Is there any effect of EU membership on the member countries' real economic growth?

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1. Introduction

Nowadays, the number of the European Union member countries has already reached 28. Becoming a member of the union is still a goal for Serbia, Macedonia, Albania, Montenegro and Turkey, which are the current candidate countries for membership. However, not every country wants to become a member and an example for such countries are Norway and Switzerland - highly developed and wealthy economies, which prefer not to be bounded by the common EU legislation and regulations. The recent debt crisis in Greece has risen the anti-EU moods in the country and recently also Great Britain's Prime Minister, David Cameron, said that the United Kingdom is considering the possible scenario of leaving the union, and it is expected a referendum on this question to be held in the near future. Greece already had a referendum on whether to accept the financial conditions of the EU creditors for lending additional emergency loan for saving the economy, and said "No", even if the result of that referendum did not have any real effect. However, this answer shows that the Greek society is skeptical about the country's membership in the EU and the government considered seriously the scenario of leaving the Eurozone. Many eurosceptics view membership in the EU as limiting the sovereignty of the countries through the common legislation and regulations which are supranational. Some countries, such as the United Kingdom are not satisfied with the increased rates of immigration, because of the open borders and free labor market, and argue that this is actually not beneficial for their economies. There are also anti-EU moods in the ex-socialist countries, especially those which remain relatively poorer than the average European level, because often EU policies and regulations are blamed to impact negatively some businesses and even countries' economies. With the present economic study, I verify whether the aforementioned concerns are valid through testing for an eventual EU membership impact, positive or negative, on the member countries' real economic growth.

It turns out also that different socio-economic classes, mainly among the countries from the largest EU enlargement in 2004, but not limited to them, oppose or favor entering the EU, according to Doyle and Fidrmuc (2006). They find out that people who voted in favor of entering the EU in national referendums were mainly students and highly educated white-collar workers, living in urban areas, while those who oppose entering the union were mainly farmers, blue-collar workers, people with lower education and older people. Being a member of the EU for the ex-socialist countries, which started their transition process towards open market economies in 1990, is

considered by many as their final stage of that transition, and that is why the people who actually lost from the change of the political regime are more likely to be against EU membership (Doyle and Fidrmuc, 2006).

However, there is much empirical evidence in support of the beneficial effect of EU membership and economic integration, part of which is described in the following section. Being an EU member is a sign for investors that the country has reached macroeconomic stability and the level of the country's institutions is good enough for making investments, thus increasing also the amount of direct investments between member countries (Festa, 2015). The European Single Market and Customs Union increase significantly the amount of goods traded within the EU, which is confirmed to be beneficial for the countries' economies since intensified trade leads to more efficient allocation of resources (Dreger and Reimers, 2013). The efficiency gains and scale effects increase due to the increased market size and higher competition pressures, but as some argue, a negative side of the European Single Market are the common barriers imposed against third countries which are not members of the union, therefore eventually reducing the amount of trade with them, by preferring European trading partners instead (Maudos, Pastor and Seranno, 1997). Preferring European trading partners in case they are less efficient than third partners can lead to less efficient allocation of resources and therefore could have a negative effect on economic growth.

Because of the lack of consensus between people regarding the positive effects of EU membership on the countries' economies and the recent emergence of even more anti-EU sentiments, the aim of my study is to test the hypothesis whether EU membership contributes in a positive, negative or neutral way to EU members' economic growth and what are the channels through which this impact is realized. I conduct a panel least squares estimation with time and country fixed effects on the EU-27 countries for the period between 1992 and 2011. Based on theory and literature, my dependent variable is real GDP growth and as explanatory variables, I initially include six growth affecting variables, lagged 1 year, their absolute yearly changes and a dummy reflecting EU membership. My results indicate that the effect of the initial GDP level (lagged 2 years), inflation, the increase of government consumption and the increase of unemployment have a significant and negative effect on economic growth. Past GDP growth and gross capital formation have the expected positive influence on real GDP growth. However, the index for human capital level,

population, share of government consumption and the unemployment level turn out to be insignificant. Regarding the EU membership effect, I obtain a significant and positive coefficient for the EU dummy. That is why in the second specification of the model I include additional three growth affecting variables, which are more probably affected by EU membership, in order to find through which of them this impact is translated into the real economy. The results suggest that trade openness and the increase of personal remittances are the main channels through which EU membership affects positively real GDP growth. Both variables reflect the positive effect of being part of the respectively free goods and free labor market. Surprisingly, however, FDI net inflows have a negative and significant effect on domestic economies. There is room for improvement of the econometric model, since the robustness check performed by adding additionally real interest rate and central government debt in the model, make the EU dummy, the trade openness level and the received personal remittances insignificant. Probably one of the reasons for that is the reduced sample period (1995 – 2011), which confirms that the expected positive effect of EU membership and growth is in the long run. Additional channels of the EU membership impact on the real economy can also be considered, as discussed in more detail in the concluding section. Therefore, based on my results, the concerns mentioned at the beginning of the section related to overall negative effects for the EU countries cannot be confirmed and supported by empirical evidence.

The rest of the paper is organized in the following way: the next section examines part of the relevant theoretical and empirical literature related to the effect of the determinants of economic growth, EU membership and economic integration, Section 3 presents the data and methodology I use in order to estimate the EU membership effect on the member countries' real GDP growth, Section 4 presents the estimation results and Section 5 concludes and presents suggestions for further improvements and strengthening of the analysis.

2. Literature review

Since, my aim is to study the effect of EU membership on the EU member countries' economic growth, in this section I am going to review the main and most recent literature related to the European integration and determinants of economic growth. Some of the studies on these topics have findings which are not always in line with the theory and the rest of the literature. That is because, in general, there is no consensus both in theory and empirics regarding the economic

growth determinants (Tashevska and Trpkova, 2011). In order to find how EU membership affects real economic growth and through which channels, I examine not only papers related to European economic integration, but also related to economic growth determinants, including non-European countries. The reason for including also non-European countries is that the effect of the main growth determinants should be similar worldwide. That is why in my econometric model in the next section, first I choose the explanatory variables which are related exclusively to economic growth and after that, in case of significance of EU membership, I add the growth affecting variables which are also influenced by the countries' EU membership. In the current section I begin with the main theoretical models related to economic growth and after that I focus mainly on the empirical studies on the topic. Most of the reviewed empirical literature consists of panel data studies, which is also the choice for this study, since I investigate the effect of the variables for a cross-country sample for certain time period, but there are also a few time series analysis investigating one or a couple of countries. A main characteristic of the reviewed literature is that, since my aim is to test the effect of EU membership on economic growth, measured by the dependent variable real GDP growth, also the empirical literature uses this variable or its alternative: real GDP per capita in almost all cases.

2.1.Theory on economic growth

Solow (1956) and Swan (1956) develop independently the so called Solow-Swan exogenous long-run growth model in which the output of the economy is produced by the two production factors: labor and capital under the neoclassical framework. The production function is characterized by constant returns to scale. In this model the increase of the production factors is not sufficient for long-run economic growth, because of diminishing returns to capital in the closed economy. That is why the increase of capital and labor alone does not lead the economy to further growth, but to its steady state. Therefore, to achieve further growth, there is need for exogenously introduced technological progress in order to increase the level of output through higher productivity of the production factors. Because of diminishing returns to capital, in this model is important also the concept of income convergence. It means that poorer economies should grow relatively faster and eventually catch-up with the already richer economies, on condition that they are similar in terms of production factors growth rate, technology, share of saving rates of output and other

characteristics. In practice, however, because of differences in the aforementioned characteristics mainly between rich and poor countries, the concept does not hold, according to Romer (1994), but there is catching up mainly between middle-income and rich countries. Therefore, in my study the concept is expected to hold true, since the poorest countries in my sample do not belong to the group of the poorest countries in the world, but to the middle-income group.

In the endogenous growth models by Romer (1986) and Lucas (1988), the nature of technology changes and it becomes endogenous. Apart from physical capital, now there is human capital whose increase represents the endogenous technological growth leading to long-run economic growth. Regarding market integration and growth, which is a main focus of my study, according to Lucas (1988), the increase of exports has a crucial role in economic growth as observed in the Asian "growth miracles" such as Singapore, Korea, Taiwan, Hong Kong and still in Japan.

In the model of Romer (1990), technological progress is an endogenous growth determinant, as already mentioned, and market integration is beneficial for the economies and their growth, because the fixed costs borne for research and development lead to increase in the gains from trade when the market becomes larger. The larger the market, more research is performed in it, because of increased competition pressure and therefore the growth is faster. According to that model, the growth rate is influenced positively by the stock of human capital and not by the total population growth as in the neoclassical models which assume full employment.

2.2. Empirical literature on economic growth

The empirical literature subsection follows the following structure: first I present six papers which investigate which are the significant determinants of economic growth. They are followed by three papers focusing mainly on the effect of government debt on growth, controlling also for other determinants, six papers related to the effect of remittances on economic growth, two papers focusing mainly on the effect of FDI on economic growth and the last part of the subsection presents five papers which investigate the growth effect of European integration and EU membership on the countries' economies. The last study presented, the one of Brodzicki (2003), is taken as a basis for my economic analysis.

Following the structure of my econometric model, I begin the review of empirical literature with those papers related to determinants of economic growth. Tashevska and Trpkova (2011) use fixed effects panel data approach to find the main determinants of economic growth in South-East Europe for the post-communist transition period 1995-2007. The countries they include in their sample are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Serbia. The dependent variable of their model is GDP growth rate and as explanatory variables they take inflation (CPI % change), current account/GDP ratio, exchange rate against the US dollar, external debt/GDP ratio, Foreign direct investment, government balance, government size, proxied by general government expenditure, population and measures for large scale privatization, overall infrastructure reform and price liberalization. Eight of these eleven variables turn out to be statistically significant. Negative effect on GDP growth have current account/GDP, inflation and price liberalization, while the effect of exchange rate, population, government balance, government size and large scale privatization is positive. Foreign direct investments, however, turn out to have an insignificant effect in the model, although their effect can occur later and they can "contribute more to economic growth indirectly through numerous "spillover effects"" (Tashevska and Trpkova, 2011, p.15). The authors conclude that macroeconomic stability and sound economic policies are essential requirements to ensure economic growth through the increase of the private sector in the transition economies. Their study confirms also the findings of the neoclassical growth models where the increase of population impacts growth positively.

