THE EFFECT OF HOUSEHOLD DISPOSABLE INCOME ON EMIGRATION IN CENTRAL AND EASTERN EUROPE

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Monika Šakytė

Advised by

Doc. Dr. Aras C. Žirgulis

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Summary

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One of the biggest sociological and political problems in Central and Eastern European countries in the 21st century is a decrease of the population with the high influence factor of emigration to the West of Europe. This problem causes significant fiscal and labour market problems. According to the literature, income is one of the main determinants of emigration and yet there is little evidence on the relationship between income and emigration in Central and Eastern European countries.

The aim of this paper is to analyze the impact of disposable household income on the level of emigration in Central and Eastern European countries. After the analysis of current situation, theoretical literature, and previous empirical publication, regression analysis is performed in order to examine the effect of household disposable income on emigration. For the analysis panel data of eight countries in the period of 2004-2014 is used. The pooled OLS model is used with the independent variables of household disposable income, unemployment rate, education, age, inequality of the country and crisis. The empirical research shows that income growth has a negative impact on the emigration growth. According to the results of this research, in order to achieve lower emigration, the income of households has to be increased, therefore, one of the solutions is to increase the minimum wage.

Keywords*:* International emigration, Income, Central and Eastern Europe

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Introduction

Central and Eastern Europe region has one of the fastest shrinking population of the present-day history (Romey, 2016). The rapid shrinkage started right after the communist regimes collapsed and the post-communist countries started to experience a demographic transition that had a significant effect on the economics, politics and societies of those countries (Chawla, Betcherman , & Banerji, 2007).

There can be several reasons for this population decrease. For instance, negative natural population change, as there are no significant changes in death rates (Eurostat, 2018b) but fertility rates in Central and Eastern Europe are one of the lowest in the world - 12.6 per 1000 people (Akkoc, 2015) and emigration (Romey, 2016). Namely emigration from Central and Eastern Europe to the Western countries as eight out of ten choose Western Countries (Atoyan, et al., 2016). Nevertheless, the strong growth of post-communist countries and convergence with Western countries was observed (Roaf, Atoyan, Joshi, & Krogulski, 2014), the Western countries continuously have higher living standards and disposable household income and, according to the GDP per capita in PPS (purchasing power standard), reaches 65-88 in comparison with the European Union average of 100 (Eurostat, 2017b). Therefore, while there are differences in the economic levels of those countries, people from the East side of Europe continuously will have an expectation for higher earnings and overall life quality (Romey, 2016), and thus, emigration to the Western European countries will continue. Moreover, as the border control in Europe is low, this can encourage free labour movement. As a result, people from Central and Eastern European countries have good opportunities to move if the conditions in their native country economy are in the lower level compared with Western Europe. This emigration has significant problems not only in the micro level as the division of families' increases but the economic and political consequences as well. As the majority of emigrants are working-age people (Eurostat, 2017a), there are additional negative implications, for

instance, the formation of the unbalanced structure of the population and increasing dependency ratio (Romey, 2016). However, despite the increasing problem in this region, there is little research about main motivations that stimulate emigration and whether economic differences between East and West countries have a relationship with emigration from Central and Eastern Europe.

To this respect, this thesis investigates the following **problem**: what is the effect of household disposable income on emigration in Central and Eastern European countries?

Moreover**, the aim** of this thesis is to evaluate the effect of the household disposable income on emigration in Central and Eastern European countries.

In order to achieve the aim of this thesis, the following **objectives** are defined:

1. To overview current emigration and economic situation in Central and Eastern European countries;
2. To review existing literature and prepare a theoretical background about the main determinants of the emigration and empirical research methods;
3. To identify an econometric model, estimate the effect of the household disposable income on emigration in the Central and Eastern European countries and analyse the results.

The research methods of this thesis are a generalization of theoretical information and analysis of the results of secondary data research using Gretl software package. Regression analysis, based on panel data of eight European Union countries, was examined using pooled ordinary least squares (thereafter, pooled OLS). The data of household disposable income and emigration are taken from Eurostat database. Moreover, the additional conditional variables are included in the regression such as unemployment rate, age, education and inequality of the country and crisis.

This thesis can be beneficial for the authorities that are responsible for the migration levels in the Central and Eastern Europe or the European Union as the problem of emigration is increasing. Moreover, the most influential factors that increase emigration are analyzed, and thus, the solutions for the emigration reduction can be obtained by analyzing the factors that have a necessity to be changed for the purpose of emigration decrease.

1. Situation analysis

At the time when Western and Southern counties in Europe are dealing with immigration crisis, the Central and Eastern countries have a problem of high numbers of leaving citizens. The populations in some of those countries have the fastest-shrinking ratios and, according to the migration expert in the European Migration Network Bernd Parusel, "Emigration is certainly a major factor" (Harris, 2018). Moreover, the free labour movement between East and West increased the volumes of emigration from the lower economic development countries to the West rather than making those countries to converge (The Economist, 2017). For example, Poland lost 1.2 million of its citizens in the past ten years, and "as they not paying anything it means no pensions for millions of retirees," said Janusz Kobeszko, an analyst at the Sobieski Institute (Szary, 2014).

This modern history massive migration from Central and Eastern Europe started as the communist regimes fallen, and thus, the expectations that the significant differences between Western and Central and Eastern European countries' economics will cause enormous migration were created. For instance, according to the Financial Times prediction in the 1990s, seven million people will migrate from Central and Eastern Europe to the Western countries (Engbersen, Okólski, Black, & Panţîru, 2010). Other newspapers and politicians have predicted that emigration can reach the number of 20-40 million of Eastern Europeans (Bauer & Zimmermann, 1999). The unclear future in the native country from the perspective of the highly qualified people was expected to increase emigration, and thus, immigration quotas in the West were tightened (Fassmann & Münz, 1994). However, the predicted flows of emigrants have never arrived in the Western countries (Engbersen et al., 2010). The overall estimation on how many migrants were from Central and Eastern countries from 1990 up to these days it is hard to observe as some of the migration was within the region (Engbersen et al., 2010) but it

is presumed that about 20 million of the Eastern Europe population has left their native country (Parikh, 2017).

Just after the regimes fallen, the migration from Central and Eastern Europe was based on the ethnic and conflict-driven issues and some years later, the situation stabilized and then the main cause of the emigration was an economic level of the outflow country (Mansoor & Quillin, 2006).

1.1. Important episodes of migration

For the purpose to understand the situation of emigration between East and West Europe, the statistical data is analyzed. As it can be stated from the Figure 1, the overall growth trend is observed. In addition, several migration waves can be observed in the 21st century. The first one after the EU enlargement in 2004 when all of the eight analyzed countries joined the EU. The Second one in 2008 with the main consequence of Global Crisis.

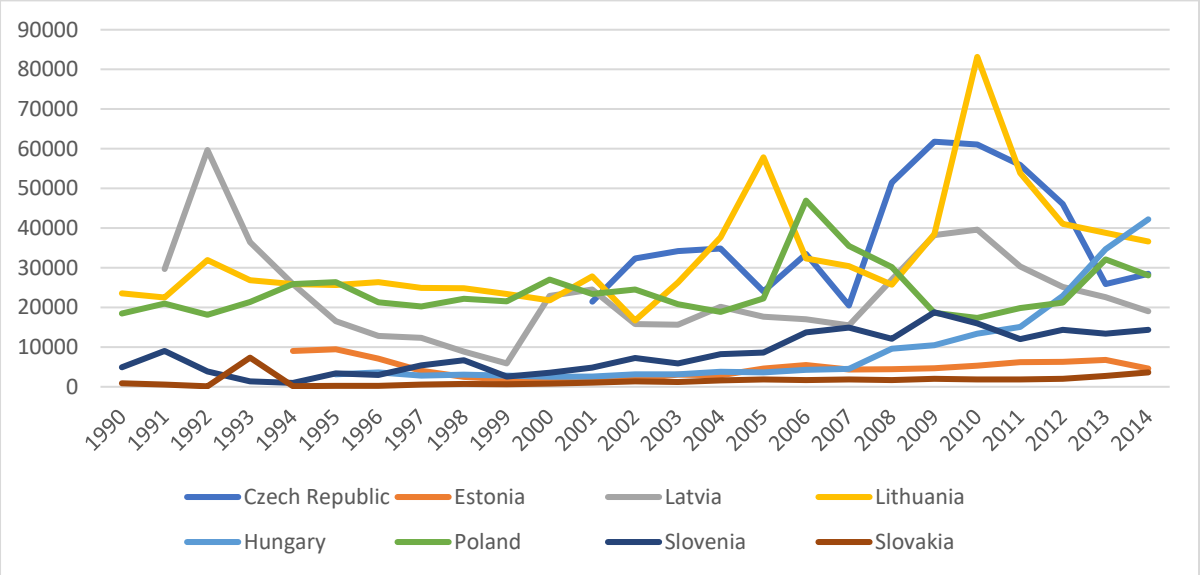

Figure 1. Emigration from Central and Eastern Europe countries, 1990-2014

Note. Data source: (Eurostat, 2017a), (Local Data Bank, 2018)

1.1.1 Enlargement of the EU

After the enlargement of the EU in 2004, the emigration numbers increased, however, the total number of emigrants from some countries exceeded the expected numbers (Mansoor & Quillin, 2006). According to the same publication of Mansoor and Quillin (2006), Ireland as one of the most popular destination from Central and Eastern European countries, had an inflow of over 85000 migrants and 80000 migrated to the UK during the first year of EU enlargement. The underestimation for some countries had happened as it was expected that all of existing EU countries will have open labour markets, however, as, for instance, Germany did not open the labour markets, other countries have unexpected large-scale migration, mainly from Poland but from other Central and Eastern countries as well (Engbersen et al., 2010). It was feared that the inflow will be cheap labour force that will push native workers from their jobs and reduce their wages (Bauer & Zimmermann, 1999).

Moreover, the nature of the migration is complicated and it is difficult to have a clear statistical data as since 2004, migration from Central and Eastern Europe have a temporal and seasonal migration pattern and some of the migrants are not registered (Engbersen et al, 2010). As a result, the concept of incomplete migration was introduced by Okólski (2001) that includes temporary migration, different levels of legality and work in a secondary labour market. Looking at the incomplete migration patterns, it can be stated, that in addition to the previous migration, the seasonal migration of young and usually educated people that came for short periods with high employment and relatively low wage can be observed, especially this is applicable to polish emigrants (Engbersen et al., 2010).

1.1.2 Global financial crisis

Significantly higher increase in the level of the emigration was observed from 2008. One of the main reasons for this skyrocketing emigration can be unemployment level in some countries. For example, high increase in an unemployment level (*see Figure 2*) in Lithuania

and Latvia can be observed in the increase in the emigration level (Eurostat, 2017a) as the youth unemployment in Lithuania was around 30 percent and as a result, the young working age people emigrated for the better employment opportunities (Sipavičienė & Stankūnienė, 2013). The trend of emigration growth is observed in all Central and Eastern European countries, except Poland. Right after the start of the global crisis, the migration trend in Poland changed to downward. This can be a result of the Poland an economic situation during the recession as the country continued to grow from economic perspective (Ziolek-Skrzypczak & Iglicka, 2010) and there were no drastic changes in the level of unemployment.

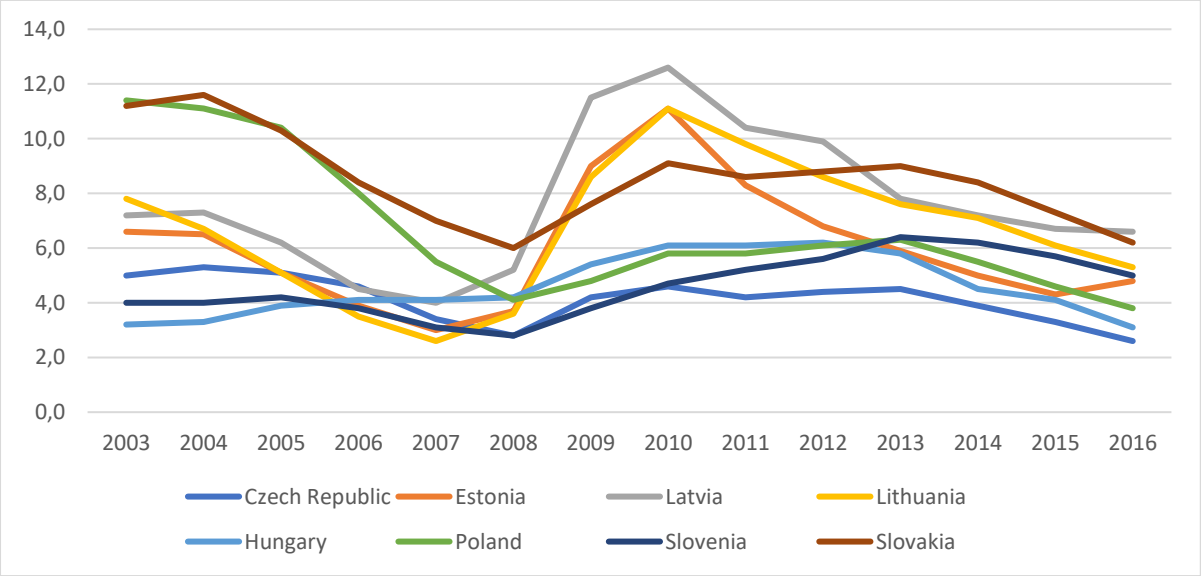

Figure 2. Unemployment in Central and Eastern European countries, 2003-2016.

