MIGRATION FLOWS FROM THE PERSPECTIVE OF SENDING AND RECEIVING COUNTRIES

PhD Thesis

by

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CONTENTS

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Chapter 1

Introduction and Summary

1.1. INTRODUCTION AND MOTIVATION

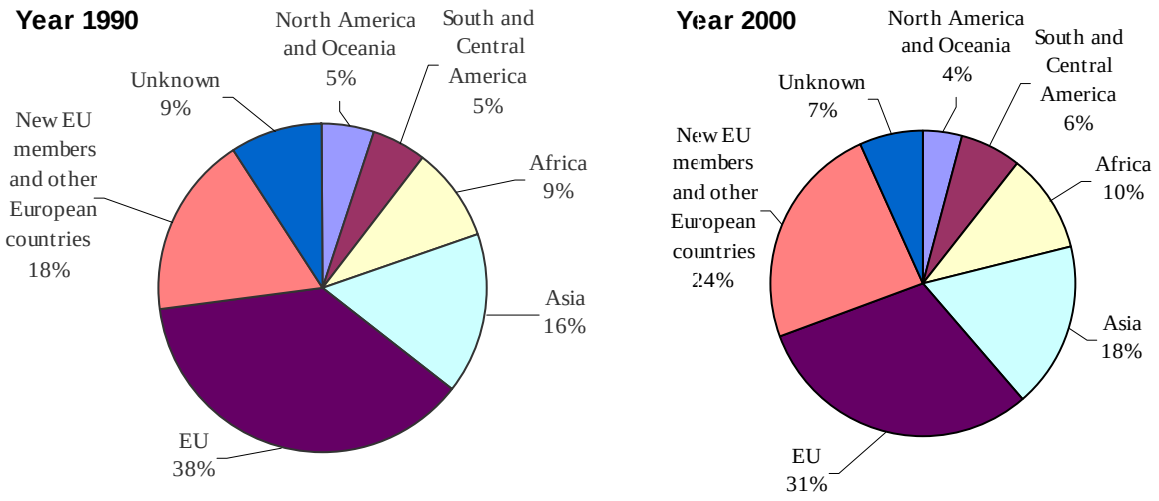
There are two specific phenomena that have had a large influence on the development in international migration during the last decades. First, while labor migration flows were dominating in the past, refugee immigrants and family reunion migrants from less developed non-Western countries have been growing sources of net immigration. But these new immigrants show lower social mobility, skills transferability and skills acquisition, which imply that the immigrants have difficulties entering the destinations' labor markets, see e.g. Chiswick (1986, 2000), Borjas (1999), Chiswick and Hatton (2003). Second, the 1990s have been strongly influenced by the collapse of the communism in Central and Eastern Europe. After forty years of communist regime, the "Iron Curtain" fell, which brought, among other things, the possibility of movement abroad. Consequently, the former communist countries have become a relatively new and large source of immigration.

These two trends are shown in Figure 1.1, which illustrates the decomposition of immigrants' stock by continents of origin in the years 1990 and 2000. Although the highest proportion of immigrants residing in OECD countries originates from Europe, the proportion has changed over time. The number of foreigners from "old" EU-15 countries dropped from 38% in 1990 to 31% in 2000. At the same time, the share of immigrants from the new EU member states and other non-EU European countries increased sharply by 6 percentage points, from 18% of the total stock in 1990 to 24% in 2000. Further, the share of immigrants from Asia, Africa and South and Central America increased by 2, 1 and 1 percentage points, respectively, see Figure 1.1.

There may be many factors explaining the migration trends and the changing composition of immigration. Besides differences in return migration behaviors, there might be different motives driving the migration flows. Hence the question is: What are the determinants behind the recent immigration? The classical explanation is that

relative real wages and employment opportunities are some of the main determinants of the international migration. In addition, there are many other economic and non-economic factors that play a role in the migration decision-making, like e.g. cultural and linguistic distance, political pressures and wars, networks of family and friends, educational pulls, social benefits, tax pressures, climate and random effects such as desire to experience adventures or pure luck. Last but not least, the growing restrictiveness of immigration policies in many OECD countries and their changing orientation towards some specific migration channels surely shape the migration flows and the composition of immigrants, see e.g. Chiswick and Hatton (2003) and Pedersen et al. (2004).

Figure 1.1. Proportion of total immigration stock in OECD countries by continents of origin, 1990 and 2000.



Note: Due to data availability, the figure shows information on: 1991 instead of 1990 for Austria, Iceland, Italy and Spain; 1991 and 2001 instead of 1990 and 2000, respectively, for Canada, Luxembourg and New Zealand; 1999 instead 2000 for France; 1997 instead of 2000 for Greece; 1994 instead of 1990 for the Czech Republic; 1995 instead of 1990 for the Slovak Republic and 1992 instead of 1990 for the United Kingdom. Hungary and Poland have been excluded due to non-detailed information on countries of origin and missing year 1990 in the case of Poland.

Source: Own calculations.

The research question on what drives migration has been much in focus over the last decades as the understanding of the migration behavior is crucial from the policy makers' point of view. Recently, the migration issues have gained a special attention among the politicians, academics and public in connection with the European Union (EU) enlargement towards the East. Given the geographical and the cultural proximity and huge economic disparities, there was a fear that, if the 10 new EU members that joined on May 1st 2004 obtained a right to free movement upon the accession[1], a mass East-West migration might occur. Accordingly, knowledge of the migration determinants and assessment of the migration potential from Central and Eastern Europe (CEE) have been especially relevant for the "old" EU-15 countries policy makers. But the majority of the previous studies have, due to data shortcomings, analyzed migration patterns from those countries on "out-of-sample" datasets. Often, they based their analysis on the migration flows data into one single destination country. Finally, despite the existing body of theoretical and empirical studies on the determinants of international migration the evidence from a multi-country perspective has been in general rather scarce, mostly due to the data limitations.

In fact, it is difficult to obtain a consistent database on international migration. For the purposes of the thesis, an international migration dataset has been compiled by contacting statistical offices in the 26 OECD countries and asking them for detailed information on immigration flows and stocks by countries of origin for the time period 1989-2000. This information is supplemented by published OECD statistics from "Trends in International Migration" publications, SOPEMI (various years). In total, the dataset contains information on immigration flows and immigration stocks in 26 OECD countries from 129 countries of origin. Besides flow and stock information, a number of other variables that may explain migration behavior have been collected. These variables are gathered from different sources like OECD, World Bank, UN, ILO and IMF publications. Although the dataset presents a substantial progress over that used in the past research, there are still some problems related to an unbalanced character of the dataset, i.e. missing observations for some countries and some years. But considering the lack of international migration

[1] The freedom of movement of workers between the EU states is one of the EU *acquis commanautaire.*

databases that previous studies had to deal with, this new dataset serves a great source for analyses of international migration behavior.

Given the recent developments in international migration and the availability of the rich migration dataset, this PhD thesis addresses selected issues related to the international migration. Concerning the phenomenon of changing composition of the international migration, one chapter of the thesis analyzes the determinants and selectivity in international migration during the latest decades. Other parts of the thesis are devoted to analyses of the Central and Eastern European migration behavior after the collapse of communism and to predictions of migration potential from those countries in connection with the EU enlargement.

Specifically, chapter 2 looks at the determinants of interregional migration in *a typical Central and Eastern European source country*, the Czech Republic. One advantage of the interregional analyses is that it provides a possibility to study the migration behavior of Central and Eastern Europeans in an environment with no migration obstacles such as restrictive immigration policies, i.e. an environment similar to the EU area with the free movement of labor. The Czech Republic represents a suitable country for this kind of analysis as this medium-sized Central European country has relatively large regional differences in economic conditions. Hence, identification of the migration determinants in the presence of the large interregional disparities may give some understanding of the migration behavior of Central and Eastern Europeans (CEE).

While Chapter 2 looks at determinants of internal migration without any migration obstacles, Chapter 3 focuses on *determinants of international migration flows*. This part is a joint work with Professor Nina Smith and Professor Peder J. Pedersen. We analyze determinants of emigration from 129 countries of origin to 22 OECD countries. The large number of destination countries included in the analysis allows us to analyze the migration patterns for groups of OECD countries which are alike with respect to welfare state regimes or migration policy, and in this way we are able to identify patterns which may be hard to document empirically in the one-country-specific studies. We go further in our analysis as we identify selectivity in international migration. As we are not able to observe individual characteristics, we look at "*country-based selection effects*". We test whether immigrants from low-income countries, where the educational level is relatively low, tend to go to

countries with higher welfare and lower income inequality and whether immigrants from high-income countries tend to go to countries with a lower welfare and higher income inequality level. We also study *network effects* and we look at whether the effects vary among different groups of the source countries.

Chapter 4 analyzes *determinants of migration from Central and Eastern Europe.* I study migration flows from a number of CEECs into a number of destination countries including the large immigration countries outside the EU-15 like the US, Australia and Canada. This allows me to study emigration from Central and Eastern Europe in more complex ways. Besides economic differences between sending and receiving countries, I include a number of other variables, e.g. language preferences, educational, social security pulls and other factors that help to explain migration behavior. The questions I address in this paper are the following: Where did the CEE immigrants go and why? What are the macroeconomic determinants of migration flows from these countries?

Chapter 5 concentrates on *predicting East-West migration potential*. In this chapter I first analyze determinants of emigration from the 7 new EU countries into EEA/EU-13 countries over the period 1990-2000. The obtained coefficients of the determinants are further used for prediction of migration potential from those countries in years after the 2004 EU enlargement, i.e. 2004–2015. I carry out the predictions in the framework of three assumed scenarios concerning the future development of the key explanatory variables.

The rest of this chapter contains brief summaries of the four main chapters and their results.

1.2. SUMMARIES

How mobile are Central and Eastern Europeans? Evidence from interregional migration in the Czech Republic (Chapter 2)

In this chapter, I analyze the determinants of interregional migration in the Czech Republic over the years 1993–2003. It is beneficial to understand migration patterns within one country, where there are no barriers to migration like those existing in the international migration such as restrictive immigration policies. Especially, it is of a

great interest to identify the migration behavior in the Central and Eastern European countries that have recently joined the EU. The reason is that it may give some understanding of the migration from the new EU countries in the case of the free movement of labor in the enlarged Europe.

The data used for the analysis have been collected from publications by the Czech Statistical Office. The dataset covers migration between 74 districts and a number of other variables and districts characteristics that may explain interregional migration during the period of eleven years, 1993 to 2003.

The results of my analyses show that migrants respond strongly to the interregional differences in wages. Thus, wages are the key driving force in the interregional migration. On the other hand, the districts' unemployment rates do not seem to play an important role. Further, on average Czechs prefer to move to regions near by and the migration propensity decreases with the distance between two districts. Overall, the scale of interregional migration in the Czech Republic is very low given the large interregional disparities, indicating relatively low migration propensity of Czechs. But the behavior is driven strongly by wages.

Selection and network effects – migration flows into OECD countries 1990-2000 (Chapter 3)

(Joint with Peder J. Pedersen and Nina Smith)

This chapter presents empirical evidence on immigration flows from 129 countries to 22 OECD countries annually for the period 1990-2000. The dataset used for the analyses is based on information obtained from the particular OECD country statistical office and other sources, as described above.

Our results indicate that economic factors such as income push/pulls and destination country unemployment rate play an important role in international migration. Further, traditional factors such as cultural and linguistic distance and migration costs as measured by physical distance between the countries are important. But the effects differ for different groups of countries. Interestingly, we have tested the simple welfare magnet hypotheses by allowing the effect of tax revenue in destination country on migration flows to vary across different source countries. We do not find any significant variation in the effect of the tax pressure on migration

flows across source countries. Contrary to the welfare magnet hypotheses, we find for some groups of destination countries that the coefficient of the tax pressure in destination countries becomes more negative for the immigrants coming from poor countries. This might be explained by the fact that relatively big public sectors correlate with restrictive immigration policies.

However, we found that the Scandinavian countries, to a much larger extent than the other welfare states, have an overweight of immigrants from the poorest source countries, when controlling for other determinants of migration flows. This pattern is not observed for the liberal welfare states like for instance the US, where newly arrived immigrants do not have the same access as natives to services and income transfers provided by the state as it is the case in Scandinavian countries. The liberal welfare states tend to have an overweight of immigrants from the highest income countries, when controlling for other factors.

A very robust key result of our econometric analysis is that the network effects measured as the coefficient of the stock of immigrants of own national background already resident in a country have a large positive effect on immigration flows, and thus networks play an important role in explaining current immigration flows. One interesting fact borne out from our econometric analysis is that the networks effect is stronger for immigrants coming from low-income groups of countries compared to immigrants from high-income group of countries. Moreover, the migration stock effects vary between different groups of welfare destination countries. The network effect variation across income levels of source countries varies a lot in the case of an Anglo-Saxon/liberal type of destination countries with a large network effect for low-income countries and a much smaller network effect for high-income source countries. Contrary to that, the network effect does not vary much across source-country income groups for Western European destination countries. Thus, this suggests that there is some migration selectivity that operates through the immigrants networks. It gives also some immigration policy implication, namely that a shift in immigration policy from largely family reunion admissions of migrants towards more skill-based admissions of labor migrants would influence the composition of immigrants.

Where did Central and Eastern Emigrants go and why? (Chapter 4)

This chapter focuses on the migration flows from Central and Eastern European countries (CEECs) after the fall of the "Iron Curtain". I analyze the importance of particular push and pull factors for the observed flows during the period 1990-2000. This is of great interest as the decade following the fall of Iron Curtain brought a period full of changes in post-communistic countries, which also was reflected in the development of migratory pressures. Contrary to most of the previous literature, I analyze migration determinants on actual migration flows from the CEE countries into a number of destination countries. Besides economic differences between sending and receiving countries, I include a number of other variables, e.g. language preferences, tertiary education, social security pulls and other factors that help to explain migration behavior.

The analysis is based on information on migration flows and stocks in 18 OECD destination countries from 9 Central and Eastern European source countries for the years 1989–2000. The data are taken from the international migration dataset that is shortly described above.

The descriptive results show that the principal destination of Central and Eastern Europeans is, not surprisingly, Germany or neighboring and nearby countries such as Austria for emigrants from the Czech and Slovak Republics and Hungary; Spain, Italy and Greece for emigrants from Bulgaria and Romania; and Scandinavia for emigrants from the Baltic countries. But besides Germany and neighboring countries as destinations, a significant part of the CEE migration flows goes to the US and Canada. The US is in fact a second main destination for Central and Eastern Europeans with an average flow of 27,000 persons annually.

My analyses reveal that the economic push/pulls factors play an important role in international migration from those countries. The disaggregated results show that there are large differences between the Central and Eastern European countries with respect to emigration patterns. The lagged stock of immigrants, which may reflect a network effect, has a strong and positive effect for immigrants from Central European countries, Romania and Bulgaria, while immigrants from the Baltic countries seem to rely much less on networks. Income gaps have a positive effect on migration flows, particularly from Southeastern countries, while employment opportunities in destination countries are main determinants of the migration flows

from the Baltic and Central European countries. The results concerning potential welfare magnet effects from those countries are mixed.

An interesting result of my econometric analyses is that language is important. When controlling for other factors, Baltic emigrants tend to go to English-speaking countries and to a smaller extent to German-speaking countries. Emigrants from Central Europe prefer the German- and French-speaking countries, while Romanian and Bulgarian emigrants favor French-speaking countries.

EU enlargement: Migration from new EU countries (Chapter 5)

The main purpose of this chapter is to predict the migration potential from new EU member states. Here, I make use of data on the actual migration from the 7 new EU member countries to the EEA/EU-13 countries over the period 1990-2000. Being able to observe migration behavior from these countries helps to avoid the problems related to (double) out-of sample forecasts and to the assumption of invariance of migration behavior across a space that previous studies had to hold.

I base my econometric analysis on the modified Hatton (1995) model, which incorporates features that help to explain migration dynamics such as formation of expectations about future utility streams based on past information. In the econometric analysis, I present and evaluate the model in its static and dynamic form estimated by different panel data econometric techniques. The results of the analyses reveal the importance of controlling for pairs of countries unobserved heterogeneity.

Some preliminary results regarding the predictions of future migration potential reveal that the average annual net increases in stocks from the 7 new EU member states are predicted to be between 20,000 and 46,000 depending on an assumed growth scenario. This leads to a total number of between 1.1 and 1.4 million migrants from those countries residing in the 13 EEA/EU countries in 2015. This is equivalent to an immigration stock of 1.5–2% of the source countries' populations in 2015. As regards the gross migration flows, the results show the total predicted accumulated gross flow over the period 2004-2015 being around 5.4-5.8% of the source population, again depending on the assumed economic convergence scenario. The results are relatively close to the findings of previous studies, although the

predictions of gross migration potential belong to the larger ones, while the net migration potential belongs to the lower ones.

The preliminary results regarding predictions of the future gross and net migration flows suggest that the fears concerned with large-scale migration are hard to justify. Furthermore, the current and predicted migration development indicates that migration from the new EU member countries towards the “old” EEA/EU countries is rather a temporary phenomenon in the sense that besides the inflows there will be substantial return flows as well. Last but not least, these migration flows may in fact play a rather positive role in the “old” EU destination countries as they can help them to alleviate the problem of declining and ageing populations that the EU countries are facing.

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Chapter 2

How Mobile are Central and Eastern Europeans? Evidence from Inter-Regional Migration in the Czech Republic[♣]

by

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Abstract: In this chapter, I analyze the determinants of interregional migration between 74 districts in the Czech Republic over the years 1993–2003. The results of my analyses show that migrants respond strongly to the interregional differences in wages. On the other hand, the districts' unemployment rates do not seem to play an important role. Further, on average Czechs prefer to move to regions near by and the migration propensity decreases with larger distance between two districts. Overall, the scale of interregional migration in the Czech Republic is very low given the large interregional disparities, indicating relatively low migration propensity of Czechs.

Keywords: Migration, unemployment
JEL-code: J61, P23, R12, R23

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2.1. INTRODUCTION

Central and Eastern Europe (CEE) became a relatively new and large source of immigration after the fall of the Iron Curtain. The CEE migration issue gained a remarkable attention in connection with the recent European Union (EU) enlargement. Politicians, academic and the public have argued about the size and speed of potential East-West migration flows. The main difficulty reaching any straightforward conclusions about the CEE migration lays in the fact that the migration behavior of Central and Eastern Europeans is relatively unknown. There is a lack of migration experience from those countries as there was a virtual migration stop during the entire 40 years of communistic regime. The period after the communistic breakdown brought fundamental changes in institutional, political and societal structures of the CEE countries, which have strongly influenced the migration behavior in the nineties. At the same time, the emigration has been limited by immigration policies from the Western world.[2] But the migration within unrestricted EU labor markets is likely to be different.

One possibility to study the migration behavior of Central and Eastern Europeans in an environment with no obstacles such as restrictive immigration policies is to analyze determinants of interregional migration in those countries. This paper deals with the determinants of interregional migration in the Czech Republic. The Czech Republic presents a suitable country for this kind of analysis as it is a typical Central European source country with considerable regional differences in economic, social and demographic conditions.

Until now there is relatively little empirical evidence on the determinants of internal migration in the CEE countries. A majority of the existing studies finds that the interregional migration responds to the economic characteristics, although the interregional migration is lower than expected, see e.g. Fidrmuc (2004). Most of the studies base their analyses on the overall inflows to and outflows from particular districts without distinguishing the regions of origin and destination. The purpose of the paper is to add additional evidence on the interregional migration from one of the CEE countries, the Czech Republic. As I use data on the migration flows between pairs of regions, it makes it possible to control for unobservable factors of

[2] Moreover, the immigration policies have changed over time towards getting more restrictive.

both regions of origin and destination. In this way, I add some new factors into the existing empirical evidence from the CEE countries. The paper deals with the following interesting questions: What are the main determinants of interregional migration in the Czech Republic? Is the migration driven mostly by "pure" economic factors such as wages and employment opportunities or do non-economic factors such as studies, family reasons, housing or environment play a role as well? In order to answer the questions, I analyze gross migration flows between 74 Czech districts annually over the period 1993-2003.

The paper proceeds as follows. Section 2.2 gives an overview of the theory and the previous empirical evidence on the determinants of interregional migration. Section 2.3 provides some stylized facts about economic and regional labor market conditions in the Czech Republic and the role of migration. Section 2.4 presents the data set used in the analysis. Section 2.5 presents an empirical model and discusses the results of my analysis. Finally, Section 2.6 concludes.

2.2. THEORY AND PREVIOUS RESEARCH

The classical economic theories on migration have focused on differences in income opportunities as the main determinant of migration, see Hicks (1932). This traditional view is further reflected in the empirical literature on migration of workers as the "human capital investment" theoretical framework (Sjaastad, 1962) that indicates that a person decides to move if the discounted future expected benefit is higher than the costs of migration. However, in reality the incentives to migrate measured only by differentials in expected earnings have failed to explain why so few people move given huge differences in wages across the geographical space. The Harris and Todaro (1970) model[3] goes a step further and indicates that migration is motivated by expected earnings differentials adjusted for the probability of being employed at the destination region.

Some studies argue that migration flows are determined by the number of job opportunities in different regions, perhaps even more so than by the wage differences. For instance in the empirical findings of Jackman and Savouri (1992), the wage differential was not significant although higher migration rates were found

[3] Harris and Todaro (1970) analyze rural-urban migration.

from high-wage to low-wage regions. On the other hand, the study shows that unemployment and vacancy rates have significant and well-defined effects. They have created the well-known "matching function", which expresses the number of total hirings as a function of the number of unemployed workers (job seekers) and the number of vacancies. If a job-seeker and a vacancy are matched, this will lead to migration whenever the two are in different regions, see Jackman and Savouri (1992).

Unemployment rate variables, on the other hand, have yielded insignificant coefficients in a number of studies, see e.g. Bentolila (1997), Pissarides and Wadsworth (1989). One possible explanation could be that existence of welfare systems may create poverty traps for unemployed. Another explanation of the difficulties with finding any significant employment /unemployment effects may be explained by the existence of the so-called "wage curve", see Blanchflower and Oswald (1994). This might be the case for CEE countries as confirmed by some empirical evidence, see e.g. Blanchflower (2001) for evidence on CEE transition countries and Huitfeld (2001), Jurajda (2002) and Galuscak and Munich (2003) for evidence from the Czech Republic.

Some studies have also analyzed the decision to migrate as e.g. a family or household decision. A move takes place only if the net gain of a family will be positive, see Mincer (1978), Holmlund (1984). Labor migration can be taken also as the risk-sharing behavior of families. In contrast to individuals, households may diversify their resources such as labor, in order to minimize risks to the family income (Stark, 1991).

Looking at migration, the other way round, as a mechanism for resolving labor market disequilibria, there is a growing number of empirical studies. The study by Blanchard and Katz (1992) confirms a strong position of interregional migration as a labor market adjustment mechanism in the United States. They find that labor migration plays a major role in reducing interregional unemployment differentials. Decrisin and Fatas (1995) found that labor mobility plays a considerably smaller role as a mechanism for diminishing labor market differentials in the European labor markets. Bentolila (1997) finds that in Spain, there is evidence even of in-migration to the depressed regions, rather than out-migration. This may be due to the return migration or compensating differentials such as quality of life and housing prices.

He also finds that the level of migration is negatively related to the national level of unemployment. This suggests that the workers perceptions of the probability of employment in other regions are significantly correlated with the national unemployment level.

Until now, there are only few papers on the migration flows in the Central and Eastern European countries. All authors agree that although most labor markets in the transition countries are rather flexible, the geographical mobility is lower than expected given the relatively big and growing regional differences. The study by Boeri and Scarpetta (1996) show that the direction of migration flows is consistent with underlying labor market imbalances, but the magnitude of interregional migration is decreasing over time in spite of increasing unemployment differentials. They show that commuting has become a substitute for migration and estimate that a distance up to 30 km makes it worth to commute rather than to move. Erbenova (1994) suggests that interregional mobility in the Czechoslovakia has been low because of the underdevelopment of the housing market. She also claims that commuting is likely to play a dominant role in regional labor market mobility. Burda and Profit (1996) estimate a matching function and find the importance of labor mobility as a determinant of adjustment dynamics between the local labor markets in the Czech Republic, despite growing regional disparities in unemployment rates during the 1992-1994 period of economic transition. The most recent and relevant study is the one by Fidrmuc (2004). The author focuses on interregional migration as an effective channel of regional adjustment to idiosyncratic shocks in CEE transitional and South European economies over the years 1992-1998. He found out that even though net migration responds to regional economic characteristics, the effects are economically small, and thus migration plays a poor role in equalizing regional disparities in transitional economies. On the basis of his results, he also mentions that it seems unlikely that there will be a massive East-West migration after the enlargement as Eastern Europeans do not move readily even within their own countries. However, the author looks at the overall gross population inflows to and outflows from particular districts without distinguishing the regions of origin and destination, respectively (the same data were used in the study by Erbenova, 1994). The purpose of this paper is to add new empirical evidence on interregional migration in the Czech Republic. My study differs from the previous research by considering flows between two particular

districts and identifying push and pull factors in both source and destination regions. Moreover, I carry out my analysis on a longer panel of data, namely for the period 1993-2003.

2.3. ECONOMIC AND REGIONAL LABOR MARKET CONDITIONS IN THE CZECH REPUBLIC

At the beginning of the transition process, the Czech labor market was characterized by relatively small wage differentials across the regions and highly specialized regional economic structures.[4] This was the result of a strong equalization policy pursued during the forty years of communistic regime.[5] The regional disparities started to grow together with price liberalizations, changes in geographical orientation of trade and a boom of the tertiary sector, which took place especially in the largest urban areas and major tourist resorts, see Erbenova (1994). The regional disparities became even more significant with the restructuring of large, inefficient enterprises in old industrial regions and with a concentration of foreign investments especially into the area of Prague and other large cities. Moreover, during the first years of the transformation the Czech government was focusing mainly on macro-economic issues and the regional needs hardly received any attention. Thus, this was mirrored in a deepening of the interregional differences on the Czech labor market.

2.3.1. Unemployment and Wages

Beginning with the development in unemployment rates, the Czech labor market was characterized as a "miracle" prior to 1997 as the Czech unemployment rate stayed below 4 per cent, see Table 2.1. However, this situation changed with the exchange rate crisis in 1997 and the following economic recession characterized by a decline in the real GDP level and a quick slowdown of inflation, see the

[4] Such structural rigidity was maintained at the beginning of the 1990's through state subsidies to selected large enterprises. The enterprises have been established under the previous regime and in majority they suffered from huge debts and inefficiency. The goal was to give them a "chance to stand on their own" and to make them more attractive for strategic investors, see Blazek (1999). The government's help often came in the form of writing off the debt from the communistic period and/or financial subsidies. By this support, sudden serious labour market problems were avoided, but at the same time the structural rigidity was kept artificially.

[5] The former Czechoslovakia was probably the country with the strongest equalization policy in the Central and Eastern European region, see Balchin et al. (1999), Blazek (1999).

development of main economic indicators in the Appendix, Table 2.A. Consequently the unemployment rate, which at the beginning of the transformation process was extremely low compared with the development of other Central and Eastern European transition countries, started to increase significantly after 1997.

Moreover, there have been enormous regional differences in the level of unemployment, see Table 2.1. At the end of 1993, the lowest unemployment rate was 0.3% (Prague) and the highest 8.7% (Bruntal). In 2003, one can observe a much higher overall unemployment rate with the lowest unemployment rate at 3.04% (Prague) and the highest at 23.51% (Most). As the overall national unemployment grew over time, the regional unemployment rates have come closer to each other over time as shown by the coefficient of variation[6] in Table 2.1. The regional unemployment structure is fairly stable during the period 1993-2003. Unemployment is highest in the typical heavy industry and coal-mining areas in North Moravia and North-East Bohemia.[7] Unemployment is also high in some typical agricultural regions of South Moravia. The lowest unemployment rates are mostly found in the areas characterized by the predominance of modern manufacturing and service sectors as well as in tourist boom areas.

The number of unemployed per vacancy, which is a broad indicator of "tightness" of local labor markets, has been growing relatively steeply over time, see Table 2.1. As regards the regional differences, the areas with a high unemployment level also appear to be those with lower vacancy rates.[8] There are almost 100 unemployed per one vacancy in the district of Ostrava whereas in Prague the ratio is 2.15 in 2003. For instance, Prague district could be characterized as "overheated" as the number of vacancies exceeded the number of unemployed for most of the period under consideration. Although there was such a substantial increase in number of unemployed per vacancy, the relative differences between the regions didn't widen as the coefficient of variation after the initial rise in 1996 and 1997 again decreased slowly over time.

[6] The coefficient of variation is widely used as a measure of interregional inequality. The coefficient is simply a dispersion measure standardized by mean.

[7] These are regions, which have experienced large-scale restructuring of the inefficient communist enterprises.

[8] Nevertheless, it also might be due to a lower number of job announcements going through the local labour offices.

Table 2.1: Regional differences in Czech unemployment rate, labor market "tightness" and wages; districts 1993-2003.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Unemployment rate											
Mean	3,89	3,38	3,12	3,75	5,58	7,77	9,60	8,89	9,00	9,94	10,47
Standard deviation	1,94	1,73	1,67	1,88	2,51	3,06	3,69	4,07	3,96	4,12	4,23
Minimum	0,30	0,28	0,29	0,43	0,65	1,59	2,53	2,82	2,51	2,75	3,04
Maximum	8,70	7,54	7,34	9,40	12,37	15,62	19,95	21,47	21,25	21,71	23,51
Coeff. of variation	0,50	0,51	0,54	0,50	0,45	0,39	0,38	0,46	0,44	0,41	0,40
Number of unemployed per vacancy											
Mean	5,89	3,06	2,19	2,81	5,51	12,84	17,31	12,08	12,48	18,32	20,15
Standard deviation	5,61	2,67	1,61	3,67	7,27	10,70	14,52	11,25	10,93	17,71	17,11
Minimum	0,17	0,12	0,13	0,23	0,51	0,88	1,15	0,82	1,08	2,06	2,15
Maximum	31,07	16,80	8,94	31,05	60,88	53,34	79,90	56,59	50,98	106,88	96,04
Coeff. of variation	0,95	0,87	0,74	1,31	1,32	0,83	0,84	0,93	0,88	0,97	0,85
Nominal wages											
Mean	5551	6500	7661	9043	9969	10819	11645	12360	13082	13944	14903
Standard deviation	445,6	556,8	656,2	789,2	876,0	1055,3	1177,9	1267,7	1301,1	1356,1	1399,9
Minimum	4837	5729	6840	8110	8834	9460	10042	10530	10990	11910	12913
Maximum	7145	8731	10520	12541	14073	15874	17437	18865	18404	19897	21093
Coeff. of variation	0,08	0,09	0,09	0,09	0,09	0,10	0,10	0,10	0,10	0,10	0,09

Source: Czech Statistical Office, own calculations.

Regarding the wages, there was a rather low degree of regional wage variation in all transition countries at the beginning of transformation, and the Czech Republic was not an exception. As far as nominal wages are concerned, the coefficient of variation increased just slightly and was relatively stable over time, fluctuating around 0.1, see Table 2.1.

2.3.2. Migration

Given such enormous economic differences between the districts and knowing what the economic theory predicts, one could expect that there will be strong incentives for individuals to move in the Czech Republic. Let us take a closer look at the development of migration flows.

Table 2.2 shows the development in the gross out- and in-migration rates[9] over the period 1993-2003. From the first quick look at the migration rates, it is clear that they are on a very low level, moving around 1% with minima and maxima from 0.5% to 1.9% and from 0.4% to 4.1% for out- and in-migration, respectively. Hence, the current level of migration is about the same level as the migration magnitude in the Western European countries, see e.g. Jackman and Savouri, (1992), Eriksson (1987), Decrisin and Fatas (1995) or Bentolila (1997), and far from the level of geographical mobility in the US (3-4%), see e.g. Blanchard and Katz (1992).[10]

As regards the out-migration flows, the magnitude was decreasing somewhat till 1996 and became relatively stable around the level of 0.88% of the district's population. After 2000, the overall gross out-migration rate grows. As regards the interregional differences in the migration behavior as shown by the coefficient of variation, there was no change in the regional differences. The coefficient of variation of the gross out-migration rate was quite low, fluctuating steadily around the value of 0.2 over time. This suggests that the out-migration rates and the regional differences in out-migration are relatively stable.

However, the picture is fairly different when looking at the gross in-migration rates and their development across districts, see Table 2.2. Although the mean value of gross in-migration rates is stable around the 0.9-1%, its standard deviation was increasing steeply over the time period 1993-2000 and so did the coefficient of variation. This shows that certain districts are more popular as destinations than others and this tendency has become more pronounced over time.

[9] The migration rates are defined in the following way: *gross out-migration rate* as migration flow from the particular district *i* to all other districts per population in the district *i; gross in-migration rate* as migration flow from all districts into the particular district *j* per population in the district *j*.
[10] Blanchard and Katz (1992) found that labour migration plays a strong/major role in reducing the interregional unemployment differentials.

Table 2.2: Migration rates across districts during the period 1993-1999.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Gross out-migration rate (from a district *i* per population in the *i* district)											
Mean	1,09	0,96	0,92	0,86	0,86	0,88	0,88	0,87	0,93	1,05	1,00
Standard deviation	0,246	0,219	0,204	0,200	0,184	0,185	0,179	0,175	0,217	0,258	0,244
Minimum	0,652	0,56	0,53	0,52	0,53	0,51	0,53	0,54	0,57	0, 63	0,60
Maximum	1,97	1,72	1,65	1,59	1,52	1,44	1,48	1,28	1,56	1,85	1,70
Coeff. of variation	0,23	0,23	0,22	0,23	0,21	0,21	0,20	0,20	0,23	0,25	0,24
Gross in-migration .ate (to a district *j* per population in the *j* district)											
Mean	1,08	0,97	0,95	0,90	0,93	0,96	0,95	0,95	1,00	1,09	1,04
Standard deviation	0,272	0,270	0,273	0,274	0,328	0,404	0,434	0,457	0,487	0,530	0,496
Minimum	0,62	0,58	0,51	0,53	0,50	0,51	0,46	0,49	0,52	0,55	0,44
Maximum	2,18	2,18	2,21	2,33	2,53	3,28	3,60	3,76	3,87	4,07	3,62
Coeff. of variation	0,25	0,28	0,29	0,30	0,35	0,42	0,46	0,48	0,49	0,49	0,48

Source: Czech Statistical Office, own calculations.

What drives the interregional migration? Are those interregional differences in unemployment and wages the main factors explaining the migration or do other factors play a role? The next sections look at those questions and provide analyses of the determinants of the interregional migration.

2.4. DATA

The data used for the analysis have been collected from publications by the Czech Statistical Office and cover a period of eleven years, 1993 to 2003. The migration statistics come from a migration register, which provides the annual information on migration flows between the 8-macro regions or/and between 77 districts.[11] My preferred unit of analysis is a district that makes it possible to capture migration patterns in a greater detail. For a complete list of Czech districts, see Appendix, Table 2.B.

[11] There were changes in the regional structure, both on macro-region and district levels in 1996. Specifically, there were 8 macro-regions (NUTS 3) prior to 1996. As regards districts, the number changed from 76 to 77 (NUTS-4 level), namely, the district Jesenik has been created out of parts of two other districts, Bruntal and Sumperk. In order not to bias the estimations, I exclude these 3 districts from my analyses.

The Czech Statistical Office defines migration as a change of the place of living connected with moving and registration of the permanent residence in a different district. International migration is not taken into account. It is obvious from the definition of migration that people moving without registration are not included in the statistics. But, people tend to register because non-registration creates difficulties, for instance when enrolling children on schools, receiving health care etc. Thus, in the case of long-term migration, movements are always registered. On the other hand, some people may migrate and register more than once a year and thus migration statistics may underestimate actual migration.[12]

In my empirical analyses of determinants of migration, I use information on wages and employment push/pull variables, such as unemployment rates and vacancies. The information on unemployment rates and vacancies is based on the administrative records of the districts' labor offices and is obtained from the Czech Statistical Office. Although employers are obliged to inform the districts' labor offices about job openings, vacancy data are, however, likely to be underestimated. The data on wages come from the Czech Statistical Office, as well. Further, for purposes of my analyses I have used a distance variable between main districts' cities. I obtained this information from the online Czech railway's information service.

For a full list of variables and their summary statistics, see Appendix, Table 2.C.

2.5. MODEL AND EMPIRICAL ANALYSES

In this paper, I estimate the determinants of the gross migration flows between 74 Czech districts. I build on the framework of gravity-type models, which is a standard and useful approach in describing choice behavior between two points in space. Its attractiveness stems partly from its simplicity and partly from the fact that it is suitable for the sort of data that I collected from the Czech Statistical Office sources.

[12] Once the migrants register, they are required to fill in questionnaires about their motives for migrating and their economic and demographic characteristics. Consequently, it is possible to identify the characteristics of internal migrants and their reasons for migration. But, as the Czech Statistical Office does not permit usage of individual data, the information is aggregated. Nevertheless, it might be useful to present the characteristics of migrants in the Czech Republic, which I'm going to do in the future.

The gravity-type models borrow the idea from Newton's law of gravitation:

$$G_{ij} = c\frac{Ww}{dist_{ij}^{\ 2}} \tag{2.1}$$

where G_{ij} is the gravity between two objects, *W* and *w* are the weights of objects, $dist_{ij}$ is a distance between *i* and *j* and *c* is a constant. The theory basically indicates that the attracting force between two objects decreases in proportion to the squared distance between the objects.

This simple relationship performs well in modeling general patterns of migration, see e.g. Karemera et al. (2000). The most simple gravity model relates the migration flow from area *i* to area *j*, m_{ij}, to an attractiveness of the origin and an attractiveness of the destination, O_i and D_j respectively, and to the distance between the areas $dist_{ij}$. The model could be rewritten in the following form:

$$m_{ij} = O_i^{\alpha} D_j^{\beta} dist_{ij}^{\gamma} \tag{2.2}$$

where α, β, γ denote constant parameters.

Following the Harris/Todaro study, I employ relative wages and variables reflecting employment opportunities such as unemployment and vacancy rates as main push/pull factors.