Huang and Chang (2013) conduct a fixed effects panel data study on 46 countries for the period 1983 - 2007 in order to find how does financial development alters the effect of trade openness on economic growth. They use 5 year averages of the data and the dependent variable is real GDP per capita growth. As explanatory variables they take trade share as a proxy for openness, financial development, which includes stock markets and banking system, and other growth related variables which are inflation rate, log of initial real GDP, government size and labor force, proxied by the share of population aged 15-64. In the first model specifications trade openness and stock market development do not affect growth significantly, only banking does so, therefore Huang and Chang (2013) include also an interaction term between trade and financial development in order to investigate whether trade openness impact is affected by financial development. Their results confirm that stock market development affects positively the growth effect of trade openness, while banking development affects positively growth directly (the interaction term with openness is

insignificant) and confirm the theoretical and empirical findings of most of the literature in this sphere that increased trade leads to increased economic growth in the long run, but when estimating their threshold panel model, it turns out that this is true only for countries which have well developed stock markets. The reason for this is that trade openness helps the diffusion of technological progress and innovation, because it stimulates research and development activities and increases the gains from them, as in the growth model of Romer (1990) and the well-developed financial system is necessary for funding investments and hedging financial risks related to research and development projects. Meanwhile, in countries with lower stock market development, trade openness has an insignificant or even negative effect on economic growth. Since in the research sample for my study there are only EU countries which have well developed stock market and banking systems, the findings of Huang and Chang (2013) confirm that, as one of the determinants of economic growth, trade should be included with the expectance of a positive impact on real GDP growth. The rest of the growth affecting variables in their study turn out to have the theoretically expected effects: initial GDP and inflation influence growth in significant and negative way, labor force in significant and positive, while the effect of government size is insignificant. The study of Huang and Chang (2013) confirms the theoretical findings of Romer (1990) regarding the increased gains from trade when the market becomes larger and also the neoclassical theory that increased labor is beneficial for economic growth. The study also contains some of the growth affecting variables I am going to include in my analysis. However, it uses different methodology, because of its more particular and different research question than mine.

Cuaresma, Doppelhofer & Feldkircher (2014) use Bayesian model averaging in order to find which are the significant determinants of regional economic growth in Europe. The sample they examine are 255 European regions for the period 1995 - 2005. In order to deal with model uncertainty problem they include a large set of 48 explanatory variables. The dependent variable is the average annual growth rate of each region from the sample and the explanatory variables are divided into six subgroups: Factor accumulation and convergence (neoclassical factors such as initial income, population growth and investment), Human capital, Technological innovation, Sectoral structure and employment, Infrastructure and Socio-geographical factors. For the European regions a main growth enhancing factor is income convergence between regions and between countries, mainly because of the high economic growth (mainly in the urbanized and capital cities regions) of the less advanced Eastern Europe during the years in consideration. Cuaresma et al. (2014) also find a

robust positive effect of human capital, in particular the share of workers with tertiary education, on growth. The authors estimate their model also with country fixed effects in order to distinguish the effect of the growth-enhancing factors within countries. Regarding income convergence within countries, they find it mainly within the Western European countries and not in Eastern Europe, where the faster growth leads to higher inequalities within the countries. Human capital remains a significant growth determinant, as before. This study confirms the theoretical concept of income convergence, introduced by Solow (1956) and Swan (1956), which applies in this case both between regions and between countries. However, it confirms also the endogenous growth theory that human capital affects economic growth positively (Romer, 1986; Romer (1990); Lucas, 1988). The findings of Cuaresma et al. (2014) are useful for my econometric analysis, because also my sample consists of EU member countries and I am going to include growth affecting variables such as initial GDP level and a measure for human capital.

Next, I present three time series analysis, each of them focusing on one country and determinants of its economic growth. Also these papers use different methodology than mine, but their findings are important for the choice of growth affecting controls in my model. I begin with the study of Silaghi and Medesfalean (2014) regarding the determinants of economic growth of one of the newest EU members – Romania. It is based on the Cobb-Douglas production function and except labor and capital as the classical determinants of economic growth, adds up also variables for innovation, research and education. The dependent variable in their time series analysis is log of GDP, while the explanatory variables chosen are gross fixed capital formation, number of employees, number of patents and number of high school graduates as a proxy for human capital. Because of non-stationarity of the data, all variables are differenced. The period they examine is 1990-2010, which starts with the beginning of the transition period towards a market economy for Romania and the rest of Eastern and Central European countries. The main results of the study of Silaghi and Medesfalean (2014) are that the effect of increase in labor (with 2 years lag) and capital is positive and significant for the GDP growth of the economy, which is in line with the exogenous growth theory, but counterintuitively and in contradiction with the endogenous growth model of Romer (1990), the effect of innovation (number of patents lagged 2 years) is negative and significant and the effect of human capital (lagged 5 years) is also negative, but insignificant. The study of Silaghi and Medesfalean (2014) uses different methodology than the one in my empirical model, because it focuses only on one EU member country, but the 20 years sample period is almost

the same. The study adds up to my analysis by backing up additionally the choice of explanatory variables which include investment and human capital. However, number of patents is a variable which is likely to be dependent on the level of human capital and its effect in the model, counterintuitively, is negative, because some companies decide to patent their products in different countries, even if their research and development activities were performed in Romania, for reasons such as high costs, time for obtaining the patent and low developed local market. The protection offered by patents can also decrease the capital demand, therefore decreasing GDP, as the authors argue. That is why I decide to leave it out of my regression. Regarding the number of employees, I pick the annual unemployment rate instead.

Feeny, Mitchell, Tran and Clarke (2012) distinguish in their study between genuine progress and economic progress in South Korea and search for differences in their determinants. However, here I focus only on the economic progress part, since this is the aim of my study. Their sample time period is 1970 – 2005 and the dependent variable is GDP per capita. The explanatory variables Feeny et al. (2012) choose for their time series model are physical capital expenditure per capita, export expenditure p.c., R&D expenditure p.c., inflation and the share of Koreans over 15 who completed post-secondary education as a proxy for human capital. The results are that human capital is not significant for the GDP per capita growth of South Korea, which is not in line with the endogenous growth model, while the positive and significant determinants are exports, research and development and physical capital expenditures, which, however, are in line with the endogenous growth theory. Inflation has a negative effect on economic growth. These findings regarding the real GDP growth per capita again can be used in my analysis in which, however, I include different measure for human capital, trade openness and I leave out research and development expenditures.

In their study, Li, Chen and San (2010) test the theoretical statements that foreign trade and mainly the exports are crucial for economic growth and that the exports' increase can be very beneficial for less developed countries. They conduct a time series analysis on the GDP growth determinants of East China for the period 1981 – 2008 using the following variables: log of GDP as a dependent variable and the three independent variables, also in their logarithm: total foreign trade, imports and exports. Their main results suggest that there is mutual long run causality between exports and GDP growth, but there is no such causality between GDP growth and imports. Therefore, the main

conclusion is that foreign trade is highly beneficial for the development of the economy both in the long and in the short run. Their results are in line with the endogenous growth theory, where increase of exports leads to economic growth (Romer, 1986; Lucas, 1988). The main conclusion of the study regarding the beneficial effect of foreign trade for the economy is useful for the construction of my econometric model, by including as a growth affecting variable the trade share for each country from the sample and expecting a positive coefficient.

Next, I present three papers investigating the effect of government debt on growth. In my econometric analysis, however, I add the government debt explanatory variable only in my second model which I use as a robustness check, because there are many missing observations for my country sample and therefore the quality of the regression diminishes. Checherita-Westphal and Rother (2012) conduct a panel data study with time and country fixed effects for the 12 euro area countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain for the period 1970-2008 in order to investigate what is the impact of debt to GDP ratio on their economic growth. The dependent variable is real GDP per capita growth and as explanatory variables they take share of gross government debt (squared), initial GDP per capita, gross fixed capital formation to GDP, population growth rate as well other variables to control for fiscal indicators, long-run real interest rate and trade openness. They find that the turning point of the non-linear relationship between debt to GDP ratio and GDP growth, when debt becomes detrimental for economic growth, is on average between 90% and 100%.

The impact of the debt to GDP ratio of the Euro area countries' economic growth in the short run is studied by Baum, Checherita-Westphal and Rother (2013). They estimate their sample of the same 12 euro area countries as in Checherita-Westphal and Rother (2012), with a dynamic panel threshold model for the 20 years period from 1990 to 2010 using yearly data. The dependent variable is real GDP growth and as explanatory variables they take one year lagged debt to GDP ratio and additional growth related controls such as lagged GDP growth, share of gross capital formation, trade openness and a dummy for the period of European Monetary Union membership. Additionally, Baum et al. (2013) control also for initial GDP per capita, population growth, human capital, proxied by secondary education, old dependency ratio (share of population over 64), unemployment, budget balance and short and long run interest rate in their robustness tests where the variables turn out insignificant with the exception of short and long-run interest rates which are

negative and significant. In their results, both in the dynamic and non-dynamic model, trade openness has a positive and significant impact on growth (which is in line with endogenous growth models), gross capital formation is positive, but insignificant, EMU membership turns out significant and negative and past GDP growth has a significant and positive impact on current growth, the latter in line with Solow (1956) and Swan (1956). Regarding the growth impact of debt to GDP ratio in the short-run, it is positive and significant until the threshold level of 66.4% and when the ratio exceeds it, the impact becomes insignificant. When they include also the crisis years 2008-2010 in the model, they find a second threshold which is around 95%, after which the effect of additional debt becomes detrimental for the economy.

The study of Dreger and Reimers (2013) investigates what is the effect of debt on real GDP per capita growth on a sample of 18 advanced countries, including those from the Eurozone. They use annual data for the 12 euro area countries, investigated in the previously described two studies and add also Denmark, Sweden, the UK, Turkey, USA and Japan. The time period examined is 1991 – 2011 and they distinguish between periods of sustainable and non-sustainable debt. The dependent variable is real GDP growth per capita and the explanatory variables are debt to GDP ratio, share of gross fixed capital formation, share of trade, population growth and real interest rate. Dreger and Reimers (2013) estimate their panel data model with time and country fixed effects. The investment rate, in line with neoclassical growth models and trade openness, in line with the endogenous growth models, have a positive influence on real GDP per capita growth, while negative influence is exerted by the population growth and the real interest rate. Debt to GDP ratio has a non-linear relation to the GDP growth and its effect is positive only when the debt is sustainable, which has a different threshold depending on the countries' macroeconomic conditions (unlike the findings of Baum et al. (2013)), and negative or none when it is not sustainable for respectively the Euro area and the broader country set. Therefore, it turns out that participating at the monetary union brings additional risks for its members.

Since accession in the EU brings more possibilities for free migration of workers within the EU borders, I add also the growth influencing variable personal remittances in the second specification of my econometric model. Even if at first look, remittances might not seem important at macroeconomic level, because they are usually sent regularly in relatively small amounts, their aggregate effect turns out to be very large and in some countries even higher than that of foreign

direct investment (Zuniga, 2010). There are evidences that remittances have a positive and relatively mild impact on economic growth in the migrant-source countries in the long run, according to Mansoor and Quillin (2006). Next, I present papers which investigate what is the effect of personal remittances on economic growth, together with other growth affecting control variables, some of which are taken also in my analysis. I present five studies which find a positive and significant effect of remittances on economic growth and add a sixth one which finds that the positive effect of remittances is not always the case. Mansoor and Quillin (2016) argue that remittances have a positive impact on development and there are evidences for reducing poverty, increasing the rate of investment, saving and consumption. In their study on migration and remittances in Europe and Central Asia, they estimate different specifications of an econometric panel data model, in order to find what the effects of international remittances on economic growth are. Their dependent variable is real GDP per capita growth and as main explanatory variables are chosen log of initial GDP per capita, log of share of remittances of GDP, log of share of Gross capital formation of GDP, log of share of net private capital inflows of GDP and lagged GDP growth rate in order to deal with autocorrelation. In addition, they include also institutional quality variables in order to check their eventual importance for the realization of the remittances' effect. Among these variables are TI Corruption Perception Index, UN Human Development Index, Governance indicators and ICRG Political risk rating. The period examined is 1970 – 2003. Mansoor and Quillin (2006) estimate nine specifications, different in their explanatory variables and using Anderson-Hsiao and a two-step GMM estimators. They find a significant (although not in all specifications) and positive effect of remittances on real GDP growth, not of a large magnitude, however.