Note. Data source: (Eurostat, 2018)

1.1.3 Emigration from 2013 to 2017

From 2013 the clear emigration trend that would be applicable to all of the Central and Eastern Europe countries disappeared, however, the problem of emigration continues. For example, Lithuania lost about ten percent of the overall population since 2004 and encounters various social and political complications (Parikh, 2017). The main perceived difference is political and social recognition of the problem as in some countries population is rapidly shrinking and new programs for the return migration are created. For instance, the summit of

Visegrad group of Central Europe was convened in order to find a prevention for the emigration of young people (Parikh, 2017). Moreover, the mass campaign that is dedicated to urging migrants to return was launched "We want you back!" (Millar, 2016) which helps emigrants to integrate into their native country by ensuring tax breaks, soft loans and other assistance (Szary, 2014). However, these new programs are not effective enough as, according to the IMF, only 5 percent of emigrants decide to come back (The Economist, 2017).

One of the most important factors that had an effect on the level of emigration in this period was a referendum on BREXIT in 2016. After the enlargement of the EU, the UK became one of the most popular destinations for the emigrants from Central and Eastern Europe, especially from Poland (Sumption, 2009). This mass migration initiated anti-immigration attitudes and became one of the main reasons for the voters' decision to leave EU (Bulman, 2017). In 2017 the lowest level of Central and Eastern European countries' immigrants to the UK was registered as the economic situation and the clarity about the future changed (Warrell, 2017).

1.2. Demographics of emigration

Moreover, it is important to consider the demographic characteristics and composition of migrants as it can have effects on both, outflow and inflow countries (Drinkwater, Eade, & Garapich, 2010).

1.2.1. Emigration by sex

As it can be seen in Figure 3, the majority of the emigrants are males, however, the difference is insignificant (Eurostat, 2017a). Traditionally the majority of migrants were young males as they were responsible for the finance of the family and it is estimated that about 65 percent of the female migration was family linked (Krieger, 2004). It is a significantly different trend from the male proportion perspective in Europe migration crisis in 2015, and thus, East-West Europe migration does not have a strong demographic effect such as increased level of

violence or insurgency (Symons-Brown, 2016). In addition, looking at the trend from 1995, the percentage of the male emigrants from Central and Eastern post-communist countries is relatively stable and varies from 50 to 60 percent of all the emigrants from those countries (Eurostat, 2017a).

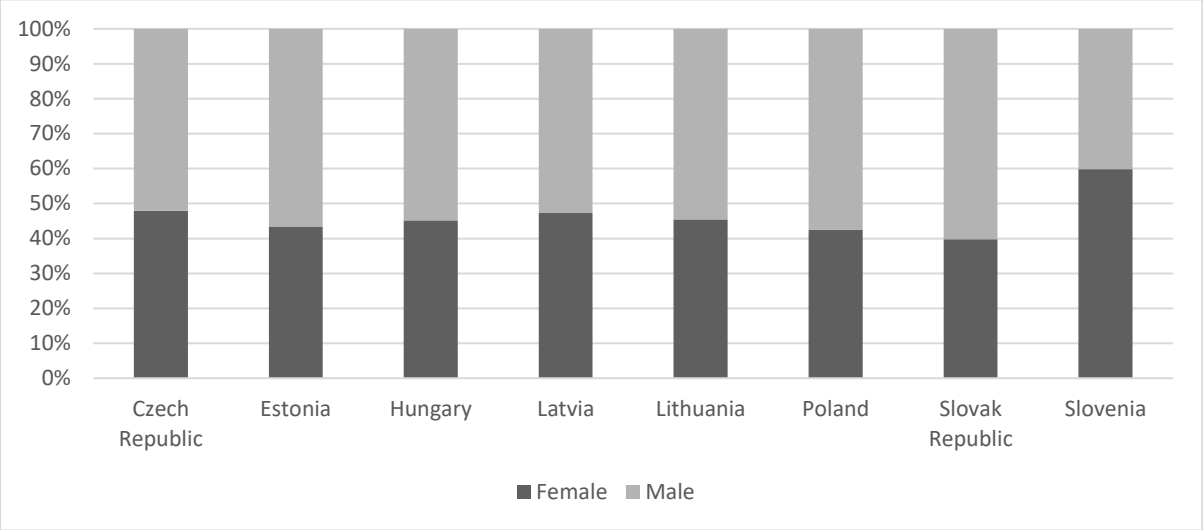

Figure 3. Emigration by sex, % of all emigrants, 2015

Note. Data source: (Eurostat, 2017a)

1.2.2. Emigration by age

Furthermore, it is important to analyze the age of the emigrants. As of 2015, the vast majority, 70-90% of emigrants from Central and Eastern post-communist countries, were working-age people (20-59 years old) (Eurostat, 2017a). This disproportion has a significant negative effect on the economies of the outflow countries. First, the imbalance of the structure of the emigrants' age increases age dependency ratio that measures the percent of people that cannot work and are dependent on the number of working people (*see Figure 4*). For instance, from 2004 to 2016 age dependency ratio increased from 44,34 to 49,34 percent (The World Bank, n.d.). Therefore, the burden of economic cost is increasing with the expansion of public expenditures on health and pension systems as well as the need for political reforms (Chavla, Betcherman, & Banerji, 2007).

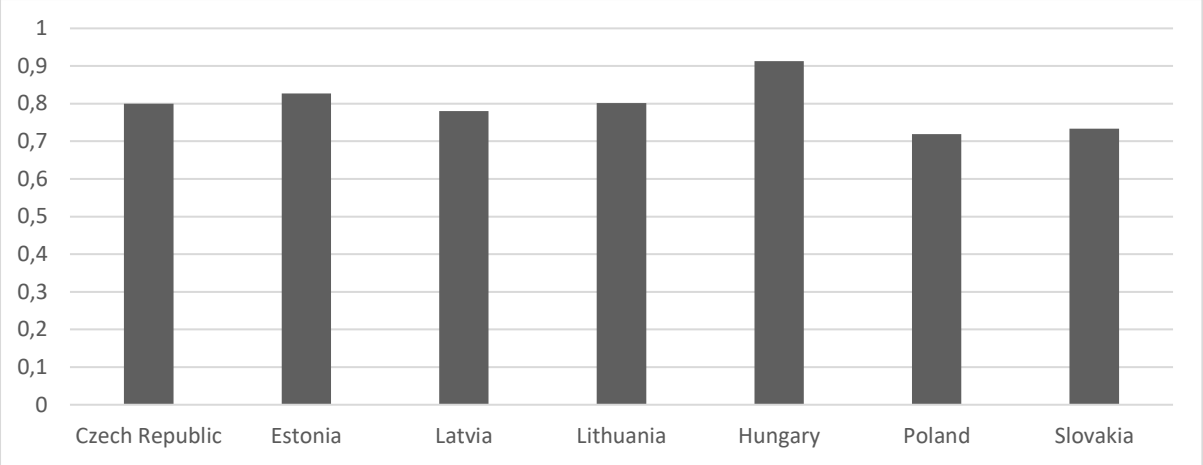

Figure 4. Working age emigrants as a part of all emigrants, 2015

Note. Working-age – 20-59 years old. The data of Slovenia is not available. Data source: (Eurostat, 2017a)

1.2.3. Emigration by level of education

According to the International Monetary Fund note, the percent of emigrants with the tertiary education of the analyzed countries is significantly higher than the countries education level and this ratio is increasing over time (Atoyan, et al., 2016). This phenomenon of brain drain has considerable consequences on the economies of those countries, for instance, the shortage of highly skilled labour force (Atoyan, et al., 2016) or fiscal losses, as usually the education was funded by taxes of the existing residents but recipients do not increase the productivity of that country as they emigrate (Gibson & McKenzie, 2010). Some of the variables that influence the significant level of emigration of highly skilled workers can be a high level of corruption, low accountability of public institutions and political ineffectiveness (Atoyan, et al., 2016). Moreover, it is considered that the disproportion of the emigration statistics has an effect on the GDP growth level as on average with the absence of emigration of skilled workers, GDP per capita income convergence with EU28 slowed down by 5% (Atoyan, et al., 2016). However, even the majority of emigrants have tertiary education, the job positions taken in the inflow country are extremely low-skilled and routine based, mainly

in manufacturing, construction and transport sectors (Drinkwater, Eade, & Garapich, 2010), and thus, about 40 percent of the emigrants are overqualified for these job positions (Warrell, 2017).

1.3. Effects of emigration in Central and Eastern Europe countries

It is important to analyze the effects of emigration on the outflow countries for the purpose to understand the magnitude of the problem. High level of migration has economic and political consequences, however as the demographics of the emigrants is not balanced emigration creates additional problems.

1.3.1. Remittances

One of the main effects of remittances is that they decrease the output of the country as remittance receivers less likely will seek work. For instance, one percent of GDP growth because of remittance has two percentage points increment in the economic inactivity (Atoyan, et al., 2016). In addition, even remittances have an impact on the decreasing poverty, they increase inequality. Remittances have also a positive impact on economics as it boosts consumption and become an investment in the production (León-Ledesma & Piracha , 2001). In addition, remittances have a positive effect on the individual's level as they can help to mitigate the lifecycle risk and income shocks (de Haas, 2007). However, negative effects of remittances outweigh the positive ones (Tetlow, 2016).

Looking at the trends of remittances as a percentage of GDP (*see Figure 5*) it can be clearly observed that the overall trend in the past 20 years is increasing. However, the situation in Central and Eastern Europe is significantly better in comparison with Southeast European countries. For example, remittances in Bosnia and Herzegovina in the last years exceeded ten percent of GDP and in Central and Eastern Europe the highest remittances were observed in Latvia and they variated between four and six percent (The World Bank, 2018a).

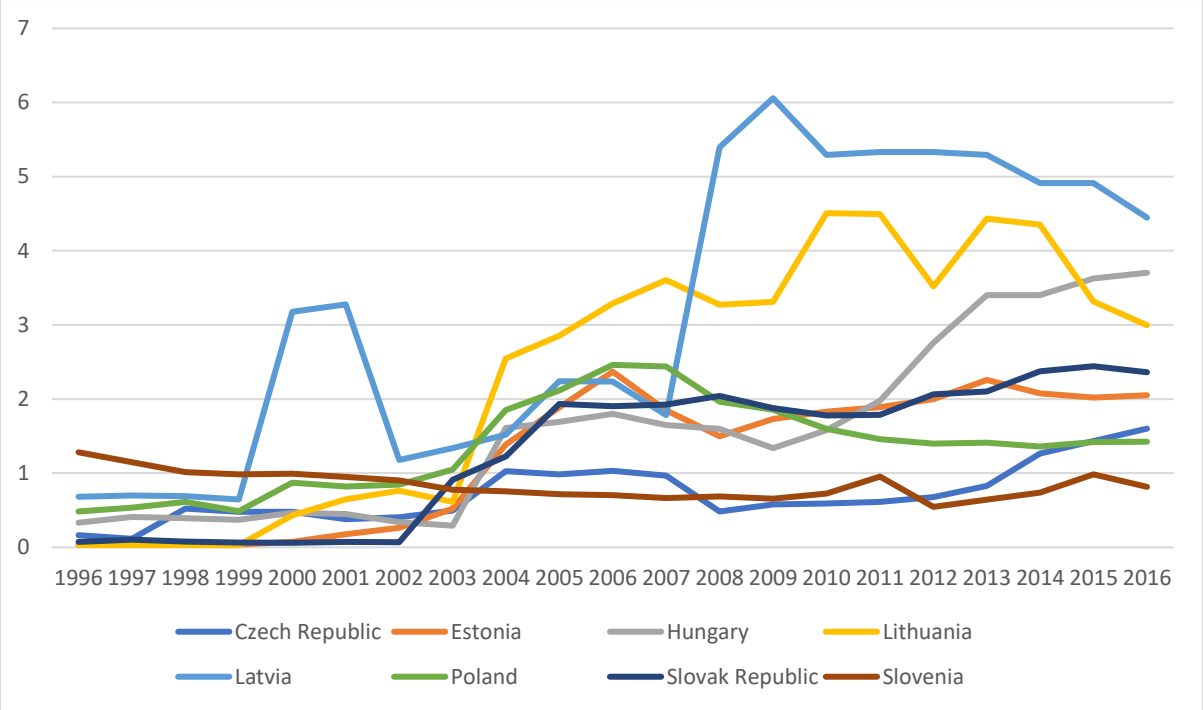

Figure 5. Personal remittances, % of GDP, 1996-2016

Note. Data source: (The World Bank, 2018a)

1.3.2. Labour market

As the supply of the labour force, especially highly skilled, is decreasing, not only the productivity of the country is decreasing but domestic wages, especially for the skilled employees and the inequality of the country increases (Mishra, 2015). For instance, 50 percent of the companies in Hungary already have obstacles to find employees (Parikh, 2017) even with an increase of 15 percent in the minimum wage in 2017 (Romey, 2016), labour costs in Lithuania and Latvia increased by more than eight percent per annum (Romey, 2016). Moreover, the increased opportunities to find a job abroad have an effect on the bargaining power in the job market (Atoyan, et al., 2016). Moreover, the real labour productivity with the absence of the emigration at the period of 1995-2012 would be six percentage points higher. In addition, the convergence is slower as the inflow countries gain additional economic benefits (Atoyan, et al., 2016). Furthermore, the government expenditure on the labour productivity

investment is lost as the taxpayers' money is used to qualify the skilled workers during the years of education but they using their human capital abroad (Rangelova, 2017).

