THE EFFECTS OF THE EU BUDGET ON ECONOMIC CONVERGENCE

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Abstract

The paper estimates the impact of the EU budget on the economic convergence process of EU member states. Although the primary role of the EU budget lies in its allocation function, the EU budget, mainly through the cohesion policy, causes redistribution effects on national and regional levels, with the objective of reducing economic and social disparities across European regions and countries. This paper contributes to the relevant literature by not only considering the effects of the cohesion policy, but also by explicitly incorporating other EU fiscal transfers and EU budget contribution as explanatory variables in a setting of a panel econometric model of conditional β-convergence. The analysis on a sample of 28 EU countries allows for the consideration of policy implications of the effect of EU budget expenditures on EU economic convergence. We have found that the contribution to the EU budget did not improve the growth rates. EU budget expenditures as a whole have small negative impact on the growth rate, although this result is influenced by the business cycle fluctuations during this period.

Key words: EU budget, beta convergence, panel data model

JEL Code: C23, H87, O47

Introduction

The EU budget expenditures for 2016 are almost 143.9 billion EUR in payment appropriations. In comparison to the national state budgets of the member countries, the EU budget is relatively small. The own resources needed for financing of the 2016 budget account for 0.97 % of the total GNI, which is substantially below the ceiling of 1.23 % of GNI. More than 70 % of this budget is allocated for two most important EU policies – cohesion policy and common agriculture policy. The tools of cohesion policy are specifically designed to support the process of convergence in less developed countries and regions.

The primary role of the EU budget lies in its allocation function. The EU budget is a basis for various expenditure programmes, aimed at the provision of public goods. These

expenditures may play a redistributive role, even in case when this is not the primary objective. There are many factors that influence the EU budget expenditures allocation among member's states and the solidarity principle is only one of them.

The aim of the paper is to estimate the impact of the EU budget on the economic convergence process of 28 EU member states. This paper contributes to the relevant literature by not only considering the effects of the cohesion policy, but also by incorporating other EU fiscal transfers (total expenditures) and contributions to EU budget as explanatory variables in a setting of a panel econometric model of conditional β-convergence. Our model also considers the effects of EU enlargement by including dummy variables affecting both the initial and new member states.

Convergence is a process that can be understood and analysed in different ways (Islam, 2003). In this paper we will use the popular methodology of β-convergence. The advantage over σ-convergence is in that it provides information regarding structural parameters of growth models. The analysis of β-convergence stems from the neoclassical growth theory (e.g. exogenous growth model of Solow, 1956). These models assume that the economic growth per labour unit has an inverse relationship to the initial level of income per labour unit. Absolute (unconditional) convergence argues that the diminishing returns to capital lead to convergence of all countries/regions to the same steady state in the long term. This implies that the less developed economies tend to grow faster than the more developed ones. Conditional β-convergence assumes that economies having various structural parameters will in the long term converge to different steady states, so a set of additional explanatory variables are added to the growth-initial level regression to control for these differences. (Islam, 2003)

The theory of endogenous growth extends the model by incorporating endogenous technological progress. The focus lies on human capital, which increases productivity of other inputs. The majority of empirical work is based on neoclassical growth models (Barro & Sala-i-Martin, 1992; Mankiw, Romer & Weil, 1992). In some studies, the Solow model is augmented by including human-capital accumulation, showing that the accumulation of human capital is correlated with savings and population growth (Mankiw, Romer & Weil, 1992). As the measurement of human capital is difficult, previous studies have used variables related to education (e.g. average years of schooling) or innovation variables (e.g. number of patents per million inhabitants used by Mohl & Hagen, 2010).

The topic of economic convergence and economic growth in EU presents an area of extensive research. From the numerous published research papers, we select some that have

analysed the relation of EU budget expenditures on the convergence of countries and regions. The impact of European regional policy on economic growth and convergence of European regions is studied by many authors (e.g. Esposti & Bussoletti, 2008; Ederveen, Groot & Nahuis, 2006; Mohl & Hagen, 2010). All these authors have used panel data approach for their analysis. Montresor, Pecci and Pontarollo investigate the role of regional policy and common agriculture policy in the convergence process of the European regions (Montresor, Pecci & Pontarollo, 2011). However, it is our understanding that no previous study has addressed the effects of overall EU budget expenditures on economic convergence.

1 Data and methodology

In this paper we analyse the influence of the EU budget on the annual economic growth rate. Empirical research of β-convergence uses primarily econometric methods of cross-sectional and panel data. The basic limitation of the cross-section approach "lies in the fact that having just one data point for a country provides a weak basis for estimation of the convergence parameter which refers primarily to a within-country process" (Islam, 2003). Another advantage of panel approach is that, it allows to control for unobserved national fixed effects. This approach may at least in part address the omitted variable bias problem by allowing for technological differences across countries in the form of individual (country) effects (Islam, 2003).