The modified gravity model can be rewritten in the following form:

$$\ln m_{ijt} = c + \alpha_1 \ln A_{ijt} + \alpha_2 dist_{ij} + \varepsilon_{ijt} \tag{2.3}$$

where m_{ijt} is a gross migration flow from a sending district *i* to a receiving district *j* in the period *t* expressed per thousand of the *i* sending district's population, where *j* = 1,…,74[13], *i* = 1,…,74 and *t* = 1,…,11. A_{ijt} is a matrix of explanatory variables of source and receiving districts that may change over time. $dist_{ij}$ denotes distance between districts in km. It might be expected that people prefer to move to districts rather close by compared to moving into districts far away. The explanation is that migration to more distant districts is connected with both higher direct, but also

[13] Three districts are excluded from my analyses: Jesenik, Bruntal and Sumperk, due to changes in regional structures in 1996.

psychological costs of migration.[14] Thus, I expect the coefficient to the distance variable to be positive. α_1 and α_2 are parameters to be estimated, ε_{ijt} is an error term. All variables are in logs in order to express impact elasticities.

The matrix of time-variant explanatory variables, A_{ij}, is given in a Harris/Todaro's model fashion as:

$$\ln A_{ijt} = \beta_1 \ln w_{ijt} + \beta_2 \ln U_{jt} + \beta_3 \ln U_{it} + \beta_4 \ln V_{jt} + \beta_5 \ln V_{it} + \upsilon_{ijt} \qquad (2.4)$$

where $\ln w_{ij}$ denotes *Log wage ratio*, defined as $\ln w_{ij} = \ln(W_j / W_i)$, where W_j, W_i stands for an average nominal wage in a receiving district *j* and a sending district *i*, respectively; $\ln U_j$ and $\ln U_i$ denote *Log unemployment rate* in a receiving district *j* and a sending district *i*, respectively. $\ln V_{jt}$ and $\ln V_{it}$ denote *Log vacancy rate* in *j* and *i*, respectively. The vacancy rate is defined as vacancies per population of the particular district, $v_j = (V_j / P_j) * 100$ for receiving district *j* and $v_i = (V_i / P_i) * 100$ for sending district *i*. According to the theory, I expect a positive effect of the wage ratio meaning that migration flows should go on average from low-wage to high-wage districts. Further, I expect that $\beta_2 < 0; \beta_3 > 0; \beta_4 > 0;$ and $\beta_5 < 0$.

Table 2.3 reports pooled OLS-estimates[15] of the simple gravity-type model for the 74 administrative districts in the Czech Republic. First, I considered the model without the distance variable. Comparing the explanatory power of the regression without the distance variable, column (1), to the explanatory power of the regression with the distance variable, column (2), the R-squared increased significantly from 4% to 52%. This shows that the distance between two districts plays an important role in explaining the migration flows.

The coefficients of the economic explanatory variables are all significant. Beginning with the wage ratio estimates, the coefficient is large and positive as expected. Thus, migrants tend to go from low-wage districts to high-wage districts. The unemployment rate coefficient for a destination and an origin has the expected negative and positive sign, respectively, but the effect is small, see Table 2.3 column

[14] This is even more true for couples, where both spouses participate in the labour market. They may find it difficult to find employment for both spouses if moving to districts far away. Such a situation is typical in the Czech Republic, where both spouses are breadwinners in most families.
[15] with the "robust" Hubert/White/sandwich variances.

2. However, the coefficients to the districts' vacancy rates both for destinations and origins have exactly the opposite signs than what the theory would predict. Thus, the employment opportunities as represented by vacancy rates provide unclear results.

Regarding the econometric specification, there might be some complications with a certain degree of endogeneity/reverse causality of explanatory variables in the model. Specifically, the migration flows might affect wages, unemployment and vacancy rates in both destination and source districts in the given period *t*.[16] In order to avoid the problem, I instrument wage ratio, unemployment and vacancy rates with their first lags. Hence, the matrix of time-variant explanatory variables, A_{ijt}, is specified as follows:

$$\ln A_{ijt-1} = \beta_1 \ln w_{ijt-1} + \beta_2 \ln U_{jt-1} + \beta_3 \ln U_{it-1} + \beta_4 \ln V_{jt-1} + \beta_5 \ln V_{it-1} + \upsilon_{ijt} \qquad (2.5)$$

I also account for a spatial autocorrelation by applying a logical spatial arrangement of the districts into the regressions. A very useful tool for bringing the notion of space into the econometric model might be a so-called spatial weight matrix, see Anselin (1988). There are many different procedures in selecting the weight matrix, see Anselin (1988) for an overview. In the simplest case, which I use in my analysis, a symmetric matrix is defined as a dummy with a value equal to one if two districts are neighbors, and zero otherwise. The *neighboring dummy* variable is denoted as $prox_{ij}$.

Finally, I include the lagged dependent variable – lagged migration rate – on the right-hand side to add dynamics into the model, see Anselin (1988). The model with spatial components and lagged dependent variable has the following form:

$$\ln m_{ijt} = c + \alpha_0 \ln m_{ijt-1} + \alpha_1 \ln A_{ijt-1} + \alpha_2 \ln dist_{ij} + \alpha_3 prox_{ij} + \varepsilon_{ijt} \qquad (2.6)$$

Table 2.3 shows the results of the model with lagged explanatory variables. In columns 4 and 5, I gradually add a neighboring dummy, $prox_{ij}$, and a lagged dependent variable, respectively. In both cases, the explanatory power of the model increased, especially by adding the lagged dependent variable.

[16] As mentioned in the previous literature/theory section, an entire stream of literature exists that focuses on migration as a mechanism for diminishing labour market equilibrium, see e.g. Blanchard and Katz (1992), Decrisin and Fatas (1995).

Table 2.3. Determinants of gross migration flows, OLS, 1993–2003

Dependent variable: Gross flows per 1000 inhab., $\ln m_{ijt}$	(1)	(2)	(3)	(4)	(5)
Independent variables:					
Gross flows lag, $\ln m_{ijt-1}$	-	-	-	-	0.510 [0.004]***
Wage ratio, $\ln w_{ijt}$	1.599 [0.044]***	1.610 [0.032]***	-	-	-
Wage ratio lag, $\ln w_{ijt-1}$	-	-	1.599 [0.034]***	1.600 [0.035]***	0.792 [0.025]***
Unemployment rate *j*, $\ln U_{jt}$	-0.096 [0.010]***	-0.043 [0.007]***	-	-	-
Unemployment rate *j* lag, $\ln U_{jt-1}$	-	-	-0.037 [0.007]***	-0.045 [0.007]***	-0.013 [0.006]**
Vacancy rate *j*, $\ln V_{jt}$	-0.083 [0.010]***	-0.112 [0.007]***	-	-	-
Vacancy rate *j* lag, $\ln V_{jt-1}$	-	-	-0.113 [0.007]***	-0.109 [0.007]***	-0.045 [0.006]***
Unemployment rate *i*, $\ln U_{it}$	-0.019 [0.009]**	0.030 [0.006]***	-	-	-
Unemployment rate *i* lag, $\ln U_{it-1}$	-	-	0.057 [0.006]***	0.049 [0.006]***	0.039 [0.005]***
Vacancy rate *i*, $\ln V_{it}$	0.111 [0.010]***	0.080 [0.007]***	-	-	-
Vacancy rate *i* lag, $\ln V_{it-1}$	-	-	0.106 [0.008]***	0.109 [0.007]***	0.064 [0.006]***
Distance in km, $\ln dist_{ij}$	-	-1.214 [0.006]***	-1.216 [0.006]***	-1.011 [0.007]***	-0.499 [0.007]***
Neighbour (0/1), $prox_{ij}$	-	-	-	1.034 [0.018]***	0.502 [0.012]***
Constant term	-2.717 [0.015]***	3.514 [0.031]***	3.476 [0.033]***	2.353 [0.040]***	1.141 [0.030]***
No of observations	59421	59421	54019	54019	54016
No of districts	74	74	74	74	74
Adjusted R-squared	0.04	0.51	0.52	0.55	0.67

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

The results show that the coefficient to the lagged dependent variable is positive, highly significant and large, see Table 2.3 column (5). The coefficients of other explanatory variables changed and became much smaller by adding the lagged dependent variable on the right-hand side, but the directions of the effects stayed the same. The coefficient to the neighboring dummy, $prox_{ij}$, shows that people indeed tend to migrate to neighboring districts.

Aside the variables considered in the model, there are other unobservable push/pull factors that play a role in a migrant's decision. For instance, people migrate because of "division of labor" between districts. Some districts are characterized by certain

industrial structures and by certain institutions such as educational institutions, i.e. universities and high schools. These and other unobservable characteristics of the districts might be important in explaining interregional migration. In the presence of the unobserved district-specific heterogeneity, the pooled OLS-estimator is biased and inconsistent, see Baltagi (2005). In order to control for the unobserved heterogeneity, I apply one of the frequently used panel data techniques such as a fixed-effect (within) panel data estimator. I account for both destination and source district's specific effects, μ_j and μ_i respectively. Finally, I control for aggregate shocks that influenced all regions in the same way in a given year by inclusion of year dummies. The model with the fixed district- and year-specific effects is given as:

$$\ln m_{ijt} = c + \alpha_0 \ln m_{ijt-1} + \alpha_1 \ln A_{ijt-1} + \alpha_2 \ln dist_{ij} + \alpha_3 prox_{ij} + \mu_j + \mu_i + year + \varepsilon_{ijt} \qquad (2.7)$$

The results of the model using fixed effects panel data estimator are presented in Table 2.4, columns (2) and (3). There are a couple of interesting differences to observe. First, the coefficients to the lagged dependent variable and the lagged wage ratio became much smaller in size. But still one can notice that the wage ratio is strongly positive and robust over all regressions. Hence, wages are one important determinant of Czech interregional migration.

Interestingly, the coefficients to the unemployment and vacancy rate in destinations switched their signs and became both positive.[17] The coefficients to the unemployment and vacancy rate in origins became insignificant and much smaller in size. Aside the wrong signs of some of the variables that capture employment opportunities, the coefficients to the variables are all very small. Similar weak or non-existent unemployment/employment effects on migration were found in other previous studies, e.g. in Fidrmuc (2004) for CEE transition economies or in Bentolila (1997) for Spain.

The positive sign of the coefficient to the destination district's unemployment rate in the fixed effect panel data regressions might be due to the existing skills heterogeneity in the unemployment structures and heterogeneity in migration

[17] The coefficient to the vacancy rate is just marginally significant in the regression with the year dummies.

flows.[18] Further, it may reflect the migration for family reasons such as marriage, partnership or divorce.

Table 2.4. Determinants of gross migration flows, Fixed effects estimator, 1993–2003

Dependent variable: m_{ijt} = Gross Flows per 1000 inhab., $\ln m_{ijt}$	(1)	(2)	(3)
Independent variables:			
Gross flows lag, $\ln m_{ijt-1}$	0.510 [0.004]***	0.269 [0.004]***	0.266 [0.004]***
Wage ratio lag, $\ln w_{ijt-1}$	0.792 [0.025]***	0.394 [0.076]***	0.395 [0.076]***
Unemployment rate *j* lag, $\ln U_{jt-1}$	-0.013 [0.006]**	0.037 [0.011]***	0.065 [0.015]***
Vacancy rate *j* lag, $\ln V_{jt-1}$	-0.045 [0.006]***	0.020 [0.008]***	0.016 [0.009]*
Unemployment rate *i* lag, $\ln U_{it-1}$	0.039 [0.005]***	0.006 [0.011]	0.034 [0.015]**
Vacancy rate *i* lag, $\ln V_{it-1}$	0.064 [0.006]***	0.007 [0.008]	0.003 [0.009]
Distance in km, $\ln dist_{ij}$	-0.499 [0.007]***	-0.805 [0.007]***	-0.808 [0.007]***
Neighbour (0/1), $prox_{ij}$	0.502 [0.012]***	0.732 [0.014]***	0.735 [0.014]***
Fixed effects of destination	-	Yes	Yes
Fixed effects of source	-	Yes	Yes
Year dummies	-	-	Yes
Constant term	1.141 [0.030]***	3.948 [0.046]***	3.933 [0.049]***
No of observations	54016	54016	54016
No of districts	74	74	74
Adjusted R-squared	0.67	0.72	0.72

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Another explanation of the difficulties with finding clear employment/unemployment push pull effects may be the fact that the overall national unemployment rate has increased so steeply during the observed period that the actual differences in unemployment have decreased slightly. Further, the Czech Republic has a generous nation-wide level of social security that likely constitutes a

[18] For instance, the districts characterized by a concentration of the large non-efficient enterprises from the communist regime have experienced growing unemployment rates after the destructuralization, especially for the low-skilled workers. At the same time, the demand for highly skilled might have increased in those districts.

welfare trap for unemployed, see e.g. Eriksson and Pytlikova (2004) for an overview of the social security system in the Czech Republic. Such a situation may not stimulate the unemployed to move in order to find a job, which might explain the results as well. It might be also due to the existence of the so-called "wage curve", i.e. wages in the districts with low unemployment tend to be higher, ceteris paribus, than in the districts with high unemployment, see Blanchflower and Oswald (1994), Galuscak and Munich (2003). Last but not least, one should be careful with the underreporting error in vacancy rates.

The coefficients to the last two variables, distance in kilometers and neighboring dummy, have both expected signs and are large and highly significant. The effects are robust over all regressions. The positive coefficient to the distance variable shows that the migration decreases with a growing distance between two districts. One explanation is that the costs of migration play a role even within one country.

2.6. CONCLUDING REMARKS

In this paper, I have analyzed the determinants of interregional migration in the Czech Republic over the years 1993-2003. It is useful to understand migration patterns within one country, where there are no barriers to migration like those considered in the international migration literature such as language, cultural barriers and immigration policies. Especially, it is of a great importance to identify the migration behavior in the Central and Eastern European countries, which have recently joined the European Union. The reason is that the behavior of the CEE migrants is relatively unknown especially in the case of free movement of labor in the enlarged Europe.

I look at the interregional migration determinants in one typical Central European country, the Czech Republic. The results of my analyses show that migrants respond strongly to the interregional differences in wages. Thus, wages are the key driving force in the inter-regional migration. On the other hand, the districts' unemployment rates do not seem to play an important role. It might be because the overall national unemployment rate has gone up so steeply during the observed period that the actual differences in unemployment have decreased. Another explanation could be the existence of the generous nation-wide level of social security benefits, which does not stimulate unemployed workers enough to migrate in order to get a job. Further,

it might also be due to the existence of the so-called “wage curve”. Finally, the distance between two districts plays an important role in the inter-regional migration in the Czech Republic.

Overall, considering the low degree of interregional migration in the presence of the considerable interregional disparities, one may conclude that Czechs have a fairly low migration propensity. But the behavior is driven strongly by wages, hence once having much larger wage differences in the enlarged Europe and no formal barriers to migration, the migration propensity might be higher.

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APPENDIX:

Table 2.A: The development of basic macroeconomic indicators in the Czech Republic during the period 1993-2003.

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
GDP annual growth at 95 const. prices	0,1	2,2	5,9	4,3	-0,8	-2,2	-0,4	3,9	2,6	1,5	3,1
Inflation rate	20,8	10,0	9,1	8,8	8,5	10,7	2,1	3,9	4,7	1,8	0,1
Labour productivity growth	1,7	1,0	4,2	3,2	0,0	0,9	3,3	4,1	2,6	2,1	3,9
The growth of gross average earnings	18,6	18,3	9,9	9,2	8,4	9,3	8,4	6,5	8,7	7,3	6,8
Subsistence wage in CZK	1 960	2 160	2 440	2 890	3 040	3 430	3 430	3 770	4 100	4 100	4 100

Source: Czech Statistical Office.

Table 2.B: List of districts in the Czech Republic:

cod		districts
1	PHA	Hl. m. Praha
201	BN	Benešov
202	BE	Beroun
203	KD	Kladno
204	KO	Kolín
205	KH	Kutná Hora
206	ME	Mělník
207	MB	Mladá Boleslav
208	NB	Nymburk
209	PY	Praha-východ
210	PZ	Praha-západ
211	PB	Příbram
212	RA	Rakovník
301	CB	České Budějovice
302	CK	Český Krumlov
303	JH	Jindřichův Hradec
304	PE	Pelhřimov
305	PI	Písek
306	PT	Prachatice
307	ST	Strakonice
308	TA	Tábor
401	DO	Domažlice
402	CH	Cheb
403	KV	Karlovy Vary
404	KT	Klatovy
405	PM	Plzeň-město
406	PJ	Plzeň-jih
407	PS	Plzeň-sever
408	RO	Rokycany
409	SO	Sokolov
410	TC	Tachov
501	CL	Česká Lípa
502	DC	Děčín
503	CV	Chomutov
504	JN	Jablonec n.N.
505	LI	Liberec
506	LT	Litoměřice
507	LN	Louny
508	MO	Most
509	TP	Teplice
510	UL	Ústí nad Labem
601	HB	Havlíčkův Brod
602	HK	Hradec Králové
603	CR	Chrudim
604	JC	Jičín
605	NA	Náchod
606	PU	Pardubice
607	RK	Rychnov nad Kněžnou
608	SM	Semily
609	SY	Svitavy
610	TU	Trutnov
611	UO	Ústí nad Orlicí
701	BK	Blansko
702	BM	Brno - město
703	BI	Brno - venkov
704	BV	Břeclav
705	HO	Hodonín
706	JI	Jihlava
707	KM	Kroměříž
708	PV	Prostějov
709	TR	Třebíč
710	UH	Uherské Hradiště
711	VY	Vyškov
712	ZL	Zlín
713	ZN	Znojmo
714	ZR	Žďár nad Sázavou
801	BR	Bruntál
802	FM	Frýdek - Místek
811	JE	Jeseník
803	KI	Karviná
804	NJ	Nový Jičín
805	OC	Olomouc
806	OP	Opava
807	OV	Ostrava - město
808	PR	Přerov
809	SU	Šumperk
810	VS	Vsetín

Table 2.C: Summary statistics of variables used in the study:

Variable	Obs	Mean	Std. Dev.	Min	Max
mij	63915	16.33923	59.3124	0	2616
uj	64760	4438.721	4287.162	180	29470
vj	64760	736.863	1124.147	44	14587
urj	64760	6.891842	4.210143	.28	23.50997
wj	64760	10519.75	3090.864	4837	21093
pj	64760	133940.1	134443.9	42148	1217023
urban_j	64760	63.34251	15.82277	33.8	100
ui	64760	4438.721	4287.162	180	29470
vi	64760	736.863	1124.147	44	14587
uri	64760	6.891842	4.210143	.28	23.50997
wi	64760	10519.75	3090.864	4837	21093
pi	64760	133940.1	134443.9	42148	1217023
urban_i	64760	63.34251	15.82277	33.8	100
d_ij	64760	241.4536	134.169	0	642
prox	64760	.0615658	.2403671	0	1

Chapter 3

Selection and Network Effects - Migration Flows into OECD Countries 1990-2000*

by

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November 2004

Abstract: This paper presents empirical evidence on immigration flows into the OECD countries during the period 1990–2000. Our results indicate that network effects are strong, but vary between different groups of welfare states. Network effects seem to be less important in the Nordic countries which also seem to attract immigrants from the lowest income level source countries. We do not find clear evidence that selection effects measured by tax pressure have had a major influence on the observed migration patterns until now. This may partly be explained by restrictive migration policies which may have dampened the potential selection effects.

Keywords: International migration, selectivity effects, network effects, immigration policy.
JEL-code: J61, F22, O15

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3.1. INTRODUCTION

In the near future, many rich OECD countries expect to face the problem of declining and ageing populations. Demographic projections by the United Nations suggest that during the next five decades Europe and Japan ceteris paribus might lose 12 and 17% of their population, respectively, United Nations (2000). This will impose an increasing pressure on the welfare systems as public pension payments will absorb a growing share of total national incomes. Immigration of young people to these ageing OECD countries is one of the possible solutions that have been discussed in relation to this problem. However, the opponents of immigration as a solution to the ageing problem fear negative impacts on labor market, public finances and social conditions. Recent studies on immigrants' economic performance in a number of European countries show that they actually tend to be more welfare dependent than natives. Thus increasing the immigration flows may not be a solution to the problem of population ageing but might instead impose a higher fiscal burden on the receiving economies, see for instance Storesletten (2003).

During the latest decades, immigration flows into the OECD countries have changed. While labor migration flows were dominating back in time, refugee immigrants and family union migration from Non-Western or less developed countries are now the main sources of net immigration in many OECD countries, see Chiswick and Hatton (2003). The skill level for these new migrant flows is often fairly low compared to the skill level in destination countries, see for instance Borjas (1994) and Chiswick (1986, 2000). According to SOPEMI (2003), the employment rate for Non-Western immigrants has been much lower than for natives in many European countries. The low employment rates are the main reason for the higher welfare dependency of Non-Western immigrants, see Wadensjö and Orrje (2002).

Why have the immigration flows changed compared to a few decades ago, and why do many developed countries seem to attract groups of immigrants with lower skills? The classical explanation is that relative real wages and employment opportunities are some of the main driving factors of international migration. Other more recent explanations focus on the effects of the welfare state regimes. Generous social services and benefit levels and a high tax pressure are nowadays characteristics of many OECD countries. According to the theory, see Borjas (1987, 1999a, b), the generosity of the welfare state may play an

important role in migrants' decision when choosing country of destination, the so-called "welfare magnet effect".

On the other hand, a number of non-economic factors are also highly important regarding the migration decision, see Zavodny (1997). Beside classic factors such as "love and wars", these include random events, environment, climate, language and aspects of "cultural distance". Regarding the last factor, it is a standard result that the more "foreign" or distant the new culture is and the larger the language barrier is, the less likely an individual is to migrate. However, changes and improvements in communication, continued globalization and declining costs of transportation may imply that the effect of 'distance' has been reduced during the latest decades. Further, network effects may also counteract 'distance'. If the concerned ethnic group is already present in the destination country, this may induce further immigration from the ethnic group concerned. Thus, an interesting question is: how much do the 'pure' economic factors like relative wages or incomes, employment opportunities, tax pressure and social expenditure level explain migration behavior, and how much is explained by other factors like immigration policies, social networks, cultural and linguistic distance, threat to own freedom and safety, random events or love?

Until now, the empirical evidence concerning international migration has been fairly scarce, and most studies have only focused on the migration flows into one country. In this paper, we add to the empirical evidence by analyzing the migration flows into a large number of OECD countries. We estimate a number of regression models on the flow of migrants from 129 countries to 22 OECD countries annually for the period 1990-2000. The large number of destination countries included in the analysis allows us to analyze the migration patterns for groups of OECD countries which are alike with respect to welfare state regimes or migration policy, and in this way we are able to identify patterns which may not be easy to document empirically in the more country-specific studies. We look at how important are selectivity effects in international migration. As we are not able to observe individual characteristics, we look at "country based selection effects". We test whether immigrants from low-income countries, where the educational level is relatively low, tend to go to countries with higher welfare and lower income inequality, and whether immigrants from high-income countries tend to go to countries with a low or high welfare level.[19]

[19] And moreover immigrants from these countries have higher transferability of their skills, see e.g. Duleep and Regets (1997).

Our results indicate that traditional factors such as cultural and linguistic distance are important. Network effects are also strong, but vary between source and destination countries. We do not find clear evidence that selection effects have had major influence on the observed migration patterns until now. This may partly be explained by restrictive migration policies in many OECD countries which may have dampened the potential selection effects.

The rest of the paper is organized as follows: Section 3.2 shortly describes the database collected for this study, and Section 3.3 describes immigration development and trends into the OECD countries. Section 3.4 presents the basic model on international migration we are estimating. Results from the econometric analyses are given in Section 3.5. Finally, Section 3.6 offers some concluding remarks.

3.2. DATA

It is not an easy task to collect data on international migration flows because a number of problems arise with respect to availability, variations of definitions of immigrants and migrations flows, and difficulties in obtaining comparable data from many countries on variables which may contribute to explain migration flows. In order to have more precise data on immigration, we have contacted the statistical bureaus in the 26 selected destination OECD countries and asked them for detailed information on immigration flows and stocks in their respective country during the period 1989-2000. This information is supplemented by published OECD statistics from "Trends in International Migration" publications.[20] Besides flow and stock information, we have collected a number of other time-series variables, which are used in the estimation of migration behavior. These variables are collected from different sources, e.g. OECD, World Bank, UN, ILO and IMF publications. The Appendix contains a list of all the variables used in estimated models, including definitions and data sources for each variable.

In total, the data set contains information on immigration flows and immigration stocks in 26 OECD countries from 129 countries of origin, see Pytlikova et al.

[20] Unfortunately, we are not able to distinguish whether the immigrants are job- or study-related people, tied movers in relation to family re-unions or refugees and asylum seekers.

(2004).[21] Although our data set presents substantial progress over that used in the past research, there are still some problems related. First of all, the data set is unbalanced, i.e. there are missing observations in the panel. For the majority of destination countries, we have information on migration flows and the stocks of immigrants for most of the years, but with different numbers of observation for each destination country, see Appendix, Table 3.A1, for means and standard deviations for all flows, stock and other variables and information for each destination country on the number of years for which we have information. There are missing observations in explanatory variables for some countries of origin as well.

Another important problem is that, different countries use different definitions of an "immigrant" and different sources for their migration statistics.[22] In definitions of immigration flows some countries like Australia, Canada, the Netherlands, New Zealand, Poland, The Slovak Republic and the United States define an "immigrant" by country of origin or country of birth, while some countries like Austria, the Czech Republic, Denmark, Finland, Greece, Iceland, Italy, Norway, and Sweden define an immigrant by citizenship and finally some countries like Belgium, France, Hungary, Germany, Japan, Luxembourg, Portugal, Spain, Switzerland, and the United Kingdom define an immigrant by nationality. For immigration stock, the definition of immigrant population differs among countries as well.[23] The differences in definition of immigrant population in the case of immigration stock are important. The first one, by country of origin/birth takes into account foreign-born population, i.e. first

[21] Table 3.A1 includes 27 OECD countries, but we have to exclude Ireland in all estimations because we do not have country specific information on the immigrant stock in Ireland. In the estimation, we further exclude 4 former Eastern European countries from the group of destination countries because these countries have a very different migration history during the period 1990-2000 because of the breakdown of the communist regimes. Thus, we end up estimating models of migration flows for 22 OECD countries.

[22] For example, Belgium, Germany, Luxembourg, the Netherlands, Switzerland and the Scandinavian countries use data based on population registers, the majority of Southern and Eastern European countries use data based on issuing residence permits, Australia, Canada, New Zealand and Poland use data from censuses, some countries like Greece, the United Kingdom and the United States use labour force surveys and others have information based on social security systems or other sources.

[23] The majority of countries, especially Australia, Austria, Canada, Denmark, Iceland, the Netherlands, New Zealand, Poland, the Slovak Republic, Sweden, the United Kingdom and the United States define immigrant population by country of origin or country of birth, some countries like the Czech Republic, Finland, Greece, Italy, Norway define immigrant population by citizenship and finally some countries like Belgium, France, Hungary, Germany, Japan, Luxembourg, Portugal, Spain and Switzerland define immigrant population by nationality.

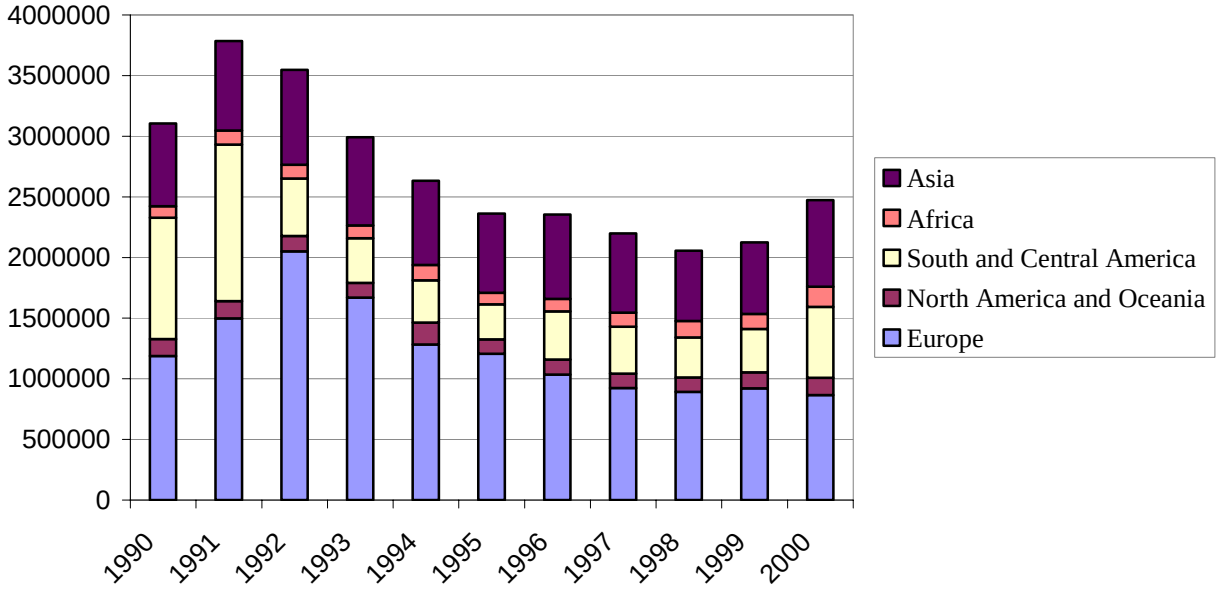
generation of immigrants, and thus it contains also immigrants that have obtained citizenship. The second and third definitions, by citizenship and nationality, include second and higher generation of foreigners, but do not cover naturalized citizens. Thus the nature of legislation on citizenship and naturalization plays a role.

3.3. DESCRIPTION OF MIGRATION TRENDS

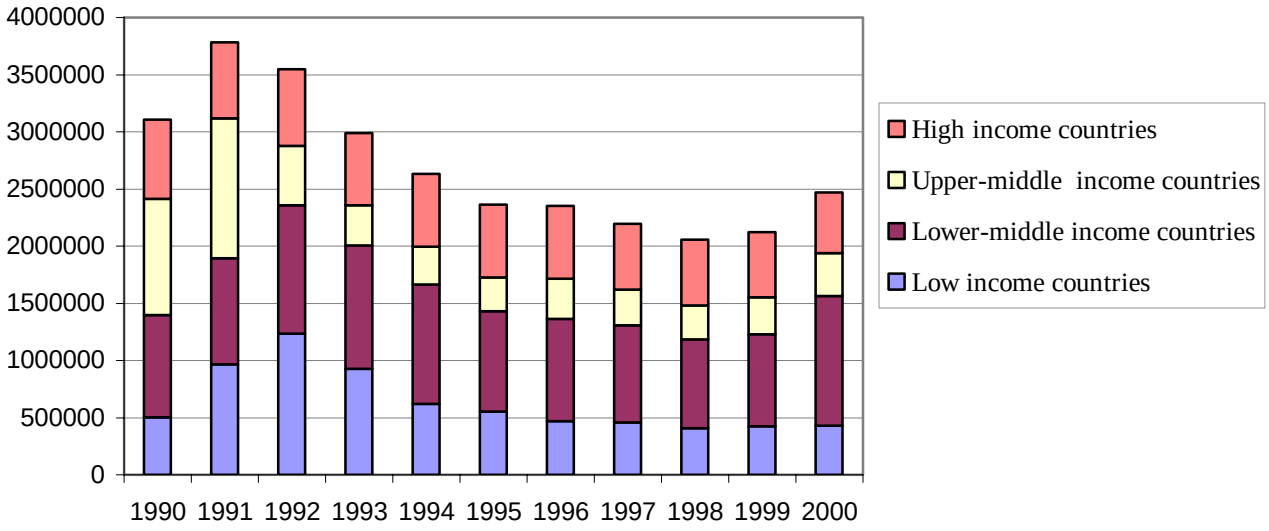
During the 1980s and the beginning of the 1990s, the immigration inflows increased in almost all OECD countries. According to Figure 3.1, which shows the development of total volume of gross immigration inflows into 17 OECD countries (see note 1 in Figure 3.1) during the period 1990-2000, the immigration flows peaked in 1991 reaching more than 3.7 million this year. The breakdown of the Iron Curtain in 1989 and the Yugoslavian civil war gave rise to a large increase of migration within Europe in the early 1990s, but in the most recent years (legal) migration flows seem to have stabilized, mainly due to immigration restrictions, see Hatton and Williamson (2004) and SOPEMI (2001). According to Figure 3.1, the distribution of OECD immigration by source-country continents and by source-country income levels has also been relatively stable since the early 1990s. We observe a slight increase in migration flows at the end of the decade, especially from South America, Africa and Asia. It should be noted that Figure 3.1 describes gross migration flows, not net flows. If there are large differences with respect to out-migration behavior for the different immigrant groups, the net migration flows may be very different from the gross flows. Non-Western immigrants tend to have a much lower return and out-migration rates than Western immigrants in many countries, and thus the stocks of OECD immigrants from different regions may still be changing despite the apparently quite stable development in Figure 3.1.

Figure 3.1. Total volume of gross immigration inflows to 17 OECD countries, 1990-2000.[1]

By source-country continent



By source-country income level

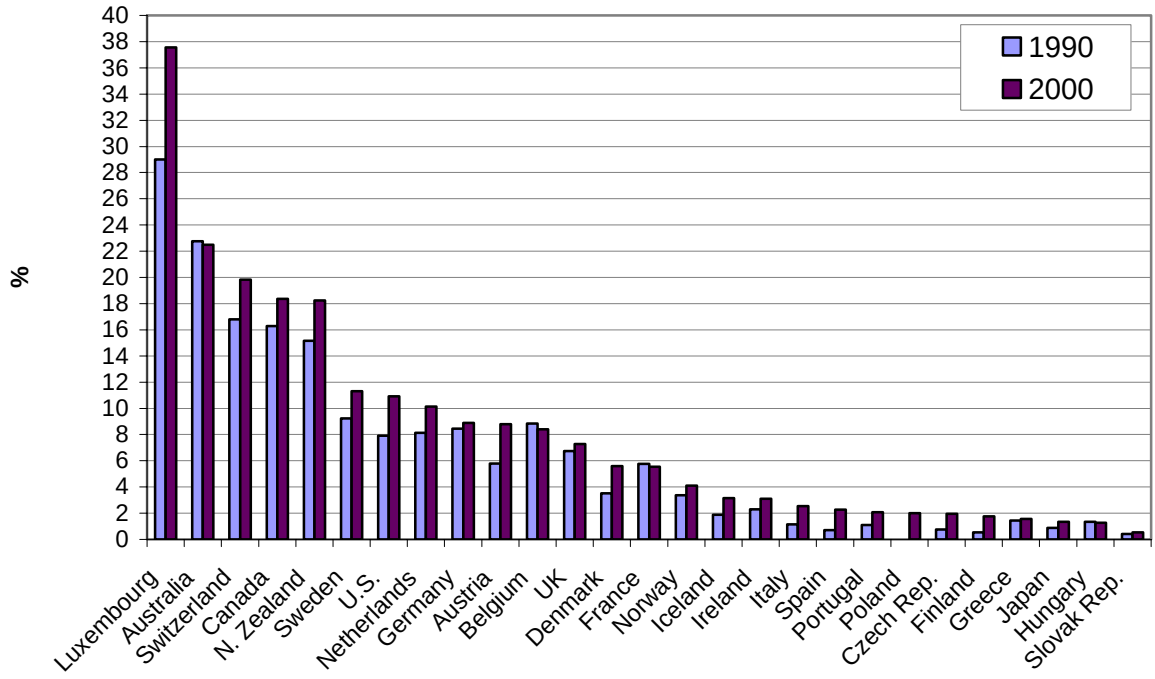


Note 1: The included destination countries are: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Hungary, Japan, Luxembourg, New Zealand, Norway, Poland, Spain, Sweden, Switzerland and the United States. These countries are selected because we have annual data for all years, i.e. no missing observations on flows, for these countries. Following countries have been excluded due to missing observations on flows for some years: Austria, the Czech Republic, Greece, Iceland, Ireland, Italy, Netherlands, Portugal, the Slovak Republic and the United Kingdom.

Source: Own calculations.

However, aggregate data tell us relatively little about the migration flows and immigration practices of each country. Figure 3.2 digs one step deeper by showing the stock of foreign population as a percentage of total population in 26 OECD countries in the two years 1990 and 2000. The stocks of immigrants in OECD countries vary considerably, in 2000 ranging from 37 % in Luxembourg to less than 1% in the Slovak Republic. It is also apparent from Figure 3.2, that migration flows have changed in the sense that some of the major immigration countries back in time, for instance Australia and Canada, have experienced a much smaller growth in their immigrant population during the latest decade compared to relatively new immigration countries like Austria, Denmark, Norway and some of the Southern European countries. These countries were during the 1990s among the 'top 20' countries with respect to destination of asylum seekers, see Hatton and Williamson (2004).

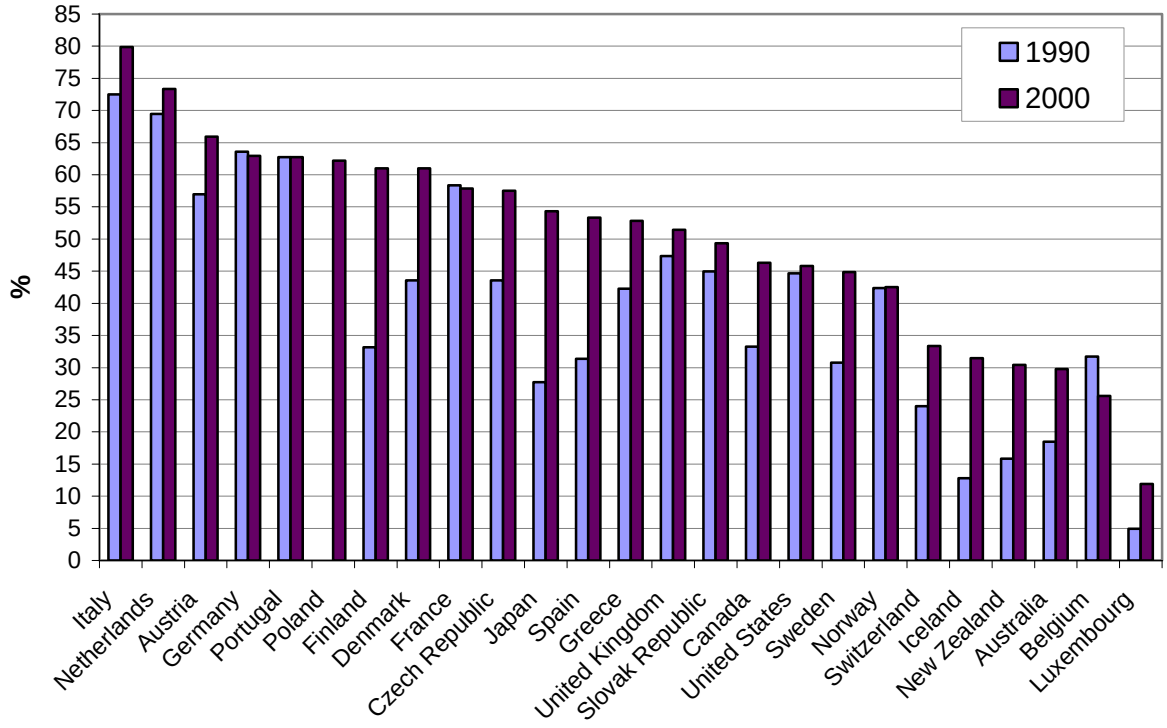
Figure 3.2. Stock of foreign population as a percentage of total population in 1990 and 2000 in selected OECD countries.