1.3.3. Fiscal consequences

As it was stated earlier in the 1.1.2 section, the disproportion of the age of emigrants and increasing dependency ratio have significant implications for the entitled expenditures, for instance, increasing costs of health and pension systems (Clements, Dybczak, Gaspar, Gupta, & Soto, 2015). Moreover, the increase in the dependency ratio has an effect on the necessity to increase the mandatory retirement age (McDaniel & Zimmer, 2016) and the increase in labour taxes (Atoyan, et al., 2016). Despite the fact that consumption-based taxes revenue because of remittances increased, fiscal revenue is affected by the lower income tax revenue, and thus, it has negative effects revenue relative to GDP. As the problem of emigration in some Eastern Countries is not decreasing, it is forecasted that the cumulative output loss in 2015-2030 can reach almost nine percent and the GDP per capita is expected to decrease by almost four percent (Atoyan, et al., 2016).

Moreover, the important consequence of the emigration is the slowed income convergence between Central / Eastern and Western Europe. According to the analysis, skilled labour emigration determined 5 percentage points lower GDP per capita (Parikh, 2017). This is a result of the seven percentage points loss of real economic growth until 2017 and it is expected to reach nine percent total output loss until 2030 (Parikh, 2017).

1.3.4. Parental migration

Finally, not only economic disadvantages of the emigration arises but the social as well. One of the biggest problems is parental migration. For instance, the number of children with at least one parent working abroad increased by 8 percent since 2008 (Szary, 2014). Nonetheless, the financial situation of these families usually increases with the better wages abroad and

remittances, there are negative consequences on the child's well-being (Botezat & Pfeiffer, 2014). This problem is common in Eastern Europe (Botezat & Pfeiffer, 2014), and thus, the significant part of society has a higher probability of mental or behavioural problems as well as lower academic results (Robila, 2010). As a result, there are long-term negative consequences of family separation.

1.4. Economic situation of Central and Eastern Europe countries

In order to understand emigration in Central and Eastern European countries, the economic situation in these countries has to be analyzed. In Central and Eastern European countries one of the main drivers of emigration is the possibility to improve ones and their families' well-being as the differences in income levels and employment exist (Atoyan, et al., 2016).

Despite the economic progress and dramatic transformation with embraced democracy, free markets and trade (Wiarda, 2017) since 1990, the Central and Eastern Europe economic indicators are well below the old EU countries (Redo, 2015). The strong growth between 1990 and 2008 can be positively affected by the uncommonly good economic environment in the global context with low interest rates and high commodity prices (International Monetary Fund, 2016). However, the significant gap between Eastern and Western Countries is still observable. This can also be seen in Figure 6. Moreover, according to the Wiarda (2017), the poorness of the country depends on the distance from the wealthy European countries and the repeated sovereign invasions. As the Figure 6 shows, the wealthiest countries from the Central and Eastern Europe region are Slovenia and the Czech Republic as they are the most western in the region. Nonetheless, the considerable economic progress and convergence between Central and Eastern Europe countries with the Western countries in the period of 1990 and 2008 can be seen. However, after the global financial economic crisis, the growth slowed down. From 2008 the convergence moved away from the fast track and because of the capital gaps,

shortage of investment and declines in working-age population, the achieving of the fast track growth rates can be challenging (International Monetary Fund, 2016).

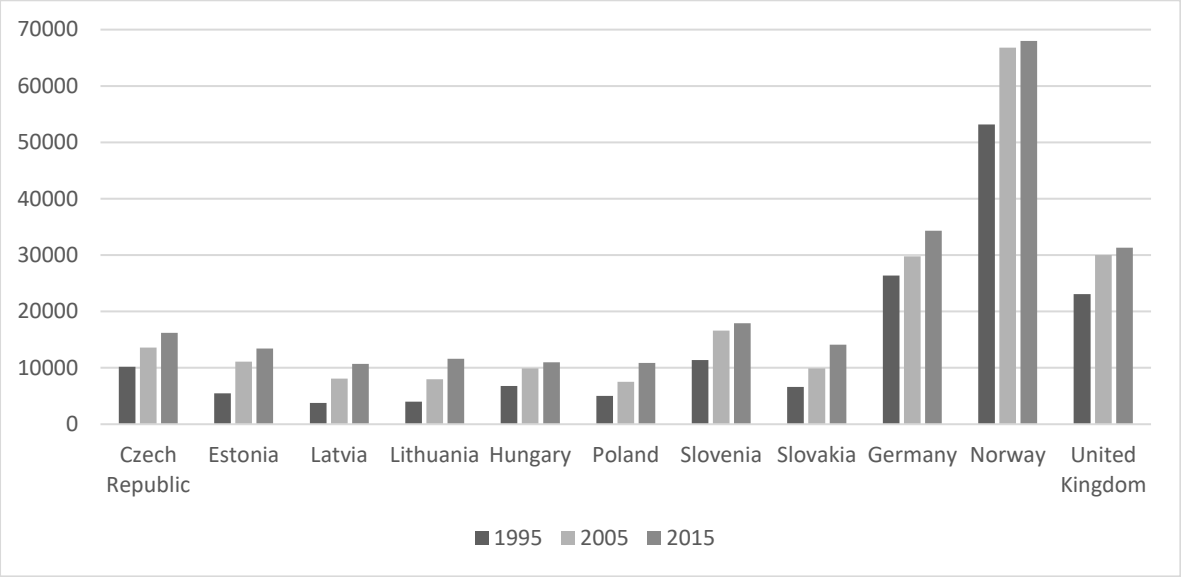

Figure 6. GDP per capita, 1995-2015

Note. Data source: (Eurostat, 2018)

1.4.1. Economic convergence

The Prosperity Index shows that the convergence between East and West of Europe is increasing as the Central and Eastern Europe steadily delivers prosperity at the faster rate (Legatum Institute, 2016). Nonetheless, the significant increase in the Business Environment index, the overall Economic Quality does not follow the same growth path as the newly created wealth is not distributed equally and favours urban areas (Legatum Institute, 2016). Moreover, the growth rate of GDP in Central and Eastern Europe region is constantly higher in comparison with the average of the EU28, as it can be seen in Figure 7. However, the GDP growth of the latest years is a consequence of the private consumption driven by a constant increase of wages, and thus, the government should be concerned whether this growth is sustainable (Bayer, 2018). Furthermore, about three percent of the annual GDP is driven by the EU Structural and Cohesion Fund (Erste Group, 2014).

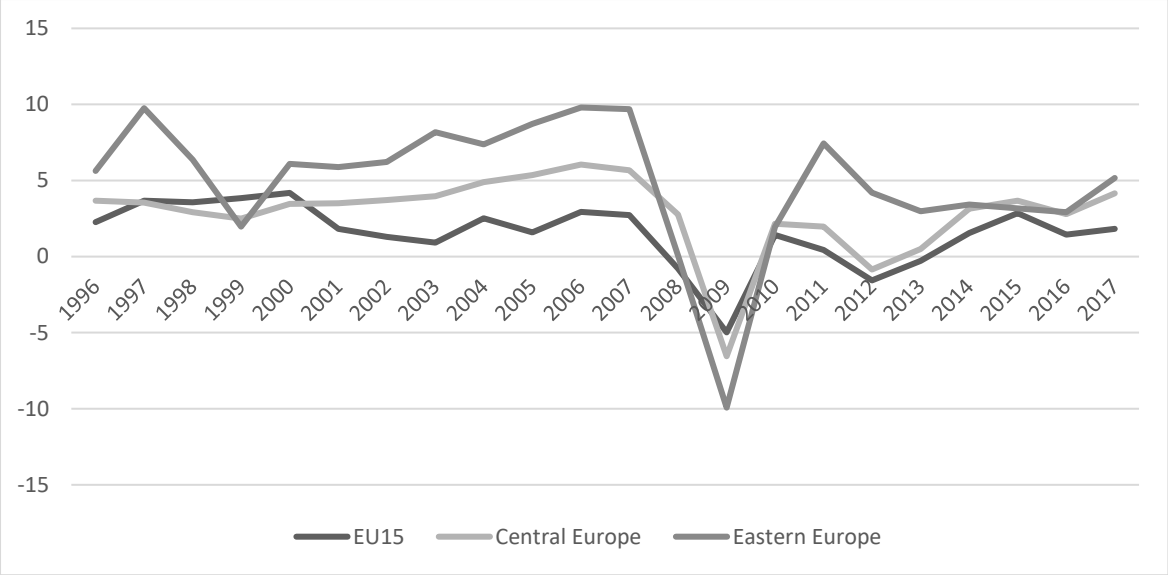

Figure 7. Real GDP per capita growth rate, 1996-2017

Note. Data Source: (Eurostat, 2018)

1.4.2. Household disposable income

One of the measures for the economic situation and well-being of the citizens is disposable household income. It is a "sum of household final consumption expenditure and savings, minus the change in net equity of households in pension funds" and it represents the idea of income in economics (OECD, 2018). The trend of disposable household income growth is reflecting the real GDP per capita growth rate, and thus, the growth in Central and Eastern Europe countries is higher than EU average (*see Appendix A*). Moreover, looking at the household disposable income data (*see Figure 8*) (Eurostat, 2018a) it can be stated that the Central and Eastern Europe region countries have similar level of the indicator and there is a substantial difference between this region and one of the most popular destinations for the emigrant countries – Germany, Norway and the UK.

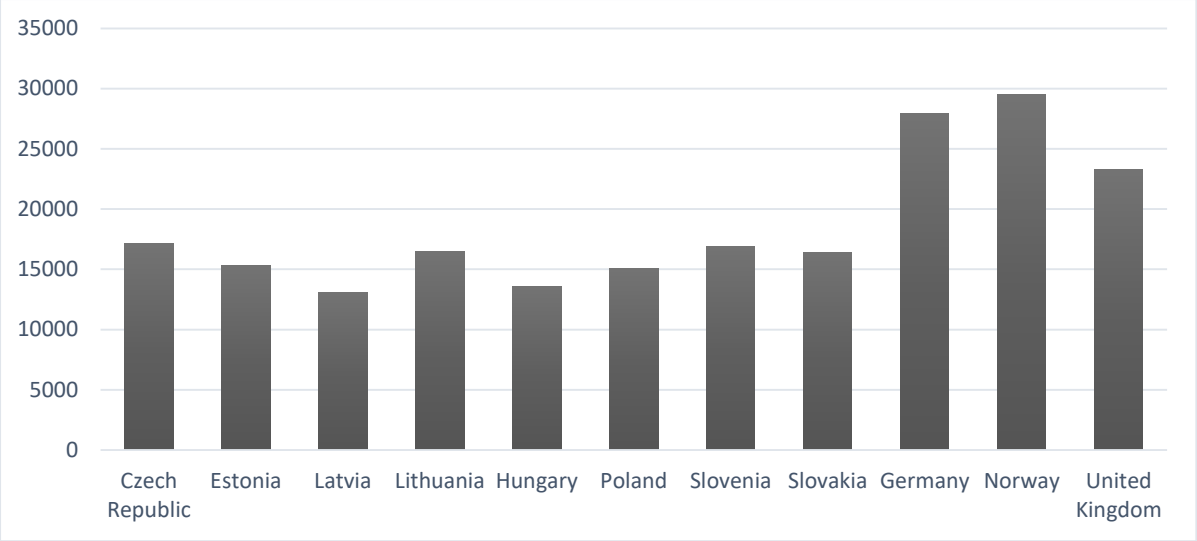

Figure 8. Household disposable income, 2015

Note. Data source: (Eurostat, 2018a)

2. Theoretical justification and research methodology

This part of the thesis begins with an existing theoretical literature review on the main theories that determine the motivations of the migration and continues with the justifications of the relevant determinants from the empirical research. Finally, it analyse the empirical methods that are the most suitable for the determination whether disposable household income affects the level of emigration.