The second study is by Pradhan, Upadhyay and Upadhyaya (2008). They also confirm the positive effect of workers' remittances on economic growth in their panel data study comprising 39 low and middle-income countries for the period 1980-2004 divided in 5 year periods. Their dependent variable is average annual real GDP growth and the explanatory variables are log of initial real GDP, i.e. in the previous 5 year period, log of per capita remittances received, share of invested income, share of total trade of GDP or exports as a share of GDP and a political variable for the strength of the political institutions measured by the difference between the levels of democracy and autocracy in each country for the current or the previous period. Pradhan et al. (2008) estimate the model in four different specifications using country fixed effects. They find a positive and

significant effect of openness, both in the total trade and export specifications, positive and significant effect of the lagged policy variable and the same effect is found also for the investment rate. In two of the four specifications remittances also exhibit a positive and significant effect on economic growth, even if the magnitude of their impact is not large. As expected, because of convergence of per capita income, the coefficient of initial real GDP per capita level is significant and negative, as in the exogenous growth theoretical models.

The third study by Zuniga (2010) investigates extensively the impact remittances have on economic growth on a vast sample of 122 countries, excluding developed countries, for the period 1980-2005 through a panel VAR model using annual data. She takes the following growth affecting variables, all in logs: share of remittances of GDP, share of investment of GDP, real GDP per capita, real exchange rate and trade openness measured by the share of imports plus exports of the GDP. Her main results are that remittances affect growth of recipient countries positively regardless of the development level of institutions which, according to other authors, such as Mansoor and Quillin (2006), is important for the real effect of remittances on the economy. In summary, remittances shocks have a significant and positive effect on real GDP growth with a lag. Trade openness and investment affect positively GDP growth. When separating for the remittances' effects on GDP growth by region, Zuniga (2010) finds out that the most significant and immediate benefit receive the Eastern European economies which is a useful finding for my study, because some of the EU members are Eastern European countries. Meanwhile, the only geographical region where the impact of remittances is insignificant, is Africa. The reason for these differences in the impact of remittances shocks is probably, because the two regions have respectively the most and least favorable economic growth conditions (Zuniga, 2010).

The fourth one by Nsiyah and Fayissa (2011) study the long-run effect of remittances on GDP per capita for a sample of 64 African, Asian, and Latin American-Caribbean countries. The period they examine is 1985-2007 using annual data. They use panel fully modified OLS estimation as their study methodology. Except for the impact of remittances, they control also for other growth affecting explanatory variables which are the economy's openness (share of trade of GDP), gross fixed capital formation to labor ratio and a measure for economic freedom, composed by Political rights and Civil liberties indices. Nsiyah and Fayissa (2011) estimate four specifications of their model, divided by regions. Remittances, trade openness and capital/labor ratio have a positive and

significant effect on GDP growth in all model specifications, while the effect of the freedom variable is positive, but insignificant for the whole sample specification and the findings for the latter variable are mixed in the rest of the specifications for each of the three sample regions.

The fifth paper by Kumar and Stauvermann (2013) investigates the economic growth effect of remittances in Bangladesh for the period 1979 – 2012 using annual data and autoregressive distributed lag model in order to find what is the relationship between remittances, capital and output per worker in the short and in the long run. Their findings are that the remittances have a net negative effect on output per worker in the short run, but in the long run their effect is positive and the causation is bidirectional, i.e. they have mutually reinforcing effect. They find also that the relationship from capital per worker to output increase is unidirectional.

However, not always the impact of remittances is found to be positive. Jawaid and Raza (2012) conduct a time series analysis in order to investigate the relationship between workers' remittances and economic growth in China and South Korea in the long and in the short run. They use annual data for the period 1980 – 2009 and the following explanatory variables: labor force (total), remittances and capital, proxied by real gross fixed capital formation. For both countries labor and capital turn out to have a significant positive effect on economic growth. Remittances' impact on economic growth is significant and positive in the short run for Korea, while for China it is insignificant. In the long run the impact of remittances remains positive for Korea and becomes negative for China, probably caused by the increase in voluntary unemployment which has a negative effect on productivity and GDP growth (Jawaid and Raza, 2012). The causality relationship they find is unidirectional from remittances to growth for both countries.

Next, I present two papers which focus mainly on the effect of FDI on economic growth. FDI is a variable influenced by EU membership, therefore, together with personal remittances, it goes in the second specification of my model. In addition to this part of the literature review I present a study confirming that EU membership is one of the main determinants for the increase of FDI inflows in a country. According to Festa (2015), EU membership is an important determinant for Intra-EU Direct Investment (IDI) flows and is a sign of macroeconomic and institutional stability of the member countries. "The EU membership is a symbol of stability of a country, quality of its institutions as well as implementation of political reforms. Thus, investors consider it the most important signal that an ex-socialist country can send." (Festa, 2015, p.18). In his panel data study

on bilateral capital flows Festa (2015) investigates which are the main determinants of IDI within the EU. His sample is composed by the EU-27 countries, the EU-15 as source countries and the remaining, mainly transition economies which accessed the EU in 2004 and 2007, as host countries. The period in consideration, 1993-2013, starts soon after the beginning of the transition to free market economies of the ex-socialist countries in the sample. The dependent variable is IDI flows from the source EU-15 to the host new member states in thousands of Euros. As potential determinants for attracting FDI flows, Festa (2015) chooses distance between the capitals of the source and host countries, size of the economy measured by its GDP, trade openness of the host country, measured by the share in GDP of its imports and exports, real unit labor cost of the host country, quality of institutions, measured by investment freedom index and an EU membership dummy. He estimates the panel data model with random effects and a lag of one period for the independent variables, because their effect on the investment flows is not immediate. His results are that distance between capitals is negative, but insignificant, EU membership is positive and significant, having the largest magnitude of all explanatory variables, GDP of the source economies is positive and significant, while the GDP, trade openness and labor costs of the host economies turn out to be insignificant, as expected. Adding investment freedom index, which is also insignificant, does not change the results, therefore confirming that the main determinant of direct investment flows within the EU is caused by EU membership itself, even if, as Festa (2015) argues, EU membership should be even a stronger determinant for investors outside the EU.

According to Popescu (2014), FDI inflows and the exports are among the most important contributors to economic growth of a country. In his paper, he analyses the important role of inward FDI and exports for the economic growth of Central and Eastern European countries for the period 1993 – 2013. According to him, membership in the EU influences positively the amount of FDI inflows, because it becomes easier for companies situated already in EU countries to make investments and also because accession in the EU is a strong signal of institutional advancement, good business environment and macroeconomic stability. Among the factors attracting FDI in CEE countries are the low unit labor costs, productivity, infrastructure, openness of the economy, low inflation, privatization and banking reform.

Finally, according to Yucel (2014), FDI contribute to the host country not only through bringing additional capital in the economy, but also indirectly through transfer of knowledge, know-how,

new skills and increase in the levels of trade integration and employment. He conducts a panel data study in order to test the hypothesis whether FDI is beneficial for the economic growth of the three Baltic countries: Estonia, Latvia and Lithuania. The period examined is 1996 – 2008 and the dependent variable is annual real GDP growth. The four explanatory variables are net FDI flows as a share of GDP, trade (imports plus exports) as a share of GDP, stock of human capital, proxied by public spending on education as a share of GDP and share of paved roads of total roads as a measure for the infrastructure level. The panel fixed effects model of Yucel (2014) confirms that there is a positive and significant impact of FDI on real GDP growth rate of the Baltic countries for the examined period.

In the final part of this literature review, I present five relevant papers related to the effect of European integration on the EU member economies. In summary, they all find a positive effect of EU membership and trade integration on economic growth. Maudos, Pastor and Seranno (1997) argue that joining the EU and the economic integration have a positive impact on efficiency and productivity of the countries and consequently on their growth. Theoretically the access to a larger market increases the economies of scale and brings wider opportunities for specialization. The larger market increases also competition pressures which stimulate firm efficiency and have a downward pressure on prices. Maudos et al. (1997) estimate the frontier productivity function for a sample of the OECD countries during the period 1965-1990. The variables they use are real GDP, aggregate labor input and total capital stock. Their empirical findings are that each expansion of the EU during this period, increased the efficiency and productivity of all member countries involved, new and old ones. The only exception is Denmark whose inefficiency level did not decrease after EU accession as the rest of the countries. Next, in order to see if the efficiency gains are caused by economic integration or by general factors which should affect all countries in similar way, Maudos et al. (2007) compare the relative efficiency gains of each country before and after EU accession with the average level of efficiency gain for the whole EU and find that after accession the relative gains for each country are higher, thus indicating that joining the EU has the aforementioned positive impact on efficiency and productivity. This study confirms the theoretical findings of Romer (1990) that there are gains from trade integration and demonstrates that in the period right before the period I examine in my study, the EU membership had a positive effect on almost all of the member countries' economies.

Kutan and Yigit (2007) also conclude that European integration is beneficial for the countries which join the economic union through capital accumulation and technology transfers. This is because of the freer flow of goods and knowledge between countries, which has an important growth enhancing role. They test whether economic integration boosts GDP convergence and productivity increase first by constructing a theoretical endogenous growth model and then by testing the model empirically through structural break and data envelopment tests. The sample they examine is constituted by the five latest EU-15 member countries (Spain, Portugal, Austria, Finland and Sweden) and France as a reference country. The empirical results confirm most of the theoretical model implications that the economic integration boosts income convergence and it is observed that the productivity increase of countries with higher GDP, such as France, slows down relatively to poorer countries. An important role for this, according to Kutan and Yigit (2007), have also the EU structural funds which contributed to increasing of the net recipient countries' productivity and growth, while slowing the growth of the richer net contributor countries. This is probably a reason for wealthy countries such as Norway and Switzerland to not want to join the EU.

Badinger (2005) conducts a panel study for the EU-15 countries (except Luxembourg, because of missing data) for a long period of 50 years (1950 – 2000) in order to check whether there are growth effects of trade integration, both global (GATT) and European (EU), and whether their nature is permanent or temporary. The sample period is divided in 10 periods by taking the average values for each 5-years period. The dependent variable is average growth rate of GDP per worker and the explanatory variables are average growth rate of capital per worker, absolute change in the integration level, measures for human capital, average growth rate of GDP deflator and trade openness (trade share of GDP). Badinger (2005) also includes a dummy in order to distinguish between the periods 1950 - 1970 and the consequent economic slowdown during 1970 - 2000. His findings are that the nature of integration induced growth is temporary but has significant effect on the countries' GDP per capita – if there was no trade integration, the average GDP per capita of the EU would have been one fifth lower at the end of the considered period. As Kutan and Yigit (2007) suggest, he also confirms that the channels through which integration affects growth, are increases in efficiency and investments. As a robustness check, he also adds additional variables which are the initial level of GDP per worker, the inflation rate and the change in the trade share, but the main

conclusions remain unchanged. He also does not reject the hypothesis of symmetry in the induced gains between small and large countries.

