This is considered an advantage when we want to estimate a single equation for a group of different cross-sections. There are some disadvantages in adopting this method, as

this approach is unrealistic and restrictive because it not possible that the estimator incorporates a weighted average of estimator of all the cross-sectional units. Moreover, the pooled OLS estimator is inconsistent in the presence of heterogeneity brought by omitted variables, caused by the fact that different cross-sectional and time-series observations are pooled together. This issue can be dealt with the use of other two models described below: the fixed effects model and the random effects model.

3.4.2.2 The Fixed Effects Model

Another method used to control for the omitted variables issue is the *Fixed Effects* approach which measures the changes between the dependent and independent variables within each cross-section observations. The peculiarity of this model is that the variable-intercept is constant only within the same cross-sections, while both the variable-intercept and the coefficient of the explanatory variables (slope) vary across different countries and individuals and over time, The model that we take into account has the following form:

$$Y_{it} = a_i + \beta_i' X_{it} + u_{it} \tag{3.12}$$

with $i = 1, 2, \ldots, N$ and $t = 1, 2, .., T$

where a_i is the cross-country effect fixed for the cross-section units, while β_i is the slope of the explanatory variables that is the same for each country but vary among the countries of the panel. The former is also known as *least square dummy variable*(LSDV) as it incorporates a dummy variable for each different country.
The advantage of applying the fixed effect model is the possibility to correct the misspecification created by the correlation between the omitted variable a_i and the observed variable X_{it}, through a fixed effect transformation. This splits the omitted effect between the portion of the effect that express the variation produced within each observation of the cross-section, a_i, and the portion of the effect that is not correlated with the past, present and future values of the explanatory variable, as this is part of the omitted effect included in the composite error term. In order to obtain a fixed effects transformation we need to differentiate the following equation:

$$y_{it} = a_i + \beta_1' \; x_{1t} + u_{it} \tag{3.13}$$

with the other equation which takes the average of the time-variant variable over time:

$$\bar{y}_i = \beta_1 \bar{x}_i + \bar{u}_i \tag{3.14}$$

with

$$\bar{y}_i = \quad = \quad T^{-1} \sum_{t=1}^{T} y_{it} \tag{3.15}$$

$$\bar{x}_i \quad = \quad T^{-1} \sum_{t=1}^{T} x_{it} \tag{3.16}$$

$$\bar{u}_i \quad = \quad T^{-1} \sum_{t=1}^{T} u_{it} \tag{3.17}$$

The final equation is the following

$$y_{it} - \bar{y}_i = a_i - \bar{a}_i + \beta_1 \left(x_{it} - \bar{x}_i \right) + u_{it} - \bar{u}_i \qquad or \quad \breve{y}_{it} = \beta_1 \breve{x}_{it} + \breve{u}_{it} \tag{3.18}$$

where $\breve{y}_{it}$ is the time-demeaned data of y_{it}, as $\breve{x}_{it}$ and $\breve{u}_{it}$ are for x_{it} and u_{it}. Thus, this method eliminates the cross-country effect (a_i) subtracting the time-mean from each observations and, in addition, this solves the issue of serial correlation according which:

$$Cov \left(u_{it} u_{jt} \right) = 0 \quad for \quad i \neq j \tag{3.19}$$

When N cross-sections are not very large, it is possible to estimate the fixed effects model with the Least Squares Dummy Variable (LSDV) technique. According to LSDV technique the explanatory variable considered in this model is a dummy variable which offers the possibility to have different constant for each specific group of countries. The advantage of including 'dummy variables' leads to lose one degree of freedom when the T time periods are more than the N cross-sections. We can write the model as it follows:

$$Y = D\alpha_i + X\beta' + u_{it} \tag{3.20}$$

where

$$\boldsymbol{Y} = \begin{bmatrix} Y_1 \\ Y_2 \\ . \\ . \\ . \\ Y_N \end{bmatrix}_{NTX1}, \quad \boldsymbol{D} = \begin{bmatrix} i_T & 0 & . & . & . & 0 \\ 0 & i_T & & & . & 0 \\ . & . & & & & \\ . & . & & & & \\ . & . & & & & \\ 0 & 0 & & & & i_T \end{bmatrix}_{NTXN}, \quad \boldsymbol{X} = \begin{bmatrix} X_{11} & X_{12} & . & . & . & X_{1k} \\ X_{21} & X_{22} & . & . & . & X_{2k} \\ & & & & & \\ & & & & & \\ & & & & & \\ X_{N1} & X_{N2} & . & . & . & {}_{Nk} \end{bmatrix}_{NTXk},$$

$$\boldsymbol{a} = \begin{bmatrix} a_1 \\ a_2 \\ . \\ . \\ . \\ a_N \end{bmatrix}_{NX1}, \quad \boldsymbol{\beta'} = \begin{bmatrix} \beta_1 \\ \beta_2 \\ . \\ . \\ . \\ \beta_k \end{bmatrix}_{kX1},$$

where D is the NT x N matrix of the dummy variables with the columns orthogonal between them. Because we are interested to study the differences across groups, then, we can adopt the F-test under the null hypothesis 'all the intercepts are equal' against the alternative that says 'at least one intercept of the specific-cross section is different than zero'. The formula used for the F-test is the following:

$$F\left(n-1, nT-n-k\right) = \frac{\frac{(R^2_{LSDV} - R^2_{Pooled})}{n-1}}{\frac{(1-R^2_{LSDV})}{nT-n-k}} \tag{3.21}$$

In order to compute the Fisher test we need to observe the R^2. As shown in the formula the subscript 'LSDV', indicates the robust model, the dummy variable model, while subscript 'Pooled' indicates the restricted model. The latter consider only one restricted variable. In conclusion, if we reject the null hypothesis then we end up saying that there is a significant fixed effect and, therefore, the fixed effects estimation is better than the Pooled-OLS one.

3.4.2.3 Random Effects Model

The third approach is the random effects model. This model differs from the fixed effects which allows the regressor to be uncorrelated with the uncorrelated as it eliminate any form of serial correlation through the within transformation or the use of dummies. Instead, the random model assumes that the intercept variable

includes a random parameter. This variable is unobservable and it would require to be uncorrelated with the error term (condition of strict exogeneity) and with the explanatory variables (condition of orthogonality).
Therefore, considering a linear panel data regression:

$$Y_{it} = a_i + \beta_i' X_{it} + u_{it} \tag{3.22}$$

with $i = 1, 2, ...N$ and $t = 1., 2, ..T$, where y_{it} is the dependent variable and x_{it} is the explanatory variable, while u_{it} is the idiosyncratic error. Here, the parameter a_i is no more constant, as shown below:

$$a_i = a + \gamma_i \tag{3.23}$$

where a is a fixed $kx1$ vector of the intercept and γ_i is the random vector. Differently from the fixed effect model, the time-invariant intercept includes the random variables γ_i. Therefore, the random effects framework of the model it is formulated as follows:

$$y_{it} = \beta_i' X_{it} + (\alpha + \gamma_i) + u_{it} \tag{3.24}$$

or

$$y_{it} = \beta_i' X_{it} + \alpha + (\gamma_i + u_{it}) \tag{3.25}$$

As seen before $v_{it} = \alpha + u_{it}$ the composite error term, whereas $\gamma_i + u_{it} = \eta_{it}$ is the error component term. It assumes that $Cov(X_{it}, \gamma_i) = 0$, but as the error component term η_{it} includes the random variable, then $Cov(u_{it}, \gamma_i) \neq 0$. Thus,

$$Corr\left(v_{it}, v_{is}\right) = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_u^2} \tag{3.26}$$

with $t \neq s$ Where $\sigma_a^2 = var(a)$ and $\sigma_u^2 = var(u_{it})$. This error-component structure given by this correlation is ignored in the classic pooled OLS model. Nevertheless, when this error-component is detected the OLS model becomes biased and inconsistent. Consequently, a more efficient method is adopted, the Generalized least square or GLS estimator.

3.4.2.4 Hausman Test

The Hausman (1978) specification test is used test if there is any misspecification of a standard regression model for a panel data analysis and for simultaneous equation

modelling. The specification test aims to understand if the unobserved individual effects a_i are included in the disturbance term and if there is any correlation with the explanatory variables. Hence, the first assumption that is observed, known as orthogonality condition, is based on the idea that the expectation of the disturbance term conditional to the explanatory variables are equal to zero:

$$E\left(u_{it}|X_{it}\right) = 0 \tag{3.27}$$

where X is the $1 * k$ vector of the explanatory variables. Nevertheless, if this condition fails, then, it means that some heterogeneity biases tend to modify the covariance matrix. The result is a loss of efficiency of the estimator. For this reason, it is necessary to apply the Hausman (1978) test which makes a comparison between the fixed effects and the random effects estimators. Under a null hypothesis it is tested if there are not any misspecifications which cause biases to the estimator. With regards to this, the null hypothesis is not rejected if the difference between the two estimators is equal to zero,

$$\hat{\beta}_{FE} - \hat{\beta}_{RE} = 0 \tag{3.28}$$

When this difference is substantial, we refer to the alternative hypothesis which allows the orthogonally condition to hold,

$$E\left(u_{it}|a_i, X_{is}\right) = 0 \tag{3.29}$$

for all s and t. Thus, the fixed effects estimator $\hat{\beta}_{FE}$ is consistent no matter if

$$E\left(a_i|X_{it}\right) = 0 \tag{3.30}$$

while the random effects estimator is consistent only when there is no correlation between α_i and x_{it}. The Hausman test is applied to understand which model between fixed effects and random effects is appropriate or rather which of the two approaches has an estimator that is both consistent and efficient.

Basically, the specification test tells us that, when the orthogonality assumption is not respected, only the random effects estimator will be biased and inconsistent. Differently, the fixed effect estimator is not affected by this assumption.
The null hypothesis of the Hausman test is formulated in the following way: when

there is 'no correlation' the OLS, LSDV and the GLS estimators are consistent but the OLS estimator is not efficient. Whereas, under the alternative hypothesis we assume that the fixed effects estimator is consistent and the opposite is true for the random effects model. Therefore, the null hypothesis is rejected when difference ($\hat{q}$) between the $\hat{\beta}_{FE}$, the within estimator, and $\hat{\beta}_{RE}$, the random effect estimator is approximately zero, $\hat{q} = \hat{\beta}_{FE} - \hat{\beta}_{RE}$. In this case, there is not any heterogeneity bias and the random effects is consistent, otherwise the fixed effects is preferred.

3.4.3 Dynamic Panel Data

The main benefit of using panel data is to exploit their characteristic of being powerful in understanding the dynamics of adjustment. The dynamic relationship between variables is typical for the presence of lagged variables among the explanatory variables (Baltagi and Levin, 1986; Arellano and Bond, 1991; Blundell et al., 1992). In the recent period, there has been an increasing interest from macroeconomists in using the panel data approach for estimating the economic relationships for a set of countries. Indeed, the interest arouse due to the peculiar characteristic of the methodology which is able to detect the country-specific effects for variables that are not been measured but that affect the dependent variable.

Additionally, the advantage of using this methodology arise from the availability of datasets for a large panel of countries (Judson and Owen, 1996). Especially, the application of this methodology has taken root with the creation of the Summers-Heston *Penn World Tables* data set used for testing the growth convergence hypothesis (Baltagi, 2008).
Previously to the paper of Islam (1995) most of the empirical studies about economic growth has been conducted on cross-section datasets. It overcome the analysis of the most influential papers on the convergence literature which has adopted this cross-section methodology is the Mankiw et al. (1992) study.

Islam (1995) reformulated the Mankiw et al. (1992) regression equation that studies the process of convergence in terms of income per capital. The author also raised the issues that Mankiw et al. (1992) do not consider in the convergence equation the variable $A(0)$, which expresses the level of technology. The term $A(0) = a + gt$ is constant among the countries analysed (term a), but differs between countries for country-specific shock (term gt), and it is not shown in the neoclassical growth equation of Mankiw et al. (1992) as the $\hat{y}\,(t)$ is formulated in terms of income per

effective worker. Additionally, Islam (1995) is able to also include the time-invariant country effects $\ln A(0)$, only by formulating the convergence equation in terms of income per capita rather than income per worker. The presence of this country-specific effect gives the opportunity for the first time to the author to improve the estimation method for the convergence analysis through the application of a panel data model.

Also Caselli et al. (1996) review the functionality of the cross-country approach to study the countries convergence to steady-state for two main reasons. Indeed, according to the authors, to be consistent, the cross-section estimator has to respect the condition according to which the individual (country-specific) effects have to be uncorrelated with the other explanatory variables and with the error term. A condition that is quite often violated. The positive correlation between the omitted country specific effect and the level of steady-state income creates upward bias in the estimate of the coefficient of the lagged-dependent variable beta. Therefore, the speed of convergence of an economy is biased downward, although this does not mean that a country with high incomes grows faster than a country with low incomes.
Caselli et al. (1996) suggest tackling the issues of endogeneity and omitted variables with the use of the Generalized Method of Moments (GMM). Specifically, they suggested adopting a first difference GMM approach. They found that the convergence rate of the income per capita to the steady-state level is equal to 10% per year in contrast to the value estimated by Mankiw et al. (1992) that was at 2-3% per year.

However, the paper of Caselli et al. (1996) has been criticized by Bond et al. (2001) for estimating the coefficient of the lagged dependent variable with a first-difference GMM since the lagged variable provide only weak instruments for subsequent first difference (Blundell and Bond, 1998). The authors underline that the bias is more probable when the time period available is small. The way to detect the downward finite-sample biased is to compare the first-difference GMM outcomes with the results of the autoregressive parameter, when we estimate the autoregressive parameter. Especially, they have found that if the GMM estimate is close or below the within group estimation of the parameter, this is a red flag that indicates the presence of weak instruments. Alternatively, they propose the application of the System-GMM approach (Arellano and Bover, 1995; Blundell and Bond, 1998). The main point of the System-GMM estimation could be a solution even for small time series. The advantage is that it reduces the bias of the first-difference GMM for persistent series or for small time series. The small time series bias arises when the time

series are close to being a random walk. This is possible incorporating more moment conditions. This is only valid when some stationarity restrictions are imposed to the initial condition process (Blundell and Bond, 1998).

3.4.4 Biases in Dynamic Panels

In the dynamic panel application one of the issues to deal with is the unobserved heterogeneity. This is possible to be treated by applying the within transformation or by taking first differences, specifically when the second dimension of the panel is a proper time series. The ability of applying first differences to remove the unobserved heterogeneity is characteristic of the dynamic panel data models. Then, consider the lagged dependent variable in the first-difference equation using levels of the series lagged two periods and more. This is possible under the assumption of the time-varying disturbance at time one is not correlated with the disturbance of the previous period, which yields to the estimation of average partial effect. This offers the opportunity to correct the endogeneity issues. Indeed, both difference GMM and the lagged differences or System GMM are consistent instruments for the lagged endogenous variable, because they are uncorrelated with the transformed error term (Arellano and Bond, 1991; Bond et al., 2001; Baltagi, 2008).

The main advantage of the dynamic panels is to overcome the limitation of the traditional OLS, which are consistent for n and T that converge to infinity. That is possible only when the regressors are exogenous and are uncorrelated with the unobserved individual effects. Let's observe how the unobserved individual specific effect in the dynamic panel data model causes the OLS estimator to be biased and inconsistent. We consider the regression of a dynamic autoregressive distributed lag model

$$y_{it} = \gamma y_{i,t-1} + \beta_i' X_{it} + u_{it} \tag{3.31}$$

where γ is the scalar, β is $k \times 1$ and X_{it} is $n \times k$, while the u_{it} is the error component given

$$u_{it} = \eta_i + v_{it} \tag{3.32}$$

This dynamic model assumes the parameter η_i, which is the individual or country fixed-effect, to express the heterogeneity across countries (Quah, 1997; Temple, 1999).
This is a fixed effect model that is usually preferred by macroeconomists (Hsiao,

2003; Judson and Owen, 1999) with respect to the Ordinary Least Square (OLS) and General Least Square (GLS) estimations. This is because of the presence of omitted variables that are correlated with the included exogenous variable. Indeed, in this case the fixed effect model does not suffer from this bias as it removes the omitted variable; while the random effect model results biased under the assumption of correlation between the individual effects and the explanatory variables.

However, the OLS estimator is biased and inconsistent, due to the presence of a lagged-dependent variable in the regression. Indeed, the dependent variable y_{it} is a function of the individual effect (η_i), consequently even the $y_{i,t-1}$ is a function of the individual effect (η_i). Therefore, the lagged dependent variable $y_{i,t-1}$ is correlated with the error term (v_{it}).

It is possible to eliminate the fixed effect. To do this we apply a within-transformation given by:

$$y_{it} = \gamma y_{i,t-1} + \beta_i' X_{it} + \eta_i + v_{it} \tag{3.33}$$

and averaging over time gives:

$$\bar{y}_i = \gamma \bar{y}_{i,t-1} + \bar{\beta}_i{}' X_i + \eta_i + \bar{v}_i \tag{3.34}$$

Therefore, subtracting the first equation to the second equation, the first differentiation allows for elimination the individual effect η_i. Hence:

$$y_{it} - \bar{y}_{it} = \gamma \left(y_{i,t-1} - \bar{y}_{i,t-1}\right) + \beta_i \prime (X_{it} - \bar{X}_{it}) + (v_{it} - \bar{v}_{it}) \tag{3.35}$$

Here $\bar{y}_i = \frac{1}{T}\sum_{t=1}^{T} y_{it}$ and $\bar{y}_{i,t-1} = \frac{1}{T}\sum_{t=1}^{T} y_{i,t-1}$; while $\bar{v}_i = \frac{1}{T}\sum_{t=1}^{T} v_{it}$. Despite the within transformation permit to wipe out the fixed effects, the difference $(y_{i,t-1} - \bar{y}_{i,t-1})$ is still correlated with $(v_{it} - \bar{v}_{it})$ even when v_{it} is not serial correlated as a consequence of the correlation between the lagged dependent variable and the error term.

Furthermore, Nickell (1981) show that the within group estimator gives biased and inconsistent estimation when the N is large and T is small. The author shows that the demeaning process creates a correlation between the regressor and the error. This correlation is evident even between the variation of the regressor and the error term, which correlation is not mitigated by the increase of the number of the cross-

section units (N). Therefore, this demeaning process creates a regressor which is not independently distributed with respect to the error term. According to the analysis of Nickell (1981) the coefficient γ estimated with a fixed effects approach is likely to be biased downward. Consequently, the OLS estimate can be roughly considered as an upper bound of the within groups coefficient.

Differently, Judson and Owen (1999) assume that the within groups estimator is the most efficient, even when T is larger than N, while the GMM is the second-best method although it gives some problems in terms of implementation, due to the fact that all the variables of the regression are considered instruments. Judson and Owen (1999) perform a Monte Carlo simulation with N that goes from 20 to 100 and T equal to 5, 10, 20 and 30. Their findings suggests that the bias of the fixed effect estimator increase when the magnitude of the time series decrease. As for as the bias is under 30% when $T = 10$, while it increases dramatically 50% for $T = 5$. However, they adopt the formula for the Least Squares Dummy Variable (LDSV) corrected by Kiviet (1995) or LSDVC. Judson and Owen (1999) find that the results of the LSDVC produce more efficient results than the dynamic panel approach of Anderson and Hsiao (1981) for panel of dimensions less than or equal to 10 observations.

Similarly to Nickell (1981), Anderson and Hsiao (1981) recognize the bias of the fixed effect estimation because the within transformation creates a correlation of order $\frac{1}{T}$ between the lagged dependent variable and the random error (Hsiao, 2003). A possible solution is the one proposed by Anderson and Hsiao (1981). Basically, they argue that it is possible to remove the fixed effect taking the first difference of the model (see eq. 3.35). Afterwards, because the dependent variable is lagged two or more periods, as well as the exogenous regressor, are correlated with the differentiated lagged dependent variable ($y_{i,t-1} - y_{i,t-2}$) but uncorrelated with the differentiated error term ($v_{i,t-1} - v_{i,t-2}$); then, it is possible to use an instrument for the differentiated lagged dependent variable in order to estimate the coefficient. However, the authors limited their analysis to Instrumental Variable (IV) estimation rather than a GMM. Their contribution is to address the estimation bias caused by the unobserved heterogeneity caused by the individual specific effect (η_i). After losing one cross-section as it is used as an instrument, with the application of the differentiated form the Anderson and Hsiao (1981), they loose another cross-section $y_{i,t-2} - y_{i,t-3}$. Therefore, the disadvantage of using this estimator is that it looses two cross-sectional observations in the process and the cross sectional that are available,

are $(t-3)$.

Hollifield et al. (2014) expand on the Anderson and Hsiao (1981) approach, showing how to implement it to estimate a vector auto regression with time-varying parameters. Arellano and Bond (1991), similarly to the previous work use this technique by applying a Monte Carlo simulation, by extending the idea of Anderson and Hsiao (1981). Arellano and Bond (1991) propose to use all the instruments of the lagged values of the dependent variables, $y_{i,t}$ that are uncorrelated with the error term $v_{i,t}$ in a GMM framework. This is presented in the next section.

3.4.5 The First-Difference GMM Estimator

The Arellano and Bond (1991) estimator is very popular among the applied researchers for estimating dynamic panels with unobserved heterogeneity and predetermined regressors. The main advantage of this panel GMM estimator is that provides consistent estimates even when the time series T is very small. In addition, it is based on few assumptions.

According to Judson and Owen (1999) the Anderson-Hsiao estimator is a specific case of the GMM approach. Indeed, it removes the individual effects by differentiation. The authors confirm that the GMM approach is more efficient and consistent, although they figure out that the one step GMM (differenced GMM) outperforms the lagged differences or System-GMM because it produces smaller bias and a lower standard deviation. These results are conforming the ones obtained by Arellano and Bond (1991) and Kiviet (1995). They conclude that the higher efficiency of the System GMM approach is due to the increase of instruments used. The Arellano and Bond (1991) approach is an extension of the Anderson and Hsiao (1981) methodology. It starts by taking a dynamic panel data model:

$$y_{it} = \gamma y_{i,t-1} + \beta_i' X_{it} + \eta_i + v_{it} \tag{3.36}$$

for $i = 1, \ldots, N$ and $t = 1, \ldots, T$.
The authors then assume that the dependent variable come from a random sample of N individual time series. Then, η_i is the individual-effect, X_{it} is the matrix of the exogenous variables. Moreover, $\eta_i + v_{it} = u_{it}$ is the standard error component structure with $\eta_i \sim IID(0, \sigma_\eta^2)$ and $v_{it} \sim IID(0, \sigma_v^2)$ independent from each other and among themselves which means :

$$E\left(\eta_i\right) = 0 \tag{3.37}$$

$$E\left(v_{it}\right) = 0 \tag{3.38}$$

$$E\left(v_{it}\eta_i\right) = 0 \tag{3.39}$$

Moreover, it requires that the errors are independent across countries and serially uncorrelated, or:

$$E(v_{it}) = E\left(v_{it}v_{is}\right) = 0 \tag{3.40}$$

for $s \neq t$. In other words, the errors v_{it} have finite moments. Furthermore, the initial condition (y_{i1}) is predetermined, then, for time period $t \geq 2$, the following assumption is valid:

$$E\left(y_{i1}, v_{it}\right) = 0 \tag{3.41}$$

This assumption of the *First-Difference GMM* shows that the dependent variable y_{it} is a valid instrument when it is lagged for two periods or more. However, the error term v_{it} of the same period is not correlated with the initial condition; it is possible that this initial condition is correlated with the error of the previous period. This is the reason why the initial value of the dependent variable is measured at the beginning of each period. Indeed, in order to have a consistent estimation of the $\gamma - parameter$ we apply the first difference procedure to equation (3.36) without considering the set of other explanatory variables, as follows:

$$y_{it} - y_{i,t-1} = \gamma(y_{i,t-1} - y_{i,t-2}) + (v_{it} - v_{i,t-1}) \tag{3.42}$$

where $(v_{it} - v_{i,t-1})$ is a MA (1) with unit-root. Then, if we consider $t = 3$ the equation becomes:

$$y_{i3} - y_{i2} = \ \gamma(y_{i2} - y_{i1}) \ + \ (v_{i3} - v_{i2}) \tag{3.43}$$

In this case, it is evident that the initial condition y_{i1} is a valid instrument for $(y_{i3} - y_{i2})$ due to both y_{i2} and y_{i1} are not correlated with $(v_{i3} - v_{i2})$. This last assumption with the no serial correlation among the error terms creates the moment restriction imposed in the differentiated GMM estimation, which yield to the parameter γ to be consistent for panels with $N \to \infty$ and T fixed. This implies $T - 3$ orthogonality restrictions:

$$E(y_{i,t-s}, \Delta vit) = 0 \tag{3.44}$$

for $t = 3, \ldots, T$ and $s \geq 2$

This is the fundamental moment condition introduced by Arellano and Bond (1991) which is formed assuming that specific level of dependent variables are orthogonal to the differentiated disturbance. The fact that Anderson and Hsiao (1981) do not take in account the orthogonality condition in their model, applying the first-difference equation to deal with the correlation between the individual effect and the explanatory variables, is a limitation. In this case, it is possible to solve only the heterogeneity bias yielded by the unobserved individual effect.

3.4.6 The Model with Exogenous Variables

Arellano and Bond (1991) consider an extended version of the dynamic equation including the explanatory variables X_{it}, as follows:

$$y_{it} = \gamma y_{i,t-1} + \beta_i' X_{it} + \eta_i + v_{it} \tag{3.45}$$

They argue that the strict exogeneity assumption can not hold. Indeed, if we consider X_{it} as a strict exogenous variable, so:

$$E\left(X_{it}, v_{it}\right) = 0 \tag{3.46}$$

for all s and t. In this case, all the values of the explanatory variables are uncorrelated with the value of the v_{it} error term from the present to the future time periods. This means that all the values of the explanatory variable, in all the time periods, are to be considered valid instruments, even when initially all the value of the X_{it} are correlated with the individual effects, η_i. Therefore, these explanatory variables are valid instruments for the first-difference equation of the previous dynamic equation. However, if we consider among the explanatory variables even the lagged variables, we know by construction that all the lagged variables are correlated with the individual effects η_i and with the lagged value of the error terms v_{it}. In presence of serial correlation between the v_{it} and the lagged value of the v_{it}, the strict exogeneity assumption can not hold any more. This led Arellano and Bond (1991) to introduce in the dynamic model explanatory variables which are predetermined rather than strictly exogenous, as:

$$E(X_{it}, v_{is}) \neq 0 \ for \ s < t \tag{3.47}$$

This assumption can be considered as an orthogonality deviation condition, which

allows the lagged error term v_{is} and the explanatory variables X_{it} to be correlated, but lets the X_{it} to be uncorrelated with the future and present values of the error term.

In conclusion, according to Arellano and Bond (1991) the explanatory variables can be both strictly exogenous and predetermined. The presence of both the exogenous or strictly exogenous, predetermined, and endogenous variables (which are correlated only with the contemporaneous error term) helps to cope with the correlation between the individual effect and some or all of the exogenous regressors. Alvarez and Arellano (2003) pointed out that the inclusion of all regressors as instrumental variables (associated with T periods) leads to an overfitting bias due the presence of too many instruments. The effect is an "endogenous bias" similar to one the produced by the within group estimator, although smaller when T is small and N is large. Namely, this model is an autoregressive model AR(1) that requires no serial correlation among the errors. As we have seen previously, the introduction of a lagged explanatory variable introduces the issue of correlation with the error term components, hence with the individual effect and the transitory error. Then, this correlation creates biases in the estimation of the parameters which can be identified in the presence of an unobserved heterogeneity.

One of the advantages of the dynamic panel model is that this bias can be solved by taking the first-difference of the equation. Hence, this transformation eliminating the individual effect allows having valid moment conditions. Moreover, it specifies the differences between the strongly exogenous and predetermined variable. Hence, when the explanatory variable x_{it} is predetermined, then the $x_{i,t-1}$ is used as a valid instrument in the difference transformation. It follow, the instrument of the difference transformation will change from $(y_{i,1} \dots y_{i,t-2})$ to $(y_{i1}, \dots, y_{i,t-2}, x_{i1}, \dots, x_{i,t-2}, x_{i,t-1})$. Whereas, when the explanatory variable X_{it} is strictly exogenous, then the assumption is more restrictive and all the series of explanatory variables, equal to $(x_{i1}, x_{i2,} \dots, x_{i,T})$, are used as a valid instrument in the explanatory variables for each differentiated equations. In this case, the instrument of the difference equation is $(y_{i1}, \dots, y_{i,t-2}, x_{i1}, x_{i2,} \dots, x_{i,T})$ which is used instead of $(y_{i1}, \dots, y_{i,t-2})$.
Afterwards, the authors find that this transformation causes an overidentification of the restrictions. They give three moment conditions:

$$E[\ (y_{i,1}\,(u_{i,3} - u_{i,2})] = 0 \tag{3.48}$$

$$E[\ (y_{i,1}\,(u_{i,4} - u_{i,3})] = 0 \tag{3.49}$$

$$E[(y_{i,2}\,(u_{i,4} - u_{i,3})] = 0 \tag{3.50}$$

These moments are used to estimate the estimator γ. Arellano and Bond (1991) perform a one-step consistent estimator γ. This is performed through a GLS estimation. According to Hansen (1982) this GMM estimator is the optimal GMM estimator. For $N \to \infty$ and fixed T. However, the Arellano and Bond (1991) estimator has poor finite sample properties, which leads to biased estimates. This issue has been overcome by the System GMM estimator.

3.4.7 System GMM

The System GMM estimator of Blundell and Bond (1998) shows that the First-Difference estimator is exposed to substantial downward finite-sample bias especially when the T (time periods) is very small. Therefore, the authors implemented the Arellano and Bond (1991) by including an additional restriction to the process generating the y_{it}. Specifically, the First Difference GMM uses as instrument the first differences with lagged levels of the respective variables to overcome the dynamic panel biases. However, the use of *lagged level of the variables* is not a very robust instrument, especially in case of highly persistent variables. In order to produce more consistent estimates the System-GMM approach proposes to also include the *lagged first-difference of the variables* as instrument for the equation in level, therefore:

$$E(\Delta y_{i,t-1}, u_{it}) = 0 \; with \; t = 3 \tag{3.51}$$

Indeed, to mitigate the problem of endogeneity, omitted variables and measurement errors, Blundell and Bond (1998) and Arellano and Bover (1995) propose the use the lags of dependent and independent variables as instrumental variables. Thus, the known "System GMM" method is a system of two equations.

To sum up, the System GMM consists of a set of two equation, where the first equation is in difference and lags of the level variables are used as instrument, proposed by Arellano and Bond (1991), known as "First-Difference GMM". While, the second equation is in levels and, in this case, the instrumental variables are the lags of the variable in differences. The later point refers to the further moment restriction. The use of a second step in the "System GMM" allows to gain more efficiency

in finite sample, which the Difference GMM fails as it suffers of "weak instrument" problems and poor finite sample properties. Although both the fist-difference and system GMM estimators are designed for situation with *small time-span and large cross-sections*, due to the better performance of the System-GMM we directly performed only this model on a set of 22 countries and six periods composed by 5 years each, between 1990 and 2018. Indeed, Islam (1995) suggests that in panel data environment should be better to divide the total period in 5 years at least. This is consider a period of time large enough during which the short-term disturbance effects, such as business cycle elements or temporary shocks, would fall apart. In this way, the error term, which should include the mentioned short-term fluctuations, would be less serially correlated to the level of output in the long-run period. Therefore, having a larger cross-sectional sample (22 countries) than the time-span period (6 periods) we have been able to apply a System GMM.

Furthermore, as the System GMM suffers of proliferation of instruments that overfits the endogenous variables, together with the autocorrelation in the disturbance terms, bias the estimations we need to apply some diagnostic tests. To be sure that the model is consistent, it is fundamental that the model passes both tests for instrumental variable validity. It is also necessary that the disturbances in the base model are free of autocorrelation (Blundell and Bond, 1998). With this regard, Arellano and Bond (1991) developed two tests, one for the first order (AR1) autocorrelation in the one-step and another for the second order (AR2) autocorrelation in the second-step. Although the rejection of the null hypothesis of no serial correlation in the first difference error (AR1) do not imply that there is a problem of misspecification; the rejection of higher orders, assessed by AR2 test, means that the moment condition is not valid. The System GMM model must pass the Sargan (1958) test and the Hansen (1982) tests for the instrument validity for first-step and second-step, respectively. The Sargan (1958) statistic is distributed as a χ^2 statistic with *(p-k)* degree of freedom, where k is the number of estimated coefficient and p is the instrument rank. When the null hypothesis of no-serial correlation of the error terms is rejected the set of additional instrumental variable used in the first-difference equation are invalid, in other words the instrument is weak (Arellano, 2003).

Generally, as the Sargan (1958) test is likely to over-reject the null hypothesis for the first-step GMM estimator, which assumes that the errors are serially uncorrelated. The Hansen test for the second-step GMM estimator is the most adopted in assessing

the validity of the instruments. Differently from the Difference-GMM, the System GMM model implements the original equations in levels which can be added to the system. Only then the additional moment conditions creates efficiency in the estimator. In conclusion, according the System GMM model, the lagged predetermined and endogenous explanatory variables in levels are good instruments of their own first differences.

3.5 Construction of Restrictive and Selective Migration Indexes

3.5.1 Introduction

One of the main challenges in understanding migration policies is to find a universal method that quantifies and measures the phenomenon over time and across countries. The complexity of this operation comes from the different directions the various countries choose to regulate migrations. The debate on migration policies is focused on the level of openness of the liberal democracies. According to Freeman (1995) a liberal democracy becomes "expansionist and inclusive" in receiving migrants, when it offers more rights to the foreign born population such as easier access to citizenship or introducing recruitment programmes for specific categories of migrants (high-skilled, guest workers), despite the adversity of public opinion toward the foreign aliens. Hence, the immigration policies are not the results of pressure groups in the society that influence policy makers in their decision-making.

Other academics observe that there is a different relationship between the restrictive public demand and the government implementation of migration policies. Although they recognise a connection between the determination of the policies and the demand of group of interest, it is too simplistic to reduce the policy formation only to this (Statham and Geddes, 2006; Spencer, 2011). Governments face a trade-off between gains and losses from migration inflows. Migrants produce a redistribution of income from the natives to the migrants and the capital owners, when natives are directly substituted by foreign workers. Apart from economic interest, in the design of the policies governments are constrained by non-economic factors such as the ethnic conflicts that arise from the increase of foreigners from different birthplaces living and working together in prosperous countries (Freeman and Kessler, 2008) .

Some countries impose quotas to regulate the number of legal migrants allowed to enter based on skills that are scarce in the indigenous labour market. In this case the intention of the governments can coincide with the one of the individuals. Countries have international legislative obligations to respect during the policy formation, offering a series of rights to the migrants. Ruhs and Martin (2008) argue that the increase in the number of temporary low skilled migration in high-income countries has created a trade-off between the protection of the migrant's rights and the costs which impact directly on the welfare and fiscal system. Guaranteeing the migrants' rights, produces an increase of costs for the employers who should offer equal wages and work-related benefits as for the native workers. In this condition the incentives of the employers in case of hiring them are reduced.

In addition to the labour market interests, Governments are also concerned about the budget balance. Indeed, the increase of migrants in a country produces a fiscal effect. The fiscal impact of migrants depends on the evaluation of their possible contribution during their life. Results differs according the skills, gender, age and origin of the migrants. Dustmann and Frattini (2014) estimated that the EEA migrants that have arrived after 2000, tend to fiscally contribute more with respect those who arrived before. This is because after having settled down in their target country migrants tend to have children, which means more use of public services and education. Moreover, they have the right to be entitled in receiving the welfare services and benefits to unemployment. This contributes to a rise in costs for governments. To maintain the fiscal balance in equilibrium, tax revenues should increase at the same time with the increase of the number of foreign workers and their family. However, if migrants are low-skilled or downgrade their skills once arrived in the destination countries, their wages will be lower than the average income resulting in a lower tax contribution.

The introduction of work programme to manage the number of migrants helps to ensure that migrants rights are guaranteed. For this reason, Ruhs and Martin (2008) conclude that the migrants and the source countries seems to tolerate the restrictions imposed by states in order to stay legally in the territory benefiting of the right to be equally treated after the arrival. However, there is a trade-off between migrants right and number of migrants allowed to enter; in fact, there is evidence that there is an inverse relationship between these two terms. Thus, countries that offer "high" rights allow the entrance of "low" number of migrants, such as Scandinavian countries.

The opposite occur in the Middle eastern countries. The difficulty of understanding the migration phenomenon is in finding out the determinants in migration politics. De Haas et al. (2019) try to disentangle the matter attributing the source of the confusion to the meaning of "migration policy" and "effectiveness". Generally, migration policies affect the traditional economic drivers that influence the decision of foreigners. The economic drivers are known as labour market imbalances, wealth inequalities in the source countries or wealth inequalities between destination and origin countries. However, it has been argued that immigration policies have little influence in restricting the migration flow in terms of volumes and selectivity.
This hypothesis arises from the significant rise in the migrant's number towards the wealthy countries, although a series of restrictions have been placed. The perception is that these migration policies have been ineffective (Düvell, 2005). However, the idea that migration is driven only by structural factors is conceptually rather limited since only a restricted number of migrants can settle in the destination country. In the long-term those migration policies are ineffective due to the presence of the "migration industry", defined as a concentration (cluster) and network of migrants already settled in the destination country. The presence of these networks produces an endogenous "feedback mechanism" (De Haas, 2010) which not only facilitate the process of migration but also incentives further inflow of people toward those countries where the network of immigrant is strong. Although the first group of migrants should be well off as can support the risk of higher costs of migration, the following groups are not and exploit the networks to reduce the cost of moving and settling in the new country. Therefore, the network of old waves of migrants can act as a reduction of the threshold level of wealth required to enable the future migration.

Furthermore, the increase of family reunification programme is another way to reduce the cost of migration, namely for non-economic migrants. Both those two factors, networks and family reunion programmes, tend to reduce the effect of the selectivity of the migration policies that attract more skilled migrants (Beine et al., 2011). In the other hand, recent empirical works (Mayda, 2010; Beine et al., 2011; Ortega and Peri, 2013; Czaika and Parsons, 2017; De Haas et al., 2019) not only show the effectiveness of policy restriction but also quantifying effects on the magnitude and selectivity of migration flows. Czaika and de Haas (2018) indicate that the confusion of those who do not attribute the effectiveness of the migration policies come from the confusion between the effect and the effectiveness of a migration policy.

The effectiveness of policy migration is determined by three different phases:

1. *the discursive gap* which is the difference between the public preference of migration levels and the "policies on paper";

2. *the implementation gap* which is the discontinuity of the "policy on a paper"(the goals of the policy) and the action taken to implement it;

3. *the efficacy gap* which explain how an implemented policy affect the migration determinants (GDP and labour market).

The implementation phase in the policy formation of a migration policy is the most long and crucial phase formation. This is because it is when it is possible to observe whether the objectives of policy have been effectively addressed. It follows that, when a policy it is implemented it is possible to understand if it has had any impact in shaping the magnitude and the skill-composition of the coming migration flows but also whether the implemented policy would produce results in the long-term. The effect of a policy instead refers to the causal effects of the policy on the dimension, direction and composition of the flows. Specifically, the effects can be categorical (promoting the use of illegal rather that legal channels), spatial (changing the direction of the flow) or inter-temporal substitution effects. The category specific effect is the variation in the category of immigration to another following a change in restrictiveness of an immigration policy. That means, if a policy on foreign workers become more restrictive there is a possibility that migrants try to enter legally in the country through another channel, for example as family reunion. Quantitative research has been able to assess the "effects" but still struggle in understand to which degree the objective of a specific policy have been achieved. In other words it is still difficult to assess the "effectiveness" of a change in migration policy. This is due to the gap during the implementation of the policy and the "multiple" objective that different political parties and groups of interest would like to prevail on the other, creating fuzziness around the definition of the objective of the policy. Furthermore, although the effects have been detected it seems they are relatively small compared to the one produced by other determinants of migration. This might be due to the presence of other policies that can influence the incoming flow of migration due to changes in the labour market or in welfare and educational system. Confusion in the implementation of the migration policy is evident in the European framework.

The European Council set its policy framework with the Tampere Council in 1999

creating a common asylum and migration law. The European State Members work in cooperation in controlling the common borders and in regulating the admission of Third-Countries Nationals. However, each single Member State has reserved the constitutional rights to transpose the EU law, formulating different definition of migration policy in terms of admission, settlement and integration rules which could be more or less open toward the migrations. The lack of a proper harmonization with regards to the EU migration policies causes issues when it comes to collection and coding process for the construction of a database that allows comparing the effects of the migration policies across the European countries.

3.5.2 Measuring the Effect of the Migration Polices

There are only a few empirical studies that have attempted to produce a systematic evaluation of the effective policy restrictiveness. The pioneer has been Mayda and Patel (2004). The authors studied 14 OECD countries between 1980 and 2000 documenting the characterizing features of the different migration policies over time. Hatton (2009) identify the "major" changes in the asylum policies, starting from zero and then going up or down one as the policy is tightening or more generous. Studying 19 western countries between 2001-2006, the author finds that the effect of tightening in asylum policy reduce the application by 14 and 17 percentage points. Also Mayda (2010) construct an index on the level of "tightness" or "relaxation" in the admission requirement for migrants.

Ortega and Peri (2009) decide to extend the Mayda (2010) dataset as according to them it suffered of several constraints for the number of information. Moving forward, Ortega and Peri (2009) provide an index that tracks the changes in the OECD policies by considering 15 OECD destination countries and 120 origin countries in the period from 1980 to 2006. The authors captured the direction of the change of the entry tightness increasing the value of variables by one when one of the following laws is applied: i) increase in the number of the quota; ii) increase in the time when a residence or work permit is offered; iii) increase in the time to obtaining a visa. Namely, the Ortega and Peri's index is created by assigning dummies with the value -1, when the introduced migration law is considered by the authors as a "loosening" entry law, while, the value $+1$ is attribute to a "tightening" entry law. The target of this study is all the migrants who decide to settle in the destination country. Although this index would have been useful to offer an indication of the level of restrictiveness across some European countries and during time, it is not a com-

prehensive indicator for our analyses mainly due to the time span limitation and geographical coverage. Moreover, it does not takes into account the specific categories of migrants such as low-skilled, high-skilled or irregular migrants, which is one of the main interests in our research. Finally, it does not spot the changes in immigration policies caused by those reforms that do not affect directly any of the three categories of entry laws previously specified.

There are two additional datasets that measured different level of openness of migration policies. Those two are the Immigration Policy in Comparison Project (IMPIC) and the International Migration Law and Policies Analysis (IMPALA) which cover a longer period of time with respect to the previous dataset; between 1980-2010 and 1960-2010, respectively. Both IMPIC and IMAPLA datasets have the advantage to be code policies measured "per se" which means that it is possible to compare information on the policies across countries, as it collects data according to a set of questions or indicators that are the same for all countries analysed. Although those datasets are very useful in understanding the developments in migration policies, they appear to be less effective in capturing the restrictiveness as they use a "pre-determinate" coding system of policy variables, such as standardised list of questions (Beine et al., 2016). It follows that, this *absolute* and subjective measurements have the limit to fail in capturing the idiosyncrasy and the designated country-characteristics that are the results of a more in-depth investigation (De Haas et al., 2016). Furthermore, the ongoing IMPALA database has another shortcoming which is the restricted number of countries analysed and the focus on admission policies only. Differently than the IMPIC, it analyses a large range of countries and observing more policy categories such as the integration, the deportation, the right at work and the welfare of the immigrants besides the policies. However, this is not the most comprehensive dataset available.

With this regards we decide to adopt the largest database completed to date, the Determinant of International Migration (DEMIG) database which tracks 6505 changes in migration policies in 45 countries from 1945 to 2014. Specifically, it is a change-tracking database that assesses the policy changes in a specific country and year. However, this means that it can not be used with the aim of cross-country comparison (De Haas et al., 2016). One of the advantages of using the policy change is the opportunity to evaluate better the policy effects. Therefore, the DEMIG dataset has the ability of describing better the way policies affect the dimension, direction

and composition of the migrants in the destination countries, though it does not determine the level of effectiveness of a policy. Specifically, the DEMIG dataset does not always detect policy effects, especially the long-run effects, as the migration's dimension and directions are also affected by other political and economic factors apart from the migration policy itself (Czaika and de Haas, 2018).

Remarkably, the DEMIG dataset contributes to the migration studies by coding the following key insights of the policies: i) the geographical and temporal dimensions; ii) a more elaborate conceptualisation of the migration policies and specification of the migrant group targeted, and iii) a disaggregation of policy changes into different policy measures. Regarding point iii), the aim of the authors is to disaggregate in more that one measure the whole policies instead of producing a single data point for the whole policy variation is to facilitate the codification of the change in restrictiveness. Indeed, according to De Haas et al. (2019) all migration policies contain a mix of decrees and laws, defined also as "mixed bags". By design the migration policies are coded in separate policy changes according the migrant group targeted. The result is the identification of impact of some policy changes on favouring the entrance, residence, work rights and integration of some migrant groups against some other category of migrants. This offers empirical evidence for also understanding the level of policy selectivity rather than restrictiveness.

Considering the comprehensive nature of this dataset, we decide to adopt this dataset to create five different indexes that assess the policies aim of 20 out of the 28 EU countries. The selection of the EU countries depends on data availability. In the next section we will describe in detail about the composition and the methodology adopted to create the following indexes: 1) restrictiveness index (general); 2) restrictiveness index for low-skilled migrants; 3) restrictiveness index for high-skilled migrants; 4) restrictiveness index for low-skilled migrants; and 5) selectivity index.

3.5.3 Strategy for Indexes-Development

This paper poses attention to the aggregate information on the restrictiveness and selectivity levels in the European countries. The aim is to create a comparable database that gauges changes in the EU regulation across countries and time ready to use for panel data analysis. Furthermore, we intend to find a migration policy measure that provides a more comprehensive understanding of the impact of

immigrations, whether there are less liberal or more selective normative in place. According to De Haas et al. (2019), migration policies have become more restrictive over time, although the number of more liberal policies still exceeds the amount of the more restrictive ones. The more stringent policies are direct to the reduction of irregular migrants and prospected asylum seekers; whereas, the more liberal policies tend to attract and retain high and low-skilled regular migrants. It seems clear that the degree of restrictiveness towards migrants seems lower than the degree of selectivity. As far as Czaika and de Haas (2018) show, with an empirical analysis on 34 countries in the world, the wrong implementation of restrictive policies can lead to ambiguous effect on net-migration. Although the restrictive polices account for a reduction of incoming migration flows, these policies do not have any direct impact on the outflows of migrants, who might overstay ("reverse flow substitution" effect).

In conclusion, restrictive policies seem not to produce straightforward the desiderated effects as do not necessarily imply a decrease in the migration population with respect to the total resident population. Whereas, the implementation of more liberal policies do not produce the same counterproductive effects. For this thesis, we adopt the DEMIG database as it offers a more extensive theoretical conceptualization on the nature of the migration policies and their impact. Specifically, the DEMIG dataset not only measures the "effectiveness" of migration policies, by stating whether the migration law reached its objective, but also considers the "effect" produced by a specific law by explaining the impact of the policy and by observing the direction, composition and volume of the migration flow (De Haas et al., 2019). The evaluation of the "effectiveness" and the real "effect" of migration policies is an area of disagreement among experts (Czaika and de Haas, 2018), as there is a discrepancy between the assessment of the aims of the policy implemented, and its actual impact. Therefore, it is not clear weather politicians' tough discourses on immigration and their entry restriction policies are actually able to control immigration flows (De Haas et al., 2019). One of the aims in adopting this database is to contribute to the understanding of the "effectiveness" application of these policies and quantifying the economic "effect" produced by these migration polices.

The DEMIG database is of pure qualitative nature and is composed of a set of variables describing policy reforms as separate entries in the dataset and it offers a detailed description of each policy change by referring to the original source which could be anything from a law to an international organization survey, a books, an

academic paper. This qualitative database offers a series of characteristics that allowed us to transform the related information into a quantitative database, which enables econometric analysis. The DEMIG dataset is produced on a group of 45 countries, out of which we selected 22 European countries. The database records the policy changes on migration from 1918 to 2014, but we only consider information stating from 1990, as per the rest of the thesis. The DEMIG dataset offers a series of details on national policy and multi-lateral agreements, as it records each singular policy change that has been introduced, implying that in the same year it is possible to observe more than one policy change.

One of the purpose of DEMIG analysis is to produce an in-dept investigation on the different effects produced by the various policies, therefore, it provides a disaggregation of the migration laws in different sub-groups according to:

1. **policy area**: assessment of policies according to the area of border control, legal entry, integration and exit;

2. **policy tool**: specification of different policies measures such as recruitment agreement, regularization programmes, quotas or entry and exit permits;

3. **migration category**: assessment of the target group of the migration policies, i.e low and high-skilled, irregular migrants, refugees or students;

4. **geographical origin**: record of the origin of migrants, specifically, all foreign-born migrants , both EU origin and specific nationalities.

This level of detail in the group of migrants and policy area gives us the advantage of producing different indexes on the degree of selectivity and restrictiveness of these policies. To this end, the first step in the creation of the index on policy restrictiveness towards all the categories of migrants is the selection of the different options offered by the variables of the database. The DEMIG database provides the information on the change in restrictiveness of the new migration policy with regards to the existent one. It is attributed the value "-1 " to a policy that becomes less restrictive, and a value "+1" to a policy which becomes more restrictive. In few cases, De Haas et al. (2015) explains that if a policy introduced does not change in as compared to the previous one, then the code attributed to this policy is "0". This code is an assessment of the relative change in the restrictiveness of a policy and it does not measure a level in restrictiveness in absolute levels. Thus, this is a drawback of the dataset, as it assesses the policy change with respect to the normative framework

of a specific country, and as such, it is not possible to compare the trends across various countries. Due to those characteristics, the DEMIG dataset is not suitable for longitudinal data analysis. The main criteria that have been to selected from the qualitative dataset to assess the level of restrictiveness of the policies are the following:

1. the quantity of migrants that gain the right of entry, stay and exit from the country;

2. the level of complexity of the policy for the migrants to enter or having guaranteed any right to stay;

3. the controls implemented at the border or within the territory of the country.

With the intention of producing an index that would be useful for comparable analysis, we exploited further information of the dataset that allows to produce a certain metrics pertinent to measure and benchmark different level of restrictiveness among the European countries. Specifically, as suggested by Rayp et al. (2017), the DEMIG dataset provides common parameters across different countries, which allow us to create a weighting for policies measured "per se" to compare information across countries. These common parameters are used to determine the *magnitude change* of the policy by assigning different weights according to the effects produced by the implementation of the law. Namely, the codes are assessed according to the following order:

- weight 1) fine-tuning change

- weight 2) minor change;

- weight 3) middle-level change;

- weight 4) major change.

These weights are assigned with respect to two criteria: 1) *degree of departure* which measures if a policy produces a significative change (fundamental or not fundamental change), and 2) the *degree of coverage* (target group) that illustrates the migrant category, which the new law targeted. In the figure 3.1, we represent all the results relative to the changes on the restrictiveness of migration policies towards all the migrants.