2.1. Theoretical basis

There are several types of migrants such as asylum seekers, labour, political migrants, family migration (Bauer & Zimmermann, 1999) and the motivations for these different types are not necessarily homogenous. In this thesis, theory and empirical research are analyzed only form the labour movement perspective. According to the UNESCO (n.d.), a migrant worker is a "person who is to be engaged, is engaged or has been engaged in a remunerated activity in a State of which he or she is not a national.".

2.1.1. Migration theories

The allocation of the labour across the international boundaries is analyzed by the economic and social theories of migration that sometimes have no linkages between themselves and usually have discipline boundaries (Massey D. S., Arango, Hugo, Kouaouci, & Pellegrino, 1998). However, there is no one and coherent theory that would explain all the determinants of migration (Bodvarsson & Van den Berg, 2013). As the migration process is highly complex and has diversified mechanisms, it is argued that such a theory will never be obtained (Haas, 2011).

There are several theories that explain possible reasons of migration such historical-structural theory, social capital theory, cumulative causation, gravitational model, dual labour market theory, segment labour market theory, and others. These theories analyze such factors

as a structural labour demand, ethnic enclaves, migrant networks, language, distance, culture of migration and other relevant factors (Massey D. S., Arango, Hugo, Kouaouci, & Pellegrino, 1998). However, the variables determined by these theories are either hardly quantified (Haas, 2011) or analyze the effects of a host country (Massey., Arango, Hugo, Kouaouci, & Pellegrino, 1998). On the other hand, there are several theories that are used in the theoretical analysis of the emigration from an economic perspective with measurable variables such as neoclassical economic theory and the new economics of migration, and thus, they are further analyzed in this part of the thesis. These theories are based on the human capital investment theory that indicates that the probability of emigration increases if the returns on the capital invested increases (Borjas, 1989).

2.1.1.1.Neoclassical human capital model

The theory of neoclassical economics is the oldest and one of the best-known theories that explains international migration. This theory is constructed from two main parts: macro, that explain income differentials between labour and capital endowment rich countries, and micro that highlights the individual cost-benefit analysis (Massey et al, 1998).

Looking from the macro perspective, as the labour surplus in the country exists, the income will continue to be low, and thus, this difference between incomes of two countries is a reason of the emigration (Castles, de Haas, & Miller, 2014). As a result, the emigration decreased the surplus and the countries start to converge (Golher, Rosa, & de Araujo Junior, 2005). According to the neoclassical approach, the emigration level is dependent on the size of income differential and will continue to exist until this difference between income decreases (Bauer & Zimmermann, 1999).

The micro model argues that the migration is as an investment with the purpose to improve the quality of the life (Golher et al., 2005) by maximizing the utility (Borjas, 1989). The person looks at the value of the possible opportunities abroad, subtracts the costs that will

be experienced and emigrates if a net return in the long run is positive (Krieger, 2004). The value focuses on available opportunities such as higher income or higher probability of employment (Massey et al., 1993). The lower the opportunities in the home country, the larger differences between these countries exist, and thus, the motivation for emigration increases. Therefore, additional factors such as higher education, experience and same language have a positive impact on the increased probability of emigration (Massey et al., 1998) as the value of opportunities increases. The cost part can be divided into money and non-money costs. The distance is a monetary cost and it can variate according to the current situation of the person. Changed surroundings, the opportunity cost that are related to traveling, searching for a new job, can have an effect on the cost-benefit analysis from a non-monetary perspective (Sjaastad, 1962). However, these costs are hardly measurable as they can only be collected from the emigrants themselves.

The neoclassical model assumes that the emigration exists until the income differentials are absent because of international equalization (Massey et al., 1998), and thus, the migration is usually permanent. Nonetheless, as it was analyzed in the situation analysis part, the emigration in most cases is not permanent but this model cannot explain why people migrate several times in their lifetime (Bodvarsson & Van den Berg, 2013).

*2.1.1.2.**The new economics of migration***

The theory of the new economics of migration emphasizes that a decision to emigrate is made not by individuals but by households and considers not only a labour market (Massey et al., 1998; Bauer & Zimmermann, 1999). As a result, the requirements for migration are not gains of the individual but the sum of the gains of all individuals in the household (Bodvarsson & Van den Berg, 2013). The goals of the households can be not only to raise income but to obtain funds and mitigate risk (Taylor, 1999) as one of several household members emigrates and work in negatively or not related sector in order to avoid market failures (Stark & Bloom,

1985). This ensures that in case of any negative economic situation in the source country, the household will have income from remittances (Bauer & Zimmermann, 1999).

There are several issues that can increase the probability of emigration. For example, the new economics of migration theory argues that income is not a homogenous good and the effect of utility is not constant (Massey D. S., Arango, Hugo, Kouaouci, & Pellegrino, 1998). People regularly do comparisons with their reference group and measure their relative deprivation and if the current situation does not satisfy the expectations, one chooses to migrate. Therefore, the person changes the relative position in the current reference setting or changes the reference group. For example, if some families rapidly improve their income because of migration, other families experience relative deprivation (Krieger, 2004). As a result, the person from the household that is more relatively impoverished will have a higher probability of migration in comparison with the less relatively deprived household person (Stark & Bloom, 1985; Krieger, 2004; Stark & Taylor, 1991). Furthermore, as the people migrate from low-income to high-income countries, both, relative and absolute income increases the likelihood of emigration (Bodvarsson & Van den Berg, 2013). However, people with the lowest income have lower emigration rates as they do not have enough resources for the movement (Krieger, 2004).

Contrary to neoclassical theory, the new economics of migration theory focuses on short-term and target oriented migration as the emigrant has strong relations with the remaining household and expects to come back (Sana & Massey, 2005). Moreover, as the new economics of migration considers other than labour markets, such as insurance, capital or consumer credit, even with the absence of income differentials between countries, the emigration can exist (Massey et al., 1998).

2.1.2. Economic situation and income

The main concept in the previously analyzed theories is that people migrate from low to high-income countries. According to the neoclassical migration and the new economics of migration theory, one of the main variables that influence the decision to emigrate is income levels in the country. As the population emigrates from low to the high-income level, some empirical research (Bertoli & Moraga, 2013; Pedersen, Pytlikova, & Smith, 2004; Sprenger, 2013; Jennissen, 2004) includes the GDP per capita level in order to measure overall country performance. The negative relationship between GDP per capita in the origin country and the level of emigration is observed.

However, this variable has some limitations in measuring the income for the person as the higher GDP per capita does not mean higher income of average worker (Mayda, 2009). Therefore, other studies instead of GDP per capita include the income as a determinant of emigration. There are several options how this variable in the studies is included. Some research as Gani and Ward (1995) and Narayan and Smith (2006) used bilateral data and measured the difference between incomes of two countries or the income of destination country. These research showed that the higher the difference between incomes of two countries or the higher the income in the destination country, the larger is the level of emigration. Analysing the relationship between the theoretical frameworks and the situation in the sending countries it can be noticed that the labour market-based theories usually focus on the destination country determinants rather than the country of origin (Haas, 2011). However, if the study contains only analysis of the counties of origin, it is not possible to measure the income differential between a country of origin and destination as it is not possible to determine the target country for every case. Therefore, there are studies that include only the income of the source country, for example, Stark and Taylor (1991). However, the results are different from the previously mentioned studies where higher income differential between two countries

led to larger emigration and the relationship in this study is positive. This can be explained by the inverted 'U' relationship between the economic level of source country and emigration that states that in the very poor countries increase of income causes increase of emigration and in the more developed countries the relationship is reverse (Pedersen et al., 2004). Previously mentioned research data sample contained only poor countries as countries of origin and, as a migration is costly, therefore, only people with higher income could emigrate. In the Pedersen et al. (2004) model, income has an effect on the level of emigration as the migration rates are higher in the lowest income group. In addition, in the study of Stark, Micevska and Mycielski (2009) that analyzed emigration from Poland, as it is expected from 'U' shape relationship, the income of the source country has a negative relationship, however, the variable in this study is not significant. According to Borjas (1989), as the population is rational and income maximizing, the lower the income in the source country, the higher the emigration rate is observed. Moreover, the effect of tax pressure in the source country was also observed as a significant factor in the study of immigration to OECD countries (Pedersen, Pytlikova, & Smith, 2004) and as a result, instead of GDP, the household disposable income is chosen as an independent variable.

Moreover, as the emigration can have an effect on the income in the source country, therefore, dual causality between income and emigration exists. There are several research papers showing that emigration increase income in the source country (Funkhouser, 1992; Dustmann, Frattini, & Rosso, 2015; Stagl, 1982; Bauer & Zimmermann, 1999). This can be a result of the significant labour force decrease (Kahanec & Kurekova, 2011) and the increase in the average wage or remittances. This relationship can also be explained by the neoclassical macro theory. As a labour supply decreases in the source country, income eventually rises (Massey et al., 1998).

2.1.3. Other determinants of emigration

However, even if the income level is an important variable that determines migration, additional determinants also can have an impact. One of the most common variables that is significant in the researches of emigration is the level of unemployment. Again, as the migration includes two countries, there are several possibilities how to include it in the model. Docquier, Peri and Ruyssen (2014) and Jenissen (2004) in their empirical research included only the unemployment level in the destination country while some researchers analyzed bilateral migration and found a significant differential influence unemployment between two countries. In the empirical studies of Sprenger (2013), Massey, Kalter and Pren (2008), Warin and Svaton (2008) and Krieger (2004) higher unemployment in the source country increases the emigration. However, the unemployment variable in some research did not have any significant influence on emigration (Fidrmuc, 2004). This can be based on the fact that the majority of emigrants are young age people and they are not that sensitive to the layoffs in comparison to the older generation (Mayda, 2009). In addition, in the studies of Pedersen et al. (2004) and Stark et al. (2009), unemployment had a counterintuitive result as the impact of unemployment coefficient was negative. In addition to the young age, this can be explained by the neoclassical cost-benefit analysis theory that the higher unemployment can have a relatively higher cost of migration as it becomes more challenging to finance migration (Pedersen et al., 2004).

Another determinant of migration that is analyzed in this theses is inequality in the country. The effect of the variable depends if the selectivity is positive or negative (Mayda, 2009). If the inequality in the country of origin is lower than in the host country, the migrants usually are identified in the upper tail of the income distribution (Borjas, 1987). This happens because higher ability person has a high probability to earn relatively higher income in the destination country in comparison to the average. In the case of the Central and Eastern

European countries, the inequality is lower in comparison to the Western countries (The World Bank, 2018). As a result, on average people are positively selected (higher than the average) refer to their abilities (Brücker & Defoort, 2007) and people with the higher income migrate. In the studies of Mayda (2009) and Stark et al. (2009), the increase in the inequality in the source country has a positive impact on the level of emigration as the marginal individual becomes poorer.

There are additional variables from the demographic perspective that can have an influence on the emigration. One of the variables that are commonly used in the empirical research is the level of education in the country. This variable is important as individuals that have higher education have a greater ability to collect the information and lower costs of migration (Bauer & Zimmermann, 1999; Docquier, Peri, & Ruyssen, 2014). Therefore, they reduce the risk of migration and increase the intention to emigrate. This variable is significant in the model of Stark and Taylor (1991) and according to the Docquier et al. (2014) study, people with tertiary education have two times higher probability of migration looking at weighted figures and much higher in non-weighted, when small countries have equal weight as larger ones. From the human capital theory perspective, the higher level of education increases the income returns. However, this variable is controversial as the Bauer and Zimmermann (1999) study found that the education has a negative influence on emigration as usually, people are overqualified for a job they are having abroad.

Moreover, the age of population determines the level of emigration from the demographic perspective. The age of the population is theoretically reasonable variable as the person calculates the value of the migration by estimating the present discount value of the net benefits. As the working time left and amortization period for a young person is longer, the value exceeds the investment (Bauer & Zimmermann, 1999). As a result, the younger the age of the population of the country, the higher rate of the emigration should be obtained. This

variable has a significant effect on the regression of Mayda (2009) and of Stark and Taylor (1991). Moreover, the emigration rate drops significantly among people above 40 (Krieger, 2004).

