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AN ANALYSIS OF THE ECONOMIC CONVERGENCE PROCESS IN THE TRANSITION COUNTRIES

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AN ANALYSIS OF THE ECONOMIC CONVERGENCE PROCESS IN THE TRANSITION COUNTRIES

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Abstract

The paper is analysing the process of economic convergence of transition countries during the period 1995–2004. Within the analysed period unconditional β-convergence across the transition economies existed. We could also discover the reduction of dispersion of income levels between accession countries (sigma-convergence). Comparative analyses of the new EU member states (NMS) economic convergence with the previous entrants into EU (Ireland, Greece, Spain, and Portugal) revealed that NMS have been much more successful in their convergence process before joining EU.

Analyses of the macroeconomic, human capital, infrastructure indicators of the current accession countries compared with the previous cohesion countries indicated that the new members have been much better prepared to the enlargement. This allows drawing conclusion that the NMS face an opportunity to obtain

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much more rapid convergence process than expected by previous analyses, which have seriously undervalued the positive role of the pre-accession harmonisation process of NMS with the implementation of the major economic reforms in order to guarantee macroeconomic stability.

TABLE OF CONTENTS

INTRODUCTION

The concept of convergence was introduced into the analysis of transition economies a decade ago, but has gained more significance during the last few years, replacing the earlier restructuring-based approach. The present paper analyses the process of economic convergence in the transition countries during the last decade, attempting to ascertain what happened to their levels of economic convergence in the pre-accesion period. The paper also addresses the question about the role of integration in the process of long-term growth and further economic convergence within the European Union (EU), focusing on the new member states that joined in spring 2004. In order to answer the questions posed, the paper is structured as follows. It begins by identifying the definitions of convergence, reviewing different concepts of convergence and various research methodologies used. The next section discusses the links between the theory of growth, economic integration, and convergence, providing illustrative examples from empirical research. Thereafter the process of convergence among the current new EU members during the last decade is analysed, using descriptive statistical methods and econometric modelling. Next the experience of previous enlargements from the point of view of convergence is analysed. In the following section, data from previous sections are used for comparing the initial situation of the countries from previous enlargements, producing some calculations about the potential speed of convergence of the new and old EU members. Finally, some conclusions are drawn on the basis of the results of the analysis.

1. Theoretical framework

Convergence is a concept that has gained popularity among economists, not only because of the importance of the issue about poor countries catching up with rich ones, but also because this analysis can serve as a way to verify the validity of different growth models.

Convergence is a process that may be analysed from various aspects. Real convergence describes the convergence of income levels, nominal convergence reflects the convergence of price levels, and institutional convergence implies harmonisation of legislation. In addition one can also speak about the convergence of business cycles, consumer behaviour, social stratification, and so on.

In order to understand the current trends in the dispute over convergence, it is very helpful to use the classification proposed by Islam, 2003: 309–362. The whole discussion may be described in the form of the following seven dichotomies:

1. Convergence within an economy vs. convergence across economies;
2. Convergence in terms of growth rate vs. convergence in terms of income level;
3. Beta (β) convergence vs. sigma (σ) convergence;
4. Unconditional (absolute) convergence vs. conditional convergence;
5. Global convergence vs. local or club-convergence;
6. Income-convergence vs. total factor productivity (TFP)-convergence;
7. Deterministic convergence vs. stochastic convergence.

In the following part of this section some of these dichotomies are analysed in the light of two growth models. However, in the framework of the paper this discussion is connected with the question: does integration help reduce the gap in income levels of the countries belonging to the same integrated region? In fact it concerns the potential for asymmetric gains from joining a regional integration club.

In the recent growth literature one can clearly distinguish two main lines of thought. During the period from 1956 until the mid-1980s, the leading theory was clearly the Solow-Swan exogenous growth model (Solow, 1956). According to neo-classical theory, an economy converges towards a steady state[3] due to diminishing returns to investment in physical capital. In this framework, it is assumed that countries are equal in all aspects but their initial levels of capital per capita (physical and human), and poor countries have higher marginal capital productivity than rich countries. Consequently, poor countries will grow much more rapidly than rich countries and this process will end with the equalisation of the countries' per capita outputs. In the convergence literature this is known as the absolute or unconditional convergence hypothesis, Convergence in terms of both growth rate and income level is called β (beta) convergence. Beta-convergence is typically tested by regressing the growth measured as gross domestic product (GDP) per capita purchasing power parity (PPP) on the initial relative level across a cross-section of countries (regions). The name of this type of convergence is derived from the coefficient of the initial income variable in these regressions (β) and is supposed to be negative if the hypothesis holds.