Cuaresma, Ritzberger-Grünwald and Silgoner (2008) investigate whether EU membership has contributed towards income convergence among the EU member states and if yes, was its impact symmetric or not. They conduct a panel data study for the EU-15 countries during the time period 1961-1998, divided into 4 subperiods. The explanatory variables used are log of initial level of GDP per capita at the beginning of each subperiod, investment share and a proxy for human capital (average years of education of people aged over 25). In addition, Cuaresma et al. (2008) add variables reflecting the subperiod average inflation rate, the share of government consumption, trade share of GDP as a measure for trade openness and years of EU membership. They obtain the following robust results: initial GDP per capita has a significant and negative effect on growth, therefore confirming income convergence, while investment share and years of education have a positive effect. When the additional variables are added, the signs of those already mentioned remain unchanged, and inflation and government consumption have a negative effect on growth, while openness of the economy and length of EU membership have a positive effect. The results confirm that the length of EU membership is associated with higher economic growth and income convergence within the EU. In order to check whether the EU membership growth enhancing effect is mainly because of higher macroeconomic stability associated with the union membership, part of it captured by including the inflation rate, Cuaresma et al. (2008) add also the variable exchange rate volatility against the US dollar, but it turns out to be insignificant. To check if the relationship between EU membership and economic growth is asymmetric, they conduct a threshold estimation in order to divide the countries in two subgroups – with lower and higher initial income levels, and find that the coefficient of EU membership length is higher for those with lower income levels, therefore poorer countries benefit more from European integration in the long run than richer ones.

Brodzicki (2003) also conducts a panel data study in order to find whether there is a long term growth effect of economic integration, focusing on the European integration, and if yes, what its direction is. He makes a comparison with other non-EU countries and that is why his sample consists of 20 countries for the period 1960-1999, including 13 European and 7 non-European countries as a reference group. The sample period is also divided in 5 year subperiods, as in Badinger (2005), and the dependent variable is real GDP per capita growth. The explanatory

variables are log of initial real GDP per capita, investment share of GDP, government share of GDP, population growth rate and an index for human capital, constructed by Barro and Lee (2002). All variables except the initial GDP per capita at the beginning of each subperiod are in their 5 year average values. In order to have a consistent result of the answer of his research question, Brodzicki (2003) estimates three different regressions, the first including a dummy for EU membership, the second including a variable capturing the length of EU membership at the end of each 5 years subperiod and the third one including a proxy measuring the degree of integration of the countries' markets. The main findings of the study are that additional years of EU membership (regression 2) and additional enlargement of the market due to EU expansion (regression 3), have a significant and positive effect on GDP growth. The EU dummy variable (regression 1), however, does not show a significant effect, but is also positive. In the three regressions the initial GDP level has a negative effect on GDP growth, which confirms the convergence theory, the investment share has a positive effect, population growth is insignificant, probably because all countries in the sample are industrialized and have homogeneous demographic dynamics (Brodzicki, 2003), government share is negative and the human capital index is positive, as expected. The study of Brodzicki (2003) is convenient to be taken as a basis for my economic analysis. However, I focus on a more recent period in my study and extend the period in consideration until 2011. Because I would like to focus on the entire EU and there are new members which joined the union after 1999, I take as a beginning of my sample period the year 1990, which marks the beginning of the free market oriented reforms for the ex-socialist countries. A reason for this choice is that there is no data for most of the variables I use before 1990 for the aforementioned group of countries. Because of the shorter time period and different country sample, I introduce some changes in the econometric model. In order to increase the number of observations and the quality of the regression, I use annual data, where the value for each variable is lagged one year and the absolute change in the current year is also taken. Because I use annual data, as a measure for economic integration the most appropriate seems to be an EU dummy variable for membership each year, which is used by Brodzicki (2003) in his first regression. My country sample includes all the 27 EU member countries until 2011 and do not consider any non-EU countries. However, because of country heterogeneity and in order to capture the common economic shocks for the EU countries during the period in consideration, I use both country and period fixed effects, as Brodzicki (2003) does. Similarly, for the estimation of the model I use the least squares dummy variable estimator which

seems most appropriate for this kind of model. Regarding the control variables used, I extend the model of Brodzicki (2003) and add additional controls such as inflation, population size and unemployment. In order to find out which are the channels through which the effect of EU membership translates into the real economy, if its effect turns out to be significant, I add in my second model specification three additional growth affecting variables, which are more probably affected by EU membership. Those are trade openness, personal remittances and net FDI inflows. A drawback of my study related to the one of Brodzicki (2003) is that my panel becomes unbalanced, because of missing observations for some of the included variables. For future improvement of his study, Brodzicki (2003) suggests to be used also different techniques such as time series and cross-section analysis. However I keep using the panel data approach, because it seems the most appropriate, especially considering the higher number of observations and the nature of the data. The reasons for this choice are discussed more in detail in the following section.

3. Data and methodology

In this section I present the data used for the estimation of my econometric model and its sources, the variables and their expected effect, the chosen sample, estimation technique used and a description of the model itself. The data used originates from the World Bank World Development Indicators Database 2015 and Penn World Tables 8.1 (Feenstra et al., 2015). The dependent variable Real GDP growth is constructed by taking the first differences of the natural logarithm of the real GDP (Feenstra et al., 2015) at constant national prices (in mln. 2005 US$). The explanatory variables are the following: an index for human capital, based on years of schooling (Barro and Lee, 2012) and returns to education (Psacharopoulos, 1994), inflation (CPI percentage change) (WDI, 2015), population (millions of people) (Feenstra et al., 2015), share of gross capital formation (percentage of GDP) (Feenstra et al., 2015) as a proxy for domestic investment, share of government consumption (percentage of GDP) (Feenstra et al., 2015) as a proxy for the size of the government and unemployment as a percentage of the total labor force of the country, based on national estimates (WDI, 2015). Based on the economic growth literature, reviewed in Section 2, the model can also include other variables such as central government debt (percentage of GDP) (WDI, 2015) and real interest rate (WDI, 2015). However, since there is much unavailable data for these indicators, the many missing observations for the period in consideration, bias the results and

the estimation software EViews™ adjusts automatically the sample period into a shorter one, excluding years and also some of the cross-section units. However, I also provide the results of the estimations with the aforementioned two variables, as a kind of robustness check, in order to investigate whether the initially estimated effects change when adding these variables, although for a reduced sample. After estimating the model including the aforementioned growth affecting variables and the EU membership dummy, I include the additional explanatory growth affecting variables which are more probably affected by EU membership. Those variables are the following: FDI net inflows (percentage of GDP) (WDI, 2015), Personal remittances received (percentage of GDP) (WDI, 2015) and Exports plus imports (percentage of GDP) (WDI, 2015) as a proxy for trade openness.

Here I provide a brief explanation of the expected effect of the aforementioned variables. As already mentioned, my study focuses on the long-run effect of EU membership on the countries' economic growth. The accession to the EU means accession to the European Single Market and Customs Union, therefore, every new and current member gains access to a larger and integrated free market, which should have a positive effect on its economic growth, as suggested by Romer (1990), and furthermore the increased amount of trade will affect growth positively, as found in most of the empirical literature reviewed in Section 2. Regarding the effect of EU membership, I construct a dummy variable which takes the value of 1 for the years in which a country is an EU member and 0 for the years before a country's accession in the EU. According to the literature review in the previous section, which includes empirical papers and theoretical growth models, I expect at least a positive, regardless of its significance effect of EU membership on member countries. The lagged level of real GDP is expected to exert a negative influence on GDP growth, as in the Solow-Swan model and confirmed by the empirical literature, because richer countries will grow relatively slower than poorer ones - income convergence. As already mentioned, according to Romer (1994), this happens mainly between rich and middle-income countries, therefore in my sample I expect such a negative effect of the initial GDP level on growth. The past GDP growth, however, should exert a positive effect, because if a country grew faster, it should continue to do so also in the current period, as Baum et al. (2013) suggest. Human capital, as a driver of the endogenous technological growth (Romer, 1990) is expected to have a positive effect on the economy, while an increase of population, according to the neoclassical exogenous growth models, should also have a positive effect, assuming full employment. However, in practice, there

is also unemployment, therefore the expectation about population and its growth cannot be clearly defined, while unemployment is always considered negative for economic growth. Investment, measured by the share of gross capital formation, exerts a positive impact on economic growth, according to the neoclassical and endogenous growth models. The share of government consumption, which is the proxy for government size, has mainly negative effect in the reviewed empirical literature, therefore I expect its coefficient to be negative, as in Brodzicki (2003) and Cuaresma et al. (2008). Inflation is expected to have a negative effect, because an increase in prices, will reduce aggregate demand. The amount of FDI net inflows should be positive, since theoretically, an increase in investment has a positive effect on the economy, but this effect can be also indirect through spillover effects (Tashevska and Trpkova, 2011). Received personal remittances are basically an additional income, which can be used for investment/saving and consumption, therefore they are expected to be beneficial for the recipient countries. Real interest rate is expected to have a negative effect on economic growth, since its increase discourages investment and consumption. Central government debt should have a positive effect on the economy, by stimulating investment and consumption, but depending on its level and sustainability, this is not always the case after a certain threshold, as shown by Checherita-Westphal and Rother (2012). In order to capture the impact on GDP growth in period "t", all explanatory variables, except the EU dummy, are taken with a one year lag "t-1" and their growth in year "t" from the preceding year "t-1" is included.

My sample consists of the EU-27 member countries and comprises the period between 1990 and 2011. The choice of the sample period and explanatory variables is made, based on the already reviewed theory and literature and also on data availability, because the data for the dependent variable and for some of the main explanatory variables comes from the Penn World Tables 8.1 (Feenstra, Inklaar and Timmer, 2015) which provide data until 2011. A period of around 20 years is good for observing long-run effects and to abstract from business cycle fluctuations and short-run shocks in the financial sector or shocks caused by policies (Edison, Levine, Ricci and Slok, 2002). It is an interesting period, because during these years, the ex-socialist countries perform their economic transition from centrally planned to market economies and most of them enter the EU. There are three EU enlargements – those of 1995, 2004 and 2007, and the period also contains the 2008 world financial crisis which has a significant negative impact on the European economies.