To better explain the structure of the mentioned dataset we take as an example a

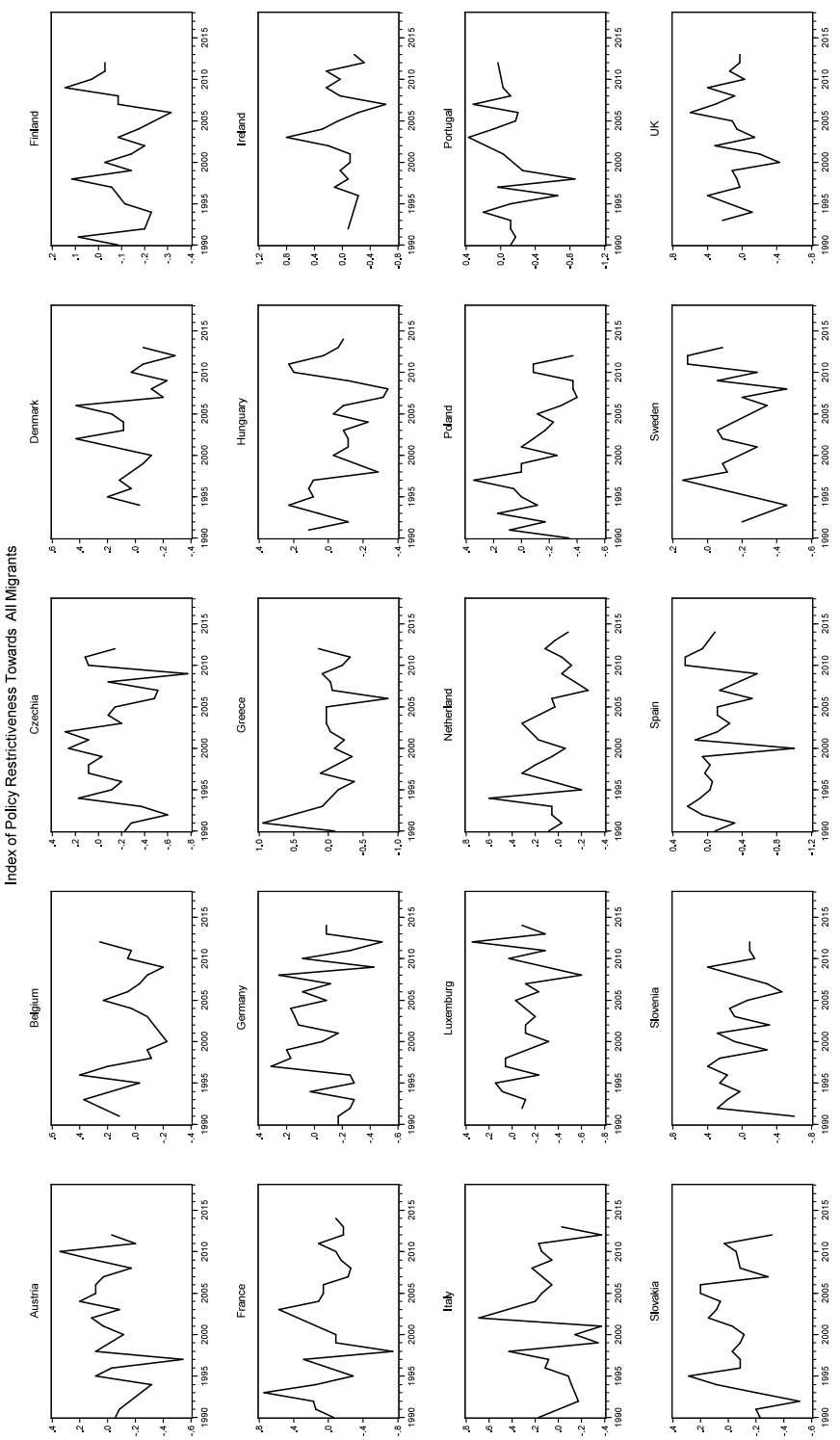


Figure 3.1: Changes in Restrictiveness Levels of Migration Laws, Over Time, in 22 European Countries

policy change introduced in Italy in 2009, also known as "Part II of the Pacchetto Sicurezza" ("Security Package"), which has a *major-level change* impact with respect to the previous migration laws towards irregular migrants. Specifically, this law declares that illegal migration in the Italian territory would be considered as a crime, therefore, if arrested, migrants would be punished with a fine (from 5000 to 10000 euro). The DEMIG dataset has the speciality to not only identify the magnitude effects of the new policies, but also identify the group of migrants which the law targets as "irregular migrants", the policy area as "border and land control", the origin of the migrants as "all migrants", and "level of restrictiveness" compared to the previous law as more restrictive. Another case is the law introduced by the United Kingdom in 2004 to permit entry to workers coming from the newly joined EU countries. This law, according the mentioned dataset, has produced a "mid-level change" to the legal framework on migration at that time. Moreover, it is also shown more details: the policy area as "legal and entry stay", the policy tools as "free mobility rights and agreements", the target group as "all migrant workers" and the origin of the migrants as EU countries[6]. Finally, it illustrates the change in restrictiveness as "less restrictive". Similarly, we can take an example of a migration policy introduced in Austria in 1997, also known as Aliens Act 1997 (Fremdengesetz) which states the quota requirements for family members of third-country nationals. As the DEMIG database illustrates the Aliens Act 1997 has produced only a "minor change" to the previous legislation on the family reunifications. However, this policy change is also defined according to the policy area as "quota", target group as "family members", origin of the migrant as "all nationalities", and as "level of restrictiveness" compared to the previous law "no change".

These three examples are handy to explain how we proceed in the creation of the indexes on restrictiveness. Beginning with the index on the restrictiveness towards all migrants, we have considered the level of tightness of the new policies. With this regards, we have attributed a value of "+1" to the policy implemented in Italy in 2009, "-1" to the policy introduced in the United Kingdom in 2004 and "0" to the Austrian policy of 1997. Then, we consider the magnitude of the impact of the policy. Namely, as shown in the paper De Haas et al. (2015), it is possible to develop for the different magnitudes from 1 for the "fine tuning change" to 4 for "major-level changes". To this end, we have assigned a value of "4" to the first case, "3" to the

[6]The EU countries which the 2004 law is direct to are the following: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia

second case, and "2" to the last case.

The next step has been the definition of a comprehensive value for each single law, hence, we multiply each year's values on the restrictiveness-levels by the respective weights. The latter express the relative magnitude of each policy change (from 1 to 4). For instance, we obtain the value "+4" for Italy in 2009, "-3" for the United Kingdom in 2004, and "0" for Austria in 1997. However, as more than one policy can implemented within a year, we can obtain multiple values for the same year. In order to have a single entry for each year, we use an additive method by summing all the *ad-hoc* policies of the same year. Finally, to have the same unit of measurement, we observe the highest value on the total restrictiveness index and we divided all the information by that value.

The index on restrictiveness to all migrants has permitted us to construct three more detailed indexes on more specific group of migrants. Specifically we have defined new indexes on the level of restrictiveness towards low-skilled, high-skilled and irregular migrants. The methodology adopted for the development of these indexes is quite similar to the previous one. Indeed, we have just added an extra step by pinning down an extra option from the criteria "target group" in the original DEMIG dataset. Namely, for each single index we select the information relative only to low-skilled, high-skilled or irregular migrants. Specifically, the category of migrants which impacted by the policy is provided in the DEMIG dataset via the variable "target group". Afterwards, we apply the multiplicative approach to the relative level of restrictiveness and magnitude of the policy, and, when necessary, we add different values that referring to the same year to have a single entry per year. The following charts (Figure 3.2, Figure 3.3, Figure 3.4) are a representation of the three indexes on the change in restrictiveness for different group of migrants.

As follows, we provide some examples for the indexes that capture the restrictiveness of migration policies towards the high-skilled, low-skilled and irregular migrants. With regards the law on high-skilled migrants, we use the DEMIG dataset on the Greek migration legislation. Firstly, we restrict our focus on the high-skilled migration by selecting only this group out of the list of "target group" proposed by the qualitative dataset. Then, we apply the same methodology used for the general restrictive index. For instance, we consider a law that targets the more talented migrants introduced in Greece during 2006. This law have impacted on the right of

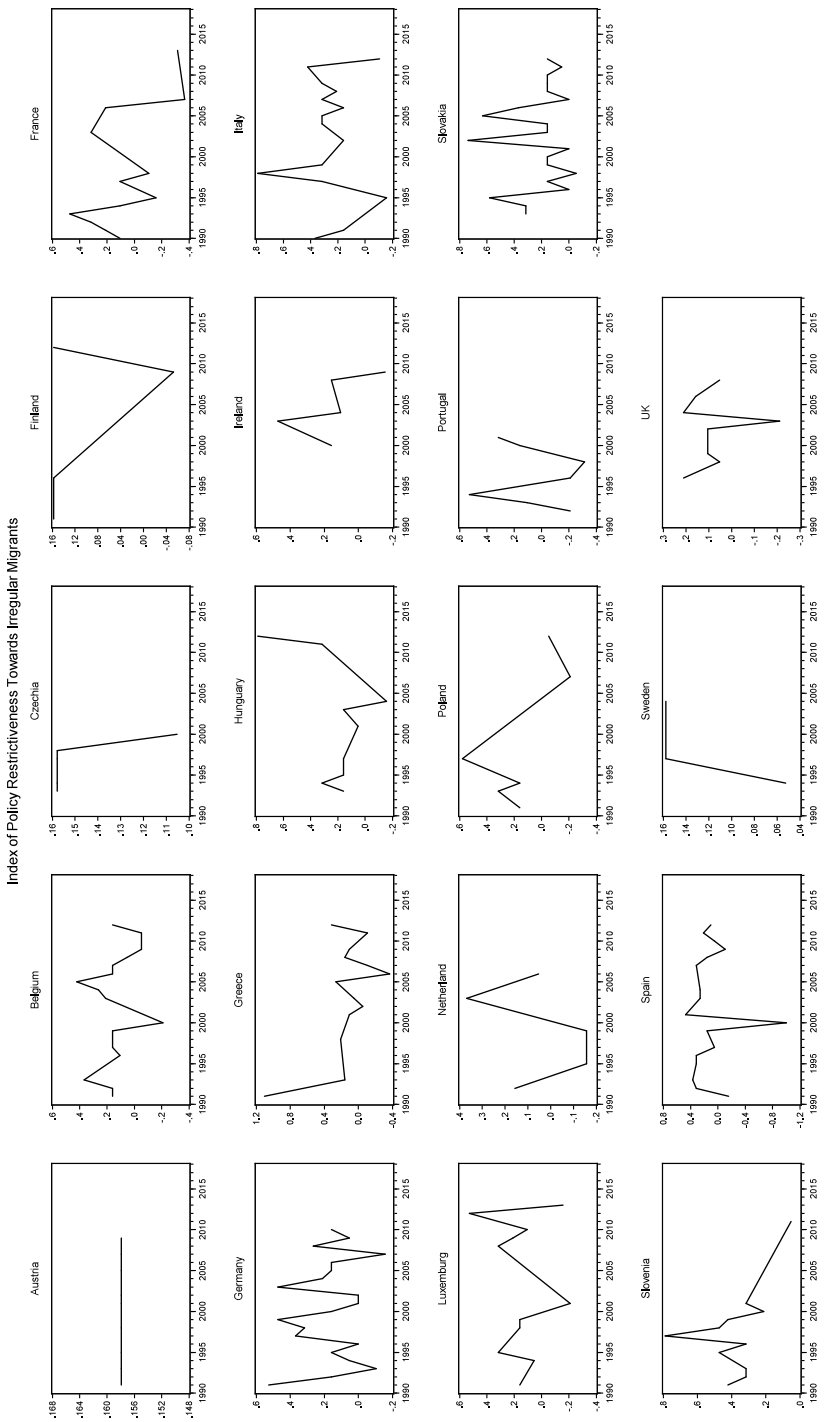


Figure 3.2: Changes in Restrictiveness Levels of Migration Laws towards Irregular Migrants, Over Time, in 22 European Countries

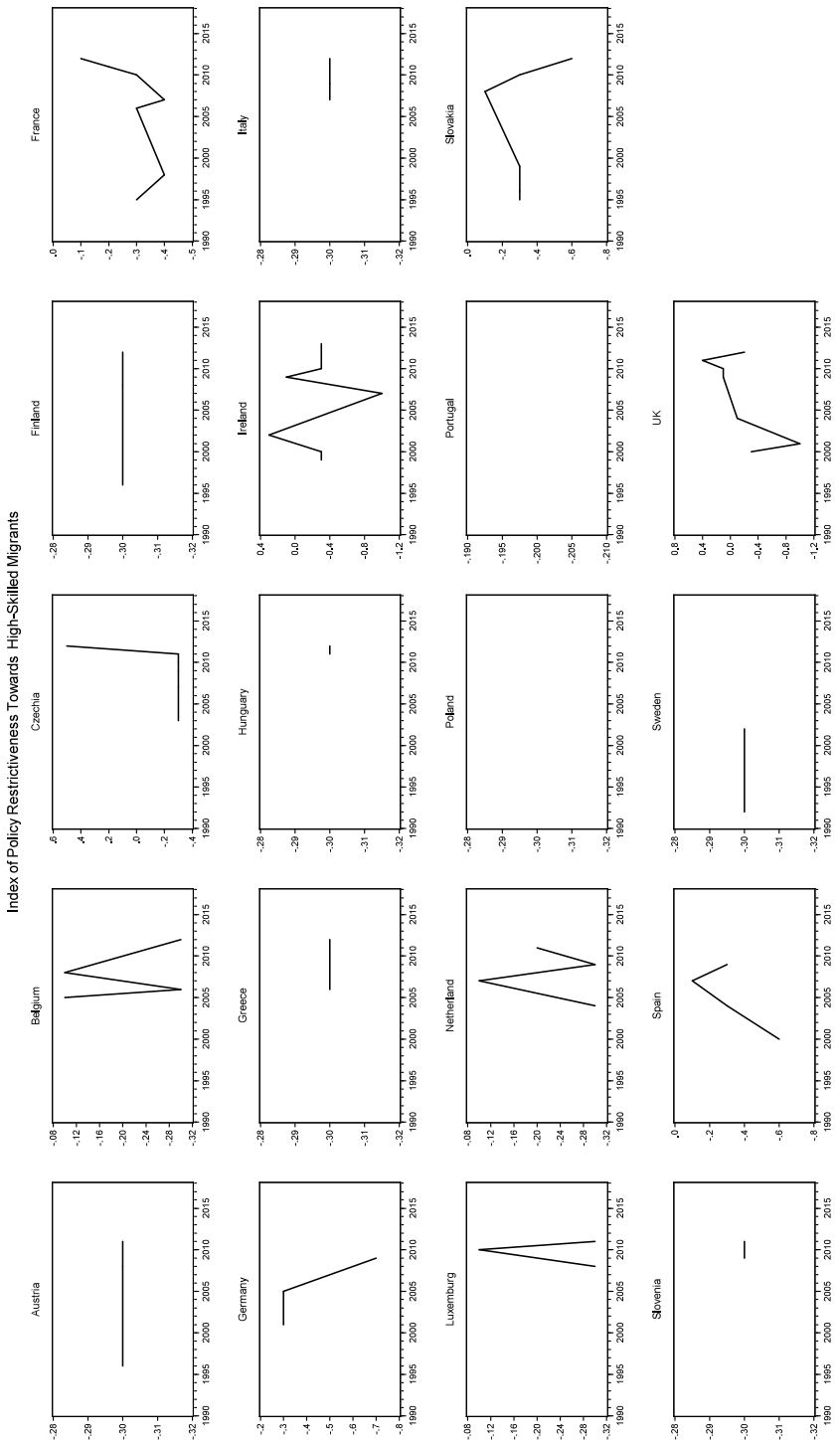


Figure 3.3: Changes in Restrictiveness Levels of Migration Laws towards High-skilled Migrants, Over Time, in 22 European Countries

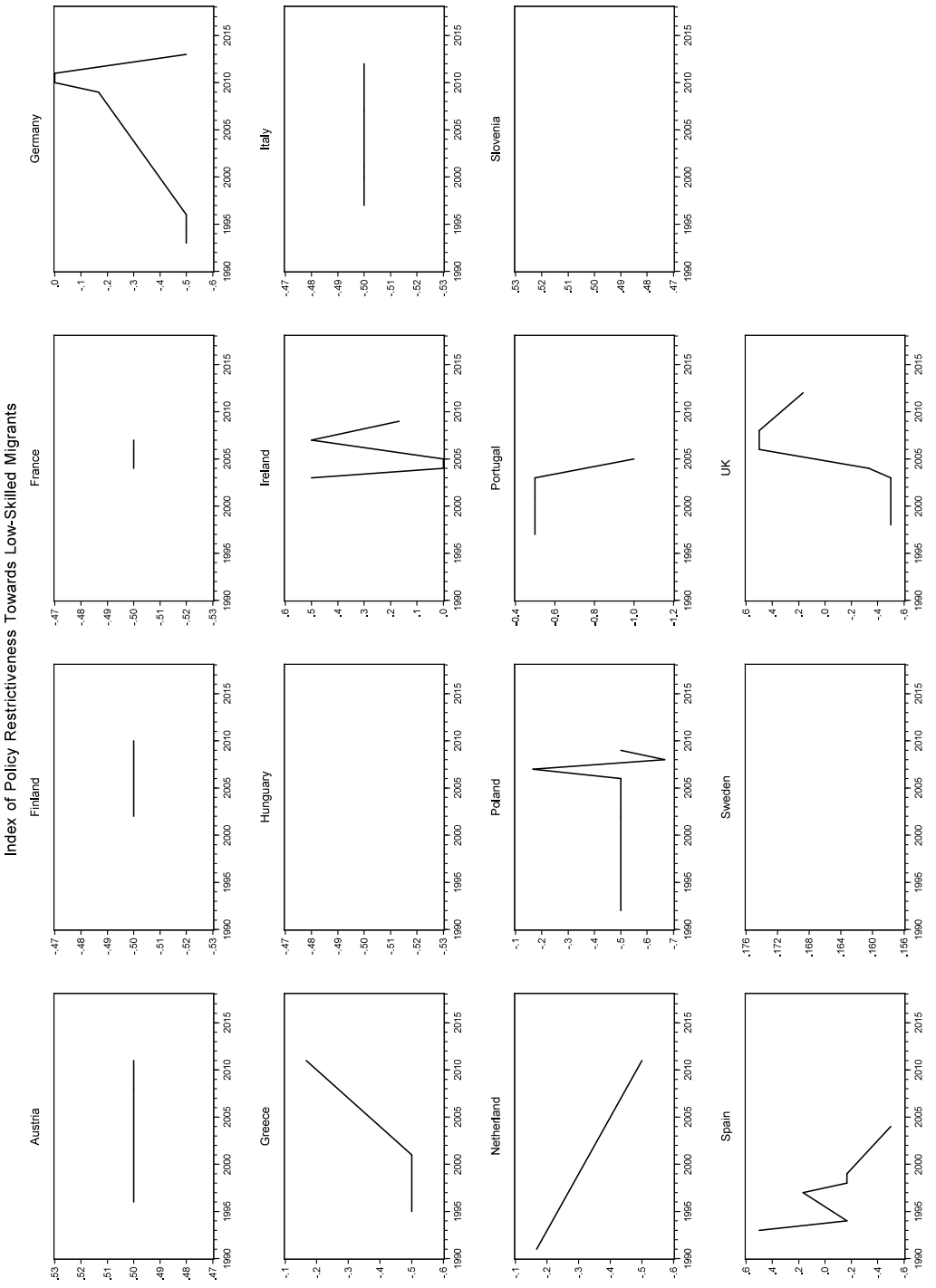


Figure 3.4: Changes in Restrictiveness Levels of Migration Laws towards low-skilled migrants, Over Time, in 22 European Countries

legally migrate in the country and integration for specific groups of migrants which the DEMIG dataset report as "specific skills categories such as members of artistic groups, intellectual creators and members of foreign archaeological schools, foreign journalists or members of religious orders". This law has been classified as "less restrictive" as allows more migrants to enter in the Greek territory as compared to the previous legislation. The impact of the norm has produced a "mid-level change" in the current legislative framework at that time. To this end, after the selection of the "target group", we multiply the value "-1" with "3", obtaining as final value "-3". As this is the only policy implemented for high-skilled migrants, then "-3" is the final value that we attribute to the year 2006 relatively to the specific index on the restrictiveness towards high-skilled migrants for Greece. An example of low-skilled policy is the one introduced in Germany in 2009 targeting qualified or unqualified seasonal workers. The policy states that such workers may be employed from four to six months per year. In this case, after again selecting in sub-group low-skilled from the criteria "target group" we observe that this policy implementation has produced a "fine tuning change" and it is considered as "less restrictive". This gives a final result of "-1" for the index on restrictiveness to low-skilled migrants in 2009 for Germany. Finally for all the three indexes, as done for the general index on restrictiveness, we observe the highest value in the panel data and divide all the data by this value. This allows us to produce an index with a common measurements. It is also worth to mention that for these specific indexes, we have not used an additive approach to gather the various information on the same year into a unique value. This is justified by the fact that the majority migration policies are generally towards all the migrants rather than specific groups, and whether it is the case that the policy implementation are direct to a category of foreign-born then there is the prevalence in the policy for irregular migrants, as shown in the 5.2 in Chapter 4.

Last but not least, we have also created an index on the level of selectivity of migration policies. This because we would like to understand whether the immigration policies in Europe are more selective rather that restrictive. Indeed, De Haas et al. (2015) show that the primary objective of migration laws in the 45 countries they have studied, including the group of 22 European countries analysed in this thesis, seems to be selection rather than restriction. The DEMIG index records a series of polices impacting on different categories of migrants such as high and low-skilled ones. Following the approach of Rayp et al. (2017), we decide to exploit these characteristics to create a quantitative index on migration selectivity. To code for

selectivity we select the policy that is more prone in increasing the number of high-skilled migrants or reducing the low-skilled ones, in which case we attributed a code of "+1". The latter value indicates that the policy taken into account is *more selective* with respect the previous policy implementation. Additionally, we code all the policies that tend to attract and retain low-skilled migrants or reduce the requirement to entry and stay for high-skilled migrants as *less selective*. With this regards, we assign a code "-1" to the *less selective* migration policies. To make our index useful for an analysis across countries and over time, we multiply the values on the more or less selective policies by assigned weighting, expressing the magnitude impact of the policy. Then, as previously done with the other indexes, we apply an additive approach to information related to the same year and as final step we divide all the values by the highest value in selectivity found among all the countries.

With this regards, we take into account, as an example, the dataset of the Netherlands. The first criteria we adopt is the selection of the "high-skilled migrants" and "low-skilled migrants" from the variable "target group". Then, we consider all the policy directly addressed only to the two category of migrants since 1990. Unfortunately, although the Netherlands are considered to be one of the European countries with a good migration system, there have been no many policy implemented especially from 1990 to 2004. However, we can take as example the policy introduced in 2004 which promotes the creation of a scheme for high-skilled migrants to stimulate more high-skilled migration. We have coded this law as more selective attributing the code "+1". This policy has produce a "mid-level change" impact, which is also indicated with a weigh equal to "3". Therefore, the final value will be "+3", which will need to be divided by the highest value of the selective policies among the 22 European countries. However, in the following chart, Figure 3.5, we illustrate the change in the level selectivity towards migrants in the Netherlands in 2010 when there has been a drastic reduction in selectivity, although migration policies in this country have been always very selective. Indeed, in 2004 the government in the Netherland has introduced a regulation that was considerably "less selective" which produced a large impact ("mid-level change"). This law is coded as "less restrictive" because it refers to the creation of a pilot project on circular migration for low-skilled workers coming from South Africa and Indonesia. Notably, this was the only immigration law directed to low-skilled migrants after 1990. Thus, if we observe the chart below, it is possible to see that after 2010 there has been a spike in the level of selectivity of the Dutch polices. The rise in selectivity in the 2011 is caused by the implementation

of two distinct policies towards high-skilled migrants. Firstly, it was introduced a law which aimed to tighten the requirement for high-skilled migrants, to which it has been attributed a low magnitude of the impact, a "fine-tuning change" ("1"). Secondly, the same year was the time when was implemented the "EU Blue Card " directive, which produced a large impact, weighted as "mid-level change ("3"). In this case, to obtain a final value for the year 2011 we add the values "1" obtained by coding the first law of 2011 and the value "3" which refers to the second lay in 2011. Therefore, the final value is equal to "+4" which is divided by the common highest value of selectivity in the whole dataset.

To have an idea on the breadth of the impact caused by policy changes since 1990, we have added up all the weights according the level of impact expressed (Table 3.2). We observe that the rise of the pressures of the migration flows towards Europe has challenged the EU countries in the ability of governments to control the common borders and to absorb the existing immigrants. Although this phenomenon has pushed governments to introduce a substantial amount of reforms, the need of the market to provide specific categories of labour has created the conditions that favour more some category of migrants through the introduction of ad hoc entry-categories.
According De Haas et al. (2019) the migration policies have become less restrictive since the 1945 as a consequence of the liberalisation of the migration policies after the second World War. However, since the 1990 there has been a reversal attitude toward migration following an increasingly sophisticated border control. Particularly, this change of direction in the EU migration policy restrictiveness in the last decades have featured the Communitarian acquis.

The project erected by Member States of a "Fortress Europe" brought to focus to the European border control toward the third national countries and the "securitization" of migration system with the detention and then expulsions of irregular migrants. In line with this theory, we find that in the recent two decades the implementation of EU migration legal framework has seen increase in terms of numbers, due to the multitude of implementations in the policies, and effects. Namely, this is evident if we look at the rise of the number of reforms counted with higher weight (mid-level and major changes). However, as we can see from the Table 3.2 this is not true for Denmark, the Netherlands and the United Kingdom. This might be because they have decided to be more liberal towards migration with respect to the rest of the European counterparts.

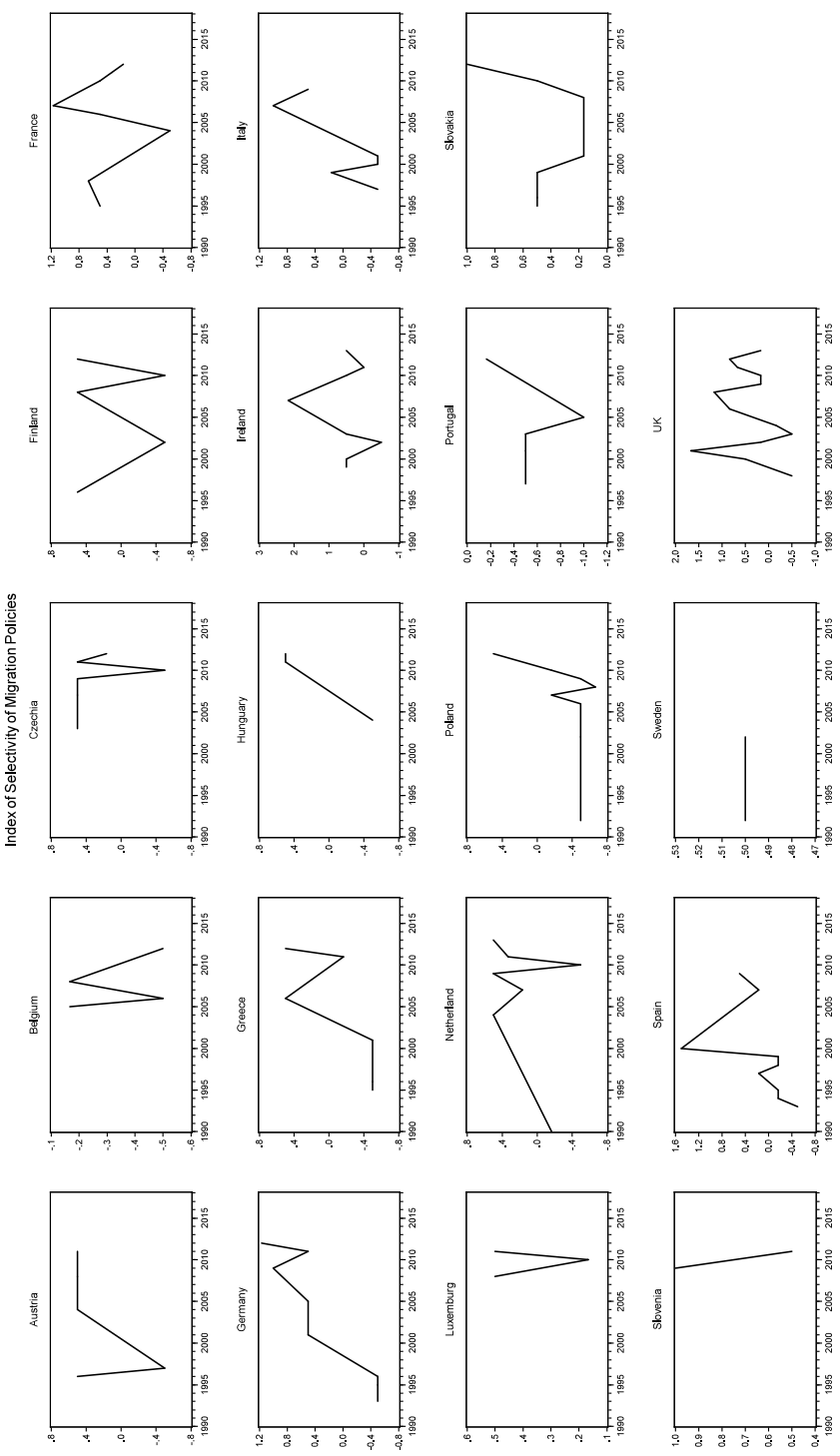


Figure 3.5: Changes in Selectivity Levels of Migration Laws, Over Time, in 22 European Countries

Table 3.2: Frequency of the number of migration policies according their *magnitude*

Country	Fine-tuning change	Minor change	Mid-level change	Major change
Austria	13	21	37	32
Belgium	13	23	31	26
Czech Rep.	6	17	39	40
Denmark	21	28	12	22
Finland	7	21	20	21
France	14	35	54	23
Germany	16	19	72	13
Greece	9	28	31	32
Hungary	11	12	37	26
Ireland	10	13	36	26
Italy	10	28	58	30
Luxembourg	11	13	29	29
Netherland	21	20	33	21
Poland	5	13	36	26
Portugal	7	28	36	36
Slovakia	8	17	50	36
Slovenia	10	19	45	30
Spain	19	22	58	38
Sweden	6	23	16	20
United Kingdom	29	24	33	27

Chapter Four

Empirical Results: Time Series Analysis

4.1 Introduction

Several changes occurred in Europe between 1990 and 2015. At the beginning of the 1990s, significant inflows of migrants moved under the family reunification programmes, while the work-related applications have been still low. There are two crucial moments in the European history at the beginning of the 1990s: the enlargement of the EU with the adhesion of Spain, Portugal and Greece during the 1980s and the collapse of communism in the Eastern Countries, provoking massive waves of people fleeing to Western Europe as workers or asylum seekers and pushing the European governments to tighten up asylum applications. However, between 1992 and 1993 there has been a substantial decline in the inflows of migrants, following a series of restrictive policies implemented by the European countries to curb these unstoppable flows of foreigners. Despite the implementation of a more sophisticated management and control of the incoming migrants, between the middle and late 1990s the European migration system was shaken again by the break-up of former Yugoslavia and Kosovo from 1997 to 1999 led to a further increase in migration. These wars were responsible of a grave humanitarian crisis which affected mostly countries such as Austria, Germany, Italy, Sweden and Finland, which received a bulk of asylum seekers.

Another change that occurred at the end of the 1990s was a rapid expansion in the Information Communications Technology (ICT) sector, creating the need for many high skilled jobs. To meet this demand, the more developed European coun-

tries, such as Germany, France and the United Kingdom simplified and speeded up the procedures to release work permits for high skilled migrants. The European countries were, therefore, starting their competition for the attraction of the most "bright and talented" migrants to solve the problem of *skill-shortage* in the ICT sector. This policy change has yielded to a positive impact on the level of education of the natives, as the skills difference pushed natives to increase their level of specialization further (Peri and Sparber, 2009; Ottaviano and Peri, 2012). Additionally, it has positively contributed to the Total Factor of Production (TPF) affecting the technological progress of the country of the European economies (Lewis, 2011; Peri, 2012).

During the same period, the Southern European countries registered an immigration increase in low skilled migrants looking for jobs in agriculture, manufacturing and service sectors, where the administrative immigration rules were easier to by-pass (Reyneri, 2001). In these sectors, migrants would often not hold work or residence permits, which fostered the development of undocumented migration. Another factor that facilitated the rise of irregular migrants in the southern area of Europe was the adoption of several regularisation schemes.[1] The result was that migrants tend to populate the underground economy of these countries. In the 2000s, the most relevant event that changed the history and geography of Europe has been the two enlargements of the European Union in 2004 and 2007 to the CEE countries. During this period, many migrants originally from the new EU member states have seen a modification of their legal status from migrants to citizens, which yield to an increase of the native-born European population. Additionally, the EU geographical change produced another effect. The legal and illegal migration moving towards the CEE countries were free to circulate into the European countries once passed the borders, moving towards the Northern European countries. All of these events have exacerbated the issue of management of the large stock of immigrants in the "core"[2] countries, due to the rise in flows of migrants entering from the new member states[3]

[1]Southern European countries have repeatedly introduced regularization programmes during the 1990s. The most frequent regularization programme in EU countries have been in Italy in the 1986, 1990, 1995, 1998 ,2002; Spain in 1985, 1991, 1996, 2000 and 2005; Portugal in 1992-93, 1996 and 2001.

[2]The core countries are: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, the Netherlands, Sweden and the United Kingdom; while, the southern countries are Greece, Italy, Portugal and Spain which are considerate separately for their different demographic position and as they have become immigration countries in the mid-1970.

[3]The peripheral countries are those countries who joined the EU15 member states after the Enlargements in 2004 (Czech Republic, Cyprus, Estonia, Latvia, Lithuania, Hungary, Malta, Poland,

and most of the "peripheral" European countries.

Since the middle of the 2000s, there has been other two changes in migration figures that have affected the European countries. Firstly, there was a decrease in inflows in 2007/2008 as a direct consequence of the global financial downturn. Secondly, in light with the recent humanitarian crisis caused by the widespread of riots in the Middle-East, commonly known as "Arabic spring", the EU experienced an unexpected number of asylum applications, which doubled the number of asylum-seekers applications registered in the 1990s. The different types of migration flows, together with the different policies adopted by governments to either attract or restrict immigration, have stimulated further research on this topic.

In the empirical literature there is no a clear-cut regarding the real impact of the migration flows on the European economies. One of the less explored area of the macroeconomic literature is the one that wants to explore the causal relationship between immigration and economic growth. In order to cover this gap in the empirical literature, the present paper aims to investigate this causal relationship using a bound testing procedure to co-integration within an autoregressive distributed lag (ARDL) framework (Pesaran et al., 2001).

The remainder if this chapter is organised as follows. Section 4.2. provides a review of the previous literature. Section 4.3. presents some descriptive statistics and the methodology. Section 4.4. presents the results. Section 4.5. discusses analytically the obtained results, and finally section 4.6. concludes.

4.2 The Previous Literature Review

For the receiving economies, new migration flows represent an opportunity to obtain new labour force without facing any cost for their education. Migrants, indeed, present different skills and education levels with which they determine their allocation in the labour market of the hosting economics. To this end, some economists studying the impact of migrants have found a certain degree of substitution between domestic workers and (legal and illegal) migrants (Dustmann and Frattini, 2014; Docquier et al., 2013).

Slovenia and Slovakia), in 2007 (Bulgaria and Romania) and in 2013 (Croatia).

So far the economic literature has considered irregular migrants as unskilled workers (Liu, 2010), viewing them as an exogenous shock which creates an increase of low skilled workers in the underground economies, producing variations in the employment level of the hosting countries. In the worst scenario, depending on the degree of substitution of low-skilled natives with low-skilled and irregular migrants, there might be a displacement effect (Liu, 2010) of natives in the labour market. Nevertheless, this effect has been seen mostly affecting the lowest quartiles of the workers income distribution (Dustmann et al., 2013). However, some studies show that migration flows yielded a small rise in the unemployment rate of the domestic workers (Hunt, 1992; Angrist and Kugler, 2003). Conversely, other studies address a negative impact of migration in the destination economies (Borjas, 1999; Friedberg, 2001).

Going beyond the effects on the labour market, the focus of my current research has evolved taking a macroeconomic approach and assessing the impact on the economic growth of the hosting countries (Morley, 2006; Ehrlich and Kim, 2015). To understand the impact of the demographic stock produced by the increase in migration concerning the native's population, this investigation aims to disentangle the causal relationship between migration and economic growth. Some papers related to the economic impact of immigration to the receiving countries, investigate the relationship between immigration and unemployment; however, few are the papers that explore the causality relationship between migration and GDP per capita. To overcome to this issue, this study aims to fill this gap in the literature by exploring any unidirectional or bidirectional relationship between immigration and GDP per capita in a the European countries.

4.3 An ARDL Bounding Test Application to a Co-integration Analysis on GDP per capita and Immigration

In our analysis we utilise the application of the ARDL test to co-integration considering the results of the Unit-Root tests. Indeed, the unit-root tests show mixed results on the level of integration of the variables GDP per capita and Immigration per capita for 22 European countries between 1990 and 2015. Full results and analysis of the unit root tests will be presented in this chapter. By adopting an ARDL

bounding co-integration approach, we are able to find a long-run equilibrium and also a short-run adjustments, which provided a more comprehensive description of the relationship between the two variables of interest. In the first step of our analysis, we want to investigate whether there is a bidirectional causality relationship between the logarithm of the GDP per capita (ly) and the logarithm of the Immigration per capita (li), considering the different level of integration of the adopted variables. Therefore, we estimate for each country an Unrestricted Error Correction Model (UECM) by Ordinary Least Squares (OLS), within ARDL(p,q) models in both directions:

$$\Delta ly_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_{1i} \Delta lny_{t-i} + \sum_{i=0}^{q-1} \alpha_{2i} \Delta lni_{t-i} + \beta_{Y1} ly_{t-1} + \beta_{Y2} li_{t-1} + e_t \qquad (4.1)$$

$$\Delta li_t = \alpha_0 + \sum_{i=1}^{p-1} \gamma_{1i} \Delta lni_{t-i} + \sum_{i=0}^{q-1} \gamma_{2i} \Delta lny_{t-i} + \beta_{I1} li_{t-1} + \beta_{I2} ly_{t-1} + \varepsilon_t \qquad (4.2)$$

where Δ is the difference operator, p and q characterize the lag structure, while ε_t are serially independent random errors with mean zero and finite covariance matrix.

Equations (4.1) and (4.2) are tested under the respective null hypothesis that there is no long-run equilibrium relationship against the alternative hypothesis of co-integration (Pesaran et al., 2001). The statistic test employed for the joint null hypothesis is an F-test which values are compared with a lower and upper asymptotic critical value bounds provided by Pesaran et al. (2001). Those values are the representation of different restrictions on the trends and intercepts. We can reject the null hypothesis that there is no long-run relationship when the F-statistic is bigger than the upper bond values, however when the statistic value is smaller than the lower value we accept the null hypothesis.

Following the identification of the existence of a co-integration relationship, we look for the optimal ARDL specification on the basis of the Schwarz Bayesian Criterion. Next step, we will be able to observe any Error Correction Term through the estimation long-run coefficients and the short-run dynamic coefficients. The lagged Error Correction Term (ECT) explains how quickly the variables converge to the steady-state. and it is expected to have a negative sign. According to Banerjee et al. (1998), for high values of the ECT's coefficient, it is possible to have relationships stable in the long-run. We continue our analysis by looking for the optimal lag length for

each country. After that, we report the results obtained from the ARDL Bound tests. Those can be identified with the F-statistic values. Only for those F-statistics that lies above the given upper bound specified by Pesaran et al. (2001), we can conclude for the existence of the long-run relationship. Moreover, to study the direction of the causality relationship we perform the test using either *ly* or *li* as the dependent variable. For some time-series, we have identified breaks, which identify events caused by the introduction of specific migration policies adopted by the governments. Hence, we have run an ARDL model with a specific dummy variable.

The models used in this analysis have a typical log-log form. The log-linearization is a very common form of approximation technique, used to put terms in percentages, providing an easier interpretation of the results. The coefficient, estimated with a variable in natural logarithmic form, gives us the elasticity of one variable with respect to the other; thus, it measures the level of sensitivity of one variable with regards to the other. Specifically, in our case we use a log-linearised form to understand the percentage change of *Immigration per capita* relative to the percentage change in *GDP per capita*. In other words, by observing the coefficient of the GDP per capita in equation 4.2, which is the income elasticity, we are able to illustrate the percentage changes in migration caused by an increase of 1% in GDP per capita during one year period. This allows to determine how much migration is sensitive to variation in economic factor such as the GDP per capita. When we find high income elasticity, given by the coefficient of the GDP per capita, then we can deduce that high economic growth in the destination country might be the major "pull" factor in determining migration rather than other non-economic factors such as the migration policies (Ortega and Peri, 2013). Besides, by estimating the migration elasticity in equation 4.1 with respect to the GDP per capita there is the advantage to observe the impact on the GDP per capita produced by 1% increase in migration in one year. Finally, the other advantage of the log-linearization when we have a first difference equation is to observe the percentage change of the deviation of the variables from the long-run equilibrium.

4.4 Descriptive Statistics

In this section we provide a preliminary analysis of the data described in section 3.1.1, in Chapter 3. Specifically, in Table 4.1 and Table 4.2 where we illustrate a summary of the descriptive statistics for the variable adopted in a time span between

1990 and 2015.

Migration has increased in average in all the European countries, although at a different pace. To understand the different changes in migration flows we adopted the European Migration Network (EMN) reports and the Determinants of International Migration (DEMIG) database. The countries which received the highest average levels of migration to the population are Luxembourg, followed by Ireland, Austria, and Germany. Despite this, the rates of immigration to the population are still high in the following order for Belgium, Denmark, Sweden, Greece, the Netherlands, Spain and the United Kingdom. Much smaller are the shocks produced by the inflows of migrants on the population for Slovenia, Croatia, Italy, Finland and France. Finally, almost close to zero is the proportion of migrant to the population of some peripheral countries such as Hungary, Latvia, Lithuania and Poland. Slovakia takes the last position of the list with an average of migration inflows to the population equal to 0.008.

Two are the explanations to justify the variation in rates. Firstly, it is possible to observe that most of the countries migration policies have alternative "migration cycle" (Fassmann and Reeger, 2012; Reyneri and Fullin, 2011; Okólski, 2012) when considering a set of European "old" countries (i.e. Austria, Germany, France and the United Kingdom), and "new" (i.e. Greece, Italy, Portugal and Spain and post-enlargement countries) ones. This is because migration tends to move to the countries with higher economic growth and welfare systems where they can prospect higher wages and living standards (Harris and Todaro, 1970; Morley, 2006; Boubtane et al., 2013). Secondly, we should consider the "real" impact of the migration policy on the inflows. Policies can shape the trend of inflows of migrants (Bjerre, 2017), for example after introducing a new "guest worker" programme in Germany there has been an increase in the number of temporary foreign workers (Djajić and Mesnard, 2015) or after the a political event such as the fall the Iron Curtain, which provoked a sudden increase of migration from the ex-communist countries toward the Western-Europe (Stalker, 2002). In the latter case, an introduction of a series of new migration policies was fundamental to regulate and control the inflows of migrants coming from those countries. These policies acted as magnet for waves of illegal migrants who knew that easily could regularise their status from illegal to legal migrants (Jandl and Kraler, 2006; Baker, 2014; Mastrobuoni and Pinotti, 2015). In order to attempt to identify which event might influence the migration inflows, we use the DEMIG database which offers insights into the main features of the

migration policies for almost all the European countries. In Table(4.2) we present the descriptive statistics for the ratio of variable *Immigration per capita*. It is clear that Germany, Austria, Luxembourg and Ireland have been in average the countries that have been most hit by the large flow of immigration with respect to the size of their population in the period between 1990 and 2015. However, for the same countries, the values of the standard deviations are very large, which might explain the fact that the inflows of migrants have not been constant over time, rather there are been period of surge and rapid decline of the same inflows during the period analysed.

By observing the Table 4.1 on the *GDP per capita* of the European countries, we can note Spain and Ireland, with exception of Luxembourg, are not the countries with the higher GDP per capita. This result can be a justification to our argumentation that GDP per capita is not the only and main determinant of the immigration. However, in some case, such as Luxembourg, we find a positive relationship between the two variables of interest with significantly high level of GDP per capita and very high figures of the average of immigration, which seems to predict that the larger GDP per capita is, the higher the interest of immigrant to move in the country is, as well. Specifically, in Luxembourg the migrants represent the largest proportion among people in active population. Additionally, it is one of the European countries with the higher migration population coming from other European countries.

Another country significantly affected by immigration flows is Spain, which has adopted a series of regularisation programmes. This has contributed to the exponential increase in migration flows, reaching its peak during the last regularisation scheme in 2005. Since the onset of the financial crisis, the series of the immigration flows show a downward slope; while, a similar pattern is observed by looking at the GDP per capita. One of the countries that suffered most during the recent financial crisis have been Ireland which at the same time has registered downwards trends for the immigration rates.

The traditional "old" immigration countries from Western and North Europe usually have strong economic performances, with high means of migration to population rates and low standard deviations as they tend to absorb migrant continually (Salt and Almeida, 2006). Among the core countries, Belgium, Denmark, Finland, France, the Netherlands, Sweden and the UK show a similar pattern. The figure for those Western European and Scandinavian countries is relatively stable with low standard deviation levels in the migration series and share exponential GDP growth rates

Table 4.1: Descriptive Statistics - GDP per capita

Variable	Average	Std.Dev.	Min	Max	Obs.
Austria	35961.33	10946.67	21774.67	51944.42	27
Belgium	33728.53	10078.10	20751.44	48620.27	27
Croatia	9978.73	4009.89	4805.34	16345.55	22
Denmark	43942.68	13462.04	26920.40	64531.51	27
Finland	35184.77	11364.61	17656.99	53531.43	27
France	32370.12	8416.20	21874.26	45674.02	26
Germany	33968.90	8690.62	22309.50	48170.47	27
Greece	18197.18	6762.71	9672.18	32046.18	27
Hungary	8920.98	4353.90	3349.85	15728.43	26
Ireland	38304.11	17907.87	14076.16	64515.79	27
Italy	28035.33	7228.88	18680.43	40760.65	27
Latvia	8738.21	5211.651	2314.810	16240.47	22
Lithuania	8814.01	5255.47	2160.528	16492.51	22
Luxembourg	74673.19	30269.68	34878.06	120665.4	27
Netherland	37228.19	12176.49	21102.31	57068.30	27
Poland	7640.24	4483.70	1734.504	14337.37	27
Portugal	16141.18	5379.300	7875.315	24826.99	27
Slovakia	10215.01	6098.39	2400.786	18661.35	27
Slovenia	17938.51	6105.189	10233.76	27652.94	27
Spain	22297.39	7584.105	13336.62	35801.48	27
Sweden	40785.67	12338.50	24154.45	60563.88	27
United Kingdom	33602.32	10154.09	18411.16	50338.87	27

Notes: Data are from Eurostat and OECD database

Table 4.2: Descriptive Statistics - Immigration per capita

Variable	Average	Std.Dev.	Min	Max	Obs.
Austria	1.137	0.284	0.831	1.939	20
Belgium	0.968	0.2789	0.578	1.383	24
Croatia	0.557	0.355	0.198	1.266	25
Denmark	0.996	0.134	0.792	1.386	26
Finland	0.393	0.119	0.228	0.588	26
France	0.303	0.164	0.081	0.547	25
Germany	1.072	0.379	0.422	1.901	26
Greece	0.764	0.253	0.524	1.479	25
Hungary	0.272	0.121	0.140	0.591	21
Ireland	1.486	0.594	0.837	3.313	26
Italy	0.464	0.231	0.170	0.911	26
Latvia	0.276	0.159	0.075	0.650	25
Lithuania	0.264	0.238	0.042	0.825	26
Luxembourg	3.099	0.549	2.436	4.228	26
Netherland	0.745	0.098	0.566	0.987	26
Poland	0.155	0.228	0.006	0.589	26
Portugal	0.340	0.186	0.045	0.758	25
Slovakia	0.080	0.043	0.017	0.171	26
Slovenia	0.589	0.400	0.096	1.526	26
Spain	0.737	0.619	0.062	2.139	26
Sweden	0.834	0.275	0.451	1.377	26
United Kingdom	0.627	0.288	0.196	0.982	25

Notes: Data are from Eurostat and OECD database

since 1996-98. Although figures for these countries (with the exception for France and the UK) are much higher, as the immigration flows data collected from Eurostat exclude asylum seekers usually residents for at least 12 months from the sample. Indeed, these countries share the highest number of asylum seekers. Belgium and the Netherlands have seen a significant expansion of immigration after the economic downturn in 2007-2008. Differently, there are the countries that faced a fall in migration inflows as a consequence of the middle 2000s downturns, among which we can find: Denmark, Ireland, Italy, Portugal and Spain, and some of the "new" CEE countries, such as Slovakia. Finally, Poland shows a sharp rose in immigration rates after 2009, where the picture shows an increase by 15%, together with a drop by 38% in emigration rates during the same year.

During the crisis years between 2007 and 2009, the *southern* and the *northern* European counties received the lowest level of migration inflows with respect to their population. The situation is different for Spain and Sweden, although the figures on the immigration inflows have absolutely different patterns. The *southern* European countries are Greece, Italy, Portugal and Spain. Those countries have become immigration countries after the 1970s. Therefore, they will not have the same level of stock of foreign-born population as the traditional European countries. Differently from the other countries, Spain has a high standard deviation value for the Immigration per capita variable, which reflects the sharp increase in migration flows in conjunction with the remarkable economic expansion since the begining of the 2000s halted during the recent economic crisis. Italy shares with Spain a similar pattern in the GDP per capita trend, while much lower is the figure for migration. Lower levels of immigration have been registered particularly after 2000, as a consequence of the introduction a strict migration policy, known as the "Bossi-Fini". The latter have created a significant reduced to pathways for the legal migration. Similar patterns are observed, albeit at lower levels, on Portugal's GDP per capita. In this case, the two variables of interest are positively related for the second half of the considered period when, during a period of expansion of the economy, the government introduced new stay permits for migrants with work permits, allowing the right of family reunification to the migrant workers. Interestingly, the figures for the GDP per capita and migration to population ratio for Greece show a negative relationship. Moreover, the immigration figures for the whole group of Southern European countries should be significantly higher. Indeed, the data used in this analysis account only for regular migration, since the flows of illegal migrants are unrecorded.

The *northern* countries are generally known to be socially cohesive and with a universal welfare model which aims to offer decent standards of living to all legal residents and to be opened toward refugees migrants and asylum seekers flows. Namely, data for Finland show a high level of GDP per capita, while the immigration to population rates are low. Immigration inflows have been quite constant during the time, about 2% per year (Sarvimäki, 2011). However, at the beginning of the 1990s there has been a sudden increase of immigration from Russia and Asia. This period has been followed by waves of asylum seekers coming from Yugoslavia. Finland accepted the Dublin convention in 1999 putting in place a programme for increasing the integration of immigrants and reception of asylum seekers, and also for increasing the quota for asylum seekers. The intention to expand the quota of asylum seekers is for promoting legal migration. Then, the other peak of immigration inflows is observed during the recent refugee's crisis. Finally, Sweden has always been a welcoming county for asylum seekers. Besides, the figure of immigration for Sweden picked during the former Yugoslavia war. Moreover, another surge in migration to population ratio is found in the second decade. In this case, a positive relationship is observed with the GDP per capita, which might indicate that the reason why migrants moved in Sweden during this period could be due to the good economic conditions.

4.5 Empirical Strategy

Economic theory outlines the factual basis for predicting the effect of the exogenous shock of migration inflows on the economic growth of the destination countries. Therefore, this paper aims to test the hypothesis as to whether changes in the immigration inflows toward the European countries cause changes in the associated GDP per capita or vice versa. To investigate the direction of causality, unidirectional or bidirectional between variables, we apply a the co-integration approach to identify the long-run relationship between migration and GDP per capita. Specifically, we use an ARDL bounds testing approach to co-integration as the variables adopted in the analysis are integrated of different orders, both I(0) and I(1). With this regards, in Table 4.5, we provide the F-statistics and diagnostic tests. For the countries which the co-integration relationship is confirmed, we make long-run results and short-run causality tests available in Table 4.6. However, as this method fails to provide robust results when the order of integration is I(2). When there is no evidence of long-causal relationship as variables as I(0), we apply a Granger non-causality test to check if

there is any relationship between the variables at least in the short-run.

4.6 Empirical Results

4.6.1 The Unit Root test results

Before moving to the description of the empirical strategy, our primary concern is to establish if our time series are stationary or if there is any presence of unit roots. Testing for unit roots is a necessary condition to perform the ARDL and Granger causality tests. Specifically, the unit root tests are conducted on the coefficient of the lagged dependent variable. If the coefficient of the lagged term is significantly different from zero, then the null hypothesis of unit root is rejected, which implies stationarity of the time series under consideration.

The conventional unit root tests, such as Augmented Dickey-Fuller (ADF) of Dickey et al. (1984), Dickey-Fuller test based on the GLS de-trending, Elliott et al. (1996) and the Phillips and Perron (1988) unit root tests, are not considered efficient, therefore, we have adopted the unit root test with breakpoints. Indeed, the conventional unit root tests might produce misleading results as they tend to ignore the presence of possible breaks in the mean or trend of the series, leading to wrong conclusions. A break represents a macroeconomic shock which might impact permanently on the series, so if this is not explicitly accounted we tend to accept the null hypothesis, which states that the residuals have a unit root, ignoring a possible co-integration relationship with one or two breaks. For our analysis, we employed the Zivot and Andrew (1992) and the Perron (1997) to test the stationarity of the variables with one structural break, but also the Lee and Strazicich (2003) minimum LM test with two breaks. We apply the unit root tests for the 22 out of 28 EU countries, as we have excluded Bulgaria, Cyprus, Czech Republic, Estonia Malta and Romania from the analysis due to the insufficient number of observations. The method adopted for the selection of the countries depends on whether we have been able to collect information on the number of immigrants and of the GDP per capita for at least the past 20 years.