Note 2: Due to data availability the figure shows information on: 1991 instead of 1990 for Austria, Italy and Spain; 1991 and 2001 instead of 1990 and 2000, respectively, for Canada, Luxembourg and New Zealand; 1998 instead of 2000 for Greece; 1993 instead of 1990 for the Czech Republic; 1994 and 1999 instead of 1990 and 2000 respectively for Hungary; 1995 instead of 1990 for the Slovak Republic and 1992 instead of 1990 for the United Kingdom.

Source: Own calculations.

Figure 3.3. Proportion of immigration stock in 1990 and 2000 originating from low– and lower-middle-income countries.



Note 3: Definition of low and lower-middle income is given in the Appendix. Due to data availability the figure shows information on: 1991 instead of 1990 for Austria, Italy and Spain; 1991 and 2001 instead of 1990 and 2000, respectively, for Canada, Luxembourg and New Zealand; 1998 instead of 2000 for Greece; 1993 instead of 1990 for Czech Republic; 1994 and 1999 instead of 1990 and 2000, respectively, for Hungary; 1995 instead of 1990 for Slovak Republic and 1992 instead of 1990 for United Kingdom.

Source: Own calculations.

Figure 3.3 shows immigration stocks originating in countries which according to World Bank classifications are categorized as poor or 'medium poor' (for a precise definition of the categories, see Appendix). As we can see, there are large variations in the composition of immigrant stocks and flows in the OECD countries. In some countries, like Luxembourg and Belgium, the large stock of immigrants mainly stems from other OECD countries (working in EU institutions and the financial sector) while in other countries, to some extent in new immigration countries like Italy, Spain, Austria and Finland, the proportion of immigrants who stem from poor source countries is large. Figure 3.3 indicates that the composition of immigrants has changed in many countries during the single decade. In almost all destination countries, the stock of immigrants coming from poor – low-income countries has increased but the largest relative increases

are found in countries which have experienced the largest relative growth in immigrant stock during the period 1990-2000.[24]

3.4. EMPIRICAL MODEL

The potential migrants are assumed to have a utility-maximizing behavior and compare alternative potential destination countries and choose the country, which provides the best opportunities, all else being equal. Immigrants' decision to choose a specific destination country depends on many factors, which relate to the characteristics of the individual, the individual's country of origin and all potential countries of destination. Under certain conditions, see Zavodny (1997), the number of individuals migrating to country *j*, i.e. whose utility is maximized in country *j*, is given by:

$$M_{ijt} = \beta_1 S_{ijt} + \beta_2 D_{ij} + \beta_3 X_{it} + \beta_4 X_{jt} + \mu_{ijt}, \qquad (3.1)$$

where M_{ijt} is the number of immigrants moving to country *j* from country *i* at time *t*.[25] S_{ijkt} is a variable that affects an individual's utility of living in country *j* at time *t,* given that the individual lived in country *i* at time *t-1.* For example, an individual may want to move to a country where his friends or family members are. This variable reflects network effects. D_{ij} reflects time-independent fixed-out-of-pocket and psychological/social costs of moving from country *i* to country *j*. X_{ikt} and X_{jkt} are vectors of push and pull factors that vary across time and affect individual *k's* choice where *i* denotes source country and *j* denotes destination country, (*i* = 1,…,129, and *j* = 1,….,22); *t* is time period (*t* = 1,…,11). Finally, μ_{ijt} is an error term assumed to be *iid* with zero mean and constant variance.

The migration flow given by (3.1) represents an 'ex ante' measure of the migration flows. The resulting and observed 'ex post' flow may of course also be

[24] The order of the countries with the highest proportion of immigrants coming from poor countries changed during the 1990 – 2000 decade. The most significant "jump", when comparing years 1990 and 2000, can be observed for Finland (from 15th to 6th position), Austria (from 6th to 3rd position), Japan (from 19th to 10th position), Spain (from 17th to 11th position) and Denmark (from 10th to 7th position).

[25] The model does not take into account potential out-migration or return migration. Since the stock of immigrants is the net result of in- and outflow mechanisms, and since out-migration is non-negligible for many immigrant groups, this topic is also very important when explaining the composition of immigrant groups in different countries. However, in this study we only focus on gross immigration.

affected by migration policy, illegal immigration etc. We normalize the immigration flows by population size in source country, i.e. we use (the logarithm of) the emigration rate, m_{ijt}, instead of immigration flow in absolute numbers as the dependent variable. All time-varying explanatory variables are lagged by one year in order to account for information on which the potential immigrants base their decision to move.

In some of the models, we have further experimented with the inclusion of destination countries fixed or random effects, $c_{j,}$ in order to capture unobserved time-constant factors influencing immigration flows, for instance differences in national immigration policy, see for instance Fertig and Schmidt (2000) for the importance of the homogeneity assumptions. Thus, the model to be estimated is:

$$m_{ijt} = \beta_1 s_{ijt-1} + \beta_2 D_{ij} + \beta_3 X_{it-1} + \beta_4 X_{jt-1} + c_j + \mu_{ijt} \qquad (3.2)$$

The network links between sending and receiving countries are captured by the normalized lagged stock of immigrants, s_{ijt-1}, i.e. the stock of immigrants from source country *i*, divided by population in source country *i*. Through the "networks" the potential migrants receive information about the immigration country - about the possibility of getting a job, about economic and social systems, immigration policy, people and culture. It facilitates easier immigration and further easier adaptation of newly coming immigrants into the new environment.

D_{ij} contains variables reflecting costs of moving to a foreign country. First, we include a variable describing cultural similarity denoted *Neighboring Country*. It is a dummy variable assuming the value of 1 if the two countries are neighbors, 0 otherwise. The variable *Colony* is a dummy variable assuming the value of 1 for countries ever in colonial relationship, 0 otherwise. This variable is included because the past colonial ties might have some influence on cultural distance: provide better information and knowledge of potential destination country and thus lower migration costs, which could encourage migration flows between these countries. Further, we include a variable *Linguistic Distance*, which is a dummy variable equal to 1 for common language in two countries, 0 otherwise. In order to control for the direct costs (transportation costs) of migration, we use the measure of the *Distance in Kilometers* between the capital areas in the sending and receiving countries. We also include a variable *Trade Volume*, which is defined as the total trade values (both imports and exports) for all country

pairs.[26] We expect that the business ties represented by the volume of trade could have (positive) effects on international migration. Moreover, this variable is often considered as an indicator of globalization.

The explanatory variables included in X_{it-1} and X_{jt-1} cover a number of push and pull factors such as the economic development measured by GDP per capita in destination and source countries (which are supposed to catch relative income opportunities in the two countries), employment opportunities in the sending and receiving countries, measured by unemployment rates, and demographic and political factors. The hypothesis is that a higher (lower) level of economic development in the destination country will lead to higher (lower) immigration rates because potential immigrants expect to experience better (worse) income opportunities.[27] The effect of GDP per capita growth in the source country may be more mixed. Earlier studies have found an inverted 'U' relationship between source-country GDP and emigration, see Hatton and Williamson (2002). At very low levels of GDP, emigration is low because people are too poor to pay the migration costs. At higher income levels, migration increases, and when GDP levels increase further, migration may again decrease because the economic incentives to migrate to other countries decline. Therefore, in most of the specifications, we allow for non-linear effects of GDP in source countries by using indicators for low, lower middle, upper-middle and high income source countries according to World Bank classifications, see the Appendix.

The GDP variable is supplemented by a variable reflecting the educational level of the source country, measured by adult *Illiteracy Rate*. According to Harris and Todaro (1970), it is expected that a low (high) unemployment rate in the destination (source) country will cause higher immigration flows. We also include a variable capturing population pressure, e.g. population in the source country *i* divided by population in destination country *j*. The higher the relative population in the source country is, the larger migration pressure is expected. A more appropriate measure, that we are not able to include because of data limitations, would be the proportion of the population in the younger adult age

[26] Import and export values from Direction of Trade Statistics are expressed in nominal U.S. dollar prices. The constant prices would be suitable for our analysis, but we decided to use the nominal ones as it is quite a complex task to get suitable export and import deflators.

[27] The causality may also run the other way around, i.e. more immigration implies increased growth. Mayda (2004) analyses whether this type of reverse causality is important and rejects that it is of any significant size.

groups because a large proportion of migration flows has been driven by these age groups, see for instance Fertig and Schmidt (2000).

The political pressure in the source country may also influence migration. Therefore, we include the variable *Freedom House Index* which is intended to measure the degree of freedom, political rights and civil liberties in the countries. The variable is in the form of a discontinuous variable assuming values from one to seven, with one representing the highest degree of freedom and seven the lowest. Violated political rights and civil liberties are expected to increase migration flows.

We include some variables which are assumed to capture potential pull factors relating to the 'welfare magnet' theories, as presented by Borjas (1987, 1999b). We have experimented with different variables: the public social expenditure and the tax revenue, both expressed as a percentage of GDP in the potential destination countries, and measures of the income distribution (Gini-coefficients). However, the tax revenue and social expenditure variables are highly correlated, and we have had difficulties in getting comparable and reliable information for the majority of countries on the Gini coefficient. Thus, in the estimations presented in Section 3.5, only the tax level is included. According to the welfare magnet theory, we expect higher migration flows from low-income countries into countries with higher tax levels (and with higher levels of public social expenditure).

All variables used in the estimations, except dummy variables, are in logs, i.e. the estimated coefficients represent impact elasticities.

3.5. RESULTS

3.5.1 Choice of preferred econometric specification

In Table 3.1 we analyze the stability of the results with respect to the choice of different econometric specifications. Column 1 shows the estimates using pooled OLS and excluding the lagged stock of immigrants from country *i* in country *j*, while Column 2 includes the stock variable. Comparing the two columns indicates that the existing stock of immigrants of a given ethnic origin is an important factor explaining future migration flows. The explanatory power (R-square) of the model increases from 62% to 78% when including the stock variable, and thus this variable is included in all subsequent models. The highly

significant coefficient to the stock variable indicates the existence of strong network effects. [28]

Since we observe the same countries during a number of years, we are able to control for time constant unobserved differences for instance with respect to migration policy regimes between the destination countries. In Columns 3-4, fixed and random effects estimations of (2) are presented. Time constant variables are excluded from the fixed effects estimation. If the unobserved factors c_j correlate with the explanatory variables, the fixed effects panel data model has priority. If they are unrelated, the random effects model is preferred. When comparing the pooled OLS results with the panel models treating destination country in Columns 3-4 as fixed or random effects, the overall impression is that the results regarding sign and statistical significance are quite robust across the different specifications.[29] As expected, the absolute sizes of the coefficients are generally larger when applying OLS on the pooled samples of countries while the panel data estimators which controls for country-specific fixed or random effects are generally smaller in numerical magnitude.

A further problem when estimating (3.2) relates to the dynamics in the panel data structure. The fact that the migration stock basically consists of the previous migration flows and having migration stock on the right hand side may imply that the least squared estimators are subject to simultaneous equation bias, see Alvarez-Plata et al. (2003) for a discussion. In the presence of unobserved country specific effects in the error term, the lagged migration stock variable will be correlated with the error term. This leads to biased and inconsistent results, especially in short panels.

One solution is to employ instrumental variable techniques such as Arellano and Bond's (1991) difference GMM estimator or Arellano and Bover's (1995) system GMM estimator, see Blundell and Bond (1998). The difference GMM estimator is based on using lagged levels as instruments in differenced equations. The method has been widely criticized for generally weak performance of used instruments, see Blundell and Bond (1998). Therefore the difference GMM

[28] In order to see whether this result is driven by the drop in observations when including the stock variable (for which a number of countries have missing information in some of the years) as a regressor, we have estimated the model in column (1) without the stock variable and including exactly the same observations as in columns (2) – (5). The explanatory power increased in a similar fashion.

[29] However, a Hausman test actually supports the random effects assumption of zero correlation between explanatory variables and country-specific effects. It gives chi-squared (10) =11.62.

estimator has been extended to system GMM estimator, which uses lagged differences of the variables as instruments for equations in levels, in combination with the usual GMM approach. We use both GMM techniques in one- and two-step procedures; see Table 3.1, Columns 5-8.[30] The GMM estimators may also be criticized for a number of weaknesses, see for instance Alvarez-Plata et al. (2003). One important problem in this study is that the GMM estimator is not well suited to cope with unbalanced panels (Arellano, 2003).[31]

Therefore, we end up using an alternative panel data approach, which is more flexible in this perspective. One obvious choice is to use population averaged generalized estimating equations (GEE) estimator that allows us to add the time-invariant variables and to specify the within-group correlation structure for the panels (it accounts for correlated observations in each group e.g. flows into the same destination country). GEE with the assumed Gaussian distribution and exchangeable correlation is equivalent to random effects maximum likelihood estimator, but allowing the standard errors to be adjusted for clustering.[32]

[30] We test the validity of instruments by the Sargan or Hansen test of over-identifying restrictions, which tests whether the instruments as a group appear exogenous. Our results show that the Hansen test of over-identifying restrictions is satisfied for both GMM estimators (Chi-squared (450) = 640.28 and chi-squared (530) = 766.97 for difference and system robust GMM estimator, respectively). The sufficiency of GMM is further tested by autocorrelation tests derived by Arellano and Bond (1991). For all GMM estimators the second-order serial correlation test in the first differenced equation is unable to reject the null hypotheses of no second-order serial correlation, there are the following values of Arellano-Bond AR (2) tests: z = 0.61, 0.68, 0.75 and 0.78 for difference GMM one-step, difference GMM two-step, system GMM one-step and system GMM two-step, respectively.

[31] Another critique stems from the fact that the application of first differences wipes out the structure of the model given by economic theory, see Alvarez-Plata et al. (2003). There is also a relatively large loss of efficiency in GMM estimators. The results from OLS, fixed effects and GMM estimations of all the models are available from the authors upon request.

[32] We use the XTGEE procedure in STATA and we use function “robust” that denotes using the Huber/White sandwich estimator.

Table 3.1. Estimation of migration flows from 129 source countries (i) to 22 (OECD) destination countries (j), 1990 – 2000.

Dependent variable: m_{ijt} = Log(Gross Flows per 1000 inhabitants of the source)	**OLS**	**OLS**	**FE (c_j)**	**RE (c_j)**	**difference GMM**	**difference GMM two-step**	**system GMM**	**system GMM two-step**	**GEE (c_j)**
Independent variables:									
Sijt-1 Log Stock of	-	0.603 [0.010]***	0.637 [0.008]***	0.614 [0.009]***	0.385 [0.076]***	0.357 [0.075]***	0.577 [0.038]***	0.581 [0.043]***	0.614 [0.033]***
Dijt-1 Neighbouring Country (0/1)	0.424 [0.067]***	0.089 [0.056]	-	-0.01 [0.048]	-	-	-	-	-0.029 [0.144]
Linguistic Distance (0/1)	1.216 [0.061]***	0.329 [0.059]***	-	0.352 [0.051]***	-	-	-	-	0.346 [0.094]***
Colony (0/1)	0.239 [0.086]***	-0.053 [0.077]	-	0.392 [0.070]***	-	-	-	-	0.404 [0.202]**
Log Distance in Kilometres	-0.394 [0.019]***	-0.225 [0.017]***	-	-0.097 [0.017]***	-	-	-	-	-0.085 [0.049]*
Log Trade Volume	0.255 [0.009]***	0.008 [0.008]	0.150 [0.013]***	0.08 [0.013]***	-0.107 [0.046]**	-0.097 [0.042]**	0.020 [0.035]	0.010 [0.032]	0.099 [0.027]***
Xjt-1 Log GDP per cap PPP, j	1.930 [0.090]***	1.205 [0.074]***	1.229 [0.248]***	1.211 [0.184]***	3.038 [0.543]***	2.519[0.490]***	1.169 [0.207]***	1.126 [0.192]***	1.270 [0.993]
Log Unemployment Rate, j	-0.320 [0.033]***	-0.151 [0.027]***	-0.242 [0.030]***	-0.249 [0.030]***	-0.086 [0.040]**	-0.095 [0.034]***	-0.151 [0.041]***	-0.150 [0.037]***	-0.243 [0.074]***
Log Tax Revenue in j/GDP, j	-0.848 [0.092]***	-0.190 [0.077]**	-0.785 [0.348]**	-0.198 [0.246]	0.071 [0.367]	0.098 [0.330]	0.006 [0.180]	-0.037 [0.183]	-0.492 [0.838]
Xit-1 Log(Pop. (j)/Pop- (i))	0.592 [0.008]***	0.198 [0.010]***	0.323 [0.014]***	0.266 [0.013]***	-0.055 [0.485]	-0.082 [0.399]	0.257 [0.036]***	0.270 [0.047]***	0.284 [0.034]***
Log GDP per cap PPP, i	0.034 [0.038]	-0.186 [0.033]***	-0.340 [0.031]***	-0.239 [0.032]***	-0.281 [0.243]	-0.308 [0.234]	-0.212 [0.124]*	-0.180[0.145]	-0.263 [0.084]***
Log Unemployment Rate, i	0.109 [0.023]***	-0.086 [0.020]***	-0.010 [0.018]	-0.030 [0.018]*	-0.034 [0.041]	-0.025 [0.039]	-0.062 [0.050]	-0.064 [0.049]	-0.025 [0.027]
Log Illiteracy Rate, i	0.017 [0.019]	-0.209 [0.017]***	-0.225 [0.014]***	-0.208 [0.014]***	1.436 [0.433]***	1.233 [0.404]***	-0.287 [0.040]***	-0.276 [0.051]***	-0.208 [0.042]***
Log Freedom HouseIndex, i	0.043 [0.045]	0.144 [0.039]***	0.205 [0.033]***	0.165 [0.033]***	0.022 [0.100]	0.020 [0.094]	0.132 [0.107]	0.130 [0.102]	0.172 [0.086]**
Fixed/Random Effects of Destination, c_j	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant Term Included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	8783	6566	6566	6566	4913	4913	6258	6258	6566
Adjusted R-squared (GEE: Scale)	0.62	0.78	0.84	0.78					1.263

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 3.1 indicates that the estimated coefficients of key variables like lagged stock of immigrants, tax pressure and GDP level are fairly robust across specifications, except for the differences which exist between pooled OLS versus panel estimators and difference estimators, probably partly due to unobserved time constant factors. Thus, we show both OLS and GEE results in Tables 3.2-3.3 below.

3.5.2 Aggregate results

In Table 3.2, we show the estimation results from OLS and GEE estimations based on aggregated models which include all 22 OECD countries. In Columns 1-2, we show results parallel to the model in Table 3.1, only exception is that income level in source country is represented by 4 indicators (highest level is excluded) instead of a continuous GDP variable in order to allow for non-linear effects. In Columns 3-4, we interact these 4 indicators with the stock and tax pressure variables, in order to dig deeper into potential selection and network effects.

Concentrating on the results from the GEE random effects estimation in Column 1, Table 3.2, the elasticity of the flow of immigrants from country *i* with respect to the stock of immigrants in country *j* is estimated to be about 0.59, implying that on average an increase in the stock of immigrants of 10 % from a given source country induces an increase in annual gross flow of about 5.9 % of new immigrants from this source country. Since we control for other country-specific factors, this result is mainly explained by the existence of network effects which seem to be both statistically significant and quantitatively of a considerable size. Similar results are found in Zavodny (1997) and Hatton and Williamson (2002).

In Columns 3-4, we also allow the stock effects to vary across source-country income level groups. Here we find that the stock effects are higher for immigrants stemming from low-income countries (62%) than for immigrants from upper-middle or high-income countries (55-56%). Thus, network effects seem to be slightly stronger for immigrants stemming from low-income groups compared to immigrants from high-income groups when estimating on the total sample of all OECD destination countries and all source countries. When splitting the estimations according to destination countries, this pattern across source country income levels seems to stem mainly from migration flows to the

Anglo-Saxon or liberal welfare states (USA, Canada, Australia and New Zealand as discussed below).

In all regressions estimated by panel data techniques the dummy variable for source and destination countries being neighbors is found to be insignificant, while it is positively significant in the OLS estimations. The other distance-related dummy variables, i.e. linguistic distance and a dummy for the source country having in the past been a colony to the destination country, are consistently found to have the expected positive impact on migration flows with most coefficients being significant. Finally, in this group of variables, the distance between countries measured in kilometers and the pair wise trade volume between source and destination countries are both significant with expected signs. Increasing distance and smaller trade volume imply lower migration flows and vice versa.

The next block of variables in Table 3.2 contains the pull factors in the destination countries. GDP per capita in destination country has a positive and – except in one GEE specification – highly significant coefficient. For instance, Column 2 indicates that a doubling of GDP increases the immigration flow by about 100%. We also find that higher unemployment in destination countries has a significantly dampening impact on migration. If the unemployment rate doubles, the immigration flow is reduced by about 25% according to GEE results.

Direct welfare state attractors among the pull factors are measured by the tax pressure needed to finance the welfare state. In the OLS estimation, Column 1, the effect is found to be negative, and the effect is insignificant in Column 2, where we control for other country-specific time constant factors. Zavodny (1997) also found that controlling for country-specific factors and network effects resulted in welfare state variables becoming insignificant regarding immigration to the USA. When splitting the tax coefficient according to source-country income level in Columns 3-4, the tax effect seems to be most negative for immigrants from poor and middle income countries, and even significantly positive for immigrants from the high income level countries, a results which is against a ‘welfare magnet’ theory.

Next, we come to a block of source-country push factors. The first of these is a simple pair wise population ratio between destination- and source-country populations. The coefficient is significantly positive in all specifications in Table 3.2, implying that immigrants tend to flow to larger countries, cet. par.

Table 3.2. GEE(c_j) estimations of migration flows from 129 source countries (i) to 22 (OECD) destination countries (j), 1990 – 2000.

Dependent variable: m_{ijt} = Log (Gross Flows per 1000 Inhabitants)	OLS	GEE (c_j)	OLS	GEE (c_j)
Independent variables:				
Sijt-1				
Log(Stock of Foreigners/Pop.*(j)*)	0.587 [0.009]***	0.594 [0.009]***	-	-
Stock*Lowest GDP level	-	-	0.616 [0.017]***	0.638 [0.034]***
Stock*Lower-middle GDP level	-	-	0.62 [0.011]***	0.621 [0.034]***
Stock*Upper-middle GDP level	-	-	0.562 [0.015]***	0.571 [0.040]***
Stock*High GDP level	-	-	0.546 [0.012]***	0.535 [0.030]***
Dijt-1				
Neighbouring Country (0/1)	0.093 [0.055]*	-0.029 [0.051]	0.156 [0.055]***	0.058 [0.151]
Linguistic Distance (0/1)	0.317 [0.058]***	0.342 [0.054]***	0.309 [0.058]***	0.339 [0.085]***
Colony (0/1)	-0.009 [0.076]	0.429 [0.074]***	-0.02 [0.075]	0.431 [0.207]**
Log(Distance in Kilometres)	-0.237 [0.017]***	-0.093 [0.018]***	-0.231 [0.017]***	-0.104 [0.047]**
Log(Trade Volume)	0.015 [0.008]*	0.118 [0.014]***	0.014 [0.008]*	0.109 [0.021]***
Xjt-1				
Log(GDP per cap PPP, *j*	1.166 [0.073]***	1.048 [0.237]***	1.170 [0.073]***	1.125 [0.996]
Log(Unemployment Rate, j)	-0.172 [0.027]***	-0.256 [0.032]***	-0.172 [0.027]***	-0.249 [0.072]***
Log(Tax Revenue in j/GDP, j)	-0.191 [0.076]**	-0.536 [0.326]		
Tax*Lowest GDP level	-	-	-0.691 [0.245]***	-0.845 [0.752]
Tax*Lower-middle GDP level	-	-	-0.772 [0.119]***	-0.933 [0.747]
Tax*Upper-middle GDP level	-	-	-0.433 [0.173]**	-0.919 [0.773]
Tax*High GDP level	-	-	0.482 [0.110]***	-0.164 [0.927]
Xit-1				
Population (j)/Population (i)	0.215 [0.009]***	0.310 [0.015]***	0.219 [0.010]***	0.310 [0.028]***
Income level:				
Lowest level (0/1)	0.394 [0.081]***	0.598 [0.083]***	4.874 [0.963]***	3.35 [2.347]
Lower-middle level (0/1)	0.694 [0.058]***	0.794 [0.058]***	5.444 [0.569]***	3.767 [1.611]**
Upper-middle level (0/1)	0.175 [0.048]***	0.275 [0.047]***	3.525 [0.726]***	3.063 [1.139]***
Highest level (excluded)	-	-	-	-
Unemployment Rate, i	-0.108 [0.020]***	-0.052 [0.018]***	-0.115 [0.020]***	-0.065 [0.024]***
Illiteracy Rate, i	-0.214 [0.015]***	-0.202 [0.014]***	-0.222 [0.015]***	-0.204 [0.045]***
Freedom House Index, i	0.028 [0.038]	0.07 [0.035]**	0.033 [0.038]	0.065 [0.066]
Random Effects of Destination, c_j	No	Yes	No	Yes
Constant Term Included	Yes	Yes	Yes	Yes
No of observations	6688	6688	6688	6688
Adj. R-square (OLS)/Scale (GEE)	0.788	1.263	0.790	1.225

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses. The number of observations varies between Column 1 and Columns 2-3 because for some source countries there is only information on income level (indicator variables) but no exact information on GDP per capita.

Instead of entering GDP per capita in source countries, we include 3 indicators for income level in source country, allowing for non-linear effects of GDP. We find the expected inverted U-curve, migration flows are higher from source

countries with middle-low and middle-high incomes compared to the countries with the lowest or highest income levels, see Hatton and Williamson (2002). This indicates that migration costs are important and in the poorest source countries this may be a barrier to emigration. This result is supported by the coefficient of the variable indicating unemployment level in source country. The coefficient tends to be negative. In a regional context inside a country this would be a counterintuitive result as higher unemployment is expected to push people to other regions. Here, however, we deal with international mobility which is expected to be much more costly in both financial and other terms. The negative coefficient of the illiteracy rate indicates the same tendency. Migration to the rich OECD countries increases when the educational level in source countries increases. Finally, we have included the Freedom House Index among the source-country push factors. The effect is positive indicating that lower degrees of freedom create out-migration incentives, part of it being in the form of refugees. However, the effect seems to become insignificant when we allow for non-linear effects of the source-country income level.

3.5.3 Disaggregated results for groups of destination countries.

One important potential criticism of the results above is that the observed migration flows may be highly influenced by differences in migration policy among countries and over time. Thus, the observed patterns may not reflect the underlying 'true migration pressure' which OECD countries face from the relatively poor countries. Hatton and Williamson (2004) document, that the EU15 countries have been the main destination region for the large refugee flows from mainly poor countries which took place during the 1990s. We are not able to control directly for 'migration policy' which may act through a number of parameters. Instead, we select two groups of destination countries: the Anglo-Saxon countries (the USA, Canada, Australia, New Zealand) which back in time were the typical in-migration countries and the Western European countries. The Anglo-Saxon countries are to a larger extent than Non-Anglo-Saxon countries characterized by selective immigration policies where immigrants are supposed to provide for themselves either by work or by being provided for by their family. The impact from these policies shows up very clearly in the ratios between immigrant and native unemployment rates, cf. OECD (2001), which are close to 1 for the Anglo-Saxon countries. For the Western European countries, on the other hand, the ratios are high which may reflect that immigration policies are characterized by entry of tied movers and refugees from less developed countries

who are difficult to integrate in labor markets that are both more regulated and in many cases have higher relative minimum wages than found in the Anglo-Saxon countries. A comprehensive discussion of these differences can be found in Boeri et al. (2002).

If the difference in migration policy regimes and labor markets matters for the observed migration flow patterns, we expect to find differences regarding the sign to the welfare state proxy variable and differences regarding the importance of destination-country unemployment rates and the illiteracy rates in source countries between the two groups of destination countries. The prior expectation is that the Anglo-Saxon countries attract immigrants from source countries with more educational skills as approximated by the illiteracy rate and income levels and further attract immigrants when unemployment is relatively low.

In Table 3.3, we show the results from estimating a model parallel to Columns 2-3 in Table 3.2, but now also interacting with an indicator variable for being an Anglo-Saxon country, i.e. the estimated coefficients in Columns 1 and 3 are the coefficients for Western European countries, and Columns 2-4 are the difference for Anglo-Saxon countries for the concerned coefficient. We actually find quite large differences between the Anglo-Saxon and Western European countries for some variables. For the Anglo–Saxon countries, there is a much larger variation across source-country income levels with respect to the network effect compared to Western Europe where the stock effect varies between 57% for middle-high and highest income source countries to 62% for immigrants from the lowest income levels. For Anglo-Saxon countries, the stock effect for the lower middle income level group is 9% higher, i.e. about 62%+9%= 71%. For the upper-middle income groups, the difference between Anglo-Saxon and Western Europe countries is exactly opposite. This may reflect, either that tightened migration policy in the Western European countries has dampened migration flows in the 1990s from poor countries more than it is the case for Anglo-Saxon countries, or it might reflect that networks are much more important for poor immigrants arriving to the Anglo-Saxon countries compared to the Western European countries which have much more generous and extended welfare services. We pursue this issue in the next sections.

The tax pressure variables are only significant in the OLS regressions, which may of course be biased if unobserved factors correlate with the tax measure. With this reservation in mind, concentrating on the OLS estimations we find the same structure as in Table 3.2, i.e. the higher tax level destination countries seem

to attract immigrants from less poor countries, and this tendency also seems to dominate when splitting into Anglo-Saxon and Western European countries.[33]

Table 3.3. Selected coefficients from estimations of migration flows from 129 source countries (i) to 23 (OECD) destination countries (j), 1990 – 2000. Disaggregating by migration policy regimes.

	OLS		GEE(c_j)	
Dependent variable: m_{ijt} = Log (Gross Flows per 1000 Inhabitants)	Main Effects	Interaction with Anglo-Saxon indicator (USA, Ca, Australia, New Zealand)	Main Effects	Interaction with Anglo-Saxon indicator (USA, Ca, Australia, New Zealand)
Independent variables:	(Western Europe = EU15+No+ Switz.)		(Western Europe = EU15+No+ Schwitz.)	
Sijt-1				
Stock*Lowest GDP level	0.610 [0.017]***	-0.036 [0.157]	0.630 [0.035]***	-0.056 [0.062]
Stock*Lower-middle GDP level	0.625 [0.011]***	0.143 [0.052]***	0.618 [0.037]***	0.092 [0.041]**
Stock*Upper-middle GDP level	0.571 [0.016]***	-0.181 [0.072]**	0.574 [0.049]***	-0.156 [0.051]***
Stock*High GDP level	0.569 [0.013]***	-0.229 [0.062]***	0.563 [0.034]***	-0.164 [0.103]
Dijt-1	yes	yes	yes	Yes
Xjt-1				
Log(GDP per cap PPP, *j*	1.735 [0.077]***	-0.570 [0.254]**	1.488 [0.998]	-0.512 [0.744]
Log(Unemployment Rate, j)	-0.116 [0.026]***	1.019 [0.328]***	-0.255 [0.078]***	1.722 [0.500]***
Log(Tax Revenue in j/GDP, j)				
Tax*Lowest GDP level	-1.027 [0.258]***	0.027 [2.061]	-0.675 [0.793]	0.796 [1.864]
Tax*Lower-middle GDP level	-1.387 [0.127]***	1.759 [0.953]*	-0.947 [0.815]	2.472 [1.883]
Tax*Upper-middle GDP level	-1.092 [0.187]***	0.165 [1.352]	-0.873 [0.814]	1.136 [1.983]
Tax*High GDP level	-0.234 [0.117]**	0.116 [0.762]	-0.363 [0.982]	0.225 [2.244]
Xit-1				
[Population (j)/Pop. (i)]/100	26.000 [9.812]***	-0.002 [0.001]**	29.784 [2.972]***	-0.001 [0.0004]**
Income level:				
Lowest level (0/1)	3.485 [1.025]***	-0.668 [6.997]	1.879 [2.441]	-2.568 [2.880]
Lower-middle level (0/1)	5.112 [0.602]***	-6.740 [3.347]**	3.020 [1.939]	-8.336 [2.310]***
Upper-middle level (0/1)	3.328 [0.790]***	-0.478 [4.759]	2.094 [1.342]	-3.138 [1.756]*
Highest level (excluded)	-	-	-	-
Unemployment Rate, i	-0.108 [0.020]***	0.019 [0.083]	-0.055 [0.023]**	-0.051 [0.026]*
Illiteracy Rate, i	-0.245 [0.015]***	0.326 [0.062]***	-0.230 [0.043]***	0.301 [0.047]***
Freedom House Index, i	0.035 [0.038]	0.161 [0.147]	0.056 [0.069]	0.177 [0.105]*
Random Effects of Destination,	No		Yes	
Constant Term Included	Yes		Yes	
No of observations	6688		6688	
Adj. R-sq (OLS)/Scale (GEE)	0.805		1.093	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

[33] We have made another set of estimations where we only look at the flows from 102 non-OECD countries into the 26 OECD countries. This does not change the finding of significantly negative coefficients to the tax pressure variable of about the same magnitude in the two country groups.

There are differences in the effects of the economic factors as well. The coefficients of the GDP per capital level in the Western European countries are positive for the lowest, lower- middle, and upper-middle income levels (though only significant in OLS estimations), while for the Anglo-Saxon destination countries the GDP effect is significantly smaller than in Western Europe (OLS estimates). This indicates that Western Europe tends to get relatively more immigrants from the 'non-rich' countries, while the liberal countries get significantly fewer immigrants from the lower-middle GDP countries, which according to the results in Table 3.2 are the countries with the largest emigration flows.

These results may be interpreted as giving some support to a selection hypothesis in the sense that the liberal countries with more selective immigration policies seem to have succeeded in getting more immigrants from the less poor countries, compared to Western Europe which has had a non-selective immigration policy, which has mainly allowed immigration of refugees and family unionization immigration from outside Europe, while Europe has been much more restrictive with respect to labor migration from outside Europe. However, this estimated effect is counteracted by the estimated illiteracy rate, which indicates that Western Europe get relatively fewer illiterate immigrants compared to the Anglo-Saxon countries.

In order to dig deeper in the question about selection effects in international migration flows in the 1990s, we have split the destination countries into subgroups according to type of welfare state in Table 3.4. The hypothesis is that immigration flows may be affected by the generosity of the different welfare state regimes, and different rules with respect to obtaining rights to the welfare schemes for immigrants. It is not straightforward to do this grouping of destination countries since there are a number of parameters which may be relevant to use. We have applied a grouping of the destination countries partly inspired by Esping-Andersen (1990): Social democratic welfare states (Denmark, Finland, Iceland, Norway and Sweden); liberal or residual welfare states (UK, USA, Canada, Australia, New Zealand and Japan); continental/conservative and Southern European welfare states (Austria, Belgium, France, Germany,

Luxemburg, the Netherlands and Switzerland, Greece, Italy, Portugal and Spain).[34]

The idea behind this division is to capture the fact that the tax pressure variable – and thus implicitly the level of social expenditure – only tells something about the level of public sector services, but not whether for instance immigrant groups or non-citizens are eligible to different benefits or services. In some welfare state regimes (mainly the conservative European continental countries), the social services are generous, but many public income transfers and services are only available for individuals who have earned their rights to the system for instance by being in the labor force, i.e. newly arrived immigrants are not eligible to a number of social services and transfers. In the Southern European welfare states, the church and the family play a major role with respect to social services, and thus in these countries the individual immigrant does not get access to many of the features of these welfare states. This is contrary to the social democratic welfare states which are characterized by high social welfare levels, fairly universal rules and welfare schemes that to a large extent are collectively financed by high income and consumer taxes. In these countries, many immigrant groups have almost the same rights as native citizens as soon as they get permanent residence permit.[35]

Looking at Table 3.4, the results confirm our a priori expectations concerning selection effects to some extent, but they also show that network effects and the classical migration factors are important and vary between the different types of welfare states. For the Continental and Southern European countries, the stock or network effect varies from 68% for immigrants from the group of lower-middle income countries to 59% for immigrants from high income source countries.

[34] Countries like UK and the Netherlands are difficult to classify. Since the general level for the universal services and income transfers are quite low in the UK, we classify the UK as a residual welfare state, despite it has in principle the same universal schemes as the social democratic countries. The Netherlands is also sometimes categorized in the group of 'social democratic' welfare states.

[35] However, it should be noted that during the latest decade, partly as a political reaction to the immigration pressure, the eligibility rules and other conditions for receiving welfare services have been tightened, also in the social democratic welfare states, see Hatton and Williamson (2004).

Table 3.4. Selected coefficients from estimations of migration flows from 129 source countries (i) to 23 (OECD) destination countries (j), 1990 – 2000. Disaggregating by welfare state regimes, GEE(c_j).