Unfortunately, the empirical analyses often failed to support this belief. For example, World Bank economists discovered that the growth rates per capita, defined in terms of persons in the labour force, show little correlation with the starting levels of GDP per capita in a sample of over 80 countries for the period 1965–89 (Barbone, Zalduendo, 1996:6). Similar results were obtained also by other authors working with different data sets (Barro, 1991).

Unsuccessful attempts to show absolute convergence stem from the most important assumption of the neoclassical growth model that the long-term growth rate is solely determined by the

[3] The economy's steady-state — the point toward which it will head, and at which it will remain is that point on the production function where the output-to-capital ratio (and the capital-output ratio, its inverse) is equal to its steady-state value.

rate of technological change, which is expected to be exogenous. It implies that no resources are needed to generate technological innovation — imitation is always an available alternative, the benefits of innovation are shared equally between economic agents, and nobody pays any compensation for gaining advantages from it.

In general, the neoclassical model assumes that countries are similar in all other ways than their per capita physical and human capital. In reality there exists a great variety between countries with regard to factors relevant for growth. This also implies that each country may have its own steady level of growth. A major question concerns the factors which are relevant in order to differentiate between countries by their individual growth patterns. As a starting point the Solow growth model can be taken by assuming a Cobb-Douglas type of production function,

$$Y_t = K_t^{\alpha} (A_t L_t)^{1-\alpha}, \tag{1}$$

where: Y = Output; K = Capital, L = Labour, A = Total Factor Productivity.

The steady state level of per capita income y^* is given by

$$y^* = A_o e^{gt} \left[s/(n+g+\delta) \right]^{\alpha/1-\alpha}, \tag{2}$$

where s is the investment rate, while g and n are assumed to be the exponential growth rates of A_t and L_t, respectively (Islam, 2003).

The formula clearly indicates that a country's steady-state-income level depends on A_0, s, g, n, δ and α. In the event of unconditional convergence, all these factors should be the same for all countries. Producing the initial growth-level based regression; this means that the sign of β should be negative even if no other variable is included on the right-hand side. The theory opposite to conditional convergence accepts the idea that

the steady-state of countries could be different and consequently the regression model should contain other variables than the initial income level. This allows an estimation of the impact of different factors.

The model described above suggests that the convergence hypothesis may hold for countries with relatively similar starting positions. In addition, the convergence hypothesis could function in countries with similar economic, political and social environments. This idea was realised in convergence theory as the concept of club-convergence. According to this concept, countries with relatively similar conditions tend to converge. This has also been called sigma (σ) convergence, meaning that during the process of growth the income levels of countries will become more equal and the variation between their per capita GDP levels will gradually lessen. Countries with very different conditions will not converge, but if certain economic policy instruments should allow for eliminating the differences in their conditions, then the countries may turn out to converge.

However, according to the Solow growth model, changes in economic policy will have only a temporary effect on economic activity, that is, they cannot drive long-term growth. Technology, which is the key driver, is available freely and therefore is considered as a public good. All countries share the same long-term growth rate which is determined by technological progress. When applying this model to the integration context it produces contradictory results. Opening up the country (region) — in the framework of an integration process — should accelerate the convergence process, as capital should flow to capital-scarce countries (regions) to benefit from higher returns. This was the line of reasoning adopted in the classical work by Viner, 1950 about the creation of customs unions. These models forecast that the income and price levels of the members of a regional bloc will converge when customs unions lower trade barriers. The main mechanisms are trade and international factor mobility. On the other hand, applying a neoclassical model to integration may in the long run lead towards an unchanged path of steady growth. The impact of integration in the form of a

reallocation of resources will only once affect the growth rate, and later each country will move along its own steady growth path.

In the mid-1980s, a new branch of economic growth theory, endogenous growth theory, was proposed (Romer, 1986, 1990). Technology that was formely considered a public good and exogenous became now endogenous and subject to decision-making process at individual firms. Firms have an incentive to invest in research as the development of new technologies assures them of the possession of temporary monopoly power. However, the absorption of monopoly rents is limited as the knowledge is only partially excludable (see e.g. in Crespo et al, 2002). According to the new growth theory the creation of the newly enlarged market allows better utilization of the economies of scale effect and this will have a lasting positive effect on growth. Instead of the diminishing returns to investment stipulated by the Solow model, in the new growth model the knowledge spillovers produce increasing returns to scale to capital accumulation. In view of endogenous growth theory the economic integration of Europe could generate increasing scale effects and thus ensure higher long-term rates of growth. The new enlargement of the EU in May 2004, according to the new growth model, is likely to have a positive impact on the growth of both new and old members as a result of a more large-scale integrated economy. Within the framework of the endogenous growth model, several types of approach could be distinguished. These include models featuring externalities resulting from linked capital-and-knowledge accumulation (Romer, 1986), accumulation of human capital (Lucas, 1988), as well as growing stock of existing product designs, or horizontal differentiation between products (Grossman, Helpman, 1991). An important line of thought was added by Abramowitz, who argued that in order to use new technologies not only technological absorption capacity but also the so-called social capability is needed, which includes human capital, infrastructure and institutional settings (Abramowitz, 1986).