The results of the unit root tests, reported in the following tables (Tables 4.3 and 4.4), indicate that *li* (logarithm of the Immigration per capita) is, for more than half of the countries, integrated of order 1, I(1), with the exception of Finland, France,

Greece, Ireland, Italy, Latvia, the Netherlands, Poland, Slovenia and which are integrated at level, I(0). While, only Austria is integrated of order 2, I(2). Similarly, the variable *ly* (logarithm of GDP per capita) is integrated of order 1, I(1), for almost the 22 countries with exception of Latvia and Luxembourg. In the case of Latvia, both the variables are integrated of order I(0), which indicates that there is not any long-run relationship between the two variables, *li* and *ly*. Having established the most likely order of integration of both the considered series for each country, we can proceed with the analysis of the long-run equilibrium by applying an ARDL model. For each unit root test we introduce change in the level of the series and changes in the level and slope of the trend of the series. The optimal lag structure of the tests are chosen as follows:

1. the Zivot-Andrews (1992) test is chosen based on the Schwartz Information Criterion;

2. the Perron (1997) test is chosen based on the F-test, based on the approach proposed by Said and Dickey (1984);

3. the Lee and Strazicich (2003) test is chosen following the Perron (1989) approach.

The specific optimal lag structure is displayed in parenthesis in Table 4.3 and Table 4.4.

Table 4.3: The Unit Root test with Breakpoints

		Unit Root tests with Breakpoints											
		Zivot and Andrew (1992)				Perron (1997)				*Lee and Strazicich (2003)*			
Country	Variable	*Intercept*	*T_b*	*Intercept & Trend*	*T_b*	*Intercept*	*T_b*	*Iter*	*T_b*	*Intercept*	*T_b*	*Intercept & Trend*	*T_b*
Austria	li	*N.A.*		*N.A.*		*-2.33 (4)*	*2006*	*-2.33 (4)*	*2006*	*-3.76 (6)***	*2003, 2007*	*-15.73 (5)****	*1999,2006*
	dli	*N.A.*		*N.A.*		*-3.84 (4)*	*2004*	*-5.16 (4)**	*2005*	*-3.37 (5)**	*1999, 2001*	*-10.51(5)****	*1998, 2004*
	ddli	N.A.		N.A.		-7.22 (4)***	2007	-7.21 (4)***	*2007*	*-40.18 (6)****	*1999, 2002*	*-192.51 (5)****	*1999, 2002*
	ly	*-3.95 (3)*	*2007*	*-3.56 (3)*	*2007*	*-4.20 (5)*	*2013*	*-3.48 (3)*	*2006*	*-3.61 (3)***	*2002, 2012*	*-7.11 (7)****	*2001, 2013*
	dly	*-5.88 (3)****	*2003*	*N.A.*		*-8.038 (1)****	*2002*	*-7.76 (1)****	*2002*	-5.36 (7)***	2010, 2012	*-10.54 (7)****	*2000, 2009*
Belgium	li	*-3.39 (3)*	*2008*	*-2.52 (3)*	*2010*	*-2.30 (4)*	*2007*	*-2.26 (4)*	*2004*	*-9.01 (8)****	*2001, 2006*	*-32.40 (8)****	*2007, 2010*
	dli	*-6.66 (3)****	*1998*	*-6.79 (1)****	*1998*	*-4.46 (5)*	*2000*	*-4.46(5)*	*2000*	*-4.69 (1)****	*2000, 2006*	*-30.60 (8)****	*2006, 2011*
	ly	*-3.91 (3)*	*2007*	*-3.60 (3)*	*2007*	*-3.89 (4)*	*2006*	*-3.55 (4)*	*2007*	*-3.40 (3)**	*2002, 2004*	*-9.23 (7)****	*2001, 2013*
	dly	*-5.92 (4)****	*2003*	*-5.21 (2) ***	*2003*	*-6.50 (4)****	*2002*	*-7.49(4)****	*2002*	*-4.69 (1)****	*2000, 2006*	*-30.60 (8)****	*2006, 2011*
Croatia	li	*N.A.*		*N.A.*		*-7.95 (0)****	*1999*	*-3.85 (5)*	***2013***	*-4.86 (6)****	*2000, 2008*	*-13.99 (8)****	*2000, 2008*
	dli	N.A.		N.A.		-8.15 (0)***	2010	-7.39 (0)***	2011	-1.69 (7)	2003, 2008	-5.13 (4)	1999, 2008
	ly	N.A.		N.A.		-3.82 (3)	2014	-4.14 (4)	2006	-37.17 (8)***	2001, 2007	-11.58 (6)***	2001, 2005
	dly	N.A.		N.A.		-4.53(0)	2008	-5.98 (3)***	2008	-7.12 (7)***	2003, 2007	-21.15 (6)***	1999, 2002
Denmark	li	-3.44 (3)	2003	-3.40 (3)**	2012	-3.37 (1)	2014	-3.44 (5)	2002	-2.29 (6)	2004,2006	-49.81 (8)***	2003, 2006
	dli	-3.77 (4)	2001	-5.14 (0)***	1996	-4.76 (0)	2011	-5.00 (0)	2009	-4.18(7)**	2001, 2008	-18.83 (7)***	2002, 2005
	ly	-3.27 (3)	2007	-3.12 (3)	2007	-3.45 (3)	2006	-3.26 (3)	2006	-3.05 (3)	2009, 2012	-8.38 (7)***	2001, 2013
	dly	-5.55 (3)***	2003	-5.29 (2)***	2003	-5.87 (3)***	2002	-6.51 (1)***	2002	-4.54 (0)***	2000, 2002	-5.38 (1)	2000, 2011
Finland	li	-4.57 (1)	2004	-5.20 (3)**	2013	-5.39 (3)***	2014	-5.20 (3)**	2013	-4.43 (8)***	2004, 2009	-5.06 (7)	2004, 2012
	dli												
	ly	-2.36 (3)	2003	2.15(3)	2003	-3.81 (1)	2005	-3.21 (0)	2012				
	dly	-6.77 (2)***	2003	-6.22 (2)***	2003	-4.80 (1)*	2002	-5.36 (1)**	2002				
France	li	-5.45 (1) **	2005	-5.58 (1)***	2005	-4.21(1)	2012	-5.31 (1)**	2004	-7.35 (8)***	2004, 2012	-11.23 (7)***	2000, 2003
	dli												
	ly	-3.24 (3)	2007	-2.35 (1)	2007	-3.60 (3)	2013	-3.91 (5)	2015	-2.90 (3)	2008, 2011	-8.25 (7)***	2000, 2012
	dly	-8.39 (1)***	2003	N.A.		-6.37 (3)***	2002	-9.00 (1)***	2002	-4.35 (8)***	2000, 2004	-18.63 (8)***	2001, 2006
Germany	li	-0.45 (0)	2011	-5.68 (0)***	2009	-2.41 (5)	2000	-4.35 (5)	2008	-2.37 (3)	2010, 2012	-22.00 (5)***	2002, 2007
	dli	-4.54 (0)	2010	-7.16 (0)***	2009	-5.84 (0)***	2011	-5.84 (0)***	2011	-3.71 (0)**	2000, 2003	-3.79 (0)**	2000, 2003
	ly	-4.06 (3)	2007	-4.02 (3)	2006	-3.93 (3)	2006	-4.04 (3)	2006	-3.94 (5)**	2002, 2012	-4.35 (3)	2001, 2010
	dly	-5.81 (3)***	2003	-5.81 (3)***	2003	-5.69 (3)**	2002	-8.39 (1) ***	2002	N.A.		N.A.	
Greece	li	-6.70 (0)***	2002	-6.53 (0)***	2002	-6.32 (0)***	2001	-6.03 (0)***	2001	-2.27 (8)	2002,2008	-18.22 (8)***	2003,2007
	dli												
	ly	-3.18 (3)**	2003	-3.15 (3)	2007	-4.03 (6)	2002	-3.83 (6)	2002	-3.29 (3)	2010, 2012	-23.37 (8)***	2001, 2005
	dly	-4.48 (0)***	2009	-4.64 (0)***	2002	-4.43 (0)	2001	-4.75 (5)	2006	-4.62 (0)***	2000,2007	-9.96(8)***	2000,2010
Hungary	li	N.A.		N.A.		-3.73 (0)	2013	-4.39 (4)	2011	-4.96 (7)***	2003,2008	-11.12 (6)***	2001, 2006
	dli	N.A.		N.A.		-5.20(0)**	2012	-8.60 (4)***	2008				
	ly	-3.62 (3)	2003	-3.01 (1)	2002	-3.98 (3)	2013	-4.15 (5)	2010	-2.61 (3)	2007,2011	-7.44 (7)***	2000, 2010
	dly	-5.34 (0)***	2001	N.A.		-4.29 (3)	2001	-4.78 (3)	2008	N.A.		N.A.	
Ireland	li	-4.94 (1)**	2008	-4.40 (1)	2004	-4.69 (0)*	2008	-5.85 (5)***	2005	-3.96 (1)**	2006, 2008	-7.25 (2)***	2004, 2010
	dli												
	ly	-4.06 (1)	2009	-5.40 (4)**	2002	-5.16 (4)**	2002	-5.40 (4)**	2002	-2.85 (3)	2009, 2013	-7.55 (4)***	2001, 2012
	dly	-4.96 (1)***	2008	-5.60 (1)***	2008	-5.16 (4)***	2008	-4.77 (4)	2008	-3.76 (0)**	2000, 2005	-7.99 (8)***	2005, 2008
Italy	li	-2.50 (2)	2011	-4.75 (2)	2009	-3.63 (0)	2012	-5.18 (0)**	2006	-3.87 (8)**	2004, 2008	-11.03 (8) ***	2002, 2005
	dli												
	ly	-3.49 (1)	2003	-2.69 (1)	2003	-3.49 (1)	2003	-2.69 (1)	2003	-2.68 (8)	2003, 2006	-9.53(8)***	2006, 2013
	dly	-5.27 (0)**	2002	-5.61 (0)***	2002	-5.32 (3)**	2002	-5.36 (1)**	2003	-5.29 (0)***	2000, 2007	-6.48 (7)**	2000, 2011
Latvia	li	-4.50 (0)	2000	-4.68 (0)	2000	-4.70 (0)*	2010	-4.37 (0)	2010	-3.85 (8)**	2000, 2009	-10.55 (8)***	2007, 2011
	dli												
	ly	N.A		N.A.		-4.80 (3)*	2014	-5.34 (4)**	2006	-5.28 (7)***	2003, 2007	-11.91 (6)***	1999, 2007
	dly												

Note: The "d" and "dd" are the first and second difference operator. The T_b represents the time of break.*,**,*** indicates the rejection of the null hypothesis at 10%, 5% and the 1% significant level respectively.

Table 4.4: The Unit Root test with Breakpoints

		Unit Root tests with Breakpoints											
		Zivot and Andrew (1992)				Perron (1997)				*Lee and Strazicich (2003)*			
Country	Var.	*Intercept*	*T_b*	*Intercept & Trend*	*T_b*	*Intercept*	*T_b*	*Iter*	*T_b*	*Intercept*	*T_b*	*Intercept & Trend*	*T_b*
Lithuania	li	*-3.74 (0)*	*2011*	*N.A.*		*-3.68 (0)*	*2010*	*-4.20 (5)*	*2008*	*-2.51 (7)*	*2004, 2010*	*-4.83 (8)*	*2003, 2009*
	dli	*N.A*		*N.A.*		*-4.68 (0)**	*2000*	*-5.55 (0)*	*2000*	*-4.62 (6)****	*2004, 2008*	*-11.45 (3)****	*2000,2011*
	ly	N.A		N.A.		-3.55 (0)	2014	-4.00 (4)	*2006*	*-35.67 (8)****	*2003, 2008*	*-11.03(5)****	*2000, 2006*
	dly	*N.A*		*N.A.*		*-5.82 (1)****	*2008*	*-12.68 (3)****	*2008*	*-4.32 (1)***	*1998, 2011*	*-11.58 (4)****	*2001, 2004*
Luxemburg	li	*N.A*		*-4.21 (0)*	*1996*	*-3.66 (1)*	*2006*	*-4.43 (0)*	*1999*	-4.50 (7)***	2004, 2008	*-12.41 (*)****	*2002, 2007*
	dli	*N.A*		*-6.23 (1)****	*2000*	*-6.17 (0)****	*2011*	*-5.91 (1)****	*2002*	*-6.73 (4)****	*2005, 2007*	*-17.72 (7)****	*2001, 2011*
	ly	*-3.01 (3)*	*2004*	*-2.91 (3)*	*2010*	*-5.55 (5)****	*2013*	*-5.11 (5)**	*2012*	*-3.68 (3)***	*2001, 2012*	*-6.37 (3)***	*2001, 2013*
	dly												
Netherland	li	*-3.49 (1)*	*2003*	*-3.82 (1)*	*2003*	*-6.29 (3)**	*2003*	*-6.33 (3)****	*2003*	*-3.36 (1)**	*2001, 2007*	*-8.59 (5)****	*2004, 2007*
	dli												
	ly	-2.85 (3)	2007	-3.15 (3)	2007	-4.37 (5)	2013	-3.96 (5)	2012	-3.22 (3)	2002, 2012	-11.00 (7)***	2001, 2012
	dly	-4.93 (2)**	2003	-4.98 (2)*	2003	-6.95 (1)***	2002	-7.17 (1)***	2002	-4.76 (5)***	2004, 2007	-12.43 (8)***	2000, 2009
Poland	li	-13.08 (0)***	2009	-10.56 (0)***	2009	-13.80 (0)***	2008	-11.23 (0)***	2008	-4.13 (&)***	2001, 2009	-8.16 (5)***	2001, 2007
	dli												
	ly	-2.20 (3)	2005	-3.76 (3)	2010	-3.43 (3)	2004	-3.58 (3)	2010	-3.96 (3)**	2009, 2011	-10.31 (7)***	2007, 2010
	dly	-5.94 (0)***	2009	-5.76 (0)***	2009	-5.50 (0)***	2003	-5.64 (0)**	2003	-3.31 (7)*	2005, 2009	-26.74 (8)***	2000, 2006
Portugal	li	-4.56 (4)	2003	-4.17 (3)	2003	-4.36 (4)	2012	-4.15 (4)	2012	-8.96 (8)***	2001, 2008	-4.10 (6)	1999, 2006
	dli	-4.18 (0)	2001	N.A.		-3.80 (0)	2003	-5.67 (5)**	2005	-2.47 (0)	2000, 2002	-43.96 (8)***	2001, 2010
	ly	-3.19 (3)	2003	-3.50 (3)	2007	-3.78 (6)	2003	-3.36 (6)	2002	-3.46 (3)*	2009, 2012	-6.73 (8)**	2001, 2005
	dly	-4.40 (2)	2003	-4.63 (2)	2003	-7.96 (1)***	2002	-5.54 (0)**	2001	-8.45 (1)***	2001, 2006	-13.28 (8)***	2005, 2011
Slovakia	li	-3.75 (1)	2004	-3.97 (1)	2004	-3.83 (0)	2003	-4.72 (5)	2000	-3.69 (8)**	2002, 2008	-6.24 (7)*	2000, 2007
	dli	-5.07 (3)**	2009	-10.17 (2)***	2009	-5.89 (2)**	2011	-5.76 (2)***	2011	-4.69 (0)***	2000, 2002	10.53 (8)***	2001, 2004
	ly	-2.79 (3)	2003	-3.96 (3)	2007	-4.42 (3)	2014	-4.19 (5)	2012	-3.79 (3)**	2009, 2012	-11.45 (8)***	2001, 2013
	dly	-5.19 (3)**	2003	-4.68 (2)	2003	-6.24 (1)***	2002	-6.08 (1)***	2002	-5.06 (6)***	2006, 2010	-7,44 (7)***	2007, 2010
Slovenia	li	-4.76 (1)*	2010	-5.59 (1) ***	2007	-4.70 (1)*	2012	-5.63 (1)**	2006	-3.26 (7)	2000, 2009	-13.42 (8)***	2001, 2004
	dli												
	ly	N.A.		N.A.		-3.45 (3)	2014	-2.93 (3)	2014	-49.43 (8)***	2006, 2009	-7.39 (6)***	2001, 2009
	dly	N.A.		N.A.		-4.86 (0)**	2008	-5.30 (3)**	2008	-7.94 (6)***	2002, 2007	-7.74 (6)***	2001, 2006
Spain	li	-2.85 (0)	2008	-3.94 (0)	2000	-3.05 (0)	1998	-5.71 (5)**	2006	-8.14 (8)***	2000, 2007	-6.85 (5)**	2002, 2007
	dli	-5.55 (0)***	1997	-5.32 (0)**	1997	-5.27 (0)**	2000	-5.46 (0)**	2000	-4.20 (8)***	2000, 2008	-7.33 (7)***	2002, 2005
	ly	-4.06 (3)	2003	-3.25 (3)	2003	-4.84 (6)*	2002	-4.20 (6)	2006	-2.85 (8)	2001, 2007	-16.72 (8)	2006, 2013
	dly	-3.52 (2)	2009	-4.11 (2)	2003	-5.18 (0)**	2008	-6.58 (6)***	2007	-6.86 (1)***	2001, 2007	-20.09 (8)	2000, 2009
Sweden	li	N.A.		N.A.		-16.76 (4)***	2005	-15.38 (4)***	2006	-3.18 (7)	2000, 2005	-11.10 (4)***	2001, 2006
	dli	-4.75 (4)*	2010	-5.55 (3)***	2000	-7.94 (4)***	2006	-5.04 (4)*	2006	-5.15 (1)***	2001, 2008	-6.08 (6)*	2000, 2004
	ly	-2.65 (3)	2004	-3.99 (1)	2006	-4.35 (1)	2005	-2.65 (2)	2004	-3.77 (8)**	2008, 2010	-6.91 (7)**	2006, 2009
	dly	-5.73 (1)***	2002	-6.61 (1)***	2003	-5.63 (1)	2002	-8.68 (6)***	2007	-5.64 (1)	2001, 2004	-5.64 (1)***	2000, 2003
UK	li	-5.64 (0)***	1998	-5.60 (0)***	1998	-4.12 (5)	2004	-4.09 (5)	2003	-4.56 (6)**	2000, 2007	-9.60 (7)***	2006, 2012
	dli												
	ly	-2.25 (4)	2013	-4.96 (4)*	2007	-3.68 (3)	2002	-7.71 (3)***	2006	-3.06 (3)	2001, 2009	-7.31 (3)***	2005, 2009
	dly	-5.14(4)**	2008	-4.29 (2)	2008	-5.52 (4)***	2007	-6.02 (6)***	2006	-4.06(1)**	2002, 2011	-7.60 (5)***	2004, 2008

Note: The "d" and "dd" are the first and second difference operator. The T_b represents the time of break.*,**,*** indicates the rejection of the null hypothesis at 10%, 5% and the 1% significant level respectively.

4.6.2 Co-integration Results

The results of the unit-root test with breakpoints show that the order of integration for *li* and *ly* is not always the same, as some countries are integrated of order I(0), I(1), but also in I(2). After testing for the stationarity in the series, we test for any co-integration relationship between variables, to ensure that variables will not move too far apart and will converge over time. This is also valid whether a variable is non-stationary or there is any large drift.

In this study, we test for co-integration by applying an Autoregressive Distributed Lags (ARDL) model since it provides several advantages. One of the main advantage is that it allows to test variables integrated at different levels, specifically I(0) and I(1), although it fails to test a co-integration relationship between variables integrated of order I(0) or I(1) and those which are integrated of order I(2). As in our case we have variables integrated at different levels, we have preferred the ARDL model to test for the existence of co-integration establishing the presence of a long-run relationship. This approach offers significant statistical bases for the Error Correction Term (ECT) through the application of the ARDL bound test (Pesaran et al., 2001), which has also the advantage to provide information on the relationship between GDP per capita and Immigration per capita in the short-run. The ARDL model is a dynamic model as it tests the impact of the explanatory variables and its lags on the dependent variables but also the lags of the dependent variables on the latter, allowing us to understand both the size and the direction of the impact over time. In this analysis we test two specification models using as dependent variables, first, the *ly* and, then, the *li*, by applying eq (4.1) and eq (4.2) respectively for each variable. When we estimated the co-integration tests, we tried various dummy variables following all the suggested breaks provided by the unit root tests with breakpoints, as well as additional breaks observed by looking at the time-series plots of the dataset. All dummy variables are included in the regressions as exogenous variables. By regressing one variable over the other and vice versa, we are not only able to observe any unidirectional casuality relationship between the two variables, but also any possible bi-directional relationship.

As first step of the ARDL bounds testing for co-integration, we have estimated an F-test under the null hypothesis that a long-run relationship between variables does not exist. The hypothesis test is different from the classical hypothesis testing as it involves a lower and upper-bounds of critical values. Results on the bounds

testing for co-integration are reported in Table 4.5. From this table, based on the direction of the relationship between variable *ly* and *li*, we can observe three different subgroups of results for co-integration :

1. `Unidirectional relationship from li to ly`, in this case, we can conclude that *Immigration per capita* Granger-causes *GDP per capita* in Belgium, Croatia, Germany, Italy, Slovakia, Spain and the United Kingdom. No reverse causality is observed;

2. `Unidirectional relationship from ly to li`, in this case, the we can conclude that only *GDP per capita* Granger-causes *Immigration per capita* in France, Ireland, Luxembourg, and the Netherlands. No reverse causality is observed;

3. `Bi-directional relationship between ly to li`, in this case, not only *Immigration per capita* Granger-causes *GDP per capita*, but also *GDP per capita* Granger-causes *Immigration per capita*. This is verified for Finland, Greece, Poland, Portugal, Slovenia and Sweden.

We carried out different diagnostic tests to verify the validity of the models. All the countries previously listed have passed all the diagnostic tests, suggested by De Vita et al. (2018). Specifically, we perform: i) the Breusch-Godfrey for serial correlation; ii) the ARCH for heteroskedasticity; iii) the Jarque-Bera for normality; iv) the Ramsey RESET test for the functional form; v) the cumulative sum of recursive residuals (CUMSUM) and the CUMSUM sum of squares (CUMSUMSQ) for the models stability.

The results are reported under corresponding model in Table 4.5, with exception for the results of the CUMSUM and CUMSUM of Squares which are reported in the Appendix, respectively from Figure 6.1 to Figure 6.5, and from Figure 6.6 to Figure 6.10. As it is possible to observe from Table 4.5, we cannot conclude that there is a co-integration relationship for Germany for the regression model where *GDP per capita* Granger-causes *Immigration per capita*. Indeed, the results of one of the diagnostic tests, the Breusch-Godfrey for serial correlation, indicate that we reject the null hypothesis of no serial correlation, meaning the model is incorrect. Indeed, the ARDL model is used to remove the auto-correlation from a series either I(1) or I(0) by including lags of dependent and independent variables and, for this reason, we conclude that the estimators are biased and inconsistent. Indeed, according Pesaran et al. (2001) it is necessary that errors are serially uncorrelated for the

validity of the bounds tests. Similar is the case of Lithuania which residuals suffer of autocorrelation.

Moreover, the results of the ARDL Bounds co-integration test for Denmark and Hungary are not significant. Therefore, also for this two countries we can not observe any long-run relationship.

Table 4.5: Bounds testing for co-integration

Country	Belgium				Croatia			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(4, 4)		*ARDL(1, 0)*		*ARDL(4,1)*		*ARDL(1, 2)*	
F-test	9.948***		*1.200*		*4.922***		*2.225*	
Dummy	2002		*2000*				*2008*	
Statistics and Diagnostic tests								
R_square	0.856		0.077		0.716		0.290	
Serial correlation	4.693	(0.095)	0.746	(0.688)	3.900	(0.142)	2.382	(0.303)
Heteroschedasticity	0.509	0.475	0.050	(0.822)	0.586	(0.443)	1.717	(0.190)
Normality	3.613	(0.164)	1.123	0.570	0.525	(0.799)	0.218	(0.896)
Functional Form	0.107	(0.750)	1.518	(0.236)	0.020	(0.886)	1.552	(0.146)
Country	Denmark				Finland			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(4, 1)		ARDL(2, 0)		ARDL(4, 3)		ARDL(2, 0)	
F-test	2.119		2.251		6.157***		5.316**	
Dummy							2004	
Statistics and Diagnostic tests								
R_square			0.223		0.665		0.498	
Serial correlation	0.413	(0.813)	2.080	0.353)	2.306	(0.315)	1.489	(0.474)
Heteroschedasticity	0.395	(0.529)	0.292	(0.588)	1.902	(0.167)	3.534	(0.060)
Normality	0.660	(0.710)	6.600	(0.035)	0.321	(0.861)	0.193	(0.907)
Functional Form	0.095	(0.761)	0.275	(0.605)	0.192	(0.668)	0.038	(0.847)
Country	France				Germany			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(1, 3)		ARDL(1, 1)		ARDL(2, 4)		ARDL(4, 4)	
F-test	0.778		9.169***		4.850***		15.043***	
Dummy	2002		1994-1995		2010		2009	
Statistics and Diagnostic tests								
R_square	0.354		0.646		0.680		0.914	
Serial correlation	0.559	(0.756)	0.594	(0.742)	0.869	(0.647)	9.432	(0.009)
Heteroschedasticity	0.058	(0.809)	0.612	(0.433)	0.029	(0.864)	2.999	(0.083)
Normality	6.399	(0.040)	0.000	(0.990)	0.794	(0.672)	0.604	(0.739)
Functional Form	4.913	(0.043)	0.119	(0.690)	1.068	(0.321)	4.161	(0.068)
Country	Greece				Hungary			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(4, 0)		ARDL(1, 0)		ARDL(4, 3)		ARDL(1, 0)	
F-test	3.748*		4.89**		1.555		0.685	
Dummy	2003		2002		2002		2008	
Statistics and Diagnostic tests								
R_square	0.755		0.542		0.788		0.276	
Serial correlation	4.528	(0.103)	1.071	(0.585)	4.142	(0.126)	4.896	(0.086)
Heteroschedasticity	0.081	(0.775)	1.364	(0.242)	1.446	(0.229)	0.482	(0.487)
Normality	1.815	(0.403)	0.592	(0.743)	1.449	(0.484)	0.324	(0.850)
Functional Form	0.266	(0.613)	1.719	(0.205)	2.262	(0.176)	0.594	(0.452)
Country	Ireland				Italy			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(3, 0)		ARDL(4, 4)		ARDL(1, 0)		ARDL(1, 1)	
F-test	3.121		7.927***		5.143**		1.296	
Dummy	2008				2002		2008	
Statistics and Diagnostic tests								
R_square	0.389		0.820				0.332	
Serial correlation	1.019	(0.600)	4.075	(0.130)	1.255	(0.533)	1.570	(0.456)
Heteroschedasticity	0.164	(0.684)	0.010	(0.920)	0.050	(0.821)	1.458	(0.227)
Normality	0.571	(0.751)	1.044	(0.593)	2.376	(0.304)	1.339	(0.511)
Functional Form	0.279	(0.604)	0.582	(0.461)	0.718	(0.347)	0.628	(0.437)
Country	Lithuania				Luxembourg			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	

Specification	ARDL(4, 3)		ARDL(1, 3)		ARDL(4, 0)		ARDL(1, 4)	
F-test	1.329		3.615*		2.296		5.506**	
Dummy	2011		2008		2012			
Statistics and Diagnostic tests								
R_square	0.643		0.635		0.554		0.631	
Serial correlation	10.311	0.0058	5.887	(0.052)	4.910	(0.085)	1.211	(0.545)
Heteroschedasticity	0.563	0.453	1.048	(0.305)	0.022	(0.881)	0.021	(0.882)
Normality	0.424	0.808	0.426	(0.811)	0.652	(0.721)	0.286	(0.866)
Functional Form	2.775	0.146	0.364	(0.559)	4.785	(0.046)	0.224	(0.643)
Country	**Netherlands**				**Poland**			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(3, 4)		ARDL(4, 4)		ARDL(3, 3)		ARDL(3, 4)	
F-test	4.306***		7.236***		11.416***		144.742***	
Dummy	2009		2001		2009-2015		2009-2015	
Statistics and Diagnostic tests								
R_square	0.664		0.724		0.797		0.987	
Serial correlation	2.248	(0.324)	2.703	(0.258)	4.585	(0.101)	1.887	(0.389)
Heteroschedasticity	0.855	(0.355)	0.109	(0.740)	0.130	(0.717)	2.485	(0.114)
Normality	0.490	(0.782)	0.716	(0.699)	11.371	(0.003)	0.807	(0.669)
Functional Form	0.059	(0.811)	0.589	(0.460)	0.043	(0.837)	1.751	(0.212)
Country	**Portugal**				**Slovakia**			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(4, 1)		ARDL(4, 0)		ARDL(1, 0)		ARDL(2, 2)	
F-test	5.558**		5.245**		5.682***		2.393	
Dummy	2012				2007			
Statistics and Diagnostic tests								
R_square	0.747		0.652		0.232		0.300	
Serial correlation	4.760	(0.092)	5.141	(0.076)	1.678	(0.432)	2.881	(0.236)
Heteroschedasticity	0.427	(0.513)	0.094	(0.758)	0.007	(0.929)	0.033	(0.855)
Normality	5.486	(0.060)	1.266	(0.530)	0.401	(0.818)	120.419	(0.000)
Functional Form	0.903	(0.359)	0.076	(0.786)	2.852	(0.106)	0.019	(0.889)
Country	**Slovenia**				**Spain**			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(3,1)		ARDL(2, 0)		ARDL(4, 3)		ARDL(1, 1)	
F-test	3.969*		15.672***		7.947***		2.166	
Dummy	2002		2002				2009	
Statistics and Diagnostic tests								
R_square	0.570		0.738		0.780		0.247	
Serial correlation	1.365	(0.505)	2.385	(0.303)	2.178	(0.336)	1.269	(0.530)
Heteroschedasticity	1.177	(0.277)	0.202	(0.652)	0.033	(0.854)	0.014	(0.902)
Normality	0.374	(0.829)	0.487	(0.785)	0.444	(0.801)	0.550	(0.791)
Functional Form	18.573	(0.001)	2.470	(0.139)	1.003	(0.336)	0.918	(0.349)
Country	**Sweden**				**UK**			
ARDL Model	li ⇒ly		ly ⇒li		li ⇒ly		ly ⇒li	
Specification	ARDL(4, 4)		ARDL(4, 4)		ARDL(4, 4)		ARDL(1, 4)	
F-test	6.888***		4.653**		5.295**		2.096	
Dummy	2007		2006				2007	
Statistics and Diagnostic tests								
R_square	0.736		0.832		0.642		0.610	
Serial correlation	2.014	(0.365)	4.383	(0.111)	3.470	(0.176)	0.666	(0.716)
Heteroschedasticity	0.432	(0.510)	0.180	(0.671)	1.536	(0.215)	0.012	(0.910)
Normality	0.762	(0.683)	0.409	(0.814)	1.165	(0.558)	8.475	(0.014)
Functional Form	2.229	(0.166)	3.827	(0.078)	1.328	(0.273)	6.793	(0.002)

Note:*,**,*** indicates the rejection of the unit root null hypothesis at 5% and the 1% significant level respectively.
The numbers in brackets denote the standard errors.

When the F-statistic is bigger than the upper-bound we can not accept the null hypothesis of no co-integration, and as the F-statistics results are satisfactory, we estimate a beta-coefficient which express the long-run relationship between the variables. Specifically, this offers the possibility to determine the sign, size and direction of the relationship between *GDP per capita* and *Immigration per capita* in the long-run. In Table 4.6, all the long-run coefficients reported are significant, representing different possible co-integration relationships. This is true, with the exception for

two ARDL models: the one for the Netherlands, when the dependent variable is *ly* and the one for Slovakia when the dependent variable *ly*.

Using the ARDL framework, we are also able to describe the speed of convergence of the short-run adjustments to the long-run equilibrium. This is captured by the coefficient of the lagged Error Correction Term (ECT) in Table 4.6. Specifically, we compute a Error Correction Model which not only provides the speed of convergence, but also the short-run adjustments to the steady-state equilibrium. Besides, when we have identified more than one short-run impact of the regressors on the dependent variable, we test whether all the short-run adjustments affect significatively the long-run equilibrium by applying a Wald test under the null hypothesis that there is a common impact among all the short-term coefficients. Mainly, we restricted the coefficients of the lagged level variables equal to zero. Results of the long-run and short-run coefficients but also of the ECTs are reported in Table 4.6.

Table 4.6: Long-run Coefficients and Short-run Dynamics of ARDL

Country	***Belgium***		***Croatia***		***Finland***				***France***	
Dep.Var.	***ly***		***ly***		***ly***		***li***		***li***	
Dummy	2002						2004		1994-1995	
Long-run Coefficients										
Variables										
li	0.771***	(0.005)	-0.714***	(0.160)	0.961***	(0.085)				
ly							0.980***	(0.150)	1.859***	(0.244)
Short-Run Coefficients										
$\Delta\, ly$									0.298	(0.346)
$\Delta\, ly_{t-1}$	0.471	(0.125)	0.580***	(0.182)	0.606***					
$\Delta\, ly_{t-2}$	-0.461***	(0.133)	0.099	(0.22)	0.022					
$\Delta\, ly_{t-3}$	0.525***	(0.129)	0.558**	(0.198)	0.467**					
$\Delta\, li$	-0.196	(0.098)	0.089	(0.112)	0.450**	(0.220)				
$\Delta\, li_{t-1}$	-0.656***	(0.137)			-0.269	(0.173)	-0.088	(0.131)		
$\Delta\, li_{t-2}$	-0.402**	(0.155)			-0.761***	(0.164)				
$\Delta\, li_{t-3}$	-0.322**	(0.129)								
DUM	-0.146**	(0.062)					0.031	(0.083)	-0.52	(0.114)
ECT(-1)	-0.678	(0.114)	-0.409	(0.097)	-0.761***	(0.164)	-0.390***	(0.093)	-0.509***	(0.009)
Wald test	5.669**									
Country	***Germany***		***Greece***				***Ireland***		***Italy***	
Dep.Var.	***ly***		***ly***		***li***		***li***		***ly***	
Dummy	2010		2003		2002				2002	
Long-run Coefficients										
Variables										
li	-1.39***	(0.504)	-0.956***	(0.234)					0.500*	(0.093)
ly					-0.628***	(0.127)	0.457***	(0.087)		
Short-Run Coefficients										
$\Delta\, ly$							0.877***	(0.282)		
$\Delta\, ly_{t-1}$	0.580***	(0.170)	0.572***	(0.151)			0.320	(0.332)		
$\Delta\, ly_{t-2}$			-0.214	(0.181)			0.466	(0.314)		
$\Delta\, ly_{t-3}$			0.552***	(0.153)			1.354 ***	(0.340)		
$\Delta\, li$	0.102	(0.089)								
$\Delta\, li_{t-1}$	-0.457***	(0.077)					0.405***	(0.142)		
$\Delta\, li_{t-2}$	0.104	(0.141)					0.113	(0.158)		
$\Delta\, li_{t-3}$	0.275***	(0.083)					-0.260	(0.140)		
DUM	-0.527***	(0.139)	0.172**	(0.069)	-0.325***	(0.108)			-0.006	(0.077)
ECT(-1)	-0.252***	(0.062)	-0.254***	(0.071)	-0.537***	(0.133)	-0.677***		-0.341***	(0.082)
Wald test	12.647***						3.382			
Country	***Luxembourg***		***Netherlands***				***Poland***			
Dep.Var.	***li***		***ly***		***li***		***ly***		***li***	
Dummy			2009		2001		2009-2015		2009-2015	
Long-run Coefficients										
Variables										
li			74.343	(386.062)			2.974***	(1.009)		
ly	0.463***	(0.039)			0.084*	(0.043)			0.405***	(0.069)
Short-Run Coefficients										
$\Delta\, ly$	0.319**	(0.130)			-0.503*	(0.257)			0.788***	(0.243)
$\Delta\, ly_{t-1}$	-0.346**	(0.149)	0.223	(0.215)	-0.388	(0.282)	-0.088	(0.186)	0.837***	(0.216)
$\Delta\, ly_{t-2}$	-0.315	(0.145)	-0.447*	(0.223)	-0.846***	(0.248)	-0.586***	(0.163)	0.844***	(0.226)
$\Delta\, ly_{t-3}$	-0.336	(0.186)			-0.625	(0.320)			0.825***	(0.204)
$\Delta\, li$			-0.479**	(0.170)			0.390***	(0.081)		
$\Delta\, li_{t-1}$			0.264	(0.199)	0.635***	(0.213)	0.133***	(0.032)	-0.219***	(0.045)
$\Delta\, li_{t-2}$			0.363*	(0.179)	0.597***	(0.212)	0.055**	(0.026)	-0.192***	(0.047)
$\Delta\, li_{t-3}$			0.404**	(0.162)	0.300	(0.204)				
DUM			-0.170	(0.102)	0.145	(0.090)	-1.276***	(0.196)	2.692***	(0.117)
ECT(-1)	-0.841***	(0.194)	0.011***	(0.002)	-1.664***	(0.328)	-0.126***	(0.020)	-0.839***	(0.037)
Wald test	5.643		1.067		1.096		7.573***		N.A.	
Country	***Portugal***				***Slovakia***				***Slovenia***	
Dep.Var.	***ly***		***li***		***ly***		***li***		***ly***	
Dummy	2012				2007		2007-2008		2002	
Long-run Coefficients										
Variables										
li	-0.592***	(0.122)			0.340	(50.565)			0.600***	(0.092)]
ly			-1.446***	(0.285)			0.385**	(0.163)		
Short-Run Coefficients										
$\Delta\, ly$							-0.755	(0.619)		
$\Delta\, ly_{t-1}$	0.307**	(0.125)							0.295	(0.227)
$\Delta\, ly_{t-2}$	-0.236*	(0.120)							-0.542**	(0.243)
$\Delta\, ly_{t-3}$	0.243*	(0.120)								
$\Delta\, li$	-0.200***	(0.053)							0.120	(0.087)

Table 4.6 continued from previous page

$\Delta\, li_{t-1}$			0.544***	(0.178)			0.392*	(0.201)		
$\Delta\, li_{t-2}$			0.352	(0.211)			0.444**	(0.193)		
$\Delta\, li_{t-3}$			-0.282**	(0.123)						
DUM	-0.196***	0.054			0.148	(0.095)	0.509*	(0.255)	-0.130	(0.106)
ECT(-1)	-0.216***	0.049	-0.535***	(0.126)	-0.073***	(0.016)	-0.843***	(0.208)	-0.463***	(0.123)
Wald test										
Country	***Slovenia***		***Spain***		***Sweden***				***United Kingdom***	
Dep.Var.	***li***		***ly***		**ly**		**li**		**ly**	
Dummy	2002				2007		2006			
Long-run Coefficients										
Variables										
li			0.223***	(0.032)	0.929***	(0.069)			0.417***	(0.007)
ly	1.381***	(0.143)					1.064***	(0.085)		
Short-Run Coefficients										
$\Delta\, ly$							0.612**	(0.262)		
$\Delta\, ly_{t-1}$			0.286	(0.122)	0.887***	(0.208)	-1.387	(0.313)	0.753***	(0.203)
$\Delta\, ly_{t-2}$			-0.256	(0.122)	-0.304	(0.185)	0.092	(0.269)	-0.122	(0.187)
$\Delta\, ly_{t-3}$			0.270**	(0.118)	0.492**	(0.176)	-0.745	(0.292)	0.477**	(0.215)
$\Delta\, li$			-0.069	(0.369)	0.387**	(0.134)			-0.020	(0.116)
$\Delta\, li_{t-1}$	0.537***	(0.125)	-0.093	(0.048)	-0.739***	(0.170)	0.812***	(0.224)	-0.255**	(0.112)
$\Delta\, li_{t-2}$			-0.123**	(0.047)	-0.147	(0.104)	0.107	(0.145)	-0.205*	(0.101)
$\Delta\, li_{t-3}$					-0.361***	(0.103)	0.327**	(0.154)	-0.149	(0.093)
DUM	0.142	(0.142)			0.174**	(0.080)	0.241**	(0.269)		
ECT(-1)	-0.943***	(0.129)	-0.440***	(0.084)	-0.906***	(0.183)	-1.096***	(0.269)	-0.526***	(0.122)
Wald test			5.101		-10.635***		-18.005***		1.150	

Note:*,**,*** indicates the rejection of the unit root null hypothesis at 5% and the 1% significant level respectively.
The numbers in brackets denote the standard errors.

In Table 4.6, the values of short-term adjustments are reported with Δ in front of the variable, as the short-run adjustments are a result of all the variations of the lags both of the GDP per capita or Immigration per capita. The ECT values are instead indicated by the coefficient of the ECT (-1) variable, which confirms the presence of a co-integration relationship, previously found in Table 4.5. Discussion of the results in Table 4.6 are reported in the section 4.7 of this chapter.

4.6.3 Tests for Granger-Causality and Short-run Causality Tests

We have found few cases when the variable *ly* and *li* are not co-integrated. Indeed, as we have seen before, we could not test the ARDL bounds co-integration for Austria, as the *ly* variable is integrated of I(2). In the case Latvia, both the variables are integrated of order I(0), which means that it is not possible to find any long-run relationship between the two variables. In the latter case, as both the variables are stationary, we can still check for any relationship between the variables at least in the short-run by testing for the absence of Granger-causality. Specifically, we simultaneously estimate the eq 3.7 and eq 3.8. A rejection of the null hypothesis, in case that the coefficients are significant, implies that there is presence of Granger-causality in the short-run.

Table 4.7: The Granger-Causality Tests

Countries	**Direction**	**(4,4)**	**(3,3)**	**(2,2)**
Latvia	$li \nRightarrow ly$	1.005	0.371	0.487
	$ly \nRightarrow li$	1.117	2.392	0.908

Note: the symbol $\nRightarrow$ indicates that there is not any causal relationship between the two variables, under the hypotheses that the immigration to population ratio do not Grange-cause the GDP per capita and vice versa. $***, **, *$ reflect the $1\%, 5\%, 10\%$ level of significance respectively.

Table 4.8: The Short-run Causality Tests

Short-Run Coefficients												
Countries	Denmark				Hungary				*Lithuania*			
Dependent. Var.	*ly*		*li*		*ly*		*li*		*ly*		*li*	
Δly							*0.153*				0.504	(0.509)
Δly_{t-1}	0.559**	(0.196)			0.603**	(0.160)			0.269	(0.241)		
Δly_{t-2}	-0.347	(0.207)							-0.271	(0.285)		
Δly_{t-3}	0.357	(0.204)							0.830***	(0.256)		
Δli	-0.031	(0.165)			0.037	(0.102)			0.154	(0.080)		
Δli_{t-1}			0.299	(0.169)	0.593***	(0.117)	0.830***	(0.172)	0.246**	(0.087)	0.542	(0.567)
Δli_{t-2}									0.188**	(0.069)	*-2.07****	(0.531)
Δli_{t-3}												
DUM												
CointEq(-1)*	-0.074**	(0.027)	-0.587**	(0.013)	*-0.154****	(0.045)			-0.085**	(0.034)	-0.430***	(0.122)

Note:*,**,*** indicates the rejection of the unit root null hypothesis at 5% and the 1% significant level respectively.
The numbers in brackets denote the standard errors.
Note:*,**,*** indicates the rejection of the unit root null hypothesis at 5% and the 1% significant level respectively.

Looking at the results of Table 4.7, we can conclude that that also in the short-run there is not any unidirectional or bidirectional causal relationship between *GDP per capita* and *Immigration per capita* for Latvia. The cases of Denmark, Hungary and Lithuania are different, as the GDP per capita and Immigration per capita are not integrated at the same level. After testing for co-integration, we observe that the results of the bounds tests are not significant, confirming that for these countries there is no evidence of a long-run relationship between *GDP per capita* and *Immigration per capita*. To this end, we check whether there is any causal relationship between variables at least in the short-run. Results of the short-run causality tests in Table 4.8 illustrate the presence of an unidirectional causality from *Immigration per capita* to *GDP per capita* for both Hungary and Lithuania. For Denmark, instead, we could not find evidence of short-run causality relationship between the variables.

4.7 Discussion of the Empirical Results

4.7.1 Introduction

All EU countries share similar issues: economic stagnation, ageing population and a high share of unemployment. Unemployment rates have increased significantly during the global crisis in the mid-2000s. The increase in unemployment levels has heightened the concern of workers on the possible impact on the labour market and the wages of the workers. This concern grows as soon as natives enter in competition with the migrants. As a consequence, the public opinion tends to be adverse toward migration especially in countries where there is an elevated density of migrants (Hatton, 2016).

Politicians, who are voted by citizens scared that migrants might take their jobs or use national welfare system, generally believe that migrants are only welfare recipients and not contributors. In this context, policy-makers need to choose which migrants have the right to stay; whether approval should be given to individuals who move for economic or humanitarian reasons, permanently or temporary, legally or illegally (Hillman and Weiss, 1999). In the EU countries, the migration phenomenon is endogenously controlled (Massey, 1999), as European governments define the quota for the access of foreigners in country imposing restrictive migration policies. Therefore, European policy-makers have to cope with both anti-immigration sentiments and the needs of the markets to cover the job shortages.

From 1990, the geography of Europe changed significantly and, at the same time, the composition of the migration flows begun to change with a decrease in the inflows of economic and refugee migrants due to the introduction of restrictive migration policies. These policies were enforced with sophisticated systems of control at the borders and detention/expulsion for those who crossed the borders illegally. This process of "securitisation" emphasised by the metaphor of "Fortress Europe" (De Haas et al., 2016) has been implemented by the Council of Europe's acquis on asylum seekers' treatment through the negotiation of the Common European Asylum System. The aim was, on one hand, to increase the responsibility and sense of solidarity, and, on the other hand, to avoid the imbalanced number of asylum application towards the EU Member States (EU MSs). Moreover, this system helped states to control and prevent the flooding waves of illegal migrants. To enhance the European integration, MSs have consolidated the concept of freedom of movement and residence

within the territory of the European Union. This has been possible with the entrance into force of the Maastricht Treaty in 1993. This concept was implemented in 1997 with the Amsterdam Treaty and the inclusion in the communitarian legal framework of the Schengen agreements. The free mobility of people, capital, goods and services is a crucial point of the European agenda aiming at the liberalisation for a more integrated and efficient common market. Since then, migration and mobility among member states represented a mechanism of adjustment for the distortions in the labour markets, as it stimulates a process of re-allocation of skills and human capital among the countries of the Unions, solving the problems of labour shortages.

Despite the attempt in Europe of economic integration and convergence among the MS, it is evident that there is still a spatial imbalance between different economies which move at different speeds. In this context, the increasing level of regional inequities interpreted through the traditional concept of convergence a la Solow (1956) do not offers always valid explanations. In other words, it is not always true that less developed economies grow faster than the developed catching-up with them in the long-term. According to Islam (1995), indeed, there is a persistent difference in technology levels and institutions among countries. The author analyses a group of 75 countries in the period between 1960-1985 finding that among a large sample of countries there is no evidence for absolute convergence[4], but there is a slow conditional convergence. This is conditional to other variables including human capital, incorporated in the model as a factor of production. The author suggests that splitting a large group of countries into sub-groups, composed of countries with similar characteristics, it is possible to find a fast-conditional convergence.

Islam (1995) adopts a panel data framework to control for those persistent technological differences, as this methodology allows to control for *country effects*. The individual *country effects* might be a measure of the Total Factor Productivity (TFP) which explains the level of efficiency necessary to combine the factor of production to obtain the output. Therefore, the author suggests to considers the different *country effects* in the aggregate production function across different sub-groups. Similarly, the club-convergence hypothesis (Baumol, 1986) states that a country of the same club (sub-group) will converge to the club-specific steady-state. Fischer and Stirböck (2006) argue that belonging to a specific club depends on the share of members with

[4]For "absolute convergence" is intended as the similar or same levels of income which state reach in the long-run, without considering the differences among these countries.

the same initial and structural conditions.

In this paper, we identify three different groups of countries: "core", "peripheral" and "new" EU countries (Arango, 2012; Asteriou et al., 2014). The sub-groups are dividend according to the following criteria: i) different regional patterns; ii) industrial structures; iii) regional location within the EU space; and iv) similar migration policies. Moreover, with regards to the migration trends for the recent European history, we identify three main events. Firstly, the rise in migration flows at beginning of 1990s caused by political instability in the former Soviet communist countries. Huge waves of migrants moved into Germany and Austria asking for the refugee status, due to the geographical proximity of this States to the former Soviet countries. The second event occurred during the two EU-enlargements phases in 2004 and 2007 towards the Central East European countries, causing a surge in intra-European migration. However, as many of those migrants were already residents in the *core* countries in an irregular condition, these EU enlargements signified, for the migrants, an acquisition of security and immediate regularisation of their status by becoming a citizens of the EU (Ruhs and Anderson, 2010*a*).

The consequence of these two enlargements are not the same for all the core countries. In the transitional phase, when a country enters the European Union, member states apply constraints to the new entering countries in order to limit the access to their labour markets. This has happened previously when Greece, Spain and Portugal joined the European Community. Especially during the 2004 and 2007, the member states adopted precautionary measures, since they were concerned for the possible consequences that the free movement of new workers coming from the ten new member states would have produced on their economies, such as overburdening the social welfare systems and also wage dumping. Therefore, almost all the European member states decided to impose a longer transitional period[5] to the free circulation of workers and goods coming from the new EU countries, longer that the one previously imposed to Greece, Spain and Portugal. Only the United Kingdom and Sweden, together with Ireland lifted all restrictions on migrant workers from *new* EU member state and to their family members too. This choice taken by these three EU countries had catastrophic effects on their labour market due to a sudden increase in unskilled workers. It is not surprising that given the good economic conditions and the absence of restrictions, the United Kingdom has issued around

[5]The labour immigrations were restricted for a period maximum of seven years.

770,000 work permits to the *new* member states between 2004 and 2007.

Finally, the third event that affected the recent migration history in the European countries was the enormous number of asylum seekers and irregular migrants coming from the Arabic countries since 2011. The most affected European countries by this phenomenon have been Italy, Greece, Germany, Sweden, France and Austria. These events are determinant by the complex evolution of the economic, social, legal and politic systems of the EU countries.

4.7.2 The "Core" Countries

The European core countries have the highest level of GDP per capita and the highest migration to population rates compared to the rest of the EU countries. After 1989, some of those countries have received the highest level of asylum-seekers applications among the developed countries. In absolute terms, the highest level of applications has been registered in Germany, the UK and France; whereas, speaking in relative terms concerning the resident population we find in first place Sweden, followed by Austria and Belgium. Looking at the result on the long-run causal relationship between the two variables, *li* and *ly* in table 2 is possible to identify three different causal relationships: 1) when migration causes GDP per capita in Belgium, Germany and the United Kingdom; 2) when GDP per capita causes migration in France, Luxembourg and the Netherlands; 3) when migration causes GDP per capita, and vice versa, for Sweden and Finland.
In the next sections we identify the possible reasons that determinate the causational direction between the two variables in the long and short-run.

4.7.2.1 Immigration per capita Granger-Causes GDP per capita in Belgium, Germany and the United Kingdom

In this section we discuss the results on the ARDL model in the Table 4.6, in particular we focus on the group of "core" countries which show evidence of unidirectional causality from *Immigration per capita* to *GDP per capita*. These countries are Belgium, Germany and the United Kingdom and represent some of the biggest economies in the EU. In this regard, we would have expected to find also a causal relationship between the variables on the opposite direction (*GDP per capita* Granger-causes *Immigration per capita*). In this section we try to understand the reasons why the immigration affects these economies and why these economies do not represents a

"pull" factor for migrants.

Surprisingly, we find that the coefficient of the long-run causal relationship for Germany is negative, specifically, as illustrated in Table 4.6, an increase in *Immigration per capita* of 1% causes a fall in *GDP per capita* equal to 1.39%. The results of the long-run co-integration between the variables is confirmed by the coefficient of the ECT, which indicate that short-run adjustments converge to the long-run equilibrium with a speed of 53%. This result is not what we would expect to find for Germany, as it means that migrants contribute negatively to its *GDP per capita*. We refer to various papers on the immigrant's assimilations in Europe that study the case of Germany (Pischke, 1992; Dustmann, 1996; Zimmermann et al., 2000; Lang, 2005) and might explain this issue. Being one of the most popular destinations, Germany has received very different typology of migrants: guest workers, asylum seekers, refugees and family members reunification. A large part of these migrants is unskilled and most of them are allowed to work in Germany only temporarily. Generally, temporary migrants have lower incentive to invest in further accumulation of human capital with respects to permanent migrants, as the former would not have time to collect the return on investment of human capital due to the short-term nature of the work-permits (Dustmann, 1996). Therefore, according to Zimmermann et al. (2000), migrants in Germany tend to work and live with people of the same *origin-group* (ethnic-enclave). It seems that network of migrants from the same ethnic group can have an adverse effect on the German economy and society.

