Cuadernos de economía

ARTICLE

Economic growth and capital flow in European countries in pre and post-crisis periods

Natalya Ketenci

Department of Economics, Yeditepe University, Kayisdagi, 34755 Istanbul, Turkey

Abstract   A lot of attention in the literature has been given to an important issue of the effect of capital mobility on economic growth of developing countries and little attention has been devoted to developed countries. Developed countries are main players in the global financial market. Lately, increasing number of financial crises had negative effect not only on developing countries but on developed countries as well. Particularly the global financial crisis of 2008 had a negative impact on advanced economies. This paper investigates the relationship between economic growth and international capital flows in the EU members before and after the global financial crisis. The study examines how these relationships change when countries in the considered panel vary. Panel estimations using annual data for the period 1995–2013 are made for different groups of European countries, such as EU27, EU15, Eurozone and CEE members of EU. A dynamic panel data applies the Generalized Method of Moments estimation technique, developed by Hansen (1982). Empirical results reveal that relationships between economic growth and capital flows significantly vary between considered groups. This study finds evidence that after the global financial crisis, economic growth in EU15 and Eurozone groups became more sensitive to capital flows compared to the pre-crisis period.
© 2015 Asociación Cuadernos de Economía. Published by Elsevier España, S.L.U. All rights reserved.

Crecimiento económico y flujo de capital en los países europeos, en los periodos previos y posteriores a la crisis

Resumen   En la literatura se ha prestado mucha atención a la importante cuestión del efecto de la movilidad del capital sobre el crecimiento económico en países en desarrollo, y muy poca atención a los países desarrollados. Estos últimos son los principales actores del mercado financiero global. Últimamente el creciente número de crisis económicas ha tenido un efecto

E-mail address: nketenci@yeditepe.edu.tr

Flujos de capital;
Método generalizado
de momentos (MGM);
UE;
Datos de panel
dinámicos

negativo, no sólo en los países en desarrollo, sino también en los países desarrollados. En particular, la crisis financiera global de 2008 tuvo un efecto negativo en los países avanzados. Este documento analiza la relación entre el crecimiento económico y los flujos internacionales de capital en los países miembros de la UE, con anterioridad y posterioridad a la crisis financiera global. El estudio examina el modo en que cambian estas relaciones al variar los países en el panel considerado. Las estimaciones del panel, utilizando los datos anuales para el periodo 1995-2013, se realizan para diferentes grupos de países europeos, tales como UE27, UE15, la Eurozona y los miembros de la CEE de la UE. Los datos de panel dinámicos aplican la técnica de estimación del Método Generalizado de Momentos desarrollado por Hansen (1982). Los resultados empíricos revelan que la relación entre el crecimiento económico y los flujos de capital varía considerablemente entre los grupos considerados. Este estudio evidencia que, tras la crisis financiera global, el crecimiento económico de los grupos UE15 y la Eurozona se ha vuelto más sensible a los flujos de capital, en comparación al periodo previo a la crisis.

1. Introduction

Membership in the EU requires the full liberalization of capital flows. The new members of the EU are eventually required to abolish all barriers to the free flow of capital. On the current day the EU has 28 member countries that have different levels of development and performance of domestic financial markets and market structures. Free capital mobility is one of the essential conditions for the Single European Market, however it can have different impacts on economies in response to their development level. This study gives answer to the question if the capital mobility will have a similar effect on all members of the EU and how this effect changes after the global financial crisis.

A significant number of studies on the effect of capital mobility on economic growth are devoted to developing countries, for example, Kyaw and Macdonald (2009), Varma (2009), Gourinchas and Jeanne (2013) and Levy-Orlik (2013). In recent years, a group of economists have been increasingly interested in comparative analysis of impacts of capital mobility on economic growth on developing and on developed countries, for example Edwards (2001), Gheeraert and Mansour (2005), Choong et al. (2010) and Fan (2013). To my knowledge, there have been no studies done purely on the effects of capital mobility on economic growth of developed economies.

In order to measure the effect of capital mobility on economic growth most of the studies employ the production function, where output is the function of physical capital, human capital and labor inputs, for example Gheeraert and Mansour (2005), Gourinchas and Jeanne (2013) and Choong et al. (2010). In terms of econometric methodology, different techniques are employed. For example Edwards (2001), in order to measure the effect of capital liberalization on economic growth, employed Weighted Least Squares and Instrumental Variables technique. Gheeraert and Mansour (2005) used the fixed effect LSDV technique. In recent years considerable interest was devoted to the dynamic panel generalized method of moments (GMM) technique (Choong et al., 2010; Azman-Saini et al., 2010; Kyaw and Macdonald, 2009) for its numerous advantages. For example, the GMM deals with the potential simultaneity problem, allows for the inclusion of lagged dependent variables as regressors, and controls for endogeneity of explanatory variables.

Most studies, based on their empirical studies, reach similar conclusion that capital mobility does not have a strong and positive effect on growth of developing countries, as it is expected, but have a stronger effect on growth of developed countries. For example Edwards (2001) compares a group of industrial countries with several groups of emerging countries. The author found that greater capital mobility has positive impact on economic growth only in case when these countries reached the advanced level of the domestic financial market. A low level of financial development may become an impediment for a positive effect of open capital mobility on economic growth of the country. Choong et al. (2010) similar to Edwards (2001) found that negative impact of private capital flows can be transformed into a positive one if the stock market reached a certain level of development, regardless of the level of development of a country. Varma (2009) found that the link between capital account openness and economic growth of developing countries is weak or is not significant. Kyaw and Macdonald (2009) found a positive effect of capital flows on growth of developing countries, however the level of the impact is stronger in upper middle-income countries compared to low-income countries. Gheeraert and Mansour (2005) illustrated uneven distribution of capital flows across countries, where developed countries have a higher level of inward private capital flow compared to developing and transition countries. The authors provided empirical evidence in favor of strong positive relationship between capital flows and growth, however in contrast to previous authors, they did not provide evidence for difference of these relationships between developed and developing countries.

This study investigates the relationship between economic growth and international capital flows in the EU member countries and how these relationships vary after

the global financial crisis. Estimations are made for four different groups EU27, EU15, Eurozone and CEE members of the EU for the period 1995–2013 on the annual basis.

The novelty of this study is the analysis of the effect of capital mobility on economic growth in developed countries such as the EU members, and how this effects changes after the global financial crisis. To my knowledge there are no similar studies in the literature. The rest of the paper is organized as follows. In the next section, the applied methodological approach is presented. In Section 3, the obtained empirical results are reported, and the final section consists of the conclusion.

2. Theoretical foundations

To analyze the effect of capital flows on economic growth, the simple endogenous growth model – the AK model is employed. The endogenous-growth AK model is developed by Pagano (1993) to capture the potential effect of financial development on growth in a closed economy. The production function of a closed economy is given by the following equation:

$$Y_t = AK_t \tag{1}$$

where the aggregate output Y_t is a linear function of the aggregate capital stock, K_t, and A is the productivity of capital. The AK model can be observed as a reduced form of one of two following frameworks. One of the frameworks considers an economy that is competitive with external economies, where each firm has a technology that exhibits constant returns to scale and productivity is a function of the aggregate capital stock K_t that exhibits increasing returns to scale as in Romer (1989). Another framework derives the AK model assuming that K_t is reproducible with identical technologies and is a composite of physical and human capital, as in Lucas (1988). Assuming that there is no population growth and only a single good is produced that can be consumed or if invested it depreciates at a rate δ per period, then gross investment equals

$$I_t = K_{t+1} - (1 - \delta)K_t \tag{2}$$

In a closed economy at equilibrium, GDP gross savings have to be equal to gross investments, however $1 - \phi$ proportion of savings is transferred to financial intermediaries as a payment for services provided, therefore the condition for the capital market equilibrium is

$$\phi S_t = I_t \tag{3}$$

Using Eqs. (1)–(3) and dropping the time indices, the steady-state growth rate is derived as follows

$$g = A\left(\frac{I}{Y}\right) - \delta = A\phi s - \delta \tag{4}$$

where s denotes the gross saving rate S/Y. This equation demonstrates how economic growth can be affected by financial development through three main channels. The first channel involves raise in ϕ, the proportion of savings that is transferred to investments, the second channel involves an increase in the productivity of capital, A, and last channel includes an increase in the private saving rate, s.