According to the new theory of endogenous growth, there may not be convergence. Lack of adequate social capability can be a serious barrier to it. In addition, for example, Lucas, 1988 showed that under the conditions where human capital with increasing returns is the main driving force of economic growth, the possibility of a brain drain acting as a vehicle of cross-country growth divergence is considered. Other authors insisted that research and development (R&D) and human capital creation, being the most important engines of growth, would also cause growing inequality between countries and, instead of convergence on the global scene, divergence could start to dominate as poor countries have much less resources to invest in these areas (Romer, 1986).

2. Empirical works about economic growth and integration

The most frequently cited study of absolute (unconditional) convergence was performed by Baumol, who based it on sample data of 16 OECD members (Baumol, 1986). An interesting conclusion of his research was about the dependency of the absolute convergence hypothesis on the sample used. From the original OECD sample, Baumol obtained a significant negative coefficient of the initial income variable in a classical growth — initial level regression. Hence the result supported the existence of absolute convergence. However, in another research (Baumol et al, 1994), the outcome of using the same methodology on the sample of over 70 countries was that convergence does not exist. In fact, the results of these two empirical studies supported the idea of the existence of club-convergence. Countries functioning in relatively similar economic, political and social environments come closer to one another in respect of their income levels. Later, World Bank economists discovered that a sample of over 80 countries for the period 1965–89 provided no evidence of unconditional convergence (Barbone, Zalduendo, 1996).

Following the seminal work of Baumol, many authors have tried to investigate conditional convergence, which means that besides keeping the neoclassical framework of including in the model the initial income variable, capital and labour, they added some other factors explaining the process of convergence. In Islam, 2003 is presented a good overview of various research attempts. In the current framework one will mention only the studies by Kormendi and Meguire, 1985, and Grier and Tullock,1989, which were based on a broad sample of countries, representing both developed and developing countries. Kormendi and Meguire's result supported absolute convergence, but Grier and Tullock received different results according to the factors included into the model.

In the early 1990s, empirical papers concentrated on the use of the ideas of the new growth theory in the analysis of the convergence process (Barro, Sala-i-Martin, 1992; Barro, Lee, 1993; Barro, Sala-i-Martin, 1995). Most importantly, human capital and innovation indicators were included into the models. In Barro, Sala-i-Martin, 1992 and 1995 was not used the neoclassical model; instead was applied the view that growth, investment, and fertility were simultaneous processes. In view of this simultaneity, was ran separate sets of regressions with growth, investment and fertility as dependent variables. Main growth regressions did not include physical capital and labour as explanatory variables. Human capital was used heavily − it was significant and important in all models. Barro also checked the validity of the unconditional convergence hypothesis. Using a sample of 98 countries, he failed to get support to this hypothesis. However, when he added into the model the variables of the initial level of human capital regression, coefficient β became important and significant. From these results Barro concluded that the data support the convergence hypothesis in a 'modified sense'. In fact this meant verification of conditional convergence.

The next advance in empirical research was associated with the empirical studies that paid a lot of attention to innovation as a factor of growth. Diffusion of technology via foreign trade and

foreign direct investments (FDI) was heavily analysed, but results were controversial (Nadiri, 1993; Blomström, Wolff, 1994).

From the point of view of the potential impact of EU accession on the speed of the convergence process in the joining countries, it is interesting to review empirical literature which combines growth models with integration. It rather clearly reflects the advances in econometric modelling. During the first stage of this research, the majority of papers were written using the cross-section approach. The authors tried to reveal extra growth stemming from EU accession (Landau, 1994). Many comparative papers were written, looking at the countries that had joined the EU and the countries left outside. The majority of the studies found no such extra growth effects (See overview in Crespo-Guaresma et al, 2002).