I perform my empirical study by constructing a panel data model for the aforementioned chosen sample. Since I am interested in the EU membership effect on a country level, panel data has an advantage to be used, because it identifies changes over time on individual level (Verbeek, 2004). It is also good for estimating large dimensions of data, but together with this advantage, comes the disadvantage of missing data, typically in large panels, which therefore become unbalanced and reduce the quality of the estimation, as in my case. In choosing between fixed or random effects model, I have to take into consideration that in the random effects model the individual effects are considered a random draw from a population, while in my case I am interested in capturing the specific individual effects coming from heterogeneity between the EU countries, which are not a random draw, but a group with relatively small number and specific nature. That is why using fixed effects seems the appropriate thing to do (Verbeek, 2004). The inclusion of fixed effects means that each individual in the sample has his own time invariant intercept, capturing his own characteristics different than the others (Tashevska and Trpkova, 2011). I also use time fixed effects in order to capture period specific characteristics as global variations in GDP (Brodzicki, 2003) and the effect of common macroeconomic shocks, such as the 2008 financial crisis which affected during the same time all countries of interest. According to Verbeek, (2004), the time fixed effects can reduce the effects of eventual incomplete model specification or omitted variable bias, because they capture the effect of the variables that do not vary on individual level. In order to back up these theoretical arguments for using fixed time and country effects, I perform the Hausman test, whose null hypothesis is that there is no correlation between the unobservable individual country and/or time effects and at least one of the explanatory variables (Verbeek, 2004). If the hypothesis is not rejected, that means that a random effects model is appropriate, but in case it is rejected, a fixed effects model has to be used, otherwise the estimator is not consistent and efficient, because random effects require that there is no correlation between the regressors and the individual effects. The test strongly rejects the null hypothesis that a period (Appendix, Table 3) or a cross-section random effects model (Appendix, Table 4) is appropriate, therefore as already discussed theoretically, it turns out that a fixed effects model and the least squares dummy variable (LSDV) estimator should be used, as Brodzicki (2003) does. The fixed country and time effects add dummy variables, given respectively by μ_i and τ_t (not reported in the estimation results) for each country and year, in order to capture the between (across individuals) and within (over time) variation in the data. I perform the estimations using the econometric software EViews™.

The model is constructed in the following way: first I include the dependent variable real GDP growth (g_t), which is the difference $\log(GDP_t) - \log(GDP_{t-1})$, as already mentioned. Next, according to convergence theory, the previous level of GDP should affect GDP growth negatively, i.e. the richer the country, the slower its GDP will grow, while the poorer it is, the faster the GDP should grow.

$$g_{it} = a + b \cdot \log(GDP_{it-1}) + \mu_i + \tau_t + \varepsilon_{it}$$

The results indicate that the coefficient b is negative and significant at 1% level, therefore the hypothesis of presence of a unit root is rejected, but there is serial correlation in the residuals (Table 5, Table 7 and Graph 1). That is why I change the specification and estimate:

$$g_{it} = a + b \cdot g_{it-1} + c \cdot \log(GDP_{it-2}) + \mu_i + \tau_t + \varepsilon_{it}$$

Here the coefficients remain significant at the 1% level and the residuals become better (Table 6, Table 8 and Graph 2) with a Durbin-Watson statistic of 1.6389 compared to 0.8880 before. Please note that, because I am going to use as one of the explanatory variables the log of real GDP lagged 2 periods, my sample period is reduced to 1992-2011.

As already mentioned, in my study I am interested in finding whether there exists a significant effect of EU membership on the countries' economic growth and if it does, what is its direction – positive or negative. Since the membership itself eventually impacts economic growth through one or a few channels, if I construct a model with all or most of the countries' significant economic growth determinants, it is almost certain that I will obtain an insignificant effect of EU membership, in case there are no omitted variables. That is why first I construct the model including the determinants of economic growth which theoretically should not be affected directly by EU membership and if EU membership turns out to be significant in this specification, then I add the remaining growth affecting variables, in order to find out through which of them, EU membership affects real economic growth. Therefore, the initial model specification is the following:

$$g_{it} = a + b \cdot g_{it-1} + c \cdot \log(GDP_{it-2}) + d \cdot HC_{it-1} + e \cdot \Delta HC_{it} + f \cdot INF_{it-1} + g \cdot \Delta INF_{it} + h \cdot POP_{it-1} + i \cdot \Delta POP_{it} + j \cdot GCF_{it-1} + k \cdot \Delta GCF_{it} + l \cdot CONS_{it-1} + m \cdot CONS_{it} + n \cdot UNEMPL_{it-1} + o \cdot \Delta UNEMPL_{it} + p \cdot EU_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (1)$$

If, after estimating the above Equation (1), the coefficient of the EU dummy variable turns out to be significant, then I add the rest of the economic growth variables, which should be affected by EU membership. Therefore, the model will be extended to the following Equation (2):

$$g_{it} = a + b \cdot \mathrm{g}_{it-1} + c \cdot \log(GDP_{it-2}) + d \cdot HC_{it-1} + e \cdot \Delta HC_{it} + f \cdot INF_{it-1} + g \cdot \Delta INF_{it} + h \cdot POP_{it-1} + i \cdot \Delta POP_{it} + j \cdot GCF_{it-1} + k \cdot \Delta GCF_{it} + l \cdot CONS_{it-1} + m \cdot CONS_{it} + n \cdot UNEMPL_{it-1} + o \cdot \Delta UNEMPL_{it} + p \cdot EU_{it} + q \cdot Trade_{it-1} + r \cdot \Delta Trade_{it} + s \cdot FDI_{it-1} + t \cdot \Delta FDI_{it} + u \cdot Remitt_{it-1} + v \cdot \Delta Remitt_{it} + \mu_i + \tau_t + \varepsilon_{it} \quad (2)$$

Here, if the model is correctly specified, the EU dummy should lose its significance and at least one of the newly included variables should turn out to be significant and having a positive or negative coefficient in the same direction as the EU dummy.

4. Estimation results

In this section I present the estimation results and check if they are in line with the reviewed theoretical and empirical literature. I provide also the modification of my model with two additional variables as a robustness check. First, I estimate Equation (2) using the panel least squares estimator with time and country fixed effects, as already discussed in the previous section. Because of missing data for some of the explanatory variables, the panel data is unbalanced and the observations are 498, instead of 540. The effects of the independent variables refer to the long-run and are the following: as expected, lagged real GDP level has a negative and significant influence on growth, because of income convergence, which is in line with Pradhan et al. (2008), Cuaresma et al. (2014), Huang and Chang (2013), Brodzicki (2003), Cuaresma et al. (2008), the Solow-Swan model, while lagged real GDP growth affects current growth positively and is also significant, in line with Baum et al. (2013). The human capital index turns out to be insignificant, which is in line with Baum et al. (2013), Silaghi and Medesfalean (2014) and Feeny et al. (2012), even if they used a different measure for it. The negative and significant growth effect of inflation is in line with the results of Tashevska and Trpkova (2011), Feeny et al. (2012), Huang and Chang (2013) and Cuaresma et al. (2008). Meanwhile population and its growth are insignificant, in line with Baum et al. (2013), probably because the demographic development dynamics in the EU countries are similar (Brodzicki, 2003). This result is also in line with Romer (1990). The investment share

measured by gross capital formation has a significant and positive effect on the economy, as expected, and in line with Dreger and Reimers (2013), Feeny et al. (2012), Silaghi and Medesfalean (2014), Kumar and Stauvermann (2013), Pradhan et al. (2008), Zuniga (2010), Jawaid and Raza (2012), Brodzicki (2003) and Cuaresma et al. (2008). The size of the government, measured by its consumption as a share of GDP has a negative and insignificant influence on growth, in line with Huang and Chang (2013), but only its change is significant at the 10% level, in line with Brodzicki (2003) and Cuaresma et al. (2008). The lagged effect of unemployment is insignificant, but its reduction in the successive years affects significantly and positively the economy, which is in line with Huang and Chang (2013), who confirm that the (amount of) labor force is beneficial for the growth of the economy. The effect of the EU membership dummy turns out to be positive, as expected, and in line with Cuaresma et al. (2011), but significant only at the 10% level. The R^2 value is almost 82% which is a high value, explaining much of the variation in the model, but in panel data its interpretation is not that straightforward, because of the fixed effects, which capture some of the variation in the variables. The Durbin-Watson statistic is 2.0244 and the residuals do not seem correlated (Graph 3 and Table 9), therefore I cannot reject the null hypothesis of no serial correlation and I can infer that the model specification and the chosen variables are correct.

Since I obtained a significant effect of EU membership on real GDP growth, I proceed with estimation of Equation (2) in order to check through which channels EU membership affects economic growth. When the rest of the explanatory variables are added, however, because of missing values, the number of observations diminishes to 451. The lagged share of received personal remittances turns out to be insignificant, partly in line with Mansoor and Quillin (2006), but the rest of the newly included variables are not. The increase in received personal remittances has a significant positive effect on GDP growth, which does not contradict the empirical studies on this topic (Mansoor and Quillin, 2006; Kumar and Stauvermann, 2013; Pradhan et al., 2008; Zuniga, 2010; Nsiyah and Fayissa, 2011; the findings for Korea of Jawaid and Raza, 2012) and confirms their positive effect on the receiving countries' economies. As expected, trade openness measured as a share of GDP has a highly significant and positive effect on GDP growth, which is in line with Li et al. (2010), Huang and Chang (2013), Cuaresma et al. (2011), Romer (1990), Baum et al. (2013), Dreger and Reimers (2013), Zuniga (2010), Nsiyah and Fayissa (2011) and Cuaresma et al. (2008). Net FDI inflows surprisingly have a significant, but negative effect on GDP growth, which is in contradiction with the reviewed literature so far. Interestingly, in this specification of

the model the population and its growth become significant with respectively positive (in line with the neoclassical models assuming full employment) and negative (not in line with reviewed theory and literature) effect on economic growth. There is no evidence for serial correlation in the residuals (Graph 4 and Table 10) with Durbin-Watson statistic of 2.0066. Here, I present the table with the estimation results described above:

Table 1. Estimation results, Equations (1) and (2)

Dependent variable: Real GDP growth				
	Equation (1)		Equation (2)	
Explanatory variables	Coefficient	P-value	Coefficient	P-value
Constant	0.8157	0%	0.5758	0%
Log Real GDP (-2)	-0.0739	0%	-0.0718	0%
Real GDP growth (-1)	0.1703	0%	0.1289	0%
Human capital (-1)	-0.0044	76%	-0.0112	43%
Δ Human capital	0.0868	21%	0.0337	62%
Inflation (-1)	-0.0001	0%	-0.0001	0%
Δ Inflation	-0.0001	0%	-0.0001	0%
Log Population (-1)	0.0436	26%	0.1283	0%
Δ Log Population	-0.1248	71%	-0.7405	3%
Share of GCF (-1)	0.1149	0%	0.1474	0%
Δ Share of GCF	0.5607	0%	0.4838	0%
Share of government consumption (-1)	-0.0822	20%	-0.0256	71%
Δ Share of government consumption	-0.0241	9%	-0.0347	2%
Unemployment (-1)	0.0001	84%	-0.0007	10%
Δ Unemployment	-0.0045	0%	-0.0058	0%
EU membership	0.0069	5%	0.0028	41%
Trade openness (-1)			0.0004	0%
Δ Trade openness			0.0007	0%
Share of FDI net inflows (-1)			-0.0001	2%
Δ Share of FDI net inflows			-0.0001	8%
Share of personal remittances (-1)			0.0012	31%
Δ Share of personal remittances			0.0053	1%
R-squared	82%		86%	
Adjusted R-squared	79%		83%	
F-statistic	32.9271		35.3165	
Prob. (F-statistic)	0%		0%	
Durbin-Watson stat	2.0244		2.0066	
Number of observations	498		451	