Taking into account migrants moving to Germany after the 1990s from Poland and the former Soviet Union, additionally to the refugees from former Yugoslavia, Glitz (2012) discovers that low-skilled workers are more segregated than high-skilled ones. The author measures the segregation level of migrants at their workplace. This is because, finding a job in the destination country facilitates the assimilation process of the migrants. However, the residential segregation is another factor that has to be considered when we analyse the level of integration of the migrants. Glitz (2012) predicts a systematic pattern between high-skilled jobs occupied mainly by natives and low-skilled jobs reserved to the migrants. As each worker interacts only with the "co-worker" of the same skill-group, then migrants will be segregated in specific productive sectors, generally the low productive ones. It follows that, migrants even if endowed with some skills are not substituted for the native's workforce. This process of segregation leads to losses in human capital of the migrants which would have

contributes differently to the economies if they were using their own skills. However, migration in Germany does not create an adverse effect on the wage of the native workers but affects only the employment levels. Additionally, due to the high degree of substitution between "old" and "new" migrants, as more new migrants enter, the more wages and employment opportunities of old migrants decrease (D'Amuri and Peri, 2014).

Germany's labour institution is characteristic for its wage rigidities and generous unemployment benefits. The rigidity in the labour market is caused by the presence of costs for unemployment insurance and missing adjustment of the wage caused by an exogenous shock (such as the East Germany workers arrival after the 1990s). D'Amuri and Peri (2014) look at the impact of an increase in immigration from Eastern Europe on the labour market from 1987 to 2001. They observe that the East European migrants, who generally are high-skilled individuals, were complementary in skills with the low-educated old migrants, hence, balancing the education groups. However, as migrants are not a perfect substitute for natives in Germany, the entrance of new migrants in the labour market creates competition with the old ones, which tends to be replaced. It follows that, in a protective labour market, long-run migration is not sustainable as increasing the costs of unemployment benefits. To overcome this issue, after 2002 a series of "Hartz" reforms were introduced in the German labour market with the intention of increasing the labour supply and improving the match between unemployment and vacancies. At the same time, the welfare system has become less generous with the intention of incentivising people to stop being inactive, stimulating the demand for labour. This has been facilitated using short-term contracts. The rise in this kind of contract has increased the employment rates, and in conjunction, unemployment has fallen since 2005, also among migrants.

The positive effect of the increase in the flexibility of the labour market was the reduction of unemployment rates by approximately 3% due to a reform in the labour market. This reform was the main cause of the development of a low-wage sector and of a less regulated employment (introduction of part-time and dampening labour costs). With the increase of low-skilled workers in the market, the complementary factor in production, high skilled workers, become necessary. This open up a debate of the international recruitment of foreign high-skilled workers and lead to the introduction of a migration policy which targeted high-skilled migrants. The effects on the increase in the flexibility of the labour market and the migration policies,

produced positive effects in the short-term. These effects might explain the positive short-run effects of the (third lag) *Immigration per capita* on the economic growth, specifically we find that an increase of 1% of the *Immigration per capita* rises the *GDP per capita* by 0.27% after three years of the migrant arrival. Generally, migration in the short-run produce positive effects on the German economy as shown by the results of the Wald test in Table 4.6 which positive and significant value of the χ^2 statistics indicates that there is a significant common short-run effect among all the lags of the variable *Immigration per capita* on the dependent variable. However, the effects of the migrants in the first-year after their arrival are negative an increase of 1% of the *Immigration per capita* causes a decrease of 0.45% in the *GDP per capita*. In conclusion, migrations create a short-run negative impact to the economy only during the first period when the foreign-born workers arrive in Germany, as they need to integrate in the new labour market. After three years once the migrant is settled, due to the support of its ethnic-network, migrants spur the growth of the GDP per capita. However, in the long-term due to the large presence of groups of settled migrants, new comers do not impact positively on the GDP per capita. Perhaps, this long-run negative impact of migration on the German economy might be attributed to the composition of the migrants' skill, predominantly low-skilled. Another factor that explain the negative impact of migration might be that migrants tend to move in the country also during the negative phases of the economic cycle as they try to reach the large number of migration communities present in the territory.

Unlike from Germany, the United Kingdom has the most flexible labour market in Europe with lower hiring costs, firing costs and less generous employment insurance. This means that the entrance cost for immigrants are lower, while the employment rates tend to be higher. In a more flexible labour market, migrants skills count. Depending on the level of flexibility, the foreign workers can be considered an imperfect substitute or complementary in skills of the native workers. Depending to which degree this effect happened, the short-run effects of migration impact the wages and employment levels to a certain degree (Borjas, 1995). However, according to the paper of Manacorda et al. (2012), the impact of an increase in migrations in the short-run affects directly the earnings of the previous migrants. This suggests that exists an imperfect substitution between local and foreign-born migrants. Moreover, migrants moving to the UK tend to have a higher level of education as compared to the natives. This creates skill-biases which impact on the return of natives with an university degree respect to those with a secondary education degrees. Thus, mi-

grants are imperfect substitutes in production of natives. At the end, the magnitude of this effect on employment is quite small. Immigration tends to have a very small effect on the wages of the British workers. This is also because immigrants tend to occupy the lower part of the wage distribution.

According to Dustmann et al. (2013), who conducted a study on the foreign-born population in the UK between 1997 and 2005, immigrants moving to the UK are more skilled with respects to natives and early groups of migrants. It follows that migrants affect the workers negatively at the bottom of the wage distribution. Our results on Table 4.6 show that in the short-run migrants might affect negatively the British economy, as indicated by the negative elasticity of the GDP per capita for up to two years from migrants' arrival in the country. Despite the negative effects produced in the first period of their arrival, migrants might push natives to seek further education, thus increasing the total level of skills in the country and impacting positively in the long-run on the GDP per capita growth. Our results confirm the presence of long-run relationship between the variables. Specifically, an increase in *Immigration per capita* of 1% causes the *GDP per capita* to rise by 0.42% with a consistent speed of convergence from one period to the next of 52%. However, we could not find evidence of long-run relationship from *GDP per capita* to *Immigration per capita*. This might be because GDP per capita is not the only factor of attraction for immigrants. The strong networks between the settled migrants previously arrived and the new coming migrants might be a determinant factor attracting more immigration, especially from the Commonwealth with whom share colonial ties and language. Generally, these networks are attracting more the unskilled workers coming from low-income source countries rather than the ones originally from high-income ones (Pedersen et al., 2008). With regards to the results of co-integration for Belgium, migration stimulates the growth of the economy, as a rise in 1% of *Immigration per capita* generates a large growth in *GDP per capita* of 0.77%. The long-run relationship between the variables in this direction is confirmed by the coefficient of the ECT in Table 4.6 which indicates that there is a high speed of convergence of the short-run adjustments towards the long-run equilibrium.

Although Belgium is not receiving the number of asylum seekers such as Germany, Austria and Sweden, it is one of the most generous countries towards asylum seekers. The highest wave of people fleeing from war was recorded in 1999 during the Kosovo war and the humanitarian crisis in 2015, doubling the number of the year

before. Indeed, Belgium policies were stricter before the acceptance of the Dublin convention in 1997. In 1993 Belgium created a detention centre in order to control irregular migrations and closed the centres for asylum seekers that were refused or waiting for a decision. Moreover, in 1996 the family member of non-European migrants where required to leave when the circumstances of their staying were not clear. This decline in migration following the restriction of immigration inflows was positively related with the worst economic recession that Belgium experienced after the World War II between 1992-1993, suffering of deterioration of competitiveness and consequent decrease in exports. To join the European Union, Belgium was required to peg the Belgian Franc to the German Mark. This situation put pressure on the Belgian currency having negative consequences on the exchange rate. However, following the economic recovery in the 2000s Belgium policy toward migration become again more flexible. Belgian together with Luxembourg has always been a country of immigration for the European neighbours due to its geographical position, being very central. While, in 1999 Belgium was a promoter in eliminating trade's tariffs among the European states and in coordinating the external tariffs with external states. Moreover, Belgium was one of the founders of the European Monetary Union (EMU), designed to have easy trades among the EU countries.

At the beginning of the 2000s, during a phase of economic expansion and increase in the degree of integration with other European countries, the Belgian government facilitated the process of naturalisation of migrants by reducing the periods of required stay in order to get the recognition. After implementing the law for protecting foreign workers, in line with the European legislation, it introduced the "second regularisation" with the intention of reducing the number of asylum seekers refused or of those people that have not received a communication officially to leave the country for five years. The consequence of these policy changes was the sharp rise in immigration to population ratio up to 2007, when the ratio showed a slight decline again. We can assume that the need for highly qualified people caused the increase of the degree of openness during the 2000s toward migrations. Hence, this brought an increase to the number of skilled migrants concerning the previous decade, which are attracted for the high-salary. However, many of the migrants are low skilled, who suffer from discrimination in the labour market and persistent gaps in employment level relatively to natives, which is more evident for the old generation (Lemaître and Liebig, 2007). The old generation of migrants in Belgium are low skilled post-war labour migrants that are employed in industrial sectors in decline since the 1970s,

coal mining and steel-making industries. The non-EU migrants are more vulnerable to the discriminations in the labour market. The high differences between the new and the old generation of foreign-born are related to the introduction of the "selective" immigration policy at the beginning of the 2000s, which select the quota of migrants according to the labour market needs. Considering a large number of low-skilled migrants already existing in Belgium, the most permits were offered to high-skilled migrants. The only reason for the lower skilled migrants to have a permit to stay in the country was *family reunification*.

According to the data on "all valid permits by reasons" of Eurostat from 2008 onwards, the family reunification is the primary reason of migration in Belgium for the non-European countries (Morocco and Turkey), followed by asylum seekers. The intention to regularise and offer permanent residence to migrants continue to be fulfilled in 2009 with the third-regularisation. Although the progress achieved in the field of naturalisation, anti-discriminatory policy and anti-discrimination, the low-skilled migrants, which mostly come from developing countries, continue to be marginalised in the labour market. The factors of discrimination in the labour market among the low-skilled migrants are related to the low-proficiency of the Dutch, French and German languages and the weak recognition of the skills and experiences acquired abroad. The network effects from settled communities seem to explain the lack of proficiency in the language. The language diversities are peculiar in the Belgian political system which is divided according to linguistic lines among the Flemish, the French-speaking and the bilingual speaking areas. After the constitutional reform in 1980, each region became responsible for the implementation of integration support and practices for the newcomers regarding housing, access to the labour market and training such as languages courses. Particularly in the Flander, during the 2000s the government provided specialized services, such as to facilitate the process of access to the labour market with the introduction of the Civil Integration Decree of the 2003 for the "new" comers and the Decree of 2006 which extended the previous decree for the "old" comers. Moreover, employment services are obligatory also for refugees and asylum seekers. Conversely, the Wallonia and the Brussels-Capital Region did not introduce any specific integration programmes which would be beneficial more for the Wallonia region that the Brussels-Capital.

While Brussels benefits from the European institutions located in the city, which bring a high level of skilled migrants coming from the EU member states and non-

EU countries; being a city it has to cope with the high-concentration of migrant enclaves. Despite the lack of coordination of migration policies among the Belgian regions, there is a positive contribution of migrants to the Belgian economy. The effective integration programs in the Flander has contributed to maintaining low unemployment rates while the high concentration of high-skilled migrants in Brussels explains the long-run co-integration relationship running from migration to GDP per capita. Results show no evidence of reverse causality as the GDP per capita is not the main factor of attraction for the migration inflows.

Furthermore, it is possible to observe a negative impact of migration on the GDP per capita in the short-run, as all the coefficients the lags of *li* are significant and negative. These negative effects caused by a rise in immigrations might be explained by the poor management at the regional level of the migration phenomenon.

In conclusion, the effects of migration in Belgium, Germany and the United Kingdom are contradictory between long-run and short-run periods. This might be to lack of coordination between migration and labour market policies. Additionally, the fact that there is no evidence of Granger-causality from *GDP per capita* to *Immigration per capita* for these three countries, might be explained by the lack or not proper implementation of integration policies for the coming foreign-born workers, especially low skilled migrants. The fact that one of the main reason to migrate to those countries is for family reunion is peculiar. The network of earlier migrants attracts low-skilled and refugees family members. As a consequence, the challenge becomes how to integrate those migrants that tend to be segregated at the workplaces and in residential areas. Those people tend to be more welfare dependent and have more difficulties in finding an occupation.

Although the problem of integration in the labour market is evident in the United Kingdom and Belgium, it seems that those adverse effects tend to overcome due to the effective selective migration policies which attract skilled migrants. Notably, the two capital cities of London and Brussels represent the most attractive poles for the high-skills in the EU as the chief financial and institutional centres. The positive contribution to the economies of the latter group of migrants might overcome the increase in unemployment rates and the discrimination of low skilled migrants in the labour market. Differently, the GDP per capita of Germany is affected by migration flows as they are mostly composed of low skilled migrants. Despite the good condi-

tion of the economy, the closed attitude of the government toward migration workers seems to create an unfavourable environment for the integration of migrants. The negative effects on employment are stronger than the one in the United Kingdom because of the strongly regulated labour market. According to Angrist and Kugler (2003), rigid labour markets tend to reduce the job loss in the short run due to the high cost of entry and employment protection, but in the long-term, the effects are harmful to the employment of the natives. Hence, this is explained by the fact that migrants labour cost is lower than the native's one. Therefore, the reduction of labour costs would reduce the entry costs for new firms where migrants would be employed. Moreover, the relationship between reduction of the cost would also interact with the reduction of firing costs and the sticky wages provoking the replacement effect of natives and natives non-working option at reduced wages. This effect is not so evident in Belgium as it does not promote temporary migration programs as Germany, although it incentivises migrants to become a permanent resident and, also if not in all the Belgian regions, offers services to match migrants skills with the Belgian labour market needs.

4.7.2.2 GDP per capita Granger-Causes Immigration per capita in France, Luxembourg and the Netherlands

Results for France, Luxembourg and the Netherlands show that GDP per capita is a determinant factor for the attraction of migrants. France and the Netherlands have a similar migration history, as they have both been characterised by return migrations during the end of the 1960s from the European colonies (Hunt, 1992), a phenomenon still present to this day. Luxembourg, instead, attracts a large share of EU migrants rather than extra-communitarians, although it remains one of the most "international" countries among Member States (Peri, 2007). However, all three countries recognise citizenship under the law of *double ius soli*, which enables the children of immigrants to become citizens, as long as they are born in that country, and if one of the parents was also born in that country.

Luxembourg stands out among the EU country for the highest level of GDP per capita. This economy is primarily based on the financial sector, which has continued to grow despite the last economic downturn; although the recent European financial regulation, which promoted more transparency, made the financial sector more vulnerable. Recently, the level of productivity of the sector has decreased as it might have reached the point that its contribution to GDP might fade. However,

there is still a significant demand for workers in this sector, which remains strong enough to support the general growth of the economy. Additionally, Luxembourg attracts cross-border migrants for the higher wage reservation rate and social insurance, which are higher than in the neighbouring Member States. The need of labour force in the expanding sector of hospitality creates a need in the labour market for low skilled migration which leads to the readmission agreement with CEE countries between 1998 and 1999, and a more specific regularisation in 2001. Moreover, the country provided temporary working permits (six months) for Albanian and Balkan asylum seekers coming from the war zone. Since 2003, the Luxembourg government decided to fund training and courses to integrate foreigners working in construction and hospitality, but also in accounting, banking and industry.

Luxembourg has seen an expansion of the ICT and professional, scientific and technological activities which accelerate productivity and performance in growth. Peculiar has been the role of the ICT sector as a driver of economic growth. The share of workers working in this sector is very high compared with the share of ICT workers relative to the total employment in the other EU economies. Indeed, the ICT sector together with the financial sector creates employment. The economy of Luxembourg is the main driver in the process of attracting migrant workforce into sectors such as financial, IT, construction and hospitality. To this end, the results of Table 4.6 show evidence of a long-run relationship from *GDP per capita* to *Immigration per capita*, hence for any increase in 1% of *GDP per capita*, the *Immigration per capita* increases by 0.46%. Moreover, the speed at which adjustments converge to the long-run equilibrium is very high, as indicated by the 84% ECT coefficient.

However, Luxembourg suffers from a high level of migrant structural unemployment as compared to the unemployment level of natives. The structural unemployment affects the mobility of the resource and the human capital development negatively. The main group of the population affected are both the young (aged 18-24) and the old (aged 55-64). To solve this issue, the Luxembourg Government is investing in high-income economies and R&D, becoming one of the EU member state with the highest Gross Domestic Expenditure in R&D rates relative to the GDP. Additionally, the labour market is characterised by the automatic legislated wage indexation which does not allow the rise of prices in case of supply shocks, reducing the downward adjustment of the wages in industries when there is a drop in productivity. Hence, this system reduces the competitiveness of national firms, while

increases the labour costs creating more unemployment. This rigidity in the labour market is seen to be more harmful during periods of economic recession. Therefore, in the recent financial crisis (2006-2009) the current system of automatic wage legislation has been suspended. Another system of coordination of overall wages would be preferable, which probably would have marginal effects of unemployment. Finally, a consequence of a more flexible employment protection system would facilitate the adoption of temporary contracts for industries, due to the reduction of costs.

What differentiates France and the Netherlands from other EU countries is the willingness to accept foreigners favouring their process of naturalisation. Mainly, France has based the legal foundation for nationality on *ius soli* (birth right of the soil) rather than *ius sanguinis* (birth right of blood) which is one of the most open notions of citizenship. During the twenty-century migration represented a source of population and industries growth, although at the beginning of the 1990s the situation has changed with the promotion of "zero" immigration policy and the introduction of selective immigration policies in 2000s. In the middle of the 1970s, the labour market was deteriorating steadily. Since the beginning of the 1980s unemployment has been dramatically rising while migration inflows continue to increase. Even if there was no causal relationship between the two phenomena, public opinion and right-wing political parties put pressure on the government in adopting more restrictive policies. The change of the attitude toward migration is reflected in the introduction of the law of Dufoix concerning the stay permits with the introduction of temporarily permits valid for maximum a year. Moreover, this migration law consolidated the right of family reunion, but under the condition, that the family had an adequate source of income, but also to cover for housing and health family expenses.

In our estimation for France, we adopt a dummy variable for the year 1994-1995, in order to account for the drop in migration after the introduction of the law of Pasqua II, signed in 1994. This migration reform was introduced by the minister Charles Pasqua to constraint working and family immigration to France. Namely, it increased the requirements for family reunification introduced in 1984 with the Decree 84-1078. Indeed, Pasqua's law allows bringing a family member into the France territory only if it is possible to offer them a reliable source of income and accommodation. The added requirement of the Pasqua's law restricted the access to the migrant's spouse, increasing the waiting period for accreditation of the permit.

Pasqua's law created an extensive debate among institutions for the impact of the constitutional right of limiting appeal to asylum seekers and giving much more power to policy for the deporting migrants. The harmful consequence of this reform was the negative impact on the GDP per capita and the increase in irregular migration, "without papers". The increase of the irregular migration has been detected by the large numbers of regularization in the 1995 for 10,100 parents of French children coming from Sub-Saharan Africa and Algeria and in 1997 when has been legalised the status of 12,000 irregular migrants living continuously in France for seven years with family's ties (DEMIG database; Hollifield et al. 2014). After those two amnesties, the migration inflows started to increase at a slow pace and, at the same time between 2000 and 2008 the unemployment rate started to decrease.

The decrease of unemployment in the 2000s has been the reason of attraction of immigrants in France. Fromentin (2013) examines the relationship between immigration, unemployment, wages and GDP per capita in France for the period 1970-2008 using a co-integration test and a vector error correction model, in order to identify the dynamics in the long and short terms of the market. The author finds that in the long term, immigration reduces the unemployment level and in particular the long-term unemployment. Besides, the increment of people in the market increases the demand for goods and services. While, in the short term, the variation of wages works as a factor of attraction for migrants, the final effect on unemployment is difficult to be measured as migrants need time to adapt to a new market. Therefore, due to the positive effects on unemployment, migrants are welcome in France. Namely, according to d'Albis et al. (2016) and Boubtane et al. (2013) the permanent immigration of low skilled are positively influenced by the French economies when migrants fulfil family reunification requirements, which call for a minimum level of income.

After the year 2000, during the period of economic expansion, migrants in France had a greater possibilities to satisfy this requirement, which raised the number of migration inflows. Most of the migrants in France come from Africa and are low-skilled labour. France attracts low-skilled as high wages are paid to the low-skilled workers. Most native workers are also low skilled. Peri (2007) assume that people migrate in a country looking at the levels of the wage paid to workers with similar schooling in the country. This explains why the large economies in Europe suffer in spurring the attraction mechanism for the low-skilled migrants. Namely, France

tends to attract low-skilled migrants due to the high distortion in the labour market which protects the wages from competition, differently from the liberal British labour market which is competitive and attracts loads of high-skilled workers despite the low-educated population in average. D'Albis et al. (2016) find that low-skilled migrants from non-EU countries moving in France, due to family ties, are attracted by the high demand of workers in the home services. Moreover, it is more convenient to enter with a family union permit rather than a work permit as it allows to work without restrictions.

Finally, France attracts intra-communitarian workers that have a better economic prospect. In the case of France, migrations are attracted by the economy and employment opportunities. Migration policies which are bound to an "income requirement" can be a economic parameter that determines the process of selection for the family member of the migrants, before entering in the country, according to the ability of the settled migrants to provide economic stability to its family member. With this regards, our results show that there is a long-run relationship from *GDP per capita* to *Immigration per capita*. In particular, an expansion of the economy of 1% generates a large rise in *Immigration per capita*of 1.86% (Table 4.6). Unfortunately, there is not evidence of short-run adjustments, while the speed of convergence to a long-run equilibrium is 52%. On the other hand, we could not find any Granger-causality relationship of the opposite direction. To understand why there is a unidirectional relationship in the long-run between the variables, we cab refer to the work of Morley (2006). The author suggests that immigration does not cause GDP per capita because the migration policies in the destination countries are not adequate to allow migrants contributing to the economy. Similarly, the Netherlands has been affected by the return migration from ex-colonies, mainly from Indonesia, Latin America, Turkey and Morocco. It is well known to be the countries with the most significant number of naturalisation. At the beginning of the 1990s, the Netherlands registered a surge of asylum seekers flows from former Yugoslavia. This event caused a tightening-up of the migration policies. Indeed, in 1994 the Dutch Government introduced new rules of identification requirement for working and residing in the Netherlands, which allows authorities to reject asylum seeker under the principle of "safe country". The introduction of this law produced a sudden decline of migrants during the same year.

The reduction of immigrants has been just a temporary phenomenon, as in the 1995 Government introduced the regularisation for the illegal immigrants overstaying the

countries for a long time. Moreover, it abolished the law of the family reunification beyond the three years, in line with the European harmonisation of the communitarian *acquis on family reunification*. In the meanwhile, the entrance into force of the Schengen agreement allows the increase of the intra-European mobility of workers. A further regularisation was introduced later in 1999. The evidence supports the preference for asylum seekers and family reunification rather than labour migration, which tends to be integrated into the labour market although without fruitful results. Indeed, one of the issues in the Dutch labour market at the end of the 1990s has been the very high level of unemployment rates for the low-skilled migrants, generally coming from the non-European countries. High-unemployment rates of migrants were a consequence of structural factors in the protected labour market. Shocks in the market would affect the more vulnerable individuals, in this case, the low-skilled non-EU migrants who lack individual qualifications.

In 1998 the Chamber introduced the "civil integration of newcomers" law which makes mandatory the integration programs with sanctions hold to those who do not pass the exam. This law has confirmed the changes in the attitude toward the migrant integration. The Netherlands indeed ware not any more the "multicultural" migration country that recognise the cultural and religious difference of foreigners, as in the 1970s. Instead, coercive policies led to the establishment of an "assimilation" integration mechanism, such as the one adopted by France. Migration inflows reached a plateau at a high level for the period between the 2000 and 2003. This figure has been captured in our estimation with the use of the "dummy 2001" , which has a positive sign but is not significant. This is because, the increase in migration at the beginning of the 2000s seems to follow the business cycle attracted by the substantial reduction of the unemployment rate. Additionally, in the same periods, the governments introduced a series of integration programmes for migrants to support them during their process of the acquisition of a working permit and of learning the Dutch language. Moreover, because the Dutch law allows migrants to have working permits only when there are vacancies in the market, with the economic expansion we observe an increase in the temporary work permits.

Despite the good economic condition and the integration policy, which has been introduced with the intention of the rise in migrant's participation rates, the migration inflow decreases dramatically between 2003 and 2004. This reduction could be attributed to the decrease in naturalisation. Public opinion towards migrants also

worsened, as natives started to consider migrants as "lacking responsibility" (Vasta, 2007). The decreasing tolerance of natives, together with the increase in difficulty to be part of the society, especially for non-EU migrants (Morocco and Turkey), created a mechanism of isolation and segregation for this group of migrants. This lead to a counterproductive effect, because migrants were not able to contribute to the destination economies, as they could. Therefore, migrations did not contribute to the economy as expected. The integration program implemented in 2006, introduced also sanctions to those who do not achieve the expected language and civil grades. However, the Dutch Government did not close the door to migration but just tighten the entry requirements.

The increase of income requirements for family reunifications was a fine-turning event in the immigration policies. This is similar to the case of France, where economic conditions are a factor of attraction for migrants, especially when migration policies consider economic factors (income requirements) together with family reunification programmes for migrants. To this end, we identify a long-run relationship from *GDP per capita* to *Immigration per capita*, with an positive but small elasticity of the *GDP per capita* equal to 0.08%. This relationship is confirmed by the negative coefficient of the ECT, which expresses the speed at which short-run adjustments reach the long-run equilibrium. This speed of convergence is very high with respect to the one of the others EU countries, as equal to 1.66%. Differently, we found that there are adverse and significant short-effects from the level and first lags of the *Immigration per capita* variable on the *GDP per capita*, that are opposite in sign to the long-run effects. Therefore, changes in the GDP per capita limit temporarily the choice of migrants to move in the Netherlands, although attract migration flows in the long run.

4.7.2.3 Bidirectional Granger-Casuality in the Northern Countries

Among the core countries, the only two countries that have a reverse causal relationship between GDP per capita and immigration are Finland and Sweden, i.e. Northern countries. We did not find any bidirectional causality for any Western European country. Those two *nordic* countries share some common experience in migration history. Until Second World War, migration flows were coming from the neighbouring regions; only after the 1960s the migration became a comprehensive phenomenon until the mid-1970s. Massive waves of migrants from former Yugoslavia, Turkey, Pakistan and Morocco, were recruited in the manufacturing sector. The in-

ternational role established by these host countries, especially from Sweden, was to be a pioneer with multicultural immigration policy (Brochmann, 2014) offering to all legal residence, decent standards of living with a welfare system that would have served the entire population. Although Sweden has one of the smallest total population stocks compared with the "old "European countries such as Germany, France and the UK, it has a similar number of asylum applications. Sweden intended to strengthen the legal entrance routes increasing the quota of refugees.

Refugees, indeed, are different from economic migrants, as they have guaranteed to stay permanently in the territory. According to Dustmann and Görlach (2016) migrants tend to distribute their leisure consumption over time and, especially, they will tend to invest more in acquiring human capital to get better jobs. The increase of human capital seen as a "technological catch-up" (Kim and Lee, 1999), "new ideas" (Romer, 1990) yields a higher economic growth rate (Dolado et al., 1994; Borjas, 1995; Boubtane et al., 2016). Finland is one of the better economies in the Europe Union which shares one of the lowest rates of immigration inflows. This has been constant during time with a rate of 2% per annum. The economy is characterised by a full rigid labour market and an extensive welfare system.

Migrants tend to downgrade their skills upon their arrival (Dustmann et al., 2013) ending up earning lower wages rather than natives with the same characteristics. Sarvimäki (2011) finds that the wage gap in Finland is wider for non-OECD countries migrants. Moreover, the Finnish labour market conditions of migrants remain the same over time, discouraging migrants from acquiring more skills. Finland registered an significant decrease in migrant workers since mid-1970s due to the oil recession which provoked a restoration of production and trades in Finland, as well as the rest of the European countries. The challenging economic conditions and the rapid increase in unemployment rates affected the more vulnerable individuals in the economy, particularly the low-skilled migrants. Also the welfare system was restructured reducing the costs for unemployment benefits and social assistance which before migrants were entitled. The worsening condition in the labour market and the increasing restriction to the access to the welfare supports discouraged many migrants to stay and many other to come. Conversely, people moving for humanitarian reasons such as those looking for refugee's status and family reunion were welcome. Nevertheless, the Finnish GDP growth rates continued to increase rapidly compared to the average of the Western European countries. From one hand, the openness

and equal treatment toward migration mirror a fundamental ideological pillar of the Scandinavian policies; on the other hand, the increase in migration is the instrument that solves the issue of declining population in working age.

Both Sweden and Finland opted in reducing the quota for low-skilled migrants since the large number of low-skilled in the previous had proven difficult to integrate in the Scandinavian labour market, characterized by high requirement in skills and highly protection in the labour market for native workers (Sarvimäki, 2011). Different is the situation for the high-skilled. Indeed, with the rapid technological revolution the production activities changed particularly in metropolitan areas (Kultalahti, 2001), generating the demand for high-skilled workers which were endowed with specific skills required by the new technological sector. The migrants that have the highest employment rate are those with upper-secondary level of education, working in the information, science and technology industries. They represent almost half of the labour force in the Nordic countries.

The GDP per capita of Finland is relatively higher than the GDP of migrants' origin countries, which might be the reason why it attracts migrations. However, the strong IT sector, which is the driving force of the Finish economy, pulls many qualified foreign-born workers to move in Finland. Accordingly, the long-run coefficient of the *GDP per capita* shows that a positive 1% increment of the latter can increase the *Immigration per capita* by 0.98%, with a moderate speed of convergence of 39%. We are also able to observe a co-integration relationship in the opposite direction, as 1% increase in *Immigration per capita* produces large positive effects on the destination economy, rising the *GDP per capita* by 0.96%, with a similar speed of convergence of 40%. Moreover, migration contributes to the Finish economy also in the short-run, as shown by the result of the Wald test in Table 4.6. Observing the data of people employed in the Information and Communication Technological sector[6], the highest proportion of ICT specialists works in Finland and Sweden, followed by the United Kingdom, the Netherland and Luxembourg.

The ageing population is a controversial issue in Sweden and for this reason the Swedish migration policies are favourable in attracting higher number of migrants. According Malmberg et al. (2018) currently one-sixth of the population is foreign-born. Since the beginning of the 1990s, migrants moving to Sweden were European,

[6]Data of "Employed ICT specialists" are available on the Eurostat website

mostly coming from Finland. This created a strong interdependence between the two scandinavian countries. However, Finns who migrated to Sweden were of relatively old age as the majority of them migrated to the country during the 1970s. Hence, migrations since this period did not contribute to adjust the age structural imbalance in the Swedish population (Salmenhaara, 2009). However, after the massive incoming of refugees, there has been an increase in the non-EU migrants which have placed concern about the stainability of the multi-cultural policy.

Feridun (2007) based his analysis on the causal relationship between GDP per capita and immigration in Sweden from 1980 to 2004, finding a bidirectional causal relationship between the two variables. The author noted that the replacement of *immigration policies* with *integration policies*, at the beginning of the 1990s, had a relatively positive impact on the perception of migrants, which are considered an essential asset in the economy. At the same time, the welfare reforms implemented during the twentieth century in Sweden and the rest of the *nordic* countries have restricted access to the cash transfer system for the less-skilled migrant workers. It also decreased the tax burden in order to be more competitive and calm down the raging political debate on migration.

Slightly different is the situation in Finland, the recession at the beginning of the 1990s has had catastrophic consequences on private investment, private consumption and GDP due to the a collapse of the domestic demand. Employment also dropped down by 20% and unemployment peaked of 18% in 1994. For this reason, there has been a rise in public employment programs that aim to increase participation in labour force. A lot of young people preferred to continue studying in the high education rather be unwanted in the labour market. The consequence of the increase of high-skilled natives created a disequilibrium in the labour market which still today faces a lack of low-skilled workers. Due to the issue of matching of jobs with the skills available in the market, there has been an increase in unemployment benefits requests from young natives who are now overqualified and unable in finding the desired jobs. Migration can be a solution, only when specific training is offered, such as the Active Labour Market Program introduced in 1999 addressed to asylum seekers for their integration into to labour market. The introduction of the Active Labour Market Program (ALMP) in 1999 produced positive effects to the immigrants and asylum seekers who arrived after 1997, which represent a valuable factor to cover the vacant position in the job market not taken by the natives. Results show that

offering adequate integration plans (basically more training in language), increases the migrant's participation in the labour market and, as a result, decreases the dependence on social benefits (Sarvimäki, 2011).

Although we have seen that migrants base their decision of moving in a country on the base of economic motivations, it seems that migrants in the Scandinavian countries base their decision to migrate there due to the high generosity of the welfare state when compares to the rest of the EU countries. Furthermore, another factor which determines migrants decisions is the facilitation that these countries offer to the migrants for integrating them in the labour market offering a series of training and languages courses.

In line with the outcomes of Feridun (2007), we find that for Sweden there a bidirectional long-run causal relationship between the variables adopted in our analysis, as shown in Table 4.6. The co-integration relationships in both the directions is indicated by the long-run elasticity of the *GDP per capita* equal to 0.929% and a long-run elasticity of the *Immigration per capita* equal to 1.06%. The ECT in both the tested regression models imply that any shock adjusts to the long-run with a speed of 90.6% for the regression model with *GDP per capita* as dependent variable and 109.6% for the regression model with *Immigration per capita* as dependent variable. Although the long-run Granger-causal relation from migration to the Sweden economy, and on the reverse direction are substantial and positive, the short-run effects have mix signs in both the directions. The results of the Wald tests, that detect if there is a common short-run effect in each models, indicate that the total short-run effects are negative. The negative short-run impact of *Immigration per capita* on the *GDP per capita* might depend on the integration problems which migrants have once they enter in the labour markets. Even though Scandinavian countries offer a series of assimilation programmes to migrants, they tend to also be highly selective. This provides access to the market only to those migrants that are endowed with a high level of human capital, especially if specialised in the technology sector.

In our study, we are also able to provide short-run impacts of *GDP per capita* on *Immigration per capita*. Namely, it is possible to observe a significant short-run effects of the GDP per capita produced on migration which are positive for the variable at level, but negative for the first and third lags. According to this, an increase of 1% of the *GDP per capita* produces an increase of 0.60% in *Immigration per capita*

during the first year of migration, but affect negatively the migration during the following years of permanence in the country, by 0.74% and 0.36%, respectively. This is a surprising results which indicates that, during the period of positive economic cycle the migrants that arrived in Sweden one or three year before might be negative affected by the better performance of the economy. Our comment on this point is that previous migrants can be negatively affected by the competition in the labour market created by the new foreign-born migrants that move to Sweden attracted by the growth in GDP per capita rates.

In conclusion, the good economic conditions, the generous welfare system and, at the same time, the high selective migration policies explain why there is a bidirectional causal relationship between GDP per capita and immigration for Finland and Sweden. The human capital of the newcomers has to be extremely high in order to compensate the other adverse effects in the labour market, such as the increase of the population or the possible displacement effect (Dolado et al., 1994; Boubtane et al., 2016).

4.7.3 The "Peripheral" European Countries

During the 1990s the *peripheral* EU countries had to respond to a surge in immigration coming from developing countries, through an introduction of various immigration policies, despite their limited experience in immigration control and regulation. The necessity of an explicit policy in the European legal and political framework emerged only at the Dublin Convention in 1992, with the signature of the Maastricht Treaty. The process of negotiation for collective control of immigrants and asylum-seekers was slow. Thus, in 1997 the Dublin Convention introduced the prevention for multiple asylum applications, which was ratified only by 12 Member States, after the agreement in 1996 on the definition of the term "refugee" according to the principle of the Geneva Convention. Notably, the Mediterranean countries did not act in time for curbing the increasing immigration flows since the early 1980s, as the imminent immigration crisis was not adequately managed (Baldwin-Edwards, 1992).

The legislation on immigration introduced in Italy and Spain since the end of 1980s has been focused on drastically reducing the irregular migrants. This was meant to be achieved by, firstly, increasing the number of deportations, then, through a series of periodical mass regularization legalising the irregular migrants already present in the national territories. The latter mechanism introduced to reduce the number of

irregular migrants was preferred with respect to the increase in the legal channels for migrations. Portugal has taken another approach to migration by not considering the constantly growing immigration flows as an issue, probably because of the cultural similarity of the incoming migration flows, since most newcomers were originally to nationals of former Portuguese colonies. Finally, also the Greek Government did not act timely in controlling the migration flows. As a consequence of this indifference, at the beginning of the 1990s, the peripheral countries were found unprepared in handling the enormous flows of migrants coming from the collapsing Eastern European countries.

The absence of legal channels for migration lead to an increase in irregular migration flows and massive underground economies (Düvell, 2011; Fasani, 2015). These characterising factors encouraged illegal migration coming from African and Asian countries. Additionally, although most of those migrants entered legally for temporary reasons, they change their migration status as irregulars since they remained in the country after the expiration of their visas, adding to the overstayer population. Devillanova et al. (2018) explore the causal relationship between employment of the irregular immigrants and the various amnesties offered to migrants with an illegal status in Italy. Using the data of the Italian regularisation of 2004, the authors exploited a quasi-experimental framework. It was observed that the prospect of legalisation of migrants increased the "value" of migrants for the employees. This also happens despite the fact that if an immigrant is legalised, his/her labour will be more expensive as employees will have to pay payroll taxes and regularisation fees.

Devillanova et al. (2018) notice that the precondition to be employed before legalisation affects the supply side before the migrants are regularised. Specifically, the prospective to legalise their status increases the probability of the migrants to be associated with qualified migrants, which, therefore, corresponds to higher employment rates. The novelty of this research is in the identification of the employment precondition to support the application as facilitator element in the process of integration of the irregular migrant through a faster labour market incorporation. The higher probability of migrant to work in the labour market, as regular worker, might generate economic surplus. The situation for Ireland is difference since it did not receive, at that time, a very consistent flow of non-EU migrants which would not have Irish roots. Indeed, at the beginning of the 1990s Ireland was the only *peripheral* countries that had a surge in net-migration rates in line with increases in economic growth and

foreign investments. It looks that the positive economic outcomes, boosted by the foreign investment, was a factor attracting migration. It is interesting that half of the immigration flows composed of foreigners with Irish origin coming from the UK and the USA, while the percentage of migrants coming from Asia and Africa was very low.

4.7.3.1 Immigration per capita Granger-causes GDP per capita in Italy and in Spain

In this section we will explore the different reasons why migration Granger-causes GDP per capita for Italy and Spain.
Italy has been a country of emigration since the 1960s, however we assist to a change in this trend from the 1970s when Italy starts to become a country of immigration, particularly for migrants coming from developing and Eastern European countries (Del Boca and Venturini, 2005). This radical change in the direction of migration flows in Italy can be attributed, according to Caponio and Cappiali (2018), to different factors. Firstly, in the 1980s the traditional European migration countries, such as Germany and the UK, changed they policies towards migrants and started to increase restrictions. Therefore, immigration flows that were previously directed to the "old" traditional migration countries started to be diverted to "new" European immigration countries (Fassmann et al., 2009), such as Italy. In this phase of reorganization in the European migration map, many of the previous Italian emigrants returned home, together with flows of immigrants producing changes to the Italian labour market. Most of the migration flows directed into the industrialised Northern areas of Italy (ISTAT). Italy, like the other new migration countries in Europe, became one of the "transition countries" where migrants temporarily stay and work waiting to find the opportunity to migrate to the traditional migration countries, although many of them end up staying, as they don't get the opportunity to move.

The demand for foreign labour force was different from the one of many Northern European countries. Migrants were required to perform low-skilled jobs in small construction and hospitality companies, and in agriculture and personal care. The segmentation of the labour market triggered the expansion of the underground economy, similarly to the other Southern European countries, which also favoured the rise in the pool of the irregular foreign workers. Due to the irregular nature of many migrants, the increase in migrants produces a positive effect on the wages of the natives, as shown in the analysis produced by Gavosto et al. (1999) between 1989 and 1995.

Although, there is a no direct competition of the migrants with the domestic workers in the regular labour market, according to Venturini (1999), there might be an impact of migrants on the domestic workforce, especially when migrants are confined in specific sectors. In the case of Italy, the author found that there is high competition between migrants and natives in the agriculture sector, where many irregular migrants are employed. These results describe a completely different situation with respect to the non-tradable sector, where migrants are complementary to natives. The possible correlation between migrant workers and the high segmentation of the Italian labour market might be the reason of the underground economy expansion. The majority of the migrants in Italy tend to find a job in the underground economy as irregulars. This might be due to the highly rigid and regulated segments of the labour market. Indeed, the segmented Italian labour market is characterised by segments of the market that enjoy the high level of employment protection, whist others are much more deregulated. The latter is where (irregular) migrants tend to be hired.

In our analysis, we found that Immigration Granger-causes GDP per capita in Italy, specifically, the GDP per capita elasticity is positive, showing that an increase of 1% in migration causes a positive impact on the GDP per capita equal to 0.50%. Unfortunately, the results, provided, in Table 4.6, do not provide any short-run elasticities of the GDP per capita. This might be due to the fact that migrants are not fully integrated in the labour market as a consequence of the highly restrictive laws. Furthermore, we did not find evidence that the economy is a driver for the immigration flows, although there are a large income differences between Italy and the origin countries of the migrants. This can also be explained by the fact that during the negative phase of the economic cycle, such as during the recent economic crisis, migration towards Italy continued to rise. It follows that, the main "pull" factor of migrating to Italy is the geographical and political proximity to the core countries. As once migrants are in Italy, they would have higher possibility moving to the close traditional migration countries. Moreover, another factor of attraction for migrants might be the presence of ethnic-networks which are expanding over time.

According to Caponio and Cappiali (2018) there is a structural gap between the restrictive migration policies and expansive inflows of migration. This can be another factor to explain why migrants move to Italy, in line with our results that illustrate the absence of a long-run causal relationship from *GDP per capita* and *Immigration per capita*. In their analysis, Caponio and Cappiali (2018) take also into account the

collapse of the external control of the border system starting with the humanitarian crisis in 2011, which causes huge waves of irregular migrants appearing in the Italian and Southern Europe countries. Italy has not been able to manage these flows of migrants, indeed, the wrong policy implementation which has lead to an increase in the level of restrictiveness of migration policies has created more irregular migration.

For too long since the rise in large migration inflows towards Italy, the Italian government did not take a clear position in the management of the migration phenomenon. The two main policies implemented for the management of the immigration flows were, firstly, the Turco-Napolitano Law in 1986, then, the Bossi-Fini Law in 2002. Both of these laws have profoundly impacted the Italian restrictive path towards migrations. Specifically, the Bossi-Fini Law of 2002 established as a main goal the reduction of the irregular migration but also increased the level of precariousness of the rest of the migrants. Additionally, it introduced two amnesties, producing effects which are in contradiction with the main aim of the same law. This was because the amnesties triggered a mechanism that favoured the increase of irregular migration (Facchini and Testa, 2015).

In our analysis, we have detected the impact of the Bossi-Fini Law with the introduction of a dummy 2002 in the ARDL model where the GDP per capita is the dependent variable. The result of the dummy 2002 coefficient is negative, although not significant. After the introduction of this law, Italian governments have continued introducing periodical amnesties to reduce irregular migration, which common practice produces flaws in the management system of the phenomenon. Although the recent Italian governments show effort in controlling migration they struggle to do so, and immigration flows have not been reduced.
To this end, the increasing number of the irregular migrant population is the result of a lack in adequate implementation of migration laws, which are too restrictive, and the large network of migrans in the country. These issues are the reason why migration, despite producing a positive effect on the GDP per capita, do not produce a significant impact on the speed of convergence from the short-run to the long-run equilibrium. Indeed, for Italy we record a very slow speed of convergence to the long-run equilibrium equal to 34,1%, as shown by the coefficient of the ECT in Table 4.6.

Since the mid$-1990s$ the flourishing Spanish economy has grown at steady paces alongside with decreasing unemployment rates. Moreover, just before the crisis, this

peripheral country was able to improve its fiscal position form a large deficit to a surplus of 1% to GDP per capita. The immigrant population in Spain grew in conjunction with the economic boom and the entry to the European Community. However, this economic expansion attracted much more migrants coming from developing countries and, at the same time, discouraged the emigration of the young population. The demographic contribution of the migration to the population growth has been significant, as the foreign population in Spain accounts for the 1.5% of the total population and represents so far the 90% of population growth (Carrasco et al., 2008). However, there are some difficulties in understanding the immigration dynamics in Spain in its whole. The issue arises from the underestimation of the data on migration until 1996 due to the undercounted number of irregular migrants. The first formal regularisation programmes adopted were that of 1985 and 1991. Those two attempts of regularisation for irregular-status migrants were unsuccessful as the requirements for residency were numerous, such as migrants could apply only if had a job offer, and the limitation of application were applied for the family member reunifications.

In 1996 the first regularization which guaranteed a relatively long period of residence in the country, five years of residence,[7] produced an upsurge of the immigration population, as effectively give time to migrants to integrate in the country. At that point, the migrants' origin countries were foremost: Morocco, the EU and Latin America. This diversity in immigration inflows composition explains the complexity of management of the migration phenomenon in Spain. The dilemma of the diversity is characteristic of the Spanish society with the presence of different cultural and linguistic groups from Catalonia and the Basque Country. Indeed, this scenario (the Spanish approach to integration) has been based on "interculturalism" builds on the principle of tolerance of diverse groups co-existing in the same place. In the 2000s Spain experienced an exponential increase in migration since the beginning of the decade, which can be a consequence of the introduction of the amnesty programs in the 2000 and 2001. Those regularisation programs offered more right to immigrants whether they were irregular workers, irregular residents or rejected asylum seekers.

This happened in parallel with the application of the *Plan GRECO*, a national program that recognised the contribution of the migrant to the Spanish economy

[7]Generally, the regularization programmes for irregular migrants allow only one year of temporary residence.

and worked on implementing their degree of integration. Those initiatives offered more conditions for foreigners to settle in the country (Monras et al., 2018). To this end, the new regulation can have played a role in attracting migrants. However, also the high demand of low-skilled migrants have played a crucial role in pulling migrants towards Spain (Rodríguez-Planas, 2013). Particularly, Carrasco et al. (2008) find that the supply of native women in the labour market was very high due to the restructuring of the industrial sector, as the foreign-born women perform jobs in the households which before were done by unemployed native women. Specifically, migrants women working in the personal care sector allowed native ones to cover new position in the labour market instead of dedicating totally to the care of their families. This factor, combined with the rise in the rate of educated women, allowed them to become more competitive in the labour market. In this scenario, migrant women become a key factor for the supply of labour in the services sectors such as the tourism and the self-care sectors.

Furthermore, the growth of the service sector for family's needs produced effects on to the nature of the welfare system as, the *southern* European welfare system traditionally relied on the support of the Church and families (De Giorgi and Pellizzari, 2006; Pedersen et al., 2008), rather than low cost option for family support (migrant women). Most of the low skilled workers coming from non-EU countries and the CEE countries later, found a job in construction and tourism. Those sectors have been strongly hit by the financial crisis of 2007 causing a surge in unemployment rates. During the same period, the Spanish Government has concluded a series of a bilateral agreements with the original countries of migrants (non-EU) which tend to stay irregularly in Spain, such as Morocco and, just later with Romania and Bulgaria. The agreement signed with the Latin Americas countries is also relevant here. Certainly, Spain has an interest in maintaining a strong tie with the former Spanish colonies in Central and South America, which share the Ibero-American cultural idea (Hazán, 2014).

The key role of this kind of immigrations is directly related to the preference in offering citizen petitions to them with respect to other nationalities (such as Africans). This is evident since 1889 with the introduction of the principle of nationality determined by the origin of the parents (*ius sanguinis*), when one or both of them are originally from Spain. According to this law, Latin American and Hispanic origin have almost the same right to gain citizenship, although there is some degree of

judicial discretion in the application.
Nevertheless, those countries share a similar culture and language. Additionally, we can compare Spain's migration framework to the Italian one. Both countries introduced various regularisation for irregulars. Considering this factor and the similar typology of migrants, the adopted regularisation programs (in 2002 for Italy and 2005 for Spain) are generally employment-oriented, although just for few categories of workers. The rest of the illegal migrants are subject to straightaway expulsions.

The introduction of the regulation in Spain in 2005 by the newly elected government led by Zapatero, permitted the registration to the social security systems of 600,000 illegal migrants already residing and working in Spain. The change of the purpose of regularisation from family reunification to employment-based permits produces various positive effects on the economy (Fromentin, 2013; Devillanova et al., 2018; Monras et al., 2018). Firstly, changes in the approach to migration cause positive effects on public finance. Monras et al. (2018) show that, by exploiting the amnesty program as a natural experiment, it is possible to assess the effects on the public finances and labour market outcomes. The authors observed that these changes produced an increase in the payroll-tax revenues by 4,189 euro. However, this increment has been lower than expected, half than the existing population. This is because migrants tend to be paid less than natives. Specifically, the tax-payroll have been increased in the housekeeping services and the high-immigration provinces (coastal provinces and big cities such as Madrid and Barcelona).

To understand whether the contribution of the newly arrived was big or small, Monras et al. (2018) run a regression with the total payroll-tax revenues as dependent variable on the total affiliates on the social security system. The outcome is not clear on whether the new migrants contribute to the social system less or as much as previous migrants and natives. Since the impact on the revenues is estimated taking into account the government expenditure, in this case it would not be registered an increase in the use of public services. This is because migrants were already making use of the health care and education system also when they were illegal. Thus, the regularisation of new migrants did not have an effect on the compensation of those government expenditures. Looking at the impact on the labour market, it is possible to observe various effects produced by the new documented migrants. Different than usual, the new migrants enter the market as competitors to the natives. Indeed, for each new documented migrant working and paying taxes, 0.54% of the low-skilled

workers were losing their job. The high level of substitutability of the legalised individuals with natives is given by the fact that those migrants were already working. The increase affects differently individuals considering their characteristics and experience. Generally, low-skilled workers lose from legalisation as the migrants that were previously illegal, tend to be less skilled endowed. Besides, as new migrants become more costly by roughly 30%, firms preferred to hire high-skilled workers. Thus, the employment rates for the high skilled worker, both migrants and natives, increased substantially. The preference to hire more skilled workers is also explained by the rise in the work inspection (132%) which disincentive employers to recruit illegally. However, the gains produced by the employment of high-skilled workers has been not so significant compared to the looses in low-skilled workers.

The effects on wages are more heterogeneous. Monras et al. (2018) looks at the *composition adjusted wages* [8] as a proxy of the full labour cost (unit labour costs), which is computed by using the tax base of social security contribution divided by the days worked during a month. Assuming that individual characteristics[9], which influences different wage levels, are equally across provinces and in each province might have different wages, it has been seen that high immigration regions registered an upsurge in wages. These increases in wages was more for natives workers rather than for migrants. Namely, the wage for high-skilled migrants increased by 0.43 log points while decreased by 0.28 ones for low-skilled native. Furthermore, the changes in wages for the shock created in the market by the rise in low-skilled foreign workers contributed to the relocation of jobs across the Spanish provinces. Immigrants started to move in low-immigration regions where they could use an advantageous employment position than the ones offered by the traditional migration network.

The long-run impact of migration on the Spanish economy is positive as we can observe from the results in Table 4.6. An increase of 1% in *Immigration per capita* rises the *GDP per capita* by 0.23%. For the short-run relationship between *Immigration per capita* and *GDP per capita*, it is not possible to observe a common significant effect for all the lags, following the outcomes of the Walt test. Nevertheless, the second lag of the *Immigration per capita* is significant and also negative.

[8]The unit labour costs measure the cost of the labour including the social security and pension contributions.

[9]The individual characteristics considered in their regression are the following: skill level, tenure, experience, type of contract and sector of activity.

Hence, migrants produce marginal negative effects on the economy in the short-term as 1% of *Immigration per capita* makes the *GDP per capita* fall by 0.12%. This negative impact in the short-run might be a result of the migration policies implemented by the Spanish government. The different regularisation programmes introduced to reduce the irregular migration, guarantees to migrants the status of regular worker only for a short period of time, usually one or two years. During this period, legal migrants enter in competition with the low-skilled natives in the labour marker, leading to increase in unemployment for natives. This is because native workers are considered as a more expensive factor of production for employers. Nevertheless, the final effect of the increase of migration is positive, this might be due to the increase in high-skilled jobs, both for natives and migrants, as indicated in the analysis of Monras et al. (2018). Therefore, the rise in high-skilled foreign workers impacts positively on the total factor productivity, enhancing economic growth.