The next stage in the analysis of the links between growth and integration arrived together with the use of the panel approach, which allowed analysing the current EU members using extensive time plus cross-sectional data sets. This provided an opportunity to bring forth the differences between the countries who were EU members and those who were outside. There were mixed results as, for example, Vanhoudt, 1999 did not find evidence of a significant long-term extra growth associated with EU membership. His research was executed on the basis of panel data regressions of 23 OECD countries. Interestingly enough, his results did not support the hypothesis about a scale effect caused by integration on economic growth. Vanhoudt concluded that the neoclassical hypothesis cannot be rejected by the data. On the other hand, the study by Henrekson and Torstensson, 1998 identified positive and statistically significant effects of European Community (EC) and European Free Trade Association (EFTA) membership on economic growth estimated from cross-sectional growth regressions for a sample of 115 countries. These analyses were all post factum type of research. Especially strong attention was paid to research on the impact of joining the EU on the economic growth and

convergence of Spain, Portugal, Ireland and Greece (Martín, Velázquez, 2001; Martín, Sanz, 2003).

3. Analysis of absolute and conditional convergence of the accession countries

The following section analyses the convergence process in the EU accession countries. The list of the countries includes eight transition countries which joined the EU in May 2004, plus Bulgaria and Romania that are invited to join during the next enlargement round. The timeframe covered starts with 1990, but due to the extremely poor quality of data from such an early period of transition, the majority of indicators used derive from 1992 and later, and the sigma-convergence analysis data from 1995.

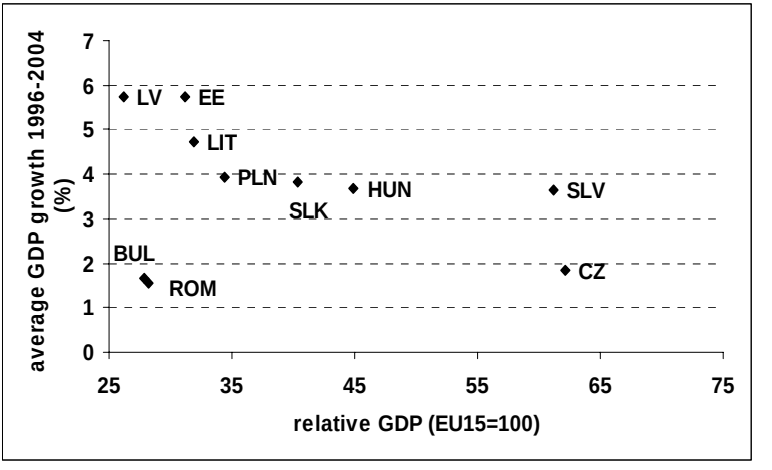

Figure 1. The accession countries' initial real GDP per capita levels in 1995 vis-à-vis the EU 15 level (in per cent) and their average GDP growth in 1996–2004 (Eurostat, 2005).

As has already been noted above, according to the absolute convergence (β-convergence) hypothesis, poor countries will grow much more rapidly than rich countries and this process will end with the equalisation of these countries' GDP per capita. Figure 1 presents data about the accession countries' initial levels of real GDP per capita in PPP terms vis-à-vis the EU level and their average annual GDP growth. There are two countries — Romania and Bulgaria, whose position in the figure clearly contradicts the absolute convergence hypothesis. The other countries are located according to the principle of unconditional convergence.

In order to obtain a deeper understanding of the convergence process among the countries in the sample, three sub-periods were chosen: 1992–1996, 1997–2000 and 2001–2004. The choice of these periods was prompted by the idea that the restructuring process and U-shaped growth experienced by transition countries will be responsible for different types of factors supporting growth during that period. During the first period, most countries in the sample were experiencing macroeconomic shocks; the second period was that of heavy privatisation and reorientation of trade, while the third period represents a certain macroeconomic stability combined with efforts to produce structural reforms required by EU accession.

Here one will attempt to assess the validity of the absolute convergence hypothesis, using first a descriptive data analysis and later panel-data analysis. In order to illustrate the speed of convergence of the accession countries, Table 1 and Figure 2 were constructed, to compare the income levels convergence process of the accession countries between 1995 and 2005. The data for 2004 and 2005 were taken from Eurostat and the Vienna Institute for International Economic Studies (WIIW) forecasts. This period was the most rapid process of reducing the gap between the income levels of the EU and the Baltic countries — Estonia 17.8 per cent, Lithuania 15.9 per cent, and Latvia 13.9 per cent. The closely following group of countries involved Hungary and Slovenia, who managed to reduce the

gap with EU average by 12.2 per cent and 11.2 per cent, respectively.

Table 1 also gives the results of the analysis of sigma (σ) convergence, meaning that during the process of growth, the income levels of the countries become more equal and the variation between their GDP levels per capita decreases.