Since, I did not include real interest rate and share of government debt in my estimations, because there are many missing observations for these variables, as already mentioned in section 3, now I test what the results are, if also these variables are included. First, I add central government debt as a share of GDP (WDI, 2015) as a variable not influenced directly by EU membership and estimate Equation (1). The number of observations drops to 331, the period is reduced to 1995-2011 and Romania is excluded from the cross-section sample, because there are no values for it. This time, however, the EU dummy variable turns out to be insignificant, even if it keeps its positive coefficient, as before (in line with Brodzicki (2003)). This can be interpreted also as a confirmation that the EU effect can be observed only in the long run, but we have to be cautious with that result, because the quality of the regression now is much lower. Central government debt as a share of GDP and its increase have a negative and significant influence on real GDP growth, a result partly in line Checherita-Westphal and Rother (2012), Checherita-Westphal and Rother (2013) and Dreger and Reimers (2013). The rest of the explanatory variables keep their previous signs and significance, except for the lagged real GDP growth variable, which loses its significance. The residuals remain uncorrelated (Graph 5 and Table 11) and the R^2 becomes higher than the previous specifications - 89%. Even if in this specification, the EU dummy loses its significance, I include the rest of the explanatory variables as before, in Equation (2), adding to them also the real interest rate, which is a variable influenced by EU and Eurozone membership. The sample period remains 1995-2011, but the number of observations drops further to only 224 and the cross-sections become 25: this time also Luxembourg is excluded from the model. The effect of real interest rate turns out to be negative and significant, because of its negative effect on aggregate demand (Dreger and Reimers, 2013). Surprisingly and against the empirical findings in this sphere, trade as a share of GDP, loses its significance, but its increase remains positive and significant at the 5% level as before. Net FDI inflows also lose their significance, which is line with Tashevska and Trpkova (2011), but their coefficient remains negative. The lagged level of gross capital formation also loses its significance. The R^2 becomes higher – 92% and the Durbin-Watson statistic – 2.1433. The residuals (Graph 6) and the correlogram (Table 12) can be seen in the Appendix. Here I present the aforementioned estimation results:

Table 2. Estimation results, Equations (1) and (2) plus additional variables

Dependent variable: Real GDP growth				
	Equation (1)		Equation (2)	
Explanatory variables	Coefficient	P-value	Coefficient	P-value
Constant	1.2691	0%	0.9898	3%
Log Real GDP (-2)	-0.1150	0%	-0.0896	0%
Real GDP growth (-1)	-0.0149	77%	0.0768	29%
Human capital (-1)	0.0177	31%	0.0141	67%
Δ Human capital	-0.0238	73%	0.0023	98%
Inflation (-1)	-0.0023	0%	-0.0027	0%
Δ Inflation	-0.0013	4%	-0.0026	0%
Log Population (-1)	0.0344	45%	0.0348	73%
Δ Log Population	-0.2149	57%	-0.1528	79%
Share of GCF (-1)	0.1410	0%	0.0508	49%
Δ Share of GCF	0.4308	0%	0.4455	0%
Share of government consumption (-1)	0.0834	33%	0.0363	76%
Δ Share of government consumption	-0.0290	21%	-0.0067	81%
Unemployment (-1)	-0.0004	52%	-0.0007	40%
Δ Unemployment	-0.0071	0%	-0.0065	0%
Share of government debt (-1)	-0.0001	3%	-0.0001	13%
Δ Share of government debt	-0.0002	1%	-0.0003	0%
EU membership	0.0073	14%	0.0057	41%
Real interest rate (-1)			-0.0013	2%
Δ Real interest rate			-0.0014	0%
Trade openness (-1)			0.0001	60%
Δ Trade openness			0.0005	2%
Share of FDI net inflows (-1)			-0.0001	48%
Δ Share of FDI net inflows			-0.0001	62%
Share of personal remittances (-1)			0.0017	74%
Δ Share of personal remittances			-0.0007	91%
R-squared	89%		92%	
Adjusted R-squared	86%		89%	
F-statistic	37.0729		27.9739	
Prob. (F-statistic)	0%		0%	
Durbin-Watson stat	2.0340		2.1433	
Number of observations	331		224	

5. Conclusion

Based on the obtained results, described in the previous section, I can conclude that the main channels through which EU membership affects the economic growth of a country are the increased amount of trade and the increased amount of received remittances, because of the respectively free flow of goods and free migration within the integrated European market. The findings support the idea that European membership brings additional gains from trade, therefore, it is an important growth-enhancing factor and can also be considered as the final stage of the ex-socialist European economies' transition to free market. That is why, future enlargements of the EU can bring additional opportunities for growth of the current and future country members. Even if the current study focuses on the integration effect within the EU borders, the positive effect of trade integration is not limited only to the EU: the reduction of tariffs and non-tariff barriers can enhance the economic performance of the countries worldwide and that is why the trends in the world economy should be towards further liberalization and free market on a supranational level.

The analysis performed and obtained results leave room for further improvements and refinements. Following are suggestions regarding how the analysis can be additionally strengthened. A longer time period can improve the accuracy of the results and as Brodzicki (2003), whose study is taken as a basis, suggests, the findings can be further verified by using standard cross-section and time series analysis. Additional measures for EU membership can be considered, as in Brodzicki (2003), such as length of EU membership and a proxy for a scale of the integrated free market which can be measured not only by the ratio of the population of the EU to the population of each country, but through alternative measures such as the ratio of trade volume for the whole EU to the foreign trade volume of each country. Except the channels through which EU membership affects growth positively, trade and personal remittances, I obtain in my results a negative effect of net FDI inflows, therefore an alternative measurement has to be considered in eventual development of the model. Also, in order to check for the presence of symmetry of the EU membership gains, as Cuaresma et al. (2008) do for a different period and country sample, the EU countries can be divided in different sub-groups, according to their overall wealth and living standards. In this way can be verified whether the overall

beneficial effect of the union membership is similar for all of the countries or some of them gain more than others.

Regarding the channels through which EU membership affects the countries' economies, additional two can be also considered in further extension and refinement of the model. Whether a country is a net recipient or a net contributor to the European budget can also be a potential growth affecting channel, as suggested by Kutan and Yigit (2007), but there is not enough data available in order to apply it to the EU-27 countries sample for the chosen period. A further distinction can be made between member and non-member countries of the Eurozone and the effect of the Eurozone membership can also be evaluated. In this way, membership of the Eurozone can be accounted as an additional channel through which the effects of EU membership and EU monetary policies translate into the real economy. The economic impact of the common EU legislation and regulations, which bring changes in some of the member countries' laws, especially the newer members, can also be accounted as a growth-affecting channel. However, there is much freedom in establishing the way of measurement of these effects.

References:

Badinger, H. (2005), "Growth effects of economic integration: Evidence from the EU member states", *Review of World Economics*, 141: 50-78.

Barro, R. and Lee, J. (2012), "A New Data Set of Educational Attainment in the World, 1950-2010", *Journal of Development Economics*, 104: 184-198.

Baum, A., Checherita-Westphal, C. and Rother, P. (2013), "Debt and growth: New evidence for the euro area", *Journal of International Money and Finance*, 32: 809-821.

Brodzicki, T. (2003), "In search for accumulative effects of European economic integration", *Presented at the Second Annual Conference of the European Economic and Finance Society "European Integration: Real and Financial Aspects", Bologna, 14-16 May 2003.*

Checherita-Westphal, C. and Rother, P. (2012), "The impact of high government debt on economic growth and its channels: An empirical investigation for the Euro area", *European Economic Review*, 56: 1392–1405.

Cuaresma, J. C., Doppelhofer, G. and Feldkircher M. (2014), "The determinants of economic growth in European regions", *Regional Studies*, 48, 44-67.

Cuaresma, J. C., Ritzberger-Grünwald, D. and Silgoner, M. A. (2008), "Growth, convergence and EU membership", *Applied Economics*, 40: 643-656.

Doyle, O. and Fidrmuc, J. (2006), "Who favors enlargement? Determinants of support for EU membership in the candidate countries' referenda", *European Journal of Political Economy*, 22: 520-543.

Dreger, C. and Reimers, H. (2013), "Does euro area membership affect the relation between GDP growth and public debt?", *Journal of Macroeconomics*, 38: 481–486.

Edison, H. J., Levine, R., Ricci, L. and Slok, T. (2002), "International financial integration and economic growth", *Journal of International Money and Finance*, 21: 749-776.

Feenstra, R. C., Inklaar, R. and Timmer M. P. (2015), "The next generation of the Penn World Table", *American Economic Review*, 105: 3150-3182.

Feeny, S., Mitchell, H. and Tran, C. (2012), "The Determinants of Economic Growth Versus Genuine Progress in South Korea", *Social indicators research*, 113:1055–1074.

Festa, A. (2015), "Intra-EU direct investment and enlargement", *Review of economic perspectives*, 15: 15-34.

Huang, L. and Chang, S. (2014), "Revisit the nexus of trade openness and GDP growth: Does the financial system matter?", *The Journal of International Trade & Economic Development*, 23: 1038-1058.

Jawaid, S. T. and Raza S. A. (2012), "Workers' remittances and economic growth in China and Korea: an empirical analysis", *Journal of Chinese Economic and Foreign Trade Studies*, 5: 185-193.

Kumar, R. R. and Stauvermann, P. J. (2014), "Exploring the nexus between remittances and economic growth: a study of Bangladesh", *International Review of Economics,* 61: 399–415.

Kutan, A. M. and Yigit, T. M. (2007), "European integration, productivity growth and real convergence", *European Economic Review* 51: 1370–1395.

Li, Y., Chen, Z. and San, C. (2010), "Research on the relationship between foreign trade and the GDP growth of East China — Empirical analysis based on causality", *Modern Economy*, 1: 118-124.

Mansoor, A. and Quillin, B. (2006), *Migration and remittances: Eastern Europe and the former Soviet Union*, The World Bank, Washington DC

Maudos, J., Pastor, J. M., and Seranno, L. (1999), "Economic integration, efficiency and economic growth: the European Union experience", *Applied Economics Letters*, 6: 389-392.

Nsiah, C. and Fayissa, B. (2013), "Remittances and economic growth in Africa, Asia, and Latin American-Caribbean countries: a panel unit root and panel cointegration analysis", *Journal of Economics and Finance*, 37: 424–441.

Popescu, G. H. (2014), "FDI and economic growth in Central and Eastern Europe", *Sustainability*, 6: 8149-8163.

Pradhan, G., Upadhyay, M. and Upadhyaya, K. (2008), „Remittances and economic growth in developing countries“, *The European Journal of Development Research*, 20: 497–506.

Psacharopoulos, G. (1994), “Returns to investment in education: A global update”, *World Development*, 22: 1325-1343.

Romer, P. M. (1990), “Endogenous technological change”, *Journal of Political Economy*, 98: 71-102.

Romer, P. M. (1994), “The origins of endogenous growth”, *The Journal of Economic Perspectives*, 8: 3-22.