Dependent variable: m_{ijt} = Log (Gross Flows per 1000 Inhabitants)	Main Effects (Continental+Southern Europe = Austria, Bel, Fra, Ger, Lux, Neth, Switz, Greece, Ita, Por, Spa)	Interaction with: Soc. Dem. Indicator (Den, No, Swe, Fin, Iceland)	Interaction with: Liberal Indicator (UK, USA, Ca, Australia, New Zea, Jap)
Independent variables:			
Sijt-1			
Stock*Lowest GDP level	0.650 [0.018]***	-0.059 [0.028]**	-0.154 [0.036]***
Stock*Lower-middle GDP level	0.684 [0.038]***	-0.201 [0.038]***	-0.087 [0.083]
Stock*Upper-middle GDP level	0.650 [0.055]***	-0.166 [0.077]**	-0.061 [0.126]
Stock*High GDP level	0.592 [0.033]***	-0.045 [0.045]	-0.198 [0.072]***
Dijt-1	yes	yes	Yes
Xjt-1			
Log(GDP per cap PPP, *j*	1.901 [1.190]	-0.949 [0.558]*	-1.158 [0.787]
Log(Unemployment Rate, j)	-0.105 [0.071]	-0.164 [0.098]*	-0.075 [0.573]
Log(Tax Revenue in j/GDP, j)			
Tax*Lowest GDP level	-2.395 [1.358]*	1.078 [1.799]	3.337 [2.125]
Tax*Lower-middle GDP level	-2.780 [1.259]**	3.429 [1.551]**	5.637 [1.924]***
Tax*Upper-middle GDP level	-3.200 [1.167]***	3.511 [1.430]**	5.116 [2.177]**
Tax*High GDP level	-2.476 [1.096]**	3.035 [1.480]**	2.700 [2.110]
Xit-1			
[Population (j)/Pop. (i)]/100	29.646 [2.899]***	-0.000[0.000]***	-0.000 [0.000]
Income level:			
Lowest level (0/1)	0.321 [1.442]	7.476 [2.439]***	-2.303 [1.926]
Lower-middle level (0/1)	2.084 [1.907]	-2.197 [2.735]	-10.175 [3.481]***
Upper-middle level (0/1)	2.919 [2.624]	-2.103 [3.585]	-8.267 [3.654]**
Highest level (excluded)			
Unemployment Rate, i	-0.045 [0.033]	-0.017 [0.046]	-0.142 [0.054]***
Illiteracy Rate, i	-0.241 [0.054]***	0.034 [0.086]	0.190 [0.113]*
Freedom House Index, i	0.047 [0.075]	-0.043 [0.134]	0.158 [0.096]*
Random Effects of Destination, c_j		No	
Constant Term Included		Yes	
No of observations		6688	
Scale (GEE)		1.009	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

For the Nordic 'social democratic' countries, the network effects tend to be significantly smaller, except for immigrants from the highest income countries. Thus, the stock of former immigrants from a given poor source country does not seem to have far the same importance for the Scandinavian welfare states compared to the rest of Europe. This may reflect an interaction between the network and selection effects. Networks may not be as important in countries like

the Nordic countries, where high and fairly universal social safety nets exist. Another explanation might be that the networks need to have a certain "maturity" to be effective. As the Nordic countries (except Sweden) are relatively "young" immigration countries, the network effect might not have the structure we observe for the old immigration countries yet. Such a hypothesis would indicate that the migration networks will gradually become more important for immigrants coming from the poor countries, perpetuating the flow of immigrants from these countries.

The indicators for GDP level in source country also show a remarkable variation across groups of welfare states. The social democratic welfare states receive a significantly larger proportion of immigrants from the poorest source countries compared to other European countries, while for the liberal welfare state the inflow is significantly higher for the poorest and the richest source income countries, compared to Continental and Southern European countries.

The above results give some support to the existence of both selection and network effects. When splitting into different type of welfare state regimes, the coefficients of the tax pressure variable do not support a hypothesis on a 'welfare magnet pattern'. Again, one should note that the lack of support to the selection theory may of course reflect that migration flows have been 'distorted' by migration policy restrictions.[36]

Thus, in total, we do find some evidence of both network and selection effects in the immigration flows to OECD countries during the latest decade, but the results mainly favor the network hypothesis, while the results concerning selection effects are somewhat mixed. Migration restriction and migration policy may have reduced the observed migration flows, and migration policy may have worked endogenously in the sense that it has become more restrictive in welfare states with large public sectors and high tax pressure levels. But despite the different migration policy initiatives, we still see strong network effects. To the extent that

[36] In order to test for the robustness of our results, in alternative estimations not shown here, we have disaggregated the regressions into groups of source countries (low, lower-middle, upper-middle and high income), instead of destination countries. If selection effects were strong and worked as predicted by the 'welfare magnet' hypothesis, we should expect that a high tax pressure in destination countries had a more negative effect for immigration flows from rich countries compared to the more poor countries. We do not find this pattern in our data, i.e. we do not find that the immigrant flows from more poor countries are less negatively affected by a high tax pressure compared to the flows from more rich countries. The tendency seems to be the opposite. The results are available from the authors upon request.

the stock of immigrants reflects past migration patterns which of course may have been subject to selection effects, we may have that part of the selection effects are captured by the stock effects.

3.6. CONCLUSIONS

Based on the database and the model structure, we present the results from empirical work on the migration flows into 22 OECD countries from 129 countries during the years 1990-2000. A very robust key result of our econometric analysis is that the network effects measured as the coefficient of the stock of immigrants of own national background already resident in a country have a large positive effect on immigration flows, and thus networks play an important role in explaining current immigration flows. Further, linguistic closeness, former colonial and current business ties are important factors, although the magnitude of the impact on migration flows varies for different groups of destination countries. Geographic distance, on the other hand, has a negative impact on migration flows as expected suggesting that the costs of migration play an important role.

The impact from economic factors is measured by entering GDP per capita (PPP adjusted) and unemployment rates in both destination and source countries and tax pressure. Migration flows tend to react positively to higher income gaps and to react negatively to depressed labor markets in destination countries. We have tested the simple welfare magnet hypotheses by allowing the effect of tax revenue in destination country on migration flows to vary across different source countries. We do not find any significant variation in the effect of the tax pressure on migration flows across source countries. Contrary to the welfare magnet hypotheses, we find for some groups of destination countries that the coefficient of the tax pressure in destination countries becomes more negative for the immigrants coming from poor countries. This might be explained by the fact that big relative public sectors correlate with restrictive immigration policies.

When estimating separate models for different groups of destination countries which are grouped in order to make the destination countries more homogenous within groups with respect to migrations policy and welfare state regimes, we find a number of interesting results favoring both the network and the selection theories. The network effect variation across income levels of source countries varies a lot in the case of Anglo-Saxon /liberal type of destination countries with

large network effect for low-income countries and much smaller for high-income source countries. Contrary to that, the network effect does not vary much across source-country income groups for Western European destination countries, which might simply reflect the more restrictive immigration policies. Thus, this suggests that there might be some selection through the migration networks.

The Scandinavian countries have, to a much larger extent than the other welfare states, an overweight of immigrants from the poorest source countries, when controlling for other determinants of migration flows. This pattern is not observed for the liberal welfare states like for instance the US, where newly arrived immigrants do not have the same access as natives to get services and income transfers from the welfare state as it is the case in Scandinavian countries. The liberal welfare states tend to have an overweight of immigrants from the highest income countries, when controlling for other factors.

Due to data availability, migration flows in the present approach are based on aggregate measures, i.e. no distinction can be made between the three main flows of migrants, being job- or study-related people (mostly intra-OECD), tied movers in relation to family re-unions and finally refugees. In the long run, welfare magnet mechanisms might influence these flows in the direction pointed out in Borjas (1999b). In the short to intermediate run, however, job movers are only in incomplete ways entitled to social benefits in source countries, the flows of tied movers are by nature strongly influenced by the stock of immigrants in a destination country, i.e. the network effect, and finally the flow of refugees consists of convention refugees, where entry depends on political decisions, and spontaneous individual asylum seekers, where the conditions for granting a residence permit depend on national immigration policies.

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APPENDIX:

Description and definitions of the basic variables and sources.

Gross flow of migrants from country i to country j per 1000 inhabitants in country j

Source: National statistical offices and "Trends in International Migration" SOPEMI 2000 OECD.

Stock of foreigners from country i in country j

Source: National statistical offices and "Trends in International Migration" SOPEMI 2000 OECD.

Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship - except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin.

Source: World Bank.

GDP per capita (constant 1995 international $), PPP: GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant **international** dollars.

Source: World Bank.

Unemployment, total (% of total labour force): Unemployment refers to the share of the labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ by country.

Source: World Bank: International Labour Organisation, Key Indicators of the Labour Market database.

Illiteracy rate, adult total (% of people ages >15): Adult illiteracy rate is the percentage of people ages 15 and above who cannot, with understanding, read and write a short, simple statement on their everyday life.

Source: World Bank (United Nations Educational, Scientific, and Cultural Organization.)

Public social expenditure as a percentage of GDP (SNA93): Social expenditure is the provision by public institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare, provided that the

provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an individual contract or transfer. Such benefits can be cash transfers, or can be the direct ("in-kind") provision of goods and services.

Source: OECD Social Expenditure Database (SOCX).

Tax revenue (% of GDP): Tax revenue comprises compulsory transfers to the central government for public purposes. Compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. Data are shown for central government only.

Source: World Bank: International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

Distance between countries – distance between capitals in km.

Source: MapInfo, own calculations.

Freedom House Index – represents scores of political rights, civil liberties, and freedom. These are measured on a one-to-seven scale, with one representing the highest degree of freedom and seven the lowest.

Source: Annual Freedom in the World Country Scores 1972-73 to 2001-2002.

Common language in two countries - in the form of dummy for the common language in two countries value 1, 0 otherwise.

Source: Ethnologue: Languages of the World, 14th edition. http://www.ethnologue.com/web.asp

Colony – in the form of dummy for countries ever in colonial relationship – value 1, 0 otherwise.

Source: The dataset freely available at the web page of Andrew K. Rose and used for the paper: Rose, A. (2002): "Do We Really Know that the WTO Increases Trade?" *NBER Working Paper No. 9273.*

Neighboring dummy – in the form of dummy for neighboring countries - value 1, 0 otherwise.

Trade Volume represents bilateral trade flows that are based on IMF Direction of Trade data; the IMF data lists total trade values (both imports and exports) for all country pairs for all years, 1989-2000.

Source: IMF

Dummies for Low-, Lower-middle, Upper-middle and High – Income countries

World Bank definitions of low-income countries, lower-middle-income countries, upper-middle-income countries and high-income countries: Economies are divided according to 2002 GNI per capita, calculated using the World Bank Atlas method. The groups are: *low income*, $735 or less; *lower middle income*, $736 - $2,935; *upper middle income*, $2,936 - $9,075; and *high income*, $9,076 or more.

1: High-income countries
Andorra; Aruba; Australia; Austria; Bahamas; Bahrain; Belgium; Bermuda; Brunei; Canada; Cayman Islands; Channel Islands; Cyprus; Denmark; Faeroe Islands; Finland; France; French Polynesia; Germany; Greece; Greenland; Guam; HongKong, China; Iceland; Ireland; Israel; Italy; Japan; Korea, Rep.; Kuwait; Liechtenstein; Luxembourg; Macao, China; Monaco; Netherlands; Netherlands Antilles; New Caledonia; New Zealand; Northern Mariana Islands; Norway; Portugal; Qatar; San Marino; Singapore; Slovenia; Spain; Sweden; Switzerland; United Arab Emirates; United Kingdom; United States; Virgin Islands (U.S.)

2: Upper-middle-income countries
American Samoa; Antigua and Barbuda; Argentina; Barbados; Botswana; Brazil; Chile; Costa Rica; Croatia; Czech Republic; Dominica; Estonia; Gabon; Grenada; Hungary; Isle of Man; Latvia; Lebanon; Libya; Lithuania; Malaysia; Malta; Mauritius; Mayotte; Mexico; Oman; Palau; Panama; Poland; Puerto Rico; Saudi Arabia; Seychelles; Slovak Republic; St. Kitts and Nevis; St. Lucia; Trinidad and Tobago; Uruguay; Venezuela;RB

3: Lower-middle-income countries
Albania; Algeria; Armenia; Belarus; Belize; Bolivia; Bosnia and Herzegovina; Brazil; Bulgaria; Cape Verde; China; Colombia; Cuba; Dominican Republic; Djibouti; Ecuador; Egypt, Arab Rep.; El Salvador; Fiji; Guatemala; Guyana; Honduras; Iran, Islamic Rep.; Iraq; Jamaica; Jordan; Kazakhstan; Kiribati; Macedonia, FYR; Maldives; Marshall Islands; Micronesia, Fed. Sts.; Morocco; Namibia; Paraguay; Peru; Philippines; Romania; Russian Federation; Samoa; Serbia and Montenegro; South Africa; Sri Lanka; St. Vincent and the Grenadines; Suriname; Swaziland; Syrian Arab Republic; Thailand; Tonga; Tunisia; Turkey; Turkmenistan; Ukraine; Yugoslavia, Fed. Rep.; Vanuatu; West Bank and Gaza;

4: Low-income countries

Afghanistan; Angola; Azerbaijan; Bangladesh; Benin; Bhutan; Burkina Faso; Burundi; Cambodia; Cameroon; Central African Republic; Chad; Comoros; Congo, Dem. Rep.; Congo, Rep.; Côte d'Ivoire; Equatorial Guinea; Eritrea; Ethiopia; Gambia; Georgia; Ghana; Guinea; Guinea-Bissau; Haiti; India; Indonesia; Kenya; Korea, Dem. Rep.; Kyrgyz Republic; Lao PDR; Lesotho; Liberia; Madagascar; Malawi; Mali; Mauritania; Moldova; Mongolia; Mozambique; Myanmar; Nepal; Nicaragua; Niger; Nigeria; Pakistan; Papua New Guinea; Rwanda; São Tomé and Principe; Senegal; Sierra Leone; Solomon Islands; Somalia; Sudan; Tajikistan; Tanzania; Timor-Leste; Togo; Uganda; Uzbekistan; Vietnam; Yemen, Rep.; Zambia; Zimbabwe

Source*:* World Bank

Table 3.A1: Descriptive statistics of basic variables for OECD destination countries (means, standard deviations and number of years observed in the data set)

Mean (St.d.) Numb. of Obs. Years with information	Australia	Austria	Belgium	Canada	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Iceland	Italy
Immigration Flows*	3 830 (4 320) 183 89-00 (12)	1 508 (2 446) 238 86-00 (5)	927 (1 707) 630 90-00 (11)	2 029 (4 267) 1 046 89-00 (12)	83 (398) 1 003 93-00 (8)	206 (560) 1 520 89 -00 (12)	65 (264) 1 524 89-00 (12)	824 (1 604) 1 143 89-00 (12)	15 951 (31 208) 546 89-00 (12)	184 (458) 1 134 89–97 (8)	1 151 (3 395) 158 89-99 (11)	25 (96) 630 92-00 (9)	3412 (6 251) 146 96-00 (5)
Sum of immigration flows **	58 409 (19 760)	29 038 (29 310)	48 656 (12 478)	176 902 (55 537)	6 973 (5 085)	26 091 (6 413)	8 262 (2 136)	78 465 (20 171)	725 797 (192 338)	17 297 (11 208)	15 158 (9 125)	1 325 (1 514)	14 515 (27 865)
Immigration Stock ***	148 943 (236 324) 108 90,95-96,99-00 (5)	5 811 (19 172) 249 91,96-99,00 (6)	15 755 (38755) 656 89-00 (12)	50 787 (1 595 564) 377 91,96,01 (3)	1 582 (6 389) 894 93-00 (8)	1.776 (3 918) 1 520 89-00 (12)	649 (1 758) 1 085 89-00 (12)	41 416 (113 211) 159 90, 99 (2)	57 261 (204 320) 1 364 89-00 (12)	1 188 (2 613) 1 136 89-98 (9)	8 084 (14 883) 74 94-97,99(5)	82 (272) 1 528 89-00 (12)	15 034 (22 491) 519 91-00 (10)
Sum of Immigration Stock******	1 340 486 (1 575 127)	120 581 (219 624)	861 306 (16 602)	1 157 930 (1 620 004)	117902 (89 299)	225 023 (38 322)	58 697 (23093)	548 757 (1 222 297)	6 508 701 (775 077)	112 498 (65 207)	49 850 (59 270)	10 457 (3 145)	650 211 (401 031)
Population (in thousands)	18 000 (725) 1 548 89-00 (12)	7 959 (153) 1 548 89-00 (12)	10 100 (99) 1 548 89-00 (12)	29 100 (1 089) 1 548 89-00 (12)	10 300 (18) 1 548 89-00 (12)	5 227 (69) 1 548 89-00 (12)	5 088 (68) 1 548 89-00 (12)	57 700 (7387) 1 548 89-00 (12)	78 400 (7 058) 1 548 89-00 (12)	10 400 (166) 1 548 89-00 (12)	10 200 (103) 1 548 89-00 (12)	266 (8) 1 548 89-00 (12)	57 300 (342) 1 548 89-00 (12)
GDP per capita PPP (constant 1995 int.$)	21 219 (1 757) 1 548 89-00 (12)	22 591 (1 597) 1 548 89-00 (12)	21 632 (1 259) 1 548 89-00 (12)	22 480 (1 451) 1 548 89-00 (12)	11 743 (749) 1 290 91-00 (10)	23 899 (1 529) 1 548 89-00 (12)	19 864 (1 529) 1 548 89-00 (12)	21 095 (948) 1 548 89-00 (12)	30 047 (1 287) 1 548 89-00 (12)	13 225 (906) 1 548 89-00 (12)	4 612 (3 816) 89-00 (12)	22 866 (1 584) 1 548 89-00 (12)	20 989 (953) 1 548 89-00 (12)
Unemployment rate (% of the labour force)	8.153 (1.472) 1 548 89-00 (12)	5.013 (0.602) 1 548 89-00 (12)	8.431 (1.264) 1 548 89-00 (12)	9.142 (1.432) 1 548 89-00 (12)	4.823 (2.322) 1 419 90-00 (11)	7.146 (1.647) 1 548 89-00 (12)	11.007 (4.495) 1 548 89-00 (12)	10.794 (1.180) 1 548 89-00 (12)	7.592 (1.146) 1 548 89-00 (12)	9.509 (1.506) 1 548 89-00 (12)	8.562 (2.703) 1 419 90-00 (11)	3.044 (1.336) 1 548 89-00 (12)	10.624 (1.186) 1 548 89-00 (12)
Trade Volume between two countries *j* and *i*. (in thousands)	782 (2521) 1 434 89-00 (12)	890 (4 190) 1 445 89-00 (12)	2 325 (8 332) 1 448 89-00 (12)	2 765 (23 942) 1 448 89-00 (12)	433 (1 716) 803 93-00 (8)	635 (2044) 1 445 89-00 (12)	484 (1 309) 1 451 89-00 (12)	4 177 (13 302) 1 447 89-00 (12)	7 197 (18 123) 1 444 89-00 (12)	293 (845) 1 369 89-00 (12)	308 (1 249) 1011 90-00 (11)	36 (96) 1 180 89-00 (12)	3195 (9 118) 1 432 89-00 (12)
Tax revenue (% of GDP)	29.073 (1.096) 1 419 89-99 (11)	42.533 (1.342) 1 548 89-00 (12)	44.575 (1.159) 1 548 89-00 (12)	37.167 (0.711) 1 548 89-00 (12)	40.025 (14.401) 1 032 93-00 (8)	48.892 (1.151) 1 548 89-00 (12)	45.642 (1.194) 1 548 89-00 (12)	44.158 (1.059) 1 548 89-00 (12)	36.800 (1.782) 1 548 89-00 (12)	32.142 (3.210) 1 548 89-00 (12)	42.620 (3.033) 1 548 89-00 (12)	32.633 (2.068) 1 548 89-00 (12)	41.633 (1.952) 1 548 89-00 (12)
No. of years with complete info on all variables	5	5	11	3	8	12	12	2	12	8	5	9	5

* Mean and st.d. for each particular migration flow from country *j* to country *i*

** mean and st.d. for the sum of migration flows to country *i*

*** mean and st.d. for stock of immigrants originating from country *j* residing in country *i*

**** mean and st.d. for the sum of stocks of immigrants in country *i*

(continued)

Table 3.A1(cont): Descriptive statistics of basic variables for OECD destination countries (means, standard deviations and number of years observed in the data set)

Mean (St.d.) Numb. of Obs. Years with information	Japan	Luxembourg	Netherlands	New Zealand	Norway	Poland	Portugal	Slovak Republic	Spain	Sweden	Switzerland	United Kingdom	United States
Flows of immigrants to the country *	15 423 (16 862) 163 89-00 (12)	886 (814) 93 89-00 (12)	938 (1 754) 823 95-00 (6)	3 962 (4 944) 106 89-00 (12)	529 (936) 638 89-00 (12)	409 (516) 150 89-00 (12)	209 (534) 238 92-00 (9)	17 (90) 499 97-00 (4)	1190 (5030) 525 89-00 (12)	365 (1 216) 1440 89-00 (12)	889 (3 088) 1460 89-00 (12)	879 (1 473) 707 91-00 (10)	7 566 (35 316) 1463 89-00 (12)
Sum of immigration flows to the country **	209 494 (36 018)	6 867 (394)	64 350 (18 716)	34 996 (4 373)	28 101 (4 969)	5 118 (1 917)	4 153 (5 928)	704 (998)	52 047 (86 327)	43 821 (11 941)	108 145 (35 081)	51 805 (29 475)	922 410 (332 837)
Stock of immigrants in the country ***	34 548 (110 834) 246 90,95,97-00 (6)	3 825 (9 460) 387 89-00 (12)	10 792 (31 109) 773 90,95-00 (7)	11 330 (35 080) 125 91,96,01 (3)	2 798 (4 072) 663 89-00 (12)	20 204 (55 505) 37 01 (1)	6 172 (8 300) 264 89-00 (12)	201 (696) 757 95-00(6)	11 997 (19 930) 447 91-00 (10)	9 056 (23 666) 1155 89-00 (12)	10 356 (40 218) 1456 89-00 (12)	51 590 (90 234) 655 92-00 (9)	300 190 (791 623) 620 90, 94-00 (8)
Sum of immigration stock in the country ******	708 234 (720 044)	123 348 (17 246)	695 195 (620880)	118 018 (206 090)	154 599 (16 952)	62 295 (278 686)	135 780 (34 750)	12 672 (12 812)	446 883 (243 560)	871 670 (75 939)	1 256 522 (91 264)	2 815 967 (1452974)	15 500 000 (11 100 000)
Population (in thousands)	125 000 (1 155) 1 548 89-00 (12)	409 (18) 1 548 89-00 (12)	15 400 (327) 1 548 89-00 (12)	3 617 (165) 1 548 89-00 (12)	4 350 (83) 1 548 89-00 (12)	38 500 (227) 1 548 89-00 (12)	9 894 (59) 1 548 89-00 (12)	5 366 (20 629) 1 548 89-00 (12)	39 200 (217) 1 548 89-00 (12)	8 744 (125) 1 548 89-00 (12)	697 (168) 1 548 89-00 (12)	58 500 (703) 1 548 89-00 (12)	262 000 (8 789) 1 548 89-00 (12)
GDP per capita PPP (constant 1995 int$)	22 476 (964) 1 548 89-00 (12)	35 351 (6 780) 1 548 89-00 (12)	21 770 (1 745) 1 548 89-00 (12)	16 568 (1121) 1 548 89-00 (12)	27 812 (2 912) 1 548 89-00 (12)	7 332 (975) 1 548 89-00 (11)	13 460 (1228) 1 548 89-00 (12)	9 301 (960) 1 548 89-00 (12)	15 214 (1 262) 1 548 89-00 (12)	19 930 (1 124) 1 548 89-00 (12)	25 670 (422) 1 548 89-00 (12)	20 020 (1 467) 1 548 89-00 (12)	28 069 (1 872) 1 548 89-00 (12)
Unemployment rate (% of the labour force)	3.12 (0.928) 1 548 89-00 (12)	2.417 (0.787) 1 548 89-00 (12)	5.591 (1.503) 1 548 89-00 (12)	7.698 (1.499) 1 548 89-00 (12)	4.709 (0.965) 1 548 89-00 (12)	12.507 (2.415) 1 548 90-00 (11)	5.464 (1.180) 1 548 89-00 (12)	12.886 (3.037) 1 290 91-00 (10)	18.868 (3.171) 1 548 89-00 (12)	5.675 (2.418) 1 548 89-00 (12)	3.048 (1.638) 1 548 89-00 (12)	7.552 (1.709) 1 548 89-00 (12)	5.574 (1.054) 1 548 89-00 (12)
Trade Volume between two countries *j* and *i*. (in thousands)	5351 (18 454) 1 369 89-00 (12)	189 (742) 376 97-00 (4)	2 549 (8 809) 1 409 89-00 (12)	200 (686) 1 299 89-99 (11)	571 (1 751) 1 429 89-00 (12)	417 (1 585) 1 428 89-00 (12)	417 (1 402) 1 421 89-00 (12)	189 (702) 785 95-00 (6)	1544 (4 841) 1 433 89-00 (12)	1 025 (2 788) 1 436 89-00 (12)	1 173 (4 239) 1 434 89-00 (12)	3 879 (10 402) 1 413 89-00 (12)	10 432 (33 280) 1 441 89-00 (12)
Tax revenue (% of GDP)	28.158 (1.350) 1 548 89-00 (12)	41.100 (1.188) 1 548 89-00 (12)	42.892 (1.423) 1 548 89-00 (12)	36.900 (1.012) 1 548 89-00 (12)	41.492 (0.846) 1 548 89-00 (12)	37.584 (1.960) 1 290 91-00 (10)	32.058 (1.679) 1 548 89-00 (12)	33.256 (1.817) 645 96-00 (5)	33.692 (0.831) 1 548 89-00 (12)	50.925 (1.984) 1 548 89-00 (12)	32.717 (1.759) 1 548 89-00 (12)	35.492 (1.210) 1 548 89-00 (12)	26.942 (2.118) 1 548 89-00 (12)
No. of years with complete info on all variables	6	4	6	3	10	1	9	4	10	12	12	9	8

* Mean and st.d. for each particular migration flow from country *j* to country *i*

** Mean and st.d. for the sum of migration flows to country *i*

*** Mean and st.d. for stock of immigrants originating from country *j* residing in country *i*

**** Mean and st.d. for the sum of stocks of immigrants in country *i*

Chapter 4

Where Did Central and Eastern European Emigrants Go and Why? ♣

by

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Abstract: This paper analyses migration flows from 9 Central and Eastern European (CEE) countries after the fall of the "Iron Curtain", 1990-2000. Contrary to most of the previous literature, I analyze migration determinants on actual migration flows from the CEE countries into a number of destination countries. Besides economic differences between sending and receiving countries, I include a number of other variables, e.g. language preferences, education, social security pulls and other factors that help to explain migration behavior. My analyses reveal that the economic push/pulls factors play an important role in international migration from those countries. The disaggregated results show that there are large differences between the CEE countries with respect to emigration patterns. The lagged stock of immigrants, which may reflect networks has a strong and positive effect for immigrants from Central European countries, and Romania and Bulgaria, while immigrants from the Baltic countries seem to rely much less on networks. Income gaps have a positive effect on migration flows, particularly from the Southeastern countries, while employment opportunities in destination countries are main determinants of the migration flows from the Baltic and Central European countries.

Keywords: International migration, panel data
JEL-code: J61, F22, O15

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4.1. INTRODUCTION

This paper focuses on the migration flows from Central and Eastern European countries (CEECs)[37] after the fall of the "Iron Curtain". I analyze the importance of economic push and pull factors for the observed flows during the period 1990-2000. This is of great interest as those countries constitute a relatively new and large source of immigration. After forty years of communist regime characterized by emigration stop, the "Iron Curtain" fell, which brought, among other things, the possibility of movement abroad. The decade following the fall of the Iron Curtain brought a period full of changes in post-communistic countries, which also was reflected in the development of migratory pressures.

The issue of migration flows from Central and Eastern European countries became especially hot in Europe in connection with the European Union (EU) enlargement towards the East. There was a fear that, if 10 new EU members that joined May 1st 2004 had a right to free movement upon accession[38], a large-scale migration wave might occur. Consequently, the majority of the "old" EU member states imposed temporary restrictions on the mobility from those countries.[39]

In the years up to the EU enlargement, a relatively rich empirical literature on the determinants of migration in connection with the EU enlargement was produced. Due to lack of data on migration from CEECs, the previous studies analyzing East-West migration have typically relied on out-of-sample historical data.[40] So far, to the best of my knowledge, empirical evidence on actual migration behavior from Central and Eastern European countries does not exist. Moreover, as most of the

[37] Here, I use the following definition of CEEC immigrants: *new EU members*: the Czech Republic, Hungary, Poland, the Slovak Republic, Estonia, Latvia and Lithuania and *other potential EU accession countries*: Bulgaria and Romania.

[38] The freedom of movement of workers between the EU states is one of the EU *acquis commanautaire.*

[39] The only countries that have opened their labor markets to the 10 new EU members from the date of EU enlargement in May 2004 are Sweden, the UK and Ireland. The rest of the EU countries still have an option to keep restrictions on mobility from the new members up to 7 years from enlargement. After 2006, the rest of "old" EU member states will decide whether to extend the "transition period" for another three years. The "transition period" should end five years after the 2004 enlargement, but it may be prolonged for additional two years in those EU member states, where "migration might threaten to cause serious disturbances on the labor market" (European Commission, 2001).

[40] I.e. migration waves from other countries than the CEECs.

studies focus on forecasting CEE migration potential, the choice of explanatory variables in a model is usually restricted to inclusion of income and unemployment variables and fixed or random effects that capture unobservable characteristics, see e.g. Alvarez-Plata et al. (2003), Bauer and Zimmerman (1999), Dustmann et al. (2003) and Boeri and Brücker (2001). But besides the differences in income and unemployment, there are many other economic and non-economic factors that play a role in migration decision-making, like e.g. cultural and linguistic distance, educational pulls, love, social benefits, tax pressures or/and immigration policies, see e.g Pedersen et al. (2004) and Chiswick and Hatton (2003). Last but not least, the majority of the studies analyze migration flows into one destination country or/and to the whole European Union, see e.g. Bauer and Zimmermann (1999), Alvarez-Plata et al. (2003) and Zaiceva (2004). But CEE migrants didn't head solely towards the EU-15 countries. They also migrated to other countries especially the traditional "old" immigration countries like the US, Canada and Australia, or to the Central and Eastern European countries as well.

Contrary to most of the previous literature, I analyze the determinants of CEE migration on actual migration flows from a number of CEECs into a number of destination countries including large immigration countries outside EU-15 like the US, Australia etc. This allows me to look at emigration from Central and Eastern Europe in a more comprehensive way. Besides economic differences between sending and receiving countries, I include a number of other variables, e.g. language preferences, tertiary education, social security benefits and other factors that help to explain migration behavior. Specifically, I estimate a number of regression models on the annual flow of migrants from 9 CEECs into 18 OECD countries for the period 1990-2000. The questions I address in this paper are the following: Where did the CEE immigrants go and why? What are the macroeconomic determinants of migration flows from these countries?

The paper is organized as follows: Section 4.2 gives a brief overview of the migration theory and the existing literature. Section 4.3 describes the data and gives an overview on economic, demographic and labor market developments and conditions in the CEECs. In this section, I proceed with a description of migration flows and stocks from the countries of origins and try to answer the part of the question from the title, namely: "Where did Central and Eastern Europeans go?" Next, Section 4.4 turns towards the second part of the question, namely: "Why did

they migrate?" In this section, my empirical model, analyses and results on the determinants of CEE migration are presented and discussed. Finally, Section 4.5 concludes.

4.2. THEORY AND PREVIOUS RESEARCH ON MIGRATION DETERMINANTS

The determinants and consequences of migratory movements have been long discussed in the economic literature. The first contributions can be found in the neoclassical economics, which stress differentials in wages as a primary determinant of migration (Hicks, 1932). The "human capital investment" theoretical framework (Sjaastad, 1962) adds existence of migration costs in migrants' decision making so that a person decides to move if the discounted expected future benefit is higher than the costs of migration.[41] The "human capital investment" theoretical framework has been further adjusted for the probability of being employed; see Harris and Todaro (1970).[42] In the aggregate terms, the differentials in wages and probability of being unemployed are typically proxied by GDP per capita levels in destination and source countries and unemployment rates[43], respectively.

The effect of GDP per capita in the source country may be more mixed. Earlier studies have found an inverted 'U' relationship between source country GDP and emigration, see Faini and Venturini (1994), Hatton and Williamson (2002) and Pedersen et al. (2004). At very low levels of GDP, emigration is low because people are too poor to pay the migration costs. At higher income levels, migration increases, and as GDP levels increase further, migration may again decrease because the economic incentives to migrate to other countries decline.

In addition to these economic determinants, Borjas (1999) argues that generous social security payment structures may play a role in migrants' decision making. The idea behind is that potential emigrants must take into account the probability of being unemployed in the destination country. The consequences of this risk may be lowered by the existence of welfare benefits in the destination country. Such a

[41] The theoretical framework describing migrants' behavior has considered the decision-maker to be a Homo Economicus, whose decisions are perfectly rational in the economic sense and are based on immediate and complete information.
[42] Harris and Todaro (1970) focus on the determinants of rural-urban migration.
[43] Sometimes employment or vacancy rates are used instead of unemployment rates.

welfare income is basically a substitute for earnings during the period of searching for a job. However, empirical studies in majority do not support the Borjas' "welfare magnet" hypothesis, e.g. Zavodny (1997), Urrutia (2001) and Pedersen et al. (2004). The fear of the "welfare magnet"[44] and of migrants coming to get a best mix of benefits, wages and taxes has dominated the EU enlargement debate.[45]

The costs of migration are also shown to be an important part of migrants' decision making. The migration costs are not only the out-of-pocket expenses, but also psychological costs connected to moving to a foreign country and leaving family, friends and the known environment. The costs typically increase with the physical distance between two countries. In addition to that, the linguistic and cultural distance is important as well. The more "foreign" or distant the new culture and the larger the language barrier is, the higher are the costs of an individual to migrate and the less likely is it that the individual decides to migrate, holding all other factors constant. However, changes and improvements in communication technologies and declining costs of transportation may imply that the effect of "distance" has been reduced during the latest decades. Further, network effects may also counteract "distance". Through "networks" potential migrants receive information about the immigration country - about the possibility of getting a job, economic and social systems, immigration policy, people and culture. This facilitates immigration and the adaptation of new immigrants into the new environment. Network effects may also help to explain the persistence of migration flows, see e.g. Epstein (2002), Bauer et al. (2002) and Heitmueller (2003). Empirical evidence has shown that migrant networks have a significant impact on sequential migration, see e.g. Pedersen et al. (2004), who also show that networks are more important to people coming from low-income developing countries compared to migrants originating from high-income countries.

[44] The term was introduced in Borjas (1999).

[45] An example of defining such a fear of the "welfare magnet" can be found in a study by Kvist (2004), which in addition to commonly used labels for national fears such as "social tourism" and "social dumping", introduces a term "social raids" as "…surprise attacks on national social security by small or large groups of people from abroad".

In line with the human capital framework, empirical studies confirm that socio-demographic characteristics of an individual such as age, gender and education[46] matter in the decision to migrate. Usually, the young and more educated individuals are more mobile – as they have higher "returns to migration". Thus, the socio-demographic structure of a source country population matters, see e.g. Chiswick (2000), Fertig and Schmidt (2000), Bauer and Zimmerman (1999) and Krieger (2004).

Some studies show that it is important to distinguish between short-run and long-run determinants of emigration and that migration flows are sensitive to short-run changes in economic conditions, see e.g. Hatton (1995), Chiswick and Karras (1999), Fertig (2001) and Chiswick and Hatton (2003). This might be explained by the option value of waiting, see Burda (1995) and Burda et al. (1998). For an individual who considers to migrate it may pay off to wait and migrate the next year in the case that the economic conditions in the destination country would improve. Thus, although the decision of an individual to migrate is based on the long-run differences in wages and employment, the timing of the actual move is correlated with cyclical fluctuations in source and destination countries.

The decision to migrate has also been analyzed as e.g. a family or household decision. A move takes place only if the net gain accruing to some members exceeds the others' net loss, see Mincer (1978), Holmlund (1984). Labor migration can also be taken as the risk-diversifying strategy of families, which implies that households diversify their resources such as labor, in order to minimize risks to the family income, Stark (1991). Further, Stark (1984) argues that members of a family migrate not necessarily to increase the family's absolute income, but rather in terms of relative deprivation, i.e. to improve the family's position relative to that of e.g. other households.

Last but not least, immigration policies strongly contribute to shape migration flows as they differ between potential receiving countries. Although it plays an important role in explaining migration flows, it is usually quite hard to find a variable that

[46] It is argued that the more educated individual has a greater ability to e.g. collect and process information, which lowers the risk and increases the propensity to migration, or to learn a foreign language.

would capture the effect of immigration policies and changes in the immigration policies over time.

A quite substantial body of literature exists on the determinants of migration from CEECs in connection with the EU enlargement that aims to predict a future migration potential from these countries. Consequently, as the main goal of the studies is to make the predictions, there are obviously just a few explanatory variables included that are relatively easy to predict as e.g. differences in income or/and employment[47], see e.g. Alvarez-Plata et al. (2003), or demographic structures, see e.g. Fertig and Schmidt (2000).

This paper adds to the above empirical evidence. It explores a panel dataset structure with information on both sending CEECs and receiving OECD countries. It enhances the CEECs' emigration literature by including additional important factors that played a role in the emigration from CEECs during the turbulent nineties.

4.3. DATA

The analysis is based on information on migration flows and stocks in 18 OECD destination countries from 9 Central and Eastern European source countries for the years 1989–2000[48], see Appendix, Table 4.A, for a list of countries included. Besides the flow and stock information, the dataset contains a number of other time-series variables, which might help to explain the determinants of migration across countries. These variables are collected from different sources, e.g. national statistical offices, OECD, World Bank, UN, ILO and IMF publications. For a more comprehensive description of the dataset, see Pedersen et al. (2004, 2006).

Although the dataset presents a substantial progress over those used in earlier research, there are still some problems. First, the dataset is unbalanced, i.e. observations are missing in the panel. For the majority of destination countries, I have information on migration flows and the stocks of immigrants for most of the years, but with different numbers of observations for each destination country, see

[47] But even for these variables it is quite difficult to get a precise prediction of their future development.