Our model is based on neoclassical Solow type growth model, enhanced by including human-capital accumulation as an explanatory variable (Mankiw, Romer & Weil, 1992). The regression function estimated in our analysis is similar to other models (Ederveen et al., 2006; Mohl & Hagen, 2010). We further extend our model by additional variables capturing the effects of the EU budget, as well as enlargement dummy variables:

$$\begin{aligned}\ln(y_{i,t}) - \ln(y_{i,t-1}) &= \beta_0 + \beta_1 \ln(y_{i,t-1}) + \beta_2 \ln(inv_{i,t-1}) + \beta_3 \ln(n_{i,t-1} + g + \delta) \\ &+ \beta_4 \ln(educ_{i,t-1}) + \beta_5 ex_{i,t-1} + \beta_6 contr_{i,t-1} + \beta_7 D_{2004} + \beta_8 D_{2007} + u_i + \varepsilon_{i,t}\end{aligned} \quad (1)$$

where i = 1,2,…,28 denotes the member state and t is a time index ranging from 2000 to 2014. Our sample spans two EU programming periods, plus the latest available data for 2014. In our model, β_0 corresponds to autonomous growth and β_1 measures the annual rate of convergence. If the convergence hypothesis holds, this coefficient is supposed to be negative.

The dependent variable is the annual rate of real GDP growth per employed person, which is calculated from OECD (2016) data of GDP per person employed (constant 2011 PPP $). The explanatory variables include:

$y_{i,t-1}$ - the logarithm of real GDP per person employed (in PPS) of country *i* in the previous year (initial level of income),

$inv_{i,t-1}$ - investment ratio to GDP, calculated from the data of gross capital formation and nominal GDP from Eurostat. This variable represents physical capital formation.

$n_{i,t-1}$ - annual population growth rate of country *i*, this variable is computed from the data of total population on January 1st for country *i* (Eurostat, 2016),

g - rate of technical progress,

δ - rate of depreciation,

As is usual in this type of studies, we assume the g and δ to be constant across the countries and time, and assume $(g + \delta) = 0.05$, as many empirical papers have used this assumption (Mankiw, Romer & Weil, 1992).

$educ_{i,t-1}$ - labour force with tertiary education as a percentage of total population (World bank, 2016). This variable is our proxy of human capital accumulation. The choice of the variable was inspired by Varblane and Vahter, who used the average share of people with upper secondary education. (Varblane & Vahter, 2005) We have used the share of people with tertiary education instead, mainly due to the compatibility with one of the goals for the "Europe 2020" strategy for smart, sustainable and inclusive growth.

u_i - fixed national effects,

$\varepsilon_{i,t}$ – error term for the country and time.

The impact of the EU budget on the economic convergence process of EU member states is estimated by using information about EU budget expenditure and revenue during the last two programming periods and 2014. In this case we are able to separate the influence of both sides of the EU budget, as opposed to using only operating budgetary balances. It should also be noted that the calculation of operating budgetary balance by the European commission is more elaborate than simple subtraction of the expenditure and contribution. The data used were figures on EU expenditure and revenue 2014-2020 (European commission, 2016),

recalculated per inhabitant (Eurostat, 2016). The variables capturing the EU budget effects include:

$ex_{i,t-1}$ - EU budget expenditure per capita for country *i* in the previous year in million EUR. This variable includes not only the structural and Cohesion fund expenditures, which are usually analysed in similar studies, but also all other expenditures that countries receive from the EU budget. This follows the idea, that all expenditures have the potential to contribute to the economic growth. The expenditures also include the pre-accession funding for countries entering the EU in the sample period. The data about expenditures represents realized payments.

$contr_{i,t-1}$ - EU budget contribution per capita for country *i* in the previous year in million EUR. EU budget contribution represents total national contributions to the EU budget, not including other EU revenues and traditional own resources, which are considered to be pure EU revenue rather than 'national contributions'. In this case we expect the coefficient β_6 to be negative, as the EU budget contribution should have detrimental effect on country's economic growth.

Our model also includes two dummy variables incorporating the effects of the EU enlargement on both the initial, as well as new member states.

D_{2004} – this variable is zero before and 1 after the year 2004, when 10 countries have become EU members.

D_{2007} – this variable is zero before 2007 and equal to 1 afterwards. It models the EU enlargement by Romania and Bulgaria, the least developed EU countries.

We did not include a further dummy variable for the Croatian EU membership, as the effects would not manifest themselves in our sample, which ends in 2014. Croatia has been included in our sample, as it has received pre-accession funding until its entry to EU in 2013.

The model represents a panel data approach with fixed effect. As shown by Islam a random effect specification is unacceptable under the neoclassical growth framework because it implies that individual effects are correlated with some regressors. (Islam, 2003)

2 Results

In this section, panel data analysis is performed to estimate the influence of EU budget on the real GDP growth per person employed within the countries of EU 28 (Tab. 1). The

regression results are mostly consistent with the predictions of the neoclassical growth theory. Coefficient β_1 for the lagged initial GDP per employed person variable is negative and highly significant. This confirms the hypothesis of conditional β-convergence for EU member states.