Silaghi, M.P. and Medesfalean M. (2014), “Some insights about determinants of economic growth in Romania. An empirical exercise”, *Theoretical and Applied Economics,* 21: 23-36.

Solow, R. M. (1956), “A contribution to the theory of economic growth”, *The Quarterly Journal of Economics*, 70: 65-94.

Swan, T. W. (1956), "Economic growth and capital accumulation", *Economic record*, 32: 334-361.

Tashevska, B. and Trpkova, M. (2011), “Determinants of economic growth in South East Europe: A panel data approach”, *Perspectives of Innovations, Economics & Business*, 7: 12-15.

Verbeek, M. (2004), *A guide to modern econometrics*, John Wiley & Sons Ltd, Chichester, West Sussex

World Development Indicators (2015), *The World Bank*

Yucel, G. E. (2014), “FDI and economic Growth: The case of Baltic Countries”, *Research in World Economy*, 5: 115-134.

Zuniga, M. C. (2011), ”On the path to economic growth, do remittances help? Evidence from panel VARs”, *The Developing Economies*, 49: 171–202.

Appendix:

Table 3. Hausman test, Period random effects

Correlated random effects – Hausman test			
Test period random effects			
Test summary	Chi-Sq. Statistic	Chi-Sq. d.f.	P-value
Period random	74.1811	15	0%

Table 4. Hausman test, Cross-section random effects

Correlated random effects – Hausman test			
Test cross-section random effects			
Test summary	Chi-Sq. Statistic	Chi-Sq. d.f.	P-value
Cross-section random	71.3994	15	0%

Table 5. Estimation results, Unit root test with Log Real GDP (-1)

Dependent variable: Real GDP growth			
Explanatory variables	Coefficient	Std. Error	P-value
Constant	1.8376	0.1979	0%
Log Real GDP (-1)	-0.1523	0.0166	0%
R-squared	49%		
Adjusted R-squared	44%		
F-statistic	10.5845		
Prob. (F-statistic)	0%		
Durbin-Watson stat	0.8880		
Number of observations	567		
Periods included	21		
Cross-sections included	27		

Table 6. Estimation results, Unit root test with Log Real GDP (-2) and Real GDP growth (-1)

Dependent variable: Real GDP growth			
Explanatory variables	Coefficient	Std. Error	P-value
Constant	1.7372	0.1719	0%
Real GDP growth (-1)	0.3547	0.0350	0%
Log Real GDP (-2)	-0.1444	0.0144	0%
R-squared	65%		
Adjusted R-squared	62%		
F-statistic	19.6701		
Prob. (F-statistic)	0%		
Durbin-Watson stat	1.6389		
Number of observations	540		
Periods included	20		
Cross-sections included	27		

Table 7. Correlogram, Included observations: 567, Sample: 1990 - 2011

	AC	PAC	Q-stat	P-value
1	0.486	0.486	134.43	0%
2	0.183	-0.069	153.64	0%
3	0.123	0.080	162.28	0%
4	0.033	-0.066	162.91	0%
5	0.009	0.022	162.96	0%
6	0.018	0.009	163.15	0%
7	0.007	-0.005	163.18	0%
8	-0.060	-0.082	165.22	0%
9	-0.097	0.046	170.67	0%
10	-0.116	-0.057	178.43	0%
11	-0.187	-0.125	198.63	0%
12	-0.206	-0.072	223.24	0%

Table 8. Correlogram, Included observations: 540, Sample: 1990 - 2011

	AC	PAC	Q-stat	P-value
1	0.013	0.013	0.0869	77%
2	-0.028	-0.029	0.5276	77%
3	0.103	0.104	6.2764	10%
4	0.010	0.006	6.3306	18%
5	0.019	0.025	6.5299	26%
6	0.016	0.005	6.6675	35%
7	0.040	0.040	7.5437	38%
8	-0.072	-0.078	10.370	24%
9	-0.062	-0.060	12.461	19%
10	0.008	-0.004	12.494	25%
11	-0.116	-0.108	19.983	5%
12	-0.107	-0.096	26.348	1%

Table 9. Correlogram, Included observations: 498, Sample: 1990 - 2011

	AC	PAC	Q-stat	P-value
1	-0.011	-0.011	0.0624	80%
2	-0.056	-0.056	1.6256	44%
3	0.021	0.020	1.8438	60%
4	-0.092	-0.095	6.1040	19%
5	-0.042	-0.043	7.0159	22%
6	-0.068	-0.082	9.3764	15%
7	-0.060	-0.065	11.176	13%
8	-0.074	-0.096	13.974	8%
9	-0.093	-0.115	18.358	3%
10	0.081	0.049	21.680	2%

11	-0.050	-0.083	22.935	2%
12	-0.046	-0.072	24.063	2%

Table 10. Correlogram, Included observations: 451, Sample: 1990 - 2011

	AC	PAC	Q-stat	P-value
1	0.021	0.021	0.2026	65%
2	-0.099	-0.099	4.6502	10%
3	0.048	0.053	5.6828	13%
4	-0.065	-0.078	7.6054	11%
5	-0.081	-0.068	10.603	6%
6	0.006	-0.008	10.618	10%
7	-0.066	-0.076	12.619	8%
8	-0.102	-0.100	17.452	3%
9	-0.100	-0.126	22.058	1%
10	0.048	0.030	23.121	1%
11	-0.059	-0.093	24.739	1%
12	-0.031	-0.042	25.193	1%

Table 11. Correlogram, Included observations: 331, Sample: 1990 - 2011

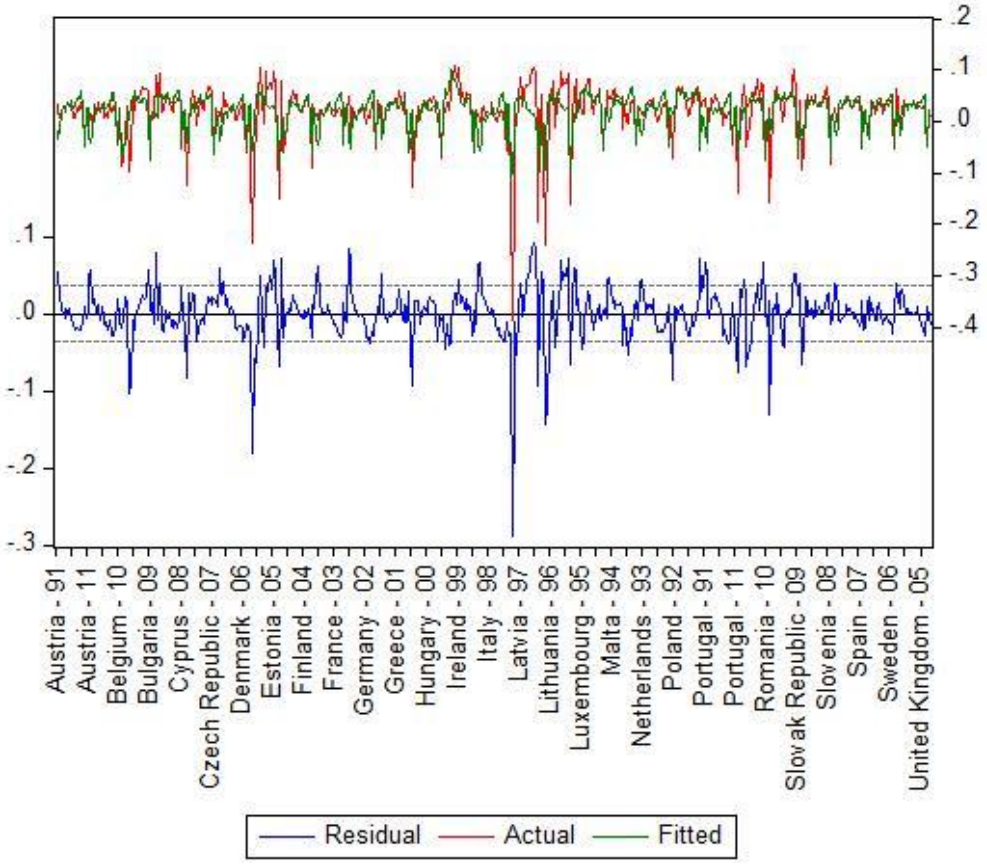
	AC	PAC	Q-stat	P-value
1	-0.011	-0.011	0.0433	84%
2	-0.102	-0.102	3.5205	17%
3	0.015	0.013	3.5971	31%
4	-0.014	-0.024	3.6632	45%
5	-0.014	-0.012	3.7291	59%
6	0.010	0.006	3.7652	71%

7	-0.047	-0.050	4.5266	72%
8	-0.094	-0.095	7.5633	48%
9	-0.085	-0.100	10.023	35%
10	0.018	-0.004	10.133	43%
11	-0.051	-0.072	11.031	44%
12	-0.096	-0.105	14.218	29%

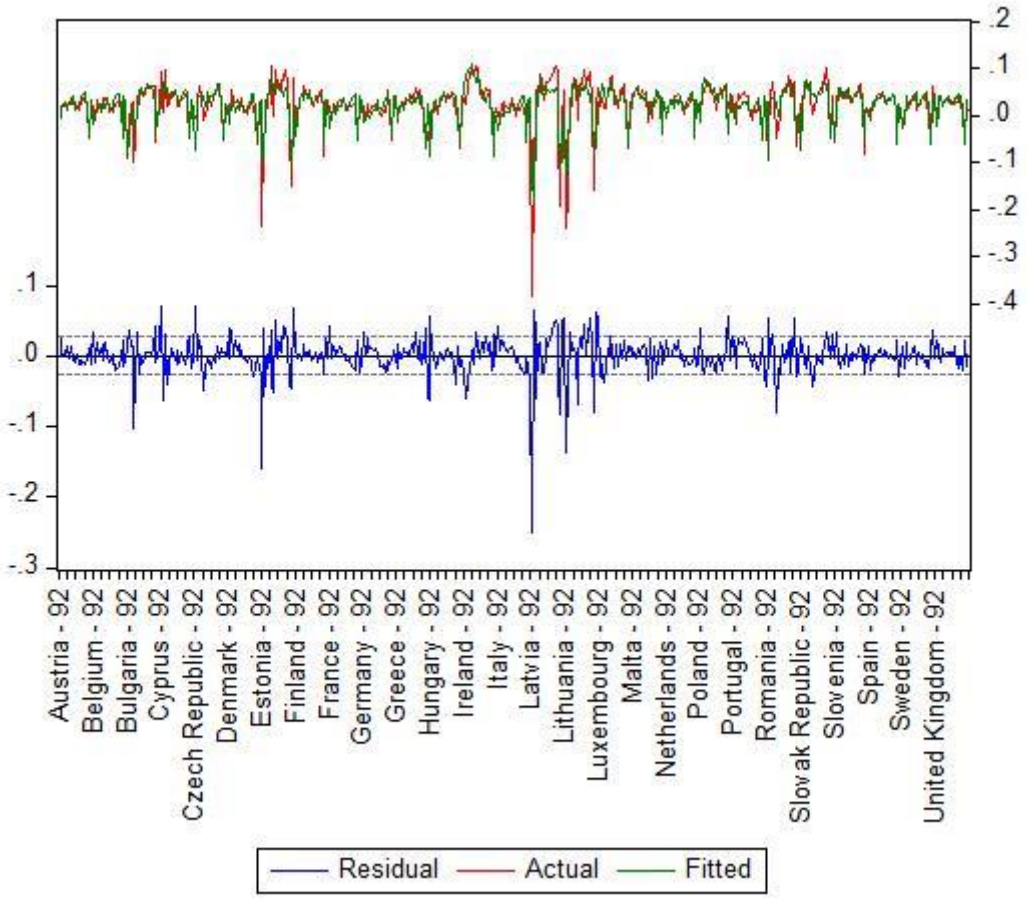
Table 12. Correlogram, included observations: 224, Sample: 1990 – 2011