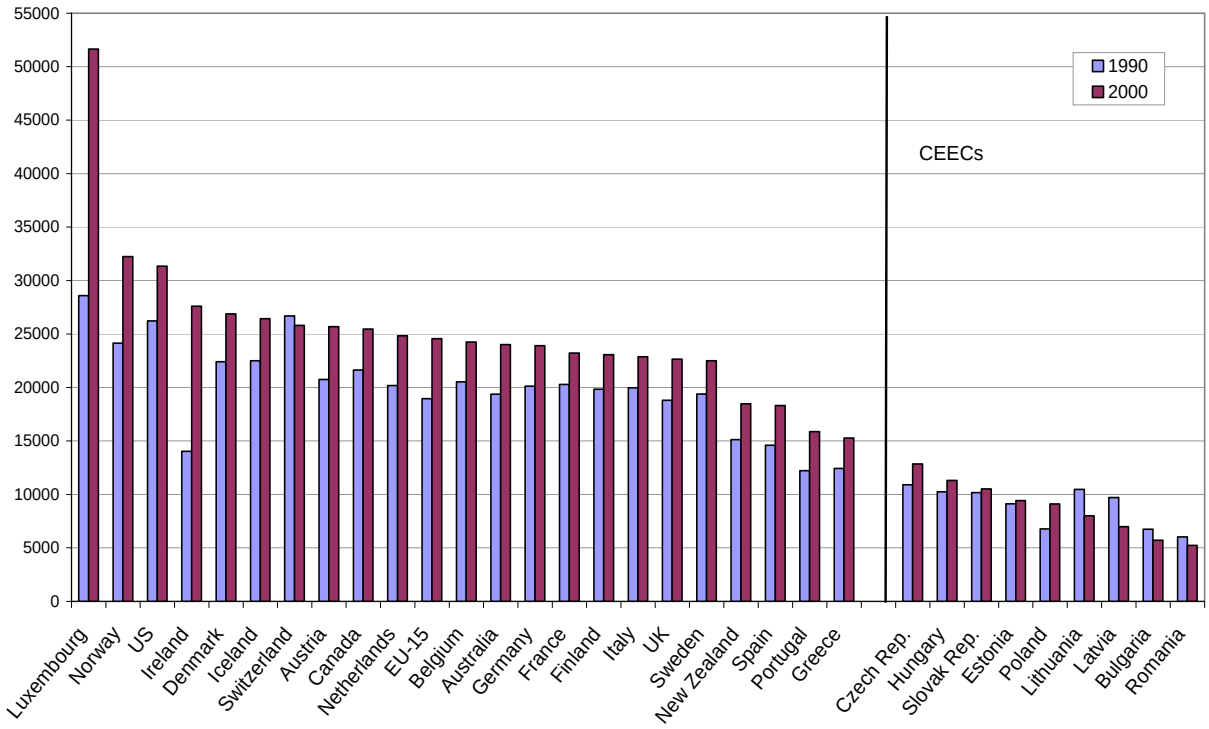
[48] The dataset originally covered 27 OECD destination and 129 source countries, see Pedersen et al. (2004) for a detailed description of the dataset. In this paper, I restricted it to a sample of 18 destination and 9 CEE source countries.

Appendix, Tables 4.B1 and 4.B2, for means and standard deviations for all flows, stocks and other variables for each destination and source country. Another problem is that different countries use different definitions of an "immigrant"[49] and different sources for their migration statistics. For a description of some of the difficulties related to collecting international migration data, see Pedersen et al. (2004, 2006).

4.3.1. Economic conditions

There are large differences in the level of GDP per capita measured in PPP, between the CEECs and their Western European neighbors and other developed OECD countries. According to Figure 4.1, the nine CEECs under analysis were and still are far below the average for the rich OECD countries.

Figure 4.1: GDP PPP per capita in the OECD and CEE countries, 1990 and 2000.



Source: The World Bank: World Development Indicators.

However, some of the countries like the Czech Republic and Hungary achieving 57% and 54% of the "old" EU-15 average, respectively, have been comparable to

[49] Some use foreign-born (by countries of birth), some foreigners (by citizenship/nationality).

the more poor EU member states, Greece and Portugal. But the gap was more than significant in the case of Romania (36%) and Bulgaria (32%) in 1990.

The early years of the transformation brought deep changes in the post-communistic economies, their labor markets and societies. The countries experienced several drastic recessions due to a collapse of the planned systems and their restructuring into market economies. This was accompanied by a break down of trade relations with the former Soviet Union and their shift towards the EU, see Bauer and Zimmerman (1999).

Therefore, the economic differences even deepened during the early nineties as the growth rates in most of the CEECs were negative, see Table 4.1, due to the recessions mentioned above. Especially the Baltic countries experienced a deep fall during the crisis in the beginning of the nineties. Consequently, the level of GDP per capita, PPP, in the Baltic countries in year 2000 still didn't achieve the economic level from 1990.[50]

Table 4.1: GDP growth in the CEE countries, 1989-2000.

GDP Growth	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Czech Rep.	-	-	-11,61	-0,52	0,06	2,22	5,95	4,29	-0,77	-1,20	-0,39	2,94
Hungary	0,74	-3,50	-1,89	-3,06	-0,58	2,95	1,49	1,34	4,57	4,86	4,17	5,15
Poland	-	-	-7,00	2,60	3,80	5,20	7,00	6,00	6,80	4,80	4,10	4,00
Slovak Rep.	1,21	-2,67	-14,57	-6,72	-3,70	4,92	6,73	6,21	6,20	4,10	1,90	2,20
Estonia	3,07	-7,06	-8,00	-2,12	-8,35	-2,00	4,29	3,91	1,06	4,72	-1,12	6,44
Latvia	6,00	-1,00	-10,00	-35,00	-15,00	1,00	-1,00	3,00	9,00	4,00	1,00	7,00
Lithuania	-	-	-6,00	-21,00	-16,00	-10,00	3,00	5,00	7,00	5,00	-4,00	4,00
Bulgaria	-3,29	-9,12	-8,45	-7,27	-1,48	1,82	2,86	-1,01	-7,04	3,50	2,40	5,80
Romania	-5,80	-5,70	-1,29	-8,78	1,53	3,94	7,12	3,95	-6,05	-4,16	-1,20	1,80

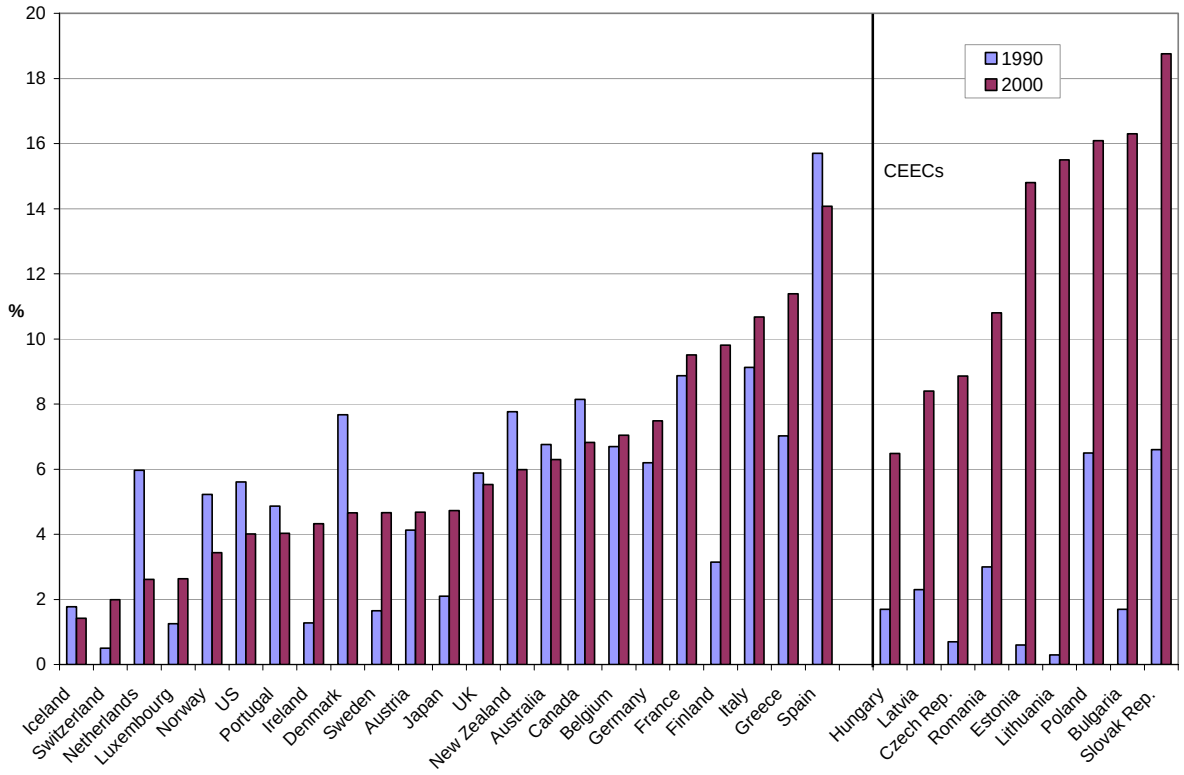
Source: The World Bank: World Development Indicators.

The period after the fall of the Iron Curtain has also been characterized by transition of the labor markets from the nearly full employment that the countries enjoyed as centrally planned economies towards relatively high unemployment, see Figure 4.2. As a result, the unemployment rates in CEE countries were among the highest in OECD in 2000, see Figure 4.2.

[50] However, it might also be due to measurement problems of the GDP level in 1989.

These economic pull/push factors in the form of higher GDP levels and sharply growing unemployment rates at the source countries, together with the suddenly acquired freedom of international mobility compared to the period before 1989, created strong incentives to migrate.

Figure 4.2: Unemployment rates in the OECD countries, 1990 and 2000.



Source: The World Bank: World Development Indicators. Year 1991 and 1992 instead of year 1990 has been used for the Slovak Republic, Lithuania and Romania, and for Latvia, respectively.

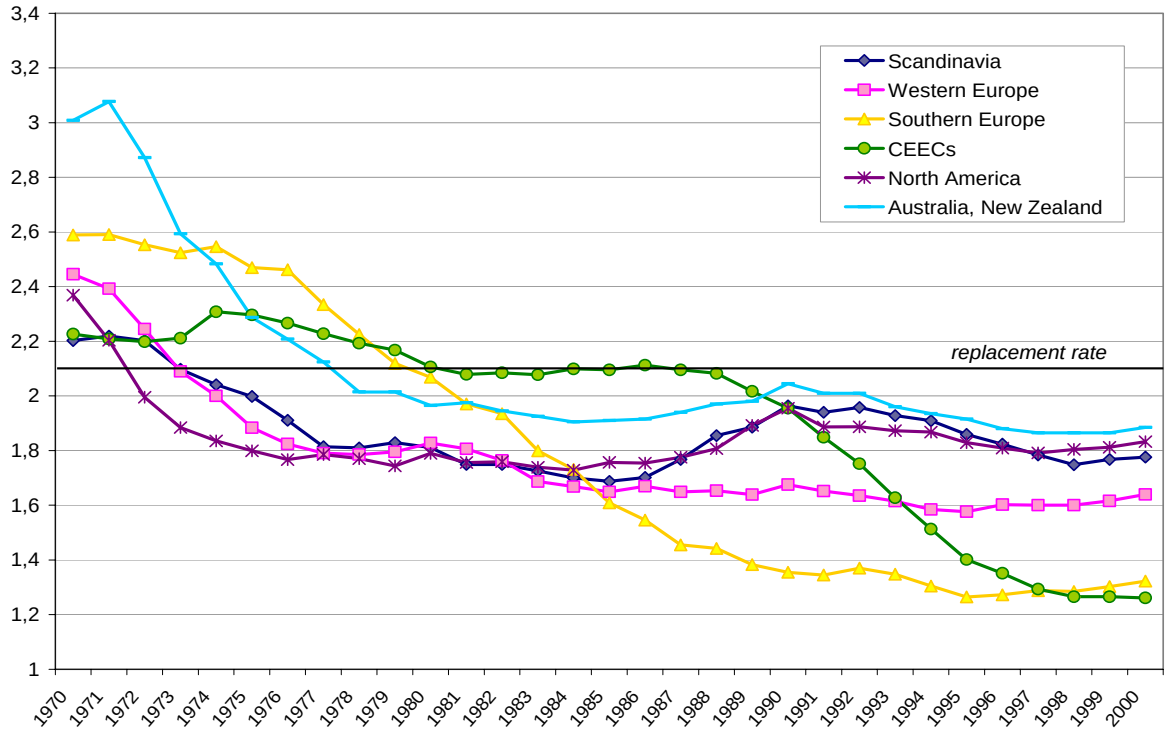
4.3.2. Demographic factors

As already mentioned, the socio-demographic structure of a source country population is important from the migration potential point of view. All CEECs except the Slovak Republic[51] experienced a slow shrinkage of their population during the nineties. It is mostly because of the development in fertility rates[52], see Figure 4.3. The fertility in those countries has decreased even more than in other

[51] But even the population in the Slovak Republic started to decline after the year 2000.
[52] A decreasing population size in CEE is partly related to decreasing life expectancy of men, but mainly it stems from very low fertility rates.

European countries or in the United States and Australia. In the year 2000, the average CEE fertility was only 1.25 children per woman, which is far below the replacement rate of 2.1. Thus, similarly to most of the EU-15 countries, the CEECs will be confronted with rapidly aging populations and shortages on the labor markets over future decades.

Figure 4.3: Development in fertility rates. Groups of OECD countries 1970-2000.



Source: The World Bank: World Development Indicators.

However, because of the higher fertility in the 1970s and 1980s, most countries in the CEE still have relatively young populations compared to other OECD countries[53], see Figure 4.3.

The populations in the CEECs are relatively well-educated. The gross secondary and tertiary enrollment rates are comparable to the rest of the developed OECD countries, see Table 4.2. In the case of gross tertiary enrollment rates, some CEECs,

[53] There are several reasons why the fertility rates have been relatively higher during the years of communist regime in the 1970s and 1980s. First, the strong post-war generations came to their fertility age. Second, married couples with children had priority on a housing list; and last but not least, there were no (exciting) job careers for young people, and at the same time they had no possibilities to travel abroad and explore the world.

e.g. the Baltic countries Latvia and Estonia, have even higher enrollment rates than the OECD average.[54]

Table 4.2: Gross enrollment rates, secondary and tertiary, year 2000.

Year 2000	Gross Secondary Enrollment Rate	Gross Tertiary Enrollment Rate
Czech Republic	87.9	29.8
Hungary	98.6	40.0
Poland	98.4	55.5
Slovak Republic	86.6	30.3
Estonia	107.0	57.5
Latvia	90.9	63.1
Lithuania	95.2	52.5
Bulgaria	92.4	40.8
Romania	80.2	27.3
Developed OECD average	114.0	55.9

Source: The World Bank: World Development Indicators.

As discussed in the previous section, the more educated and the young are more likely to migrate as they have higher gains from migration. The relatively larger share of the young population in the CEECs compared to other OECD countries and relatively high level of education in the CEE source countries may have a positive effect on migration pressures from those countries.

4.3.3. Language

The ability to speak a foreign language is an important factor in the potential migrants' decision making. Fluency in particular languages plays a key role in the transfer of human capital to a foreign country and therefore it helps the immigrant to be successful at the destination country's labor market, see e.g. Chiswick and Miller (2002, 2004), Dustmann and Fabbri, (2003) and Dustmann et al. (2003).

Table 4.3 shows the proportion of the populations in the CEECs that is able to communicate in a foreign language. There is still a prevalence of Russian as a

[54] However, an important question is how transferable educations from those countries are. Another question is related to the quality of education. Especially troublesome are the disciplines within the social sciences, which suffered a lot during the forty years of communist regime. For a discussion on this issue, see e.g. Ammermueller et al. (2005).

foreign language[55], especially in the Baltic countries. English is a popular language in most of the countries followed by German, which is known especially in countries on the border to Germany and Austria, i.e. the Czech and Slovak Republics, where German has a long historical tradition.

At the same time, the knowledge of at least one widely used foreign language became a necessary requirement to obtain a job in the CEECs.[56] The Eurobarometer survey of 10,000 young people in CEECs reveals that language proficiency is cited by 81% of the young people in the CEE countries as an essential skill for finding a good job in their home countries compared with 44% of their counterparts in the "old" EU-15 countries, see European Commission (2002). Hence knowledge of a foreign language is considered to be an important part of the human capital on the CEE labor markets.

Table 4.3: Proportion of the populations in the CEECs with a knowledge of foreign language, 2000.

In %	Czech[57] Republic	Hungary	Poland	Slovak Republic	Estonia	Latvia	Lithuania	Bulgaria	Romania	Average
English	22	14	22	18	28	26	21	14	16	20
German	27	14	15	22	11	13	15	6	4	14
Russian	19	2	24	30	53	60	78	20	3	32
French	4	2	3	2	1	1	3	3	10	3
Spanish	1	1	1	1	0	1	0	1	1	1
Italian	2	1	1	1	0	0	0	1	4	1

Source: European Commission: Candidate Countries Eurobarometer (CCB). Response to a question: Which languages can you speak well enough to take part in a conversation apart from your mother tongue?

Table 4.4 shows the choice of two languages that people in the CEECs find most useful. English is chosen to be among the two important languages by on average 88% of the interviewed people. German has the highest popularity in the countries

[55] Except in Romania and Hungary.

[56] One of the reasons is that those countries, mostly small open economies, experience a strong interaction with the Western world in their trade and other relations, and at the same time a relative lack of people with the "widely spoken" language skills.

[57] Both the Czech and Slovak Republics have many people speaking Slovak (21%) and Czech (45%), respectively, due to a common historical past.

bordering on Germany, but also in other CEECs. Russian is important for the Baltic countries and French for Romania.[58]

This suggests an interesting hypothesis to test, namely, that potential migrants prefer to choose a destination with a "widely spoken" language as the native language. There may be two different forces driving this migration pattern. First, knowledge of particular foreign languages increases the chances of a potential immigrant to be successful at the foreign labor market and helps to lower his/her costs of migration. As one or two of the "widely spoken" languages are taught at schools in the CEECs, the immigrants from those countries are more likely to migrate to destinations, where the languages are spoken. Second, the foreign language proficiency is considered to be an important part of human capital at the local CEE labor markets. Thus, the learning/practicing/improving of "widely spoken" language in the "native" countries serves as a pull factor especially for temporary migrants.

Table 4.4: The two most useful foreign languages in the CEECs, 2000.

In %	Czech Republic	Hungary	Poland	Slovak Republic	Estonia	Latvia	Lithuania	Bulgaria	Romania	Average
English	89	91	92	91	92	93	86	76	86	88
German	69	80	74	75	25	31	46	41	29	52
Russian	9	2	9	5	32	34	32	15	1	15
French	12	7	11	8	9	6	8	13	51	14
Spanish	4	2	2	3	2	1	3	4	4	3
Italian	1	3	2	1	0	1	3	3	8	2

Source: European Commission: Candidate Countries Eurobarometer (CCB). Response to a question: In your opinion, which languages do you think are the most useful to know apart from your mother tongue?

From the discussion above and Tables 4.3 and 4.4, it seems that the English- and German-speaking countries are preferred to other countries. Thus, those languages would constitute an additional pull factor in emigration from the CEECs.

4.3.4. Networks

Migration networks help to reduce the direct and indirect migration costs and therefore they play an important role in the decision making of potential migrants.

[58] It is mostly due to linguistic closeness between the two languages as Romanian belongs to the Romanic family of languages.

As can be seen in Table 4.5, there have been around 2.5 and 2.9 million CEE migrants living abroad in 1990 and 2000, respectively. This amounts to 2.5 and 3% of the CEE source countries' populations in 1990 and 2000, respectively.

Table 4.5: Central and Eastern European stock of immigrants by group of host countries, 1990 and 2000.

	1990		**2000**		
	Absolute	*% of CEE population*	Absolute	*% of CEE population*	Increase in absolute numbers
Western Europe	758.193	*0,781*	965.724	*0,954*	27,37 %
Southern Europe	104.636	*0,114*	209.974	*0,210*	100,67 %
Scandinavia	105.689	*0,104*	133.623	*0,131*	26,43 %
The US, Canada	1.096.715	*1,060*	1.198.210	*1,174*	9,26 %
Australia, New Zealand	146.339	*0,207*	131.103	*0,186*	-10,41 %
CEECs	243.989	*0,266*	265.406	*0,291*	8,78 %
Total	**2.455.561**	***2,532***	**2.904.040**	***2,946***	***18,26 %***

Note: Due to data availability, the table shows information on: 1991 instead of 1990 for Austria, Iceland, Italy and Spain; 1991 and 2001 instead of 1990 and 2000, respectively, for Canada, Luxembourg and New Zealand; 1999 instead of 2000 for France; 1997 instead of 2000 for Greece; 1994 instead of 1990 for the Czech Republic; 1995 instead of 1990 for the Slovak Republic and 1992 instead of 1990 for the UK. Spain has records of the stock from Poland and the Czech and Slovak Republics only. UK numbers do not contain Baltic countries: Estonia, Latvia and Lithuania. Ireland and Portugal have been excluded due to non-detailed information on CEE countries of origin, Poland due to having only one year (2001) census data.

Source: National statistical offices, Own calculations.

The highest share of migration stock from those countries can be found in North America[59] followed by Western European countries, specifically Germany[60],

[59] I made the following division of host countries: *Scandinavia:* Denmark, Iceland, Finland, Sweden, Norway; *Western Europe:* Austria, Belgium, France, Germany, Luxembourg, the Netherlands, Switzerland, the UK; S*outhern Europe:* Greece, Italy, Portugal, Spain; *North America:* the US and Canada; *Oceania:* Australia and New Zealand; *CEECs:* the Czech and Slovak Republics, Poland.

[60] However, the numbers for Germany do not include "Aussiedler" ethnic Germans, who moved in large numbers from CEECs to Germany during the nineties. Obviously, if the numbers were included, the share of CEE migration stock in Germany would be much higher.

Austria[61] and the UK, and by Southern European countries. Scandinavian countries and Oceania have around the same number of CEE foreigners, i.e. around 5% of the CEE immigrants.

Comparing the development over the nineties, one observes an increase in the population of CEE origin in all groups of destination countries except Australia and New Zealand, see Table 4.5. The largest relative growth has been in Southern Europe, where the number of CEE immigrants almost doubled mostly due to a significant increase of Romanians and Bulgarians. Further, the CEE migration stock increased in Western Europe and Scandinavian countries by 27 and 26%, respectively.

It is interesting that the numbers of CEE immigrants have increased in Central and Eastern European OECD countries as well. The migration stock in those countries has been on a relatively low level due to the fact that during the communist regime it was relatively difficult to migrate between the countries of the former communistic bloc.[62] Not surprisingly, the acquired freedom of movement after 1989 also resulted in a higher migration between the CEECs themselves albeit the economic push/pulls were not as strong as factors between CEECs and other developed OECD countries.

4.3.5. Where did Central and Eastern Europeans go?

In the following section, I address the first part of the question from the paper's title: "Where did Central and Eastern Europeans go? Table 4.6 shows main destinations and average emigration flows from CEECs over the period 1989-2000.

From a quick look at Table 4.6, it is obvious that Germany is a principle destination of Central and Eastern European emigrants. At the same time, neighboring and nearby countries are important too, e.g. Austria for the Czech and Slovak Republics and Hungary; Spain, Italy and Greece for Bulgaria and Romania; and Scandinavia

[61] In Austria, most of the foreign-born population is of Czech origin. However, these immigrants did not come during the latest decade – the majority of them (90%) came during the period shortly after the Second World War (Lebhart, 2003).
[62] It was even hard to move from one region to another within one country.

for the Baltic countries.[63] The average annual migration flow of Central and Eastern Europeans to Germany is spinning around 200,000. More than half of the average annual inflow is of Polish origin.[64] The biggest migration waves from Poland came during the early nineties.[65] During the second half of the decade, the flows stabilized at around 70,000 annually. Taking into account such a magnitude of Polish migration inflows and the fact that there were 300,000 Poles residing in Germany in 2000, one may think that migration from Poland to Germany mostly is a temporary phenomenon, i.e. the majority of the Polish immigrants emigrate within a fairly short time period.

Besides Germany and neighboring countries as destinations, a significant part of the migration flows goes to the US and Canada. The US are in fact a second main destination for Central and Eastern Europeans with an average annual flow of 27,000 persons, see Table 4.6.

The only country that does not have Germany as a main destination country is Estonia. Here, the main emigration flows go to Finland. It is probably because Estonia and Finland share a common Nordic history and physical and language proximity. As regards to the last one, Estonian language belongs to the same Finno-Ugric family of languages as Finnish and Hungarian. Hungary and the Czech Republic present themselves as popular destinations for Romanians and Slovaks, respectively.[66] Although the economic push/pulls are not that large compared to other countries, there is substantial migration due to the chain migration and geographical, historical and cultural proximity between those countries.

Overall, the highest emigration flows as a percentage of home country population were experienced by Poland followed by Romania, with an average annual emigration rate equal to about 0.4%. The lowest emigration rates were registered from Latvia and the Czech Republic, 0.14 and 0.17%, respectively, see Table 4.6.

[63] The UK is not among top destinations simply due to the fact that the flow statistics are based on applications for settlement only. Therefore the numbers of CEE immigrants in the UK are heavily underestimated. The development in CEE migration stocks in the UK suggests that the gross migration flows must be substantial.
[64] I.e. 110,000, which equals 0.3% of the entire Polish population.
[65] The highest number of Poles, around 260,000, came in 1989 just after the fall of the Iron Curtain.
[66] Hungary is also among top-six for the Slovak Republic.

Table 4.6: Central and Eastern European gross emigration flows and their main destinations, annual average over the years 1989-2000; in absolute numbers and as a percentage of the source countries' populations.

Source:	CZECH REPUBLIC			HUNGARY			POLAND	
Main destinations:	Absolute	%	*Main destinations:*	Absolute	%	*Main destinations:*	Absolute	%
Germany	12 163	0.118	Germany	18 290	0.180	Germany	110 279	0.287
Austria	1 388	0.014	Austria	2 219	0.022	US	17 104	0.045
Slovakia	942	0.009	US	1 102	0.011	Canada	6 720	0.018
US	570	0.006	Canada	644	0.006	Austria	4 416	0.012
Canada	450	0.004	Netherlands	405	0.004	Italy	3 673	0.010
Switzerland	342	0.003	Switzerland	383	0.004	France	1 530	0.004
Total	17 197	0.167	*Total*	24 359	0.239	*Total*	152 179	0.396
	SLOVAK REPUBLIC			BULGARIA			ROMANIA	
Main destinations:	Absolute	%	*Main destinations:*	Absolute	%	*Main destinations:*	Absolute	%
Germany	7 827	0.146	Germany	11 606	0.139	Germany	42 593	0.189
Czech Rep.	3 835	0.072	Spain	2 168	0.026	Italy	10 185	0.045
Austria	1 756	0.033	US	1 987	0.024	Hungary	9 958	0.044
US	555	0.010	Greece	1 588	0.019	Spain	8 618	0.038
Hungary	333	0.006	Canada	693	0.008	US	5 563	0.025
Canada	273	0.005	Austria	632	0.008	Canada	3 240	0.014
Total	15 626	0.291	*Total*	20 686	0.248	*Total*	86979	0.385
	ESTONIA			LATVIA			LITHUANIA	
Main destinations:	Absolute	%	*Main destinations:*	Absolute	%	*Main destinations:*	Absolute	%
Finland	1 307	0.094	Germany	2 182	0.090	Germany	2 652	0.075
Germany	1 230	0.089	US	406	0.017	Spain	2 283	0.064
Sweden	176	0.013	Denmark	197	0.008	US	574	0.016
Denmark	175	0.013	Sweden	80	0.003	Denmark	252	0.007
US	166	0.012	Canada	77	0.003	Norway	121	0.003
Norway	72	0.005	Norway	73	0.003	UK	97	0.003
Total	3 331	0.240	*Total*	3 347	0.138	*Total*	6 587	0.185

Note 1: Due to data availability there are missing numbers of: Estonians, Latvians and Lithuanians going to Italy, Spain and the UK; Czechs, Slovaks and Bulgarians going to Italy; and Hungarians, Estonians, Latvians and Lithuanians going to Italy and Spain. For the UK, the numbers of CEE immigrants are heavily underestimated as the flow statistics are based on applications for settlement only. Ireland and Portugal have been excluded due to missing information on CEE countries of origin.

Source: National statistical offices; Own calculations.

Thus, there seem to be many similar, but also many different patterns in emigration from these countries. The next section focuses on "why did they migrate" and hence analyses determinants of Central and Eastern European emigration.

4.4. ECONOMETRIC ANALYSIS OF DETERMINANTS OF CENTRAL AND EASTERN EUROPEAN EMIGRATION

In the following section, I estimate a migration model that is based, as in previous studies, on a human capital framework. Besides relative incomes, unemployment rates in destination and source countries and distance between each pair of countries, I add other variables into the model that are discussed in the previous sections and which are relevant when explaining determinants of migration from CEE countries. The migration model central in this paper has the following form:

$$m_{ijt} = \beta_1 + \beta_2 s_{ijt-1} + \beta_3 (GDP_j / GDP_i)_{t-1} + \beta_4 u_{jt-1} + \beta_5 u_{it-1} + \beta_6 welfare_{ji-1} + \beta_7 teg_{it-1} + \beta_8 dist_{ij} + \beta_9 neighb_j + \beta_{10} foreignlang_i + \mu_{ij} + \varepsilon_{ijt} \quad (4.1)$$

where j represents each destination country (j =1,…,18), i each source country (i =1,…9) and t time period (t=1,…,10). β_1 to β_{10} are parameters to be estimated, μ_{ij} is a country-specific fixed effect and ε_{ijt} is an error term. The migration rate, m_{ijt}, is defined as *gross migration flow* to country j from country i divided by source country population at the end of the period t. The network links between sending and receiving countries are captured by the lagged *stock of immigrants* from i country of origin living in j country, divided by the source country population, s_{ijt-1}. The difference in economic developments between two countries is measured by *GDP per capita PPP* and enters the equation as the *GDP ratio*. Employment prospects in sending and receiving countries are captured by *unemployment rates*, which enter the model separately for receiving and sending countries, u_j and u_i. Next, *welfare* denotes a variable capturing potential "*welfare magnet*" effects.[67] I use two different specifications, Tax Revenue and Public Social Expenditure as a percentage of GDP.[68] In order to control for direct costs of migration, I use a

[67] However, one may argue that the access to the welfare systems became limited for the CEE emigrants. This trend reflects immigration policies that have gradually become more and more restrictive.

[68] The first alternative, *Tax Revenue Level*, has been used to catch a "welfare magnet" effect in a study by Pedersen et al. (2004).

measure of the *Distance in Kilometers* between the capital areas in the sending and receiving countries. I also include a variable *Neighboring Country*, which is a dummy variable assuming the value of 1 if the two countries are neighbors, 0 otherwise.

Finally, I experiment with dummies for foreign languages. I define the following dummy variables: *English* language dummy with assigned value of 1 for Australia, Canada, the UK and the US, 0 otherwise. *German* language dummy with the value 1 for Austria, Germany, Luxembourg and Switzerland, 0 otherwise, and finally *French* language dummy with the value 1 for Belgium, Canada, France and Luxembourg, 0 otherwise.

To reduce a risk of simultaneity bias, the explanatory variables enter the regression analysis with a one-year lag. Another reason for lagging the explanatory variables is that we expect the migration decision to be a decision which takes time, and therefore past (lagged) values of the determining factors are more appropriate to use than actual, non-lagged variables. All variables except dummy variables are in logarithms to express impact elasticities.

4.4.1. Estimation results

Table 4.7 shows pooled OLS estimates with "robust" Hubert/White/sandwich variances.[69] In column 1, the model includes the relative income, unemployment rates in destination and origin countries and the distance variables. The relative income and distance variables have the expected sign and are significant. However, the unemployment rates in destinations and origins have unexpected positive and negative effect, respectively.

Concerning the positive effect of unemployment in destinations, one might argue that this is a signal of some welfare magnet pull, as indicated by the Roy model of migration, see Borjas (1987), or welfare magnet theory, see Borjas (1999). In this case one would expect that the coefficient to destinations' unemployment rate will decrease when including the "tax revenue" variable, which serves as a proxy for the

[69] As a first step, I estimate the migration flows from 9 CEE countries to 18 OECD destination countries. The following destination countries are considered: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK and the US.

welfare magnet. But the coefficient to destinations' unemployment rate is even greater in regressions with the tax revenue variable, see columns 2 to 4 in Table 4.7. Furthermore, the coefficient to the tax has an unexpected negative sign.

As for the unexpected negative coefficient to the unemployment rate in the source countries, one possible explanation is that there are poverty constrains for potential migrants in the CEECs, i.e. higher unemployment constitutes difficulties with financing the costs of migration. Such an effect is often found in other studies on the determinants of international migration, e.g. Faini and Venturini (1994), Hatton and Williamson (2002) and Pedersen et al. (2004). Another explanation may be the existence of the so-called "wage curve", see Blanchflower and Oswald (1994).[70]

In the second column, the educational level in CEECs measured by gross tertiary enrollment rate is added into the model. This variable reveals a positive effect of education. This implies that the more educated population the higher is the migration flow from this country, which is well in line with the human capital theoretical expectations.

In column 3, the dummies for "widely spoken" foreign languages – *English, German and French* – enter the model. The explanatory power (adjusted R-square) of the model increases notably from 23% to 44% when including the language dummies, showing that taking effects of foreign language into account is important. The language dummies have expected positive signs and are statistically significant, meaning that Central and Eastern Europeans prefer to migrate to countries with a "widely spoken" language rather than to other destinations, all other things being equal. English and German show the strongest positive effects, which is in line with the hypothesis and with the facts related to language skills in the CEECs, which were discussed in the previous section.

Finally, in the last column in Table 4.7, the lagged stock of immigrants of a given CEE origin enters the model. The coefficient is positive and highly significant,

[70] The "wage curve" literature shows that wages in countries with low unemployment tend to be higher, *ceteris paribus*, than in countries with high unemployment rates. This might be the case for CEE countries as confirmed by some empirical evidence from those countries, see e.g. Blanchflower (2001), Huitfeld (2001) or Galuscak and Munich (2003).

which indicates a strong network effect. However, once the "network" effect is included, the coefficient to the English language dummy is switching its sign. One of the possible explanations of the change is that well-established CEE migration networks exist in the "traditional" immigration countries like the US, Canada and Australia, which are at the same time English-speaking countries.

Table 4.7. Estimation of migration flows from 9 CEE source countries (i) to 18 (OECD) destination countries (j), 1990-2000.

Dependent variable: m_{ijt} = Gross Flows per 1000 inhabitants	(1)	(2)	(3)	(4)
Independent variables:				
Stock of Foreigners/Pop *(j)*	-	-	-	0.713 [0.022]***
GDP per cap PPP ratio *(ij)*	1.635 [0.166]***	2.019 [0.166]***	1.466 [0.152]***	1.433 [0.114]***
Unemployment Rate, (*j*)	0.539 [0.115]***	0.917 [0.119]***	0.790 [0.111]***	0.582 [0.080]***
Unemployment Rate, (*i*)	-0.115 [0.080]	-0.268 [0.083]***	-0.170 [0.073]**	-0.481 [0.079]***
Tax Revenue (j)	-	-3.948 [0.322]***	-1.489 [0.356]***	-2.741 [0.253]***
Tertiary Enrollment Rate (*i*)	-	0.505 [0.154]***	0.504 [0.133]***	0.719 [0.100]***
Distance in Kilometers (ij)	-0.291 [0.056]***	-0.831 [0.071]***	-0.978 [0.085]***	-0.640 [0.073]***
Neighbouring Country (0/1)	1.394 [0.222]***	1.017 [0.197]***	0.734 [0.170]***	-0.267 [0.126]**
English (0/1)	-	-	2.096 [0.179]***	-1.018 [0.151]***
German (0/1)	-	-	1.958 [0.159]***	0.588 [0.108]***
French (0/1)	-	-	0.768 [0.087]***	0.672 [0.085]***
Constant Term	-4.306 [0.457]***	11.646 [1.523]***	3.453 [1.610]**	8.097 [1.195]***
No of observations	1175	1175	1175	890
Adjusted R-squared	0.14	0.23	0.44	0.77

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Aside the variables considered in the model, there are other unobservable factors that shape international migration flows and that are characteristic for particular countries or pairs of countries. In the presence of the unobserved country-specific heterogeneity, the pooled OLS estimator is biased and inconsistent, see Baltagi (2005). There are two frequently used panel data techniques that control for unobserved heterogeneity, namely fixed-effect (within) and random effect GLS

estimator. The fixed-effects estimates are calculated from differences within each country across time; the random effects estimates are more efficient, but they are consistent only if the country-specific effects are uncorrelated with other explanatory variables.

In the context of international migration, there is a question whether to account for destination country specific effects, μ_i, or pair of countries specific effects, μ_{ij}. Destination country unobservable effects might represent characteristics of immigration policy practices in each destination country, as well as climate, weather, openness towards foreigners or culture. On the other hand, pair of countries unobservable effect might capture traditions, historical and cultural ties between two particular countries of destination and origin, as well as immigration policy between the two countries. Therefore, I present both cases in Table 4.8 using the fixed and random panel data techniques.[71]

Columns 1 and 2 (3 and 4) of Table 4.8 show the results of the regressions that control for unobservable destination country (pair of countries) specific fixed and random effects, respectively. F-test and Breush and Pagan LM test at the bottom of Table 4.8 show that both fixed and random effects are significant and thus the pooled OLS estimate indeed suffers from an omission variable bias. In order to decide, which estimator, fixed or random effects, is more suitable, one needs to establish a relationship between the country-specific effects and the explanatory variables. The Hausman test comparing the destination fixed-effect estimates in columns 1 and 3 with the random-effects estimates in columns 2 and 4, respectively, rejects the null hypothesis of independence between the unobservable effects and the explanatory variables for both specifications; see Hausman test at the bottom of Table 4.8. Therefore the fixed effects estimator is preferred.