Tab. 1: Results of the fixed effects panel data model

	Coef.	*Std. Error*	*t-ratio*	*p-value*	
const	1.639	0.216	7.575	<0.0001	***
$\ln(y_{i,t-1})$	-0.149	0.019	-7.701	<0.0001	***
$\ln(inv_{i,t-1})$	-0.025	0.010	-2.608	0.010	***
$\ln(educ_{i,t-1})$	-0.006	0.013	-0.440	0.660	
$ex_{i,t-1}$	-0.000	0.000	-1.787	0.075	*
$contr_{i,t-1}$	0.000	0.000	0.810	0.418	
D_{2004}	0.020	0.004	5.135	<0.0001	***
D_{2007}	-0.010	0.004	-2.686	0.008	***
$\ln(n_{i,t-1}+g+\delta)$	-0.037	0.295	-0.124	0.901	

Note: The *,**,*** indicate significance at 0.1, 0.05 and 0.01 levels respectively. In this model, the LSDV R-squared = 0.47, within R-squared = 0.33, Durbin-Watson = 1.92. The hypothesis that the groups have a common intercept was rejected (F(27, 355) = 3.92 ***, p-value <0.0001).
Source: Own calculation.

The population growth rate follows the predictions of the Solow growth model as it is negative, but statistically insignificant. Investment ratio to GDP is negative and statistically significant, which is rather unexpected. This result may be due to economic cycle fluctuations (our time horizon was influenced by financial and economic crisis) and we have used annual growth rate and lagged values of explanatory variables. The empirical investigation for longer time periods might reach a different conclusion.

Our proxy for human capital accumulation has a negative and insignificant coefficient, which contradicts the endogenous growth theory. However, as shown by de la Fuente and Domenech it is not unusual to find that within panel data models, educational variables are insignificant or have an unexpected sign in growth regressions. The authors showed that these results might be caused by measurement error. They also showed, that „productivity growth has declined over time while both enrollment rates and schooling levels rose sharply in the last decades (especially in developing countries)“ (de la Fuente & Doménech, 2000). Negative sign on human capital variable according to these authors might be caused also by the omission of some other factors that may have caused slowdown of growth. Our opinion is

also, that people might prefer to prolong their studies in case of rising unemployment during a crisis.

The variables of most interest are related to the EU budget and its allocation to different countries. As we have expected, we have found that the contribution to the EU budget did not improve the countries' growth rates. These contributions approximately correspond to the economic development of countries and are not set progressively. On the other hand, the EU budget expenditures are targeted towards two largest policies – cohesion policy (Cohesion fund and structural funds) and common agriculture policy. There are also other expenditures for programmes promoting employment and growth (e.g. HORIZON, ERASMUS, COSME, CEF), which may also contribute to the economic growth. Even though studying the impact of various types of expenditures on growth might have easily been added to our analysis, we included only the mainline results for brevity. The coefficient corresponding to the EU budget expenditures per capita in our model is negative and significant. This means that the EU budget expenditure as a whole have negative impact on the growth rate of the countries.

As not all countries were member states during the whole period, we have augmented the regression by two dummy variables coefficients. Both of them were significant at 1% level. Coefficient for D_{2004} has a positive sign and D_{2007} a negative sign with can be influenced by other factors like economic crisis. The 2004 EU enlargement has thus been accompanied by positive development in old and new member states. This effect is not only related to the EU budget, which has been redistributed between an increasing number of members, but also to other factors influencing economic growth and convergence, such as free movements of goods and services, liberalization of capital and labour market, but also economies of scale, specialization, increased competition and so on.

Conclusion

In this paper we have estimated a model of beta convergence for the EU 28 during the period of 2000 – 2014. The model was based on standard variables included in the MRW model, like initial level of income (instead of GDP per working-age person we have used GDP per employed person), investment ratio to GDP, population growth rate, exogenous rate of technological progress, rate of depreciation and a proxy for the rate of human capital accumulation. Our approach differs from that of other authors in that we have incorporated the EU fiscal flows (expenditures and contributions of countries) as explanatory variables in a

setting of a panel data model. Our model also considers the effects of EU enlargement by including dummy variables affecting both the initial and new member states.

Annual GDP growth rates in the period 2000-2014 were negatively correlated with the initial GDP per employed person. The results confirm the results of other authors that variables conditioning the steady state of the country are significant, thus the countries approach their own steady state.

As we have expected, we have found that the contribution to the EU budget did not improve the countries growth rates. EU budget expenditures as a whole have negative impact on the growth rate of the countries. Our model can be easily extended to include the effects of different types of expenditures of the EU budget. For example, we can reasonably assume that there should be a significant effect of cohesion policy on convergence. We have also found that the 2004 EU enlargement has been accompanied by positive development in old and new member states.

Our empirical findings are influenced by relatively short time period due to the data availability. We have used annual growth rate (similar to Mohl & Hagen, 2010), instead of a 5-year averages (Islam, 1995), which may be less influenced by business cycle fluctuations and less likely to be serially correlated.

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