The AK model for closed economies was extended by Bailliu (2000) by introducing international capital flows into the model. Following Bailliu (2000) the capital market equilibrium in the presence of international capital flows can be written as:

$$\phi^*(S_t + NCF_t) = I_t^* \tag{5}$$

where NCF_t denotes net international capital flow. If the capital inflow exceeds capital outflow, then more capital will be available for domestic investments compared to the case of a closed economy and controversially net international capital outflow will decrease the potential capital source for domestic investments. Using Eqs. (1), (2) and (5) and dropping time indices, the steady-state growth rate in the presence of international capital flows becomes

$$g^* = A^*\frac{I^*}{Y} - \delta = A^*\phi^*\frac{(S + NCF)}{Y} - \delta = A^*\phi^*s^* - \delta \tag{6}$$

This equation reveals channels through which international capital flows can affect the economic growth. The first channel involves increase in an investment rate. The economic growth will take a place if net international flows are positive, i.e. capital inflows exceeds capital outflows, and are used to finance investments and not consumption and if investments made by domestic savings are not crowed by investments made by foreign capital. Second, international capital flows will lead to economic growth if the investments they finance increase capital productivity, A. In addition, a third channel is an increase in financial intermediation raising efficiency of financial intermediates that consequently decrease their charges and increases ϕ, the rate of savings that is transformed to investments. Additionally, the better efficiency of financial intermediates allows them to select more productive projects for investments, increasing capital productivity, A, Bailliu (2000).

3. Empirical methodology

3.1. Unit root tests

This study employs the GMM (Generalized Method of Moments) estimation framework which was developed for strictly stationary data. In order to test the stationarity of panel data and to check the robustness of the results, four panel unit root tests were employed. These are the Im, Pesaran, and Shin (IPS) test (Im et al., 2003), Fisher-type tests that employ ADF and PP tests (Maddala and Wu, 1999; Choi, 2001), and Hadri tests (Hadri, 2000). The IPS test is a heterogeneous panel unit root test based on individual ADF tests and proposed by Im et al. (2003) as a solution to the homogeneity issue. It allows for heterogeneity in both the constant and slope terms of the ADF regression. Maddala and Wu (1999) and Choi (2001) proposed an alternative approach employing the Fisher test, which is based on combining the p-values from individual unit root test statistics such as ADF and PP. One of the advantages of the Fisher test is that it does not require a balanced panel. Finally, the Hadri test is a heterogeneous panel unit root test that extends the KPSS (Kwiatkowski–Phillips–Schmidt–Shin) test, outlined in Kwiatkowski et al. (1992), to a panel with individual and

time effects, as well as deterministic trends, which has as its null hypothesis the stationarity of the series.

3.2. GMM

This study employs the GMM for a dynamic analysis of the impact of capital flows on economic growth of the EU member countries before and after the global financial crisis. The GMM estimation technique is often used in the literature to study effects of capital flows on economic growth of countries (see for example Bailliu, 2000; Choong et al., 2010; Vo, 2010; Anwar and Sun, 2011; Zhang et al., 2012; Omri and Kahouli, 2014). The GMM first was introduced by Hansen (1982) and can be recast as an instrumental variables estimation. The GMM is a flexible estimation principle where many estimators, including ordinary least squares and instrumental variables, can be seen as special cases and different econometric models can be cast. The GMM uses the orthogonality conditions to allow a weighting matrix to account for serial correlation and heteroskedasticity of unknown form. One of the important advantages of the GMM method is that the problems of heteroskedasticity and autocorrelation are avoided. Employing the GMM estimation approach, the theoretical model specification is translated into empirical one where lagged growth rate is included as an explanatory variable. Thus the general formulation of the Eq. (6) becomes

$$Y_{it} = a_1 + a_2 Y_{it-1} + \beta X_{it} + \gamma Z_{it} + \varepsilon_{it} \tag{7}$$

where Y_{it} is the real output growth rate per capita, Y_{it-1} is the lagged real output growth rate per capita, X_{it} is a row vector of possible macroeconomic growth determinants and Z_{it} is a row vector of international capital flow variables. For macroeconomic growth determinants, variables that are mostly used in the literature and are generally accepted to be important to explain economic growth (see for example Bailliu, 2000; Prasad et al., 2006; Choong et al., 2010; Shen et al., 2010; Mody and Murshid, 2011; Rousseau and Wachtel, 2011; Aizenman et al., 2013) are employed in this study and they are: Initial income, Education, Private credits, Government expenditures, Openness and Investment ratio. For international capital flows the following variables are employed: FDI (foreign direct investments), FDI outflows, FDI inflows, Portfolio investments, other investments and reserve assets.[1]

The first channel of the effect of an increase in an investment rate on the economic growth is captured by one of the macroeconomic determinants of the row vector, X_{it}, Investment ratio, and by all international capital flow variables, Z_{it}, FDI, FDI outflows, FDI inflows, Portfolio investments, Other Investments and Reserve assets. Investment variables have direct effect on economic growth and their coefficients are expected to have positive sign. The second channel represents investments that increase capital productivity and is captured by Education, Government expenditures and Openness variables. Education has positive substantial effect on economic growth of developing countries as well as developed countries (see for example Barro, 1991;

Mankiw et al., 1992; Gemmell, 1996, specifically in longer term Holland et al., 2013). Countries with higher level of openness become more efficient and productive by having access to larger markets, Edwards (1993). Therefore Openness is expected to have positive effect on the economic growth, as well. However Government expenditures variable is expected to have negative effect on the economic growth, Barro and Sala-i-Martin (1995). Government expenditures do not directly affect productivity but can cause distortion of private decisions. Finally the third channel of raising efficiency financial intermediates is captured in this model by the Private credits variable. Growth in private credits indicates on increase in bank transactions leading to raising efficiency of financial intermediates. Improved efficiency of financial intermediates positively affects the economic growth.

In order to remove the country specific effects, the Eq. (7) is first differenced and becomes

$$\Delta Y_{it} = a_1 + a_2 \Delta Y_{it-1} + \beta \Delta X_{it} + \gamma \Delta Z_{it} + \varepsilon_{it} \tag{8}$$

Estimations of the Eq. (8) are made for 6 different models. The first model does not include capital flows and represents a pure growth model. The second model represents base growth model with addition of FDI variable as representative of international capital flow. The third model includes FDI inflows and outflows as representative of international capital flow. The fourth, fifth and sixth models include Portfolio, Other Investments and Reserves variables, respectively, as representatives of international capital flows. The panel data set of estimated series is unbalanced as not all data are available for the full set. The applied GMM framework is flexible and accommodates unbalanced panels, therefore a larger set of observation can be estimated.

4. Empirical results

4.1. Unit root tests

GMM estimations require stationary data, so it is necessary to investigate the integration order of the panel series. Four alternate unit root tests, consisting of the IPS, ADF, PP, and Hadri tests were employed. The IPS, ADF, and PP tests each test the presence of individual unit root process in the series. The Hadri test's hypothesis has no unit root in the common unit root process. The results of the unit root tests are presented in Table 1. All series, in majority cases, demonstrated the absence of the unit root in levels and in their first differences except the Hadri test in level estimations. The IPS, ADF, and PP tests rejected the hypothesis of the unit root presence in levels and first differences of all series in most cases. The Hadri test accepted the hypothesis of stationarity in nine series out of thirteen in their first differences, but rejected the hypothesis of stationarity on levels in ten series. The results of the Hadri test indicate the non-stationarity of variables; however, this might have been due to the fact that in the presence of high autocorrelation, the size distortion takes place in the Hadri test and the null hypothesis of stationarity may be over-rejected. Therefore, it is important to interpret these results with caution. Based on the results of these alternative unit root tests,

---

[1] Detailed description of variables is in Appendix 2.

it is reasonable to conclude that all series are generated by a stationary process and free from issues of time-series processes; therefore, series may be estimated by the GMM approach.