The results from the panel regressions are not very different from the pooled OLS regressions, albeit the numerical size of the coefficients usually is smaller. There are, however, few changes worth mentioning. The coefficient to the unemployment rate in destination countries switched its sign and became significantly negative in the panel data regressions, which is in line with the theory. But the coefficient to the

[71] Further, I tried to add year dummy variables in order to control for common idiosyncratic shocks over the decade under analyses, e.g. waves connected to the fall of the Iron Curtain, or for business cycle. The dummies didn't add much to the results; therefore I do report the results from the regressions in the Appendix – see Appendix, Tables 4.C1 and 4.C2.

source countries' unemployment variable stays significantly negative. Hence, the higher unemployment rate the less likely people decide to migrate, which is again in line with findings of other studies on international migration such as e.g. Faini and Venturini (1994), Hatton and Williamson (2002) and Pedersen et al. (2004).

Table 4.8. Estimation of migration flows from 9 CEE source countries (i) to 18 (OECD) destination countries (j), 1990-2000.

Dependent variable: m_{ijt} = Gross Flows per 1000 inhabitants	(1)	(2)	(3)	(4)
Independent variables:	FE(j)	RE(j)	FE(ij)	RE(ij)
Stock of Foreigners/Pop *(j)*	0.382 [0.030]***	0.452 [0.029]***	0.410 [0.048]***	0.586 [0.034]***
GDP per cap PPP ratio *(ij)*	1.589 [0.114]***	1.488 [0.115]***	0.964 [0.312]***	0.903 [0.195]***
Unemployment Rate, (*j*)	-0.349 [0.089]***	-0.211 [0.087]**	-0.438 [0.069]***	-0.247 [0.066]***
Unemployment Rate, (*i*)	-0.228 [0.054]***	-0.263 [0.055]***	-0.070 [0.059]	-0.176 [0.052]***
Tax Revenue (j)	1.459 [0.896]	-0.853 [0.626]	1.526 [0.728]**	-1.029 [0.480]**
Tertiary Enrollment Rate (*i*)	0.525 [0.086]***	0.608 [0.086]***	0.207 [0.104]**	0.327 [0.089]***
Distance in Kilometers (ij)	-1.129 [0.103]***	-0.927 [0.098]***	-	-0.575 [0.146]***
Neighbouring Country (0/1)	-0.207 [0.144]	-0.101 0.144]	-	-0.024 [0.304]
English (0/1)	-	0.600 [0.372]	-	-0.362 [0.312]
German (0/1)	-	0.642 [0.331]*	-	0.707 [0.227]***
French (0/1)	-	0.802 [0.334]**	-	0.850 [0.208]***
No. of destinations / pairs of countries	18	18	148	148
Fixed/Random Effects of Destination / Pair of Countries	Yes	Yes	Yes	Yes
Constant Term	-2.637 [3.283]	3.947 [2.451]	-9.478 [2.590]***	3.755 [2.291]
No of observations	890	890	890	890
Adjusted R-squared	0.86	0.68	0.95	0.94
F-test	F(17,864)=31.73 p=0.000		F(147,736)=13.60 p=0.000	
Breush-Pagan test	chi2(1) = 1513.10 p=0.000		chi2(1) = 926.45 p=0.000	
Hausman test	chi2(8) = 86.41 p=0.000		chi2(8) = 279.65 p=0.000	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Further, the welfare state magnet as measured by the tax pressure needed to finance the welfare state turns out to be positive in the pair of countries fixed effects

regressions. Nevertheless, the coefficient is unstable across the specifications. Thus the overall welfare magnet effect is unclear.

It is reasonable to think that the CEE source countries exhibit relatively heterogenous migration behavior. The fixed/random effect models permit different intercepts for the countries or pairs of countries, but the slope coefficients are restrained to be the same across the countries or pairs of countries. One solution to this problem would be to estimate migration determinants separately for each individual destination and source country. Unfortunately, given the nature of the dataset, which is relatively short and unbalanced, this is not appropriate. Nevertheless, as it is of great interest, I try to avoid the problem by clustering the CEE source countries into 3 groups that are historically and culturally inter-connected. First, the *Central European* group of countries contains the Czech Republic, Hungary, Poland and the Slovak Republic. Further, the three *Baltic countries*, Estonia, Latvia and Lithuania[72] are grouped together, and finally the two South-Eastern European countries, *Bulgaria and Romania*, are clustered together.

The estimated model allows for pair of countries unobservable effects, either random or fixed effects.

4.4.2. Disaggregated results for groups of the CEE source countries

Overall, the results in Table 4.9 confirm the hypothesis that the determinants of migration differ significantly across different groups of the CEE countries. Beginning with the lagged migration stock, the network effects are relatively large for the Central European countries and Bulgaria and Romania, while the coefficient is much lower for the Baltic countries.

The income gap plays an important role in the case of migration from the South-Eastern European countries. But the effect is insignificant for the Baltic countries and the coefficient even switches its sign in the case of Central Europe. According to Table 4.9, one of the main determinants of migration common for Central Europe and the Baltic countries is the prospects of getting a job. On the other hand, the

[72] One may argue that these countries still present a very heterogeneous sample as Estonia and Latvia culturally and historically belong to Northern Europe, where Lithuania due to its common history with Poland is more connected to Central Europe.

source country unemployment rate is an important push, too. Thus, for these two groups of countries job-seeking is a key driving force in migration.

For Bulgaria and Romania, the effect of destination unemployment rate is insignificant, and the source country unemployment rate has an unexpectedly significantly negative coefficient. This finding may indicate that poverty constraints play an important role in migration from the two countries.

Table 4.9. Estimation of migration flows from 9 CEE source countries (i) to 18 (OECD) destination countries (j), 1990-2000.

Dependent variable: m_{ijt} = Gross Flows per 1000 inhabitants	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables:	FE(ij) Central	RE(ij) Central	FE(ij) Baltic	RE(ij) Baltic	FE(ij) Bulgaria and Romania	RE(ij) Bulgaria and Romania
Stock of Foreigners/Pop *(j)*	0.623 [0.129]***	0.741 0.061]***	0.130 [0.073]*	0.318 [0.059]***	0.663 [0.106]***	0.883 [0.052]***
GDP per cap PPP ratio *(ij)*	-1.324 [0.652]**	-0.833 0.356]**	0.929 [0.841]	-0.142 [0.521]	1.401 [0.590]**	0.436 [0.444]
Unemployment Rate, (*j*)	-0.518 [0.085]***	-0.415 [0.081]***	-0.345 [0.179]*	-0.287 [0.168]*	-0.268 [0.182]	0.015 [0.146]
Unemployment Rate, (*i*)	0.145 [0.113]	0.126 [0.096]	0.236 [0.124]*	0.252 [0.100]**	-0.506 [0.139]***	-0.583 [0.126]***
Tax Revenue (j)	0.265 [0.957]	-1.013 [0.632]	3.569 [1.557]**	0.232 [0.966]	1.556 [1.639]	-2.375 [0.690]***
Tertiary Enrollment Rate (*i*)	0.085 [0.150]	0.250 [0.119]**	0.140 [0.269]	-0.144 [0.221]	-0.112 [0.303]	0.408 [0.214]*
Distance in Kilometers (ij)	-	-0.117 [0.178]	-	-2.188 [0.315]***	-	-0.441 [0.220]**
Neighbouring Country (0/1)	-	0.167 [0.418]	-	-2.464 [0.506]***	-	-0.005 [0.638]
English (0/1)	-	-1.097 [0.399]***	-	3.125 [0.817]***	-	-0.917 [0.364]**
German (0/1)	-	1.047 [0.367]***	-	0.609 [0.344]*	-	-0.074 [0.331]
French (0/1)	-	0.957 [0.268]***	-	0.334 [0.381]	-	0.825 [0.283]***
Fixed/Random Effects of Pair of Countries	Yes	Yes	Yes		Yes	Yes
Constant Term	-2.669 [3.529]	1.805 [3.024]	-17.73[6.389]***	12.589 [4.893]**	-8.150 [5.717]	9.297 [3.404]***
No of observations	440	440	230	230	220	220
No. of pairs of countries	68	68	45	45	35	35
Adjusted R-squared	0.94	0.79	0.93	0.79	0.91	0.86
F-test	F(6,366)=8.43 p=0.000		F(6,179)=16.61 p=0.000		F(6,179)=7.55 p=0.000	
Breush-Pagan test	chi2(1) = 459.95 p=0.000		chi2(1) = 48.19 p=0.000		chi2(1) = 24.24 p=0.000	
Hausman test	chi2(6) = 11.90 p=0.064		chi2(6) = 29.46 p=0.000		chi2(6) = 23.98 p=0.001	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

The welfare magnet variable as proxied by the tax pressure in destination is large and positive for the Baltic countries in the fixed effects regression. This partly reflects that immigrants from the Baltic countries tend to choose Scandinavian countries as destinations. On the other hand, one might not expect such a large positive effect in regressions, which account for pair of countries fixed effects. For Bulgaria and Romania, the tax coefficient is significantly negative. Thus, the "welfare magnet" effect is still very unclear.

There are also interesting patterns to note with respect to the foreign language dummies that are shown in the random effects specifications. Beginning with the estimates for the Central European countries, German and French influence the choice of destination for Central Europeans, while for the Baltic countries English and German language dummies have positive signs, with the coefficient on English being especially large. Finally, as expected the coefficient to the French language dummy is significant and positive for Romania and Bulgaria. These findings clearly confirm the hypothesis presented in the previous sections that foreign languages play an important role in shaping the international migration.

4.5. CONCLUSIONS

In this paper, I analyze the determinants of emigration from 9 CEE countries during the first decade after the communistic break-up. Contrary to most of the previous literature, I analyze migration determinants on actual migration flows from the CEE countries into a number of destination countries. Besides economic differences between the countries, I include a number of other factors that may drive migration from those countries.

The descriptive analyses show that emigrants from Central and Eastern European countries tend to go primarily to Germany or neighboring and nearby countries. But besides Germany and neighboring countries as destinations, a significant part of the migration flows goes to the US and Canada. The US is in fact the second main destination for Central and Eastern Europeans with an average flow of 27,000 persons annually.

Results of my econometric analyses reveal that the economic push/pulls factors play an important role in international migration from those countries. The disaggregated

results show that there are large differences between the Central and Eastern European countries with respect to emigration patterns. The lagged stock of immigrants, which reflects the existence of immigrants networks, has a strong and positive effect for immigrants from Central European countries, Romania and Bulgaria, while immigrants from the Baltic countries seem to rely much less on networks. Income gaps have a positive effect on migration flows, particularly from Southeastern European countries, while employment opportunities in destination countries are main determinants of the migration flows from the Baltic and Central European countries. The results concerning potential welfare magnet effects are rather mixed.

Language is important. When controlling for other factors, Baltic emigrants tend to go to English-speaking countries and to a smaller extent to German-speaking countries. Emigrants from Central Europe prefer the German- and French-speaking countries, while Romanian and Bulgarian emigrants favor French speaking countries.

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APPENDIX:

Description and definitions of the basic variables and sources.

Gross flow of migrants from country i to country j per 1000 inhabitants in country j

Source: National statistical offices and "Trends in International Migration" SOPEMI OECD.

Stock of foreigners from country i in country j

Source: National statistical offices and "Trends in International Migration" SOPEMI OECD.

Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship - except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin.

Source: World Bank.

GDP per capita (constant 1995 international $) based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the US dollar has in the US. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 1995 international dollars.

Source: World Bank, International Comparison Programme database

Unemployment, total (% of total labour force): Unemployment refers to the share of the labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ by country.

Source: World Bank: International Labour Organisation, Key Indicators of the Labour Market database.

Tax revenue (% of GDP): Tax revenue comprises compulsory transfers to the central government for public purposes. Compulsory transfers such as fines, penalties, and most social security contributions are excluded. Refunds and corrections of erroneously collected tax revenue are treated as negative revenue. Data are shown for central government only.

Source: International Monetary Fund, Government Finance Statistics Yearbook and data files, and World Bank and OECD GDP estimates.

Public social expenditure as a percentage of GDP (SNA93): Social expenditure is the provision by public institutions of benefits to, and financial contributions targeted at, households and individuals in order to provide support during circumstances which adversely affect their welfare, provided that the provision of the benefits and financial contributions constitutes neither a direct payment for a particular good or service nor an

individual contract or transfer. Such benefits can be cash transfers, or can be the direct ("in-kind") provision of goods and services.

Source: OECD Social Expenditure Database (SOCX).

School enrollment, tertiary (% gross): Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.

Source: WDI; United Nations Educational, Scientific, and Cultural Organization.

Distance between countries – distance between capitals in km.

Source: MapInfo, own calculations.

Neighbouring index – in the form of dummy for neighbouring countries - value 1, 0 otherwise.

Table 4.A: List of countries included in the emigration flows' analysis:

Destination countries
Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, the UK, the US
Source countries
Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic

Table 4.B1: Descriptive statistics of basic variables for OECD destination countries (means, standard deviations and number of observations)

Mean (St.d.) Numb. of Obs.	Australia	Austria	Belgium	Canada	Czech Republic	Denmark	Finland	France	Germany	Greece	Iceland
Immigration flows*	196.87 (307.93) 85	1 420.74 (1 513.71) 46	298.07 (438.66) 69	16 36.77 (3 477.53) 74	544.70 (1 347.23) 64	193.62 (191.88) 104	152.71 (431.71) 108	456.30 (597.37) 87	26 526.91 (42 890.21) 91	444.23 (618.71) 78	35.68 (84.28) 62
Sum of immigration flows **	1 394.50 (899.96)	5 446.17 (6 224.02)	1 713.92 (1 223.72)	10 093.42 (7 691.173)	2 905.08 (2 314.42)	1 678 (535.12)	1 374.42 (800.86)	3 308.17 (1 105.76)	201 162.40 (82 065.51)	2 887.50 (1 883.65)	184.33 (178.41)
Immigration stock ***	18 334.76 (22 874.81) 29	13 498.17 (14 803.83) 24	1 789.21 (2 081.33) 57	56 936.67 (71 571.85) 24	9 414.30 (15 077.10) 60	1 523.32 (2 931.88) 104	1 109.29 (2 568.11) 90	9 712.36 (15 761.74) 11	59 844.29 (83 639.70) 105	2 256.62 (3 224.50) 77	87.58 (178.01) 100
Sum of immigration stock******	44 309 (56 887.97)	26 996.33 (55 353.85)	8 498.75 (2 753.79)	113 873.30 (143 336.9)	47 071.50 (34 800.93)	13 202.08 (1 882.40)	8 319.67 (4 559.25)	8 903 (20 006.35)	523 637.50 (89 897.92)	14 480 (8 463.10)	729.83 (369.82)
Population	18 000 000 (728 253.50) 108	7 959 417 (153 688.40) 108	10 100 000 (99 444.38) 108	29 100 000 (1 093 661) 108	10 300 000 (18 449.79) 108	5 227 002 (69 348.17) 108	5 087 750 (68 690.44) 108	57 700 000 (741 940) 108	78 400 000 (7 088 775) 108	10 400 000 (166 711.6) 108	266 316.70 (8 433.96) 108
GDP per capita PPP (constant 1995 int.$)	21 219.52 (1765.45) 108	22 590.97 (1 604.68) 108	21 632.55 (1 265.17) 108	22 480.15 (1458.07) 108	11 743.74 (753.69) 90	23 899.39 (1 536.27) 108	19 864.98 (1 535.56) 108	21094.68 (952.33) 108	21 780.67 (1 265.35) 108	13 225.56 (910.13) 108	22 866.21 (1 591.013) 108
Tax Revenue (% of GDP)	29.07 (1.10) 99	42.53 (1.35) 108	44.58 (1.16) 108	37.17 (0.71) 108	40.03 (1.45) 72	48.89 (1.16) 108	45.64 (1.20) 108	44.16 (1.07) 108	36.80 (1.79) 108	32.14 (3.22) 108	32.63 (2.08) 108
Unemployment rate (% of the labour force)	8.15 (1.48) 108	5.01 (0.60) 108	8.43 (1.27) 108	9.14 (1.44) 108	4.82 (2.33) 99	7.15 (1.65) 108	11.01 (4.51) 108	10.79 (1.18) 108	7.59 (1.15) 108	9.51 (1.51) 108	3.04 (1.34) 108
Public Social Expenditure (% of GDP)	16.75 (1.83) 99	27.73 (1.05) 81	26.75 (0.76) 90	19.03 (1.50) 99	18.79 (0.88) 90	31.33 (1.33) 90	29.70 (3.66) 90	28.14 (1.37) 90	26.75 (2.67) 90	21.01 (1.21) 90	19.54 (0.20) 45

* mean and st.d. for each particular migration flow from country *i* to country *j*

** mean and st.d. for the sum of migration flows to country *j* (from all countries *i)*

*** mean and st.d. for stock of immigrants originating from country *i* residing in country *j*

**** mean and st.d. for the sum of stocks of immigrants residing in country *j* (originating from all countries *i)*

Table 4.B1 (continued): Descriptive statistics of basic variables for OECD destination countries (means, standard deviations and number of observations)

Mean (St.d.) Numb. of Obs.	Italy	Netherlands	Norway	Poland	Slovak Republic	Spain	Sweden	Switzerland	UK	US
Flows of immigrants to the country *	6 928.80 (7 722.84) 10	393.77 (523.25) 60	112.62 (121.86) 68	81.15 (21.79) 13	137.81 (317.29) 32	1 278.85 (3 517.66) 27	304.06 (419.27) 97	484.36 (2 091.24) 92	245.95 (197.26) 58	3 273.55 (5 932.70) 100
Sum of immigration flows to the country **	5 774.00 (10 208.61)	1 968.83 (845.16)	638.17 (98.04)	87.92 (48.69)	367.50 (531.62)	2 877.42 (7 793.87)	2 457.83 (996.55)	3 713.42 (5 912.91)	1 188.75 (732.05)	27 279.58 (5 427.19)
Stock of immigrants in the country ***	12 404.06 (13 510.20) 34	3 337.91 (4 533.90) 54	625.79 (844.14) 72	13 729.43 (29 169.68) 7	1 519.08 (1 893.14) 48	2 870.66 (2 558.27) 32	9 453.78 (11 852.21) 102	1 982.83 (1 784.02) 92	15 329.75 (20 763.52) 53	107 166.30 (152 497.50) 52
Sum of immigration stock in the country ****	35 144.83 (30 541.49)	15 020.58 (15 203.59)	3754.75 (192.76)	8 008.83 (26 686.13)	6 076.33 (6 177.06)	7 655.08 (6 843.10)	80 357.17 (3 265.57)	15 201.67 (1 774.54)	67 706.42 (39 434.97)	464 387.40 (334 928.20)
Population	57 300 000 (343 096.10) 108	15 400 000 (328 680.10) 108	4 349 661 (83 805.93) 108	38 500 000 (227 941) 108	5 365 983 (20 718.06) 108	39 200 000 (217 580.40) 108	8 744 336 (125 971.30) 108	6 969 317 (168 586.80) 108	58 500 000 (706 125) 108	262 000 000 (8 826 596) 108
GDP per capita (constant 1995 int$)	20 989.33 (957.31) 108	21 769.54 (1 753.36) 108	27 812.8 (2 924.72) 108	7 332.26 (979.51) 108	9 300.69 (963.75) 108	15 832.82 (1 268.15) 108	19 929.54 (1 128.93) 108	25 670.72 (423.92) 108	20 020.98 (1 473.38) 108	28 069.18 (1 881.06) 108
Tax Revenue (% of GDP)	41.63 (1.96) 108	42.89 (1.43) 108	41.49 (0.85) 108	37.58 (4.03) 90	33.26 (1.84) 45	33.69 (0.83) 108	50.93 (1.99) 108	32.72 (1.77) 108	35.49 (1.21) 108	26.94 (2.13) 108
Unemployment rate (% of the labour force)	10.62 (1.19) 108	5.59 (1.51) 108	4.71 (0.97) 108	12.51 (2.43) 99	12.89 (3.05) 90	18.87 (3.18) 108	5.67 (2.43) 108	3.05 (1.65) 108	7.55 (1.72) 108	5.57 (1.06) 108
Public Social Expenditure (% of GDP)	25.86 (1.22) 90	26.99 (1.72) 90	28.11 (0.94) 90	23.85 (2.93) 90	13.97 (0.25) 45	20.35 (1.00) 90	33.43 (2.21) 90	24.50 (3.23) 90	24.60 (2.37) 90	15.11 (0.80) 99

* mean and st.d. for each particular migration flow from country *i* to country *j*

** mean and st.d. for the sum of migration flows to country *j* (from all countries *i)*

*** mean and st.d. for stock of immigrants originating from country *i* residing in country *j*

**** mean and st.d. for the sum of stocks of immigrants residing in country *j* (originating from all countries *i)*

Table 4.B2: Descriptive statistics of basic variables for source countries (means, standard deviations and number of observations)

Mean (St.d.) Numb. of Obs.	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovak Republic
Population	8 385 060 (177 345) 252	10 300 000 (18 400.72) 252	1 463 841 (73 372.32) 252	10 200 000 (103 569.50) 252	2 534 225 (108 881) 252	3 628 583 (68 583.83 252	38 500 000 (227 334.80) 252	22 700 000 (257 589.30) 252	5 365 983 (20 662.96) 252
GDP per capita (constant 1995 int$)	5 754.98 (582.30) 252	11 743.74 (751.28) 210	7 984.02 (1 149.26) 252	9718.76 (856.74) 252	6 668.51 (1 707.85) 252	7 633.84 (1 373.72) 231	7 332.26 (976.90) 252	5 379.71 (328.05) 231	9 300.69 (961.19) 252
Unemployment rate (% of the labour force)	8.13 (4.19) 248	8.13 (4.19) 248	8.13 (4.19) 248	8.13 (4.19) 248	8.13 (4.19) 248	8.13 (4.19) 248	8.13 (4.19) 248	8.13 (4.19) 248	8.13 (4.19) 248
Tertiary Enrollment Rate Gross	16.12 (13.37) 182	24.73 (22.62) 194	26.00 (14.60) 212	21.47 (13.60) 208	24.91 (17.54) 188	24.64 (25.85) 213	20.06 (23.41) 197	18.87 (25.37) 179	29.65 (20.69) 204
Secondary Enrollment Rate Gross	79.58 (8.00) 252	91.15 (6.84) 252	101.67 (4.59) 252	92.74 (7.45) 231	87.64 (2.57) 231	87.64 (4.63) 231	91.51 (6.96) 210	81.92 (4.82) 252	87.96 (3.24) 252
Fertility Rate	1.41 (0.26) 252	1.46 (0.31) 252	1.51 (0.33) 252	1.58 (0.21) 252	1.46 (0.35) 252	1.61 (0.27) 252	1.72 (0.26) 252	1.49 (0.26) 252	1.69 (0.30) 252

Table 4.C1. Estimation of migration flows from 9 CEE source countries (i) to 18 (OECD) destination countries (j), 1990-2000, with year dummies.

Dependent variable: m_{ijt} = Gross Flows per 1000 inhabitants	(1)	(2)	(3)	(4)
Independent variables:	FE(j)	RE(j)	FE(ij)	RE(ij)
Stock of Foreigners/Pop *(j)*	0.382 [0.030]***	0.705 [0.021]***	0.360 [0.049]***	0.565 [0.033]***
GDP per cap PPP ratio *(ij)*	1.628 [0.115]***	1.565 [0.122]***	1 .004 [0.381]***	1.147 [0.190]***
Unemployment Rate, (*j*)	-0.063 [0.114]	0.767 [0.074]***	-0.149 [0.088]*	0.094 [0.079]
Unemployment Rate, (*i*)	-0.193 [0.058]***	-0.391 [0.069]***	0.024 [0.063]	-0.110 [0.058]*
Tax Revenue (j)	1.524 [1.040]	-2.990 [0.275]***	1.167 [0.755]	-1.502 [0.465]***
Tertiary Enrollment Rate (*i*)	0.493 [0.102]***	0.611 [0.126]***	-0.237 [0.241]	0.040 [0.154]
Distance in Kilometers (ij)	-1.144 [0.103]***	-0.673 [0.072]***	-	-0.626 [0.136]***
Neighbouring Country (0/1)	-0.223 [0.144]	-0.286 [0.133]**	-	-0.011 [0.283]
English (0/1)	-	-1.053 [0.152]***	-	-0.352 [0.294]
German (0/1)	-	0.577 [0.119]***	-	0.709 [0.213]***
French (0/1)	-	0.539 [0.125]***	-	0.694 [0.197]***
Fixed/Random Effects of Destination / Pair of Countries	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Constant Term	-3.087 [3.926]	9.285 [1.406]***	-7.182 [3.215]**	6.101 [2.312]***
No of observations	890	890	890	890
No. of destinations / pairs of countries	18	18	148	148
Adjusted R-squared	0.83	0.78	0.93	0.75
F-test	F(17,855)=28.79 p=0.000		F(147,727)=13.58 p=0.000	
Breush-Pagan test	chi2(1) = 1478.56 p=0.000		chi2(1) = 1034.82 p=0.000	
Hausman test	chi2(17) = 509.79 p=0.000		chi2(15) = 115.58 p=0.000	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Table 4.C2. Estimation of migration flows from 9 CEE source countries (i) to 18 (OECD) destination countries (j), 1990-2000, with year dummies.

Dependent variable: m_{ijt} = Gross Flows per 1000 inhabitants	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables:	FE(ij) Central	RE(ij) Central	FE(ij) Baltic	RE(ij) Baltic	FE(ij) Bulgaria and Romania	RE(ij) Bulgaria and Romania
Stock of Foreigners/Pop *(j)*	0.546 [0.129]***	0.711 [0.057]***	0.220 [0.076]***	0.511 [0.051]***	0.667 [0.103]***	0.872 [0.050]***
GDP per cap PPP ratio *(ij)*	0.204 [0.741]	-0.223 [0.430]	0.985 [1.197]	-0.078 [0.382]	3.293 [1.160]***	0.737 [0.597]
Unemployment Rate, (*j*)	-0.183 [0.114]	-0.063 [0.103]	-0.249 [0.209]	0.154 [0.179]	0.197 [0.208]	0.343 [0.161]**
Unemployment Rate, (*i*)	0.199 [0.162]	0.296 [0.134]**	0.335 [0.160]**	0.419 [0.175]**	0.716 [0.627]	0.378 [0.648]
Tax Revenue (j)	0.470 [0.958]	-1.280 [0.615]**	3.911 [1.535]**	0.051 [0.655]	2.459 [1.708]	-2.739 [0.657]***
Tertiary Enrollment Rate (*i*)	-0.097 [0.528]	0.013 [0.338]	-0.153 [0.495]	-0.344 [0.592]	0.899 [0.929]	-0.339 [0.788]
Distance in Kilometers (ij)	-	-0.160 [0.166]	-	-1.597 [0.197]***	-	-0.486 [0.215]**
Neighbouring Country (0/1)	-	0.138 [0.385]	-	-2.447 [0.253]***	-	-0.176 [0.591]
English (0/1)	-	-1.028 [0.377]***	-	1.679 [0.637]***	-	-0.980 [0.338]***
German (0/1)	-	1.082 [0.348]***	-	0.563 [0.209]***	-	-0.089 [0.323]
French (0/1)	-	0.764 [0.251]***	-	-0.091 [0.261]	-	0.699 [0.265]***
Fixed/Random Effects of Pair of Countries	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant Term	-4.718 [4.208]	2.532 [3.258]	-18.03[6.645]***	9.291 [4.065]**	-21.140[8.022]***	10.625 [3.400]***
No of observations	440	440	230	230	220	220
No. of pairs of countries	68	68	45	45	35	35
Adjusted R-squared	0.94	0.82	0.93	0.79	0.92	0.86
F-test	F(67,357)=31.94 p=0.000		F(44,170)=22.43 p=0.000		F(34,170)=8.16 p=0.000	
Breush-Pagan test	chi2(1) = 440.69 p=0.000		chi2(1) = 44.66 p=0.000		chi2(1) = 19.86 p=0.000	
Hausman test	chi2(15) = 55.39 p=0.000		chi2(15) = 44.77 p=0.000		chi2(15) = 3.63 p=0.999	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

Chapter 5

EU Enlargement: Migration from New EU Member Countries[♣]

by

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Abstract: The main purpose of the paper is to give predictions of the migration potential from the 7 new EU member countries to the EEA/EU-13 countries. Being able to analyze "real" migration behavior from these particular countries over the period 1990-2000 helps me to avoid problems related to (double) out-of sample forecasts and to the assumption of invariance of migration behavior across a space that previous studies had to hold. Results of the econometric analyses reveal the importance of controlling for pairs of countries unobserved heterogeneity. Preliminary results regarding the predictions of future gross and net migration flows suggest that fears concerned with the large scale migration are hard to validate. Furthermore, current and predicted development in gross and net migration flows indicates that migration from the new EU member countries towards "old" EEA/EU countries is rather a temporary phenomenon in the sense that besides the inflows there will be substantial return flows as well.

Keywords: International migration, panel data, EU enlargement
JEL-code: J61, F22, O15

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5.1. INTRODUCTION AND MOTIVATION

On May 1st 2004, the European Union (EU) went through a process of the biggest enlargement in its history, when ten Central and Eastern European countries[73] joined the European Union.

In connection with the EU enlargement, labor migration issues have gained a special attention among the public, politicians and academics, as one of the fundamental rights guaranteed to EU citizens is free movement of workers between the member states. Given the geographical and cultural proximity and huge economic disparities, the old EU-15 countries have feared a mass migration from the new member states and its impact on their labor markets. In many of the "old" EU-15 countries, the likelihood of increased migration from the new members became an important issue for the internal political agenda. Consequently, a majority of the "old" member states have imposed restrictions on their employment and welfare systems driven by those fears of large-scale labor migration from Central and Eastern Europe (CEE). The only countries that have opened their labor markets to the 10 new EU members from the date of the EU enlargement in May 2004 are Sweden, the UK and Ireland. The rest of the EU countries decided to regulate the entry of the new members to their labor markets for at least two years. In 2006, the "old" EU-15 member states have an option to decide whether to extend the "transition period" for another three years. In principle, the "transition period" should end five years after the 2004 enlargement, but it may be prolonged for additional two years in the EU member states, where "migration might threaten to cause serious disturbances on the labor market" (European Commission, 2001). All in all, the "old" EU countries can keep their labor markets restricted to the new members up to 7 years from the enlargement.[74]

Given the sensitivity of this issue in the "old" EU member states there has been a strong need for analyses of the migration potential from Central and Eastern European countries (CEECs). Consequently, there is relatively rich empirical evidence focusing on identifying migration determinants and on forecasting the possible emigration pressure from CEECs. As regards the last one, forecasting of

[73] The following 10 countries have entered the EU on May 1st 2004: Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic and Slovenia.
[74] There are, however, no such restrictions for Cyprus and Malta.

migration potential, there are, in general, two different approaches in the literature: surveys and econometric analyses. Surveys give estimates of CEE migration potential ranging from 6 to 30% of the populations, see e.g. Wallace (1998), Fassmann and Hintermann (1997). These numbers are clearly overestimated as only a minority of those who express an interest in migration actually migrates; see Fassmann and Hintermann (1997). Econometric analyses constitute the richest source of studies on this issue and their forecasts of CEE migration potential vary due to different modeling frameworks, estimation techniques or/and data samples. But the majority of existing studies forecast a long-run migration potential at around 3-4% of the source countries population. Taking into account out- and return migration, the net migration potential is usually estimated around 2% of source countries population, see Appendix Table 5.IA for an overview of existing studies and their forecasts, and further e.g. Dustmann et al. (2003) or Alvarez-Plata et al. (2003) for a more detailed literature review.

There are, however, several problematic issues connected to those studies and their estimates. Due to data limitations, the econometric analyses relied solely on out-of-sample historical data on migration[75] and/or past enlargement experience, and the estimates were further extrapolated to predict East-West migration, e.g. Bauer and Zimmermann, (1999), Boeri and Brücker (2001), Fertig (2001), Sinn et al. (2001), Alvarez-Plata et al. (2003), Zaiceva (2004). Thus, those studies assume the same migration behavior across the different countries, i.e. that migration decisions in the Central and Eastern European countries will respond to the same factors and in the same way as migration decisions in other source countries, e.g. Southern Europe or non-European countries like India and Pakistan with a very different economic and cultural background. Next, the studies assume invariance across time, i.e. that future migrations react to changes in economic factors in the same way as past migrations. Such assumptions of invariance across space and time are especially open to the Lucas critique. Some studies try to avoid the problems, at least partly, by controlling for unobservable country-specific effects. But the country-specific effects can not be used in out-of-sample predictions, therefore some studies try to model the differences in country-specific effects by time-constant factors that are characteristic

[75] I.e. migration waves from other countries than the CEECs.

for those countries or pairs of countries[76], see e.g. Fertig (2001), Dustman et al. (2003). Nevertheless, these variables can reveal a part of the unexplained variation between the countries or pairs of countries, but cannot get rid of it completely. Therefore they still suffer from an omitted variable bias. Consequently, the forecasts based on such (double) out-of-sample estimates might be seriously biased and do not clearly remove uncertainty connected to the expected migration flows from those countries. For a more detailed discussion of the problems with assessing the migration potential, see Dustmann et al. (2003) and Fertig and Schmidt (2000).

This paper brings a new aspect into the discussion as it presents analyses of East-West migration potential by using new sources of data. The dataset records migration patterns from the new EU member countries to the EEA/EU-13 countries over the period 1990-2000. To the best of my knowledge, this paper is the first that analyses East-West migration potential based on the actual Central and Eastern European migration behavior. This helps me to avoid the problems discussed above related to out-of-sample forecasts and the assumption of invariance of migration behavior across a space. Specifically, the data allows me to include the unobserved effects between the destination and particular Central and Eastern European countries into predictions of migration potential from those countries. Nevertheless, I still keep the assumption of invariance across time, i.e. that the migration behavior will not change with the openings of the EEA/EU-13 labor markets.[77]

Notably, the analyses reveal that unobservable effects of particular pairs of countries indeed play an important role in explaining emigration from those countries. The results of some preliminary predictions of future gross and net migration flows show that the net migration potential from the 7 new EU member countries is lower than the previous studies have estimated, with average annual net increases in stocks between 20,000 and 46,000 depending on the particular growth scenario used for the predictions. This leads to a total number of between 1.1 and 1.4 million migrants from those countries residing in 13 EEA/EU countries in 2015, which is equivalent

[76] Fertig (2001) followed by Boeri and Brücker (2001), Alvarez-Plata et al. (2003) and Zaiceva (2004) estimates fixed effects in the two-step procedure, where the unobservable country-specific effects are regressed by distance, language and development index (or other time-constant variables, e.g. traveling time, neighboring country etc. in further studies). Nevertheless, the authors are able to explain only 40-50% of country-specific effects.

[77] This is again open to the Lucas critique. The challenge to model and simulate the openings of the EEA/EU labor markets is left for the near future.

to 1.5–2% of the source countries' populations. On the other hand, the magnitude of the estimated gross migration flows is relatively high compared to the forecasts from previous studies. Specifically, the estimations show that the total accumulated gross flow over the period 2004-2015 is around 5.4–5.8% of the source population. Such a development in gross and net migration flows indicates that migration from the new EU member countries towards the "old" EEA/EU countries mostly is a temporary phenomenon.

The paper is organized as follows: Section 5.2 gives a description of migration trends from CEECs during the observed period 1990-2000. Next, in Section 5.3 a theoretical model of migration is presented. Section 5.4 describes the data used and presents econometric analyses and a discussion of estimation results. Section 5.5 gives some preliminary results of predictions of future gross and net migration flows from the new EU member countries. Finally, Section 5.6 concludes.

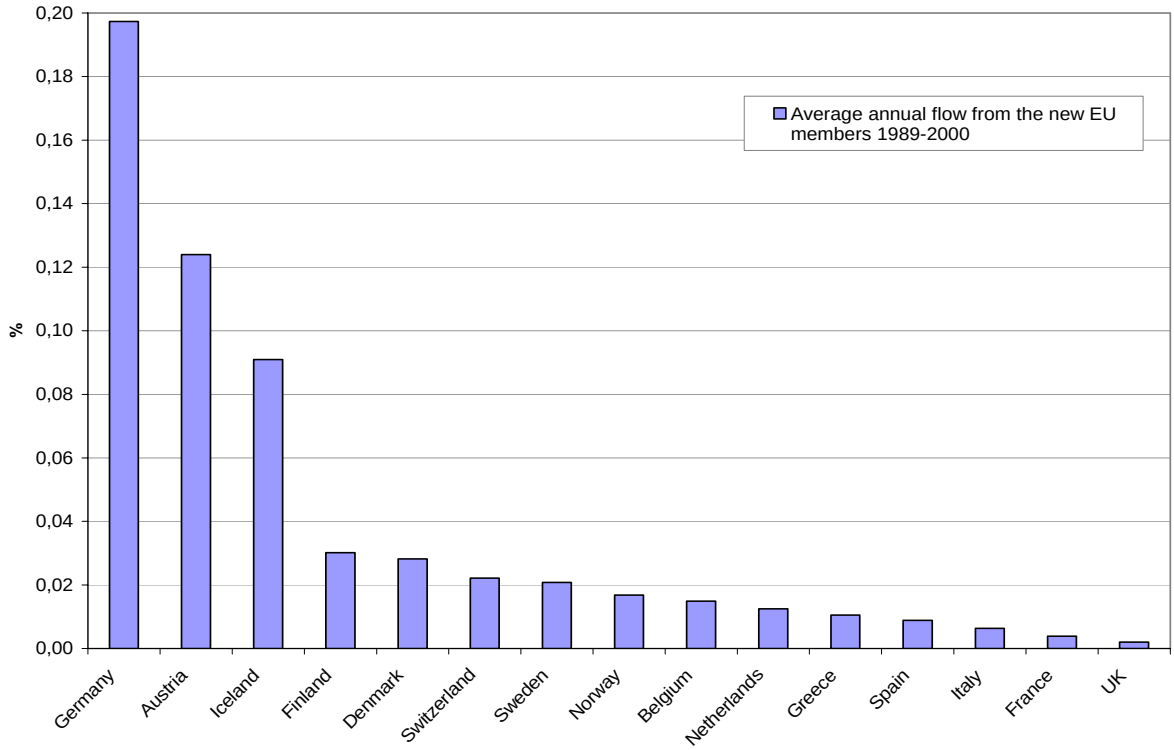
5.2. DEVELOPMENT OF MIGRATION FLOWS AND STOCK FROM CEE COUNTRIES AFTER 1989

Under the socialist regime, migration from the CEECs was tightly restricted and most of those who emigrated did so as political refugees. With the fall of the Iron Curtain in 1989, this situation changed and Central and Eastern Europeans became relatively free to migrate to other countries.[78] Many indeed have chosen to experience the newly acquired freedom of movement in order to improve their economic conditions or simply to experience living and working in another country without a fear of not being able to return and not to see relatives in their home countries again.