4.7.3.2 GDP per capita Granger-Causes Immigration per capita in Ireland

At the beginning of the 1990s, Ireland was starting its process of fast-growth. The expansion of the output during the first years of the decade was related to the strong export growth, following a devaluation of the Irish pound. Additionally, the output growth was supported by the growth in consumption and business investments. With regards to latter, Ireland attracted foreign companies in specific high-technological areas of the manufacturing sectors. Namely, these highly productive companies were concentrated in the computers, pharmaceutical, medical technology, electrical engineering and food sectors. Together accounted for more than 70% of the manufacturing service (Ó Riain, 2000). Despite this scenario, the Irish public debt and unemployment rates continued to be high. Thus, tighter control on public expenditure appeared to be necessary, to respect the agreement with the European Community as defined by the Maastricht Treaty rules.

The higher unemployment affecting mainly the low educated population spurred the Government to improve the education and training levels with the introduction of the "Back to work Allowance Schemes". This financial cushions between employment and unemployment had as a target the reduction of the long-term employment among the young population. Since the end of 1993, the Irish government begun to implements a series of policies with the intention of attracting more immigrations. Although, the outcomes of the implemented policies was positive, the new inflows

of foreign workers were not enough to compensate the imbalances in net-migration due to the high rates of natives still emigrating abroad. The accumulation of human capital for the Irish policymakers became one of the main objectives. Indeed, this was considered as the dynamic factor necessary to boost the country for moving from a low income agricultural economy to a service-based industrial one. In this process of modernisation of the economy, the growing services and manufacturing sectors appeared to demand more skilled labour force, although the necessity of unskilled jobs remained a critical factor for the development of the communication and transport sectors.

The broadening of the services-based economy created positive spillovers in the growth of Total Factor Productivity (TFP), conferring to Ireland the higher position among the most productive OECD countries. Between 1989 and 1998, foreign-owned companies produced an increase in employment in the manufacturing sector by 24.8% more and in the financial, trade and software services by 384.5% (Ó Riain, 2000). The flourishing economy and the increase in employment attracted the return of Irish living abroad or people with Irish heritage. Most of them were coming back from the United Kingdom and the United States of America. This new migration phenomenon for Ireland transformed the migration history of this country attributing the characteristic of new immigration country in the European scenario.

This change in the migration composition in Ireland, happened at the same time of the increase in the tightness in the migration policies in the core European countries. These changes have critically defined new pathways for the migrations moving towards the peripheral European countries. However, it is important to mention that the Irish Republic migration was different from the one in the South European countries. Indeed, most of the migrants moving to Ireland had strong cultural and family ties coming from Anglophonic countries, such as the UK and the USA. The contribution to the economic growth of the foreigners' human capital has been fundamental. Indeed, most of the migrants coming from Anglophone countries were well-educated (completed college or university). With time, also large groups of high-skilled European passport holders decided to move in Ireland. In general, there has been the tendency to adopt a laissez-faire policy regime was adopted for foreigners coming from the European Economic Area who had not require any work permits. Indeed, there was not a real need of implementing quotas for migrations coming from Europe, as well as from the UK and the US, as these migrants "self-selected" according

the need of the Irish market (Minns, 2005).

Barrett et al. (2002) have found that migration affected the earning inequity and the return to education in the period that goes from 1987 to 1997. Namely, the authors splitting this time period into two parts, observe that between 1987 and 1994 there has been a surge in earning inequity. Looking at the gross hourly and weekly earnings, a marked dispersion at the top of the distribution is observed. Moreover, this dispersion heightens when ones examine the typology of contract, part-time workers are more subjected to inequity rather than full-time workers. Furthermore, the authors argue that there is a relationship between the earning inequity and the variation in return to education. Although it is expected that an increase in high-skilled individuals (natives and migrants) is directly related to economic growth, the expansion of foreign investments in the high-technological manufacturing sectors has led to the human capital accumulation, as the demand of specialised workers in engineering and IT specialists increased.

In his work, Barrett et al. (2002) estimate a regression equation with the logarithm of hourly earnings as a dependent variable on a range of factors that influence earnings, including education levels. Again, the results of this analysis show that the earning inequity has sharpened between the end of the 1980s and mid-1990s. This happens when they control earning inequality using other variables, such employment levels, industry-specific unemployment rates and the return to third-level education. Similarly, a the reduction in inequity is detected between 1994 and 1997, consistently with the previous results. The increase of the immigration allows during the mid-1990s explains the reduction of the earning inequity and the return to education. Specifically, the effects of skilled migration have been determinant in reducing the upward pressure created by the wage of skilled workers. This reduces the costs of production in favour of more output making Ireland more competitive concerning the rest of the world, which has as final effect the increase in the GDP. Therefore, well-educated migrants were attracted by the growing GDP per capita rates and demand of skilled workers moved in Ireland.

The rapid increase of the migration drive-by work reasons has increased together with the refugee's applications following the introduction of the Refugee Act 1996, for the first time. This phenomenon was not peculiar to Ireland itself, but it mirrored the European trends. The flow of this group of migrants was dominated by

Nigeria, Romania, and China. However, only few applications were accepted. The Dublin convention entered into force in 1997, committing the state to be responsible for assessing asylum claims. As it follows, Ireland was forced to introduce the annual quota for asylum seekers in 1998. The quota system for asylum seekers produced a grow in the applications and by 2002 the asylum seekers peaked to 22,604 (UNHCR, Population Statistics), though only half of them was guaranteed the status of refugee migrant. The management of the asylum-seekers applications has not been successful. For many of those which their application was pending, there was no right to be employed until they would not recognise their status of refugee. Although many of those applications have been refused, the number of applicants or pending ones declined as the many of them were parents of children born in Ireland. Indeed, according to the *ius soli*, introduced by the Citizenship Act in 1956 law, the right to be an Irish citizen was guaranteed to all children born into Irish territory. Namely, with the constitutional agreement on the entitlement of being citizens of Ireland, were entitled to be Irish also the *people born in northern Ireland*.

A more rigorous approach was taken in 2003 by the Supreme Court which did not attribute the right of the Irish child's parents as 'absolute', who could be objected to deportation in case the non-national parents remained as illegal migrants. Despite the increase in work permits granted to create more legal channel for non-EU immigration, many of the permits were issued for a short-term, usually one year. This could have represented an issue, as once migrants' permit expired they could end up overstaying in the country. In the following years, Ireland, by introducing a series of regularisation programmes, was able to control for irregular migration, differently from the other Southern peripheral EU countries (Handoll, 2012).

On the basis of the principle of *ius soli*, many migrants have been regularised. The Irish Nationality and Citizenship Act of 2004 that amended the Act of 1956, provides the basis for the existing regime on naturalisation. The main change was the acquisition of citizenship under the *ius soli* principle. Parents of Irish citizens now need to demonstrate that they have a strong connection with the Irish island[10] Although this reform seems to predict the failure of Ireland in being entitled country of immigration, this decision to restrict the citizenship was a way to avoid that irregular

[10]According the Irish Nationality and Citizenship Act 2004 those who can benefit *ius soli* citizenship are those; I) who would be stateless; ii) who is born in Ireland and one of his parents was entitled to reside in Northern Ireland or born was British citizen; iii) who is born in Ireland and at least one of the parents is entitled of diplomatic immunity in the state.

migrants would be entitled to be citizens only because their children have born in the island of Ireland.

The beginning of the 2000s shows different trends than one of the previous decades, though in the first two years of the 2000s the country continued to assist in rising in investment made by foreign industries and still lower unemployment rates. The fall in Foreign Direct Investments (FDI) after 2001 produced a negative impact on the GDP growth and unemployment rates, conversely to Spain where the inflow of migrants continued to increase. This negative performance of the economy affected the flow of migrations differently. This is because there was, on one hand, an increase in the number of less qualified migrants from Europe and, on the other hand, there was a small increase in the group of qualified migrants coming from non-EU countries. The latter were easily recruited from traditional Anglophone countries such as Philippines, India and Pakistan (Minns, 2005). Barrett and Duffy (2008) controlled the occupation distribution of the immigrants and natives in four periods: i) 1995-1999; ii) 2000-2001; iii) 2002-2003 and iv) 2004-2005. The authors found that immigrants coming in the first period were occupying more position in the top occupation ladder than the natives (managers, administrators and professionals), while moving across periods the percentage of immigrants working as professionals decreased with respect to the natives' one, due to the decrease in the educational attainments of migrants. According to Barrett and Duffy (2008), this is explained by the increase in the proportion of the inflows of migrants coming from the *new* European countries, defined as A10 countries.[11] They were overrepresented among the group of migrants suffering from the largest occupational gaps, especially for the group of migrants coming after the 2000-2002 period.

Until 2003, Irish residence permits were 'employer-led' and were mainly offered to non-EEA nationals. The large amount of applications for work-related lead the Irish police-maker to create more hard rules for employing migrants, particularly the over-represented low skilled ones in the markets by introducing the Employment Permits Act in April 2003. Just before the 2004 agreements with the new EU member states, Ireland has seen a complete change in the composition of the migration population.

[11]The A10 countries are the countries that accessed simultaneously the European Union in the 2004. The 2004 enlargement is known to be the largest single expansion that the Union has experienced. The countries who join in that date were: Cyprus, The Czech Republic, Estonia Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. Most of the EU countries imposed a restriction to access their labour market to the A10 countries for a period of two years at least.

Ireland was getting ready to the future increase in legal migrants which, after the enlargement, would have had the right to work and live in the country. To this end, new occupations for the new member state workers were created. This re-imposed employment permits with regards to the nationals of the post-2004 accession states were very peculiar for Ireland, as it was one of the three countries, together with the United Kingdom and Sweden who opened their labour market entirely to the workers coming from the former Soviet Union without imposing any restriction as the rest of the EU countries. As the Government adopted a more liberal approach toward workers from the A-10 countries, it decided to control for the occupation of the non-EEA countries. The Department of Enterprise, Trade and Employment and the training authority FAS published the list of the occupations which were no more opened to the non-EEA workers, which at that point would be no more needed. The substantial influx of nationals of the new member state is positively related to the rapid boom in the Irish economy, which achieved the most between 2000 and 2006.

Moving into recession after the first half of 2008, the rapid slowdown of the construction sector produced a surge in the unemployment for male workers, where foreign workers were the most affected. Hence, the unemployment rates in 2007 were 5.4% and 4.1% for male and female respectively, compared to 16.5% and 8.9% in 2008 respectively. This unemployment discrepancy can be explained by the predominance of males in the construction and industrial sectors that were more heavy affected by the crisis. Moreover, Barret and Kelly (2012) observe that the substantial employment loses of the job for migrants is not only justified by the fact that they were employed in those sectors more sensitive to the effects caused by the financial crises, but also that migrants have suffered more job losses with respect to natives, working in the same sectors. The authors conclude that the disadvantaged group of migrants that have lost from the downturn are those who had benefitted before from the economic boom.

Ireland has been rewarded for its openness toward those migrants as the same migrants tend to release their jobs during the economic downturn, moving back home. This contributes to reducing unemployment. At the same time, house prices dropped down because of the global credit crisis, leading to a reduction in the Government fiscal revenues due to a decline in the taxes on the sale of houses. The latter, adding up to the reduction in the income tax revenues, was the main reason for the Irish fiscal crisis. As the Irish budget was under pressure, also integration policies addressed

to migrants (such as the one put in place on 2006[12] and in 2008[13] were adjusted by cutting on training and education (languages courses for migrants). With the intention to controlling migration flows, avoiding the irregular migration and facilitating migrants' stay and economic activity, the Irish government imposed the restriction in offering work permits to those migrants would have at least €30,000 annual remuneration. This facilitated the permanence of high skilled migrants with respect to the low qualified ones, as the low-skilled immigrants were paid lower. However, combatting illegal immigration is an issue for Ireland. This has lead to the growth of restrictive measures toward specific groups of migrants, such as low skilled migrants, the family reunification group and the asylum seekers. This increase in tightness of the migration policies has created a series of limitation such as the access to permanent residency and in the labour market access (De Haas et al., 2016). The reduction of the the legal channels to migration, both for residence and work, instead, has contributed to the spread of the illegal migration.

According to Ruhs (2006) the introduction of temporary migration programs between 1999 and 2004 for non-EEA countries to support the increasing demand for migrant labour in the growing economy, has not been followed by effective enforcement of immigration and employment laws. Hence, the failure of the enforcement toward employers with sanctions for hiring illegal workers is a factor that uncourtly encouraged the spread of illegal immigration. This is evident from the fact that, after just two years before the Employment Permit Act 2003 was enforced, only three employers have been found to violating the law. If at the national level there have been the intention of limiting the non-EEA migration, on the other hand, it is evident that an increase in the proportion of permits for highly skilled workers has grown enormously. The proportion of highly-skilled workers on the total third-country nationals' employment was 46%. However, the proportion of the high-skilled natives was also high. The implementation of a policy for facilitating third-country national migration in Ireland was one of the main challenges. Indeed, following the economic recession, many migrants returned home, and also natives began to emigrate again, creating a skill shortage in information technology and engineering (sectors that have grown during the 1990s fostering the Irish economic growth). Therefore, the

[12]In the 2006 the first integration measure for all the migrants have been put in place for funding assistance in employment, language and community activity.

[13]The guide line for a comprehensive integration policy have been published for the firs tine on a report: 'Migration Nation: Statement on Integration Strategy and Diversity Management' which underline the intention of the Irish Government to not create 'parallel societies' among migrant communities and natives.

government put in place an Action Plan Jobs 2012 to implement good practices for companies in recruiting more high qualified third-country nationals.

In conclusion, Ireland has known a period of economic expansion during the last two decades. The booming economy has attracted large Foreign Direct Investments (FDI), particularly for the high-tech manufacturing sector. The rise of investment in the high-technological sector required an equal increase in skills. Therefore, the increase of demand for high-skilled has promoted a mechanism for the attraction of high-skilled foreign workers. However, during the financial crisis of 2007/08, many high-skilled foreign workers emigrated abroad, creating a new demand for high-skilled workers. With this regards, the Irish government decided to implement a series of policies together with the national businesses to promote the employment of high-skilled workers from abroad. As a result, the current demand for high-skilled workers and the booming economy are the reason why migrants are attracted to move to Ireland.

From the results of Table 4.6, the elasticity of the *Immigration per capita* is positive. An increase in 1% of the *GDP per capita* leads to an substantial increase in *Immigration per capita* of 0.46%. By allowing for the accumulation of (national and foreign) human capital, Ireland has been able to reach the long-term equilibrium faster than the other peripheral countries in the EU. The latter is observable from the ECT coefficient values in Table 4.6, according to which the model adjusts to the long-run equilibrium with a speed of 68%. We also found evidence of short-run effects of the first and third lag of the *GDP per capita* on *Immigration per capita*. Specifically, the rise in *GDP per capita* of 1% has positive effects on the dependent variable of 0.88% and 1.35%, respectively. The results for the short-run relationship between the variables are in line with the results for the relationship in the long-run. This might be due to the introduction of a series of work-schemes that the government implemented with the national companies with the aim of attracting more migrants. As a result of this cooperation between institutions and businesses, the control of migration through adequate migration selective policies seems to be producing positive effects in the short and long-run.

4.7.3.3 Bidirectional Granger-Causality in Portugal and Greece

The *Southern* European countries have been experiencing issues in attracting migration, managing irregular flows and asylum seekers. The "Mediterranean model" of

migration shares some common characteristics, such as "deregulation, casualisation and precarious employment" (La Spina, 2017). In this context, the *southern* countries had to overcome the implementation of the migration rules, necessary to cope with the sudden rise in mass migration in the last two decades.

The difficulties in managing this unstoppable flow of migrants led to stricter policies reducing work and residence permits. Both Greece and Portugal experienced very low levels of GDP per capita concerning the rest of the EU-15, which figures are comparable to some of the new member states. Additionally, the high level of unemployment and the non-developed tertiary sectors determine the weakness of these economies, diverging furthest from the rest of EU-15 patterns. However, in the mid-1980s both these two countries received a series of structural funds from the European Community, allowing for a slow catching up process towards the EU-15 countries by producing high labour demand (Fayolle et al., 2000). Notably, the Structural Funds produced different regional effects in Portugal, contributing to the growth of the coastal areas rather than the internal ones (Angrist and Kugler, 2003). The increasing demand for labour attracted foreigner workers, which produced structural changes in the Portuguese economy. The economy transformed from a low-productive agriculture economy, based on traditional and socio-economic values, to a more modern industrialised one. The contribution to the population and employment of migration have been crucial for that country development (Domingo et al., 2007; Carrasco et al., 2008; Cavounidis, 2018). Indeed, higher young migrants contributed to the expansion of the industrial and services sectors.

Also Greece received a significant rise in the number of foreigner workers in almost all the sectors, although, as in Portugal, the principal sectors occupied by migrants were the following: 1) agriculture, forestry and fishing; 2) industry and energy; 3) construction and 4) hotels and restaurants (Domingo et al., 2007). The male-dominated sectors are construction and agriculture, while the female-dominated one is the services sector. The strong demand of young female workers in housework duties for the care of children and elders have been fundamental for allowing women of each household to integrate to the labour market. As described in the welfare state classification of Esping-Andersen (1990), the southern countries' welfare system rely on family and church (De Giorgi and Pellizzari, 2006; Pedersen et al., 2008). As it follows, female foreign workers would take care of the family taking the job that previously devolved to the woman of the household.

Furthermore, both countries have faced a deterioration of their public finances after the global financial crisis of 2007. The current account deficit of those countries grown steadily until 2000. Both countries here received financial support in exchange for structural reform and austerity, in order to take corrective actions. The adjustment programs adopted by Greece and Portugal worked in different ways. Portugal after receiving financial aid in 2011, was able to restore its economy in 2014. Instead, Greece has been by far the less successful in restoring its financial market equilibrium. Generally, those two countries have faced fluctuations in their net migration rates, due to the parallel rise in the emigration rate during the various periods of economic downturns.

The Portuguese evolution of the labour market, related to the economic restructure in the 1980s, was a failure. This was because of a harsh de-industrialisation and reduction of jobs in the agricultural sector in favour to an expansion of the tertiary one. Baganha (2000) shows that the expansion of the tertiary sector generated an increase in male unemployment, which was counterbalanced by a rise in female employment. Moreover, the centralisation of the tertiary activity in the Metropolitan Area of Lisbon (MAL) created a high concentration of migrant workers just in Lisbon, due to high labour demand. Indeed, most of the modern sector where locate in MAL, like banking, finance and business sectors, and commerce, restaurants and hotels as well as personal and domestic services.

The main limitations to the success of the labour market restructure were a deficit of highly qualified workers, who would have occupied the tertiary sector vacancies, and an increase in the unemployment from the deindustrialised sectors. At the same time, the mechanism for employing workers in the agriculture become more flexible, based on part-time contracts. Generally, those working in agriculture were seasonal migrants (Lobo, 1990) or illegal workers with more than one temporary job in vulnerable sectors, such as in the construction, textile, garment or footwear sectors (Fonseca and McGarrigle, 2014). Informality spread all over the sectors, especially in the less industrialised part of the country (Lobo, 1990).

The need of control for migration increased recently after the European enlargement, there has been a change in migration inflow of migrants, as more people from Ukraine, Moldavia and Romania added up to the low-paid migration group. Fur-

thermore, another reason of concern for the Portuguese government was the 'second wave' of Brazilian migrants arrived in Portugal during the 2000s. Differently from the first group of Brazilian emigrated during the end of the 1980s (skilled professions such as dentists, IT expert and engineers), the most recent group were less educated and employed in hotels and catering sector, construction and household care (Van Meeteren and Pereira, 2013). Therefore, to curb illegal migration, in 2003 the Government signed an agreement with Brazil, to open particular channels that facilitate the exchange of information between the two countries. The cooperation goal was to prevent and reduce the trafficking of migrants. Besides, Portugal allowed Brazilians to get permanent residence. Similarly, between 2003 and 2005, Portugal signed agreements with Ukraine and Romania recruiting migrants from those two countries on temporary contracts.

During the last decade, the Portuguese economy performed poorly, as the Portuguese TFP deteriorated its trajectory diverging from the EU-15 average pattern. Although it faced several reductions of the public spending, Portugal has introduced several measures to increase the level of migrant integration. This process was coordinated by the High Commission for Immigration and Intercultural Dialogue (ACIDI), introduced in 2007. The *Second Plan* for integration (2010-2013) promoted the reduction of scholastic abandonment of children's migrants and ensured social assistance to the immigrants living in poverty. Besides the introduction of the *Second Plan*, intensified language courses and training encouraged migrants to open their own business. Portugal maintained a strong commitment to adjusting its fiscal position after the recent crisis, nonetheless, they lost young individuals emigrate abroad. In this context, the migration population was a good substitute of natives in working age.

The bad performances of the Portuguese economy and the deterioration of public finance, especially after the financial crisis, generated negative effects in the process of attracting migrant workers. Specifically, large number of migrants moving to Portugal have been low-skilled, thus, not necessarily enhancing the level of productivity. Specifically, these migrants were attracted by the rise in the demand for labour in the agriculture sector, in the remote areas, and in the urban services sector in the Metropolitan Area of Lisbon. With this regards, in our analysis we have been able to capture a negative long-run relationship from *Immigration per capita* to *GDP per capita*, specifically an increase in 1% of the *Immigration per capita* generates a decrease in *GDP per capita* equal to 0.59% (Table 4.6). Moreover, the ECT, which

confirms the presence of co-integration between the variables, describes a slow speed of convergence of the adjustments to the long-run equilibrium (21.6%).

Results shows that there is an elasticity of the GDP per capita also in short-run equal to -0.20%, in line with the results of long-run co-integration. However, we also find a co-integration relationship in the other direction. Specifically, an increase in 1% of *GDP per capita* decreases *Immigration per capita* by 1.446%, and the speed of convergence of the short-run adjustments to the long-run equilibrium is of 54%. This result is surprising both for the sign and size of the long-run coefficient, as generally migration increases during the periods when the economic cycle is positive. This result might be attributed to the inadequate functioning of the migration policies in Portugal which does not attract migrants according the real need of the market. The mismatch between job vacancies and migration skills does not generate a process which encourages the rise in regular migration, especially skilled foreign workers.

Due to the economic stagnation in Europe in the 1980s, unemployment in Greece grew significantly. Following the fall of the Iron Curtains, a significant flows of Albanians moved to Greece. Not all of them were allowed to obtain a residence permit, only Greek Albanian could register to the Foreign Office. Many of them were recognised as refugees escaping Albania where they represented an ethnic minority. Indeed, those Greek Albanian were persecuted for their Greek origin and for following the Christian Orthodox religion. For the rest of the Albanian migrants, there was not any form of formal recognition from the Government. Hence, Greek policy-makers ignored the dramatic upsurge of migrants (Fakiolas, 2000). The late intervention of the State in managing that migration flows allowed for the strengthened position of Albanian workers in the informal economy.

Only in 1997, Greece introduced the first regularisation program. Greece was the latest country among the peripheral European countries that introduced an amnesty program for the first time, although this regularisation did not produce the desired results. The total number of regulated migrants where 75,000 against the expected 300,000 (King et al., 2000). Therefore, in 2001 there was another regularisation program which introduced a quota for work permits, allowing the migrants to receive a residence permit. Moreover, after the naturalisation, the foreigners who contributed to the economy by working and paying taxes enjoyed an equal treatment as compared to the natives.

These migrants entered an economy based on backward small-scale enterprises which dominated the agricultural sector. As those businesses were small family-firms managed by households, there was no market in the agriculture sector for paid workers. a wage (Fakiolas, 2000; Cavounidis, 2006). This structure was similar in the service and manufacturing sectors. All these sectors were mostly occupied by natives, and where based on a labour intensive production and low technological levels. In this context, the new demographic shock created in the labour market by the Albanian migrants produced a low-cost labour force employed illegally, especially in the agriculture sector, as documented by Lianos et al. (1996) in a study of the local labour market in Northern Greece. The main advantage of local businesses in hiring foreign workers was that migrants, with similar characteristics to natives, were paid 45% less, as generally irregular in the market. Moreover, illegal migrants represented a reduction in taxes for employers, which resulted in lower fiscal contributions to the state coffers. However, according to Lianos et al. (1996), the lower wages paid to the migrants where negative compensated in lower productivity. To solve the problem of irregular migration, Ambrosini and Triandafyllidou (2011) suggest that if strict control at the borders are not implemented through controls and sanctions at work places, the fight of the irregular migration will not be effective. Additionally to the lack of enforcement to fight irregular migration, regularisation programmes are considered another solution. However, in all the southern European countries this method of regularisation has not been successful. This leads us to reflect on the way how migration programmes are implemented in Greece, as well as in the other peripheral European countries. In particular, the criteria generally adopted by Greece for the regularisation programmes is based on the nationality of the migrants, and should also take into account the skills of migrants necessary to cover vacant position in the labour market.

Migrants seem to contribute to the economy in the short-term, although this is not confirmed in the long-term. Indeed, at the beginning of their arrival migrants have not impacted significantly on the unemployment (Papademetriou and Martin, 1991). On the one hand, migration has been a key factor in the modernisation of the labour market, firstly, by changing the nature of the employment. Greek family-based enterprises tended to employ family members without providing an actual wage. Hence, the arrival of wage-paid migrants helped restructuring the market (Cavounidis, 2006), that usually easy done by migrants. Secondly, increased the

participation of woman in the labour market, as the household's responsibility was depending on the low paid migrant workers (Filipino women). Thirdly, manual jobs now associated with migrants, were no more performed by family members, who carried out studies and improved their employment conditions. This concept is explained by Peri and Sparber (2009), migrants perform manual jobs as they are not endowed of communication skills (language proficiency). At the same time, natives substituted in the market by migrants increased their level of specialisation achieving better jobs which required high communication skills. Finally, the adjustment of labour supply to demand contribute to reducing labour market rigidities. Shortage of labour was limited by the surplus of new workers, who were more flexible and can take different seasonal jobs.

Results from the co-integration tests in Table 4.6 show that there is a relationship between the variables going from *Immigration per capita* to *GDP per capita*. Indeed, an increase of 1% of *Immigration per capita* decreases *GDP per capita* by 0.95%, with a slow speed of the convergence of adjustments to the long-run equilibrium of 0.25%. Migrants in Greece have contributed to the modernisation of the economy, from an agricultural-based to an industrialised-based one. However, the lack of positive contribution of migrants to the fiscal system and the low-productivity of these workers, due to their low skill levels, might be the reason of the negative results in the long-run. Indeed, foreigner workers are hired almost exclusively in the informal market and, therefore, both employers and migrants do not pay taxes. This is translated into a decrease in government revenues. Additionally, most of those migrants tend to send remittances at home, which is an extra fiscal burden. Moreover, the Greek migration policy does not motivate migrants in acquiring more human capital.

Furthermore, there is evidence of Granger-causality relationship in the opposite direction, from *GDP per capita* to *Immigration per capita*. Results of our analysis are similar to the case of Portugal. Indeed, an increase in 1% of *GDP per capita* decreases *Immigration per capita* by 0.62%. Moreover, it is not possible to observe the same relationship in the short-run. This results shows that migrants are very dependent on the economic cycle. This might also be due to the presence of temporary migration that move to Greece only when the economic condition in the countries are positive. Moreover, many migrants enter and stay as irregular in the country, probably because they move to Greece only as a first step to Europe, following which they can easily reach the traditional European migration countries, such as Germany and

the Unite Kingdom. In this contest, the fact that we found evidence of a relationship between the two variables but that the relationship is negative, might be because of a poor implementation and enforcement of the migration policies. In Table 4.6, it is also displayed the result of the speed of convergence to the long-run equilibrium, which in this case is of 53%.

To conclude, both Portugal and Greece have not been able to reduce the informal markets where migrants are employed. Hillman and Weiss (1999) find that when migrants are a sector-specific factor working in the service sector for the production of non-tradable goods, natives do not prefer to legalise migrants. The latter is because domestic businesses prefer to employment migrants in order to reduce the costs of production. However, although we can not simplify the explanation of the failure in the management of migration flows, it has to be taken into account the attitude of governments of both countries in not adjusting the migration flows to the market needs, rather regularising migrants on the basis of common cultural and historical ties.

4.7.4 The "New" Member States

After 1989 the countries of the former Soviet Union experienced a period of geographical, political and economic transformation. After the establishment of democratic parliament across all the Eastern Europe, political differences between Central East[14] and Balkans countries became more pronounced. The former group experienced a series of social reforms, while in the latter a more authoritarian regime was established. The beginning of the 1990s, was characterised by political instability, due to the disaggregation of Czechoslovakia and former Yugoslavia. The division of Czechoslovakia (called the *Velvet Revolution*) was the only peaceful breakup among those countries. The Czech Republic reformed and modernised its political and economic approach, while Slovakia developed a more traditional and authoritarian approach closer to the Balkans. At the beginning of the transition from a planned economy to an open market-based one, most of the countries did not perform well, with low GDP per capita and high unemployment rates. In Poland, Hungary, Czech and Slovak Republic the manufacturing output decreased by 65% with respect to its pre-transition values.

[14]The Central East countries are the following: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland Slovakia and Slovenia. The Balkans countries are: Albania, Bulgaria, Romania and the ex-Yugoslavia countries.

The '*shock therapy*' adopted to liberalise the markets did not successfully manage the series of structural imbalances inherited by the former socialist regime. Sachs (1996) detects the following imbalances such as: inflation, shortage in consumers and producers' price, large fiscal deficit, currency inconvertibility, weak trades and low competitiveness with the rest of the world. The stabilisation of inflation has been one of the major successful achievements post-transition period. Indeed, there has been a real concern about the explosion of prices during the transition period, as an excessive growth in prices would trigger wage demand. Additionally, the rigidity yielded by an exchange rate pegged to the dollar did not allow the monetary authorities to conduct specific manoeuvres for the reduction of inflation. All possible reforms for the implementation of stabilization programs where costly and produced a deterioration of the fiscal balances. This period saw a reduction in taxes combined by an increase in expenditure from governments to support the national reforms, putting a strain on the budget. However, the choice of the government to support human capital and health expenditures was a way to fuel future economic growth (Romer, 1986; Lucas, 1988). Public investment in R&D and FDI lead to a modernization of the private sector. Namely, FDI contributed to the reallocation of property and increase in the TFP. Surprisingly, those investments from foreign-ownerships have increased at a rate that doubled the growth rate of the international trades and it was four times higher than the world GDP (Capello and Perucca, 2015). However, these investments were made on a regional-basis, creating large inequities between regions.

Furthermore, two additional problems were manifested, firstly, the reduction of barriers set by the governments to protect public ownership as opposed to private ownership by people and businesses and, secondly, the employment preservation subsidised by the State to maintain the employment figures.
Boeri and Scarpetta (1996) find that before the transition the wage premia in the heavy industries were very high and the reduction of this premium become a challenge at the beginning of the transition. The reduction of real wage since the beginning of the transition left small spaces for further adjustment. Hence, the conservative labour market reform affected severely employment. The Central Eastern European governments decided that the best way to protect workers was to offer subsidies, which disincentive to look for another job. The contemporary migration history in the Central Eastern Europe begun after 1990. This is because under the Soviet Union there was little mobility of people. With the fall of the Berlin Wall, migration to

the Western countries increased considerably. Since the Eastern governments were subsidizing jobs, this reduction in population was welcomed by them as it meant lower public expenditure.

4.7.4.1 Immigrations per capita Granger-Causes GDP per capita in Croatia

Croatia in 1991 was the first country to gain independence from the Socialist Federal Republic of Yugoslavia, experiencing a substantial drop in the GDP following the war. During the 1990s, Croatia experienced a transition phase from central planned economy to market economy, although making slow progress in transition resulting in many areas lagging behind many of new European countries. Capello and Perucca (2015), by looking at the contribution of the employment and productivity growth, from the post-communist period to the recent crisis period, find that the economic growth in the most advanced and internationally open economies among the CEE countries was achieved mainly during the first period of transition rather than in the following periods. This can be one of the reasons why Croatia did not grow as other new European countries, as it did not invest in the first period.

Moore and Vamvakidis (2008) identify the possible reasons of the delays in the economy recovery of Croatia compared to the other CEE economies in a similar phase of transition to a market economy. According to the authors, although Croatia had a good potential for convergence to the core and peripheral European economies by investing in the public sector, health care, and in the formation of human capital, the country did not introduce significant reforms to incentive both private sector and the foreign direct investments. Specifically, the Croatian government did not implement the regulations to guarantee adequate protection of property rights and the enforcement of contract regulation to control the high corruption in the business environment. To exacerbate the recovery of the economic condition, the missing reforms in the labour market did not contribute to the reduction of the high unemployment rates which especially affected the young population. Hence, Moore and Vamvakidis (2008) suggest that the issue of the unemployment is correlated to the lack of flexibility of the labour market.

Only at the beginning the 2000's the country experienced a steady GDP growth, although it was still coping with the issues of unemployment and low labour force participation. The reform of labour market introduced in the 2003 did not alleviate

the issue of unemployment, and the consistent mismatch between demand and supply of productive skills in the market. During the recent financial crisis, Croatia was strongly hit, with negative consequences on growth of GDP. In the 2013, Croatia entered the European Union with some difficulties. The financial crisis had reduced the expenditures of firms and households, reducing the revenues and increasing the liabilities of both. The public sector worsened, and Croatia had to adopt appropriate policy to correct the excessive government deficit and debit. These continued to grow in 2014 and 2015 above 3% and 60%, respectively, risking to breach the criterion imposed by the EU Stability Growth Path.

In this contest of unstable economic growth and bad political behaviour, the phenomenon of migration does not contribute to the growth. Botric (2015) find that the migrants are the most affected by the unemployment rates, which is the reason why Croatia is not seen as target migration country, but mostly a country where to transit to reach other European countries. Moreover, the lack of proper migration policies which wants to match the needed skills required by the market and the skills of the foreign migration does not allow the immigrants to enhance the economic growth. According the results of our analysis, *Immigration per capita* impacts negatively on the *GDP per capita* of Croatia. Indeed, an increase of 1% in migration produces a decrease in *GDP per capita* equal to 0.71%. Moreover, results shows that there aren't any evidence of short-run impact which could be explained by the difficulties integrating migrants in the labour market.

4.7.4.2 GDP per capita Granger-causes Immigration per capita in Slovakia

Since the collapse of the Soviet Union, Slovakia (existing as state since 1993) benefitted of the best macroeconomic conditions. After the separation from the former-Soviet Union, Slovakia was not able to control for unemployment. Although reforms for employment have been done, the unemployment remains still high because of a growth of people in working age. However, the unemployment rates are lower than the average of the EU-15 countries. Other structural problems are the high old-dependency rate and the low immigration rate, which stands around 1% of the population (Kahanec and Kureková, 2016).

The education of the population is unbalanced, mainly composed by individuals that completed secondary education only. Also, the tertiary educated account for a

small portion of the population. Emigration flows are highly correlated with unemployment rates, as emigrating become a sort of "employment protection". However, as the recent financial crisis affected many of the destination countries, Slovakian nationals returned home. Interestingly, many of the returnees were well-educated. The presence of more educated native-born returnees migrants avoided much of the 'brain waste', although many of those young returnees could not use theirs knowledge and skills due to the lack of jobs that required those skills. Consequently, many of these individuals had to do a low-skilled job.

In conclusion, although the high unemployment and the high emigration rates, Slovakia tends to attract its citizen abroad especially when in the destination country of the migrant they do not find job. The "circular migration" of Slovakian coming back from the "core" EU countries has been crucial during the economic downturn producing a inflow of young educated natives. The results of our analysis indicate that an increase in 1% of *GDP per capita* increases the *Immigration per capita* by 0.38%. This co-integration relationship might be explained by the return migration, when migrants move back home due to the demand of skilled workers in Slovakia, and also because the economic condition in the destination countries are no more a pull factor for them. The absence of significative effects in the short term are probably due to the recent nature of this phenomenon.

4.7.4.3 The Bi-Directional Causality in Poland and Slovenia

The Czech Republic, Poland and Slovenia, together with Slovakia have higher output levels with regards to the transition period. Those countries gain from the geographical proximity to the core European countries, which facilitates movement of capital, people and knowledge with the rest of the EU. In this section, we describe the report the results of co-integration for the two most prosperous Baltic countries, Poland and Slovenia.

After 1989, Poland sped up the process of catching up and performed exceptionally well by registering low unemployment rates and high levels of GDP per capita compared to the other "transition" economies. In Poland a combination of financial and monetary measures contributed to the reduction in inflation rates which was one of the main concerns in the new liberalised economy. The control of price growth lead to an appropriate management of the exchange rate (Sachs, 1996). Indeed, Poland was the first country that was able to move rapidly from a pegged exchange

rate to a floating mechanism. The ability of this country to exit the peg is considered a success. Poland's strategy was considered an example to follow for the other transition economies, especially for the rapid policy action. This so called 'shocked therapy' produced the following positive effects: inflation reduction, price liberalisation, privatization of small scales. Poland's GDP growth improved markedly from an average of -0.2 to +4.8 between 1994-2001. Moreover, an important role in the reduction of poverty in Poland has been produced by remittances and social benefits (Giannetti et al., 2009).

Though during the recent financial crisis the Polish economy has seen a slow-down, the country is steadily catching up with the "core" European countries. The country enjoys a strong competitive advantage with respect the neighbour country and it is characterised by a vibrant business environment.
The strong economy of Poland represents the main "pull" factor for migrants. As show by the outcomes of Table 4.6, there is a co-integration relationship from *GDP per capita* to *Immigration per capita*. The long-run effects of an increase of 1% in *GDP per capita* rises *Immigration per capita* by 0.40%. Moreover, it is also possible to observe positive effects also in the short-run, which converges to the long-run equilibrium with a speed of 0.89%.

Poland was the country with the highest population and for this reason registered the highest emigration flows, which decreased slightly after the 1990s. The continuous emigration toward the EU-15 countries did not favour an equilibrium between demand and supply of labour. However, the Polish government have been resilient in accepting foreign labour force to supply the labour needed in the market. Although Poland is not a typical country of long-term migration, especially after entering the EU, since when emigration flows have increased, there has been a rise in demand of seasonal jobs in the agriculture, services and construction. These jobs tend to be filled by temporary migrants, which have supported many small business. This might explain the results on the co-integration relationship displayed in Table 4.6, according to which a rise of 1% in the *Immigration per capita* generates a increase of 2.97% in *GDP per capita*. The positive effects of the "circular migration", where migrants move to Poland only for work but maintain their principal "home" in the original countries, are large and significant also in the short-run. This is indicated by the Wald test which $\chi 2 - statistics$ is equal to 7.57 and significant at 1%.

Slovenia was able to enter the transition towards a market economy with a stronger economy than the other former-socialist countries. This was due to relative high GDP, openness towards foreign competition and relative low indebtness. However, the country suffered a severe crisis during privatisation. Many companies entered bankruptcy, also due to the restrictive monetary policies imposed by the central bank, namely imposed high-interest rates, thus reducing investments. The increase of interest rate was done in an effort to curb inflation. The cost of these strict monetary policies was the reduction of liquidity, recession and job losses.

The instability in the labour market led to an increase in outflow of many native-born workers emigrating abroad. With time, the phenomenon of emigration towards the European countries become an issue both in terms of decrease in the population growth, as many young citizens left the country, and in the loss of human capital, as many of the emigrants were well-educated. Although the Slovenian migration has been characterised by its negative net-migration rates, Slovenia is part of one of the Easter Mediterranean corridor attracting many migrants from non-EU countries, and part of the population is composed by refugees from former-Yugoslavia; many of them already holding a Slovenian passport.

After the accession to the EU in 2004, Slovenia became a country of immigration for EU and non-EU countries Moreover, since the 2008 the Slovenian government started to implemented a series of integration programmes, which have been aimed at attracting migrants permanently and not just temporarily. The contribution of migration to the Slovenian economy is also one the results of our analysis. With this regards, we detect a long-run relationship from *Immigration per capita* to *GDP per capita*, and in particular an increase in *Immigration per capita* of 1% rises *GDP per capita* by 0.60%, with a speed at which short-run adjustments converge to a long-run equilibrium of 0.46%.

Immigration has been an important factor that supported the labour market where the native labour force was not enough, though, under pressure of the EU institutions, from 2004 the government introduced a "quota system" to control the migration phenomenon. Following this, to protect the labour market in response to the economic crisis, the Slovenian government introduced a "Decree on Restrictions and Prohibition of Employment and Work" which limited the entrance of seasonal workers. Although the new tendency of Slovenia is to control for migration, recently

new policies, such as the "Blue card" system, have been introduced with the aim of targeting the higher skilled migrants. Therefore, we can conclude that the Slovenian government is slowly becoming more selective rather than restrictive. Despite some improvements in the integration of migrants, the welfare system is not one of the main factor of attraction. Instead, the majority of the migrants moves in Slovenia as its economy performs better than the one in their origin countries. To illustrate this, our results in Table 4.6 identify a long-run causality relationship of *GDP per capita* to *Immigration*, with an elasticity of the GDP per capita equal to 1.38% and a high-speed of convergence from one period to the other equal to 0.94%, although there is no evidence of short-run adjustments.

4.8 Conclusion

European countries are growing at different speeds, and in many of the countries the phenomenon of migration is very recent. The heterogeneity of the immigrant population across these countries, due to the different historical integration experience contributes to produce different causal relationships between migration and growth. However, there are some common aspects that accumulate the migration policies of each of the macro-group detected.

The *core* European counties are traditionally immigration recipients and have been able to develop selective policies that help to identify and manage the different inflows of foreign workers. Over time, they have reformed the labour market to better exploit the native and immigrant skills. Most of the *core* countries have been welcoming to asylum seekers and refugees until the explosion of the recent 2011-2015 humanitarian crisis. The second group is the *peripheral* countries, which have became immigration countries only recently. The large informality in their labour markets attracted massive inflows of undocumented migrants. We have also seen that even when migrants enter legally they would be hired irregularly in the informal market. In addition, another characteristic aspect shared by Southern countries is the regularisation programs introduced to control the irregular phenomenon. The experimental like situation in the *central eastern European* countries, although it has produced favourable initial conditions that enhance the speed of the catching-up process with the rest of the European economies, produced a pattern of disparities and polarisation (Monastiriotis, 2011).

Currently, the inequalities among the different internal regions of each *central eastern European* country are very large. The lack of comparative economic structures among these countries does not allow for that a comparison with the EU-15 countries. Indeed, these regions, who are not integrated, would not be able to face external shocks if they would be completely open to globalisation. Competitive *central eastern European* regions are able to attract innovative inputs and foreign technologies, but also high-skilled human capital. Together they contribute to the increase in productivity and industrial specialization. According to Capello and Perucca (2015) the ability of some regions to be open to globalisation avoids the correlation with the business cycle. Consequently, some of the most competitive *central eastern European* countries were less affected by the crisis than some of the EU-15 countries, namely the *peripheral* European group of countries.

To sum up, migrants contribute to the economies, although it seems that the total productivity of the European countries is not the main attractive factor of the migrants moving there. Probably, this is explained for the high number of visas permits of kinship (Duleep and Regets, 1996; Barrett and Duffy, 2008; McKenzie and Rapoport, 2007). We conclude that there are other factors that influence the individual decision of migration into a country. These are the following: rigid/flexible labour market, the job match efficiency, the level of unemployment, the language proficiency and the skills/experience of the migrant with respect to the natives. Therefore, those factors should be explored in future research to understand how they influence migration and GDP per capita growth in the EU countries.

4.9 Limitation of the Time Series Analysis

Through history, European countries have been subject to continuous changes in population and mobility of people at regional, cross-national and international level. In general European countries can be divided into the following groups:

1. "core" countries which have developed strong migration systems and a clear regulation on the matter of humanitarian mobility;

2. "peripheral" countries which have registered large negative net-migration rates, as the out-flow of natives was higher than the in-flow of immigrants. However, around 1970s, there countries have experienced a huge increase in the in-flows

with respect to the out-flows of migrations

3. "new" countries, which generally register negative net-migration rates(i.e. out-flow of natives grater than the inflow of migrants)

As a result of the strong migration system, the first group of countries (core), have been able to collect detailed statistics necessary for developing successful policies. On the other hand, the other two groups of countries had less interest in collecting data on the inflows of migrants, not considering it an issue for their territories. At the same time, data on the outflow of migrants have generally not been collected consistently as governments of European countries have not been interested in recording this data. It is, therefore, very challenging to have long statistical series of data on net-migration. Only recently, research has begun to explore the potential effects of net-migration on economic growth (Boubtane et al., 2013), thus, motivating policy-makers to consider the collection of this data.

There is also another challenge that increases the complexity in the collection and analysis of the data for the European countries. The regulation on migration which can be divided into different groups, such as stock/flows, temporary/permanent migrants, and regular/irregular migrants, depends on the national laws of each European countries. Especially for data collected before the accession of 10 central est European countries to the EU in 2004, it is difficult to find extensive statistical series for migration. Indeed, the enlargement of the EU created the necessity for more harmonised statistics on migration in order to better understand population and labour market dynamics. A more accurate system of data collection across the EU member states was implemented after the introduction of Regulation (EC) No 862/2007, even though data are provided to the Statistical Office of the EU (EUROSTAT) only on voluntary basis. The data available on the Eurostat have already been validated and consolidated, representing a trustable source for our data collection, although the lack of data for periods before 2004 for some of the European countries is still an issue. With this regard, we recognise that this limitation applies also to this study and this leads us to reflect on the scarcity of studies in the current literature on economic migration about the economic impact of migration conducted across all European countries.

The availability of data also had an implication in the analysis, considering that one of the objective of this thesis is to apply a co-integration approach between *Immi-*

gration per capita and *GDP per capita*. This approach does not generally lend itself well when used with very small samples, due to the risk of spurious results. However, Romilly et al. (2001) suggest that when dealing with smaller sample, the adoption of the ARDL technique (Pesaran et al., 2001) gives us better results than when using the Engle and Granger (1987) or Johansen and Juselius (1990) approaches, based respectively on two-stage or multivariate system methods. The ARDL estimation method is more reliable as it estimates both the short-run and long-run coefficients simultaneously in a single equation. This causes the loss of less degrees of freedom, which can make a substantial difference when using shorter time-series. In our analysis we have defined as a short time series, all the series that have less than 20 observations. The application of this rule leads us to drop from our analysis the following countries: Bulgaria, Cyprus, Czech Republic, Estonia, Malta and Romania (as they have less than 20 observation for "Immigration per capita" variable).

Chapter Five

Empirical Results: Panel Data Analysis

5.1 Introduction

The aim of this analysis is to estimate the impact of migration flows on the economic growth of European countries by considering the effects on productivity. Specifically, in our analysis we take into account the net-migration of natives (native emigrants) and foreign-born migrants (immigrants born abroad). This work finds roots into the work of Dolado et al. (1994) and Boubtane et al. (2016) which extended the Solow model to include the human capital available in a country, distinguishing it between the domestic and foreign (migrants) contribution.

To better explore the role played by policy interventions, we included in our analysis both domestic and foreign human capital along with the migration policies adopted by each European country, so to understand how these policies have influenced the contribution to capital accumulation produced by migrants. Migrants potentially can directly impact on the population of the destination country. As the proportion of young, working-age, foreign population is generally larger as compared to the domestic one, the inflow of migrants towards Europe tends to produce a demographic shock. An increase in young workers might reduce the dependency ratios, however, it might increase the capital dilution, yielding negative impact on the economic growth. By taking into account both possible effects caused by migration, this analysis wants to find out whether the positive effects brought by the foreign human capital can compensate the negative effect of *capital dilution*. Migrations have taken an important role in the macroeconomic studies for their effects on the

economic growth. The increase in population due to migration affects the economies of the destination countries as they receive additional human capital without facing any cost. Indeed, the majority of the foreign-born population migrated to the host countries is at a working age. Due to different experience and cultural diversity, human capital accumulation follows different processes, when considering migrant or domestic workers (Alesina et al., 2016; Docquier et al., 2018). Looking at these types of processes, the literature has explored alternative approaches (Barro et al., 1991; Mankiw et al., 1992; Barro and Sala-i Martin, 1992) proposing an augmented version of the neoclassical Solow (1956) model where human capital is inserted in the production function together with physical capital. However, even when migration generates positive effects on the human capital accumulation, it does not converge at the same pace across countries. The level of convergence depends on the relationship between human capital of the migrants and natives in the destination countries.

The *neoclassical* economic growth theories support the idea that migration, intended as mobile labour across countries, is a factor that speeds up the convergence toward a long-run equilibrium, also named as *steady state*, whereas the *endogenous* macroeconomic theories can persistently grow "without bounds" (Romer, 1986) and do not reach any steady-state. The difference between those two theories depends on the assumption on the marginal returns to capital. In the Solow (1956) neoclassical model, the returns to capital diminish over time, in the long-run the marginal contribution of capital to capital accumulation slow down decreasing the rate of adjustment to steady-state. In the endogenous models the rate of return of capital is expected to increase over time, which might increase the accumulation of capital as a result of the differences between countries in endogenous technological changes. To overcome the issue related to the persistent divergence in growth among countries, Barro and Sala-i Martin (1992) and Mankiw et al. (1992) better formulate the concept of *conditional converge* previously introduced by Barro et al. (1991).

The use of the neoclassical theory allows us to investigate the converge among the European countries and estimate their speed of adjustment to the steady-state. Moreover, it is possible to quantify the *size* of the migration flows and the *composition* effect of the migrants' human capital. To understand the contribution of the migration flows on the GDP per-capita in a neoclassical theoretical framework, we need to consider two channels through which migrations can affect the transition path to the long-term steady state of the destination countries. The change in de-

mographic represents the first channel. Newcomers reduce the dependency ratio in the host countries, as generally migrants belong to the population in the working-age (Boubtane et al., 2016), increasing the level of the total productivity. A second channel is identified in the level of skills of migrants which modify the human capital accumulation of the host country.

5.2 Theoretical Framework

5.2.1 Introduction

In this section we introduce a theoretical framework which finds roots in the Solow model (1956), where the out output produced by an economy is defined as a combination of two inputs: labour and capital, as follows:

$$Y = F(K, L) \tag{5.1}$$

where Y denotes the output, K the capital stock and L the stock of labour.
The model assumes also that a constant part of the capital is consumed and the other invested. Additionally, the capital depreciates at a rate equal to δ with $\delta \in (0, 1)$, but under the distinctive second assumption of the model of *diminishing return to inputs*. Therefore, for all the $K > 0$ and $L > 0$ the production function $F(K,L)$ assumes that each additional unit of capital and labour increases the aggregate production, but the contribution to output of each single unit decreases as the inputs increases. Therefore:

$$\frac{\partial F(K, L)}{\partial K} > 0 \qquad \frac{\partial^2 F(K, L)}{\partial K^2} < 0 \tag{5.2}$$

$$\frac{\partial F(K, L)}{\partial L} > 0 \qquad \frac{\partial^2 F(K, L)}{\partial L^2} < 0 \tag{5.3}$$

To allow an economy to grow, the amount of output not consumed ($cY(t)$), and then saved $1 - c = s$, will be invested. The economy converge to an equilibrium when the portion of the output invested sy is equal to the capital to labour ratio net of the effective depreciation, as it follows:

$$sy = \delta k^* \tag{5.4}$$

where y is the quantity of output per unit of effective labour, while k^* denotes the steady-state.