4.2. GMM estimations

Four different groups of European countries are estimated. They are EU27, EU15, Eurozone and CEE members of EU. In order to catch the impact of the global financial crisis of 2008 on the growth of European economies, three different periods were estimated; full period: 1995–2013, period before the financial crisis: 1995–2007 and the period after the global financial crisis: 2008–2013. Tables 2–5 present the results of the GMM estimation of Eq. (8) for 6 different models. The results of the diagnostic tests suggest that all models are relatively well specified. The Sargan test does not reject the over-identification restrictions.

Table 2 shows results of estimations for the EU27 set. Estimates of all included macroeconomic growth determinants for the 1995–2013 period are statistically significant except the Education variable in the first model. The signs of the coefficients of macroeconomic growth determinants are generally consistent with theory. The lagged dependent variable is statistically significant, indicating the reliability of the results of the specified dynamic model. The sign of the lagged dependent variable is negative. This suggests the existence of the tendency of the growth rate to converge toward an average long-run trend (for examples see Wane, 2004; Ismail, 2008; Barro, 2012).

The coefficient of the Initial GDP variable is statistically significant in all six models with negative sign. The negative effect of initial GDP on the growth indicates a convergence effect where countries initially with lower income tend to grow faster compared to countries with higher income in the considered set. However, if there convergence effect exists, it exists in a very slight form as coefficient is very low. Effect of the human capital measurement on a growth of European economies is positive and significant in most models. Private credit flows have positive effect on growth of considered countries indicating that financial depth leads to growth. Government consumption as a share of GDP is significant and has a negative effect on growth as it is expected.

Literature suggests that economic growth is higher if government spending is lower. Mitchell (2005) in its academic literature survey illustrated several reasons that support this hypothesis. For example, extraction and displacement costs are main reasons of poor government performance that are mostly discussed in the literature. Extraction costs are represented by taxes that are imposed to finance the government budget and displacement costs are spending by government that inefficiently uses resources withdrawing them from productive sectors of the economy. The coefficient of international trade is positive, highly significant and has a high value. This suggests that level of openness to international trade boosts economic growth in European countries. Finally, investments rate as a share of GDP has a significant and positive effect on the growth of the employed set of countries.

Five different models were estimated by adding different types of capital flows to the main model. Only coefficients of

FDI flows are significant with positive sign while other capital flows such as Portfolio, Other investments and Reserve assets are not significant. This suggests that non-FDI flows have no effect on the growth of European countries.

In contrast, coefficients of macroeconomic growth determinants for the pre-financial crisis period 1995–2007 are not significant except the lagged dependent variable, Education and Investment variables in the first model. They appeared with the same sign as in the full estimated period, but not significant when capital flows are added. Coefficients of capital flows for the pre-crisis period are not significant as well. This suggests that capital flows did not have an effect on growth of the estimated set of countries before the crisis. Estimations for the post-crisis period, 2008–2013 present similar results to estimations of the full period except the Education variable that appeared to be significant with positive sign only in the second model, where FDI flows were included.

In post-crisis period similar to the full period estimations, FDI flows affect the growth while non-FDI flows do not have any effect on growth of European countries except Reserves flows. The coefficient of the Reserves variable is very low, 0.0002, which is not enough to make a conclusion that Reserves flows affect the economies' growth. The effect of total FDI flows is slighter lower in the post-crisis effect compared to the full estimated period, where coefficients are estimated at the 0.311 and 0.229 levels, respectively. Thus, results of estimations for the EU27 set suggest that FDI flows have an important effect on growth of the European countries particularly in the post-crisis period. Separation of FDI flows into FDI inflow and outflows did not illustrate different results. This suggests that FDI inflows and outflows at the similar degree stimulate growth of considered countries.

Table 3 illustrates results of estimations for the EU15 countries. The coefficient estimates suggest that signs of macroeconomic growth determinants remain the same as in estimations for the EU27 countries, however less variables are significant. Thus, Education and Investments ratio are not significant in the full period, Initial GDP, Private Credits and Openness are significant only in some estimated models. Initial GDP, Government expenditures, Openness and Investment ratio are significant with expected signs only in a few estimated models of the pre-crisis period. The post-crisis period is characterized by significance of the lagged dependent variable and Government Expenditure variable in all models. In contrast to the EU27 countries, none of capital flows are significant in estimations of the EU15 countries. Results illustrate that international capital flows do not affect the EU15 economies' growth.

Table 4 reports results of estimations for the Eurozone countries. In the full period, all macroeconomic growth determinants appeared significant in most estimated models where the signs remained the same as in estimations for the EU27 countries. In the pre-crisis period, only openness of countries affected their growth. In the post-crisis period Government consumption, Openness and Investment rate have an effect on growth of the Eurozone countries. Estimations present similar results for capital flows as in the EU27 countries estimations. Thus, FDI flows have an effect on the growth of Eurozone in the full and post-crisis periods except FDI inflows that are not significant in the full period. The effect of the FDI flows in the post-crisis period is lower

compared to the full period estimations which is similar to the EU27 estimations. Estimation results provide evidence of substantial effect of FDI flows in the post-crisis period on the growth of the Eurozone countries.

Table 5 presents results of estimations for the CEE countries. Openness appeared to be the main growth determinant of the CEE countries in the full and post-crisis periods. Results indicate that in the full and pre-crisis period there is no capital flows that would affect growth, in contrast to the post-crisis period where FDI flows are positive and highly significant. This suggest that non-FDI flows do not have an effect on the growth of the CEE countries, while FDI flows are significant determinants of growth in the CEE countries. The effect of the FDI flows in the post-crisis period is the highest in the CEE countries compared to other estimated groups of countries.

Table 6 shows growth rates of the EU members for the last decade. Before the global financial crisis best GDP growth rates belong to the CEE members. However during the global financial crisis, all CEE members, except Poland, had the deepest decline in their GDP compared to other members. Table 7 demonstrates GDP per capita for the European Union member states in 2013. It shows that the CEE members of the EU have the lowest GDP per capita compared to other members. Nevertheless, in post crisis period almost all CEE members had growth rates higher compared to most developed members of the EU (for example Germany, France). It points toward the high speed of convergence of the CEE countries to more developed members of the EU.

5. Conclusion

This study investigates the relationship between economic growth and international capital flows in the EU member countries and how these relationships vary after the global financial crisis. Estimations are made for four different groups: EU27, EU15, Eurozone and CEE members of the EU. In order to catch the impact of the global financial crisis of 2008 on the growth of European economies, three different periods were estimated; full period: 1995–2013, period before the financial crisis: 1995–2007 and the period after the global financial crisis: 2008–2013. For all four groups of European countries one main model was estimated that includes core macroeconomic determinants and five different models were estimated by adding different types of capital flows to the main model.

Estimation results for the EU27 countries (Table 2) indicate that only coefficients of FDI flows are significant with positive sign in the full estimated period 1995–2007 while other capital flows such as Portfolio, Other investments and Reserve assets are not significant. This suggests that non-FDI flows have no effect on the growth of considered European countries. Nevertheless, coefficients of capital flows for the pre-crisis period are not significant. This suggests that capital flows did not have an effect on growth of the considered set of countries before the crisis. In post-crisis period similar to the full period estimations FDI flows affect the growth while non-FDI flows do not have any effect on growth of European countries. Thus, results of estimations for the EU27 set

suggest that FDI flows have an important effect on growth of the European countries particularly in the post-crisis period.