According to Figure 5.1, Germany and Austria not surprisingly experienced the highest average annual flows from the new EU member states both in absolute numbers and as a percentage of the particular host country population. The average annual inflow of immigrants from new EU member states over the period 1989-2000 was around 155,000 and 10,000, or 0.20 and 0.12% of the German and Austrian populations, respectively.

[78] Although "degrees of freedom" and "timings of freedom" were different across those countries.

Figure 5.1: *Immigration flows from the 7 new EU member states to the "old" EEA/EU countries as a percentage of the host countries' populations. Annual average 1989-2000.*



Note 1: Due to data availability the figure shows average migration flows to Italy from Poland only, to Spain from the Czech and Slovak Republics and Poland only. For the UK the figures show numbers of applicants for settlement and thus the gross migration flow is highly underrepresented. Ireland and Portugal have been excluded due to missing information on CEE countries of origin.

Source: National statistical offices; Own calculations.

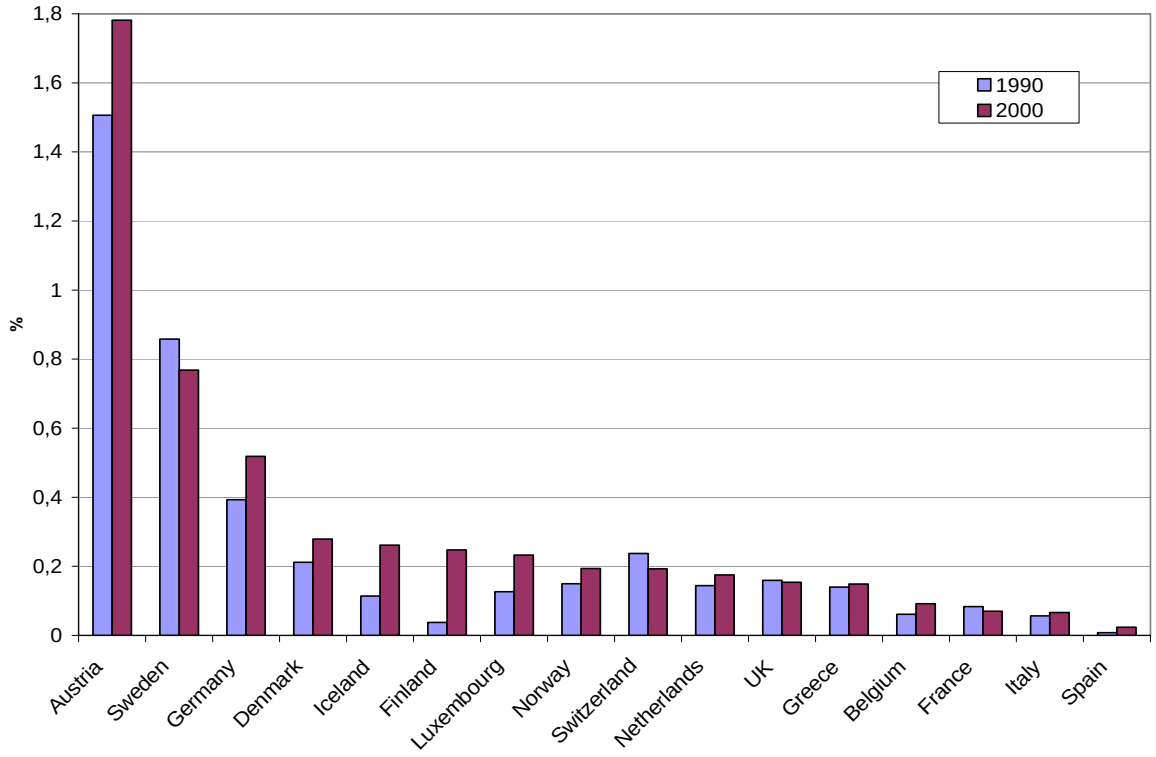
Thus, Germany is clearly the most dominant European receiving country[79] of immigrants from the new EU countries in both absolute and relative terms.[80] Further, fairly high migration flows as a proportion of host countries' populations were experienced by Scandinavian countries. In absolute numbers, the Southern European countries like Italy and Spain have also been popular destinations of Eastern Europeans during the latest decade.

[79] However, as can be seen in Pytlikova (2005) there are other popular destinations of Central and Eastern European emigrants outside the EU.

[80] Moreover, the figure does not include Aussiedler, ethnic Germans from the Central and Eastern Europe – if the numbers were included, the share would be much higher.

Although there have been significant flows of immigrants from the new EU members after the breakdown of the Iron Curtain as shown in Figure 1, the stock of immigrants from those countries has remained relatively low at around 0.2% of the population for the vast majority of EEA countries, see Figure 5.2.

Figure 5.2: *Stock of immigrants from the 7 new EU member states residing in the "old" EEA/EU countries as a percentage of the host countries' populations, year 1990 and 2000.*



Note 2: Due to data availability the table shows information on: 1991 instead of 1990 for Austria, Iceland, Italy and Spain; 1991 and 2001 instead of 1990 and 2000, respectively, for Luxembourg; 1999 instead of 2000 for France; 1992 instead of 1990 for the UK. For the UK the figure does not reflect foreigners from Baltic countries as due to confidentiality there is no information on those origins. Ireland and Portugal have been excluded due to missing information on CEE countries of origin.

Source: National statistical offices, Own calculations.

Figure 5.2 shows that the highest percentage of immigrants originating from the new EU countries relative to the host country population is found in Austria reaching 1.8% of the total Austrian population. Here the biggest number is of Czech origin with 54,000 Czechs living in Austria. However, these immigrants did not arrive

during the latest decade – the majority of them (90%) came during the period shortly after the Second World War, see Lebhart (2003).

Furthermore, Germany, Sweden and other Scandinavian countries have relatively high percentages of the population coming from the new EU member states. Sweden, which traditionally has been a popular destination country for political refugees from former socialistic countries, experienced a significant outflow of the citizens to their home countries after 1989. This return migration together with a growing overall Swedish population during the nineties contributed to a decline in proportion of the immigrants from the new EU members over the decade 1990-2000, see Figure 5.2. A similar pattern can be observed in the cases of Switzerland and France.

Central and Eastern European countries have an entirely different migration history compared to other typical EU source countries, e.g. Turkey or Southern Europe. Besides the fact that migration flows from those countries were very limited prior to the fall of Iron Curtain, there was also a difference as regards the educational composition of the Central and Eastern European migrants. Those that emigrated from the CEECs as political refugees prior to 1989 had in general very high levels of education. In the period after 1989, migrants have been drawn from other parts of the educational distribution as well, but as the general level of education in those countries is relatively high, the Central and Eastern Europeans still constitute a relatively educated group of migrants.[81] Surveys conducted on migration potential in CEECs confirm this trend into the future as the people that expressed the highest willingness to move are in average relatively well educated and young, see e.g. Fassmann and Hintermann (1997).

Table 5.1 summarizes the stock and flow figures during the 1990s for the 15 EEA/EU countries. The change in the CEE migrant stocks between 1990 and 2000 differs to a great extent from the cumulated flows of CEE immigrants because of out- and return migration.[82] For example, the cumulated CEE migrant inflows to EEA/EU in 1989-2000 were 2.23 million, which is equivalent to 3.10% of the

[81] It is a question, however, how transferable is the education from those countries. Another question is related to the quality of education, especially as regards disciplines within the social sciences that suffered a lot during the forty years of communist regime. For a discussion on this issue see e.g. Ammermueller et al. (2003).

[82] It might also be due to deaths or existing differences in definitions of "migrant".

source countries' populations from new EU member states, respectively. Nevertheless, the migration stock in 2000 was only 180,000 higher than in 1990.

Table 5.1: Flows and stocks of immigrants from the new EU member countries to 15 EEA/EU countries, absolute number and as a percentage of the source countries' populations, 1990 to 2000.

	Flows from the new EU member states:		
Average annual flow	*Period 1989-2000*		
Absolute	185,856		
% of source population	0.26%		
Total accumulated flow			
Absolute	2,230,268		
% of source population	3.10%		
	Stocks from the new EU member states:		
Stocks	*Year 1990*	*Year 2000*	*change*
Absolute	761,120	941,065	179,945
% of source population	1.06%	1.32%	0.25%

See Note 1 and 2.

Source: National statistical offices, Own calculations.

5.3. THEORETICAL MODEL OF MIGRATION

The theoretical framework for my analysis is built on a modified Hatton (1995) model. The model's foundations lay on traditional "human capital investment" framework (Sjaastad, 1962), but in addition the model incorporates features that help to explain migration dynamics. Specifically, it accounts for the formation of expectations about future utility streams based on past information. Thus, it is possible to distinguish short-run and long-run determinants of emigration.[83] In this paper, I slightly modify the Hatton (1995) model as a theoretical framework for my econometric analysis.[84]

[83] The Hatton (1995) model has been applied by many previous studies, e.g. Fertig (2001), Mitchell and Pain (2003), Zaiceva (2004) and others.

[84] However, the model is still a model of permanent migration. From the previous descriptive part one may think that CEE migration mostly has a temporary character, and therefore a model that would allow for return migration would be more appropriate. Till date no such complex migration

Suppose that a potential migrant *k* maximizes his/her utility and that his/her utility from migration is based on the difference between expected incomes in destination *j* and the potential migrant's country of origin *i*, adjusted for costs of migration, z_{kij}.[85] The probability of his/her migration is determined by the value of his/her utility from migration. The individual's utility is represented by a concave function[86], in particular, the linear case is considered, i.e.:

$$u_{kij} = \ln E(y_{kj}) - \ln E(y_{ki}) - z_{kij} \quad (5.1)$$

Expected income can be defined as earnings times the probability of finding a job. Thus the model accounts for uncertainty in a Harris and Todaro (1970) fashion:

$$E(y) = we \quad (5.2)$$

where *e* denotes employment rate[87] and *w* real earnings. The expected income in the case of migration is:

$$\ln E(y_{kj}) = \ln(w_{kj}) + \ln(e_{kj}), \quad (5.3)$$

Staying in the home country in general implies a higher probability of finding a job compared with moving abroad where the potential migrant may face employment obstacles as foreigners usually do, e.g. language barriers, difficulties with transferring education and/or qualifications and a lack of information. This can be expressed in expected utility of staying at home in country *i*:

$$\ln E(y_{ki}) = \ln(w_{ki}) + \gamma \ln(e_{ki}), \gamma < 1 \quad (5.4)$$

where γ reflects the fact of a higher possibility of finding a job at the home labor market.

Substitution of (5.3) and (5.4) into (5.1) gives the following form of the difference in expected utility:

$$u_{kij} = \ln(w_{kj}) + \ln(e_{kj}) - \ln(w_{ki}) - \gamma \ln(e_{ki}) - z_{kij}, \gamma < 1 \quad (5.5)$$

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model does exist due to the fact that it is very hard to derive. The author leaves the challenge for future research. For now I derive the model, which is based on the Hatton (1995) model.

[85] The costs of moving to foreign country may be two-fold: direct out-of-pocket costs of migrating and psychological costs of leaving own country, family and friends.

[86] Assuming risk-averse individual.

[87] The employment rate can be expressed as one minus the unemployment rate, i.e $E(y) = w(1-u)$.

It is reasonable to assume that the potential migrant is a forward-looking individual and therefore he/she takes into account expected future income streams in destination country, *j*, and country of origin, *i*. Therefore the total net present value (NPV) of migrating today is equal to expected future, from time *t+1* on, values of the utility viewed at time t, which can be denoted as u^*_{kijt}. The probability of the individual *k* to migrate from country *i* to country *j* at time *t* is given by:

$$\Pr(M_{kijt} = 1) = \Pr(u^*_{kijt} > 0) \tag{5.6}$$

Assuming an average probability of migration over all individuals *k*, the aggregate emigration rate (m_{ijt}) into a given destination country *j* is thus assumed to be a function of NPV:

$$m_{ijt} = \beta u^*_{ijt} \tag{5.7}$$

where β is an aggregation parameter that measures the impact of utilities on the aggregate migration rate.

The model assumes that a potential migrant forms his/her expectations about the future utility gains on the basis of past experience and information. Further, I assume that the formation of expectations follows a geometric series of values:

$$u^*_{ijt} = \lambda u_{ijt} + \lambda^2 u_{ijt-1} + \lambda^3 u_{ijt-2} + ... + \lambda^S u_{ijt-S+1}, 0 < \lambda < 1 \tag{5.8}$$

where λ is a weight between 0 and 1, i.e. λ^S becomes progressively smaller as *s* increases.[88] The geometric series (8) can be also rewritten as:

$$u^*_{ijt} = \lambda u_{ijt} + \lambda u^*_{ijt-1} \tag{5.9}$$

Substituting (5.9) into (5.7) gives:

$$m_{ijt} = \beta\lambda u_{ijt} + \beta\lambda u^*_{ijt-1} \tag{5.10}$$

Further, assuming that if the equation (5.7) is true for time period *t* then it is true also for time period *t-1*:

$$m_{ijt-1} = \beta u^*_{ijt-1} \tag{5.11}$$

which can be used into (5.10) to eliminate u^*_{ijt-1}:

[88] A lag structure with geometrically declining weights is described as having a Koyck distribution.

$$m_{ijt} = \beta\lambda u_{ijt} + \lambda m_{ijt-1} \quad (5.12)$$

Recalling (5.5), it is possible to rearrange (5.12) into:

$$m_{ijt} = \beta\lambda[\ln(w_{jt}) + \ln(e_{jt}) - \ln(w_{it}) - \gamma \ln(e_{it}) - z_{ijt}] + \lambda m_{ijt-1} \quad (5.13)$$

There are different factors that may affect the costs of migration of a potential migrant, z_{ij}. Generally, the larger the distance between two countries the higher are the direct migration costs associated with transportation. The cultural and linguistic distance is important as well: the more distant the new culture is and the larger the language barrier the higher are the migration costs of an individual to migrate. However, changes and improvements in communication technologies, continued globalization of the economy and declining costs of transportation lead to a decline in direct costs of migration over time. An important role in lowering both types of migration costs, direct and psychological, is played by migration "networks", i.e. networks of family members, friends and people of the same origin that already live in a host country. The "networks" can provide potential migrants with the necessary help and information and thus lower the costs of migration.

Thus, it can be assumed that $\bar{z}_{ijt}$ the migration costs associated with migration from country *i* to country *j* averaged over all individuals *k* are larger with distance, but fall over time and are reduced by the existence of migration networks, which can be expressed as:

$$\bar{z}_{ijt} = \varepsilon_0 - \varepsilon_1 s_{ijt-1} - \varepsilon_2 T + \varepsilon_3 D_{ij}, \varepsilon_1 \geq 0, \varepsilon_2 \geq 0, \varepsilon_3 \geq 0 \quad (5.14)$$

where s_{ijt} denotes a stock of immigrants of *i*-origin residing in country *j* as a proportion of the source country's population[89] at the end *t-1*, *T* is a deterministic linear trend and serves as a proxy for falling migration costs, D_{ij} denotes distance[90] between two countries *ij* and serves as a proxy for growing migration costs with a larger distance. Finally, $\varepsilon_0, \varepsilon_1, \varepsilon_2, \varepsilon_3$ are coefficients.

The stock of migrants usually serves as a good proxy for migration networks, see Hatton (1995) and Pedersen et al. (2004). The larger the established "networks" of a

[89] The stock of immigrants is expressed as a proportion of the source country's population in order to account for a proportion of networks around potential migrant.
[90] Here, I assume that a distance serves as a kind of spatial trend.

particular ethnic group are, the lower are the migration costs for potential migrants from those ethnic origins. The stock of immigrants is lagged one period as I assume that the networks have to be established at least for some time in order to be effective, i.e. immigrants must have some time to settle down, get orientated in a new country and gain some resources to be able to provide followers with information and other forms of help.

Finally, substituting relations (5.14) into (5.13) gives a model that is used for analyses in this paper:

$$m_{ijt} = a\left[\ln(w_j / w_i)_t + \ln(e_j)_t - \gamma \ln(e_i)_t - \varepsilon_0 + \varepsilon_1 s_{ijt-1} + \varepsilon_2 T - \varepsilon_3 D_{ij}\right] + \lambda m_{ijt-1} \qquad (5.15)$$

where $a = \beta\lambda$. Equation (5.15) is in fact a model in an autoregressive distributed lag model form, which allows distinguishing between the short-run and long-run determinants of international migration flows. In the long run, the steady state has the following form:

$$\overline{m_{ij}} = \frac{a}{1-\lambda}[\ln(w_j / w_i) + \ln(e_j) - \gamma \ln(e_i) - \varepsilon_0 + \varepsilon_1 s_{ij} + \varepsilon_2 T - \varepsilon_3 D_{ij}] \qquad (5.16)$$

However, if we would assume that the potential migrant takes into account not only the expected future values of utility viewed at time *t*, u^*_{kijt}, but also current values of his/her utility, u_{kijt}, then the total NPV of migrating today would be a sum of these two utility values, $NPV = u^*_{kijt} + u_{kijt}$. This introduces the individual's option of waiting[91] with migration into the model. Thus, if the current utility of migration is negative for some individuals, then he/she prefers to postpone the decision to migrate.

Thus the probability of the individual *k* to migrate is given by:

$$\Pr(M_{kijt} = 1) = \Pr(u^*_{kijt} + u_{kijt} > 0 \cap u_{kijt} > 0) \qquad (5.17)$$

Then the aggregate emigration rate in (5.7) is extended to:

$$m_{ijt} = \beta(u^*_{ijt} + \alpha u_{ijt}), \alpha > 1 \qquad (5.18)$$

where α reflects a higher importance given to the current period's utility, given the option to wait with migration.

[91] See Burda (1995) on the option value of waiting in connection to migration.

Holding the prior assumption related to formation of expectations, the emigration rate can be rewritten as:

$$m_{ijt} = \beta(\alpha + \lambda)u_{ijt} - \lambda\beta\alpha u_{ijt-1} + \lambda m_{ijt-1} \tag{5.19}$$

which is possible to rearrange into:

$$\begin{aligned} m_{ijt} &= \beta(\alpha + \lambda)[\ln(w_{jt}) + \ln(e_{jt}) - \ln(w_{it}) - \gamma \ln(e_{it}) - z_{ijt}] \\ &\quad -\lambda\beta\alpha[\ln(w_{jt-1}) + \ln(e_{jt-1}) - \ln(w_{it-1}) - \gamma \ln(e_{it-1}) - z_{ijt-1}] + \lambda m_{ijt-1} \end{aligned} \tag{5.20}$$

Remembering the migration costs equation (5.14), the term z_{ijt} can be substituted by the existing stock of immigrants, by time trend and distance. Further, I assume that the stock diminishes due to death and out-migration and it increases by new waves of immigrants, i.e. there is a change in the migration stock, which makes up a net migration flow. Thus, the stock of immigrants[92] in period *t* is given by the following equation:

$$s_{ijt} = s_{ijt-1} + \Delta s_{ijt} \tag{5.21}$$

Relation (5.21) can be used further to rewrite (5.14) for time period *t-1*[93]:

$$\bar{z}_{ijt-1} = \varepsilon_0 - \varepsilon_1(s_{ijt-1} - \Delta s_{ijt-1}) - \varepsilon_2 T + \varepsilon_3 D_{ij}, \varepsilon_1 \geq 0, \varepsilon_2 \geq 0, \varepsilon_3 \geq 0 \tag{5.22}$$

which is needed to eliminate $\bar{z}_{ijt-1}$ in equation (5.20). Finally, substituting relations (5.14), (5.21) and (5.22) into (5.20) gives:

$$\begin{aligned} m_{ijt} &= \beta(\alpha + \lambda)\ln(w_j / w_i)_t - \lambda\beta\alpha \ln(w_j / w_i)_{t-1} \\ &\quad +\beta(\alpha + \lambda)\ln(e_j)_t - \lambda\beta\alpha \ln(e_j)_{t-1} \\ &\quad -\beta(\alpha + \lambda)\gamma \ln(e_i)_t + \lambda\beta\alpha\gamma \ln(e_i)_{t-1} \\ &\quad -\beta(\alpha + \lambda)\varepsilon_0 + \lambda\beta\alpha\varepsilon_0 \\ &\quad +\beta(\alpha + \lambda)\varepsilon_1 s_{ijt-1} - \lambda\beta\alpha\varepsilon_1 s_{ijt-1} + \lambda\beta\alpha\varepsilon_1 \Delta s_{ijt-1} \\ &\quad +\beta(\alpha + \lambda)\varepsilon_2 T - \lambda\beta\alpha\varepsilon_2 T \\ &\quad -\beta(\alpha + \lambda)\varepsilon_3 D_{ij} + \lambda\beta\alpha\varepsilon_3 D_{ij} \\ &\quad +\lambda m_{ijt-1} \end{aligned} \tag{5.23}$$

This expression can be further rearranged into:

[92] The stock of immigrants is expressed similarly as migration flows as a rate, i.e. as a proportion of source country population.

[93] I assume that if the equation (5.14) is true for time period *t* then it is true also for time period *t-1*:

$$\Delta m_{ijt} = \beta(\alpha+\lambda)[\Delta \ln(w_j / w_i)_t + \Delta \ln(e_j)_t - \gamma \Delta \ln(e_i)_t] + \lambda\beta\alpha\varepsilon_1 \Delta s_{ijt-1}$$
$$+\beta(\alpha+\lambda-\lambda\alpha)[\ln(w_j / w_i)_{t-1} + \ln(e_j)_{t-1} - \gamma \ln(e_i)_{t-1} + \varepsilon_1 s_{ijt-1} + \varepsilon_2 T - \varepsilon_3 D_{ij} - \varepsilon_0] \quad (5.24)$$
$$-(1-\lambda) m_{ijt-1}$$

Equation (5.24) presents a dynamic model in an error correction form. Here, the long-run steady state is given by:

$$\overline{m_{ij}} = a_1[\ln(w_j / w_i) + \ln(e_j) - \gamma \ln(e_i) + \varepsilon_1 s_{ij} + \varepsilon_2 T - \varepsilon_3 D_{ij} - \varepsilon_0] \quad (5.25)$$

where $a_1 = \dfrac{\beta(\alpha+\lambda-\lambda\alpha)}{(1-\lambda)}$ and where the parameters do not depend on time.

Then the models in the forms (5.15) and (5.24) can be used further as a base for econometric analyses.

5.4. ECONOMETRIC ANALYSIS

5.4.1. Data

For the analysis I use information on migration flows and stocks in 13 EEA/EU destination countries from the 7 new EU member source countries for the years 1989-2000, see Appendix 5.IIA for a list of countries considered in the analysis. I have collected the migration information by contacting statistical offices of particular OECD destination countries.[94]

Besides the actual migration flow and stock information, the dataset contains a number of other time-series variables, which may help to explain the determinants of migration across countries. For purposes of the current paper, only information on GDP per capita, unemployment rates, population and distance has been used. These variables were collected from different sources, e.g. OECD, the World Bank and others; see Appendix 5.IIB for definitions and sources of the variables. For a more comprehensive description of the dataset, see Pedersen et al. (2004, 2005).

[94] Originally, the dataset has been constructed for 27 OECD destination and 129 source countries, see Pedersen et al. (2004) for a detailed description of the dataset. In this paper, I restricted it to a sample of 13 destination and 7 CEE source countries. Destination countries as Austria and France have been excluded from the analyses due to the fact that there are just two observations of the stock of immigrants from censuses. This makes it impossible to create sensible time-series for these countries.

Although the dataset presents a large progress over the datasets used in earlier East-West migration research, there are still some problems. First, the dataset is unbalanced, i.e. observations are missing in the panel. For the majority of destination countries, I have information on migration flows and stocks of immigrants for most of the years, but often with different numbers of observation for each destination country. Another problem is that different countries use different definitions of an "immigrant"[95] and different sources for their migration statistics. For a description of some of the difficulties related to collecting international migration data, see Pedersen et al. (2004, 2005). For summary statistics, see Appendix 5.IIC.

5.4.2. Choice of preferred econometric specification - model and estimator

5.4.2.1. Static model

In this section, I present econometric analyses of migration potential from new EU member countries. I base my econometric analysis on the human capital model presented in the previous section. The model assumes that emigration is driven by relative mean earnings and employment rates between origins and destinations, and the costs of migration as captured by existing networks of migrants, distance and a time trend. I start with the econometric specification, which has the following form:

$$\ln m_{ijt} = \gamma_1 + \gamma_2 \ln(GDP_j / GDP_i)_{t-1} + \gamma_3 \ln e_{jt-1} + \gamma_4 \ln e_{it-1} + \gamma_5 \ln s_{ijt-1} + \gamma_6 dist_{ij} + \gamma_7 T + \mu_{ij} + \varepsilon_{ijt} \quad (5.26)$$

where m_{ijt} denotes gross flows of migrants from country *i* to country *j* divided by the population of the country of origin *i* at time *t*[96], where *i=1,…,7; j=1,…,13* and *t=1,...,11*. The difference in earnings is approximated by relative differences in economic development measured by GDP per capital in PPP and enters the model as a ratio, GDP_j / GDP_i. The employment opportunities in the sending and receiving countries measured by employment rate (1-unemployment rate) are denoted as e_j and e_i, respectively. The network links between sending and receiving countries that

[95] Some use foreign-born (by countries of birth), some use foreigners (by citizenship/nationality).
[96] I estimate the model with net migration rates on the left-hand side as well, but I return to that later on in the paper.

help to lower the costs of migrating are captured by the normalized stock of immigrants, s_{ij}, i.e. the stock of immigrants from source country *i* living in destination *j*, divided by population in source country *i*. Variable $dist_{ij}$ denotes a distance in kilometers between two countries, which serves as a proxy for the direct costs of migration. The declining travel costs of migration over time are captured by the trend variable T. Finally, μ_{ij} denotes unobservable country-specific effects and ε_{ijt} denotes remaining error. I use all variables (except the trend) in logs to show the impact elasticities. In this econometric model, I omit the lagged dependent variable that enters the theoretical model in the previous section. I will come back to the specification with the dynamic term in the next section.

From the economic theory point of view, the relative differences in economic development and employment should be lagged in order to account for the information, on which the potential immigrants base their decision to move. Further, there might be a reverse causality with respect to the effect of migration flows on earnings and employment.[97] One way to avoid the problems of endogeneity in the model is to instrument earnings and employment variables with their lags. As regards the migrants' network, the variable is endogenous, too, as in fact the stock is a function of previous stock plus migration flows minus out-migration. Therefore, all the explanatory variables enter the model as lagged. According to the theory, I expect estimated coefficients to have the following signs:

$\gamma_2 > 0, \gamma_3 > 0, \gamma_4 < 0, \gamma_5 > 0, \gamma_6 < 0$, and $\gamma_7 > 0$.

Besides the explanatory variables covered in the model above, there are, naturally, other variables that can help to explain migration behavior and that might be included in the econometric analysis.[98] But this paper focuses on the present simplified specification for several reasons. First, the model is used primarily for the purpose of predictions of the CEE migration potential. As it is relatively difficult to make reliable predictions of other explanatory variables themselves, the model should stay as uncomplicated as possible. Second, the model above is typically used

[97] There is another huge stream of literature that focuses on the effect of immigration on the labor market, see e.g. Chiswick (1996), Filer (1992), Hunt (1992) and Chiswick and Hatton (2002).

[98] For instance variables capturing language, cultural barriers, education, trade and other, see e.g. Karemera et al. (2000), Pedersen et al. (2004, 2005), Pytlikova (2005), Belot and Ederveen (2005) and Mayda (2005) for discussions on determinants of migration.

in previous studies assessing East-West migration potential. Thus, it is possible to compare my results with the ones from the previous studies. For these reasons, I stick to the explanatory variables suggested by the theoretical model.

As a starting point of my analysis, I estimate the model (26) above by using pooled OLS,[99] see Table 5.2. As I deal with international migration, one would suspect an existence of unobserved country-specific heterogeneity. In this case, the pooled OLS estimator is biased and inconsistent, see Baltagi (2005), and therefore the fixed and random effects panel data estimators are estimated in the next step. The rich structure of my dataset gives me an opportunity to evaluate whether to consider unobservable effects of destinations, origins or pairs of those countries. One could interpret e.g. destination country fixed effects, FE(j), as destination's climate, weather, openness towards foreigners, culture, existence of widely spoken language, or immigration policy, which do not change over time and which is common for all countries of origin. On the other hand, unobservable pairs of countries fixed effects, FE(ij), capture traditions, historical and cultural ties between two particular countries of destination and origin, as well as the immigration policy between the two countries. According to the adjusted R-squared in Table 5.2, the pairs of countries unobserved effects panel data estimator would be preferred.

At the bottom of Table 5.2, the F-test and Breush and Pagan LM test show that both fixed and random effects are significant, and thus the pooled OLS that omits the country-specific effects indeed suffers from an omission variable bias. In order to choose a suitable panel data estimator, I evaluate the relationship between the country–specific effects and the explanatory variables by using a Hausman specification test. According to the Hausman test, the fixed effects estimator is preferred over the random-effects estimator in all specifications except in the destination countries' unobserved effects estimators. Overall, taking into account the econometric issues discussed above, the most preferred estimator for the static model is the pairs of countries fixed effects estimator, FE(ij), shown in column 4 in Table 5.2.

[99] I estimate the model by OLS with robust - Huber/White/sandwich – estimate of variance and I also use a cluster option for pair of countries in order to adjust standard errors for intra-group correlation.

Table 5.2: Estimation of migration flows from 7 source countries (i) to 13 EEA/EU destination countries (j), 1990-2000.

Dependent variable	**Gross flows per source country population** $\ln m_{ijt}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS	FE(j)	RE(j)	FE(ij)	RE(ij)	FE(i)	RE(i)
Independent variables:							
Migration stock, $\ln(s_{ij})_{t-1}$	0.572 [0.038]***	0.374 [0.036]***	0.386 [0.035]***	0.278 [0.048]***	0.364 [0.042]***	0.643 [0.032]***	0.572 [0.032]***
lnGDP ratio *t-1*	1.444 [0.209]***	2.287 [0.179]***	2.242 [0.179]***	1.012 [0.354]***	0.747 [0.284]***	0.194 [0.279]	1.444 [0.214]***
Employment rate *j*, $\ln(e_j)_{t-1}$	-1.561 [1.296]	8.671 [1.668]***	7.257 [1.609]***	9.032 [1.121]***	7.397 [1.085]***	0.373 [1.413]	-1.561 [1.423]
Employment rate *i*, $\ln(e_i)_{t-1}$	1.873 [1.394]	4.238 [0.951]***	4.196 [0.955]***	0.058 [0.820]	0.277 [0.804]	2.065 [1.545]	1.873 [1.391]
lnDistance	-0.830 [0.120]***	-0.982 [0.102]***	-0.961 [0.102]***	-	-1.315 [0.254]***	-0.695 [0.120]***	-0.830 [0.120]***
Trend	0.046 [0.021]**	0.091 [0.014]***	0.090 [0.014]***	0.060 [0.011]***	0.052 [0.011]***	0.028 [0.021]	0.046 [0.021]**
Fixed/Random Effects of Destination	No	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	591	591	591	591	591	591	591
No. of destinations / origins/ pairs of countries		13	13	78	78	7	7
Constant Term Included	-0.203 [7.362]	-57.672 [8.214]***	-50.998 [7.959]***	-46.061 [5.794]***	-29.924 [5.726]***	-9.265 [8.046]	-0.203 [7.343]
Adj. R-square	0.64	0.86	0.55	0.94	0.60	0.69	0.64
RMSE	1.207	0.749	0.749	0.450	0.454	1.108	1.201
F- test		F(12,572) =74.99, p=0.000		F(77, 508) =40.36, p=0.000		F(6,578) =16.72, p=0.000	
Breush-Pagan test		chi2(1) =4696.92, p=0.000		chi2(1) =1360.89, p=0.000		chi2(1) =177.73, p=0.000	
Hausman test		chi2(6) =10.37, p=0.110		chi2(5) =54.67, p=0.000		chi2(6) = 125.15, p=0.000	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

When looking at results across the different estimators, they seem to be quite robust over all specifications. Concentrating on the results from my preferred FE(ij) estimator, the coefficients have the expected signs except the employment rates in the source countries. Income differences and employment prospects in destinations appear to be key driving forces behind the CEE emigration. The source employment rate variable has an unexpected positive sign, but it is insignificant. Such an effect is often found in other studies on the determinants of international migration, e.g. Faini and Venturini (1994), Hatton and Williamson (2002) and Pedersen et al. (2004). It

might be explained by poverty constraints of potential migrants, i.e. higher employment gives necessary resources to emigrate. In the case of Central and Eastern European countries besides the poverty constraints, it might be due to the exceptional development in unemployment during the first years of transition.

5.4.2.2. Dynamic model

In the static model specification (5.26), I have omitted the dynamic terms that are in fact extensively discussed in the theoretical model. Specifically, the dynamics are introduced into the model by adding a lagged dependent variable.[100] This allows for modeling of persistence in migration caused by the outcomes of previous periods in addition to the persistence caused by the unobserved country-specific effects. Thus, short-run and long-run effects are possible to distinguish. The dynamic econometric model can be presented in two different forms: in the form of an autoregressive distributed lag model (ARDL) or in the form of an error-correction model (ECM), which are equivalent to the equation (5.15) and (5.24) from the theoretical model.

First, the ARDL[101] model of migration can be written as:

$$\begin{aligned}\ln m_{ijt} &= \beta_0 + \beta_1 \ln m_{ijt-1} + \beta_2 \ln(GDP_j / GDP_i)_{t-1} + \beta_3 \ln e_{jt-1} + \beta_4 \ln e_{it-1} + \beta_5 \ln s_{ijt-1} \\ &+ \beta_6 dist_{ij} + \beta_7 T + \mu_{ij} + \varepsilon_{ijt}\end{aligned} \tag{5.27}$$

The short-run elasticities are represented by estimates of $\beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ and β_7. The long-run elasticities for each variable are calculated as:

$$\frac{\beta_2}{1-\beta_1}, \frac{\beta_3}{1-\beta_1}, \frac{\beta_4}{1-\beta_1}, \frac{\beta_5}{1-\beta_1}, \frac{\beta_6}{1-\beta_1} \text{ and } \frac{\beta_7}{1-\beta_1} \tag{5.28}$$

Next, I consider the dynamic migration model in an error-correction form, which can be written as follows:

$$\begin{aligned}\Delta \ln m_{ijt} &= \delta_0 + \delta_1 \Delta \ln(GDP_j / GDP_i)_t + \delta_2 \Delta \ln e_{jt} + \delta_3 \Delta \ln e_{it} + \delta_4 \Delta \ln s_{it-1} \\ &+ \phi EC_{ij} + \mu_{ij} + \varepsilon_{ijt}\end{aligned} \tag{5.29}$$

[100] The dynamics enter the equation also through the migration stock variable, which contains previous history of migration flows. To be precise, the stock of immigrants consists of the previous stock plus the migration in-flows minus the migration out-flows.
[101] In fact, it is an ARDL (1,1) model.

The parameters to the first difference denoted by Δ measure the short-run effects. The parameter to the error-correction component, ϕ, is interpreted as a speed of adjustment to the long-run equilibrium relationship.[102] A small value of the error-correction component indicates that any shock to aggregate migration activity typically has a long lasting impact.

The error-correction model is estimated in a two-step procedure. First, the long-run parameters are obtained from the long-run migration relationship:[103]

$$\ln \bar{m}_{ij} = a_0 + a_1 \ln(GDP_j / GDP_i) + a_2 \ln(e_j) + a_3 \ln(e_i) + a_4 \ln(s_{ij}) + a_5 dist_{ij} \qquad (5.30)$$

The error-correction component, *EC*, can then be calculated from:

$$EC = \ln m_{ijt-1} - \hat{a}_1 \ln(GDP_j / GDP_i)_{t-1} - \hat{a}_2 \ln(e_j)_{t-1} - \hat{a}_3 \ln(e_i)_{t-1} - \hat{a}_4 s_{ijt-1} - \hat{a}_5 dist_{ij} - \hat{a}_0 \qquad (5.31)$$

And finally the full model as given in (5.29) is estimated.

The dynamic models can be estimated by different panel data techniques. Once analyzing the migration behavior in the static framework, I found that pairs of country-specific effects play an important role in explaining migration flows. Therefore, these unobservable effects should be included in the dynamic modeling, too.

One potential problem with the fixed or random panel data techniques in an ARDL framework is that both estimators are biased and inconsistent once the lagged dependent variable enters the model, especially in short panels like the one used in this study, see e.g. Baltagi (2005). It is possible to tackle the problem by using the Arellano-Bond (1991) difference (diffGMM) or the Arellano-Bover (1995) system

[102] From the microeconomic behavior point of view, the error correction term accounts for the existence of uncertainty and imperfect information connected to migration and the option value of waiting as argued in the previous theoretical model section.

[103] Here, the condition of co-integrating relationship must be satisfied. In order to test whether the co-integrating relationship exists, I first tested for existence of unit roots in the variables by using the Fisher's panel unit root test. The results are rather mixed and reveal that there are specific co-integration relations for each pair of countries. However, given the short panel of the data, one should be careful with any strong interpretation from the unit root tests run on the data. For a detailed description of the testing techniques and the results of panel unit roots tests, see Appendix II D. Further, I apply the augmented Dickey-Fuller (pooled) test in order to detect the stationarity in the error terms of the long-run migration equation. The test supports the hypothesis that the variables above form a co-integrating relationship; see bottom of Table 5.3. But as the test is not a panel data test, the results should be treated with caution.