The production function expressed by a Cobb-Douglas takes the same property of constant return to scale of the Solow model, where both capital and labour are increased by the same proportion.[1] It follows that:

$$Y(t) = (K^{\alpha}(A(t)L(t))^{1-\alpha} \qquad with\ 0 < \alpha < 1 \tag{5.5}$$

where the *A(t)* is the augmenting technological process, while both *L(t)* and *A(t)* exhibits productivity parameters of labour and technology growing endogenously at n and g rates. The marginal contribution of the capital and labour to the output is expressed as follows:

$$\frac{\partial F(K,L)}{\partial K} * K = \alpha Y \qquad \frac{\partial F(K,L)}{\partial L} * L = (1-\alpha)Y \tag{5.6}$$

The technology change affects labour efficiency, *A(t)L(t)*, which grows at a rate equal to $n + g$. It follows that:

$$y(t) = \Big(\frac{K(t)}{L(t)}\Big)^{\alpha} = k(t)^{\alpha} \quad with\ 0 < \alpha < 1 \tag{5.7}$$

The Solow model depicts a closed-economy with competitive market, the factor prices are assumed to be paid as their marginal production function, so that the real wage, w, is equal to the marginal production of labour, and the rental price of capital, r, is equal to the marginal product of capital. This means that:

$$r = \frac{\partial F(K,L)}{\partial K} = \alpha k(t)^{\alpha-1} \tag{5.8}$$

$$w = \frac{\partial F(K,L)}{\partial L} = k(t)^{\alpha} - \alpha k(t)^{\alpha-1} * k(t) = (1-\alpha)k(t)^{\alpha} \tag{5.9}$$

It follows that the capital share is:

$$\frac{r * k(t)}{y(t)} = \alpha \tag{5.10}$$

$$\frac{w}{y(t)} = 1 - \alpha \tag{5.11}$$

This demonstrates that in a competitive market the share of input to output are constant and the eq (5.10) and eq (5.11) are the same of the eq (5.6), expressed as quantities per effective unit of labour. The Cobb-Douglas production function is

[1]The assumption of constant return to scale shows that the size of the economy (measured in term of number of workers) do not affect the relationship between the output per worker and the capital per worker (capital to labour ratio).

special for its characteristic presenting an elasticity of substitution between capital and labour equal to 1. Indeed, the elasticity of substitution is defined as:

$$\sigma = -[\frac{\partial log(F_K/F_L}{\partial log(K\ L)}]^{-1} \tag{5.12}$$

In the Cobb-Douglas function $F_K/F_L = \frac{\alpha L}{(1-\alpha)K}$, then $\sigma = 1$.[2]

5.2.2 Assumptions of the model

For this work we make use of the theoretical framework developed by Dolado et al. (1994). Specifically, we do not take into account the traditional assumption of the Solow (1956) model about the presence of *decreasing returns to scale*, as this does not take into account the contribution of other factors of production, in addition to labour and capital. Indeed, following the theoretical foundation of Mankiw et al. (1992), in our model we use a production function with *constant returns to scale*. This assumption is used because it considers the contribution of human capital to economic growth. Specifically, in this model, we want to highlight the contribution of migrants as a results of their human capital. Therefore, in our model we consider that output in the economy is produced by labour, physical capital and human capital (both of natives and migrants).

This model assumes that the labour force and the level of technology in the economy grow at exogenous rates. The labour force changes due to variations in both the native and foreign born migrant population. An increase in the labour force, has a negative effect on the steady-state, as it decreases the available capital per head (capital dilution). On the other hand, migrants bring additional human capital at no cost to the receiving nation. Therefore, it is important to understand if the positive contribution of the human capital can overcome the negative effects produced due to the growth of the population. In addition, we take into account the contribution to economic growth of the natives that decide to emigrate or repatriate. Finally, we introduce another augmentation to the model by considering the change in migration flows as a result of the migration policies implemented by the destination countries. A parameter is introduced to determine the impact of these policies. The higher the

[2]The Cobb-Douglas production function is a special case of the Constant Elasticity of Substitution (CES) production function (Arrow et al., 1961), in which $\sigma \in [0, \infty]$.

level of tightness of the migration policies the closer the parameter's value is to "0" and less migrants will be let in the country. On the other hand a value closer to "1" means a decrease in the level of restrictions and therefore an increase in the flow of migrants into the country.

According the assumptions of the Solow model, saving rates are exogenous and are an important source of growth for the economy. This is because they represent the income which will be invested. Specifically, in this model we assume savings are invested towards physical and human capital. A further assumption of the model is that the stock of physical and human capital depreciates over time at a constant rate (δ) and that both types of capital depreciate at the same rate.

5.2.3 The theoretical model

Due to the special characteristics of the Cobb-Douglas of constant return to scale we exploit this for describing our production function is defined as:

$$Y = K^{\alpha} H^{\eta} (AL)^{1-\alpha-\eta}, \quad 0 < \alpha < 1 \quad 0 < \eta < 1 \quad 0 < \alpha + \eta < 1 \tag{5.13}$$

where capital is intended as the stock of physical and the human capital, respectively K and H. The output Y depends on the total output and A is the technology adopted, which means that the productivity of the total working population grows at an exogenous rate g. The output per unit of effective labour is defined:

$$y = k^{\alpha} h^{\eta} \tag{5.14}$$

where $k = \frac{K}{AL}$ and $h = \frac{H}{AL}$.
The total working population in this model is not only the domestic labour force that grows at an exogenous rate n, but is increased by the number of immigrants, M, net to the emigration rate, E, in the considered country

$$\dot{L} = \hat{n}L + \mu M + E \tag{5.15}$$

with $0 < \mu \leq 1$ which in growth terms in equal to:

$$\dot{L} = \hat{n} + \mu \frac{M}{L} + \frac{E}{L} = \hat{n} + \mu m + e \tag{5.16}$$

for convenience, the time subscripts has been omitted from the equation. The $\hat{n}$ is the natural population growth rate, the m is the migration rate, while e is the emigration rate. The parameter μ that multiply the migration rate indicates a spectrum of restrictiveness in the migration policies of the hosting countries. This can span from zero to 1, wherever the policies on migration in a country are very restrictive or very open to foreign-born flows.

It is assumed that the migrants bring more human capital than the physical one since we want to focus on their contribution in term of skills and expertise, and not further investment in physical capital. Therefore, this model takes into account only the human capital of migrants $m\,K_m$.

Following the Solow model, people consume a constant fraction of their income and the rest is invested. The fraction of output invested is defined by s. Namely, a constant fraction of the investments is devoted to investment in physical capital $0 < s_k < 1$, while the rest goes for investments in human capital $0 < s_h < 1$.

The dynamic evolution of the aggregate physical and human capital are given by the following equations (5.17) and (5.18):

$$\dot{K} = s_k Y - \delta K \tag{5.17}$$

where $0 < \delta < 1$ is the depreciation rate.

The human capital accumulation is similar to the standard accumulation equation defined in Boubtane et al. (2016) model endowed by the human capital of each coming migrant which, in our case, depend on the human capital of the migrants selected by the migration policy (μ) in the destination country. Migrants are allowed to enter in the countries depending if the migration policies provide the right to enter and settled to the immigrants. Additionally, we considered the part of the human capital that the receiving countries looses due to natives emigration. Hence:

$$\dot{H} = s_h Y - \delta H + \mu M h_m + E h_e = s_h Y - (\delta - (\mu \frac{M}{L}\frac{h_m}{\hat{h}} + e\frac{E}{L}\frac{h_e}{\hat{h}}))H = \\ s_h Y - (\delta - (\mu m K_m + e K_e))H \tag{5.18}$$

where the $\hat{h} = \frac{H}{L}$ is the average human capital of the resident population, while K_m and K_e are the average human capital of immigrants and emigrants, respectively. The relative human capital of the migrants with respects to the average human capital of workers in the receiving countries is $K_m = \frac{h_m}{\frac{H}{L}}$ while the relative human capital of emigrants compared to the average human capital of native workers is $K_e = \frac{h_e}{\frac{H}{L}}$.

In other words, the terms K_m and K_e are key factors which explain the "effective" contribution of migrants. Hence, when the migrant human capital is higher than the average human capital of the population in the destination country $h_m > \frac{H}{L}$, then there is a *brain gain* for the host country. Differently, when the level of skills of migrants is lower than the level of native worker skills, $h_m < \frac{H}{L}$, it means that migrants are low skilled migrants. Their effects on the host economies are ambiguous depending whether there is demand of these workers in the labour market.
Instead, the receiving countries that looses more skilled workers that emigrate abroad, $h_e > \frac{H}{L}$, will suffer of *brain drain*.

Let us rewrite the equations (5.17) and (5.18) in effective unit of labor:

$$\dot{k} = s_k k^{\alpha} h^{\beta} - (\delta + n + g)k \tag{5.19}$$

$$\dot{h} = s_h k^{\alpha} h^{\beta} - (\delta + n + g - (\mu m K_m + e K_e))h \tag{5.20}$$

The economy approaches to an unique steady-state when $\dot{k} = 0$ and $\dot{h} = 0$ in the equations (5.19) and (5.20).

$$s_k(k^{\alpha}\, h^{\beta}) = (\delta + n + g)k \tag{5.21}$$

$$s_h(k^{\alpha}\, h^{\beta}) = (\delta + n + g - (\mu m K_m + e K_e))h \tag{5.22}$$

The equations (5.21) and (5.22) make clear that there is a possibility of steady-states as far as there is a variation in the selectivity of foreign workers and restrictiveness in the number of migrants across countries. By substituting both previous equations into the (5.14), we obtain the following results:

$$k^{1-\alpha} = \frac{s_k\, h^{\beta}}{\delta + n + g} \tag{5.23}$$

$$h^{1-\beta} = \frac{s_k\, k^{\alpha}}{\delta + n + g - (\mu m K_m + e K_e)} \tag{5.24}$$

Therefore:

$$k = \Big(\frac{s_k\, h^{\beta}}{\delta + n + g}\Big)^{\frac{1}{1-\alpha}} \tag{5.25}$$

$$h = \Big(\frac{s_h\, k^{\alpha}}{\delta + n + g - (\mu m K_m + e K_e)}\Big)^{\frac{1}{1-\beta}} \tag{5.26}$$

The substitution of the (5.26) into (5.21) and (5.25) into (5.22) gives:

$$k^{1-\alpha} = \Big[\Big(\frac{s_k}{\delta+n+g}\Big) * \Big(\frac{s_h\, k^{\alpha}}{\delta+n+g-(\mu m K_m + eK_e)}\Big)\Big]^{\frac{\beta}{1-\beta}} \tag{5.27}$$

$$h^{1-\beta} = \Big[\Big(\frac{s_h}{\delta+n+g-(\mu m K_m + eK_e)}\Big) * \Big(\frac{s_k\, h^{\beta}}{\delta+n+g}\Big)\Big]^{\frac{\alpha}{1-\alpha}} \tag{5.28}$$

The steady-state the growth rate of physical and of the human capital are respectively:

$$k^* = \Big[\Big(\frac{s_k}{\delta+n+g}\Big)^{\frac{1-\beta}{1-\alpha-\beta}} * \Big(\frac{s_h}{\delta+n+g-(\mu m K_m + eK_e)}\Big)\Big]^{\frac{\beta}{1-\alpha-\beta}} \tag{5.29}$$

$$h^* = \Big(\frac{s_k}{\delta+n+g}\Big)^{\frac{\alpha}{1-\alpha-\beta}} * \Big(\frac{s_h}{\delta+n+g-(\mu m K_m + eK_e}\Big)^{\frac{1-\alpha}{1-\alpha-\beta}} \tag{5.30}$$

which show that increments in saving of physical capital produce increase in k^* but also in h^*, vice versa it works for savings of human capital.
In order to find the steady- state income per effective worker we substitute the equations (5.29) and (5.30) into the production function (5.14) and taking the logs, it follows that:

$$ln\, y^* = ln\Big(\frac{Y}{AL}\Big)^* = \Big(\frac{s_k}{\delta+n+g}\Big)^{\frac{\alpha}{1-\alpha-\beta}} * \Big(\frac{s_h}{\delta+n+g-(\mu m K_m + eK_e)}\Big)^{\frac{\beta}{1-\alpha-\beta}} \tag{5.31}$$

$$lny^* = \frac{\alpha}{1-\alpha-\beta} ln\Big(\frac{s_k}{\delta+n+g}\Big) + \frac{\beta}{1-\alpha-\beta} ln\Big(\frac{s_h}{\delta+n+g-(\mu m K_m + eK_e)}\Big) \tag{5.32}$$

In other terms

$$\begin{aligned} ln\, y^* = {} & \frac{\alpha}{1-\alpha-\beta} lns_k - \frac{\alpha}{1-\alpha-\beta} ln(\delta+n+g) + \\ & + \frac{\eta}{1-\alpha-\beta} lns_h - \frac{\beta}{1-\alpha-\beta} ln(\delta+n+g-(\mu m K_m + eK_e)) \end{aligned} \tag{5.33}$$

From here, to find the convergence pace we compute the growth rate of the real income per worker, which is a weighted average of the growth rate of the two factor of production:

$$\frac{\dot{y}}{y} = \alpha\frac{\dot{k}}{k} + \beta\frac{\dot{h}}{h} \tag{5.34}$$

The growth rates of k and h are:

$$\frac{\dot{k}}{k} = s_k k^{\alpha-1} h^{\beta} - [\delta + n + g] \tag{5.35}$$

$$\frac{\dot{h}}{h} = s_h k^{\alpha} h^{\beta-1} - [\delta + n + g - (\mu m K_m + e K_e)] \tag{5.36}$$

in other terms, when we substitute equations (5.35) and (5.36) and into the equation (5.34), then it will be at follows:

$$\frac{\dot{y}}{y} = \alpha(s_k \frac{y}{k} - (\delta + n + g)) + \beta(s_h \frac{y}{h} - (\delta + n + g - (\mu m K_m + e K_e))) \tag{5.37}$$

Under the steady-state we know that $\frac{\dot{k}}{k} = 0$ and $\frac{\dot{h}}{h} = 0$, therefore:

$$s_k k^{\alpha-1} h^{\beta} = (\delta + n + g) \tag{5.38}$$

$$s_h k^{\alpha} h^{\beta-1} = (\delta + n + g - (\mu m K_m + e K_e)) \tag{5.39}$$

By including the last two equations into the equation (5.37), it results as:

$$\frac{\dot{y}}{y} = \alpha\Big(s_k \frac{y}{k} - s_k \frac{y^*}{k^*}\Big) + \beta\Big(s_h \frac{y}{h} - s_h \frac{y^*}{h^*}\Big) \tag{5.40}$$

$$\frac{\dot{y}}{y} = \alpha s_k \frac{y^*}{k^*}\Big((\frac{k}{k^*})^{\alpha-1}(\frac{h}{h^*})^{\beta} - 1\Big) + \beta s_h \frac{y^*}{h^*}\Big((\frac{k}{k^*})^{\alpha}(\frac{h}{h^*})^{\beta-1} - 1\Big) \tag{5.41}$$

Following Boubtane et al. (2016), we assume that:

$$\Big(\frac{k}{k^*}\Big)^{\alpha-1} * \Big(\frac{h}{h^*}\Big)^{\beta} - 1 = exp\Big((\alpha-1)ln(\frac{k}{k^*}) + \beta ln(\frac{h}{h^*})\Big) - 1 \tag{5.42}$$

as around the steady-state $\Big[(\alpha-1)ln(\frac{k}{k^*}) + \beta ln(\frac{h}{h^*})\Big]$is small, thus, we can use an exponential approximation

$$\Big(\frac{k}{k^*}\Big)^{\alpha-1} * \Big(\frac{h}{h^*}\Big)^{\beta} - 1 = (\alpha-1)ln(\frac{k}{k^*}) + \beta ln(\frac{h}{h^*}) \tag{5.43}$$

while

$$\Big(\frac{k}{k^*}\Big)^{\alpha} * \Big(\frac{h}{h^*}\Big)^{\beta-1} - 1 = (\alpha)ln(\frac{k}{k^*}) + (\beta-1)ln(\frac{h}{h^*}) \tag{5.44}$$

By substituting the following equations (5.35), (5.36), (5.43) and (5.44) into (5.41),

we get the income growth rate as:

$$\frac{\dot{y}}{y} = (\alpha-1)(\delta+n+g)\Bigg((\alpha-1)ln\Big(\frac{k}{k^*}\Big)+\beta ln\Big(\frac{h}{h^*}\Big)\Big)\Bigg)+$$
$$+\beta-(\delta+n+g-(\mu mK_m+eK_e)\Bigg((\alpha)ln\Big(\frac{k}{k^*}\Big)+\beta ln\Big(\frac{h}{h^*}\Big)\Big)\Bigg)$$
$$=-(\delta+n+g)(\Bigg[(1-\alpha-\beta)ln\Big(\frac{y}{y^*}\Big)+\beta\Big(\frac{\mu mK_m+eK_e}{\delta+n+g}\Big)\Bigg(ln\Big(\frac{y}{y^*}\Big)-ln\Big(\frac{h}{h^*}\Big)\Bigg)\Bigg] \tag{5.45}$$

Considering $\frac{\mu mK_m+eK_e}{\delta+n+g}$small, then $\beta\frac{\mu mK_m+eK_e}{\delta+n+g}*\Big(ln\Big(\frac{y}{y^*}\Big)-ln\Big(\frac{h}{h^*}\Big)\Big)$ may be neglected. Then, in the transition to the steady-state, the growth rate output per worker is as follows:

$$\frac{\dot{y}}{y} = -(\delta+n+g)(1-\alpha-\beta)ln\Big(\frac{y}{y^*}\Big)=$$
$$=-(\delta+n+g)(1-\alpha-\beta)(lny-lny^*)=$$
$$=-\lambda(lny-lny^*) \tag{5.46}$$

where $\lambda=(1-\alpha-\beta)(\delta+n+g)$ is named as the *speed of convergence* towards the *steady-state*. Approximating around the steady-state the growth rate is

$$\frac{\dot{y}}{y}=\frac{\partial\dot{lny}}{\partial t}=\lambda(lny-lny^*) \tag{5.47}$$

Therefore

$$lny-lny^*\approx e^{-\lambda t}(lny(0)-lny^*) \tag{5.48}$$

where the *y(0)* is the GDP per worker at its initial level.
Assuming that the explanatory variables that determine growth are constant over a period between t and $t-1$ (one period time), then the speed of convergence will also be constant over this period. We need to take into account another factor that impact to the *steady-state*. Mankiw et al. (1992) assume that different countries share a common technological progress growth rates, $g*t$ that it is assumed to be the same among all the countries of the cross-section, with t as a constant number, but differ for different initial level of *A(0)*. The latter not only reflects the technology

but also the institutions, climate or resource endowment of a country.
To this regards, Mankiw et al. (1992) introduce a new term that affect the income growth a part from the investment in physical and human capital or the population growth, which is

$$ln\, A(0) + g * t$$

where $lnA(0) = a + \epsilon$ with a as a constant and ϵ *country-specific shock*.
This country-specific shock is likely to be correlated with the other explanatory variables such as the growth of the population. Therefore, we should include the unobservable country-specific factor $A(0)$ into the regression. Also Acemoglu (2012) points that as unobserved, $\hat{A}$ could be correlated with the investment rates of the two different type of capital considered, therefore it is necessary to take the previous assumption to avoid the *omitted variables bias*. It follows that the technological differences have to be a results of the investment decisions.

With this regards, we will adopt the income per capita $y = \frac{Y}{L}$, so that:

$$lny = ln\frac{Y}{L} - lnA(0) - gt = ln\hat{y} - lnA(0) - gt \tag{5.49}$$

At this point we can substitute the equations (5.48) and (5.33), into account the eq(5.49) Hence, we get the "growth initial level equation":

$$\begin{aligned} ln\hat{y} - ln\hat{y}_{t-1} &= g(t - e^{-\lambda}(t-1)) + (1 - e^{-\lambda})lnA(0) \\ &\quad - (1 - e^{-\lambda})lny_{t-1} + (1 - e^{-\lambda})\frac{\alpha}{1-\alpha-\beta}(lns_k - ln(\delta + n + g)) \\ &+ (1 - e^{-\lambda})\frac{\beta}{1-\alpha-\beta}lns_h - (1 - e^{-\lambda})\frac{\beta}{1-\alpha-\beta}ln(\delta + n + g - (\mu m K_m + eK_e)) \end{aligned} \tag{5.50}$$

According to Boubtane et al. (2016) it is possible to obtain a variable that compares the net human capital brought by the migration and the detrimental effect on the growth of the increase of the population. Therefore, we can take the term $(ln(\delta + n + g - (\mu m K_m + eK_e))$ and re-arrange as follows:

$$\begin{aligned} ln(\delta + n + g - (\mu m K_m + eK_e) = ln((\delta + n + g)(1 - (\mu m K_m + eK_e)) = \\ ln((\delta + n + g)(1 - (\mu m K_m + eK_e)) \end{aligned} \tag{5.51}$$

which once we substitute the (5.51) into (5.50), the later becomes:

$$lny_t - lny_{t-1} = g(t - e^{-\lambda}(t-1)) + (1-e^{-\lambda})lnA(0) - (1-e^{-\lambda})lny_{t-1} + (1-e^{-\lambda})\frac{\alpha}{1-\alpha-\beta}lns_k - (1-e^{-\lambda})\frac{\alpha+\beta}{1-\alpha-\beta}ln(\delta+n+g) - (1-e^{-\lambda})\frac{\beta}{1-\alpha-\beta}\frac{mK_m + eK_e}{\delta+n+g} \quad (5.52)$$

From the eq (5.52) we can derive the following empirical model which will be used for our estimates:

$$\Delta lny_{i,t} = \beta_1 lny_0 + \beta_2 lnsk_{i,t} + \beta_3 lnsh_{i,t} + \beta_4 ln(\delta + n_{i,t} + g) + \beta_5 ln\frac{\mu m_{i,t}K_{m\,i,t}}{(\delta+n_{i,t}+g)} + \beta_6 ln\frac{e_{i,t}K_{e\,i,t}}{\delta+n_{i,t}+g} + \beta_i + \gamma_t \quad (5.53)$$

where ln y_0 is the GDP per worker at initial level, $lny_{i,t-1}$; β_i is equal to $(1 - e^{-\lambda})lnA(0)$, while γ_t is equal to $g(t - e^{-\lambda}(t-1)$. The variables β_i and γ_t are the *country* and *time-specific effects.*

The inclusion of the human capital in the Solow model allows for variations in the steady state across countries and, hence, the lack of convergence across group of countries. Namely, in the augmented neoclassical model the capital per effective workers is related to the marginal product. An increase in productivity leads to an increase in the capital per effective worker, not so much for the marginal productivity of the physical capital, but for the contribution of the human capital to productivity. Human capital is the factor that speeds up the pace of convergence for those countries which are more endowed with. The convergence to the steady state of each economy is *conditional* to the different structural characteristics [3] and to the economic levels of human capital accumulation, which migrants contribute to with their skills (Mankiw et al., 1992). Therefore, different countries will have different steady-states.

5.3 Descriptive Evidence

In Table 5.1 we present some descriptive statistics, which show important disparities across European economies. Due to the large diversity among the European

[3] Technological progress, population growth, governmental policies.

countries, we split the European countries according to their economies, geographical position, and migration population as: *northern*, *peripheral* and *new Member States*. Additionally, the *northern* countries group is divided in two groups according the population of migrants with higher and moderately high migration population relatively to the resident population aged 15-64 (Figure 5.1).

The level of dispersion of the GDP per worker is moderately high among all the European countries with a large standard deviation, this can be attributed to the significant differences in GDP per worker between the *new European countries* with a real GDP per worker equal to 26957.16 euro per year and the *northern* countries with an average of 58181.29 euro per year. There is a large dispersion in GDP per capita within the *peripheral* countries as shown by the high value of the standard deviation with respect all the other group of countries, with a minimum of income per worker for Greece in the period 1990-1994 and a maximum in Ireland during 2015-2018. The later correspond to the maximum level of GDP per worker among the European countries. The growth of the population n is small, 1.4% among all the European countries.

The *northern countries* have higher population growth rate, although Germany values from 2005 to 2018 behaves as outlier with respect the population growth rates of the rest of the northern countries, due to the negative population rates. However, the European average is very low due to the problematic low growth rate of the population in the *new migration* countries, especially Latvia, Lithuania and Romania. The share of investments in human capital (s_h) are much more than the investments in physical capital (s_k). As shown in the Figure 5.2, the gap between the two different type of investments increased exponentially since early 1990s. Especially, after the mid-2000s the investments in physical capital began to decrease.

Investments in human capital rises consistently at the same pace of the GDP per worker. The trends of the Real GDP per worker are shown in Figure 5.3.

The *northern* countries have higher investment rates than the European average. Surprisingly, the *peripheral* countries generate the higher share in investments in human capital respect the rest of Europe, with an exceptional increase in Greece since 2000. Later figures of the Greek human capital are the highest in Europe.

Figure 5.1: Shares of the Net-migration of Native and Foreign-born to the Total Population in Working-age

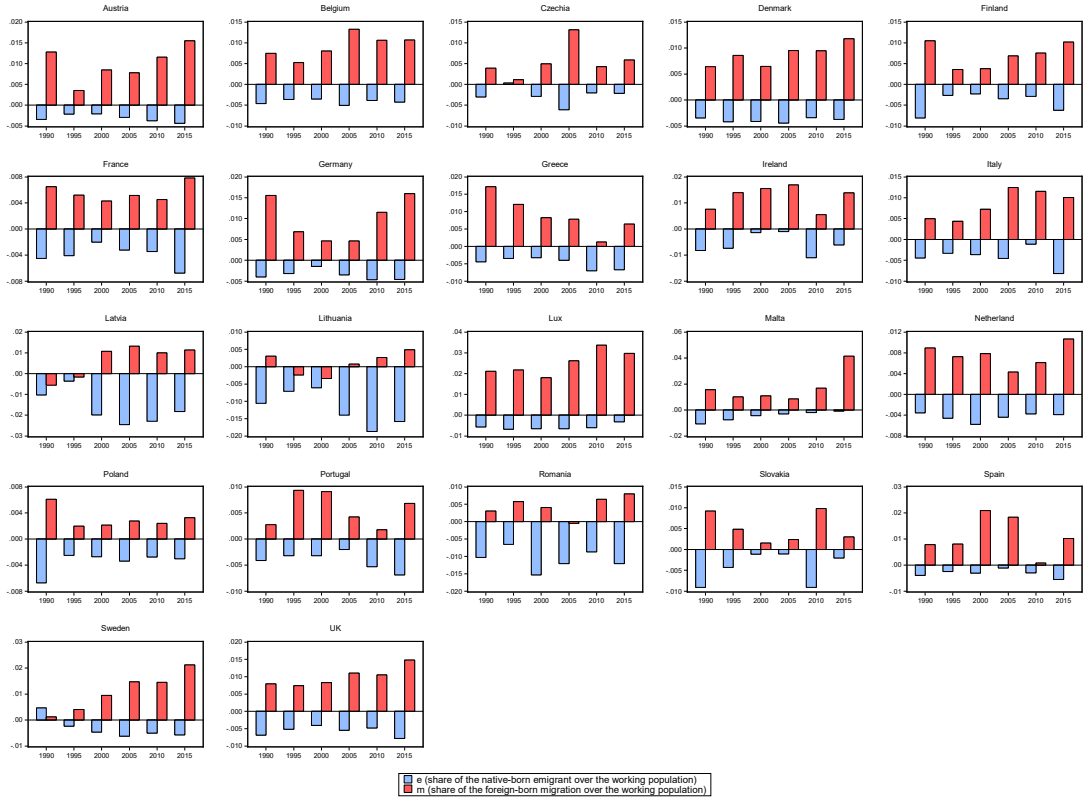


Figure 5.2: Shares of the Physical and Human Capital in the European Countries

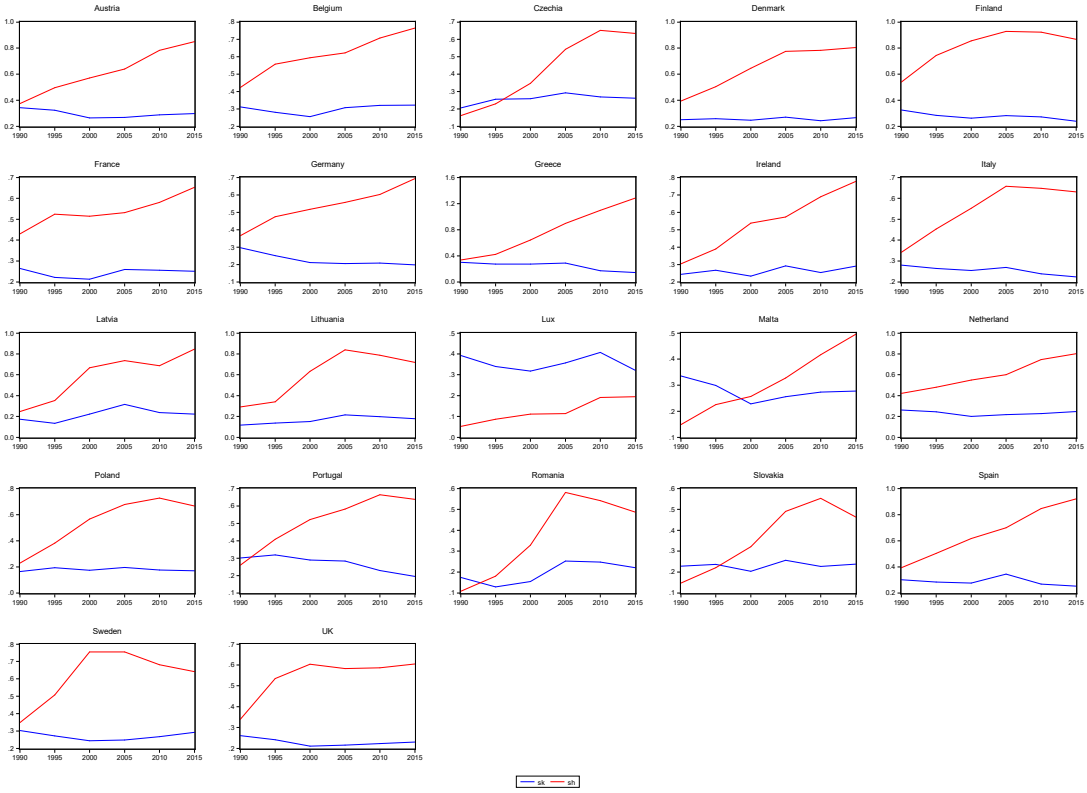


Figure 5.3: Real GDP per Worker Across the European Countries

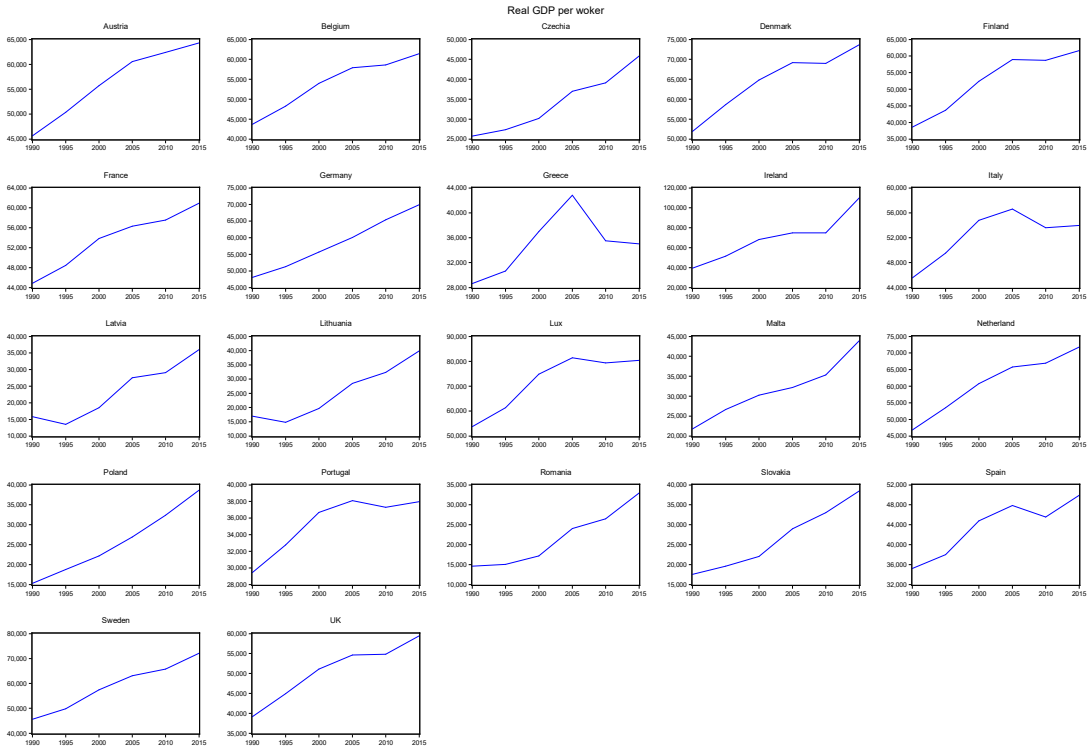


Table 5.1: Summary Statistics

European Countries					
Variables	Obs.	Mean	Std. Dev.	Min	Max
y	132	45750.62	17753.85	13481.19	110065.85
n	132	.013955	.0371433	-.0878279	.1347699
s_k	132	.2514079	.0520379	.1164030	.4074831
s_h	132	0.5410062	.2203925	.0525866	1.2862179
n	132	.013955	.0371433	-.0878279	.1347699
e	132	-.0054037	.0042977	-.0244889	.0046335
m	132	.008747	.0067607	-.0056095	.0414282
h_e	132	281094.1	422757.8	5053.09	2039067
h_m	128	364423.1	617578.3	-1398867	3531398
Northern European Countries					
y	60	58181.29	9963.763	38550.07	81403.11
n	60	.0215276	.0264907	-.0265524	.1347699
s_k	60	.2690371	.0458633	.1974009	.4074831
s_h	60	.5646544	.206342	.0525866	.9291548
n	60	.0215276	.0264907	-.0265524	.1347699
e	60	-.004198	.001854	-.0080521	.0046335
m	60	.0103685	.006421	.0012179	.0336754
h_e	60	406380.2	577402.6	5053.09	2039067
h_m	60	616619.4	754125.4	-8591.416	3531398
Northern European Countries with large migration population					
y	30	55703.97	8103.885	39127.83	72087.08
n	30	.0167411	.0153972	-.0265524	.0430061
s_k	30	.2650303	.0410819	.1974009	.3423221
s_h	30	.5844676	.133241	.3391233	.8487478
n	30	.0167411	.0153972	-.0265524	.0430061
e	30	-.0039469	.0021337	-.0078394	.0046335
m	30	.0099618	.0045093	.0012179	.0212156
h_e	30	635631.2	733256.3	45486.83	2039067
h_m	30	825934.2	886507	48178.62	3531398
Northern European Countries with medium-large migration population					
y	30	60658.61	11117.83	38550.07	81403.11

n	30	.026314	.0338118	-.0208139	.1347699
s_k	30	.273044	.0505815	.2008511	.4074831
s_h	30	.5448413	.260877	.0525866	.9291548
n	30	.026314	.0338118	-.0208139	.1347699
e	30	-.0044491	.0015199	-.0080521	-.0019956
m	30	.0107752	.0079501	.0035732	.0336754
h_e	30	177129.2	178556.8	5053.09	697742.3
h_m	30	407304.7	529602.9	-8591.416	1698395
		Peripheral European Countries			
y	30	472000.15	16.740.65	28648.06	110065.85
n	30	.0230339	.0395228	-.0512849	.1269317
s_k	30	.263159	.0401007	.1426672	.343863
s_h	30	0.609439	0.228817	0.260097	1.286218
n	30	.0230339	.0395228	-.0512849	.1269317
e	30	-.004433	.0024069	-.0110312	-.0009736
m	30	.009233	.0052261	.0007929	.0209353
h_e	30	292525.8	143208.3	45982.75	584865.27
h_m	30	960271.2	1604084	-1398867	1258740
		New European Countries			
y	42	26957.16	8797.187	13481.19	45846.99
n	42	-.0033479	.0429237	-.0878279	.0670813
s_k	42	.2178297	.052441	.116403	.3355355
s_h	42	.4583424	.2134396	.1078124	.8461804
n	42	-.0033479	.0429237	-.0878279	.0670813
e	42	-.0078196	.0064167	-.0244889	.00034
m	42	.0060835	.0074902	-.0056095	.0414282
h_e	42	148456.6	191216.9	15400.09	731567.2
h_m	38	22980.93	32518.05	-13515.47	117396.5

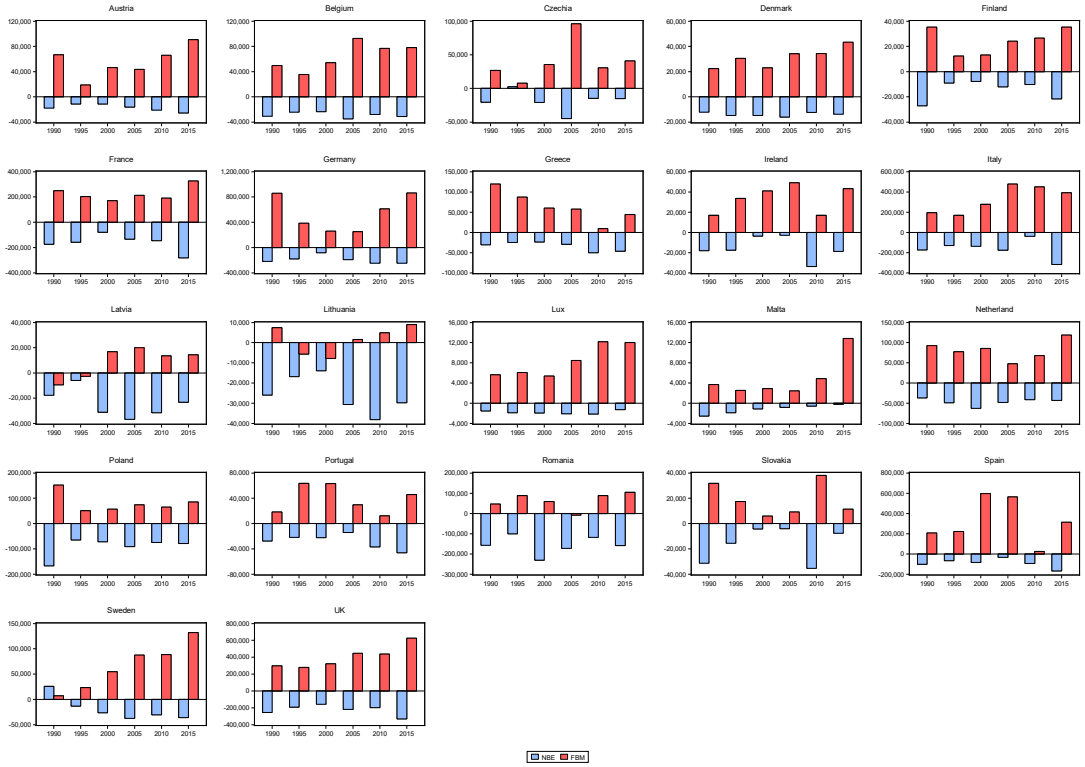
With regards the net migration, the number of foreign-born migrants is the double compared with the native-born emigrants. This explain the low mobility across Europe and a substantial inflow of high-skilled migrants coming from Third-Country Nationals (TCN). The values relative to the emigration rates have a negative sign as they refer to the number of people that leave each country producing a decrease in the stock of the population. Indeed, positive figures of native-born emigration rates

refers to return migrations. The largest outflow of native-born migration, relative to their working-age population, is registered in *new European countries*; conversely, the same group of countries tend to attract a lower number of foreigners. It is possible to observe this by looking at the stocks of native and foreign-born workers in Figure 5.4. However, the *northern counties* with medium-large migration population and the *new European countries*, seems to have higher standard deviations of foreign-born migration, which indicate that within the groups there are countries that tend to attract much more migrants than others

The discussion become more interesting when we consider the human capital of the net-migrants, natives and foreigners, in other words h_e and h_m. The first observation is that the inflow of human capital for the foreign-born migration is larger to the one lost by the destination countries due to the emigration of brilliant talents. This might be explained also by the dimension of the foreign-born flow relatively to the native emigrants. The other point of discussion is the large number of high-skilled foreigners in the *norther countries* is in line with the European average, although when we compare the norther group with higher foreigners population to the one with medium-large migrant population, it is evident that the fist group perform better than the European average (Sweden has highest figure for foreign-born migrants), while the second group attracts and loose a lower number of high-skilled migrants with respects to the total average. Whereas, the average of the foreign-born skilled migrants moving to the *peripheral countries* is the highest. Finally, the *new migration countries*, in average lag behind with the rest of Europe in terms of loose and acquisition of human capital through the migration process.

In this analysis, we take into account the migration policies implemented by European countries according the level of restrictiveness and selectivity towards migrants. Following this, we present the descriptive statistics of the data presented in Chapter 3 (from Figure 3.1 to Figure 3.5). In Table 5.2, we report the means and the standard deviation, on the level of tightness and selectivity of different group of migration policies. The following data refers to the period between 1990 and 2014. During this time, we find that in Europe 90 restrictive policies were implemented and more than an half of them were adopted by the *northern countries*, with the same proportion in both the two northern groups of European countries. The *peripheral countries* adopted the same proportion of the other two groups. Conversely, the *new member states* are the lowest restrictive.

Figure 5.4: Native-Born Emigrants and Foreign-Born Immigrants in the Selected European Countries from 1990 to 2018



Migrants are generally allocated into three different groups for the purpose of policy implemented; the groups of migrants are: high-skilled, low-skilled and irregular. The highest level of restrictiveness among all European countries is toward irregular migration flows, with the same proportion of regimentation implemented among the European countries with exception of the European member states that accessed to the community after 2004. Furthermore, there is a lower interest in producing restrictive policies for low-skilled, especially in the *northern countries with medium-large migration population* and *new countries* as they implemented a lower number of policies towards low-skilled migrants with respect to the other groups. Although there is an interest in implementing policies that attract high-skilled migrants according specific parameters, European countries have to implement few policies to target this group of migrants. The *northern counties* are more experienced in the management of migration and, therefore, have produced more polices to attract high-skilled migrants.

The high number of restrictive policies implemented relatively to the selective one, leads to the conclusion that European migration policies are more restrictive rather than selective. In Figure 5.5[4] we plot the *selective*[5] and *restrictive policies* towards migration. From Figure 5.5 it emerges a different trends between these two variables only in the middle of the 1990s they overlap. After this period, the level of selectivity increases constantly reaching a peach around 2005, at the same time selectivity was at its lower level.

Furthermore, it emerges that the set of countries part of our analysis show a very different GDP per capita and also growth rate of the population. The *northern* economies are more prosperous compared from the countries that accessed Europe after 2004. The former suffer of the lowest level of population growth with a larger part of the population which emigrate. Additionally, the immigration of foreign-born in the later group of countries is not enough to compensate the lost of population. The *peripheral* countries have on average a higher GDP per capita than the European average and also produce high investments in human capital to the GDP. Although in the past these have been country of emigration, when we observe the

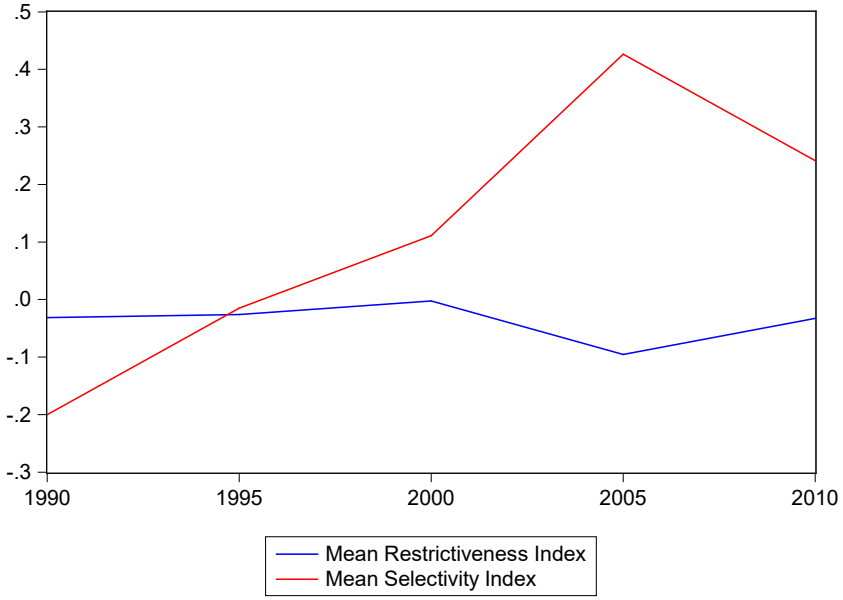
[4]The Figure 5.5 refer the following periods: 1990 (1990-1994), 1995 (1995-1999), 2000 (2000-2004), 2005 (2005-2009), 2010 (2010-2014)

[5]We intend as more *selective policies* the migration laws that are designed to attract more high-skilled rather than low-skilled migrants.

Table 5.2: Descriptive Statistics on Migration Policies

Variables	Observations	Mean	Std. Dev.
European Countries			
Restrictiveness	90	-0.037	0.143
Selective	61	0.551	0.175
$Restrict - High$	41	-0.266	0.129
$Restrict - Low$	36	-0.253	0.377
$Restrict - Irr$	70	0.156	0.136
Northern European Countries			
Restrictiveness	50	-0.018	0.131
Selective	31	0.231	0.437
$Restrict - High$	23	-0.262	0.134
$Restrict - Low$	18	-0.143	0.404
$Restrict - Irr$	38	0.111	0.135
Northern European Countries with large migration population			
Restrictiveness	25	-0.019	0.141
Selective	17	0.224	0.473
$Restrict - High$	12	-0.252	0.177
$Restrict - Low$	12	0.006	0.411
$Restrict - Irr$	20	0.138	0.054
Northern European Countries with moderately large migration			
Restrictiveness	25	-0.018	0.121
Selective	14	0.240	0.387
$Restrict - High$	11	0.057	-0.272
$Restrict - Low$	6	-0.444	0.124
$Restrict - Irr$	18	0.082	0.183
Peripheral Countries			
Restrictiveness	25	-0.036	0.155
Selective	19	0.114	0.742
$Restrict - High$	11	-0.281	0.117
$Restrict - Low$	15	-0.338	0.336
$Restrict - Irr$	20	0.161	0.168
New Member States			
Restrictiveness	15	-0.102	0.141
Selective	11	0.122	0.420
$Restrict - High$	7	-0.254	0.130
$Restrict - Low$	3	-0.486	0.019
$Restrict - Irr$	12	0.171	0.183

Figure 5.5: Mean of Selective and Restrictive Migration Policies in 22 European Countries



rate of emigration of high-skilled natives to the total population between 15 and 64 years old, the figures are not very different than the ones of the *northern* countries. We also illustrate that the *northern* countries have implemented much more restrictive policies than the rest of other countries. Generally, there is a complete closure to irregular migrants. Finally, it would seems that the European migration policies as a whole are more selective than restrictive. However, in the reality the number of selective policies is less than of the restrictive ones.

5.4 Results and Discussion

In this section, we are testing the convergence prediction of the neoclassical Solow (1956) model. Specifically, we analyse the growth rate of the log GDP per worker between 1990 and 2018 dividing this period in 6 subperiods of 5 years each. We try to understand the impact of the log of the income per capita at the initial level of period, lny_0,[6] to estimate the impact of this on the economic growth of 22 European countries.

We decided to divide our data into 6 periods, composed of five-year spans, following the common practice of the panel data studies on economic growth and income convergence. As argued by Shioji (1997), the Solow model would not capture a representation of the GDP per capita year by year, but wants to illustrate the dynamics of the output per capita in the long-run without taking in consideration the short-run adjustments of the output caused by the temporary shocks and business cycle elements. With this regards, the author states that by taking the mean of the output and considering the deviation from this mean, it is possible to reduce the possible measurement errors produced by the business cycle. This is also suggested by Islam (1995) who shows that 5 years is a period of time long enough for the business cycle elements to fall apart. Moreover, during this period the error term, which should include also the short-term fluctuations, would be less correlated to the level of output in the long-run.

The type of convergence tested is the one know as *conditional* convergence is the $\beta - convergence$, which states that in the long-run, all the countries converge to the same level of income per capita. Wherever convergence take place, then the speed of growth for the poorer countries will have to exceed the one of the rich counties. In Table 5.3, we estimate income convergence applying pooled OLS, fixed effects (FE), random effects (RE) and system GMM (SYS-GMM). In the first row of the table is it reported the coefficient of the lagged dependent variable, lny_0, which has a negative sign as expected, in a manner consistent with the Solow model. The SYS-GMM estimator is between the pooled OLS estimator, which is biased upwards, and the FE estimator which is biased downwards. This coefficient is significant for all the

[6]The initial level of per capita GDP is the value of the GDP five-years before. That means that for the differences of GDP per workers in the first period, which goes from 1990 to 1994, the initial level of the GDP per worker would be referring to the year 1990. Same method is applied for the rest of the subperiods.

estimation procedures, except for the random effect approach. However, this is not of concern as in this case the Hausman test for the selection of the model specification between random and fixed effects models, suggests that the fixed effects model is more appropriate. Result of the χ^2 statistics of the Hausman test are reported in the Table 5.3.

In Table 5.3 are reported also the estimates of the convergence coefficient reproducing the value of the implicit λ of the neoclassical model. According all the models the speed of income convergence among the European countries is between 1.9% (fixed effects) and 2.9% (SYS-GMM). Therefore, for this specification model we can conclude that there is a significant tendency toward convergence the European countries, similar to the results on the paper of Mankiw et al. (1992) based on a cross-country regression of 121 countries between 1960 and 1985. However, the speed at which the GDP per capita level of the less prosperous countries in Europe, generally the *new Member States*, adjust to the growth levels of the GDP per worker in the more prosperous countries (EU-15[7]) with a with a speed between 2% and 3%. According to the literature, the standard convergence rate in developed countries is close to 2% per year (Knight et al., 1993; Sala-i Martin, 1995), with some exception where also convergence would happen at higher level (Islam, 1995; De la Fuente, 2002). It seems that the method of analysis applied might influence the results. To solve any possible problem of endogeneity or measurement errors, we make use of the GMM estimators.

By taking out all the countries specific characteristics with a first-difference transformation we have not eliminated completely the endogeneity issues that might arise with the lags of the explanatory variables. Putting in a system the difference and the level equations, known as SYS-GMM model, we obtain more consistent estimation (Caselli et al., 1996). This is possible as we introduce some instrumental variables to correct the issue of endogeneity. With this regards, we take a conservative approach in which we consider that the pace of income growth similar or slightly higher than the average value estimated in the classical literature of 2% (Barro et al., 1991, 2004). The results for the estimation of the effects of the increment in population growth in the dependent variable are in line with the augmented Solow model. The coefficients for all the three models are negative and significant. This suggests that

[7]According the OECD Glossary (2003) the EU-15 countries are the earlier number of the European Member State before the 2004 EU-enlargement are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, the United Kingdom.

higher working-age population growth reduce the economic growth, generating what is called "capital dilution effect" (Boubtane et al., 2016).

Table 5.3: Results of Solow Model Augmented with Human Capital

Variables	OLS	FE	RE	SYS-GMM
$lny0$	-0.0145*	-0.108**	-0.0145	-0.0178**
	(0.00766)	(0.0382)	(0.00926)	(0.00479)
$lnsk$	0.0510***	0.0654**	0.0510**	-0.0771***
	(0.0140)	(0.0235)	(0.0215)	(0.0133)
$lnsh$	0.0101*	0.0558**	0.0101	0.0167**
	(0.00570)	(0.0177)	(0.00769)	(0.00688)
$ln(g+\delta+n)$	-0.0100**	-0.0177**	-0.0100**	-0.00614**
	(0.00461)	(0.00499)	(0.00417)	(0.00292)
constant	0.222**	1.244**	0.222*	0.0932
	(0.0983)	(0.422)	(0.120)	(0.0594)
implied λ	0.024	0.019	0.024	0.029
Hausman			0.000	
AR1				0.510
AR2				0.0914
Hansen-J				0.179

Note : The dependent variable is the Δlny. The method of estimation are fixed effects and random effects with robust standard error. In the third column reports the result of two-step GMM, System GMM model. The Hausman test is used to choose between the fixed and random effects under the hypothesis that the random test is appropriate. This hypothesis is rejected for values of the χ^2 statistic higher than 0.05. The AR1 and AR2 are tests for the first-order and second-order serial correlation in the first-order residuals, which are asymptotically distributed under the null of the hypothesis of no serial correlation. The Hansen-J is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null hypothesis of instrument validity. The numbers in brackets denote the standard errors. (***), (**), (*) reflect the 1%, 5%, 10% level of significance respectively.

Looking at the coefficient of the share of investment in physical and human capital, our results show that investments have a significant and positive effect on the dependent variable, in line to what the literature has already developed. Instead, opposite results are obtained for what concern the investment in human capital. Results are statistically significant. Hence, they would suggest that investing in tertiary education would not promote economic growth. This sounds a bit a puzzle. Indeed, the current literature on growth see education as a leading factor to improve economic outputs (Aghion and Jaravel, 2015). However, to obtain such a type of results

investment in R&D are needed, introducing new policies which promote efficiency reforming the markets. Lack of this reforms might not promote the expected results in term of investment in education.

Asteriou and Agiomirgianakis (2001) suggest that, although economic development foster the acquisition of higher level of education, the increase of high-educated workforce do not necessarily lead to favourably condition for the economies it those economies are not able to absorb. Observing the Greek economy during 1960 and 1994 mostly specialised in low-skilled industries, the authors conclude that the increases in enrolments in high education do not have a positive effect in the economy, differently would have been whether the new graduate would have been specialised in science and IT-related subjects due to the high request of those skills in the technological and financial sectors.