In order to test these ideas, standard deviations were calculated for all the accession countries and also for two subgroups — the so-called Luxembourg and Helsinki groups of countries.[4] This classification has only a historical meaning now, but in the late 1990s it gave a different signal to the countries about their rate of progress towards joining the EU and launching certain reform processes in the groups at various speeds. So, one might expect that the Luxembourg group countries would converge more quickly with one another. In reality the Luxembourg group was rather heterogeneous in 1995, and by 2005 the convergence within the group had been significant — the standard deviation decreased from 14.5 to 11.6. The Helsinki group, on the other hand, was much more homogeneous at the beginning of 1995 and has experienced no convergence within the group.

The results from Figure 2 allow the comparison of the data about the convergence process of the countries that joined the EU in the 1970s and 1980s with the data of the recent accession countries. The lower part of each stake in Figure 2 indicates the initial GDP levels of the accession countries vis-à-vis the EU-15 level in 1995, and the same for the cohesion countries vis-à-vis the EU-12 level at their moment of entry.

[4] Classification of EU candidate countries into Luxembourg and Helsinki group was derived by the EU summit meetings accordingly in 1997 Luxembourg and in late 1998 in Helsinki were invitation to join EU was given to group of countries given in table 1.

Table 1. The accession countries' convergence with the EU level

	Convergence level – GDP at PPP from EU average in % (EU=100)			**Speed of convergence (reducing the GDP gap with EU in %)**
Luxembourg group	1995	2000	2005	1995–2005
Slovenia	61.2	66.4	72.4	11.2
Poland	34.4	41.7	44.3	9.9
Hungary	44.9	48.8	57.1	12.2
Estonia	31.2	37.6	49	17.8
Czech	62.2	59.6	66	3.8
Helsinki group	*1995*	*2000*	*2005*	*1995–2005*
Slovakia	40.3	43.8	49.2	8.9
Romania	27.9	23.1	30.7	2.8
Lithuania	31.9	35.8	47.8	15.9
Latvia	26.2	31.5	40.1	13.9
Bulgaria	28.2	24.5	32	3.8
σ-convergence in the Luxembourg group	14.54	12.06	11.63	10.98
σ-convergence in the Helsinki group	5.65	8.50	8.60	9.06
σ-convergence in the total group	13.35	14.07	13.45	10.02

Source: own calculations based on Eurostat and WIIW.

The upper part of each stake in Figure 2 denotes by how many percentage points the accession countries converged with the average EU level in 1995–2005 and by how much did the cohesion countries do likewise in a period of the same duration. The starting position of Spain, judging by the income level relative to the EU-12 average in 1985, was practically the same as that of Slovenia in 2004. Ireland and Greece were at the time of joining the EU comparable to the Czech Republic and Hungary more recently. Portugal was slightly above the current income levels of Slovakia, the Baltic countries and Poland.

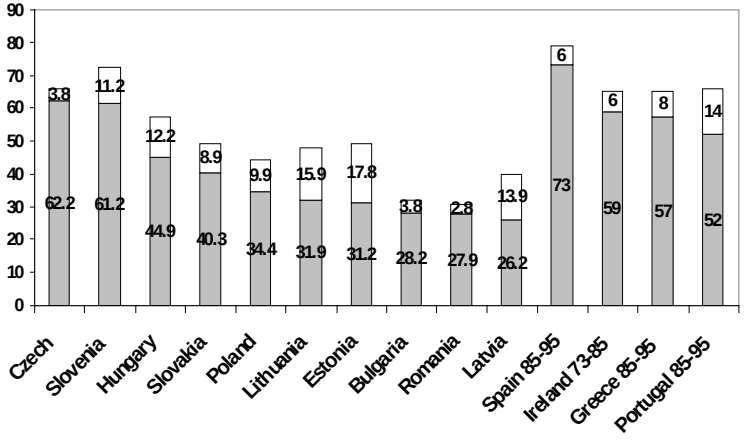

Figure 2. The real convergence process among accession countries in 1995–2005 and EU cohesion countries after joining the EU[5]

The following figure 3 compares not only accession countries but also other transition countries with EU-15 in terms of the cumulative real GDP growth, 1995 being the base year. It appears from figure 2.3 that the Central European accession countries and especially the Baltic countries clearly outperformed the cumulative growth of EU-15. Within the period 1995–2002, the total real GDP growth was 16.7 per cent in EU-15, 42.4 per cent in the Baltic countries and 26.7 per cent in the Central European group of accession countries. The recent 2003 data about the Baltic countries with nearly 6 per cent average growth, compared to the 0.4 per cent growth in the EU, suggest that the trend is continuing.