Finally, there is one political determinant that can be found in the empirical research on migration. It is a political pressure that is measured as a Freedom House Index. It has an effect on the level of migration in the model of Pedersen et al. (2004) and Narayan and Smyth (2006).

2.2. Methods of empirical research

There are several ways to measure if the household disposable income has an effect on emigration and the empirical research are mainly divided into two main categories: the ones that analyze the bilateral migration and look into the data of two countries and the ones that analyze only the source country. The latter is used in this thesis by using time-series cross sectional – panel data. This type of data is best suitable when there is an implied relationship for all the entities but the dependent values of each of them differ. Moreover, panel data gives more accurateness for model parameters as the data points are increased (Hsiao, 2014), less collinearity between variables and more degrees of freedom (Baltagi, 2005). Based on these advantages, panel data analysis is most appropriate for this research.

By using panel data the general equation estimation is as given:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + .. + \beta n X_{nit} + u_{it}$$

Where Y is a dependent variable, β is a coefficient of an independent variable, X is independent variable and u is an error term. The *i* represents the i^{th} cross-sectional unit and the *t* stands for the time identifier.

As the model uses several observations of entities in different points of time, three methods can be applicable: pooled OLS, fixed and random effect models.

The analysis of migration contains same parameters across regions and time, and thus, pooled OLS model is used. This model is also used in the migration studies of Pedersen et al.

(2004) and Bertoli and Moraga (2013). It ignores unit fixed effects and they are eliminated from the estimation and it disregards individual differences between the cross-section entities. Examining pooled regression, the individual coefficients should be statistically significant, however, Durbin-Watson test should be low as with the pooled OLS model the autocorrelation in the data can be obtained (Gujarati, 2004). Moreover, as the time constant variable is omitted, the heterogeneity bias can be obtained (Wooldridge, 2013). This method usually is the most appropriate with a large number of observations but a lower number of time periods.

Fixed effect model that was used in the study of Mayda (2009) assumes that even the intercept varies across entities, the intercept of each entity does not vary over time (Gujarati, 2004). It recognizes that each entity can have its own characteristics but there are no differences between time periods of the same entity. The model is constructing by adding differential intercept dummies according to the number of entities (Gujarati, 2004). As a result, even if the number of entities is large, the number of explanatory variables increases significantly, and thus, it is better suited if the regression equation has a restricted number of entities (Wooldridge, 2013). Moreover, this method gives exactly the same estimates of the coefficients, standard errors and major statistics as they would be in time-demeaned data (Wooldridge, 2013). However, because of a significant increase in the number of dummies, this model has a disadvantage of the lost degrees of freedom (Baltagi, 2005), as well as the possibility of multicollinearity, exists (Gujarati, 2004). Moreover, if the number of entities is higher than the number of time periods, the fixed effect estimator should be used with caution as inferences can be sensitive to the violations of the assumptions and, as a result, first differencing can be used (Wooldridge, 2013). Moreover, serial correlation of the data has to be examined and fixed effect model should be used only in the cases with no serial correlation.

However, the loss of the degree of freedom can be evaded by assuming random constant term in random effects model (Baltagi, 2005). The entities have a common mean intercept

value and the intercept values differences between individuals are reflected in the error term. This means that the intercept of each entity is extracted randomly from a large population that has a constant mean value (Gujarati, 2004). As a result, the individual error components of a cross-section and individual-specific errors are not correlated between themselves and there is no autocorrelation. However, the correlation structure is constant between all the cross-sectional units (Gujarati, 2004). Moreover, the random effect model does not show the information how the selected variables change over time (Wooldridge, 2013). This model is usually used when the number of entities is small and the number of time periods is high (Wooldridge, 2013). Nevertheless this model was not observed in the empirical research about the determinants of migration, this model will be tested as it assumes the differences between entities.

As the model uses several observations of entities in different points of time, for the estimation of household disposable income on emigration three methods are applicable and tested in the analysis: pooled OLS, fixed and random effects.

3. Empirical research

The main goal of this part is to test whether household disposable income has a negative impact on emigration. For this purpose, the data was collected and composed into one panel dataset. This part of the thesis begins with the short description of the data that is used in the empirical research and continues with the composition of the different econometric models and analysis of the results.

3.1. Data sample

The research contains panel data from eight countries (Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovenia and Slovakia) in the time period of 2004 – 2014. There are several reasons for this specific data selection. As the data analysis should be comparable, the most similar countries in the Central and Eastern Europe are chosen. Therefore, only countries that are post-communist and now the members of the European Union and the Schengen Area are included in the dataset. Moreover, as they joined EU at the same time, the changes that could influence the significance of the determinants are expected to be similar. The time is selected from 2004 to 2014 as these years are available on the databases for all the variables. The data sample contains 88 observations and is drawn from the Eurostat, The World Bank and Freedom House databases.

In order to examine the relationship between household disposable income and emigration, the relevant variables are selected from the theoretical analysis findings. Short descriptions of dependent and independent variables are provided below:

Emigration in the country of origin is chosen as the dependent variable in this empirical research. It is calculated as a percentage of emigrated people to the overall population of that country. The data of the number of emigrants for seven countries are extracted from the Eurostat database (2017a), however, the data for Poland in the same database have a break in time series in 2008 and the number of emigrated people drastically changes. For the purpose

of accurateness, data for emigrants from Poland is taken from the Central Statistics Office of Poland (Local Data Bank, 2018). The level of emigration is calculated as the rate from a population, and thus, the total population data is used from the database of Eurostat (2018c).

Household disposable income is the main independent variable of interest. The model uses the adjusted gross disposable household income per capita in PPS (purchasing power standard), extracted from the Eurostat database (2018a) and expressed in the euro currency. The variable indicates the real purchasing power of the households and is calculated as the adjusted gross disposable income of each household divided by the PPP (purchasing power parity) of actual consumption of the individual in the household (Eurostat, 2018a). In the model, it is denoted as 'Income' and it is expected to have a negative sign.

Unemployment ratio, control variable, taken from the Eurostat database (2018) is a number of unemployed people as a percentage of the total population. The variable is expected to have a positive relation with emigration.

Age control variable shows how many young people live in the country and positive sign in the regression is expected. It is a percentage of 25-39 years old people to the overall population, expressed in percentage. The exact age was chosen as people from 25 are usually in the labour market already and, as it was mentioned in the previous part, the emigration level of people who are above 40 usually drops significantly. The data is extracted from the Eurostat database (2018c).

Education of the country shows the percentage of the population that is highly educated and have tertiary education level. It is the percentage of 25-64 years old population with the tertiary education to the overall population. The data is taken from the Eurostat database (2018d) and positive relationship is expected.

Inequality of the country is given as a GINI index and shows a scope of the income distribution deviation among individuals that differ from perfect distribution. It is an area

between the hypothetical line of maximum equality of income and the curve that shows the real cumulative income distribution. The higher the coefficient of GINI index, less equal the country is. The data of GINI index is taken from the World Bank database (2018). The sign of the relationship is expected to be positive.

The political determinant of the country is measured by the Freedom House Index (2018) that is composed of the civil and political rights and it is taken as an average of these two measurements. However, after the data for the relevant countries were collected it was discovered there is almost no variation of this variable and six out of eight countries have the highest rating in both categories. Therefore, the variable of political pressure is not used in the model.

Finally, as the observations are taken from 2004 to 2014, the Global crisis of 2008 can have an impact on the overall results, and thus, the variable of **crisis** is included. It is a dummy variable that has a value of one in the years of 2008-2010 and zero in other years. It is expected to have a positive coefficient.

3.2. Examination of variables

There are several ways how to analyze panel data. One of the ways is to apply time series procedures, such as stationarity, as the data has observations in different time periods. This is important as some variables such as income have strong nonstationarity, and thus, relationships can be misleading (Baltagi, 2005). The stationarity is observed when the basic statistical properties such as mean and variance are stable and do not change over time. One of the methods for the stationarity testing is Augmented Dickey-Fuller test. It is evident (*see Appendix C*), that variables are non-stationary, and the Im-Pesaran-Shin (IPS) bars are lower in absolute terms than critical values. For the purpose to have stationary variables all variables are transformed into percentage change from a previous time period. The variable of Crisis was not transformed as it is a dummy variable and the transformations would make the values of

this variable meaningless. As a result of the transformation, the variables are stabilized over time (except for the 'Income', 'Age' and 'Unemployment'). In addition, the transformation of variables can be seen visually in Appendix D.

As the transformed variables decreased the problem of non-stationarity, these variables are used for the further examination. The equation of the model with these variables in the empirical research is:

$$Emigrowth_{it} = \beta_0 + \beta_1 Incgrowth_{it} + \beta_2 Unemgrowth_{it} + \beta_3 Edugrowth_{it} + \beta_4 Agegrowth_{it} + \beta_5 Ineqgrowth_{it} + \beta_6 Crisis_{it} + u_{it},$$

This equation is used to test the hypothesis that *higher household disposable income has a negative effect on emigration in the Central and Eastern Europe.*

Main information of the variables statistics is provided in Table 1. It shows the measures of the central tendency and the measures of the spread.

Table 1

Descriptive Statistics

	Mean	**Median**	**S. D.**	**Min**	**Max**
Emigrowth	11,06	4,974	36,85	-43,90	148,9
Incgrowth	4,265	4,374	4,672	-14,60	14,11
Unemgrowth	2,482	-5,900	31,79	-31,37	143,2
Edugrowth	4,244	4,262	2,721	-2,581	11,71
Agegrowth	0,07223	0,07034	1,056	-3,845	2,297
Ineqgrowth	-0,01309	-0,6727	5,209	-18,44	18,15
Crisis	0,2727	0,0000	0,4479	0,0000	1,000

Note. Output from Gretl

In addition, multicollinearity of the variables is examined (*see Appendix E*). It is important to look at the collinearity as it can have an effect on the significance of the coefficients as it is complicated to distinguish effects of two different variables (Gujarati, 2004). First, the variance-inflating factor (VIF) is examined that shows the extent to which one

specific independent variable can be explained by other independent variables (Studenmund, 2014). The values of VIF should be lower than ten in order to state that the collinearity is not present. All the variables have VIF slightly above one, and thus, it can be stated that collinearity does not exist. Moreover, concerning the correlation matrix, it can be stated that the significant multicollinearity for none of the variables exists. However, relatively high multicollinearity, as it can be expected, is observed between 'Income' and 'Unemployment' variables. As the multicollinearity is not highly significant, for the purpose to avoid omitted variables, all the variables are included in the model.

3.3. Decision on the data panel model

In order to select the best model from the pooled OLS, fixed effect and random effect, panel diagnostics is performed. Three tests are run: F-test, Breusch-Pagan and Hausman test.

The F-test has a null hypothesis that favours pooled OLS and is against fixed effects. The test is significant, and thus, pooled OLS model is suggested. Breusch-Pagan test has a null hypothesis that the pooled OLS is preferred against random effect model. The conclusion from this test is that pooled OLS model is preferred. Hausman test examines the null hypothesis that the fixed effect and random effect estimator have no significant difference (Gujarati, 2004), The Hausman test suggested to use random effect method. The pooled OLS, fixed and random effects models are compared in the Appendix Table F1. These three initial model shows that the Akaike criterion is the lowest using pooled OLS and random effects models. However, the pooled OLS and random effects models show almost the same result and, as a result, pooled OLS is chosen for further analysis. The same method was chosen in Pedersen et al. (2004) research.

3.4. OLS assumptions analysis

For the more detailed analysis of the model, the key assumptions of OLS have to be analyzed: normality of residuals, heteroscedasticity, autocorrelation and specification of the model.

First, the normality of residuals is examined by running the test in Gretl. The null hypothesis states that the error is normally distributed and the null hypothesis is rejected. As a result, it can be stated that the model has a problem of non-normality of residuals. This can have an effect on the coefficients of the variables, however, this violation of the assumption does not cause substantial biases of the model (Osborne, 2013). In addition, it is important to test heteroscedasticity as it can make coefficients look more significant than they really are (Studenmund, 2014). The White's test shows that initial pooled OLS model does not have heteroscedasticity problem at five percent the significance level. Looking at the autocorrelation of the model it can be seen that Durbin-Watson is 1,87, and thus, it can be assumed that the problem of autocorrelation does not exist. Finally, the misspecification of the model is tested by running Ramsey RESET test for specification. This test shows the probability that omitted variables or other specification errors are left out (Studenmund, 2014). The test showed that misspecification does not exist in the model.