Running a set of diagnostic tests, it emerges that there is no evidence of residual first and second-order serial correlation as the value reported in Table 5.3 of AR1 and AR2 respectively are bigger than 0.05, therefore we can not reject the null hypothesis of no serial correlation; while the Hansen-J test suggests that we can accept the validity of the instruments. In order to remove any serial correlation all the explanatory variables, the initial level of income per worker, the physical and human capital, and the population growth rate are considered endogenous as there is a simultaneous correlation between the current disturbance in the error term and the endogenous variables. However, feedbacks from past disturbances are also correlated with the investment in physical and human capital (Bond et al., 2001). We use from 2 to 4 lags, with the collapse option[8] in order to keep the number of the instruments low. We apply the system GMM model using the xtabound2 function of Roodman (2009) in Stata16.

5.4.1 The Role of the Migrant Human Capital

In this section, we test the impact of migration in the destination economies, by focusing on the impact of the migrants' human capital, under the circumstances that the already settled groups of immigrants generate a network for the new coming migrants.

[8]The collapse option is used to collapse the matrix of a set of instruments into one column in a system GMM model. This is useful as it helps to treat the problem of instrument proliferation, although it convey less information to the analysis.

In Table 5.4 we report the diagnostic test, from which it emerges that no problem of any serial correlation, and the number of the instruments is valid (i.e. the Hansen-J tests do not reject the null hypothesis, which states that the number of the instruments used is valid. Also in this case we use all the variables as endogenous, with exception of human capital of the native-born emigrants and the foreign-born immigrants is treated as weakly exogenous that are treated as predetermined or weakly exogenous and, therefore, instrumented at a first and second lags, as they should produce highly persistent effects over time (Aiginger and Falk, 2005) on the level of production and innovation.

In the second SYS-GMM regression, we include the initial level of income per worker, the physical and human capital, and the population growth rates as "internal" instrument lagged from two to three periods and to avoid biased estimates we collapse some instruments. This latter relies on the assumption that the investments in physical and human capital and the population growth are main drivers of the migration phenomenon. We introduce also an "external instrument" or strictly exogenous variable as usually considered in the literature (Ehrlich and Kim, 2015). Namely, we use as an instrument the year before number of foreign-born migrants at time $t-1$ (Card, 2001; Pedersen, Pytlikova and Smith, 2008; Jaeger, 2007).

The estimates of the Solow model augmented with the inflow and outflow of human capital of migrants generate a income convergence although very low. Results are significant for the OLS, random effects and System GMM models. The coefficient of the population growth have significant negative sign, as expected.
The inclusion of the human capital of the net migration in the regression model increases for all the estimations procedures the speed of the convergence among the European economies (between 2.8% and 3.6%). The investment in physical and human capital are only significant in the dynamic models. When network of migrants are contemplated (SYS-GMM2 model), the negative impact of human capital accumulation decreases its level of significance, while the investment in physical capital impact positively on the growth. Specifically, the coefficients of the physical capital in the system GMM, which use only internal instruments (SYS-GMM1 model), show that an increase of 1% in the physical capital produces a decrease in the GDP per capita equal to 0.018%, while in the SYS-GMM2 an increase of 1% in the physical capital increases the GDP per capita by 0.043%. The difference in the level of significance in physical investments between the static panel models and the dynamic

Table 5.4: Results of Solow Model Augmented with Migrants Human Capital

Variables	OLS	FE	RE	SYS-GMM1	SYS-GMM2
lny_0	-0.0167**	-0.0189	-0.0188**	-0.0172***	-0.0108***
	(0.00569)	(0.0171)	(0.00742)	(0.00381)	(0.00202)
$lnsk$	-0.0185	-0.00706	-0.0136	-0.0188**	0.0439***
	(0.0119)	(0.0189)	(0.0145)	(0.00867)	(0.00670)
$lnsh$	-0.00346	-0.00710	-0.00359	-0.0355***	-0.00568*
	(0.00446)	(0.00907)	(0.00266)	(0.00361)	(0.00286)
$ln(g+\delta+n)$	-0.00278	-0.00415	-0.00362	-0.0142***	-0.0111***
	(0.00346)	(0.00323)	(0.00264)	(0.00139)	(0.00155)
$mK_m/(g+\delta+n)$	0.0800**	0.122**	0.0886**	0.120***	-0.0449**
	(0.0382)	(0.0436)	(0.0327)	(0.0129)	(0.0170)
$eK_e/(g+\delta+n)$	0.0154	0.0268**	0.0187	0.0132**	0.00505**
	(0.0153)	(0.0106)	(0.0122)	(0.00401)	(0.00205)
constant	0.161**	0.193	0.188**	0.112*	0.163***
	(0.0704)	(0.197)	(0.0861)	(0.0565)	(0.0169)
implied λ	0.028	0.031	0.031	0.028	0.0363
Hausman			0.9109		
AR1				0.0127	0.881
AR2				0.0773	0.0740
Hansen-J				0.142	0.169

Note : The dependent variable is the Δlny. The method of estimation are fixed effects and random effects with robust standard error. In the third and the fourth columns report the result of two-step GMM, System GMM model, the SYS-GMM 2 model includes the network of migrants as an external instrument. The Hausman test is used to choose between the fixed and random effects under the hypothesis that the random test is appropriate. This hypothesis is rejected for values of the χ^2 statistic higher than 0.05. The AR1 and AR2 are tested for the first-order and second-order serial correlation in the first-order residuals, which are asymptotically distributed under the null of the hypothesis of no serial correlation. The Hansen-J is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null hypothesis of instrument validity. The numbers in brackets denote the standard errors. (***), (**), (*) reflect the 1%, 5%, 10% level of significance respectively

ones could be attributed to the fact that static models suffers from the problem of endogeneity which is solved in the dynamic panel models by the introduction of instrumental variables. Similar results for the share of investments in human capital are found in the literature by Benhabib and Spiegel (1994) and Boubtane et al. (2016).

Interesting results emerges for native born and foreign-born migrant's contribution in human capital in Table 5.4. Both the variables have a positive impact on the income growth, but larger is the impact of the human capital of immigrants compared to that of the emigrants. That could lead to the conclusion that the migration phenomenon is a "brain gain". The results of SYS-GMM show higher level of significance. However the size of the coefficient is the same of the FE model, which shows that the impact of the high-education levels of foreign-born migrants is much larger than the negative *quantitative* shock of an sudden increase of the population produced on the capital-labour ratio, therefore on the economy. An increase of foreign-born workforce

of 1% produces an impressive increment in GDP per worker growth equal to 0.12%.

However, the results of the SYS-GMM2 are different when the network of migrants is used as "external instrument". In this case the sign of the coefficient human capital of foreign-born migrants is the opposite to the coefficient of the human capital of the native-born according the assumptions of the theoretical model, despite the positive sign of the later. Even in this case the emigration phenomenon do not produce negative effects. On one hand, the emigration of high-skilled individuals represents a financial lost for the origin countries and especially in the case of large outflow of high-skilled emigrations, it is detrimental for the labour markets as it cause a loss of skills with a prevalence of low-skilled workforce and further decrease of productivity. On the other hand, the emigration of tertiary education might produce positive effects on the origin countries, if the emigrants find better opportunities abroad. Hence, those who stay at home would be stimulated in acquiring higher level of skills as a source of investment to find better opportunities abroad.

It is also possible that the decision of emigrate is done also to support the family and friends at home by sending remittances. Furthermore, the high-skilled that move abroad might decide to come back, bringing with them a higher level of experience and different knowledge accumulated during the period they have been abroad in more prosperous economies which might be a factor that foster the productivity at home. All this positive effects are also find when it is taken into account the network of immigrants in the countries where the emigrants are at home. This is might be explained considering a possible interaction between emigrants and immigrants. The emigrants abroad could favour the creation of scientific and business networks with the natives and settled migrants at home, promoting higher productivity.

With regards of the negative impact of the foreign-born human capital on the growth when we introduce in the regression model the *network* of settled migrants, we need to understand which is the main determinant factor that affected the choose of individuals in moving in that specific migration. Indeed, it could be that the motivation of migration in a specific country is affected by the presence of previous immigrants. Another reason why the sign of the human capital variable impacts negatively the migration contribution in human capital , $mK_m/(g+\delta+n)$, might be due to the disincentive of the newcomers in investing in education by attending university when the *network* of previous migrants in the destination country is very strong. Specif-

ically, an increase of 1% of the high-skilled migration relative to the total resident population, $mK_m/(g+\delta+n)$, reduces the economic growth by 0.044%. This negative impact of the human capital of the high-skilled migrants can be explained by the paper of Battisti et al. (2018). The authors studying the effect of co-ethnic migrant network in Germany find that migrants, who exploit the network, have high probability to find job at first within the first two years. This probability is reduced due to the fact that migrants are not stimulated to improve their condition by acquiring more human capital, such as better language skills or going to university.

To summarise, the phenomenon of migration creates positive impacts on the growth of the European countries promoting the incomes convergence among the European countries. As a result, countries with different endowment of capital-labour ratio and output per workers will attain the same steady-state in the long-run. The net migrations seem to be a stimulus for the economies although tend to decrease of the investments and human capital accumulation in the dynamic model SYS-GMM1. We find that net-migration generates positive impacts on the investments of physical capital. Although we would expect positive effects of the migration on human capital accumulation in the destination economies, lack of industrial policies in some of the *peripheral and central eastern European* countries do not generate positive economic returns.

5.4.2 The Role of Migration Policies Restrictions

In this section we report the results of the augmented Solow (1956) model including the different level of migration policy restriction implemented by our panel of countries. Looking a the Figure 5.2, it is possible to see that during 1990-1994 the level of restrictiveness increased, probably due to the high rise of flow of refugees after the ex-Jugoslavia war. During the years 2005-2009 again policies turned again more restrictive, more likely due to the reaction of European "core" and "peripheral" countries enlargements jointly with the humanitarian crises triggered by the was in Syria, and the socio-economic stability in neighbor countries.

By looking at the descriptive statistics on the migration policies Table 5.2, it is possible to observe that the number of the restrictive policies towards all groups of migrants is close to the number of policies implemented to restrict only the irregular migrants. This trend is also clearly observable by looking at Figures 5.6 and 5.7. Therefore, when Member States aim to reduce all migration inflows towards

the EU, they also are strongly implementing policies towards irregular migrants. To this regard, we want to understand whether the implications produced by the implementation of general restrictive policies are similar to the impact produced by policies focusing only on irregular migrants. In the following two tables we will report the results of the Solow model augmented with the restrictive policies towards all migrants (Table 5.6) and restrictive policies only towards irregular migrants (Table 5.7). Thus, it is possible to observe the direction and the dimension with which the two policies impact on the contribution of migrants' human capital and on the economic growth of the destination countries.

Table 5.5 reports our estimates of the effects of migration policy restriction on economic convergence of our set of European countries. All the coefficients of the GDP per worker at theirs initial level are negative and significants, which confirm the convergence hypothesis. The speed of convergence in the static model estimations is the same of the case when the migration policies become more thigh, around 3%, but it significantly increase for the use of dynamic method of estimation, indeed, the speed of growth rises to 5,4% (SYS-GMM1) and to 8,6% when the network of migrants are observed. Firstly, we comment our results considering both pooled OLS and Random Effects (RE). In both the cases, we find that an increase of 1% in physical capital impact negatively on the GDP per capita decreasing it by 0.0185%, while and increase of 1% in human capital produce a small decrease of the GDP per worker equal to 0.007%. Both the OLS and Random Effects models show the same coefficients means that both model are consistent, although the Random Effects model as the level of significance of its coefficients is higher. However, the coefficient of the lns_h is only significant for the OLS model, while the lns_k is it not significant for the OLS model, but it is for the RE one. With regards to the coefficient of the native and foreign-born human capital, in both the model the coefficients present same dimension and sign, but are not significant.

To understand which of the results are more appropriate between the fixed should random effects model, we look at the outcome of the Hausman test. This show that the fixed effects estimations describes better the model, as the χ^2 is equal to 0.019. Therefore, we can not accept the null hypothesis of the Hausman test which states that the random effect model is more appropriate as compare to the fixed effect one. Moreover, we prefer to comment the results of the FE model rather than the on of

Figure 5.6: Restrictiveness Index of Policies Towards All Migrants in Europe between 1990-2014

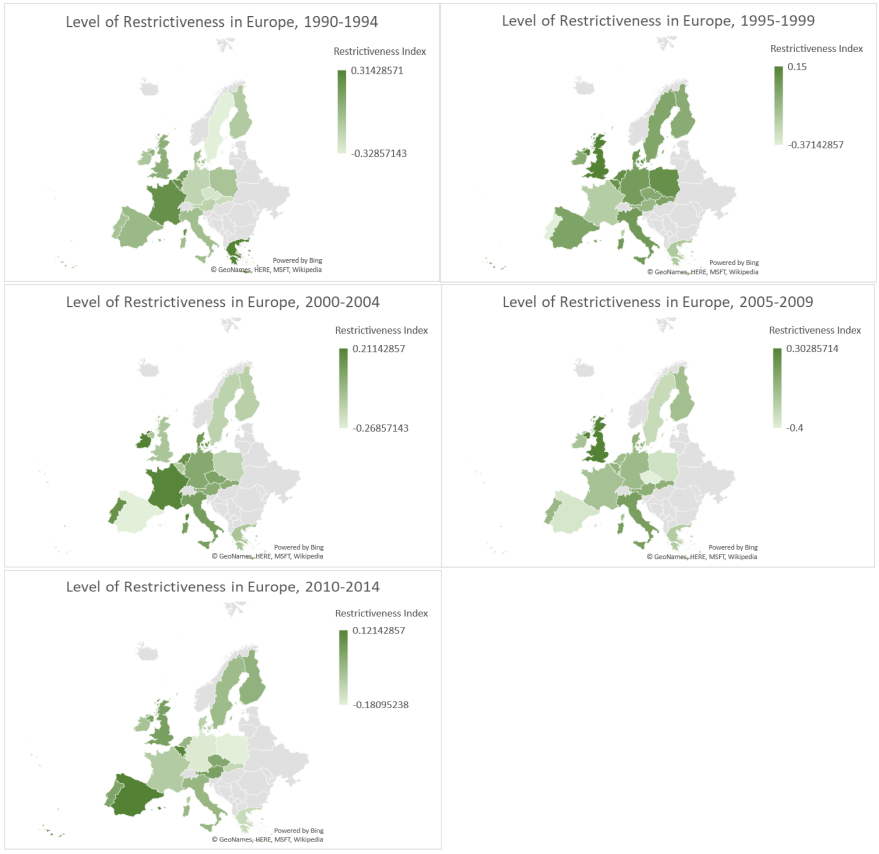
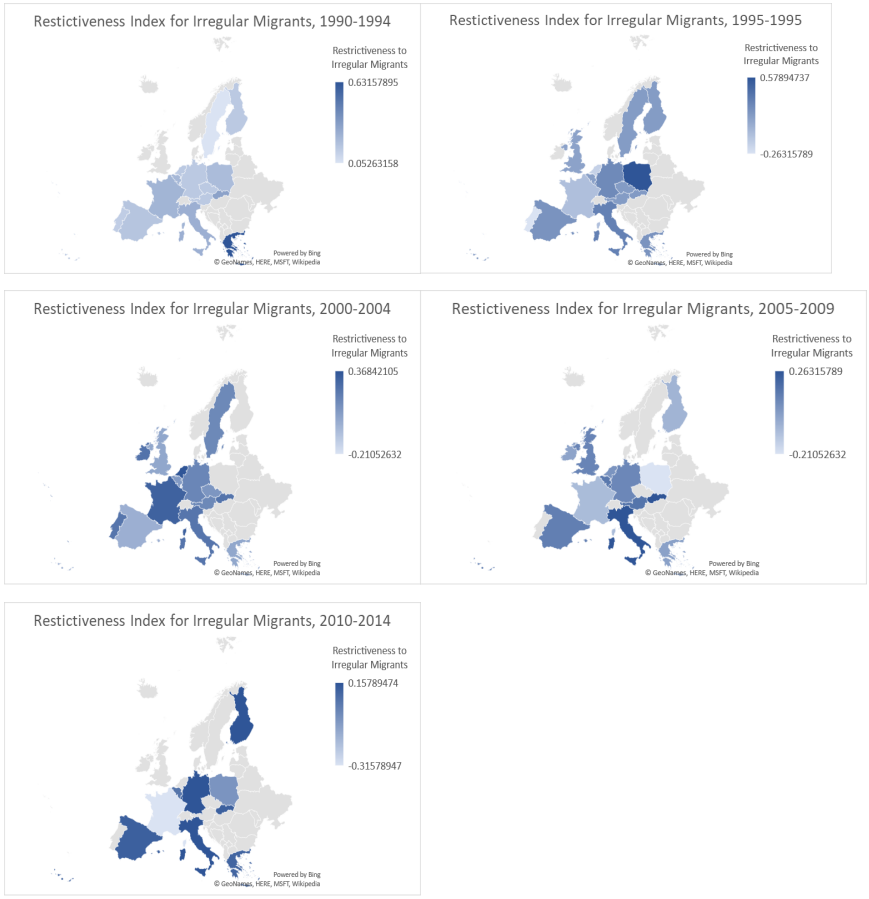


Figure 5.7: Restrictiveness Index of Policies Towards Irregular Migrants in Europe between 1990-2014



the OLS, as the first model is able to overcome to the heterogeneity and endogeneity issues which affect most the OLS model. Looking at the FE model, it is possible to observe that there in no feedback effect from investments in physical and human capital. The 1% increase in the general level of restrictiveness on the regulation towards all migration flows produces adverse effects on the human capital of the foreign workers. In this case the contribution to the GDP per worker of high-skilled foreign worker decrease substantially of 0.546%. Differently, the human capital of the native emigrants still produces positive effects on growth equal to 0.637%. Nevertheless, the positive impact produced by the natives' emigration is much larger, both in terms of magnitude and level of significance, as compared to the case when no policies towards migration are implemented.

The dynamic GMM model, SYS-GMM1, offers similar results, in terms of human capital of the tertiary educated foreign migrants, to the FE model. In both these models we observe that the human capital of the migrants does not produce positive effects on the economies, when high restrictive migration policies are in place. The lower contribution of migrants to the destination economy might be a consequence of the increase in restrictiveness not only of the legal pathways to migration in Europe, but also of the decrease in the number of rights guaranteed to migrants in the country. To this end, it might be that high-skilled migrants do not produce as much as they could because of the lack of policies supporting their integration. Specifically, the coefficient of the variable $HC_m - Rest.tot$ refers to the impact of migrants' human capital on the economy. This coefficient is further affected by the restrictive policies implemented by the governments of the destination countries. These polices affect not only migrants' rights to enter and stay in the country, but also to their level of integration in the society and labour market. The lower level of migrants' integration might trigger negative effects on the economic growth, changing the effects produced by the net-migrations with respect to the case when the restrictiveness in policies is lower. In conclusion, the possible positive effects that might be produced by the diversified skills brought by the migrants in the market are not large enough to compensate the negative impact of capital dilution due to an increase in the total population of the destination countries. Migrants, especially high-skilled ones, are no more a *brain gain* for the destination countries.

On the other hand, the high barriers to migration are overcome from migrants when in the destination countries there are strong the ethnic networks of settled migrants.

The $HC_m - Rest.tot$ in the SYS-GMM2 also considers the effects of the presence of ethnic-networks on the migrants' human capital. In this model, the coefficient of $HC_m - Rest.tot$ is positive and significant at 1%. Specifically, this indicates that a rise in foreign-born worker of 1% increase the economic growth by 0.329%. Conversely, the beta coefficient of the human capital of the native-born migrants, $eK_e/(g + \delta + n)$, becomes negative producing a *brain loose* in the their origin countries. The change can be attributed to the decision of the high-skilled migrants to decrease the relationship with its own network at home due to the negative economic conditions or the less flexible and discriminatory liberal policies that have determinate the introduction of more restrictive migration policies.

This propensity of moving abroad and no desire to come back home can be more marked when network of migrants are strong in the countries. Especially in periods of economic crisis when competition is higher, migrants are a more attractive than natives, as the former tend to accept less advantage conditions than the latter. If we compare the estimations for the selected Fixed Effects and the SYS-GMM we might have different results for two different reasons. Firstly, the results of the Fixed Effects can be biased as we have previously seen that the Fixed Effects model provides robust estimation under the assumption that all the variables are strictly exogenous, therefore, it can still suffer of heterogeneity problem when the countries are affected by asymmetric shock and endogeneity issues. The SYS-GMM estimations are more robust as they imply extra moments condition which removes any serial correlation. Secondly, the fixed effects is static model, therefore, the results are only take into an account only specific years, differently than the SYS-GMM that show the impact of explanatory variables not only in some determined years but also respects to different years before. By knowing this we can state that the introduction of restrictive migration policies.

The effect of a reduction of the level of the openness are shown by the negative coefficient of the variable $HC_m - Rest.tot$, which would impact negatively on the GDP per worker growth if it would have seen any level of significatively of this variable. Also, the variable of the native expatriates' loose significance and change sign (negative) for the OLS and random effect model, while remain still significant and positive for the fixed effect model. Both the GMM models, SYS-GMM1 and SYS-GMM2, offer robust results. In these two cases, the foreign-born migration human capital is used as an endogenous variable, differently from the previous model which

does not consider the impact of the restrictive migration policies. We include migration as an endogenous variable as this is determined by the policies and quotas set by the European governments.

Table 5.5: Results of Solow model Augmented with Restrictive Policies Towards Migration

Variables	OLS	FE	RE	SYS-GMM1	SYS-GMM2
lny_0	-0.0147**	-0.0768**	-0.0147***	-0.0266***	-0.0421***
	(0.00615)	(0.0229)	(0.00354)	(0.00180)	(0.00466)
$lnsk$	-0.0185	0.0183	-0.0185*	0.0122	-0.0165
	(0.0129)	(0.0262)	(0.0103)	(0.0141)	(0.0143)
$lnsh$	-0.00715*	0.0199	-0.00715**	-0.00732**	-0.0199***
	(0.00424)	(0.0133)	(0.00249)	(0.00252)	(0.00218)
$ln(g+\delta+n)$	0.00828	-0.0164**	0.00828	-0.00187	0.000958
	(0.00581)	(0.00700)	(0.00647)	(0.00396)	(0.00525)
$HC_m - Rest.tot$	-0.101	-0.546*	-0.101	-0.545*	0.323*
	(0.307)	(0.306)	(0.297)	(0.275)	(0.173)
$eK_e/(g+\delta+n)$	-0.0781	0.637**	-0.0781	0.414**	-0.276*
	(0.176)	(0.238)	(0.225)	(0.119)	(0.154)
constant	0.166**	0.842**	0.166***	0.311***	0.439***
	(0.0736)	(0.254)	(0.0412)	(0.0339)	(0.0410)
implied λ	0.03	0.016	0.03	0.054	0.086
Hausman			0.0192		
AR1				0.103	0.139
AR2				0.0157	0.303
Hansen-J				0.353	0.972

Note : The dependent variable is the Δlny. The method of estimation are fixed effects and random effects with robust standard error. In the third and the fourth columns report the result of two-step GMM, System GMM model, the SYS-GMM2 model includes the network of migrants as an external instrument. The Hausman test is used to choose between the fixed and random effects under the hypothesis that the random test is appropriate. This hypothesis is rejected for values of the χ^2 statistic higher than 0.05. The AR1 and AR2 are tested for the first-order and second-order serial correlation in the first-order residuals, which are asymptotically distributed under the null of the hypothesis of no serial correlation. The Hansen-J is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null hypothesis of instrument validity. The numbers in brackets denote the standard errors. (***), (**), (*) reflect the 1%, 5%, 10% level of significance respectively

We have previously mention that the increase of restrictiveness in migration policies is correlated to an increase in policy tightness to irregular migrants and border controls. The large is the population of irregular migrants the larger is the underground economy. The increase of clandestine workforce worsen in the condition in the labour market as these migrants are willing to take accept more demanding and less paid jobs. Moreover, there is an impact on the fiscal system, as the shadow economies escape taxation, which in the long-term lead to pressure on the budget constrains, therefore, to a increase in taxes and decrease in government spending. Generally, the underground economies does not act as stimulus to productivity with a

further negative effect of encouraging the expansion of the unofficial economy. This is phenomenon is relatively more pronounced in the *southern* European countries such as Italy, Greece and Spain.

The consequence is that in these countries,where the underground economy is stronger, there tends to be more income inequality. Berdiev and Saunoris (2019) investigated the relationship between income inequality and shadow economies. Shadow, or underground economies, are present in all the countries to different degrees and are a segment of the labour market where migrants find easily a job as irregulars. The shadow economies hinder economic development especially when there is a large number of low-income individuals trapped in this situation. As a result of this, low-income natives and foreign-workers working in this segment of the market do not have access to high-quality education and financial institutions. Both the access to education and financial institutions is required reduce income inequality of the migrants, as access to education enables migrants to increase their human capital, while the access to financial institutions allows them to obtain access to credit. The situation is further exacerbated when individuals are forced to remain in the shadow economy for long periods of time, suffering the most during the periods of economic slowdown. Therefore, the reduction of the irregular migration, which supply their labour to the shadow economies, can be an effective measure that countries have to take to reduce the level of income inequality in Europe.

The common measures adopted by the European countries to curb irregular migration are based on the joint control of the external border of all the European member states. Specifically, each state is responsible of controlling part of the common borders, however, since 2005 the operations implemented by each single states to control the borders have been coordinated by the European agency for border control, *Frontex*, to be sure that all the European States provided the same effort and resources to reach the common goal. In this analysis we also found that an increase in restrictiveness towards irregular migrant flows allows the income convergence of the European countries at a high pace. Nevertheless, the investment in physical capital tends to be negative and insignificant, which can be explained by the lax enforcement of policy implementation causing an insignificant decrement of the irregular population. This might also impact on reducing government spending due to budget constraints. With regards to the negative impact of the population expressed by the variable $ln(g+\delta+n)$, this is only significant for the fixed effects and

the SYS-GMM2. Nevertheless, the random effect is preferred over the fixed effects according the result of the Hausman test, indeed, the χ^2-statistics is equal to 0.068.

The coefficient of the variable on the contribution of the native and foreign-born human capital to the European income growth is significant only for the dynamic models. However the sign of these beta-coefficients is consistently in all the models. The dynamic models, especially the SYS-GMM2, gives a better representation of the possible impact of a very tight migration policy implemented by the European countries. Generally, the outcomes of the System GMM models are different from the static models ones. This is because the dynamic models are more efficient in correcting and removing problems of endogeneity in the data. In this regards, both the SYS-GMM1 and the SYS-GMM2 models are the only ones that provide significant coefficients of the contribution in human capital of the migrants. Specifically, we find that restrictive policies towards irregular migrants affect negatively the human capital of the regular skilled migrants, which produced negative effects on the GDP per worker. Specifically, according to the dynamic model SYS-GMM2, which instrumentalise the network of previous migrants, an increase of 1% in the high-skilled foreign migration's human capital decreases their contribution to economic growth of 0.283%, while the increase of 1% in the native-born migrants' human capital produces a positive impact on the growth equal to 0.563%.

To sum up, the increase in restrictive policies toward migrants adopted by countries during a time of more adverse economic conditions or in a phase of negative political cycle, does not cause any positive impact on the total domestic investments. At the same time, we observe that the contribution of the foreign-born workers to the economy is negative. Therefore, it is possible to conclude that the higher level of restrictiveness in the European policies does not allow member states to gain from migration. However, the effects on the GDP per worker of the increase in tightness in the migration policies are not the same, but depends on which group of migrants these policies target. Although there is a positive correlation between the number of restrictive in policies toward all migrants and the ones towards irregular migrants, the implications on the human capital of native and foreign-born migrants are not the same. Generally, the rise in policies, that aim to curb irregular migration, creates more adverse effects on the contribution of migrants to the economy. This might be because migrants feel less integrated. Moreover, this result can also be explained by the fact that a reduction in the market of irregular migrants might affect negatively

Table 5.6: Results of Solow Model with Restrictive Policies to Irregular Migrants

Variables	OLS	FE	RE	SYS-GMM1	SYS-GMM2
lny_0	-0.0164**	-0.0698**	-0.0164***	-0.0252***	-0.0364***
	(0.00708)	(0.0323)	(0.00449)	(0.00320)	(0.00470)
$lnsk$	-0.0204	0.0238	-0.0204	-0.0175	0.00989
	(0.0143)	(0.0303)	(0.0127)	(0.0116)	(0.0163)
$lnsh$	-0.0117**	0.0201	-0.0117***	-0.00603	-0.0179***
	(0.00472)	(0.0174)	(0.00299)	(0.00634)	(0.00138)
$ln(g+\delta+n)$	-0.00108	-0.0237**	-0.00108	-0.00376	-0.0130*
	(0.00704)	(0.0112)	(0.00454)	(0.00411)	(0.00668)
$HC_m - Rest.irr$	-0.107	-0.118	-0.107	-0.157*	-0.283***
	(0.256)	(0.147)	(0.161)	(0.0751)	(0.0568)
$eK_e/(g+\delta+n)$	0.459	1.164	0.459	0.284	0.565*
	(0.415)	(0.950)	(0.674)	(0.642)	(0.278)
constant	0.157*	0.757**	0.157**	0.253***	0.382***
	(0.0826)	(0.350)	(0.0483)	(0.0336)	(0.0496)
implied λ	0.033	0.0145	0.033	0.0510	0.0741
Hausman			0.0685		
AR1				0.985	0.373
AR2				0.117	0.197
Hansen-J				0.475	0.998

Note : The dependent variable is the Δlny. The method of estimation are fixed effects and random effects with robust standard error. In the third and the fourth columns report the result of two-step GMM, System GMM model, the SYS-GMM2 model includes the network of migrants as an external instrument. The Hausman test is used to choose between the fixed and random effects under the hypothesis that the random test is appropriate. This hypothesis is rejected for values of the χ^2 statistic higher than 0.05. The AR1 and AR2 are tested for the first-order and second-order serial correlation in the first-order residuals, which are asymptotically distributed under the null of the hypothesis of no serial correlation. The Hansen-J is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null hypothesis of instrument validity. The numbers in brackets denote the standard errors. (***), (**), (*) reflect the 1%, 5%, 10% level of significance respectively

the job opportunities for the high-skilled migrants, as the former are complementary in production to the latter. Hence, a reduction of the reduction of (low-skilled) irregular migrants might cause an increase in unemployment for high-skilled workers. The conclusion are different when we consider the impact of restrictiveness of the policies in the system GMM model that considers also the impact of the network of family member and people of the same ethnic-group of migrants. In this case, the human capital of foreign-born changes becoming positive when the policies target all the migrants, while it remains consistently negative when the policies address to curb only irregular migrants. As in the later case, the impact of the restrictive policy toward irregular migrants affect negatively also the network of the irregular migrants.

5.4.3 Testing the Solow Model Using Selective Migration Policies

In this paragraph, we describe, firstly, the impact of the migration policies restricting the flows of high-skilled foreign-born migrants with the aim of attracting only the most talented individuals (Table 5.8). Secondly, we also consider the implications of the role played by selective migration policies on low skilled migrant workers (Table 5.9). Additionally, we also present a index on the level of selectivity of migration policies. The selectivity index is a syntectic index that refers to the conditions to enter and stay offered to the migrants according their education level, nationality and occupation. This index, differently from the restrictive ones, increases as the implemented migration policies rise their skill-requirement to enter, as the number of high-skilled increase and the number of low-skilled decrease or both decrease at the same time.

In the historical definition of the selective policies, it is possible to draw a comparison between two different models of the migrant skill selectivity: the human capital model and the shortage model (Cerna, 2016). The "human capital" model aim to attract more high-skilled migrants in order to increase the human capital accumulation in the country by promoting the settlement of the foreign-born individual. Conversely, the "shortage " model aims to recruit high-skilled migrants to overcome shortage in *structural labour*. This approach tend to attract the migrants only when there is higher demand of skilled migrant in a specific sector and in a determined period of time. With this regards, the implementation of *point-based*

system programmes such as the *Green Card* in the US and the *Blue Card* in Europe are introduced with the purpose of attract high-skilled migrant rather than low-skilled migrants. Although the *Blue Card* does not allow to stay permanently in the European countries, the *Green Card* gives permanent resident in the US. However, there is very difficult to obtain a Green Card and the majority of the high-skilled migrants are recruited with a H-1B visa. To this end, the tendency of the countries that adopt a "shortage" migration model encouraging the inflow of the foreign-born worker that are embodied with the skills scarce the labour force lead to incentive only high-skilled migration for short-term stay, which do not promote the economic gains produced by an allocation of permanent right to the high-skilled migrant (Constant and Zimmermann, 2005). Another limit of this demand-driven entry system is the fact that allow the migrant to enter only upon a job offer, without considering the economic benefits in the medium-long term produced by altering the occupation composition of the migration flows (Czaika and Parsons, 2017).

The attraction of high-skilled have some fiscal advantage as high-skilled migrants working in high-skilled jobs might be expected to pay higher taxes and a positive impact on the productivity in the knowledge-intensive sectors, allowing to the access of international network in the same sector and diffusion of the knowledge and an increase of the jobs for the native high-skilled in the sector as complementary in production to the tertiary-educated foreign-born. Looking at the results of Table 5.7, the increase in selective policies among our set of European countries allow the income converge with an higher pace compared to the cases where no migration or restrictive policies have been introduced. The convergence pace across the static and dynamic panel models vary between 4.7% and 6.8%. The impact of investments physical capital on the GDP per worker growth is insignificant according to the static panel (pooled OLS, FE and RE) models.

The results given by the two dynamic regression models, SYS-GMM1 and SYS-GMM2, are different as shown in Table 5.7. The investments in physical capital are very significant and positive for the model that uses only internal instruments (SYS-GMM1). Indeed, looking at the fourth column of Table 5.7, it is possible to see that an increase of 1% in the physical capital increases the GDP per worker by 0.036%, while this is decreased by 0.009% for the SYS-GMM2 model.[9] The coefficient of the

[9]The two System GMM models provide the results of the two-step estimators, where all the lags of the variables are used as endogenous variables, hence, these variables are instrumentalized by at least their second lagged levels.

population growth, $ln(g+\delta+n)$, is significant and negative only for the SYS-GMM2 model, according the assumption of the neoclassical model. Also the coefficient of the native and foreign-born migrants are consistently insignificant for all estimations model, except for the SYS-GMM2 model, which shows negative impact of the increase in selective policies on the foreign-born human capital. Hence, the (negative) effect produced by an increase of the migrant population is not compensate by an increase in human capital accumulation yield by high-educated immigrants. Moreover, as the process of immigrant skill-selection is the result of an endogenous political choice, we decide to use the lags of the variable of the foreign-born human capital, $HC_m - Selectivity$, as endogenous instruments. In this analysis we have found that in Europe there is a tendency of increasing the level of selectivity of the migration policies to reduce the number of the low-skilled migrants. Additionally, the selective measures affect the migrants flows more than the restrictive policies as shown in Figure 5.5.

The selective migration policies create positive impacts as they allow the income convergence among the European migrants and the positive effects of investments in physical capital on the GDP per worker growth. This could be because the selective policies reduce the number of low-skilled migrants, who generally tend to be highly dependent on the social services and benefits, such as social housing and education (Dustmann and Frattini, 2014). The reduction of this group of migrants leads to positive and significant effects of the physical capital to the growth due to the increase of the capital-labour ratio. Moreover, the selection of more high-skilled migrants with their knowledge and experience increases the level of productivity of the physical capital. However, the more selective policies do not affect the positively the impact of the investment in human capital. Although the coefficients of the investments in human capital are not significant in all the three static models (Pool OLS, FE and RE), these are significant for both the System GMM regressions. Additionally, in both the dynamic models, the coefficient of $lnsh$ assumes a negative sign, which means that an increase of human capital of 1% decrease the economic growth among the European country by 0.013% for the SYS-GMM1 and by 0.004% for the SYS-GMM2.

The negative sign of the variable $lnsh$ can be explained by the inappropriate allocation of the jobs with respect to the skills of migrants. As results immigrants

Additionally, both the regression model passes the diagnostic tests of no serial correlation and adequate number of instruments according results shown in Table 5.7 for AR2 and Hansen-J tests.

Table 5.7: Results of Solow Model Using Selective Migration Policies

Variables	OLS	FE	RE	SYS-GMM1	SYS-GMM2
lny_0	-0.0235**	-0.0957**	-0.0235***	-0.0335***	-0.0316***
	(0.00743)	(0.0333)	(0.00352)	(0.00446)	(0.00452)
$lnsk$	-0.00486	0.0430	-0.00486	0.0365**	-0.00965*
	(0.0144)	(0.0365)	(0.0141)	(0.0138)	(0.00495)
$lnsh$	-0.00409	0.0168	-0.00409	-0.0130*	-0.00459*
	(0.00685)	(0.0237)	(0.00692)	(0.00698)	(0.00223)
$ln(g+\delta+n)$	0.0106	-0.0162	0.0106	-0.00841	0.00975***
	(0.00656)	(0.0106)	(0.00893)	(0.00834)	(0.00217)
$HC_m - Selectivity$	-0.0353	0.0679	-0.0353	0.0291	-0.337**
	(0.0892)	(0.102)	(0.0950)	(0.135)	(0.142)
$eK_e/(g+\delta+n)$	-0.310	0.140	-0.310	0.0165	-0.357**
1	(0.232)	(0.158)	(0.380)	(0.181)	(0.0950)
constant	0.286**	1.071**	0.286***	0.395***	0.370***
	(0.0891)	(0.354)	(0.0558)	(0.0516)	(0.0465)
implied λ	0.047	0.020	0.047	0.068	0.064
Hausman			0.0417		
AR1				0.220	0.183
AR2				0.177	0.353
Hansen-J				0.490	0.998

Note :The dependent variable is the Δlny. The method of estimation are fixed effects and random effects with robust standard error. In the third and the fourth columns report the result of two-step GMM, System GMM model, the SYS-GMM2 model includes the network of migrants as an external instrument. The Hausman test is used to choose between the fixed and random effects under the hypothesis that the random test is appropriate. This hypothesis is rejected for values of the χ^2 statistic higher than 0.05. The AR1 and AR2 are tested for the first-order and second-order serial correlation in the first-order residuals, which are asymptotically distributed under the null of the hypothesis of no serial correlation. The Hansen-J is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null hypothesis of instrument validity. The numbers in brackets denote the standard errors. (***), (**), (*) reflect the 1%, 5%, 10% level of significance respectively

could be more qualified than the vacant position they occupy in the labour market. Moreover, as the Blue Card programmes adopted by the European countries support a higher skill-selection of migrants only on the basis of their education level, this might not be the best criteria for selecting the migrant' skills. Indeed, there are other non-economic factors which might affect the human capital of the migrants such as the colonial history of the migrants. Indeed, the selection process can be more effective if it depend also on the ability of the migrant to be able to speak the same language and have a common cultural background with the destination country. To this end, results of the SYS-GMM2 model shows that ethnic-networks of migrants might be negative the affected by these of policies which select migrants only according their skills. Indeed, the presence of ethnic-network of migrants can allow also the skilled migrants to feel more integrated in the job market.

In Table 5.8, we report the estimates of the Solow model augmented with the human capital of migrants and emigrants, when a rise in restrictiveness towards high-skilled migrants is observed. This means that European countries introduce migration policies with the intention of increasing the criteria of selection specifically for migrants with a high-education. According to the results of the OLS and FE models, the increase in policies that aim at attracting only the most talented workers does not allow the income convergence among the European countries. The same results are obtained for the SYS-GMM with ethnic-network as an exogenous instrument. The results are inverted when considering the coefficients of the lagged dependent variable in the RE and SYS-GMM1 models, which are negative and significant, confirming the presence of the income convergence. We conclude that results of the RE and SYS-GMM1 models are more adequate for two different reasons. Firstly, according to the Hausman test the RE model is the most appropriated as the χ^2 is equal to 0.0855 and therefore we can accept the null hypothesis of the test. Secondly, the results of the RE model are in line with the dynamic System-GMM model which overcomes the limitation of the FE model by removing the problem of endogenity, therefore, the first model is more efficient and less biased than the second one.

However, the effects of reducing the quota for high-skilled migrants on the speed at which European countries converge to long-run equilibrium are worst with respect to the effects produced by selective policies toward all migrants. When the migration polices are more restrictive towards high-skilled migrants, the effects generated on the economic growth by an increase in tertiary-educated migrants in the

EU countries are not significant. Indeed, as we can see from 5.8, the coefficients of $HC_m - Rest - high$ and $eK_e/(g + \delta + n)$ are negative but not significant for both the RE and SYS-GMM1 models. On the other hand, the results for the dynamic panel regression that instrumentalise the ethnic-network of settled migrants (SYS-GMM2) show a different picture. Indeed, the coefficient of the $HC_m - Rest - high$ is significant but negative; while, the coefficient of $eK_e/(g + \delta + n)$ is negative but not significant.

Only when we take into account the ethnic-networks of migrants in the destination countries, we can observe that 1% of high-skilled workers coming in the European labour market produces a negative effect on the economic growth, decreasing it by 0.405%. Thus, the networks of migrants in the receiving country favour the integration of foreign-migrants, which enables high-skilled migrants to positively impact on the economic growth. In this case, the impact of net-migration remains unclear as we are not able to capture the impact of native-born migrants on the economy. Moreover, the rise in restrictiveness toward high-skilled migrants does not promote the investment in physical capital on the economic growth, as shown by the coefficients of the $lnsk$ in all the regression models in Table 5.8. Similarly, the coefficient of the investments in human capital, $lnsh$ is insignificant for the static models. On the other hand, $lnsh$ become significant for the dynamic models, and an increase in investments in human capital produces a decrease of the GDP per worker for the dynamic system-GMM models, respectively by 0.048% and 0.053%.

Summarizing the results, it is possible to observe that the increase in tightness of the migration policies for high-skilled migrants does not lead very significant effects from migration and it is not possible to observe whether this phenomenon represents a brain gain for the destination countries. Indeed, the increase in restrictive policies that tend to reduce the integration of high-skilled migrants, their right to work and their right to stay does not promote a system which allows these workers to enhance the local productivity and the economic growth. Instead, this policy implementation neutralises any possible positive effects which would be produced by the migrants with their human capital, as migrants do not feel welcome. We have previously seen that a network of previous migrants already settled in the destination countries has function of "cushioning" between the new labour market, that the incoming migrants are trying to enter, and the group of family and friends belonging to the same origin country of the migrants. It would be expected that the high-skilled migrants would

feel more welcome in destination country where there is a stronger ethnic-network of foreigners, thus leading to more integration and higher productivity. Instead, our results show that rise in the number migrants, although high-skilled, do not promote economic growth, when the country guarantees less rights to them.

Table 5.8: Results of Solow Model with Restrictive Policies to High-Skilled Migrants

Variables	OLS	FE	RE	SYS-GMM1	SYS-GMM2
lny_0	-0.0172	-0.0679	-0.0172**	-0.0247**	-0.0339
	(0.0108)	(0.0649)	(0.00809)	(0.0112)	(0.0234)
$lnsk$	0.00353	0.0443	0.00353	-0.0280	-0.00447
	(0.0224)	(0.0549)	(0.0177)	(0.0347)	(0.0257)
$lnsh$	-0.0161	-0.00699	-0.0161	-0.0484**	-0.0535**
	(0.0146)	(0.0382)	(0.0149)	(0.0214)	(0.0142)
$ln(g+\delta+n)$	0.000826	-0.0480*	0.000826	0.00761	0.00160
	(0.00997)	(0.0231)	(0.00475)	(0.0119)	(0.0119)
$HC_m - Rest - high$	0.0398	-0.428**	0.0398	-0.307	-0.405**
	(0.279)	(0.194)	(0.187)	(0.175)	(0.177)
$eK_e/(g+\delta+n)$	0.249	1.871	0.249	-0.426	-0.0561
	(0.671)	(1.652)	(0.878)	(1.294)	(0.850)
constant	0.200	0.684	0.200**	0.231*	0.350
	(0.132)	(0.693)	(0.0943)	(0.111)	(0.243)
implied λ	0.035	0.014	0.035	0.05	0.069
Hausman			0.0855		
AR1				0.140	0.253
AR2				0.189	0.441
Hansen-J				0.924	0.998

Note : The dependent variable is the Δlny. The method of estimation are fixed effects and random effects with robust standard error. In the third and the fourth columns report the result of two-step GMM, System GMM model, the SYS-GMM2 model includes the network of migrants as an external instrument. The Hausman test is used to choose between the fixed and random effects under the hypothesis that the random test is appropriate. This hypothesis is rejected for values of the χ^2 statistic higher than 0.05. The AR1 and AR2 are tested for the first-order and second-order serial correlation in the first-order residuals, which are asymptotically distributed under the null of the hypothesis of no serial correlation. The Hansen-J is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null hypothesis of instrument validity. The numbers in brackets denote the standard errors. (***), (**), (*) reflect the 1%, 5%, 10% level of significance respectively

The rise in restrictions for low-skilled migrants does not impact as much as negatively as the restrictive policies towards high-skilled migrants. In the European labour market there is an abundance of low-skilled migrants among the European and non-European nationalities. The intra-mobility of the low-skilled migration has been favoured by need of manual labour force, mainly in the northern European

countries, form the southern European countries, while the non-European low-skilled migration have also increased due to the large number of family reunification applications. According the results of Table 5.9, a reduction of the low-skilled workers allows the effects of the investments in the physical capital to impact positively on the economic growth. This result is similar to the one obtained by the regression model that takes into account the increase of restrictiveness towards all irregular migrants. However, we only find evidence of the impact of `ad-hoc` restrictive policies towards low-skilled migrants on the growth and on investments, when we test the dynamic panel models. The higher level significance of the coefficients for the dynamic models might be explained by the higher efficiency and lower tendency to produce biased estimation of the panel System-GMM models as compared to the classical static panel regression ones. Specifically, looking at the Table 5.9, it is possible to observe that there is evidence of the impact of physical investments on the economy only for the model SYS-GMM1. Specifically, an increases in 1% of the physical capital increases the GDP per worker of 0.084%.

Looking at the SYS-GMM1 model results, it is possible to observe that the coefficient of investments in human capital are also significant but with a negative sign, according to which an increase of 1% of human capital will lead to a decrease of 0.026% of human capital. The negative effect produced by higher accumulation in human capital might again be explained by the presence of skill-mismatch in the European labour market. The effects of the human capital of the native and foreign-born migrants are evident only when we observe the SYS-GMM1 estimators.

Moreover, when we perform static panel regression models, it is not possible to observe any contribution to economic growth produced by migrants in the presence of higher restrictiveness towards irregular migrants. Also in this case, there is no clear result that identifies a common effect produced by the rise in migrants on all the European labour market together, except for the SYS-GMM1 models. The results of the latter show a significant but negative net effect produced by the contribution in human capital of the (native and foreign-born) migrants. Particularly, an increment of 1% in high-skilled foreign-born decreases the GDP per worker by 0.555%, while, an increase of 1% in native-born migrants increases the GDP per worker by 0.245%. On the other hand, the effects produced by net-migration are opposite when we consider also the strong ethnic-network of migrants in the destination countries. In the later case, we find that an increment of 1% in foreign-born migrants generates a surge

in GDP per worker equal to 1.170%, whereas the same percentage increase in native-born migrants produces detrimental effects of the economic growth of the European countries, leading to a decrease in GDP per worker equal to 0.226. However, the net-effect of migration for the SYS-GMM2 is positive. We suggest that the reason why in the SYS-GMM1 the sign of the variable relative to the foreign-born human capital contribution is negative, might be because the high-skilled foreign-workers lose the complementary factor in production, represented by low-skilled foreign-workers. While, the tertiary-educated native-born migrants are not directly affected by the introduction of the migration policy and still contribute positively to the GDP per worker as in the case when no restrictive and selective migration policy is introduced in the European acquis, see Table 5.4.

Conversely, when the instrumental variable of the ethnic-network enter in the regression model (SYS-GMM2), we can observe the further impact of a higher level of restrictiveness towards low-skilled foreign-born workers still allows a slight positive contribution of more skilled foreign-worker to the economic growth, probably due to the support of the migrants coming from the same ethnic background. Nevertheless, the higher level of restrictiveness in regulations for the low-skilled foreign-born migrants tend to weaken all the network of migrants in the destination country, which might affect the native-born migrants as we have seen they are connected to the origin countries through the international network.

Table 5.9: Results of Solow Model Augmented with Restrictive Policies to Low-Skilled Migrants

Variables	OLS	FE	RE	SYS-GMM1	SYS-GMM2
lny_0	-0.0346**	-0.138***	-0.0416***	-0.0388**	-0.0391***
	(0.0116)	(0.0284)	(0.00790)	(0.00983)	(0.00863)
$lnsk$	-0.00680	0.0351	-0.00573	0.0840***	0.0212
	(0.0196)	(0.0505)	(0.0236)	(0.0189)	(0.0223)
$lnsh$	-0.00707	0.0354	-0.00620	-0.0262**	-0.00150
	(0.00894)	(0.0238)	(0.0102)	(0.00863)	(0.00284)
$ln(g+\delta+n)$	0.0220**	-0.00464	0.0194*	-0.0164**	0.0162**
	(0.00911)	(0.0117)	(0.0117)	(0.00629)	(0.00516)
$HCm - Rest.low$	0.257	-0.332	0.0555	-0.555**	1.170*
	(0.333)	(0.502)	(0.361)	(0.167)	(0.556)
$eK_e/(g+\delta+n)$	-0.294	-0.0239	-0.283	0.245*	-0.226**
	(0.261)	(0.132)	(0.461)	(0.133)	(0.0983)
constant	0.433**	1.558***	0.501***	0.486***	0.517***
	(0.136)	(0.304)	(0.106)	(0.108)	(0.0825)
implied λ	0.070	0.028	0.085	0.079	0.080
Hausman			0.1203		
AR1				0.269	0.0823
AR2				0.289	0.189
Hansen-J				0.982	0.997

Note : The dependent variable is the Δlny. The method of estimation are fixed effects and random effects with robust standard error. In the third and the fourth columns report the result of two-step GMM, System GMM model, the SYS-GMM2 model includes the network of migrants as an external instrument. The Hausman test is used to choose between the fixed and random effects under the hypothesis that the random test is appropriate. This hypothesis is rejected for values of the χ^2 statistic higher than 0.05. The AR1 and AR2 are tested for the first-order and second-order serial correlation in the first-order residuals, which are asymptotically distributed under the null of the hypothesis of no serial correlation. The Hansen-J is a test of the over-identifying restrictions, asymptotically distributed as a χ^2 under the null hypothesis of instrument validity. The numbers in brackets denote the standard errors. (***), (**), (*) reflect the 1%, 5%, 10% level of significance respectively

5.5 Conclusion

The results of the panel data analysis provide two important insights on the impact of migration on the European countries. First insight is the impact on economic growth of the gains and the losses in human capital due to the migration phenomenon. The second insight is an assessment of the impact of economic growth of an increase in restrictiveness, rather than selectivity, in migration policies among 22 European countries. Overall, our results suggest that migrants and their education contribute to the economic growth of the European countries. In particular, an increase of 1% in high-skilled foreign-born migrants increased the GDP per capita of all the European countries by 0.120%. This impact is significant at it is larger than the effects produced by investments in physical and human capital in the destination country. The contribution of native-born high-skilled migrants to the economic growth of the home country is also surprising as normally considered a net loss of "talented" workers. Particularly, we are able to see that when there are not any increments in the restrictiveness or selectivity of migration policies, an increase of 1% of tertiary-educated natives moving abroad increases the GDP per worker of the origin country by 0.013%. This leads us to conclude that the net impact of migration in Europe is positive.

Net-migration is also a factor that stimulates the pace of income convergence among the European countries, helping the less prosperous European economies to reach the more prosperous ones. We can conclude that the increase in mobility of high-skilled individuals across Europe, and the rest of the world, is a net brain gain. However, both national and European immigration policies play an important role in this equilibrium when manipulating migration quotas and the level of tightness in admission procedures. These activities impact negatively on the contribution of migrants to the destination countries.

An increase in restrictiveness towards the irregular migrants, although supporting the income convergence among the EU countries, do not help the high-skilled native and foreign-born migrants to impact positively on the destination economies. This is likely to be because a rise in restrictiveness discourages even high-skilled migrants, as it makes the countries to be perceived as less welcoming.

Better results are achieved when governments introduce selective policies to attract

the most skilled migrants and reduce the number of low-skilled ones. Although the implementation of selective policies is one of the most adopted measures to attract high-skilled migrants, our estimates do not suggest that the real effects that these policies produce are not in line with the expectations of the EU countries. We suggest that this can be caused by the wrong intention of the policies. Indeed, rather than attracting migrants on the basis of the *skill-shortage* listed in the market, it would be more beneficial for European countries to adopt policies that attract more high-skilled migrants with the aim of increasing their accumulation of human capital.