[5] The lower part of stakes shows the percentage of the accession countries' initial GDP levels vis-à-vis the EU average in 1995 and the same of the cohesion countries at their entry. The upper part shows the total convergence with the average EU level in PPP during the analysed period. Data for 2004 and 2005 are based on Eurostat forecasts.

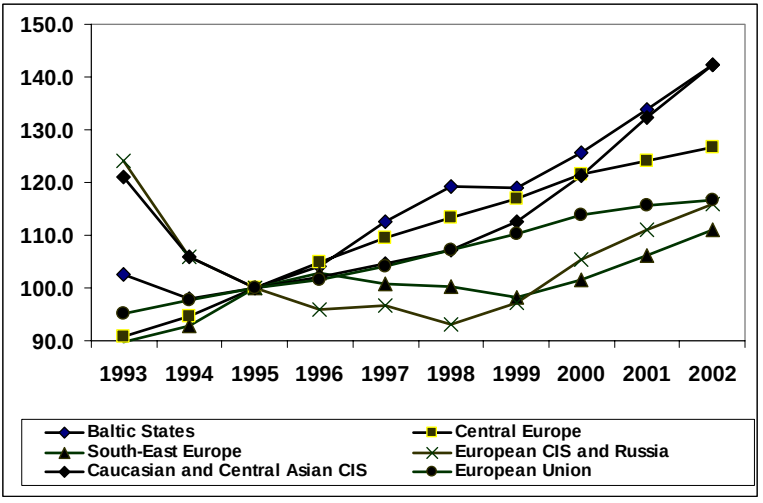

Figure 3. Real GDP growth in different groups of transition countries compared with EU-15 (cumulative growth in per cent, 1995=100).

4. Econometric modelling of conditional and unconditional convergence among transition countries

In order to study unconditional or β-convergence, the following framework will be used (Crespo-Cuaresma et al., 2002).The data of transition countries will be divided into three subperiods (1993–1996, 1997–2000, 2001–2004, with the data for 2004 being forecasts from WIIW, Eurostat and Deutsche Bank) and the β parameter in a panel regression model will be estimated as follows:

$$\left[\ln(y_{Tt,i}) - \ln(y_{0t,i})\right] / n_t = \alpha + \beta \ln(y_{0t,i}) + u_{t,i}, \qquad (3)$$

where $y_{Tt,i,}$ means the ratio of country *i's* real per capita GDP to EU's (15) per capita GDP level (EU level = 100) in the last year

of subperiod t (t =1,2,3 for each of the sub-periods as given above), $y_{0t,i}$ means the value of this ratio in the initial year of sub-period t, n is the number of years in period t (n = 4 in our analysis).

Panel data have several advantages for analysis, such as more observations (pooling of cross-sectional and time-series data), a larger number of degrees of freedom (stemming from more observations), and reduced multicollinearity (Wooldridge, 2002: 1–11). These advantages lead to improved efficiency of econometric analysis. More observations and thus a larger degree of freedom in econometric analysis (by comparison with cross-section or time-series analyses) are crucially important if data for transition economies are used, as the observations are not abundantly available. With panel data it is possible to control for the other factors that vary across entities but do not vary over time.

Some econometric concerns should be addressed before estimating the presented model of this study. The first problem is the choice of the method for estimation based on panel data: whether one should use the simple pooled least squares model (pooled LS), or the random effects, or the fixed effects model. The pooled LS has many disadvantages if panel data are used: it assumes that the error term is independent of the cross-sectional units (countries) and *iid* (individually and identically distributed) normal, it does not take into account the time-invariant country-specific effects that are likely to exist if panel data are employed. Taking no account of these effects (if they exist), that is, simply running ordinary LS for pooled data, would lead to biased and inconsistent estimation results. A common remedy could be to use random effects (RE) or fixed effects (FE) models instead. Both of them include object-specific time-invariant effects, but have different assumptions about their essence.[6] An FE model assumes that differences across

[6] In case of the random effects model, the country specific constant terms are viewed as randomly distributed across cross-section units (that is countries). See, for example, Wooldridge, *Econometric Analysis of Cross Section and Panel Data*; pp. 257–262.

countries can be captured into differences in the constant term. The fixed effects model is most widely used. It is a reasonable approach when the differences between countries can be viewed as parametric shifts of the regression function.[7]

The model was estimated for different specifications, including pooled least squares and a fixed effects estimator, that is, depending on different assumptions about the error term. The estimation results are presented in Table 2. The parameter of the initial GDP ratio to the EU level is insignificant and zero in case the pooled least squares method is used for estimation, so no unconditional β convergence could be found by means of this method.