3.5. Model specification

In the pooled OLS model variables that impact the level of emigration are taken only in the current year. However, it is highly doubted that only values from this year have an impact on the current year emigration level. People are not inclinable to change their behaviour immediately after the change in income (Gujarati, 2004), and thus, lagged values can have an effect on the emigration. Therefore, a finite distributed lag model of one year is performed in the study of Bertoli and Moraga (2013) and the lagged variables of 'Income', 'Unemployment' are added in this empirical research. These variables are chosen as they can change the

behaviour of people as the result of previous year situation. As it can be seen in the Appendix Table F2, the model with lagged independent variables produces lower Akaike criterion and higher R^2, and thus, this model analyzed further.

However, this model shows that the insignificant variables are contained. For the purpose to improve the model, variables that have the highest p-value are omitted from the model until the model gives the lowest Akaike criterion. As a result, the Model 1 is obtained.

Table 2

Model 1

	Coefficient	**Std. error**	**t-ratio**	**p-value**
const	9,85180	8,65044	1,139	0,2589
Incgrowth	−2,21048	1,31355	−1,683	0,0972*
Incgrowth_l	0,659048	1,23929	0,5318	0,5967
Unemgrowth	−0,193869	0,219521	−0,8831	0,3804
Unemgrowth_l	0,181158	0,192312	0,9420	0,3497
Inegrowth	−0,625422	1,04689	−0,5974	0,5523
Crisis	19,8559	11,8502	1,676	0,0986 *
R^2	0,044471			
Akaike criterion	729,9943			
Durbin-Watson	1,757742			
Heteroscedasticity	0,109748			
Normality of residuals	9,94408e-006			
Ramsey RESET	0,970307			
VIF	Incomegrowth	1,983		
	Incomegrowth_1	1,944		
	Unemgrowth	2,768		
	Unemgrowth_l	2,134		
	Inequality	1,124		
	Crisis	1,663		

Note. Standard errors are in parentheses and p-values are in brackets. * indicates significance at the 10 % level. Output from Gretl.

3.6. Model in first differences

However, as it can be seen in the Appendix C, three variables are still nonstationary and in order examine whether results are not misleading, first difference of the percentage growth are tested. After the transformation 'Income', 'Unemployment' and 'Age' variables became stationary. This process decreases the number of observations to 72 and reduces the amount of information. The transformation of variables solved the problem of nonstationarity and the model with stationary variables is tested with the following equation, where d refers to the first difference of the variable:

$$Emigrowth_{it} = \beta_0 + \beta_1 d\_Incgrowth_{it} + \beta_2 d\_Unemgrowth_{it} + \beta_3 Edugrowth_{it} + \beta_4 d\_Agegrowth_{it} + \beta_5 Ineqgrowth_{it} + \beta_6 Crisis_{it} + u_{it},$$

As in the model with variables in percentage growth, this model follows the same sequence of testing. First of all, the panel diagnostics with the same three tests is run in order to select the best model and all three models are composed (*see Appendix Table F3*). However, as first differences is similar as the fixed effect model (Wooldridge, 2013), the latter is not analyzed. As in the previous model, pooled OLS is chosen.

Moreover, the OLS assumptions are analyzed and, according to the White's and Ramsey RESET tests, heteroscedasticity and misspecification are not present. However, looking at the autocorrelation it can be seen that Durbin-Watson is 1,64, and thus, the problem of autocorrelation can exist. In addition, the test of normality of residuals shows that the problem of non-normality exists.

Finally, as lagged variables are tested and, as in the previous model, the variables of 'Income' and 'Unemployment' are lagged. The model with lagged variables produced lower Akaike, and thus, this model is further analyzed. However, the model includes insignificant variables and as a result, they are excluded from the model until the lowest Akaike criterion is obtained and the Model 2 is composed.

Table 3

Model 2

	Coefficient	**Std. error**	**t-ratio**	**p-value**
const	0,388290	5,52371	0,07030	0,9442
d_Incgrowth	−2,37967	1,04442	−2,278	0,0263**
d_Incgrowth_l	−1,34706	0,865472	−1,556	0,1249
d_Unemgrowth	−0,264118	0,147264	−1,793	0,0780*
Crisis	19,4969	10,0619	1,938	0,0575*
Adjusted R^2	0,131340			
Akaike criterion	637,5107			
Durbin-Watson	1,776287			
Heteroscedasticity	0,277955			
Normality of residuals	0,000128934			
Ramsey RESET	0,399951			
VIF	d_Incomegrowth	2,361		
	d_Incomegrowth_1	1,621		
	d_Unemgrowth	1,925		
	Crisis	1,319		

Note. Standard errors are in parentheses and p-values are in brackets. * indicates significance at the 10 % level and ** indicates significance at the 5 % level. Output from Gretl.

3.7. Results of the research and implications

Two models are obtained for the final analysis of the results: Model 1 and Model 2. The hypothesis raised that the higher income has a negative effect on the level of emigration is failed to reject. However, as the models suffer from several problems that are more detailed explained in the limitation section, the results of the models and the interpretations have to be evaluated with prudence.

The independent variable that is in the field of interest – Income – has the obtained coefficient value of −2,21 in the Model 1 and -2,38 in Model 2. This means that both, the growth of the income and the difference of growth have an effect on the emigration rate.

However, this variable is sensitive to the specifications of the model, and in some models this variable lost its significance but the coefficient in all the cases is negative. A relatively low significance of the 'Income' variable could be a result of the differences between the analyzed countries that is further explained in the limitation part. Moreover, obtained significance can be a consequence of abnormalities in emigration trend, for example, in 2010 Lithuania had drastically increased emigration in comparison to 2009 (*see Figure 1, p. 11*) because of new Health Insurance Law that stimulated to declare the emigration for those who previously emigrated but did not declare it (European Migration Network, 2011).

The model is based on the neoclassical theory that states the emigration decreases as the income level between countries decreases. As a result, the larger the difference between incomes of two countries, the larger the emigration should be. In the empirical research of this thesis panel data, source countries are analysed and it is not possible to see whether countries with higher income such as Slovakia has a lower relationship between income and emigration in comparison with lower income countries such as Lithuania. However, this variable implies that the convergence of the income should decrease the level of emigration between East and West countries as it was stated in the neoclassical emigration theory. According to the results of this study, policies on income have to be considered as the problem in some analyzed countries is extensive. As it was mentioned before, analyzed countries face aging and population decline problems and, according to the results of this analysis, higher disposable household income could decrease this obstacle for continuous growth of the economy. It is important to look at the composition of income to understand possible solutions to this problem. According to the Eurostat (2016), 67,9% of all income in Europe is composed of the work income and 20,6% from pensions. In addition, as it was analyzed in the first part of this thesis, the majority of emigrants are working-age people, therefore, it is extremely important to analyze wages as it impacts the level of emigration. One of the ways how Eastern and Central

European countries solve the problem of emigration is by increasing minimum wage. As the current increase in Eastern and Central countries is higher than in Western countries (Eurostat, 2018e), this trend, in the long run, could lead to convergence. For example, in the study of Slovenia (Laporšek & Vodopivec, 2017), the increase of minimum wage resulted in higher growth of wages. However, the problem is extensive and additional progress have to be implemented as current policies do not suppress the emigration trend. According to macroeconomic theory, wages correspond to marginal productivity, however, real wage development in Central and Eastern European countries is lagging behind productivity (Galgóczi, 2017). It can be argued that higher labour costs mitigate low-wage competitiveness of the Eastern European countries, however, according to Galgóczi (2017), it is a constraint for the future development as well as historical data shows that increases in wage did not reduce the levels of foreign direct investment. In addition, governments of Central and Eastern Europe run programmes for return migration. However, these programs do not have a significant result as, for example, in Lithuania the program "Create for Lithuania" returned back only about 100 people in five years and, as it was mentioned before, overall return migration is only about 5% of those who left (The Economist, 2017). Looking at the result of the research of this paper and current emigration trends it can be suggested that the programs are not very effective and one of the solutions could be a focus on the ones who still work in their native country and encourage them to stay by applying the policies for the increase of income.

Nonetheless, even income in all the analyzed countries is constantly growing, the emigration trend continues to be upward sloping. This implies that there can be additional factors such as relative deprivation that was explained in the second part. Even in the case of income increment in the country of origin, people compare themselves with their reference group and the increase in income can be relatively low in comparison to those who emigrated and had significant increases. Therefore, it is important to have income developments

according to the level of education and skills as people look not only to the actual income but compare it with their reference group. For example, doctors and nurses are one of the most leaving types of workers as the salaries in Western countries can be several times higher (Hervey, 2017). In addition, emigration of professionals, such as doctors, is expensive for the country as the taxpayers pay for the education. As a result, income increment can be relatively less expensive than the preparation of the specialists that will emigrate.

At the same time, as it was analyzed in the theoretical part, dual causation is observed between emigration and income in the source country. The disposable income has an upward sloping trend, the bargaining power of employees on wages is increasing. As a result, it can be expected that in the long-run, the emigration problem, to some extent, will be solved without additional cures.

The variable of 'Unemployment' in Model 1 shows that growth of unemployment has no significant effect on emigration growth and in the Model 2, the coefficient is negative and significant, and thus, it implies that only the acceleration of unemployment growth has an effect on the emigration growth. The coefficient sign is unexpected, however, the same negative relation is obtained in the Stark et al. (2009) and Fidrmuc (2004) research. There can be several reasons for this negative relation. First of all, this can be explained by the cost-benefit theory because emigration is costly and accessibility is unfavourable for unemployed. Second, in this study only the countries of origin are analyzed and it is possible that in the periods of unemployment increase, the same situation was observed in host countries. As, according to the new economics of migration theory, households choose the lowest risk, it can be expected, that in the case of higher unemployment in all the countries, a person evaluates emigration as risky and chooses to stay.

The variable 'Crisis' has a significance in both models, however, the significance is relatively low. This can be explained by the fact that in the period of the Global crisis all the

countries had different migration patterns, for example, emigration from the Czech Republic increased, emigration from Poland decreased and there was no significant effect in Slovakia (*see Figure 1, p. 11*). However, both models have a positive correlation between crisis and the emigration growth. As the 'Crisis' is a dummy variable, the interpretation of the variable in the models is as follows: in the periods of crisis, the emigration growth increases by 19,5 percent.

3.8. Limitations and recommendations for further research

There are several shortcomings of the empirical research that should be noted in the limitations of this thesis as well as recommendations and possible directions for the future research.

First, the empirical research, as it was mentioned before, only employs the numerical and obtainable variables. As a result, variable omission bias can possibly exist. Therefore, in the future research, factors such as network, language and etc. should be taken into consideration if the necessary data is available.

Second, as the model examines only the countries of the origin, the differences between origin and host country are not possible to be evaluated. The accurateness of results could be increased as the exact distinctions between situations of two countries would be analyzed. However, as only the data of the source country is used, there is no possibility to see if an increase of income the in the source country converge East and West countries or the convergence does not exist as income increases at the same time in both countries. Moreover, in the bilateral emigration research, the cost of emigration could be included by adding distance variable.

In addition, as eight countries are analyzed in the model, it is not possible to state whether the coefficients would have the same importance if the countries would be analyzed separately. As it was showed in the first part, the economic situation and household disposable income in the Central and Eastern European countries differ (*see Figure 8, p. 23*) even if the

destination countries for these countries in most cases are the same. Therefore, the difference in income levels of origin and host country variates between the countries in Central and Eastern Europe. The analysis of each country could lead to the different determinants of the emigration or the disparity in the significance level and coefficients. However, as the data at the moment is only available from 2004 to 2014 for all the used variables and only the yearly data exists, it is not possible to analyze separate countries. However, future researchers could analyze two groups of countries: Central and Eastern separately.

Looking at the model in the analysis it is important to mention that both final models suffer from non-normality of residuals problem. None of the transformations solved these problems, and thus, models can have some biases. One of the reasons why limitations can be generated is a relatively small number of observations as only nine time points were taken after the transformations of the variables.

Lastly, this research can be used as a background for other research not only for the discovery of the more accurate relationship between the growth of income and the emigration growth but also for the reverse causality. As it was mentioned, the dual causality of income and emigration can exist and this research also might be useful for the estimation how emigration effects the level of income in the source country, especially in Central and Eastern Europe. Moreover, the effect of disposable income on emigration can have a biased effect as the increase in the income is caused partially by growing levels of remittances to Central and Eastern European countries (*see Figure 5, p. 18*).