Chapter Six

Conclusion

6.1 Introduction

This thesis provides an understanding of the impact of migration on the European economies. Various works analyse a single or a group of European economies, but it is rare to find a comparative analysis on the causal relationship between immigration and GDP per capita. The literature on the different impacts of net migration in terms of human capital on the economic growth of the European countries is also very limited. This thesis, therefore, contributes to the current state of knowledge by filling this gap.

Immigrants are essential to the population growth of Europe. According to the United Nations UN (2018), between 2000 and 2015, the European population would have declined if it was not for a favourable net-migration rate, contributing to the labour force by bringing in young workers. Foreign-born workers also bring with them skills, experiences and knowledge that are key to fostering productivity. On average, the recent foreign-born population migrating to Europe has the same proportion of tertiary-educated individuals, as compared to the native population in the European countries. To understand the implications of the migration phenomenon, we carried out two different analyses explaining their results and implications. This conclusion chapter is organise as follows: 1) summary of research findings; 2) policy recommendations; 3) contribution to knowledge; 4) limitation of the study; and 5) recommendation for future research.

6.2 Summary of the research findings

Socio-economic characteristics in destination countries, such as income inequalities, play a key role in the decision of migrants to move there. Migrants differ from non-migrants due to their personal characteristics, skills and labour market performance. As a result, the structure and the size of the migration flow depends on a complex-mix of factors in the destination countries, such as the wage differentials, the probability to find a job, and the presence of welfare programmes. Additionally, the different policies implemented towards migrants in the destination countries are another factor of selection for specific groups of migrants, who might be more welcome in one country as opposed to others. In recent years, there has been an increment in policies favoring the arrival of the most talented foreign-born workers, explaining why generally more educated workers tend to leave their origin country (Chiquar and Hanson, 2005).

Some papers show that the possibility to find better welfare opportunities ("welfare magnet") or have more guaranteed rights (Ruth and Martin, 2013) can have a crucial role in the decision of migrants to move to a specific country. These papers also explain why when a new regularisation law is announced the probability that the migrant will commit a crime decreases (Mastrobuoni and Pinotti, 2015) and the probability that he/she will be employed increases (Devillanova et al, 2018). On the other hand, a non correct regulation of migration can produce counterproductive effects. Indeed, as seen from the results of the first analysis, when migration policies are not correctly implemented, such as the series of amnesties introduced in Spain and Italy, there are severe consequences on the labour market equilibrium, causing mismatches between the skills offered by migrants and needs of the labour market.

The lack of prompt actions in managing the migration phenomenon can led to negative impacts on the GDP per capita. In particular, the incorrect management of migration can lead to detrimental effects in the long term, as experienced by Germany, Greece and Portugal. During the reconstruction period, after World War II, the German government introduced a series of `temporary` migration programmes called "guest worker programmes" which gave migrants permission to work only for short-periods. The absence of legal channels for permanent migration led migrants to overstay without any formal permission, creating a pool of irregular workers in the labour market. The phenomenon of irregular migration in Germany is a result

of the restrictiveness of policies toward permanent migration, when Germany did not recognise itself to be an "immigration country". Similarly, Greece did not take into account the danger of inaction in response to the waves of refugees and irregular migrants coming from the Balkans, mainly Albania. Especially after the fall of the Berlin wall and following the period of instability for the war in the former-Yugoslavia, many migrants with Greek ethnic-origin moved back to Greece asking for protection from the risk of persecutions. Only towards at the end of the 1990s did the Greek government decide to recognise the status of the already settled migrants and naturalise them. The late response in managing the increasing waves of migrants and the fact that regularization had been based on "nationality" rather than on "labour market needs", might have been the cause of the negative consequences produced by the increase in migrants on the Greek economic growth. Although these migrants would provide support to the economy by working in low-skilled jobs and allowing the native population to further develop their skills and work in more productive sectors. Similarly, Portugal, despite partially supporting migration using schemes based on the labour market needs, implemented a series of wrong strategies by developing its services and financial sectors only in the capital.

The results of the first analysis, which takes into account individual countries characteristics, are heterogeneous. Even when we group all the analysed European countries into three macro-groups based on similar geographical, economic and migration history (core, peripheral and new member states), the results are still mixed. Within the same macro-group, for some countries we detect a unidirectional long-run relationship running from migration to GDP per capita; for others running from GDP per capita to migration, while for few other countries the relationship between the two variables is bidirectional. Additionally, we also observe the same relationship in the short-run.

We conclude that the short-run relationship is not an indicator of the long-run results, as short-run and long-run are positively or negatively related depending on the specific country under study. The absence of a clearer response in immigration to changes in GDP per capita explains that for some European countries, with significant levels of economic growth, GDP per capita is not the primary determinant in pulling migration. Indeed, in countries such as Germany, the United Kingdom, Belgium, and Spain there is a long-run and short-run relationship between immigration and GDP per capita but, surprisingly, there is no relationship in the opposite

direction (i.e. GDP per capita causes Immigration per capita). This result can be explained by the fact that the majority of migrants moving to these countries arrive from countries linked by past colonial relationships. Long-established social, cultural and economic ties, link citizens of Commonwealth to the UK, or refugees and family member from easter-Europe to Germany or South-Americans to Spain. In this case, the immigrants are less dependent on the business cycle and do not just move due to better economic conditions or higher employment rates, but mainly because they share similar cultural values and language, which allow them to integrate more easily.

Some ethnic-networks in the destination countries play an important role on migration decisions of potential new migrants. As we have seen, colonial links and the presence of co-ethnic networks can have a much stronger pull factor in comparison to wages or selective migration policies, as Belot and Hatton (2012) have found. Besides, networks help ensuring the economic integration of new immigrants at the destination country (Hatton and Leigh 2011). Though networks are generally more effective than the economic incentives in attracting migrants, the restrictive and selective policies put in place in the destination countries and inefficiencies in the labour market can also be a reason why GDP per capita does not Granger-cause migration. Specifically for the cases of Belgium and Spain, the strong internal diversities, both cultural and linguistics, are reflected on the local and national uncoordinated management of the migration phenomenon. It is evident that the behaviour of these national and local authorities is not the main "pull-factor" for the foreign workers.

In each macro-group, we find that for the rest of the countries the GDP per capita is the main factor that determines the migration flows, except for France, the Netherlands, Luxembourg, Ireland and Slovakia. The reasons why in these five countries there is only an evidence of a causational relationship from GDP per capita to Immigration per capita are explored in this paragraph. Luxembourg has the higher GDP per capita among the European countries, however there is no evidence of an inverse causal relationship because of a very rigid wage system, the automatic wage indexation system, which leads to increases in unemployment rates during negative phases of the business-cycle, and due to the fact that the majority of the migrants are citizens of the neighbour countries and do not live, consume and pay taxes in Luxembourg. France, the Netherlands and Slovakia have in common a similar management system for the inflow of migrants, indeed, all the three countries impose a *minimum resource requirement* to allow migrants to move in their territories. This

is because the main channel used by migrants to entry and settle is based on family-reunion programmes, as seen in the paper of Fromentin (2013) and Boubtane et al. (2013). As family-based migration can be a burden for the health, welfare and fiscal systems in the destination countries, migrants are allowed to bring their families, as long as their income is above a certain threshold. During a period of higher growth, immigrants have good change to satisfy this minimum level of income criteria. Similarly, this can justify the results of the Granger causality relationship from GDP per capita to Migration found for the Netherlands and Slovakia, where other restrictions are also imposed to migrants that want to move using the family-reunion schemes, such as accountability for the payment of the accommodation or knowledge of the national language.

In the second analysis we investigate he impact of immigration in Europe as a whole using a panel data analysis. According to our findings the migration phenomenon is beneficial to the prosperity of the European countries. Indeed, the net contribution of migrants, calculated as difference between the inflows of foreign-born workers and outflow of the native-born ones, to the GDP per worker in the destination countries is significant enough to compensate for the adverse effects produced by the capital dilution of an increase in population. Our results show that the effects produced on the economies by tertiary-educated native-born emigrants and foreign-born immigrants are not harmful. Interestingly the native-born tertiary-educated who move abroad are not negatively impacting on the GDP per worker of their country of origin. This is explained by fact that there are strong ties between the native-borns migrated abroad and their network in their country of origin. Therefore, the native-born migrants can continue to contribute to economy of origin even after from abroad. In addition, as part of our second analysis, we produced a further study of the Solow model by introducing a parameter that captures the implication of changes in migration policies. We test this model empirically considering the migration regulations as a determinant of the migration flows. Namely, in a dynamic framework, when we take into account the three year-lags of all the variables, we consider migrations as an endogenous phenomenon caused by an increase in restrictiveness and selectivity of the migrant flows.

The results from the second analysis show that an increase in restrictiveness of migration policies prevents the tertiary-educated migrants to contribute to the European economies, without impacting on the human capital contribution of the native ex-

patriates to the national economic growth. The increasing levels of selectivity on migration flows, although producing more efficient results than when implementing restrictive policies towards low or high-skilled migrants, needs to improve in order to lead to the desired results of total capital accumulation, but also on the GDP per worker.

Comparing the more general index of restrictiveness with the selectivity one, we can conclude that the increase of barriers to migrations in Europe does not allow the destination countries to gain from the beneficial effects of the human capital of the tertiary-educated foreign-born migrants on productivity. However, when the European countries restrict the entrance of all the groups of migrants (low and high-skilled, asylum-seekers or irregular migrants), it is possible to find a positive impact of the tertiary-educated migrants on productivity, only when there are well represented co-ethnic networks of migrants. This is probably because the network of migrants settled in the European countries act as a "cushion" for the new migrants in a context of hostility and discrimination. Indeed, we have seen that an increase of restrictiveness in the migration policy is a result of pressures on policy-makers from public opinion. We need to note that the network of migrants does not affect significantly the human capital of the high-skilled migrants, as it has been seen that the less skilled migrants tend to be more integrated into the co-ethnics networks than the high-skilled ones. Nevertheless, the presence of strong ethic networks allows the high-skilled migrants to contribute to the economic growth and income convergence of the European countries when these migrants experience restrictions in the rights to enter, stay and work together with the other groups of migrants. The results on the income convergence among all the 22 European countries shows that an increase in tightness of the migration regulations encourages the less prosperous European countries to grow at a faster rate than the more prosperous ones.

6.3 Policy recommendation

In this thesis we explore the impact of migration on the European economies, looking both at each country individually and all of them together. With exception of few cases, such as the one of Germany, migrations boost the economic growth and promote a "catch-up" process among EU stimulating economic convergence. The various policies that have been introduced in Europe over the last two decades have been focused on restricting both the entrance, and the rights to stay and work of

different category of workers, especially low-skilled and irregular migrants. In our analysis we have identified different speeds of income convergence to the steady-state by applying different hypothesis and considering different scenarios from low to high level of restrictions. Results show that the different restrictive policies help the European countries converge with a higher speed despite a series of limitations, such as weakening the benefits produced by tertiary-educated migrants on the productivity levels of the destination countries. The policy implications following this contribute to the debate on the role of skilled migrants in the growth process of the European economies and associated income convergence among them.

The design of selective and restrictive policies according to migrants' skill is a valid approach; however, it seems that the European countries have to change their approach to the matter. The main focus of the regulation implemented on curbing irregular flows of foreigners and attracting individuals from abroad with specific skills short in the market. Especially recently, European regulation has moved towards the promotion of policy that incentivises the entrance and also the residence of more talented migrants which, as our results show, is an influential factor to foster economic growth. The point is that the current European policies are designed to reflect a "shortage occupation list" which does not necessarily imply that there is an interest from the destination countries in effectively integrating the newcomers in the market.

The limit of migration policies based on a "shortage list" is that they are implemented to satisfy the interest of the job market only in the short-term. Nevertheless, it is crucial that the role of migrants overcomes the issue of lack of skills in the local market. Countries need to also consider the importance of engaging the most skilled migrants with the intention of strategically let them settle in the country in order to increase the human capital accumulation, thus promoting, in the long-run, increments in productivity, as indicated by the point-based system programmes. Taking into account only the criteria to admit migration is not enough, as policy-makers have to consider the conditions that the migrants will encounter once they get established in the receiving country, in order to convince them to make long-term commitments to stay. Moreover, in order to retain the most talented migrants and their families, the European states have to increase the flexibility and innovate the labour markets in order to be able to capitalize on the coming human capital of migrants. This means, to avoid the losses of capital in the labour market, due to the migrants not being able to find the appropriate jobs that match their skills.

The recent tendency of increasing restrictions to the entrance of less skilled migrants, according to our results, is not the most efficient policy to deal with migration. In fact, young low-skilled migrants are determinant for economic growth as they replace the decreasing number of young natives with their man-power. Additionally, low skilled migrants allow the expansion of jobs for high-skilled natives and migrants, as both are complementary in production. As a consequence, the European countries have also to increase the number of legal pathways for these less skilled migrants, which would allow for a reduction irregular migrants and, therefore, of underground economies. A migration system considering all the previous points would, firstly, solve the issue of decreasing population (and therefore workforce), secondly, the skills-shortage issue in the labour-market and, thirdly, would provide new contributors to the fiscal and pension systems. Additionally, more high-skilled migrants would promote income growth and convergence among the European countries.

6.4 Contribution to Knowledge

This thesis contributes to the current state of knowledge of economics of migration in three ways. Firstly, by providing a comparative analysis on the causal relationship between GDP per capita and migration on selected European countries. Secondly, by offering an empirical contribution to growth theory by augmenting the Solow model to take into account the human capital of native-born emigrants and foreign-born immigrants, with a further parameter concerning migration policy changes.

With this regards, we created a series of indexes that capture the changes in restrictiveness towards all migrants or specific groups of migrants (low and high-skilled and irregular) and also an index on the selectivity of migration policies in all European countries. To this end, we have been able to see whether any specific policies affect the human capital of net migrations producing changes on the economic growth. In order to perform the analysis, we also estimated the number of native and foreign-born migrants which are not always available from official sources from 1990 onwards for the selected European countries. Finally, we contributed to the studies on economic growth by testing for the presence of income convergence among a set of European countries, understanding the impact produced by changes in native and foreign human capital, and migration policies.

6.5 Limitation of the Study

We need to recognise some of the main limitations of this study. Firstly, there are several limits to the accurate collection of information on migrations in Europe. The main problem is related to the regulation of migration data, which is partially managed at the European level and partially at the national level. The lack of a common ground or a common definition and treatment of migrants is a live debate among experts.

In our analysis we have illustrated the impact of regular migration on the European countries using flows and stocks of migrants. The limitation on the availability of data, especially at the beginning of the 1990s is compounded by lack of comparability among the available datasets provided by each Member State, as individual methodologies were used at the time by each member states. Data becomes more standardised and available in the mid-2000s. Indeed, in 2003 the European Commission proposed an Action Plan for the collection and analysis of EU statistics in the field of migration, while the European Parliament and the Council of European Union introduced a regulation in 2007 explicitly stating a series of definitions on citizen, migrant and international protection status.

Another limit of the data about migration in Europe depends on the European geographical and political transformation over time. Indeed, European Union has expanded and, due to the different enlargements the status of individuals living and working in the EU territory, has changed. This means, for example, that after the 2004 EU-enlargement many foreign workers from the CEE countries living in EU as migrants became citizens. Therefore, due to these limitations, we could't include all the member states in our analysis. Secondly, in this thesis we have focused on the impact of the legal migrants, rather than the impact of irregular ones, on the economic growth. This is because of the lack of data on irregular migration, especially considering the need of a extended series of data on the number of overstayers and illegal migrants. Large number of data are necessary to perform time-series and panel data analysis. Specifically, the only data on irregular migration available from the Eurostat dabase refers to apprehensions, refusals and returns. However, this data can not be used to create synthetic information of the number of irregular migrants presented in the EU territory every year, particularly because data between the third-country nationals apprehended and returns overlap every year. Thirdly,

we could not distinguish the impact of the European and non-European migrants because of the unavailability of the data and difficulty to estimate the number of tertiary-educated migrants, over time, coming from within and outside the EU.

6.6 Recommendation for future research

We wish that future research on migration and economic growth will be able to cover these gaps. We wish that research in the field of migration would be able to understand whether migrants coming from different countries could impact differently than other, mainly, looking at the difference between EU and non-EU citizens. It would be interesting to extend the research on the effects of the EU policy regulation in the field of migration. Specifically, future research should be focused on understanding which migration system the European Union and the individual member states should adopt in order to gain the most from this phenomenon.

Appendix

Figure 6.1: CUMSUM stability charts

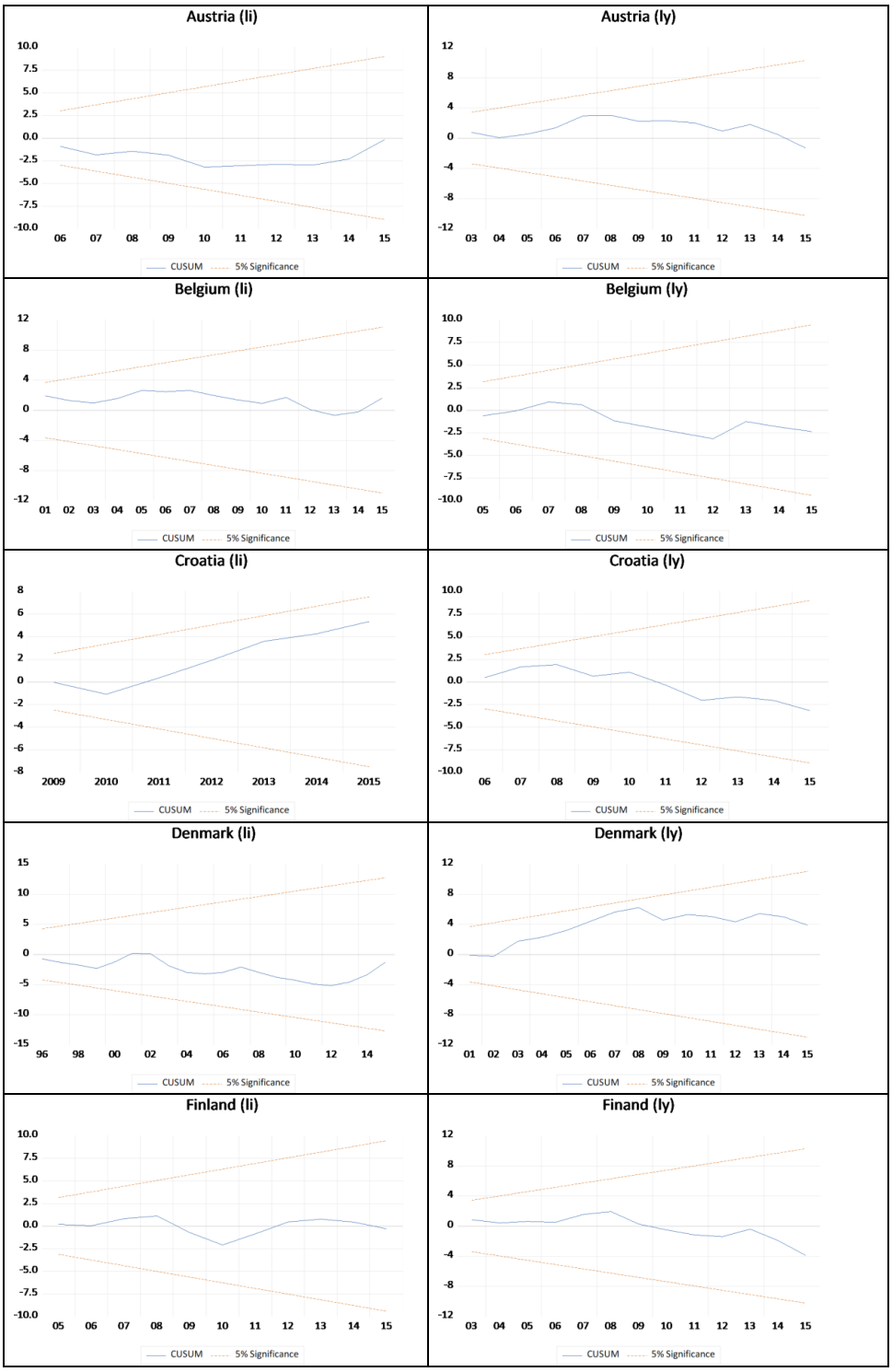


Figure 6.2: CUMSUM stability charts

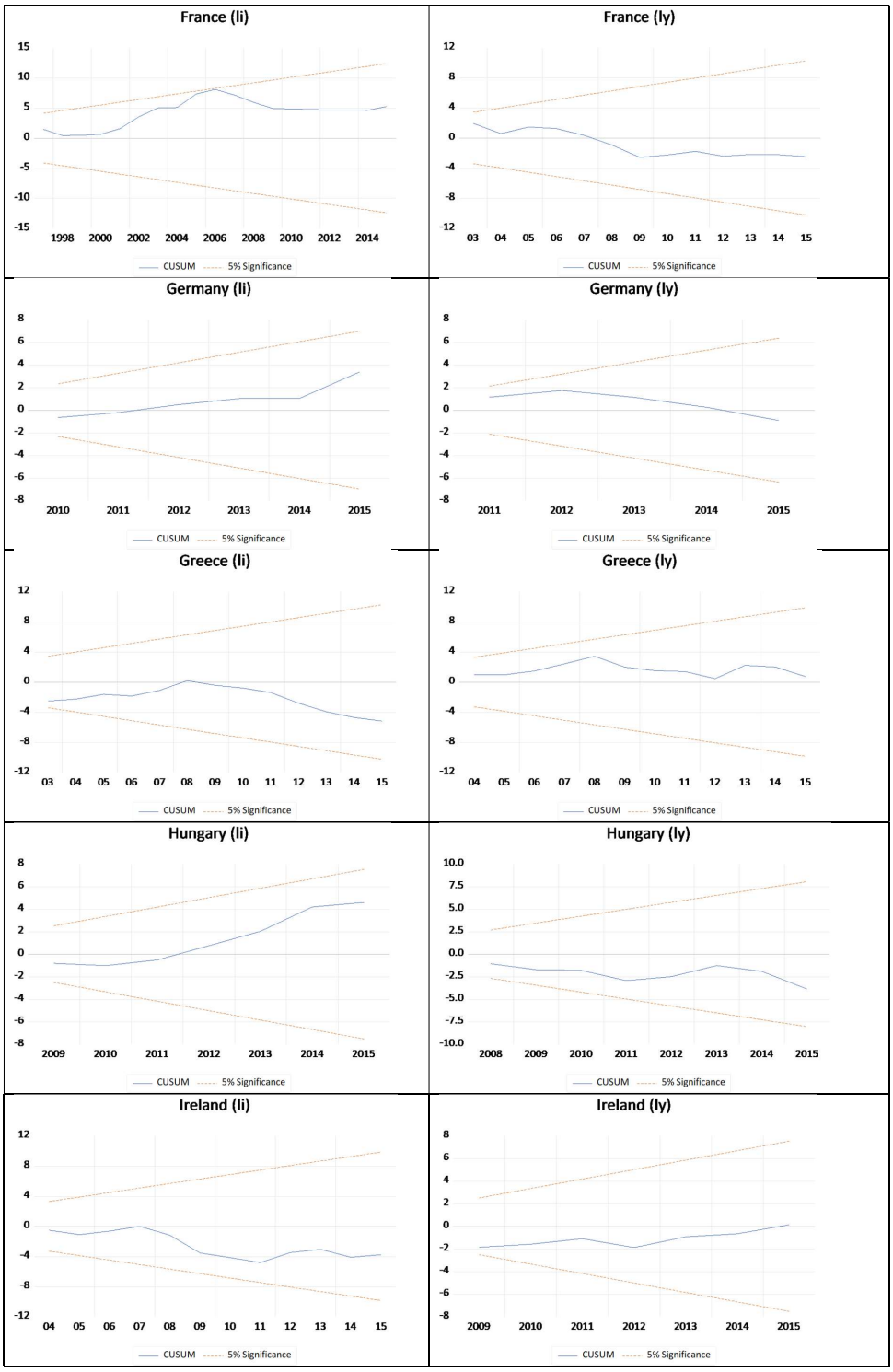


Figure 6.3: CUMSUM stability charts

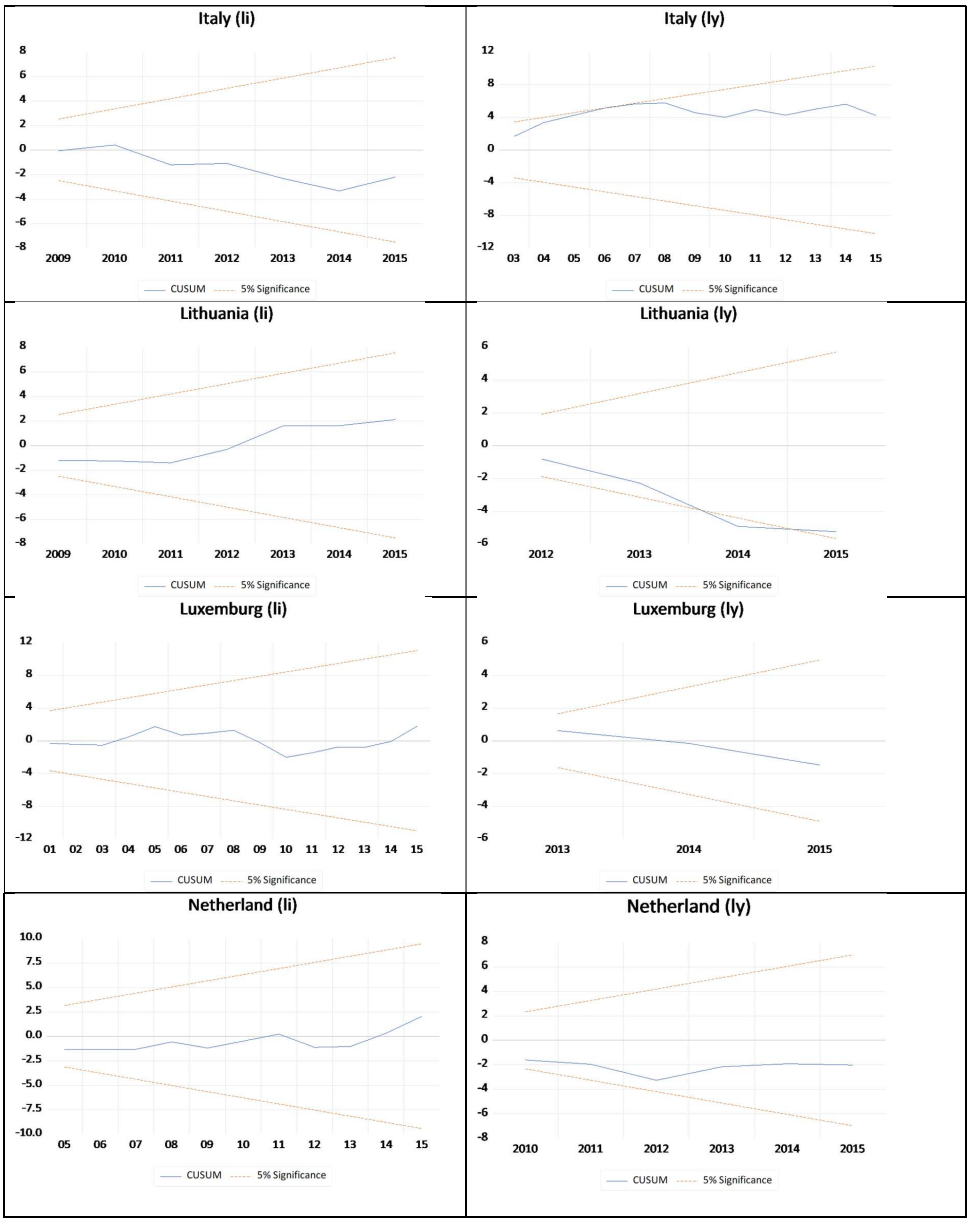


Figure 6.4: CUMSUM stability charts

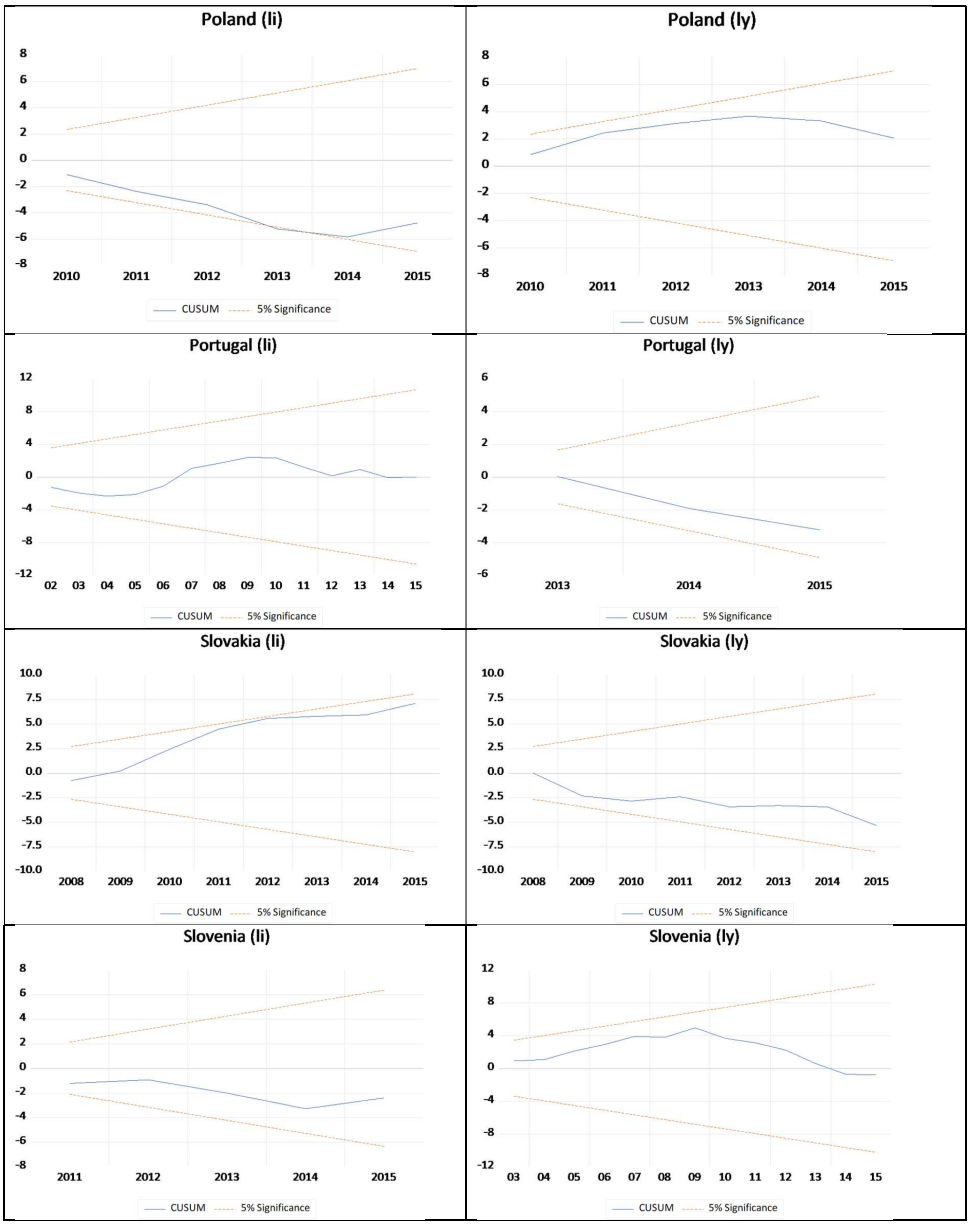


Figure 6.5: CUMSUM stability charts

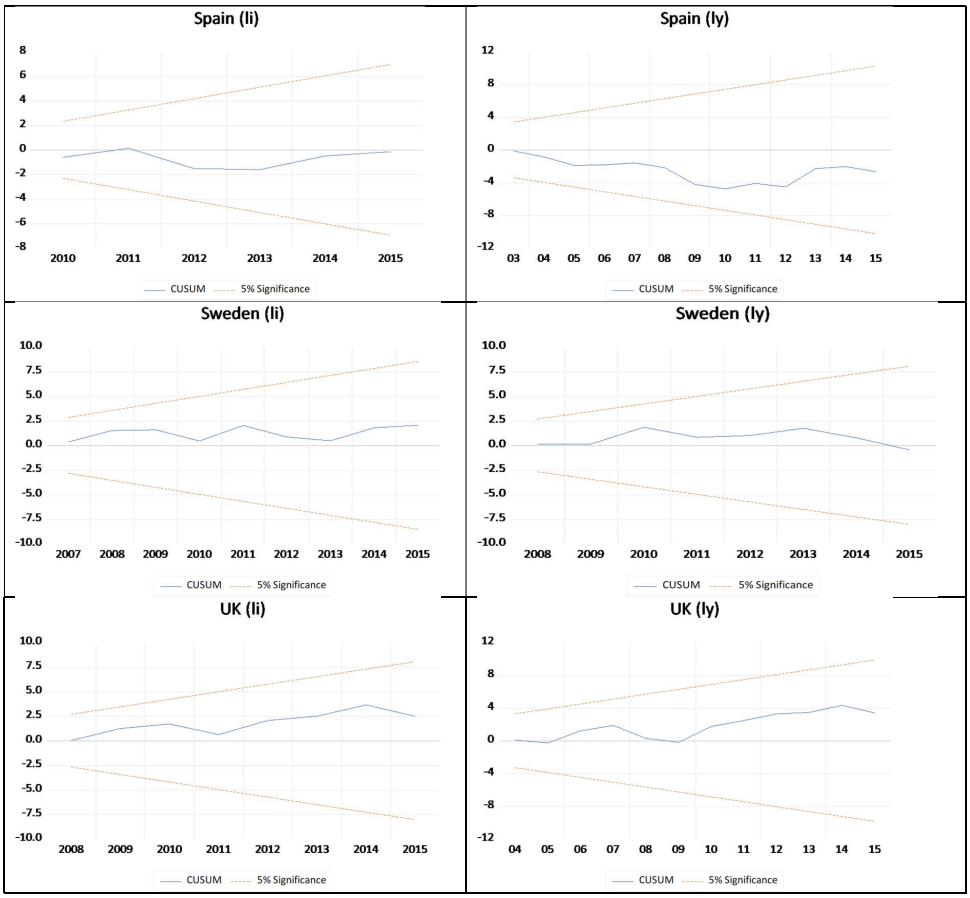


Figure 6.6: CUMSUM of SQUARES stability charts

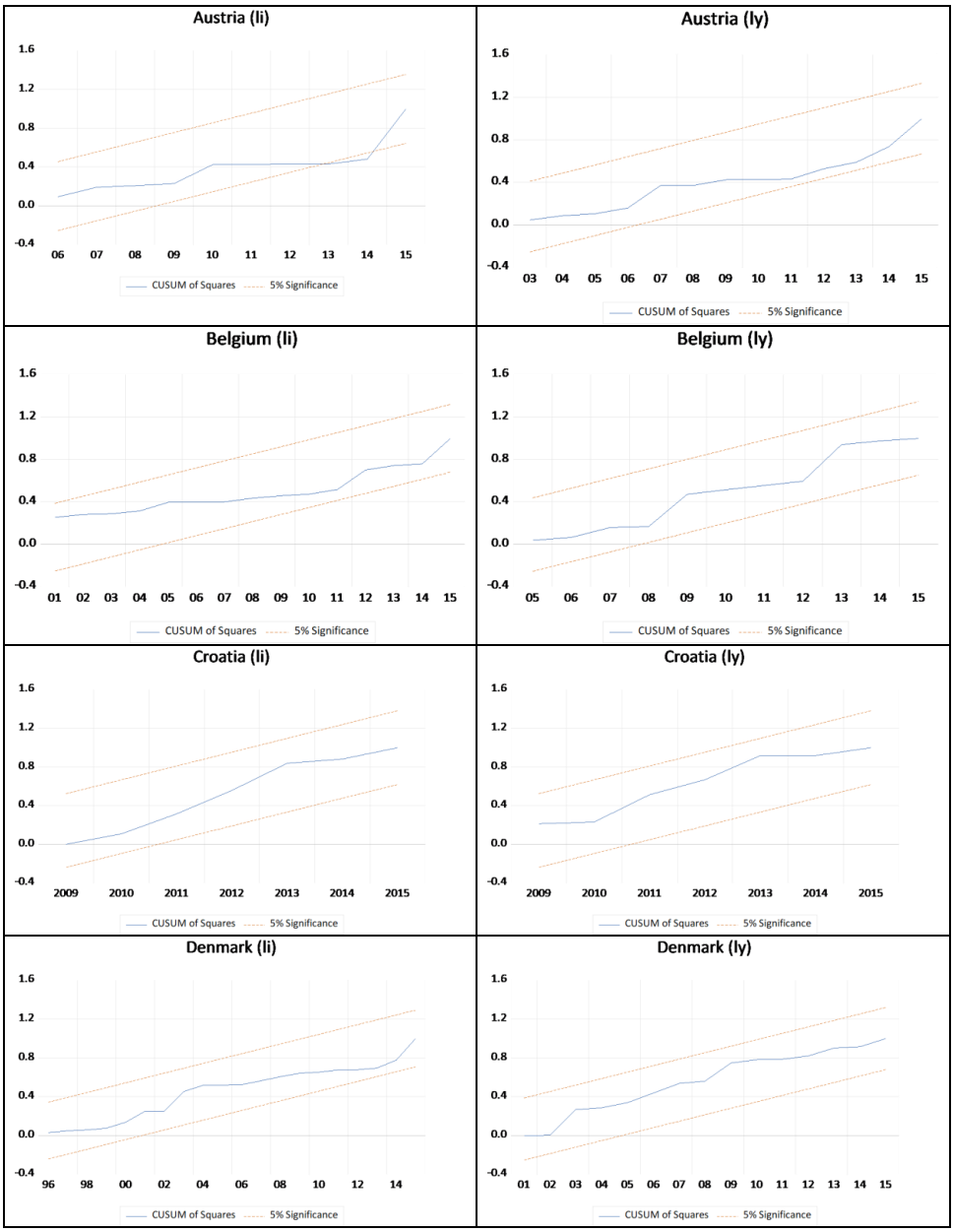


Figure 6.7: CUMSUM of SQUARES stability charts

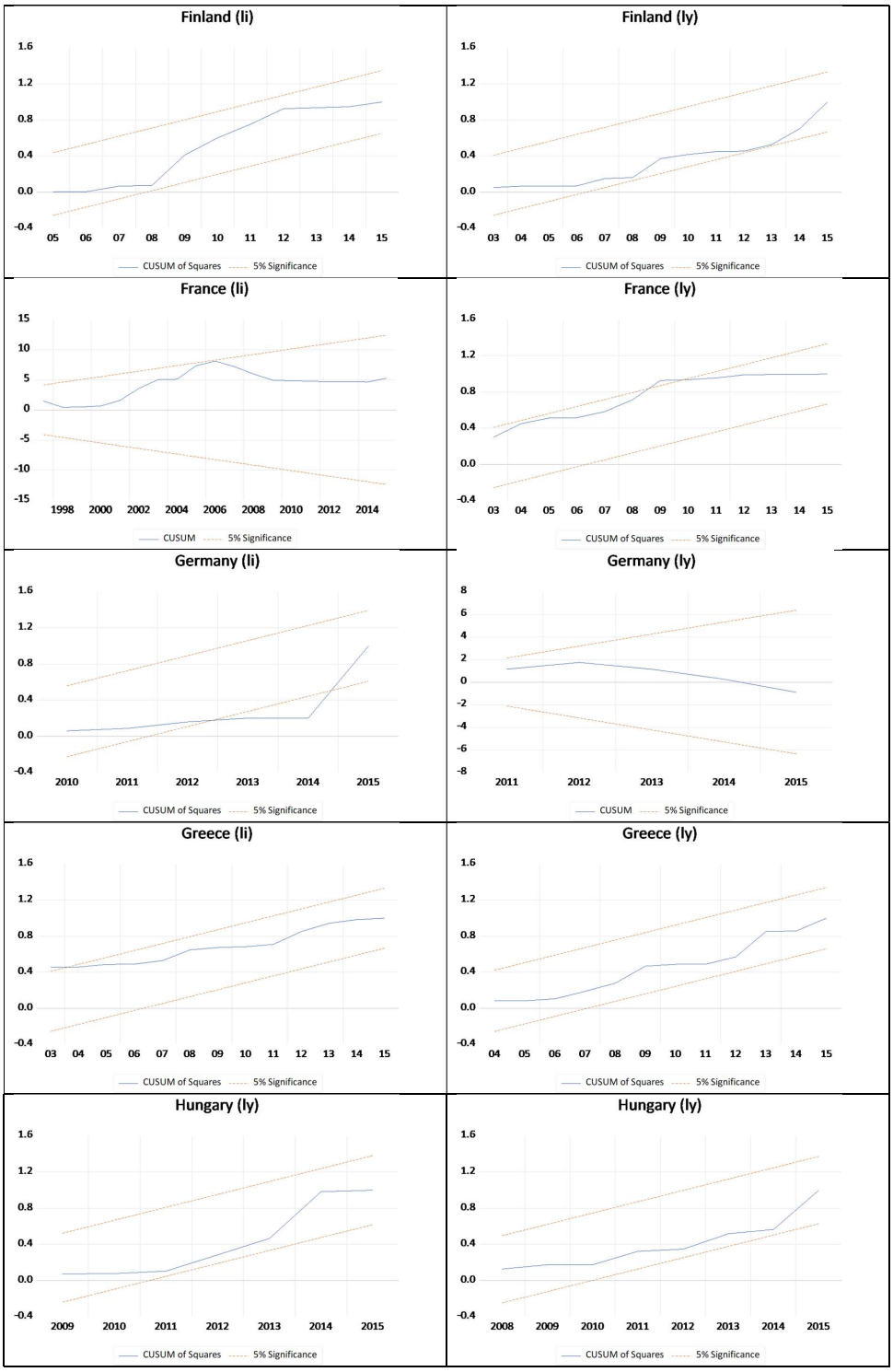


Figure 6.8: CUMSUM of SQUARES stability charts

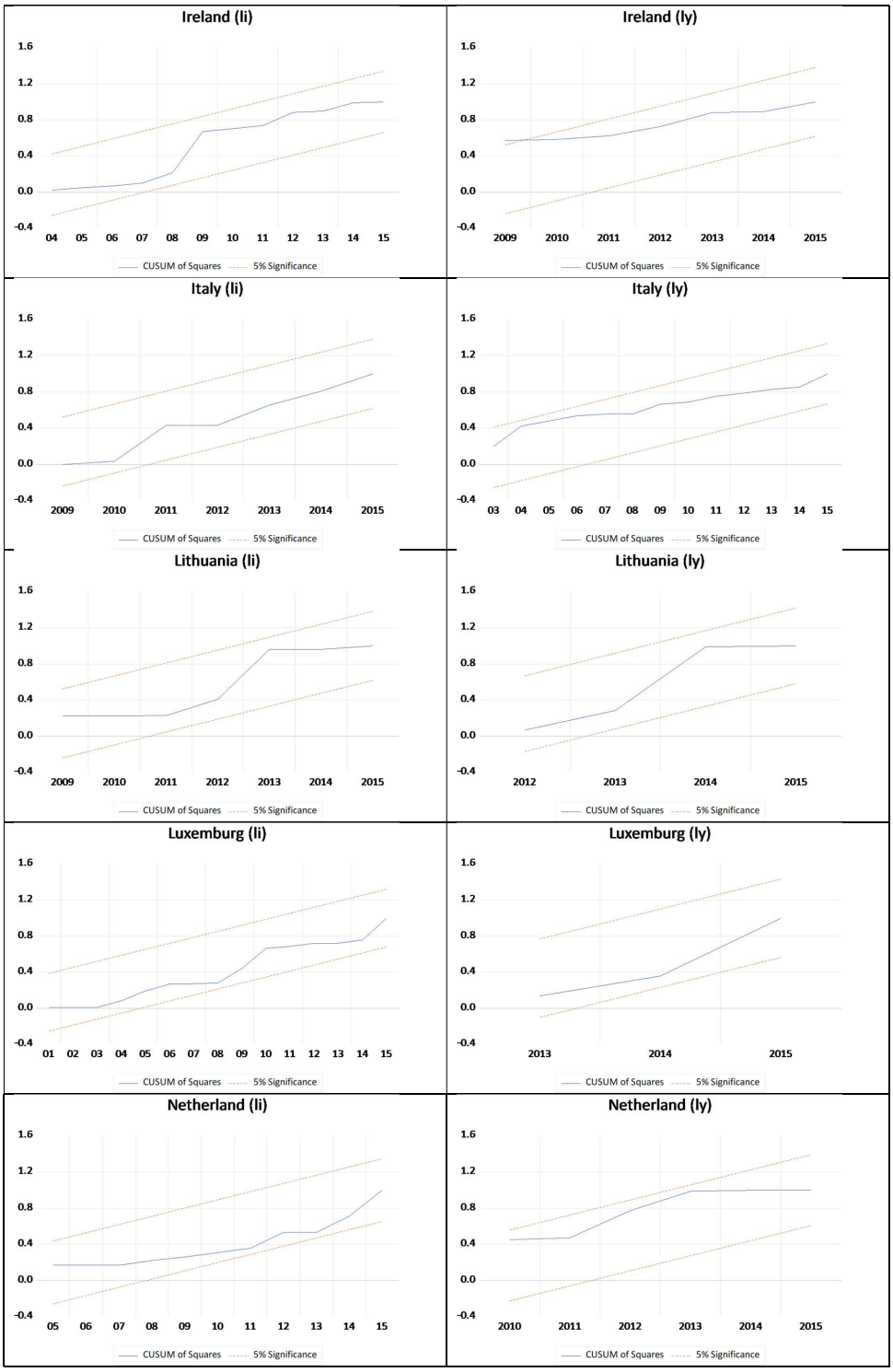


Figure 6.9: CUMSUM of SQUARES stability charts

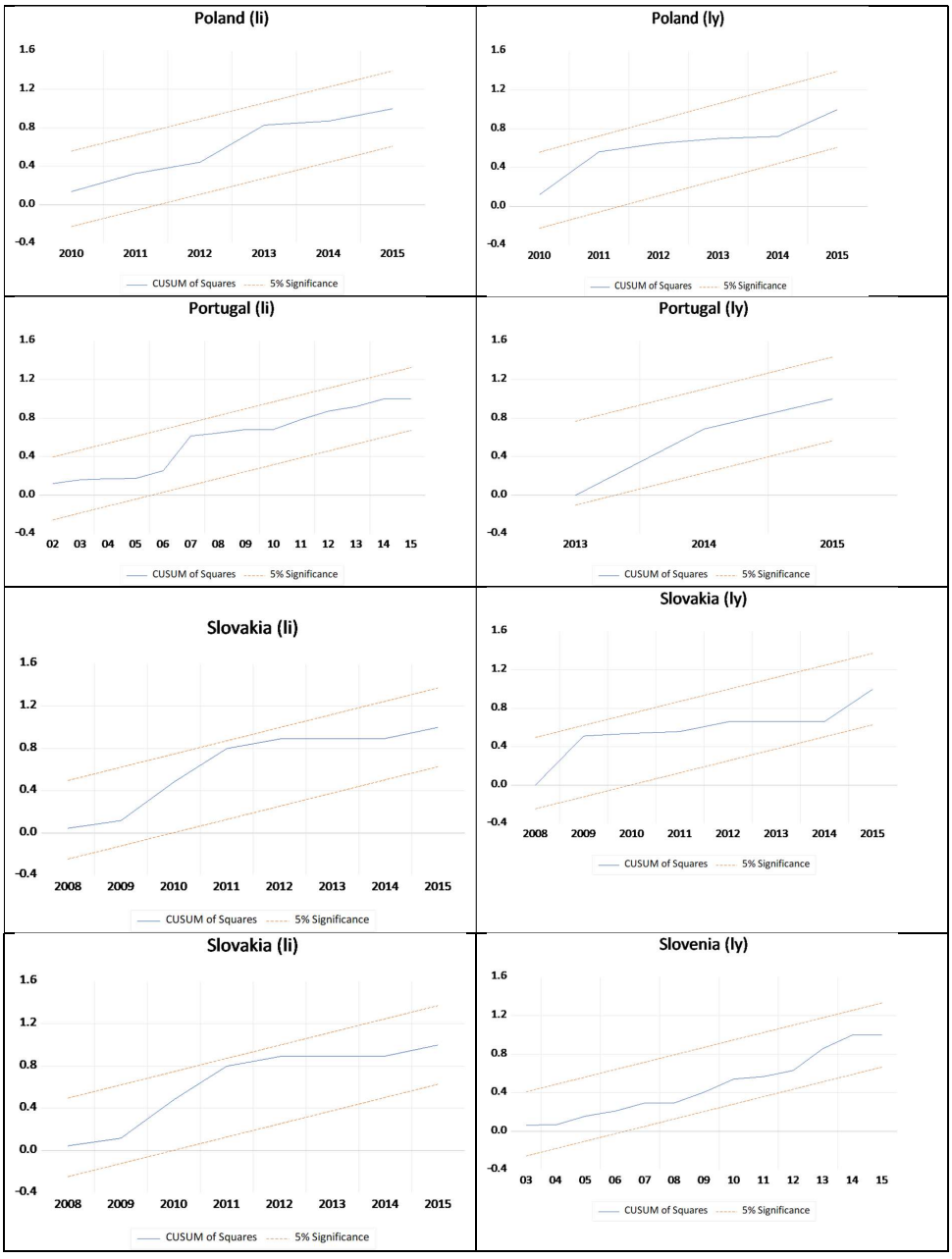
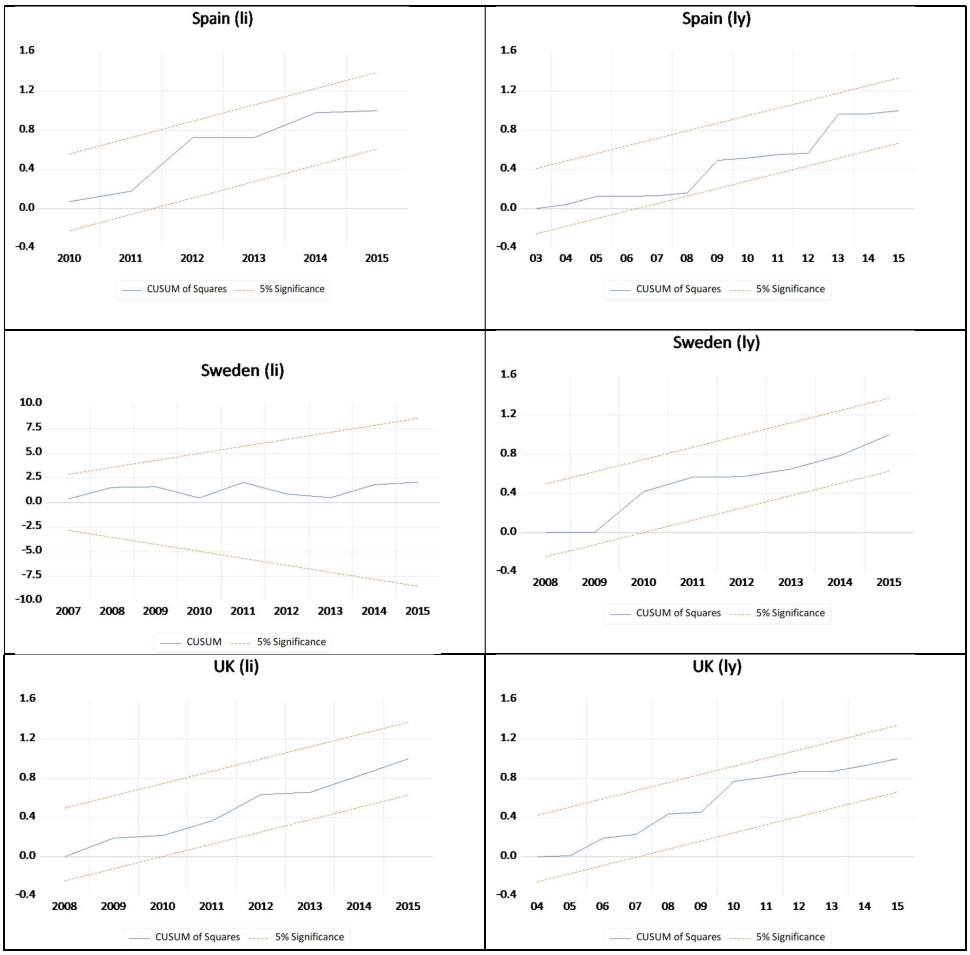


Figure 6.10: CUMSUM of SQUARES stability charts



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