In contrast to the EU27 countries, none of the capital flows are significant in estimations of the EU15 countries. Results illustrate (Table 3) that international capital flows do not affect the EU15 economies' growth. On the other hand, estimation results for Eurozone (Table 4) and for the CEE countries provide evidence of substantial effect of FDI flows in the post-crisis period on the growth of the considered countries. This suggests that non-FDI flows do not have an effect on the growth of European countries, while FDI flows are significant determinant of growth in estimated countries except the EU15, particularly in the post-crisis period. Effect of the FDI flows in the post-crisis period is highest in the CEE countries compare to other estimated groups of countries.

The empirical model is estimated by means of the Generalized Method of Moments technique. The estimated model reveals evidence in contrast to existing literature that argues that private capital flows promote stronger economic growth in countries with well established infrastructure and better financial developments (Edwards, 2001; Kyaw and Macdonald, 2009; Choong et al., 2010). On the contrary, this study found evidence that in the case of the European Union FDI flows have greater effect in the CEE members of the EU. The CEE members of the EU include 11 countries, which are Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. These countries accessed the EU after 2004 and all of them are former socialist countries with less established infrastructure and less developed financial system compared to other European Union members.

Table 7 demonstrates GDP per capita for the European Union member states. It shows that the CEE members of the EU have the lowest GDP per capita compared to other members. The policy implication here is that in order to promote economic growth, countries should focus on investments such as FDI, while other investments do not effect growth at all. Table 6 shows growth rates of the EU members for the last decade. During the global financial crisis, all CEE members, except Poland, had the deepest decline in their GDP compared to other members. However, during the last decade in pre crisis and post crisis periods almost all CEE members had growth rates higher compared to most developed members of the EU (for example Germany, France).

A lot of previous studies found that capital flows have stronger effect in more developed countries rather than in less developed ones (Edwards, 2001; Kyaw and Macdonald, 2009; Choong et al., 2010). This study found that particularly capital flows such as FDI have a stronger effect on economic growth of the CEE members of the EU, which are less developed in their infrastructure, compared to developed members of the EU. However, growth rates show that the CEE members fastly converge to the level of developed members of the EU. Therefore, this study found that capital flows such as FDI have a stronger effect on rapidly growing countries, which is in fact in line and not in contrast with previous studies, because sustained high growth for a decade shows that the CEE members attained certain level of development and may be considered as countries of the better performance of domestic financial markets and market structures compare to developed members of the EU.

Appendix 1.

Tables 1–7.

Table 1 Panel unit root tests.

Variable	IPS[a]		ADF[a]		PP[a]		Hadri[b]	
	Level	Δ	Level	Δ	Level	Δ	Level	Δ
Growth	−8.68**	−17.37**	201.60**	369.94**	173.16**	658.74**	5.23**	−2.72
Initial income	−1.17	−8.67**	71.37	185.83**	67.83	160.43**	7.24**	6.07**
Education	−1.86	−12.68**	62.61	246.73**	57.42	242.06**	12.86**	0.29
Credit	−3.06**	−13.08**	93.22**	256.37**	81.51*	259.45**	2.18*	0.97
Government	−2.79**	−16.26**	88.56**	504.48**	102.19**	497.07**	10.39**	3.99**
Openness	−1.49	−15.38**	40.62	297.21**	42.59	337.08**	12.87**	−1.55
Investments	−1.85*	−9.89**	77.17*	203.51**	62.64	197.35**	6.70**	2.19*
FDI	−8.70**	−18.03**	183.21**	358.61**	186.26**	597.49**	2.24*	−2.31
FDI out	−6.72**	−17.13**	147.67**	351.29**	145.74**	422.84**	5.74**	5.09**
FDI in	−7.80**	−19.33**	166.32**	396.18**	160.17**	434.86**	7.59**	1.53
Portfolio	−7.77**	−13.95**	168.21**	301.61**	151.13**	472.49**	−0.88	−1.43
Financial derivatives	−8.17**	−14.50**	190.68**	311.96**	181.86**	677.98**	−0.27	−3.83
Other investments	−4.65**	−14.78**	119.84**	297.31**	114.92**	567.39**	0.71	−1.92

Notes: In panel unit root tests, probabilities are computed assuming asymptotic normality. (a) Tests the hypothesis of the presence of the individual unit root process, and (b) tests the hypothesis of no unit root in the common unit root process.
* The rejection of the null hypothesis at the 5% significance level.
** The rejection of the null hypothesis at the 1% significance level.

Table 2 GMM estimations, EU 27.

1995–2013 EU27	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.435** (0.0319)	−0.385** (0.052)	−0.417** (0.047)	−0.328** (0.025)	−0.316** (0.024)	−0.336** (0.060)
Initial GDP	−0.003** (0.001)	−0.003** (0.001)	−0.002** (0.001)	−0.003** (0.001)	−0.003** (0.001)	−0.002** (0.001)
Education	0.107 (0.121)	0.498* (0.249)	0.317** (0.121)	0.492* (0.210)	0.481* (0.211)	0.370** (0.154)
Private credits	0.118** (0.022)	0.207** (0.057)	0.152** (0.041)	0.381** (0.040)	0.381** (0.041)	0.353** (0.041)
Government	−3.364** (0.346)	−3.051** (0.683)	−3.085** (0.486)	−1.532** (0.462)	−1.421** (0.497)	−0.792 (1.132)
Openness	26.337** (3.126)	15.090*** (8.018)	16.761** (4.890)	19.545** (4.166)	19.948** (4.049)	20.975** (6.173)
Investments	1.045** (0.138)	0.536** (0.218)	0.867** (0.149)	0.589** (0.105)	0.574** (0.096)	0.664* (0.359)
FDI	–	0.311** (0.096)	–	–	–	–
FDI outflow	–	–	0.314** (0.109)	–	–	–
FDI inflow	–	–	0.242** (0.065)	–	–	–
Portfolio	–	–	–	−0.002 (0.019)	–	–
Other investments	–	–	–	–	0.011 (0.020)	–
Reserve assets	–	–	–	–	–	0.000 (0.000)
NOI	9	8	9	7	7	8
ST	0.27	0.22	0.25	0.26	0.27	0.25

1995–2007 EU27	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.387** (0.095)	−0.172* (0.083)	−0.088 (0.101)	−0.211 (0.275)	−0.524 (0.606)	−0.308* (0.139)
Initial GDP	0.001** (0.001)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	−0.000 (0.000)
Education	0.184** (0.031)	−0.019 (0.076)	0.017 (0.083)	−0.007 (0.192)	−0.073 (0.312)	−0.181 (0.136)
Private credits	−0.015 (0.011)	0.022 (0.024)	0.051*** (0.027)	−0.046 (0.096)	−0.005 (0.211)	0.088** (0.021)
Government	−0.299 (0.202)	−0.385 (0.323)	−0.315 (0.345)	−0.286 (0.432)	0.214 (0.957)	0.362 (0.212)
Openness	−1.454 (2.644)	3.461 (3.589)	5.011 (5.154)	5.374 (13.590)	14.053 (19.496)	7.437* (3.391)
Investments	0.018** (0.097)	−0.096 (0.249)	−0.203 (0.283)	−0.287 (0.286)	−0.238 (0.357)	0.134 (0.088)
FDI	–	0.002 (0.076)	–	–	–	–
FDI outflow	–	–	−0.002 (0.092)	–	–	–
FDI inflow	–	–	0.089 (0.089)	–	–	–
Portfolio	–	–	–	−0.024 (0.089)	–	–
Other investments	–	–	–	–	0.093 (0.124)	–
Reserve assets						−0.000 (0.000)
NOI	7	6	6	7	7	5
ST	0.24	0.21	0.20	0.27	0.28	0.28