Conclusions

The aim of this thesis was to analyze whether the disposable household income has an effect on the level of emigration in Central and Eastern European countries. In the thesis the current trends of emigration and economic situation in Central and Eastern countries are revealed, the existing theoretical literature and empirical studies are analyzed and empirical research is performed. The following findings can be concluded:

1. The emigration problem in the post-communist Central and Eastern countries started right after the communist regimes fallen and has an upward growth trend from the EU enlargement in 2004 till nowadays. There are several demographic characteristics of emigrants from those countries: people are relatively young and usually have higher education level than the average of the country. However, as the countries lost a significant amount of people and the trend of growing emigration still continues, the effects of the emigration becomes more relevant. For example, countries suffer from the decreased production output as remittance receivers are less willing to seek employment. Moreover, countries face the labour market problem as it is constantly shrinking and the wages are increasing as there are less working-age people in these countries. In addition, emigration causes negative fiscal consequences as the expenditures increases because of increasing age dependency ratio. Finally, most of the families are divided as parents emigrate separately from the rest of the family, children are left alone in the country of origin and this has long-term negative consequences. However, despite the convergence between East and West countries, the differences between countries are significant, and thus, the emigration exists.

2. As it is explained in the theoretical part, a high number of theories that explain the determinants of migration exists. However, only two theories that are most relevant in this thesis are chosen: neoclassical human capital theory and the new economics of migration theory. Neoclassical macro theory shows that emigration exist when the countries have

differences in the labour market and income levels and micro theory states that people make a decision to emigrate based on the cost-benefit analysis. The new economics of migration have an additional element of a household as a decision maker and considers possible risk management and well as relative deprivation. These theories are approved by the empirical research as it is found that people emigrate from low-income to high-income countries. Moreover, in the analyzed empirical studies additional factors that can influence emigration are employed, such as unemployment, age and education of society, and inequality, and thus, these variables were added to the model.

3. As a result of the theoretical analysis, all the above-mentioned variables such as disposable household income, unemployment, a percentage of young people in the population, a percentage of highly educated people in the population, inequality of the country and crisis were included in the model. The dataset is composed of panel data of eight countries in the period of 2004-2014 and the pooled OLS model was chosen. The empirical research suggests that income growth has a negative effect on the emigration growth and the results are validated by the model in first differences. According to the result, for the purpose to solve this intense emigration problem in Central and Eastern Europe, the focus of the governments should be on the income increment. As in the analyzed countries wages constitute the majority of income, it is suggested to increase minimum wages. In addition, it is important to consider increment for intense human capital requiring positions such as doctors as they compare themselves with the reference group and decide to leave the country. Moreover, results of the current return migration programmes suggest that it is can be more effective to focus on the income increment of current native workers than running above mentioned migration programmes for the emigrants.

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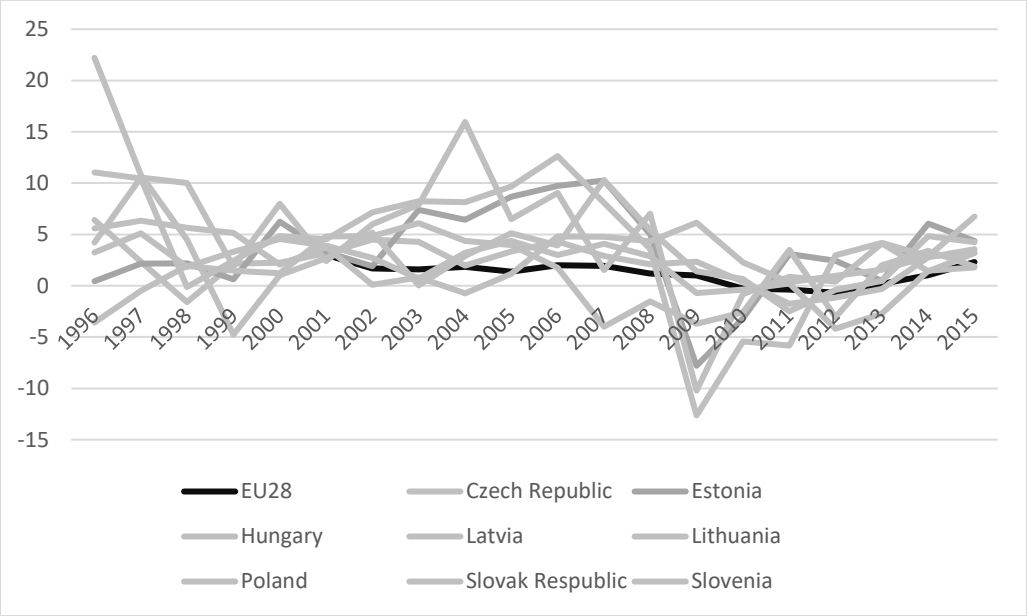
Appendixes

Appendix A

Household disposable income, net, annual growth rate (%), 1996 – 2015



Note. Data source: (OECD, 2018)

Appendix B

Statistical data

Country	Time	Emigration rate	Income	Unemployment	Education	Age	Inequality	Freedom	Crisis
Czech Republic	2004	0,341509	11962	5,3	12,3	23,19086	27,5	1	0
Czech Republic	2005	0,235958	12585	5,1	13,1	23,42181	27	1	0
Czech Republic	2006	0,327312	13108	4,6	13,5	23,57749	26,7	1	0
Czech Republic	2007	0,199917	13951	3,4	13,7	23,68075	26	1	0
Czech Republic	2008	0,497688	14254	2,8	14,5	23,85876	26,3	1	1
Czech Republic	2009	0,592577	14546	4,2	15,5	23,97499	26,2	1	1
Czech Republic	2010	0,583717	14808	4,6	16,8	23,93954	26,6	1	1
Czech Republic	2011	0,53315	14826	4,2	18,2	23,81307	26,4	1	0
Czech Republic	2012	0,438877	15057	4,4	19,3	23,66918	26,1	1	0
Czech Republic	2013	0,246231	15463	4,5	20,5	23,40625	26,5	1	0
Czech Republic	2014	0,270804	16396	3,9	21,5	22,98207	25,9	1	0
Estonia	2004	0,214236	8064	6,5	30,9	20,8322	33,6	1	0
Estonia	2005	0,339257	9007	5,1	33,2	20,82496	33,5	1	0

Estonia	2006	0,409195	9861	3,9	33,2	20,86844	33,7	1	0
Estonia	2007	0,326453	11218	3	33,3	20,94168	31,2	1	0
Estonia	2008	0,329189	12104	3,7	34,2	21,04315	31,9	1	1
Estonia	2009	0,348721	11379	9	36,1	21,12612	31,4	1	1
Estonia	2010	0,397063	11552	11,1	35,5	21,14694	32	1	1
Estonia	2011	0,467338	12304	8,3	36,9	21,07682	32,5	1	0
Estonia	2012	0,476978	13126	6,8	37,6	21,01445	32,9	1	0
Estonia	2013	0,510539	13478	5,9	37,4	21,08571	35,1	1	0
Estonia	2014	0,352404	14237	5	37,6	21,23856	34,6	1	0
Latvia	2004	0,88587	7557	7,3	19,8	20,48899	36,5	1,5	0
Latvia	2005	0,78423	8486	6,2	20,3	20,4362	39	1	0
Latvia	2006	0,763912	9683	4,5	20,9	20,4929	35,5	1	0
Latvia	2007	0,700051	10806	4	22,2	20,4989	37,5	1,5	0
Latvia	2008	1,233912	11657	5,2	24,8	20,63555	37,2	1,5	1
Latvia	2009	1,766571	9955	11,5	25,8	20,70062	36	1,5	1
Latvia	2010	1,869886	10190	12,6	26,9	20,6616	35	2	1
Latvia	2011	1,461049	10011	10,4	27,7	20,53321	35,8	2	0
Latvia	2012	1,230577	10876	9,9	29,2	20,5188	35,2	2	0
Latvia	2013	1,11477	11437	7,8	31	20,61137	35,5	2	0
Latvia	2014	0,950153	11991	7,2	30,2	20,64125	35,1	2	0
Lithuania	2004	1,108908	9348	6,7	25,6	20,98217	37	2	0
Lithuania	2005	1,725222	10074	5,1	26,5	20,72299	35,3	1	0
Lithuania	2006	0,984548	11108	3,5	26,1	20,47771	34,4	1	0
Lithuania	2007	0,934866	11595	2,6	28,2	20,33078	34,6	1	0
Lithuania	2008	0,80153	12700	3,6	30,2	20,19436	35,7	1	1
Lithuania	2009	1,209226	11854	8,6	30,8	20,11762	37,2	1	1
Lithuania	2010	2,655097	12590	11,1	32,4	19,92841	33,6	1	1
Lithuania	2011	1,764503	13421	9,8	33,5	19,24508	32,5	1	0
Lithuania	2012	1,368339	14060	8,6	34,1	18,93355	35,1	1	0
Lithuania	2013	1,306166	14963	7,6	35,2	18,83775	35,3	1	0
Lithuania	2014	1,244143	15510	7,1	36,7	18,82831	37,7	1	0
Hungary	2004	0,037759	10298	3,3	16,7	22,11317	29,9	1	0
Hungary	2005	0,036227	10830	3,9	17,1	22,55812	34,7	1	0
Hungary	2006	0,042812	11199	4,1	17,7	22,90008	28,3	1	0
Hungary	2007	0,044704	11122	4,1	18,1	23,13391	27,9	1	0
Hungary	2008	0,095477	11131	4,2	19,3	23,1663	27,5	1	1
Hungary	2009	0,104506	11032	5,4	19,8	23,11047	27	1	1
Hungary	2010	0,133459	11501	6,1	20	23,0185	29,4	1	1
Hungary	2011	0,151216	12271	6,1	21	22,99247	28,9	1	0
Hungary	2012	0,230368	12348	6,2	22,1	22,10834	30,5	1	0
Hungary	2013	0,350103	12627	5,8	22,6	21,93242	31,5	1	0
Hungary	2014	0,427371	13178	4,5	23,4	21,71336	30,9	1	0
Poland	2004	0,049428	8846	11,1	15,6	20,84868	35,4	1	0
Poland	2005	0,058265	8926	10,4	16,8	21,20131	34,5	1	0
Poland	2006	0,123007	9500	8	17,9	21,60661	33,7	1	0
Poland	2007	0,093061	10561	5,5	18,7	21,98815	33,5	1	0
Poland	2008	0,079075	11008	4,1	19,6	22,46644	33,7	1	1
Poland	2009	0,048825	11443	4,8	21,2	22,98246	33,6	1	1
Poland	2010	0,045657	12404	5,8	22,5	23,16375	33,2	1	1
Poland	2011	0,052172	12977	5,8	23,3	23,46589	32,8	1	0
Poland	2012	0,055696	13753	6,1	24,5	23,66543	32,4	1	0

Poland	2013	0,084343	13897	6,3	25,8	23,76371	32,5	1	0
Poland	2014	0,07386	14314	5,5	27	23,78845	32,1	1	0
Slovenia	2004	0,414189	13803	4	19	22,48165	27,1	1	0
Slovenia	2005	0,430769	14606	4,2	20,2	22,45195	24,6	1	0
Slovenia	2006	0,686298	15176	3,8	21,4	22,41427	24,4	1	0
Slovenia	2007	0,743293	15920	3,1	22,2	22,33666	24,4	1	0
Slovenia	2008	0,602357	16488	2,8	22,6	22,20588	23,7	1	1
Slovenia	2009	0,924442	15561	3,8	23,3	22,2793	24,8	1	1
Slovenia	2010	0,778563	15866	4,7	23,7	22,28868	24,9	1	1
Slovenia	2011	0,586483	16241	5,2	25,1	22,17079	24,9	1	0
Slovenia	2012	0,699491	16161	5,6	26,4	21,99265	25,6	1	0
Slovenia	2013	0,650081	16093	6,4	27,9	21,82021	26,2	1	0
Slovenia	2014	0,695556	16377	6,2	28,6	21,61502	25,7	1	0
Slovakia	2004	0,029524	9291	11,6	12,8	22,79556	24,8	1	0
Slovakia	2005	0,034862	10064	10,3	14	23,05903	29,3	1	0
Slovakia	2006	0,032292	10614	8,4	14,5	23,29155	25,8	1	0
Slovakia	2007	0,034077	11978	7	14,4	23,5438	24,7	1	0
Slovakia	2008	0,031715	12899	6	14,8	23,85944	26	1	1
Slovakia	2009	0,036768	12956	7,6	15,8	24,14874	27,2	1	1
Slovakia	2010	0,035044	14002	9,1	17,3	24,34332	27,3	1	1
Slovakia	2011	0,034548	14066	8,6	18,6	24,52548	26,5	1	0
Slovakia	2012	0,037063	14472	8,8	19	24,62474	26,1	1	0
Slovakia	2013	0,051194	14734	9	19,9	24,60904	28,1	1	0
Slovakia	2014	0,067283	15457	8,4	20,4	24,43915	26,1	1	0

Appendix C

Stationarity of the variables

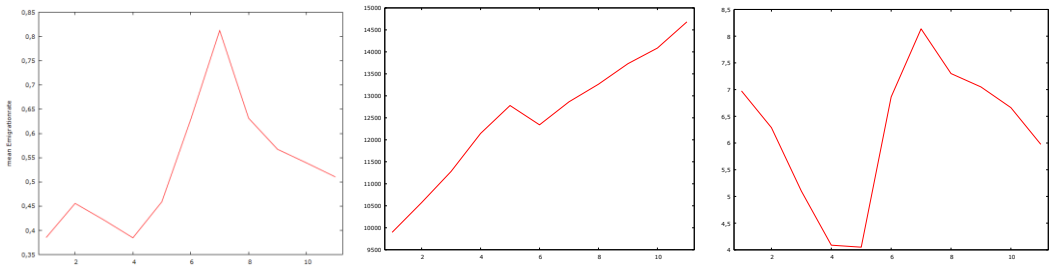
	Stationarity		
Variable	**Initial variable**	**Percentage change**	**First diff. of the % change**
Emigration	-0,884638	-2,83182***	-
Income	-1,16749	-2,53042**	-3,75575***
Unemployment	-1,5637	-1,80699	-4,32512***
Education	0,116637	-2,82395***	-
Age	-0,953484	-0,750638	-2,57446**
Inequality	-2,5506***	-4,40643***	-

Note. * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level, *** indicates significance at the 1 percent level. Output from Gretl.