GMM estimator (sysGMM). The first one uses instrumental variables in a form of lagged levels of predetermined and endogenous variables in first-differenced equations. The system GMM additionally permits the original equations in levels to be added into the model and predetermined and endogenous variables in levels to be instrumented by their suitably lagged first differences.[104] In this paper, both difference and system GMM estimators are performed in a two-step set up. I acknowledge possible heteroscedasticity by presenting robust standard errors.[105]

Results of the ARDL and ECM dynamic models are presented in Table 5.3. The first four columns show the ARDL model estimated by simple pooled OLS[106], countries pair's fixed effect FE(ij), system and difference GMM two-step estimators, (sysGMM, diffGMM). [107]

[104] For endogenous variables, I used lagged levels dated t-2 as instruments in first difference equations and lagged first-differences dated t-1 as instruments in level equations. For predetermined variables, their lagged levels dated t-1 and their first differences are used as instruments in first difference and level equations, respectively. I treat lagged migration flows and migration stock as endogenous variables, the GDP ratio and employment rates in destination and origin as predetermined, and trend and distance as exogenous. A precise list of the instruments is given in the Note of Table 5.3.

[105] As the panel is short, the Windmeijer's finite sample correction has been applied. Both estimators have been conducted using the "xtabond2" command developed independently by Roodman (2005) for STATA9.

[106] With a robust estimate of variance.

[107] I test the validity of instruments by the Hansen test of over-identifying restrictions, which tests whether the instruments as a group appear exogenous. As can be seen from Table 5.3, the Hansen test of over-identifying restrictions cannot be satisfied for both GMM estimators in a two-step set up. However, the Hansen test turns out to be satisfied in a one-step set up, which shows a sensitivity of the test to different set ups. The results from the one-step GMM estimations are available from the author upon request. The sufficiency of GMM is further tested by autocorrelation tests derived by Arellano and Bond (1991). For both GMM estimators the first-order serial correlation test rejects the null hypotheses of no first-order serial correlation (Arellano-Bond AR (1) test: z = -2.14 and -2.62), whether the second-order serial correlation test is unable to reject the null hypotheses of no second-order serial correlation (Arellano-Bond AR (2) tests: z = 0.63 and 1.04).

Table 5.3: Estimation of gross migration flows in the dynamic ARDL and ECM framework from 7 new EU member countries to 13 EEA/EU countries, 1990-2000.

	ARDL Model			**Error Correction Model**		
Dependent variable	Gross migration rate $\ln m_{ijt}$			Change in gross migration rate $\Delta \ln m_{ijt}$		
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables:	OLS	FE(ij)	sysGMM (ij) two-step	diffGMM (ij) two-step	OLS	FE(ij)
Short-run	*In levels*				*In changes*	
Migration stock, $\ln(s_{ij})_{t-1}$	0.026 [0.022]	0.112 [0.053]**	0.056 [0.067]	0.542 [0.105]***	0.077 [0.065]	-0.108 [0.067]
lnGDP ratio *t-1*	0.280 [0.092]***	0.342 [0.365]	0.632 [0.221]***	0.100 [0.424]	1.334 [0.551]**	1.790 [0.533]***
Employment rate *j*, $\ln(e_j)_{t-1}$	-0.358 [0.683]	6.949 [1.120]***	-0.130 [0.933]	8.096 [1.633]***	6.390 [1.752]***	1.752 [1.699]
Employment rate *i*, $\ln(e_i)_{t-1}$	0.778 [0.690]	-0.546 [0.790]	1.847 [0.719]**	0.189 [0.992]	1.496 [0.869]*	0.719 [0.823]
Distance	-0.050 [0.054]	-	-0.103 [0.100]	-	0.058 [0.039]	-
Trend	0.028 [0.010]***	0.042 [0.011]***	0.025 [0.009]***	-0.009 [0.016]	-	-
Long-run ♠						
Migration stock, $\ln(s_{ij})$	0.333	0.165	0.397	0.654	0.620 [0.030]***	
GDP ratio	3.590	0.503	4.482	0.121	1.192 [0.196]***	
Employment rate *j*, $\ln(e_j)$	-4.590	10.219	-0.922	9.766	-1.666 [1.314]	
Employment rate *i*, $\ln(e_i)$	9.974	-0.803	13.099	0.228	0.545 [1.232]	
Distance	-0.641	-	-0.730	-	-0.764 [0.110]***	
Trend	0.359	0.062	0.177	-0.011	0.031 [0.018]*	
Dynamic components						
Error-correction term	-	-	-	-	-0.078 [0.020]***	-0.574 [0.047]***
Migration flows, $\ln(m_{ij})_{t-1}$	0.922 [0.022]***	0.320 [0.046]***	0.859 [0.052]***	0.171 [0.091]*	-	-
Fixed/Random Effects - Country Pair	No	Yes	Yes	Yes	No	Yes
No. of observations	561	561	597	519	547	547
Constant Term Included	-2.202 [4.127]	-32.118 [5.822]***	-8.168 [5.928]	no	-0.320 [0.275]	0.062 [0.024]***
Adj. R-square	0.93	0.95			0.07	0.27
RMSE	0.532	0.406	0.557	1.124	0.522	0.429
Hansen test			chi2(316) = 70.3 p=1.00	chi2(264) = 70.51 p=1.00		
Dickey-Fuller test					chi2(150) = 381.99, p=0.00	

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses. Following instruments were used for diffGMM (column 4): ln migraton rate t-2, ln stock t-2, ln GDP ratio t-1, ln employment j t-1, ln employment i t-1and all further lags. Additional instruments used for levels equations in sysGMM (column 3): Δ ln migration flows t-1, Δ ln stock t-1, Δ lnGDP ratio t, Δ employment j t, Δ employment i t and all further lags. ♠ In ARDL models, the long-run coefficients are calculated from short-run elasticities and lagged dependent variable as described in (5.28).

The last two columns in Table 5.3 contain results from the error-correction model estimated by using OLS and the countries pair's fixed effects FE(ij) panel data estimator. Similarly as in the model without the lagged dependent variable, the unobserved country pairs fixed effect estimator in the ARDL framework gives the best performance as measured by the RMSE. The FE(ij) in ECM framework and sysGMM perform relatively well, too.

As regards results, the coefficients mostly attach the expected signs, but their size varies across the different econometric specifications. The coefficients to the dynamic component have the correct signs and are significantly different from zero, which confirms that statistically valid long-term equilibrium exists, and thus migration rates indeed adjust towards some long-run level. But, most importantly, the size of the coefficient varies significantly across the different specifications. To be precise, the coefficient to the lagged dependent variable and to the error-correction term in the models estimated by OLS or sysGMM, see columns 1, 3 and 5 in Table 5.3, have relatively lower magnitude compared to the models estimated by FE(ij) and diffGMM estimators, see columns 2, 4 and 6 in Table 5.3. This suggests that the adjustment in migration rate towards its equilibrium would be more sluggish according to the former ones and relatively faster according to the latter mentioned estimators.

The relative lack of robustness across different estimators in the dynamic models with lagged dependent variable on the right-hand side might be due to the nature of the panel data set used for the analysis. In particular, its unbalanced structure and/or its short-time panel dimension may cause the instability of the results in the dynamic models.

5.4.2.3. Preferred econometric specification to be used for predictions

The different estimators both in the static and dynamic frameworks, Tables 5.2 and 5.3, show that it is important to control for pairs of countries unobserved heterogeneity in the intercepts. The fixed country pair's effects estimator in its dynamic form, see column 2 in Table 5.3, beats the other estimators on the basis of explanatory power measured by the adjusted R-squared and in the terms of the RMSE. Therefore, this estimator is preferred in my analysis and is used for the predictions of a future migration potential.

Further, in addition to the gross migration rate as the dependent variable, I estimate similarly - as done in other studies - the model (25) with the net migration rate nm_{ijt} on the left-hand side:

$$nm_{ijt} = \gamma_1 + \gamma_2 nm_{ijt-1} + \gamma_3 \ln(GDP_j / GDP_i)_{t-1} + \gamma_4 \ln e_{jt-1} + \gamma_5 \ln e_{it-1} + \gamma_6 \ln s_{ijt-1} + \gamma_7 dist_{ij} + \gamma_8 T + \mu_{ij} + \varepsilon_{ijt} \quad (5.32)$$

The net migration flows numbers are obtained from the change in stocks per source population: $nm_{ijt} = \Delta s_{ijt} = s_{ijt} - s_{ijt-1}$ and enter the equation in a non-log form.[108] The coefficients from the model (5.32) are estimated similarly as in the gross migration flows equation by using the fixed effects FE_{ij} panel data estimator.[109]

The results of the models to be used for the predictions of the gross and net migration flows are presented in Table 5.4.

Overall, the two regressions show different effects of the explanatory variables on the gross and net migration flows. For instance, the coefficient to the migration stock attaches an unexpected negative sign in the net flows regression. The similar result is found in e.g. Fertig (2001) who argues that the stocks variable captures not only the "network" effect, but also "decreasing returns to migration". The larger stocks of immigrants imply a harder competition on the labor market, which leads to larger migration outflows. Further, the coefficient to the lagged GDP ration has an unexpected negative sign. This has a direct implication for the carried predictions as the predicted net migration flows will increase with the higher GDP convergence, but will be decreasing slowly with the growing stocks of immigrants. The lagged dependent migration rates yield statistically significant positive coefficients in both regressions. This means that a long-run equilibrium exists for both gross and net migration rates. Finally, the coefficients to the employment rates in the destinations and origins have expected signs in both gross and net migration rate regressions.

[108] The reason why the model is in the semi-log form and not as the model with gross migration rates in the log-log form is that there are some negative values of the net migration rate for some pairs of countries, e.g. Czechs and Hungarians in Germany in 1995-1998 and 1995-1997, respectively, Hungarians in Switzerland in 1992-1996, Estonians in Sweden in 1996-1999, Czechs, Hungarians and Poles in the UK for some years. Therefore, a model in semi-log form is more suitable.

[109] Results of the model estimated by other econometric specifications: OLS, REij, diffGMM and sysGMM are available from the author upon request. The FE_{ij} is preferred over the RE_{ij} in the Hausman specification test.

Table 5.4: Fixed effects FE_{ij} estimation of gross and net migration flows from 7 new EU members to 13 EEA/EU countries, 1990-2000.

	New EU member countries	
Dependent variable:	Gross flows per source country population, $\ln(m_{ij})_t$	Net flows per source country population, nm_{ijt}
Independent variables:		
Gross migration flows, $\ln(m_{ij})_{t-1}$	0.320 [0.046]***	
Net migration flows, nm_{ijt-1}		0.378 [0.038]***
Migration stock, $\ln(s_{ij})_{t-1}$	0.112 [0.053]**	-0.026 [0.013]*
lnGDP ratio *t-1*	0.342 [0.365]	-0.192 [0.094]**
Employment rate *j*, $\ln(e_j)_{t-1}$	6.949 [1.120]***	0.280 [0.307]
Employment rate *i*, $\ln(e_i)_{t-1}$	-0.546 [0.790]	-0.121 [0.218]
Trend	0.042 [0.011]***	-0.002 [0.003]
Fixed/Random Effects of Country Pair	Yes	Yes
No. of observations	561	607
No. of pairs of countries	78	76
Constant Term Included	-32.118 [5.822]***	-0.557 [1.585]
Adj. R-square	0.95	0.39

Notes: 10, 5 and 1% levels of confidence are indicated by *, ** and ***, respectively. Standard errors are in parentheses.

5.5. PREDICTIONS OF MIGRATION POTENTIAL

In the following section, I carry out a prediction exercise based on the models that have been presented in Table 5.4. Specifically, I predict the gross and net migration flows from the 7 new EU countries over the period 2004 to 2015. In connection with that, I make several assumptions concerning the future developments of the explanatory variables.

First, as regards the development of GDP per capita and the convergence between the source and destination countries, I assume, as Alvarez-Plata et al. (2003), three different scenarios:

a) *High convergence scenario* with a 3 percentage points convergence rate. The source countries are assumed to grow 5% annually where the EEA/EU destination countries are assumed to grow 2% annually;

b) *Medium convergence scenario* with a 2 percentage points convergence rate. The source countries are assumed to grow 4% annually where the EEA/EU destination countries are assumed to grow 2% annually;

c) *Low convergence scenario* with a 1 percentage points convergence rate. The source countries are assumed to grow 3% annually where the EEA/EU destination countries are assumed to grow 2% annually.

Further, I assume the population size and the employment rates in both destinations and origins to be stable over time.[110] Thus, I take their values from year 2000 to be the same over the projection period 2004-2015.

As to the network effects, I model the development of migration stock endogenously, i.e. first carrying out the prediction of the net migration flows and then adding the predicted net migration flows to the migration stock from the previous year: $\hat{s}_{ijt} = s_{ijt-1} + n\hat{m}_{ijt}$. Next, the acquired stock value is used to predict the net migration flows in time t+1, $n\hat{m}_{ijt+1}$. I continue with such recursive estimations up to the year 2015. Finally, I also use the obtained migration stock in the model with the gross migration rates as a dependent variable. In this way, I do not have to base my predictions of the migration flows on time-invariant migration stock values as it has been assumed in some previous studies on migration potential, e.g. Hille and Straubhaar (2001), Zaiceva (2004).

Concerning the unobserved pair of countries specific effect, I have first obtained an estimate of the effect specific for each pair of destination and CEE source countries for both the net and gross migration regression models, separately. These (time constant) fixed effects are included in the predictions. The results from this prediction exercise for gross flows and net migration flows from the 7 new EU countries are shown in Tables 5.5 and 5.6, respectively.

Before the description of results, there are a few methodological/data remarks. First, for Spain and Italy, the net migration rates show the stock of immigrants originating from Poland only. For the UK, the figures on stock variables do not cover Baltic

[110] From the previous sections one may observe that there have been drastic declines in the fertility rates in the CEECs. Nevertheless, it is relatively hard to make precise predictions on the population growth. Therefore I assume it to be stable over time.

countries: Estonia, Latvia and Lithuania.[111] Lastly, the UK was dropped from the gross migration flow analysis because the flow data are based on application for settlement statistics only. Consequently, the flow numbers constitute just a fraction of the true migration flow from the new EU members to the UK. I present only predictions of the net flows and stocks from those countries to the UK, as the migration stock statistics is the only reliable source of migration records for the UK. All the details related to the data in connection with the predictions are described in notes under Tables 5.5, 5.6 and 5.7.

Returning to the prediction results, I begin with the estimates of the predicted *gross* migration flows in Table 5.5. Assuming the medium convergence scenario, the average gross flows amount to an average annual immigration of around 322,000 persons from the new EU member countries, which is equivalent to accumulated gross flows of 3.9 million people from those countries or 5.6% of the source countries' populations over the period 2004-2015. This result belongs to the high end of the forecasts from the previous literature.[112] The highest flows from the new EU members are obviously expected to head towards Germany with the average gross migration flow being around 275,000 CEE migrants annually.

[111] The study by Portes and French (2005) shows that the (gross) migration flows from Baltic countries to the UK were especially significant after the opening of the UK labor market for new EU members in 2004.

[112] The results are comparable to two recent studies by Bruder (2003) and Zaiceva (2004). The first study predicts the total accumulated gross flows from CEECs over the period 2004-2015 at around 4.2% of the source countries' populations. The latter study predicts the accumulated gross migration flows between 3 and 5%, see Appendix Table 5.IA for an overview of results of the existing studies.

Table 5.5: Predicted gross migration flows from the new EU members into the 13 EEA/EU countries, 2004-2015.

Gross Flows	1989-2000	Year 2000	High convergence scenario 2004-2015			Medium convergence scenario 2004-2015			Low convergence scenario 2004-2015		
Countries:	Yearly average		Yearly average	cumulative	% of source	Yearly average	cumulative	% of source	Yearly average	cumulative	% of source
Belgium	1510	3659	4213	50559	0,071	4238	50859	0,071	4226	50712	0,071
Denmark	1472	2515	5189	62266	0,087	5257	63085	0,088	5290	63483	0,089
Finland	1536	1024	4472	53660	0,075	4623	55477	0,078	4777	57318	0,080
Germany	154625	117102	263887	3166649	4,424	274494	3293933	4,602	285688	3428260	4,790
Greece	1092	577	1607	19285	0,027	1610	19319	0,027	1597	19163	0,027
Italy*	3673	7100	10062	120747	0,312	10395	124735	0,323	10734	128810	0,333
Netherlands	1926	2574	6293	75511	0,105	6452	77419	0,108	6599	79186	0,111
Spain**	953	4331	3949	47391	0,087	4069	48830	0,090	4186	50227	0,092
Sweden	1819	1493	3810	45717	0,064	3925	47103	0,066	4039	48467	0,068
EU-9	**168606**	**140244**	**303482**	**3641786**	**5,253**	**315063**	**3780760**	**5,453**	**327135**	**3925626**	**5,660**
Iceland	242	497	700	8403	0,013	680	8160	0,012	655	7857	0,012
Norway	734	859	1811	21737	0,030	1805	21659	0,030	1779	21347	0,030
Switzerland	1547	2129	4235	50821	0,071	4318	51811	0,072	4383	52599	0,073
EEA/EU-12	**171129**	**143729**	**310228**	**3722746**	**5,366**	**321866**	**3862390**	**5,567**	**333952**	**4007429**	**5,775**

Notes: The UK is excluded due to the fact that gross migration flows are based on the settlement migration definition.[113] *For Italy, only numbers of Poles are shown. ** For Spain, only migration from Poland and the Czech Republic is shown. Figure IIIA in the Appendix III shows prediction intervals for the mean gross migration rate across the three different convergence scenarios. Prediction errors for each pair of countries are available from the author upon request.

There might be observed rather lower migration tendencies in the development of the predicted *net* flows from the new EU member countries. Table 5.6 shows that the predicted *net* flows amount to an annual average of 33,000 CEE migrants only. This is equivalent to an accumulated net increase of the CEE residents by 391,000 or by 0.6% of the source countries' populations in the 13 EEA/EU countries over the period 2004-2015.

[113] Consequently the predicted gross migration rates are heavily underestimated. The results from the predictions show an average yearly gross migration flow of 2 940, which makes an accumulated flow over the period 2004-2015 equal to 35284 CEE migrants.

Table 5.6: Predicted net migration flows from the new EU members into the 13 EEA/EU countries, 2004-2015.

Net Flows	Year 2000	High convergence scenario 2004-2015			Medium convergence scenario 2004-2015			Low convergence scenario 2004-2015		
Countries:		Yearly average	Cum. increase	% of source	Yearly average	Cum. increase	% of source	Yearly average	Cum. increase	% of source
Belgium	583	2188	26255	0,037	1171	14053	0,020	308	3692	0,005
Denmark	438	2878	34531	0,048	1716	20587	0,029	665	7975	0,011
Finland*	390	1518	18211	0,030	1075	12902	0,021	819	9822	0,016
Germany	16827	13604	163251	0,228	11972	143665	0,201	10325	123899	0,173
Greece	6	1976	23707	0,033	959	11512	0,016	90	1085	0,002
Italy**	4459	3915	46978	0,122	3094	37125	0,096	2271	27250	0,071
Netherlands	1588	4113	49362	0,069	2758	33092	0,046	1445	17340	0,024
Spain**	1626	1936	23231	0,060	1228	14738	0,038	549	6586	0,017
Sweden	362	3993	47917	0,067	2545	30542	0,043	1117	13405	0,019
UK***	9270	4034	48414	0,075	2653	31830	0,049	1266	15191	0,024
EU-10	**35549**	**40155**	**481856**	**0,769**	**29171**	**350046**	**0,559**	**18855**	**226245**	**0,362**
Iceland****	25	257	3080	0,008	83	990	0,002	5	59	0,0002
Norway	351	1845	22145	0,031	898	10779	0,015	122	1464	0,002
Switzerland	454	3715	44585	0,062	2427	29124	0,041	1199	14391	0,020
EEA/EU-13	**36379**	**45972**	**551667**	**0,870**	**32578**	**390939**	**0,617**	**20181**	**242159**	**0,384**

Notes: *For Finland, predictions do not contain numbers for the Czech Republic, **For Italy and Spain the predictions contain numbers for Poland only, ***UK numbers do not contain Baltic countries: Estonia, Latvia and Lithuania. **** For Iceland the predictions contain numbers for Poland and Estonia only. Figure 5.IIIB in Appendix III shows prediction intervals for the mean gross migration rate across the three different convergence scenarios. Prediction errors for each pair of countries are available from the author upon request.

The highest predicted net flows from the new EU members are again seen for Germany with the average net migration flow being around 12,000 CEE migrants annually. This number is much lower than the one predicted in other studies, e.g. Fertig (2001), Fertig and Schmidt (2000).

Table 5.7 presents the development in migration stocks. Here, the annual net migration flow numbers are simply added to migration stock year by year. The total accumulated net increase in migration over the 12 years after the EU enlargement leads to a total number of 1.2 million migrants from those countries residing in the 13 EEA/EU countries in 2015. This is equivalent to 1.8% of the source countries' populations. Contrary to the predicted gross flows, the results in this study

concerning the predicted stock are in the low end compared to other recent studies, but they get close to the findings of e.g. Boeri and Brücker (2001), Alvarez-Plata et al. (2003) and Dustmann et al. (2003) for Germany.

Table 5.7: Development in migration stocks from the new EU members in the 13 EEA/EU countries, 2004-2015.

Stocks	**Year 2000**		**High convergence scenario, year 2015**		**Medium convergence scenario, year 2015**		**Low convergence scenario, year 2015**	
Countries:		% of source		% of source		% of source		% of source
Belgium	9461	0,013	39536	0,055	26918	0,038	16139	0,023
Denmark	14903	0,021	54374	0,076	40006	0,056	26964	0,038
Finland	12849	0,018	34253	0,048	28642	0,040	25265	0,035
Germany	437104	0,611	637401	0,891	617372	0,863	597159	0,834
Greece	7157	0,01	37784	0,053	25182	0,035	14347	0,020
Italy	38400	0,054	95816	0,134	85726	0,120	75611	0,106
Netherlands	27897	0,039	85209	0,119	68505	0,096	52314	0,073
Spain	10441	0,021	38563	0,060	28723	0,059	21449	0,033
Sweden	75465	0,105	128072	0,179	110257	0,154	92677	0,129
UK	91597	0,142	150204	0,233	133224	0,207	116185	0,181
EU-10	**725274**	**1,034**	**1301212**	**1,847581**	**1164555**	**1,667**	**1038110**	**1,472**
Iceland	743	0,001	4746	0,007	2452	0,004	1343	0,002
Norway	9050	0,013	33218	0,046	21449	0,030	11731	0,016
Switzerland	13930	0,019	67582	0,094	51692	0,072	36526	0,051
EEA/EU-13	**748997**	**1,067**	**1406758**	**1,99504**	**1240148**	**1,772**	**1087710**	**1,541**

Notes: The prediction for Spain shows numbers for Poland and the Czech Republic only, the rest of the countries have missing migration records. UK numbers do not contain Baltic countries: Estonia, Latvia and Lithuania.

However, due to the fixed effects specifications those predictions assume no change in the immigration policy, i.e. no free movement. Obviously, the opening of the EU labor market is likely to affect the gross and net migration flows from the new EU countries.

The growth assumptions for the alternative high and low convergence scenarios lead to the average annual gross migration flows of 310,000 and 334,000, respectively. The accumulated gross migration flow over the predictive period 2004-2015 is then equal to 3.7 and 4 million migrants from the new EU members, for high and low convergence scenarios, respectively. This is equivalent to 5.4 and 5.8% of the source

countries' populations, respectively. The magnitude of the range of estimated gross migration flows belongs to the higher end of the forecasts from the previous studies.

The results of predicted net migration flows under alternative scenarios show the average annual net increases in the stocks by 46,000 and 20,000 under assumptions for high and low convergence scenarios, respectively. This leads to a total number of 1.4 and 1.1 million migrants from those countries, which is equivalent to 2 and 1.5% of the source countries' populations residing in 13 EEA/EU countries in 2015. Such a development in the gross and net migration flows indicates that migration from the new EU member countries towards the "old" EEA/EU countries would remain a temporary phenomenon in the sense that besides the inflows there will be substantial outflows as well.

5.6. CONCLUSIONS

In this paper, I have made use of new sources of data that allow me to follow the actual migration from new EU member and EU candidate countries to the EEA/EU-13 countries over the period 1990-2000. Being able to observe migration behavior from these particular countries helps me to avoid problems related to (double) out-of-sample forecasts and to the assumption of invariance of migration behavior across a space that previous studies had to hold.

The results of the panel data analysis show indeed importance of controlling for pairs of countries unobserved heterogeneity. Further, some preliminary results regarding predictions of future gross and net migration flows suggest that the fears concerned with the large scale migration are hard to justify. Furthermore, these relatively modest migration flows from CEECs towards "old" EU members may in fact play a rather positive role in the destination countries that are facing a problem of declining and ageing populations.

Specifically, the average annual net increases in stocks from the 7 new EU member states are predicted to be between 20,000 and 46,000 depending on assumed convergence scenario. This leads to a total number of between 1.1 and 1.4 million migrants from those countries residing in the 13 EEA/EU countries in 2015, which is equivalent to 1.5–2% of the source countries' populations. Concerning the gross migration flows, the results show the total predicted accumulated gross flow over

the period 2004-2015 being 5.4–5.8% of the source population, again depending on the assumed growth scenario. The results are relatively close to the findings of previous studies, although the predictions of gross migration potential belong to the larger ones, while the net migration potential belongs to the lower ones.

The results above show predicted net and gross migration flows and stocks in the case that the current immigration restrictions stay unchanged. But the opening of the EU labor market is likely to affect the migration flows from the new EU countries and thus especially in this case the Lucas critique can be applied. Therefore, it is an obvious task for future research to model and simulate the openings of the EEA/EU labor markets by relaxing the assumption of time-invariant employment rate in the EEA/EU destination countries. These are, however, steps to be carried out in future work.

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APPENDIX I: *Previous literature*

Table 5.IA: Existing studies on CEE migration potentials.

Study	**Countries of origin**	**Destinations**	**Flows per year**	**Long-run (absolute)**
Hille, Straubhaar (2001)	10 CEECs	EU15	188.000-396.000	
Boeri, Brücker (2001)	10 CEECs	EU15	335.000 down to 100.000 in 2030	3.900.000 in 2030
Alvarez-Plata et al. (2003)	10 CEECs	EU15	335.000 down to 0 in 2030	3.817.409 in 2030
Bauer, Zimmermann (1999)	POL, CR, HUN, SR, SLO, ROM, BUL,	EU15	200.000 per year	883.505 – 2.614.544
Fertig (2001)	10 CEECs	Germany	67.101	1.409.119 in 2015
Fertig and Schmidt (2000)	POL, CR, EST, HUN	Germany	14.656 – 62.656/	293.122 – 1.253.000 accumulated inflows over 1998 – 2017
Sinn et al. (2001)	POL, CR, HUN, SK, ROM	Germany	240.000 – 270.000 down to 60.000-150.000 in 2020	
Dustmann et al. (2003)	AC-10	Germany/(UK)	20.459 – 209.651 (5.000 – 13.000) to 2010	
Zaiceva (2004)	10 CEECs	EU-15	300.000 – 500.000	3.500.000 – 5.000.000 over 2004-2014
Bruder (2003)	CEEC-8 without Malta and Cyprus	EU-15	238.063-273.300	1.700.000 (net) 3 000 000 (gross) 2004-2015

APPENDIX II: *Data*

5.IIA. List of countries included in the emigration flows' analysis:

Destination countries

Belgium, Denmark, Finland, Germany, Greece, Iceland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the UK

Source countries

The Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic

5.IIB. Description and definitions of the variables used in the paper and their source:

Gross flow of migrants from country i to country j

Source: National statistical offices and "Trends in International Migration" SOPEMI OECD.

Stock of foreigners from country i in country j

Source: National statistical offices and "Trends in International Migration" SOPEMI OECD.

Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship - except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin.

Source: World Bank.

GDP per capita (constant 1995 international $) based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant 1995 international dollars.

Source: World Bank, International Comparison Programme database

Unemployment, total (% of total labour force): Unemployment refers to the share of the labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ by country.

Source: World Bank: International Labour Organisation, Key Indicators of the Labour Market database.

Distance between countries – distance between capitals in km.

Source: MapInfo, own calculations.

5.IIC. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
year	1092	1994.5	3.453634	1989	2000
Flows ij	717	2750.865	16253.94	0	260266
Stock ij	798	9565.734	34539.64	0	301366
POPj	1092	2.31e+07	2.51e+07	252700	8.21e+07
POPi	1092	1.03e+07	1.20e+07	1354666	3.87e+07
GDPpcPPPj	1092	21176.55	3930.378	12383.73	32227.57
GDPpcPPPi	1053	8561.24	1946.647	4963.767	12839.68
Uj	1092	7.907412	4.513214	.5008767	23.66247
Ui	962	9.703817	4.914661	.3	18.9
Dist ij	1092	1347.302	664.5027	86.5	3070

5.IID. Testing time-series properties of the data:

The panel structure of the data enables me to analyze migration behavior in a two-dimensional framework, across space and time. Therefore, I look at the time-series properties of my data in the following part. Specifically, I test for the existence of unit roots in the variables. This is quite important, as if a series turns out to have a unit root, then its variance is infinite, therefore standard statistical inference is not valid asymptotically (Granger and Newbold, 1974). On the other hand, if a long-run relationship between the dependent variable and explanatory variables exists, i.e. if the variables are cointegrated, the outcome may be different as nonstationarity in this case may provide a possibility for obtaining super-consistent results, see Bentzen and Engsted (1997) for a discussion on these issues.

Although unit root's tests are commonly used in time-series data analysis[114], their panel data applications are not that developed.[115] Till now, the following tests are available: Breitung and Meyer (1994) test, Im, Pesaran and Shin (IPS) test and the Fisher test (Maddala and Wu, 1999). However, all tests except the last mentioned one, require balanced panels, which is not a case for my dataset. Therefore, I decided to test for unit roots by using the Fisher test. The test combines p-values from N independent unit root tests, as developed by Maddala and Wu (1999), and

[114] A standard procedure is to run a Dickey and Fuller test.
[115] A good overview of panel data unit root tests in the context of migration is given in Zoubanov (2004).

computes the statistic $\lambda = -2\sum_{i=1}^{N} \ln p_i$, where p_i is observed significance level (p-value) in the *i*th individual unit root test. Based on the p-values of individual unit root tests, Fisher's test assumes that all series are non-stationary under the null hypothesis against the alternative that at least one series in the panel is stationary.

The results of the Fisher's unit root tests for migration flow, stock and other variables, which enter the model, are given in Table 5.IIA. For migration flows and stock the Fisher test tends to reject the hypothesis that all flows and stock series in the panel are non-stationary.[116] In the case of GDP per capital in PPP and employment rates, the Fisher test cannot reject the Ho that all series are non-stationary, thus these variables have unit roots. Their first differences reveal that they are integrated of order one.

Table 5.IIA: Fisher's unit root test (ADF) for the entire panel of destination and source countries.

Variables	in levels		in differences	
	Chi-squared	*p-value*	*Chi-squared*	*p-value*
Immigration Flows $\ln(m_{ij})$	chi2(320) = 906.980	0.0000	chi2(492) = 2116.374	0.0000
Immigration Stock $\ln(s_{ij})$	chi2(240) = 1825.456	0.0000	chi2(384) = 2244.920	0.0000
GDP per capita PPP $\ln(GDP_j)$	chi2(810) = 136.058	1.0000	chi2(810) = 1440.443	0.0000
GDP per capita PPP $\ln(GDP_i)$	chi2(810) = 654.860	1.0000	chi2(810) = 912.191	0.0070
Employment rate $\ln(e_j)$	chi2(360) = 139.688	1.0000	chi2(310) = 1293.474	0.0000
Employment rate $\ln(e_i)$	chi2(350) = 126.134	1.0000	chi2(252) = 812.291	0.0000

In order to look into the stationarity properties of flow and stock variables, I run the Fisher test for flows and stock variables for each destination country separately, see Table 5.IIB. The test shows that the results are mixed for different destination countries with half of the destination countries having stationary flows and stock and half having a unit root. This means that there exist specific co-integration relations for particular countries or pair of countries. Given the short panel of the data, one

[116] The null hypothesis is that all time-series in the panel are stationary I(0) – if the hypothesis is rejected, it does not imply that the hypothesis is rejected for all groups, i.e. there may be a mixture of I (0) and I(1) variables in the panel.

should be careful with any strong interpretation from the panel unit root tests. But it can at least give a feeling that the stationarity/non-stationarity in variables may be different for different countries.

Some previous studies, e.g. Alvarez-Plata et al. (2003), Brücker and Siliverstovs (2004), argue that there is no equilibrium between migration flows and other explanatory variables on the basis of unit-root tests. They argue that such a relationship exists between stocks and explanatory variables only. However, the panel unit root tests on my data reveal that the results may be different for different countries.

Table 5.IIB: Fisher's unit root test (ADF) for each particular destination country.

	Immigration Flows		**Immigration Stock**			**Immigration Flows**		**Immigration Stock**	
Austria	chi2(28) = 148.0791	0.0000	-	-	**Italy**	chi2(10) = 15.1855	0.1254	chi2(4) = 0.012	1.000
Belgium	chi2(22) = 6.0195	0.9997	chi2(20) = 151.197	0.0000	**Netherlands**	chi2(28) = 68.7396	0.0000	chi2(28) = 52.521	0.0001
Denmark	chi2(28) = 50.6672	0.0054	chi2(20) = 249.530	0.0000	**Norway**	chi2(20) = 72.1684	0.0000	chi2(16) = 118.659	0.0000
Finland	chi2(28) = 53.6129	0.0025	chi2(20) = 460.429	0.0000	**Spain**	chi2(14) = 0.0276	1.0000	chi2(6) = 0.491	0.9987
France	chi2(28) = 45.2611	0.0208	-	-	**Sweden**	chi2(28) = 117.4586	0.0000	chi2(20) = 322.4328	0.0000
Germany	chi2(26) = 18.5743	0.8539	chi2(20) = 123.195	0.0000	**Switzerland**	chi2(28) = 154.4900	0.0000	chi2(20) = 236.427	0.0000
Greece	chi2(28) = 121.2409	0.0000	chi2(20) = 28.878	0.0902	**United Kingdom**	chi2(12) = 4.1617	0.9803	chi2(14) = 25.193	0.0327
Iceland	chi2(22) = 30.2483	0.1126	chi2(20) = 19.445	0.493					

APPENDIX III: *Standard errors for the predictions*

Figure 5.IIIA: Development of the observed and predicted mean gross migration rate and prediction intervals for the mean gross migration rate; 1989-2015.

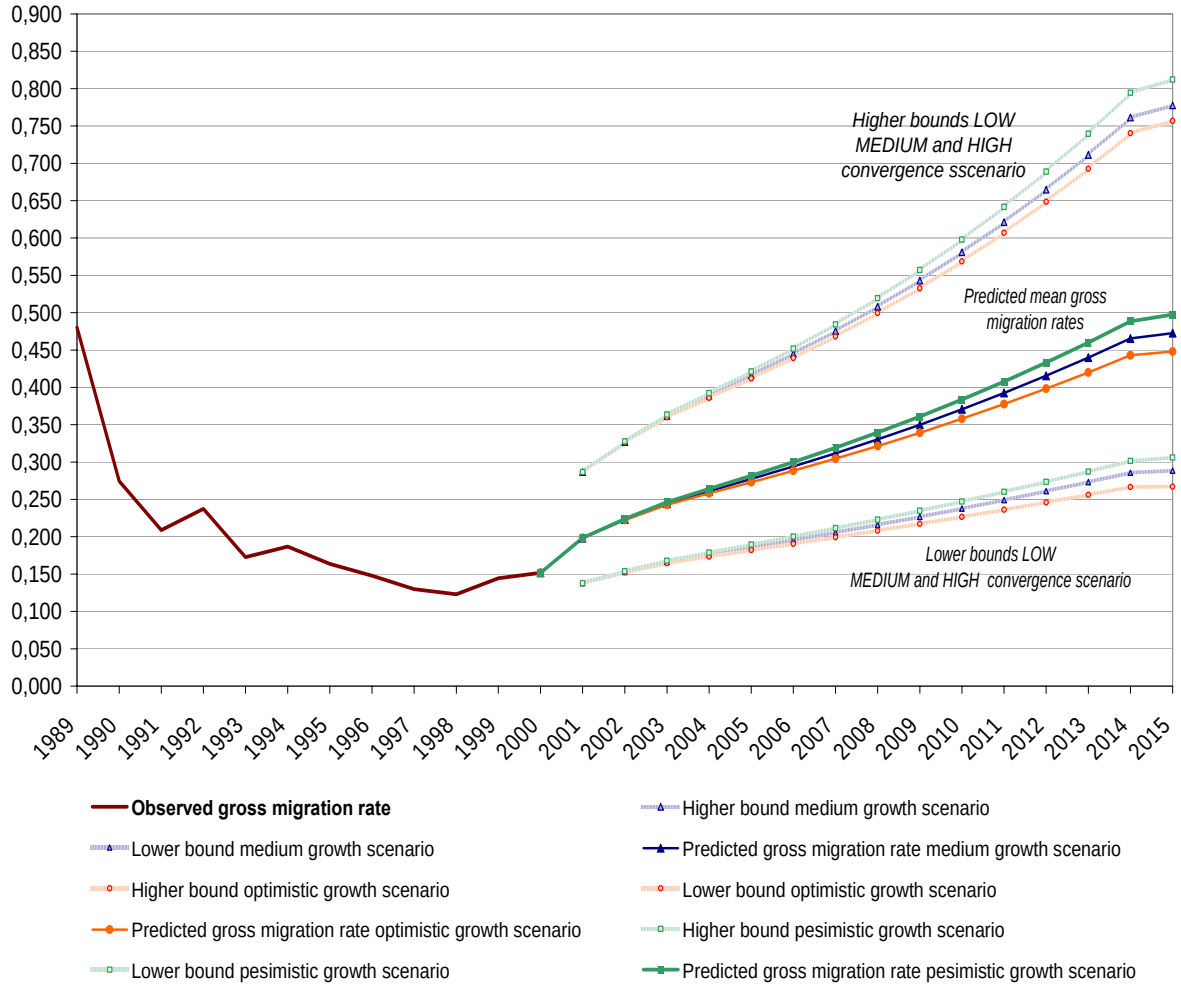

Figure 5.IIIB: Development of the observed and predicted mean net migration rate and prediction intervals for the mean net migration rate; 1990-2015.