Table 2 (*Continued*)

2008−2013 EU27	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.448** (0.049)	−0.417** (0.037)	−0.420** (0.019)	−0.454** (0.020)	−0.436** (0.019)	−0.511** (0.028)
Initial GDP	−0.003** (0.001)	0.000 (0.000)	−0.001* (0.001)	−0.003** (0.001)	−0.002** (0.001)	−0.003** (0.001)
Education	−0.076 (0.201)	0.447** (0.112)	−0.177 (0.188)	−0.355 (0.333)	−0.621 (0.357)	−0.188 (0.284)
Private credits	0.073* (0.013)	0.076* (0.038)	0.144** (0.025)	0.103** (0.016)	0.094** (0.014)	0.138** (0.029)
Government	−3.696** (0.402)	−2.054** (0.447)	−3.346** (0.399)	−3.384** (0.589)	−3.207** (0.551)	−2.881** (0.740)
Openness	26.757** (4.154)	20.309** (2.567)	27.702** (3.372)	39.087** (4.833)	42.994** (4.343)	38.586** (4.597)
Investments	0.993** (0.224)	0.674** (0.220)	0.515** (0.122)	0.784** (0.222)	0.696** (0.253)	1.024** (0.243)
FDI	–	0.229** (0.057)	–	–	–	–
FDI outflow	–		0.319** (0.061)	–	–	–
FDI inflow	–		0.238** (0.068)	–	–	–
Portfolio	–		–	0.009 (0.013)	–	–
Other investments	–		–	–	−0.003 (0.012)	–
Reserve assets						0.0002* (0.000)
NOI	9	10	7	6	6	6
ST	0.23	0.20	0.23	0.24	0.26	0.28

Notes: Standard errors for the coefficient estimates are given in parentheses. Sargan *p* values are reported. α and β coefficients are from Eq. (1). NOI, number of instruments; ST, Sargan test.
  * Significance level at 5%.
  ** Significance level at 1%.
  *** Significance level at 10%.

Table 3 GMM Estimations, EU 15.

1995–2013 EU15	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.474** (0.065)	−0.478** (0.073)	−0.724* (0.333)	−0.368** (0.098)	−0.363** (0.089)	−0.393** (0.098)
Initial GDP	−0.002** (0.000)	−0.002** (0.0004)	−0.004* (0.001)	−0.001 (0.000)	−0.001 (0.001)	−0.000 (0.001)
Education	−0.015 (0.222)	0.073 (0.213)	0.921 (1.119)	0.169 (0.252)	0.045 (0.198)	0.166 (0.185)
Private credits	0.058 (0.047)	0.036 (0.049)	0.063 (0.241)	0.155* (0.049)	0.158** (0.041)	0.113 (0.095)
Government	−2.614** (0.525)	−2.543** (0.761)	−4.495* (3.435)	−2.012** (0.766)	−2.323** (0.914)	−2.203* (1.127)
Openness	32.967** (9.097)	24.792** (10.488)	48.813 (35.957)	25.534*** (15.222)	17.449 (12.705)	4.338 (16.428)
Investments	0.358 (0.320)	0.336 (0.319)	2.453 (1.515)	0.472 (0.638)	0.021 (0.531)	0.076 (0.909)
FDI	–	−0.076 (0.118)	–	–	–	
FDI outflow	–	–	−0.366 (0.477)	–	–	
FDI inflow	–	–	−0.237 (0.387)	–	–	
Portfolio	–	–	–	0.005 (0.032)	–	
Other investments	–	–	–	–	−0.015 (0.041)	
Reserve assets						0.0001 (0.0001)
NOI	6	6	4	7	7	8
ST	0.28	0.24	0.25	0.24	0.24	0.26

1995–2007 EU15	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.348 (0.286)	−0.245 (0.203)	−0.637 (0.509)	0.265 (0.774)	−0.318 (0.486)	0.009 (0.189)
Initial GDP	−0.003** (0.000)	−0.003** (0.001)	−0.000 (0.001)	−0.0001 (0.001)	−0.002 (0.001)	−0.002* (0.001)
Education	0.375 (0.244)	0.492 (0.307)	0.472 (0.380)	0.597 (0.408)	0.560 (0.357)	0.247 (0.299)
Private credits	0.018 (0.069)	−0.066 (0.042)	−0.004 (0.193)	−0.081 (0.179)	−0.138 (0.222)	−0.008 (0.068)
Government	−2.982** (1.029)	−2.048 (1.281)	−3.091* (1.351)	−3.311* (1.681)	−1.975 (1.658)	−1.008 (1.237)
Openness	42.035* (16.374)	42.495** (11.845)	−7.676 (37.868)	8.547 (27.634)	30.795 (29.594)	29.108** (10.211)
Investments	0.567 (0.304)	0.652** (0.265)	0.074 (0.659)	0.628 (0.811)	1.682 (1.431)	0.237 (0.447)
FDI	–	0.143 (0.094)	–	–	–	
FDI outflow	–	–	0.028 (0.367)	–	–	
FDI inflow	–	–	−0.111 (0.367)	–	–	
Portfolio	–	–	–	−0.096 (0.171)	–	
Other investments	–	–	–	–	−0.049 (0.149)	
Reserve assets						0.0001 (0.0001)
NOI	5	3	6	6	6	4
ST	0.24	0.21	0.20	0.29	0.14	0.18

Table 3 (*Continued*)

2008–2013 EU15	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.543** (0.047)	−0.454** (0.061)	−0.499** (0.041)	−0.577** (0.134)	−0.587* (0.072)	−0.497** (0.094)
Initial GDP	0.002 (0.002)	0.002* (0.001)	0.001 (0.001)	−0.001 (0.002)	0.002 (0.001)	−0.0001 (0.001)
Education	−0.856 (0.581)	−0.300 (0.329)	−0.572 (0.717)	0.138 (0.683)	−0.688 (0.643)	−1.007 (1.243)
Private credits	−0.087 (0.076)	−0.020 (0.029)	−0.011 (0.049)	0.078 (0.095)	0.026 (0.076)	−0.081 (0.249)
Government	−3.883* (1.769)	−2.042** (0.616)	−3.449*** (1.892)	−2.615** (1.075)	−4.264** (1.107)	−6.403*** (3.477)
Openness	15.593 (16.783)	13.833 (10.673)	15.652 (12.665)	20.869 (17.862)	10.209 (11.189)	9.105 (22.716)
Investments	−0.999* (0.473)	−0.501 (0.507)	−0.563 (0.466)	0.454 (1.164)	−0.568 (0.787)	−1.158 (1.224)
FDI	–	0.086 (0.132)	–	–	–	
FDI outflow	–		0.068 (0.144)	–	–	
FDI inflow	–	–	0.079 (0.073)	–	–	
Portfolio	–	–	–	0.071 (0.076)	–	
Other investments	–	–	–	–	−0.069 (0.063)	
Reserve assets						−0.0001 (0.0001)
NOI	5	8	6	9	4	5
ST	0.23	0.29	0.12	0.25	0.28	0.23

Notes: Standard errors for the coefficient estimates are given in parentheses. Sargan *p* values are reported. α and β coefficients are from Eq. (1). NOI, number of instruments; ST, Sargan test.

* Significance level at 5%.

** Significance level at 1%.

*** Significance level at 10%.

Table 4 GMM estimations, Eurozone.