Appendix D

Transformation of variables

Emigration Income Unemployment



Education Age Inequality

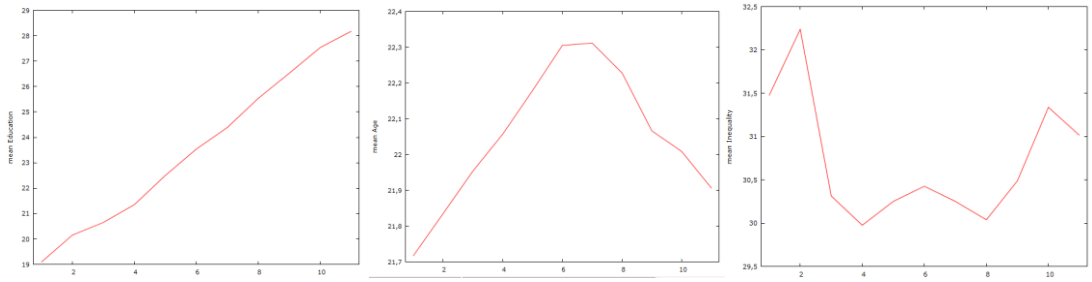
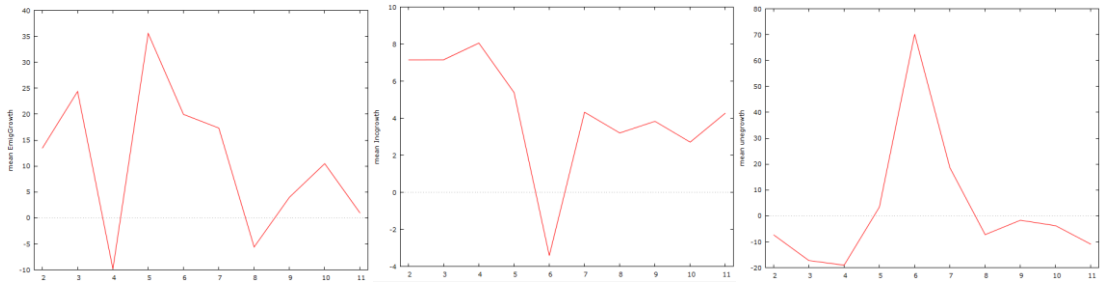


Figure D1. Initial nonstationary variables

Emigration Income Unemployment



Education Age Inequality

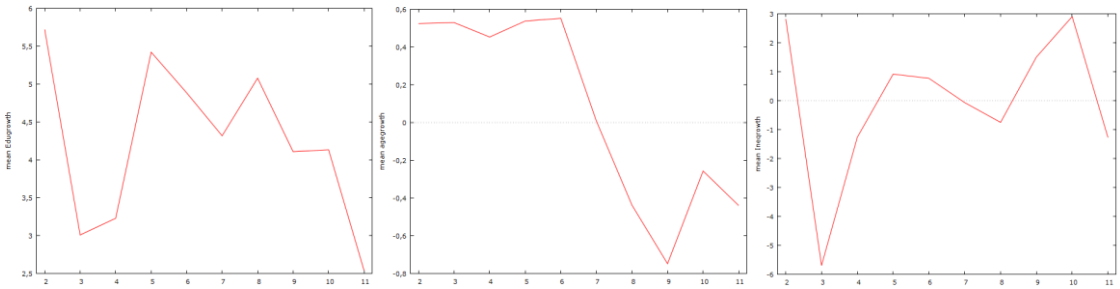


Figure D2. Transformed stationary variables to percentage growth

Income Unemployment Age

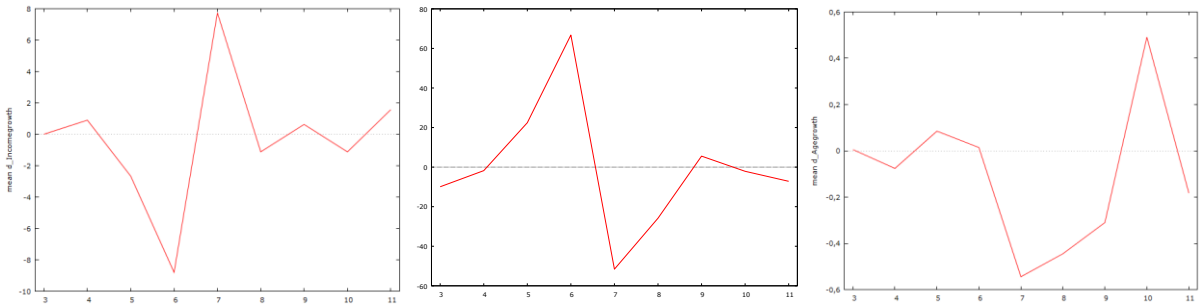


Figure D3. Transformed stationary variables to first differences

Appendix E

Correlation of variables

Table E1

VIF values

Variable	**VIF**
Incgrowth	1,731
Unemgrowth	2,359
Edugrowth	1,039
Agegrowth	1,068
Ineqgrowth	1,011
Crisis	1,610

Note. Output from Gretl

Table E2

Correlation Matrix

	Incgrowth	**Unemgrowth**	**Edugrowth**	**Agegrowth**	**Ineqgrowth**	**Crisis**
Incgrowth	1,0000					
Unemgrowth	-0,6385	1,0000				
Edugrowth	-0,0696	0,1249	1,0000			
Agegrowth	0,0730	0,0325	0,1258	1,0000		
Ineqgrowth	-0,0807	0,0672	0,0503	-0,0225	1,0000	
Crisis	-0,3059	0,5851	0,1831	0,0699	0,0673	1,0000

Note. Output from Gretl

Appendix F

Comparisons of the models

Table F1

Comparison of Models with variables in growth

	Pooled OLS	**Fixed effects**	**Random effects**
const	2,84079	−0,954341	2,84079
	(9,34318)	(9,85076)	(9,34318)
	[0,7620]	[0,9231]	[0,7611]
Incgrowth	−1,60743	−1,79946	−1,60743
	(1,14281)	(1,28968)	(1,14281)
	[0,1638]	[0,1676]	[0,1596]
Unemgrowth	−0,131536	−0,176594	−0,131536
	(0,196051)	(0,213255)	(0,196051)
	[0,5044]	[0,4106]	[0,5023]
Edugrowth	2,37785	3,47864**	2,37785
	(1,52056)	(1,72176)	(1,52056)
	[0,1222]	[0,0474]	[0,1179]
Agegrowth	−1,17403	−0,0636982	−1,17403
	(3,97083)	(5,27668)	(3,97083)
	[0,7683]	[0,9904]	[0,7675]
Ineqgrowth	−0,501577	−0,680367	−0,501577
	(0,783485)	(0,803896)	(0,783485)
	[0,5241]	[0,4004]	[0,5221]
Crisis	17,9533	17,8597	17,9533
	(11,1656)	(11,3813)	(11,1656)
	[0,1122]	[0,1214]	[0,1079]
n	80	80	80
Adj. R^2	0,041956	0,136524	-
Akaike criterion	807,3677	815,7294	807,3677
Durbin-Watson	1,867533	1,962354	-

Note. Standard errors are in parentheses and p-values are in brackets. . ** indicates significance at the 5 % level. Output from Gretl.

Table F2

Base model and model with lagged independent variables comparison (variables in growth)

	Base model	**Model with lagged independent variables**
const	2,84079	1,44567
	(9,34318)	(10,9713)
	[0,7620]	[0,8956]
Incgrowth	−1,60743	−2,14792
	(1,14281)	(1,31581)
	[0,1638]	[0,1076]
Incgrowth_l	-	0,665197
		(1,24700)
		[0,5956]
Unemgrowth	−0,131536	−0,201454
	(0,196051)	(0,220817)
	[0,5044]	[0,3651]
Unemgrowth_l	-	0,210161
		(0,196290)
		[0,2884]
Edugrowth	2,37785	2,24559
	(1,52056)	(1,66564)
	[0,1222]	[0,1824]
Agegrowth	−1,17403	1,43205
	(3,97083)	(0,786080)
	[0,7683]	[0,7969]
Ineqgrowth	−0,501577	−0,541378
	(0,783485)	(1,09479)
	[0,5241]	[0,6227]
Crisis	17,9533	16,5378
	(11,1656)	(12,8217)
	[0,1122]	[0,2018]
n	80	72
R^2	0,041956	0,042372
Akaike criterion	807,3677	731,9021
Durbin-Watson	1,867533	1,690846
White’s test p-value	0,0655298	0,0905116
Test for normality of residuals p-value	0,000566896	0,000310803

Note. Standard errors are in parentheses and p-values are in brackets. Output from Gretl.

Table F3

Model comparison with variables in differences

	Pooled OLS	**Random effects**
const	−6,78948	−6,78948
	(8,22305)	(8,22305)
	[0,4120]	[0,4090]
d_Incgrowth	−1,57435	−1,57435
	(0,978031)	(0,978031)
	[0,1123]	[0,1075]
d_Unemgrowth	−0,269278*	−0,269278*
	(0,159419)	(0,159419)
	[0,0960]	[0,0912]
Edugrowth	2,46287	2,46287
	(1,66887)	(1,66887)
	[0,1448]	[0,1400]
d_Agegrowth	3,69993	3,69993
	(5,61800)	(5,61800)
	[0,5125]	[0,5102]
Ineqgrowth	−0,611484	−0,611484
	(1,02295)	(1,02295)
	[0,5521]	[0,5500]
Crisis	21,3600**	21,3600**
	(9,66315)	(9,66315)
	[0,0306]	[0,0271]
n	72	72
Adj. R^2	0,057607	-
Akaike criterion	728,9976	728,9976
Durbin-Watson	1,642523	-

Note. Standard errors are in parentheses and p-values are in brackets. * indicates significance at the 10% level. Output from Gretl.

Table F4

Base model and model with lagged independent variables comparison (variables in first diff.)

	Base model	**Model with lagged independent variables**
const	−6,78948	−6,25557
	(8,22305)	(8,86660)
	[0,4120]	[0,4835]
d_Incgrowth	−1,57435	−2,60702**
	(0,978031)	(1,13724)
	[0,1123]	[0,0257]
d_Incgrowth_l	-	−1,63172
		(1,14873)
		[0,1611]
d_Unemgrowth	−0,269278*	−0,302756*
	(0,159419)	(0,161901)
	[0,0960]	[0,0668]
d_Unemgrowth_l	-	−0,0724842
		(0,173572)
		[0,6779]
Edugrowth	2,46287	1,52581
	(1,66887)	(1,69674)
	[0,1448]	[0,3724]
d_Agegrowth	3,69993	1,43205
	(5,61800)	(5,53631)
	[0,5125]	[0,7969]
Ineqgrowth	−0,611484	−0,450426
	(1,02295)	(1,32704)
	[0,5521]	[0,7356]
Crisis	21,3600**	20,4709*
	(9,66315)	(11,7970)
	[0,0306]	[0,0883]
n	72	64
R^2	0,057607	0,086889
Akaike criterion	728,9976	644,2116
Durbin-Watson	1,642523	1,651901
White's test p-value	0,545145	0,17731
Test for normality of residuals p-value	0,000414495	0,0012521

Note. Standard errors are in parentheses and p-values are in brackets. ** indicates significance at the 5 % level. Output from Gretl.