	AC	PAC	Q-stat	P-value
1	-0.063	-0.063	0.8947	34%
2	-0.097	-0.101	3.0264	22%
3	0.047	0.034	3.5272	32%
4	-0.063	-0.068	4.4402	35%
5	0.000	-0.000	4.4402	49%
6	-0.037	-0.052	4.7539	58%
7	-0.034	-0.035	5.0157	66%
8	-0.121	-0.143	8.4655	39%
9	-0.044	-0.068	8.9138	45%
10	0.046	0.005	9.4085	49%
11	-0.093	-0.102	11.453	41%
12	-0.063	-0.095	12.387	42%

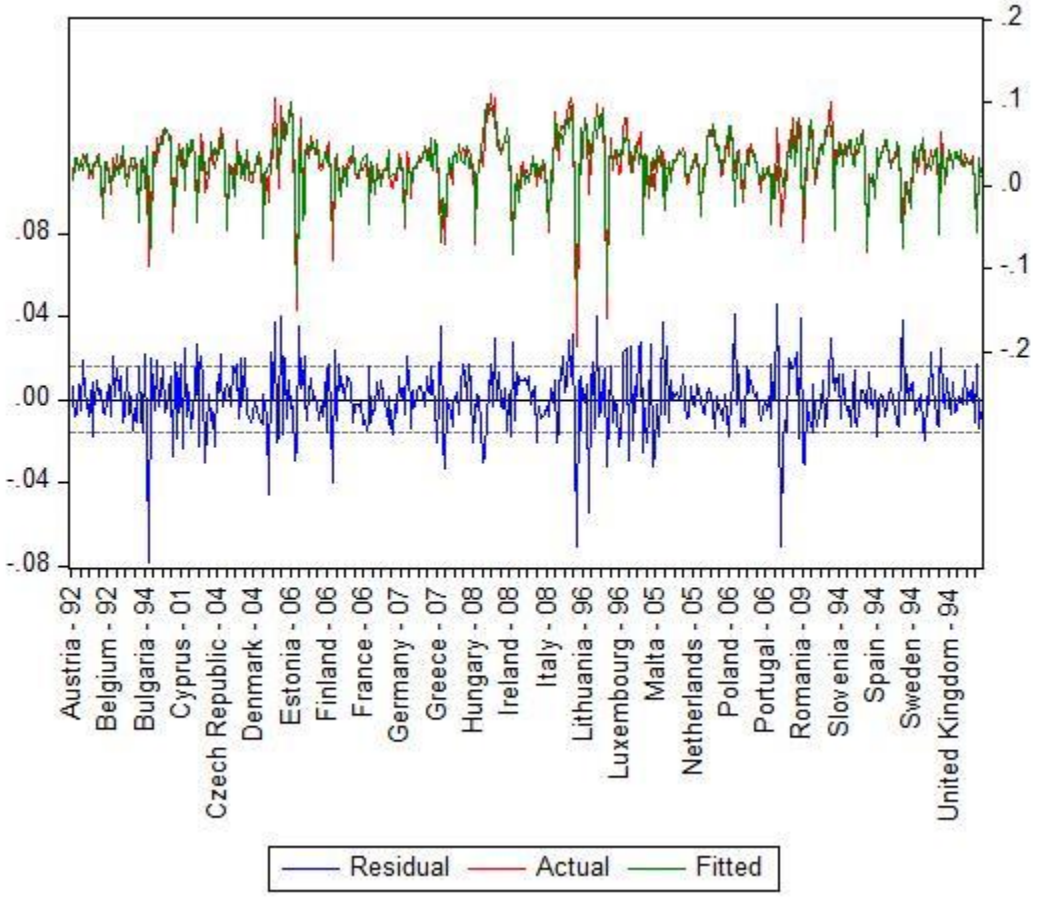
Graph 1. Actual, Fitted, Residual



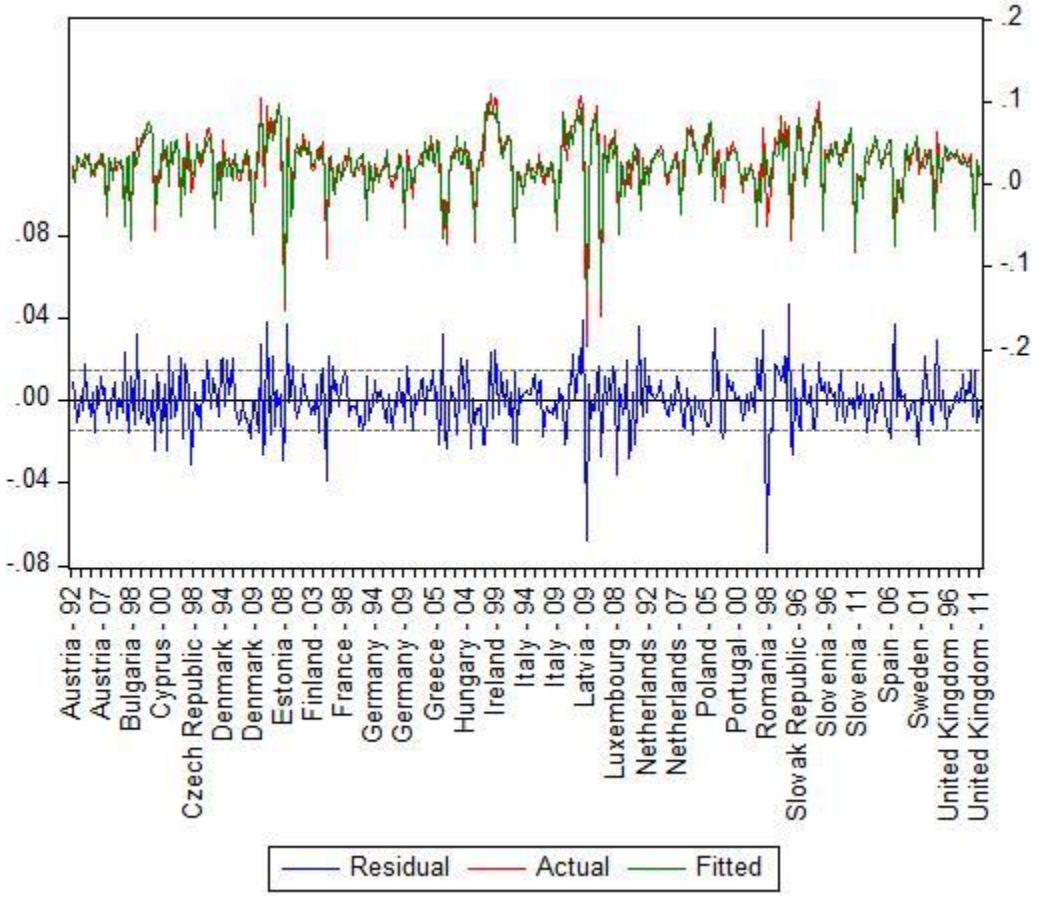
Graph 2. Actual, Fitted, Residual



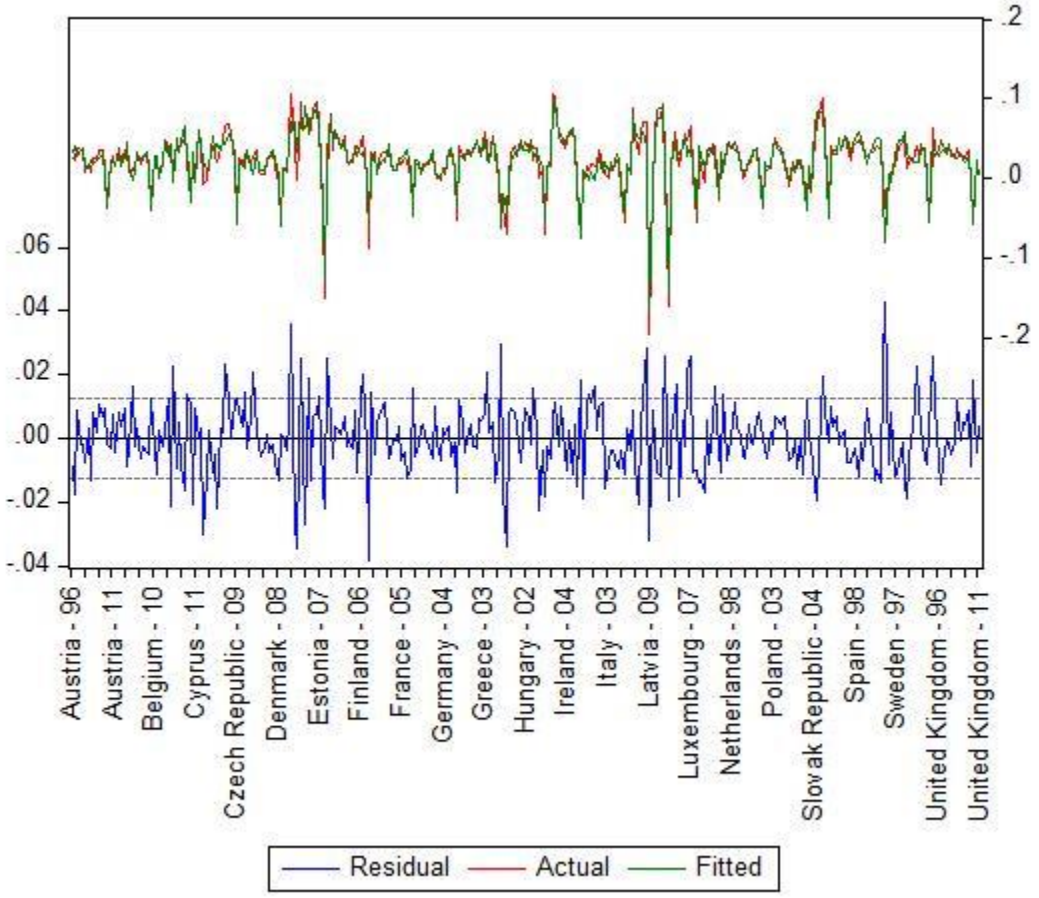
Graph 3. Actual, Fitted, Residual – Regression 1



Graph 4. Actual, Fitted, Residual – Regression 2



Graph 5. Actual, Fitted, Residual – Regression 1 (Central government debt included)



Graph 6. Actual, Fitted, Residual – Regression 2 (Central government debt and real interest rate included)