1995–2013 Eurozone	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.271** (0.110)	−0.414** (0.094)	−0.331** (0.063)	−0.367** (0.076)	−0.347** (0.087)	−0.518** (0.060)
Initial GDP	−0.003** (0.001)	−0.003** (0.001)	−0.004 (0.002)	−0.006** (0.002)	−0.005** (0.001)	−0.004** (0.001)
Education	−0.602 (0.410)	−1.749** (0.557)	−1.078 (0.900)	−0.793 (0.699)	−1.114** (0.646)	−0.652** (0.223)
Private credits	0.161** (0.068)	0.209** (0.041)	0.269*** (0.163)	−0.008 (0.144)	−0.001 (0.133)	−0.003 (0.049)
Government	−1.536* (0.769)	1.347 (1.159)	1.860*** (1.045)	0.828 (0.581)	1.333*** (0.744)	−0.540 (0.638)
Openness	51.683** (16.141)	96.313** (6.378)	82.439** (14.375)	79.894** (12.983)	87.792** (16.753)	58.297** (9.049)
Investments	0.449*** (0.264)	1.106** (0.391)	1.415*** (0.755)	1.672** (0.748)	1.536** (0.652)	1.459** (0.160)
FDI	–	0.522** (0.101)	–	–	–	–
FDI outflow	–	–	0.424** (0.179)	–	–	–
FDI inflow	–	–	0.159 (0.159)	–	–	–
Portfolio	–	–	–	0.018 (0.035)	–	–
Other investments	–	–	–	–	−0.015 (0.036)	–
Reserve assets						−0.0001 (0.0001)
NOI	7	3	4	4	4	3
ST	0.23	0.26	0.20	0.26	0.22	0.18
1995–2007 Eurozone	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.113 (0.447)	0.135 (0.189)	0.099 (0.141)	−0.002 (0.212)	0.374 (0.421)	−0.376 (0.267)
Initial GDP	0.001 (0.001)	−0.002*** (0.001)	−0.001 (0.001)	−0.002 (0.001)	−0.001 (0.002)	0.002 (0.003)
Education	−0.387 (0.822)	0.091 (0.374)	−0.051 (0.383)	−0.049 (0.329)	−0.499 (0.525)	−0.675 (0.909)
Private credits	−0.037 (0.059)	0.011 (0.044)	0.035 (0.055)	0.032 (0.069)	0.026 (0.098)	0.025 (0.064)
Government	−0.351 (1.236)	0.159 (0.738)	−0.349 (0.679)	0.389 (0.811)	−0.019 (1.175)	3.339* (1.586)
Openness	24.141 (19.711)	33.322** (12.419)	25.996* (12.293)	29.409*** (16.752)	41.663 (38.259)	23.577* (11.769)
Investments	−0.547 (0.395)	0.449 (0.488)	0.101 (0.579)	0.673 (0.463)	−0.094 (0.891)	−0.145 (0.777)
FDI	–	0.113 (0.097)	–	–	–	–
FDI outflow	–	–	0.136 (0.133)	–	–	–
FDI inflow	–	–	0.045 (0.076)	–	–	–
Portfolio	–	–	–	0.092 (0.139)	–	–
Other investments	–	–	–	–	0.021 (0.270)	–
Reserve assets						−0.0001* (0.000)
NOI	6	4	4	4	5	2
ST	0.24	0.27	0.16	0.28	0.20	0.29

Table 4 (*Continued*)

2008–2013 Eurozone	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.563** (0.043)	−0.518** (0.035)	−0.443** (0.040)	−0.639** (0.071)	−0.586** (0.050)	−0.449** (0.143)
Initial GDP	−0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	−0.001 (0.001)	−0.000 (0.001)	−0.001 (0.001)
Education	0.187 (0.287)	0.010 (0.291)	0.324 (0.522)	0.486 (0.572)	0.105 (0.492)	−0.061 (0.627)
Private credits	0.003 (0.044)	0.118 (0.089)	0.330* (0.153)	0.067 (0.156)	−0.026 (0.082)	0.079 (0.084)
Government	−4.087** (0.634)	−2.1443** (0.776)	−0.291 (1.432)	−2.679** (1.035)	−3.663** (0.884)	−3.834** (0.846)
Openness	29.769** (8.532)	41.031** (7.850)	40.397* (17.979)	40.294** (13.321)	30.723*** (18.407)	17.808* (8.818)
Investments	1.039** (0.336)	0.400 (0.311)	0.324 (0.428)	1.348** (0.405)	1.058** (0.375)	0.524 (0.743)
FDI	–	0.159** (0.054)	–	–	–	–
FDI outflow	–	–	0.265** (0.059)	–	–	–
FDI inflow	–	–	0.245** (0.037)	–	–	–
Portfolio	–	–	–	0.025 (0.035)	–	–
Other investments	–	–	–	–	−0.029 (0.023)	–
Reserve assets	–	–	–	–	–	−0.000 (0.000)
NOI	6	4	3	5	6	6
ST	0.21	0.31	0.27	0.21	0.26	0.23

Notes: Standard errors for the coefficient estimates are given in parentheses. Sargan *p* values are reported. α and β coefficients are from Eq. (1). NOI, number of instruments; ST, Sargan test.
* Significance level at 5%.
** Significance level at 1%.
*** Significance level at 10%.

Table 5 GMM estimations, CEE.

1995–2013 CEE	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.236 (0.156)	−0.213 (0.146)	−0.231 (0.367)	−0.208 (0.138)	−0.316*** (0.172)	−0.478 (0.373)
Initial GDP	−0.006 (0.005)	−0.004 (0.005)	−0.006 (0.016)	−0.001 (0.006)	−0.002 (0.006)	−0.024* (0.007)
Education	−1.201 (1.585)	−2.006 (1.486)	−0.278 (3.652)	−3.366 (2.075)	−0.737 (1.329)	−1.951 (1.431)
Private credits	0.061 (0.182)	0.129 (0.088)	0.178 (0.389)	0.304*** (0.164)	0.371 (0.258)	0.419 (0.327)
Government	3.739 (2.648)	2.221 (3.052)	6.654 (9.577)	0.808 (1.205)	−2.174 (2.577)	−3.199 (4.477)
Openness	67.209** (13.762)	54.774** (12.119)	67.414* (30.685)	54.284** (8.502)	27.286 (22.959)	64.892** (14.461)
Investments	1.194* (0.513)	0.563 (0.879)	1.367 (2.119)	−0.014 (0.897)	0.013 (1.359)	1.582 (1.200)
FDI	–	0.315 (0.362)	–	–	–	–
FDI outflow	–	–	0.588 (1.699)	–	–	–
FDI inflow	–	–	1.207 (1.731)	–	–	–
Portfolio	–	–	–	−0.093 (0.332)	–	–
Other investments	–	–	–	–	0.197 (0.246)	–
Reserve assets	–	–	–	–	–	0.000 (0.000)
NOI	3	5	2	5	6	2
ST	0.18	0.20	0.20	0.20	0.25	0.25

1995–2007 CEE	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.222 (0.291)	−0.205 (0.647)	−0.168 (0.437)	−0.319 (0.383)	−0.064 (0.125)	0.142 (0.960)
Initial GDP	0.001 (0.001)	0.001 (0.003)	0.002 (0.007)	0.001 (0.002)	0.001 (0.002)	0.001 (0.005)
Education	−0.449 (0.639)	−0.966 (1.006)	−2.094 (1.414)	−0.886 (1.092)	−0.552 (0.763)	−0.687 (0.835)
Private credits	0.038 (0.155)	0.168 (0.364)	0.541 (0.741)	0.126 (0.217)	0.236 (0.272)	0.117 (0.307)
Government	−1.358 (1.462)	−2.1112 (2.393)	−1.726 (4.574)	−1.284 (1.705)	−1.335 (1.318)	−1.011 (2.530)
Openness	−0.649 (10.858)	−8.913 (32.606)	−10.851 (33.207)	−5.535 (20.663)	−4.626 (18.582)	0.429 (17.082)
Investments	−0.629 (0.864)	−0.669 (1.599)	−0.699 (0.704)	−0.412 (0.961)	−0.753** (0.235)	−0.739 (0.716)
FDI	–	−0.032 (0.204)	–	–	–	–
FDI outflow	–	–	1.068 (4.839)	–	–	–
FDI inflow	–	–	−0.355 (0.474)	–	–	–
Portfolio	–	–	–	−0.141 (0.372)	–	–
Other investments	–	–	–	–	−0.136 (0.204)	–
Reserve assets	–	–	–	–	–	−0.000 (0.000)
NOI	4	4	3	4	3	4
ST	0.18	0.15	0.18	0.10	0.25	0.13