Table 2. Unconditional β convergence, transition countries 1993–2004

	Pooled LS	Fixed effects
B	–0.0046 (0.707)	–0.1214 (0.005)*
Constant	0.0278 (0.535)	0.4540 (0.004)*
Observations	30	30

Note: p-values in parentheses; * — stands for 1 per cent significant.

However, if a fixed effects model that takes into account possible country-specific time-invariant effects (that is, captures also the country-specific aspect explaining the convergence process in accession countries) is estimated, one finds statistically significant and negative values for parameter β. This means that there is a negative correlation between the initial ratio of the countries' per capita GDP to the EU level and its subperiod average yearly growth rate; thus there exists unconditional β convergence across the transition economies for the period 1993-2004.

[7] W.H. Greene, *Econometric Analysis* (New Jersey, 1993), pp. 466–469.

As a next step, in addition to the initial level of GDP, new variables could be added in order to involve other determinants of convergence and also to capture better the country-specific aspect explaining the convergence process in accession countries. This approach would allow certain forecasts about the impact of joining the EU on these factors to be made and accordingly calculate the speed of convergence under the assumption of including changing factors in the model. Unfortunately, adding additional independent variables into the regression would require a larger number of observations than it is possible to employ for the transition economies. The number of observations in this analysis is only 30 (ten countries, three subperiods); inclusion of a number of exogenous variables and possible fixed effects would reduce the degrees of freedom so much that one would probably be unable to make significant inferences about the effects of these exogenous variables.

Table 3. Conditional β convergence, transition countries 1993–2004

	Pooled LS	**Fixed effects**
$\ln(y_{0t,i})$	0.0021 (0.872)	–0.1585 (0.003)***
$GFC_{t,i}$	–0.0019 (0.164)	–0.0041 (0.071)*
$EXPTOGDP_{t,i}$	0.0006 (0.165)	0.0003 (0.753)
$INFL_{t,i}$;	–0.00003 (0.760)	0.0002 (0.865)
Constant	0.0223 (0.666)	0.4997 (0.008)
F–statistic	F(4, 25)=0.76	F(4, 16)=4.11
Observations	30	30

Note: p-values in parenthesis; ** — stands for 1 per cent significant, * — stands for 10 per cent significant.

In the modelling process, major determinants of long-term growth can be added on the basis of the economic growth literature. In the current analysis the following explanatory variables was used:

1. The initial level of GDP per capita (log) (evaluated in the first year of each sub-period) — $\ln(y_{0t,i})$;
2. The gross fixed capital formation (average of the sub-period) — $GFC_{t,i}$;
3. The share of people with upper secondary education (average of the sub-period) — $ED_{t,i}$;
4. Openness of the economy (measured by the ratio of export to GDP, average of the sub-period) — $EXPTOGDP_{t,i}$;
5. Euromoney country credit risk ranking — $EUROMONEY_{t,i}$;
6. The inflation rate (consumer price index — CPI, average of the sub-period) — $INFL_{t,i}$;
7. Total population having completed at least upper secondary education (aged 25–64, average of the sub-period) — $YOUTHEDU_{t,i}$.

The specification of the model is presented with $\ln(y_{0t,i})$, $GFC_{t,I}$, $EXPTOGDP_{t,I}$, $INFL_{t,i}$ as exogenous variables. Including these variables and including all the variables from the list above yields the same results, namely that all variables except initial level of GDP per capita and gross fixed capital formation prove to be not statistically significant. This does not mean that these variables do not affect the convergence, but the result is due to the few degrees of freedom (25 for pooled least squares and 16 for a fixed effects model) and the small number of observations in this dataset. Including these control variables will not change the finding of the unconditional convergence model — in the case of a fixed-effects model β is still negative, thus indicating β convergence.

5. Comparison of economic convergence of the current new members of EU with the previous cohesion countries

Over the last decade, studies of the effect of EU accession have stressed at least four groups of effects. Trade effects appear most rapidly, which means that as a result of abolition of the

existing import tariffs, the allocative effect of trade costs will help to use resources more efficiently. The second type of effect is related to the free movement of productive factors. In this respect, there are two main vehicles — the movement of capital in the form of FDI flows and the movement of labour. The third type of effect is associated with the creation of a single market and reveals itself in the improvement of efficiency and in a much stronger price and non-price competition. The fourth type of effect may be called the accumulative effect of enlargement, which means that countries joining with a lower income level enjoy the transfer of funds boosting their convergence process.