Table 5 (*Continued*)

2008–2014 CEE	(1)	(2)	(3)	(4)	(5)	(6)
Growth (−1)	−0.515** (0.151)	−0.477** (0.174)	−0.557* (0.249)	−0.481** (0.179)	−0.568* (0.291)	−0.616** (0.145)
Initial GDP	0.002 (0.006)	−0.004 (0.009)	0.009 (0.013)	0.003 (0.006)	0.002 (0.009)	0.001 (0.005)
Education	−1.688** (0.558)	2.201 (2.249)	0.017 (1.596)	−1.824 (2.613)	−0.443 (4.578)	−0.522 (1.291)
Private credits	0.140 (0.156)	0.221 (0.156)	−0.007 (0.148)	0.129 (0.280)	0.314 (0.543)	0.219 (0.161)
Government	−2.285 (3.103)	−4.576** (0.816)	−4.414 (6.322)	−1.584 (3.508)	−3.034 (3.819)	−1.671 (2.056)
Openness	40.887** (6.719)	4.719 (29.737)	10.350 (25.092)	42.918** (13.229)	29.829 (33.539)	41.586** (12.044)
Investments	0.571*** (0.350)	0.851 (1.062)	−0.298 (0.601)	0.517 (0.479)	1.271 (1.319)	1.089** (0.3994)
FDI	–	0.742** (0.331)	–	–	–	–
FDI outflow	–	–	0.919*** (0.544)	–	–	–
FDI inflow	–	–	0.986** (0.275)	–	–	–
Portfolio	–	–	–	−0.011 (0.180)	–	–
Other investments	–	–	–	–	−0.261 (0.444)	–
Reserve assets						0.000 (0.000)
NOI	5	4	3	5	4	3
ST	0.25	0.28	0.21	0.19	0.28	0.25

Notes: Standard errors for the coefficient estimates are given in parentheses. Sargan *p* values are reported. α and β coefficients are from Eq. (1). NOI, number of instruments; ST, Sargan test.
* Significance level at 5%.
** Significance level at 1%.
*** Significance level at 10%.

Table 6 Growth rates of the EU member states.

Member states	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Austria	2.1	3.4	3.6	1.5	−3.8	1.9	3.1	0.9	0.2	0.3
Belgium	1.9	2.6	3.0	1.0	−2.6	2.5	1.6	0.1	0.3	1.0
Bulgaria	6.0	6.5	6.9	5.8	−5.0	0.7	2.0	0.5	1.1	1.7
Croatia	4.2	4.8	5.2	2.1	−7.4	−1.7	−0.3	−2.2	−0.9	−0.4
Cyprus	3.9	4.5	4.9	3.6	−2.0	1.4	0.3	−2.4	−5.4	−2.3
Czech Republic	6.4	6.9	5.5	2.7	−4.8	2.3	2.0	−0.8	−0.7	2.0
Denmark	2.4	3.8	0.8	−0.7	−5.1	1.6	1.2	−0.7	−0.5	1.0
Estonia	9.5	10.4	7.9	−5.3	−14.7	2.5	8.3	4.7	1.6	2.1
Finland	2.8	4.1	5.2	0.7	−8.3	3.0	2.6	−1.5	−1.2	−0.1
France	1.6	2.4	2.4	0.2	−2.9	2.0	2.1	0.3	0.3	0.4
Germany	0.7	3.7	3.3	1.1	−5.6	4.1	3.6	0.4	0.1	1.6
Greece	0.9	5.8	3.5	−0.4	−4.4	−5.4	−8.9	−6.6	−3.9	0.8
Hungary	4.3	4.0	0.5	0.9	−6.6	0.8	1.8	−1.5	1.5	3.6
Ireland	5.7	5.5	4.9	−2.6	−6.4	−0.3	2.8	−0.3	0.2	4.8
Italy	0.9	2.0	1.5	−1.0	−5.5	1.7	0.6	−2.3	−1.9	−0.4
Latvia	10.2	11.6	9.8	−3.2	−14.2	−2.9	5.0	4.8	4.2	2.4
Lithuania	7.8	7.4	11.1	2.6	−14.8	1.6	6.1	3.8	3.3	2.9
Luxemburg	4.1	4.9	6.5	0.5	−5.3	5.1	2.6	−0.2	2.0	2.8
Malta	3.8	1.8	4.0	3.3	−2.5	3.5	2.2	2.5	2.5	3.5
Netherlands	2.3	3.8	4.2	2.1	−3.3	1.1	1.7	−1.6	−0.7	0.8
Poland	3.5	6.2	7.2	3.9	2.6	3.7	4.8	1.8	1.7	3.3
Portugal	0.8	1.6	2.5	0.2	−3.0	1.9	−1.8	−3.3	−1.4	0.9
Romania	4.2	8.1	6.9	8.5	−7.1	−0.8	1.1	0.6	3.4	2.9
Slovakia	6.5	8.3	10.7	5.4	−5.3	4.8	2.7	1.6	1.4	2.4
Slovenia	4.0	5.7	6.9	3.3	−7.8	1.2	0.6	−2.6	−1.0	2.6
Spain	3.7	4.2	3.8	11	−3.6	0.0	−0.6	−2.1	−1.2	1.4
Sweden	2.8	4.7	3.4	−0.6	−5.2	6.0	2.7	−0.3	1.3	2.1
United Kingdom	2.8	3.0	2.6	−0.3	−4.3	1.9	1.6	0.7	1.7	2.6

Source: EUROSTAT.

Table 7 GDP of the EU member states.

Member states	GDP (PPP) per capita, 2013, euro	GDP (PPP) per capita 2013, EU28 = 100
European Union	26,600	100%
Austria	34,000	128%
Belgium	31,600	119%
Bulgaria	11,900	45%
Croatia	16,100	61%
Cyprus	23,600	89%
Czech Republic	21,900	82%
Denmark	33,100	124%
Estonia	19,500	73%
Finland	30,000	113%
France	28,400	107%
Germany	32,600	122%
Greece	19,300	73%
Hungary	17,600	66%
Ireland	34,500	130%
Italy	26,500	99%
Latvia	17,000	64%
Lithuania	19,400	73%
Luxemburg	68,500	257%
Malta	22,900	86%
Netherlands	34,900	131%
Poland	10,700	67%
Portugal	21,000	79%
Romania	14,500	55%
Slovakia	20,000	76%
Slovenia	18,100	82%
Spain	25,000	94%
Sweden	33,700	127%
United Kingdom	28,900	109%

Source: EUROSTAT.

Appendix 2. Data

GDP growth – the change in the gross domestic product per capita.[2]

Initial GDP – the gross domestic product per capita.

Education – upper secondary, post-secondary non-tertiary, first and second stage of tertiary education, the variable is expressed in the percentage to the population in age from 15 to 64 years old.

Government expenditure – the final consumption expenditure of general government as a ratio to GDP.

Private credits – the private sector credit flow represents the net amount of liabilities in which the sectors Non-Financial corporations and Households and Non-Profit institutions serving households have incurred along the year. The instruments that are taken into account to compile private sector credit flow are Securities other than shares, excluding financial derivatives and Loans, that is, no other instruments are added to calculate the private sector credit flow. Data are presented in consolidated terms, i.e. data do not take into account transactions within the same sector. The variable is represented as a ratio of GDP.

Openness – sum of exports and imports of goods and services as a ration to GDP.

Investments – gross fixed capital formation as a ration to GDP.

Direct investment – reflecting the lasting interest of a resident entity in one economy (direct investor) in an entity resident in another economy (direct investment enterprise) – covers all transactions between direct investors and direct investment enterprises. That is, direct investment covers the initial transaction between the two and all subsequent transactions between them and among affiliated enterprises, both incorporated and unincorporated. Direct investment transactions occurring abroad and in the reporting economy are subclassified into equity capital, reinvested earnings, and other capital (intercompany transactions). For equity capital and other capital, claims on and liabilities to affiliated enterprises and to direct investors are distinguished. Transactions between affiliated banks and between other affiliated financial intermediaries are limited to equity and permanent debt capital.

Portfolio investment – covers transactions in equity securities and debt securities; the latter are subsectored into bonds and notes, money market instruments, and financial derivatives (such as options) when the derivatives generate financial claims and liabilities. Various new financial instruments are covered under appropriate instrument classifications. Transactions covered under direct investment and reserve assets are excluded.

Other investment – covers short- and long-term trade credits; loans (including use of Fund credit, loans from the Fund, and loans associated with financial leases); currency and deposits (transferable and other – such as savings and term deposits, savings and loan shares, shares in credit unions, etc.); and other accounts receivable and payable. Transactions covered under direct investment are excluded.

Reserve assets – covers transactions in assets that are considered by the monetary authorities of an economy to be available for use in funding payments imbalances and, in some instances, meeting other financial needs. Such availability is not closely linked in principle to formal criteria such as ownership or currency of denomination. The items covered are monetary gold, SDRs, reserve position in the Fund, foreign exchange assets (currency, deposits, and securities), and other claims.

All data are extracted or calculated employing data from the Eurostat, official statistical site of European Commission.

References

Anwar, S.S., Sun, S., 2011. Financial development, foreign investment and economic growth in Malaysia. Journal of Asian Economics 22, 335–342.

Azman-Saini, W.N.W., Baharumshah, A.Z., Law, S.H., 2010. Foreign direct investment, economic freedom and economic growth: international evidence. Economic Modelling 27, 1079–1089.

Aizenman, J., Jinjarak, Y., Donghyun, P., 2013. Capital flows and economic growth in the era of financial integration and crisis, 1990–2010. Open Economies Review 24, 371–396.

---

[2] Definitions are taken from the Balance of Payment Manual. International Monetary Fund.

Bailliu, J.N., 2000. Private Capital Flows, Financial Development, and Economic Growth in Developing Countries. Working Papers 00-16. Bank of Canada.

Barro, R.J., 1991. Economic growth in a cross-section of countries. Quarterly Journal of Economics 100, 407–443.

Barro, R.J., 2012, August. Convergence and Modernization Revisited. NBER Working Paper Series, WP 18295. National Bureau of Economic Research, Cambridge, MA.

Barro, R., Sala-i-Martin, X., 1995. Economic Growth. McGraw-Hill, New York.

Choi, I., 2001. Unit root tests for panel data. Journal of International Money and Finance 20, 249–272.

Choong, C.K., Baharumshah, A.Z., Yusop, Z., Habibullah, M.S., 2010. Private capital flows, stock market and economic growth in developed and developing countries: a comparative analysis. Japan and the World Economy 22, 107–117.

Edwards, S., 1993. Trade Policy, Exchange Rates and Growth. NBER Working Paper No. 4511.

Edwards, S., 2001, January. Capital Mobility and Economic Performance: Are Emerging Economies Different? NBER Working Paper 8076. National Bureau of Economic Research, Cambridge.

Eurostat, 2015. Eurostat – The Official Statistical Website of the European Commission. http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

Fan, P.H., (Theses and Dissertations) 2013. Essays in Capital Mobility, Growth, and Macroeconomic Volatility. Paper 349.

Hadri, K., 2000. Testing for stationarity in heterogenous panel data. Econometrics Journal 3, 148–161.

Hansen, L.P., 1982. Large sample properties of generalized method of moments estimators. Econometrica 50, 1029–1054.

Holland, D., Liadze, I., Rienzo, C., Wilkinson, D., 2013. The Relationship Between Graduates and Economic Growth Across Countries. BIS Research Paper 110.

Gemmell, N., 1996. Evaluating the impacts of human capital stocks and accumulation on economic growth: some new evidence. Oxford Bulletin of Economics and Statistics 58, 9–28.

Gheeraert, L., Mansour, J.M., 2005. On the Impact of Private Capital Flows on Economic Growth and Development. CEB Working Paper 05/003. Centre Emile Bernheim, Research Institute in Management Sciences.

Gourinchas, P.O., Jeanne, O., 2013. Capital flows to developing countries: the allocation puzzle. Review of Economic Studies 80, 1484–1515.

Im, K.S., Pesaran, M.H., Shin, Y., 2003. Testing for unit root in heterogenous panels. Journal of Econometrics 115, 53–74.

Ismail, N.W., 2008. Growth and convergence in ASEAN: a dynamic panel approach. International Journal of Economics and Management 2, 127–140.

Kyaw, K.S., Macdonald, R., 2009. Capital flows and growth in developing countries: a dynamic panel data analysis. Oxford Development Studies 37, 101–122.

Kwiatkowski, D., Phillips, P.C.B., Schmidt, P., Shin, Y., 1992. Testing the null hypothesis of stationarity against the alternative of a unit root: how sure are we that economic time series have a unit root? Journal of Econometrics 44, 159–178.

Levy-Orlik, N., 2013. Financialization and economic growth in developing countries: the case of the Mexican economy. International Journal of Political Economy 42, 108–127.

Lucas, R., 1988. On the mechanics of economic development. Journal of Monetary Economics 22, 3–42.

Maddala, G.S., Wu, S., 1999. A comparative study of unit root tests with panel data and a new simple test. Oxford Bulletin of Economics and Statistics 61, 631–652.

Mankiw, N.G., Romer, D., Weil, D., 1992. A contribution to the empirics of economic growth. Quarterly Journal of Economics 107, 407–437.

Mitchell, D.J., 2005. Supplement to ''The Impact of Government Spending on Economic Growth''. Heritage Foundation Backgrounder No. 1831 http://www.heritage.org/research/reports/2005/03/supplement-to-the-impact-of-government-spending-on-economic-growth

Mody, A., Murshid, A.P., 2011. Growth from International Capital Flows: The Role of Volatility Regimes. IMF Working Paper, WP/11/90.

Omri, A., Kahouli, B., 2014. The nexus among foreign investment, domestic capital and economic growth: empirical evidence from the MENA region. Research in Economics 68, 257–263.

Pagano, M., 1993. Financial markets and growth: an overview. European Economic Review 37 (2–3), 613–622.

Prasad, E., Rajan, R., Subramanian, A., 2006. Patterns of international capital flows and their implications for economic development. In: Presented at the Symposium ''The New Economic Geography: Effects and Policy Implications'', The Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 24–26.

Romer, P., 1989. Capital accumulation and the theory of long-run growth. In: Barro, R. (Ed.), Modern Business Cycle Theory. Harvard University Press, Cambridge, MA.

Rousseau, P., Wachtel, P., 2011. What is happening to the impact of financial deepening on economic growth? Economic Inquiry 49, 276–288.

Shen, C.H., Lee, C.C., Lee, C.C., 2010. What makes international capital flows promote economic growth? An international cross-country analysis. Scottish Journal of Political Economy 57, 515–546.

Wane, A.A., 2004, October. Growth and Convergence in WAEMU Countries. IMF Working Paper, WP/04/198.

Varma, S., 2009. Capital mobility and growth in the developing worlds: an empirical investigation. Indore Management Journal 1, 1–17.

Vo, X.V., 2010. Net private capital flows and economic growth – the case of emerging Asian economies. Applied Economics 42, 3135–3146.

Zhang, J., Wang, L., Wang, S., 2012. Financial development and economic growth: recent evidence from China. Journal of Comparative Economics 40, 393–412.