In the following part of the paper on the analysis of the convergence experience of the countries that joined the EU between 1973 and 1986 — Ireland, Greece, Portugal and Spain — will be concentrated. The aim is to show how quickly after joining the EU the convergence process of these countries started to accelerate owing to the implementation of structural funds and since 1994 the specially designed Cohesion Fund. Subsequently the starting positions of the cohesion countries are compared with those of the accession countries.

The following Table 4 gives a general picture about the medium-term growth performance of the countries that joined the EU from the very beginning of integration in Europe until the current enlargement. According to the results of Table 4, from among the member states of the EU, seven out of 14 experienced acceleration in growth after their accession by comparison with the pre-accession growth trend.[8] On the other hand, six out of 14 suffered a decrease in post-accession growth rates, while the effect for France was roughly neutral.

[8] See, for example, T. Brodzicki, *In search for accumulative effects of European economic integration* (Bologna: Paper prepared for the Second Annual Conference of the European Economic and Finance Society 'European Integration: Real and Financial Aspects', May 2003), p. 6.

Table 4. Medium-term growth performance before and after accession to the EC/EU

Countries	Year of accession	Real GDP growth rates (5-year averages)		
		Before accession	After accession	Absolute change
Belgium		2.92	3.18	0.27
France		3.84	3.83	–0.01
Italy		4.83	6.29	1.47
Netherlands		5.48	2.04	–3.44
Luxembourg		2.89	1.11	–1.78
Initial members	1958	*3.99*	*3.29*	*–0.7*
United Kingdom		2.47	1.98	–0.49
Denmark		3.33	0.97	–2.36
Ireland		4.11	3.17	–0.94
1st enlargement	1973	*3.76*	*2.87*	*–0.89*
Greece		2.61	–0.62	–3.23
2nd enlargement	1981	*2.61*	*–0.62*	*–3.23*
Spain		0.47	4.14	3.67
Portugal		0.37	5.79	5.42
3rd enlargement	1986	*0.42*	*4.97*	*4.55*
Austria		1.61	2.11	0.50
Finland		–2.31	4.31	6.62
Sweden		–0.7	2.81	3.51
4th enlargement	1995	*–0.47*	*3.08*	*3.55*
5 th enlargement	2004	*3.02*	*?*	*?*

Source: T. Brodzicki, *In search for accumulative effects of European economic integration* (Bologna: Paper prepared for the Second Annual Conference of the European Economic and Finance Society 'European Integration: Real and Financial Aspects', May 2003), p. 6; and own calculations.

Despite the positive average effects for all the 14 countries considered (an increase of 0.66 per cent)[9] the stylized facts are therefore inconclusive as to the mid-term growth impact of accession. The calculation is of course too simple, in terms of its assumptions about 'what might have been'. Clearly, shifts in the world economic environment also affected the growth indicators of these countries, and therefore the conclusion could be that accession to EU alone will not guarantee a mid-term improvement in growth performance.

In the framework of current paper, the growth experience of Ireland, Spain, Portugal and Greece is of serious interest. Irish 5-year average growth after accession in 1973 was almost 1 per cent and Greece's growth after 1981 3.2 per cent lower than before joining the EU. Spain and Portugal, however, experienced respectively a 3.6 per cent and 5.6 per cent increase in average growth rates after joining the EU. Moreover Ireland grew very rapidly after 1990, thanks partly to EU structural funds (see below). Table 5 produces the necessary data for analysing the convergence of the income levels of these countries to the EU average level. Several conclusions may be drawn on the basis of this information. Firstly, it shows clearly that, until 1990, the convergence process of these countries with the EU average level was very weak. Secondly, it describes how much the paths of convergence of these countries have diverged. On one side is Ireland with its extremely rapid convergence with the EU and on the other are Spain, Greece and Portugal with a slower convergence process.

[9] See, Brodzicki, *In search for accumulative effects of European economic integration*, p. 5.

Table 5. Relative per capita GDP of the cohesion countries in 1960–2005 vis-à-vis the EU average level (EU12=100 until 1990 and EU15=100 afterwards)

	1960	**1973**	**1985**	**1990**	**1995**	**2000**	**2005**
Ireland	61	*59*	65	69	90	115	121
Spain	60	79	*73*	78	79	83	89
Greece	39	57	*57*	53	65	68	76
Portugal	39	56	*52*	56	66	70	70
Four countries-average	50	63	62	64	75	83	89

Source: E. O'Leary, 'The convergence performance of Ireland among EU countries: 1960 to 1990', *Journal of Economic Studies*, 24/1/2 (1997): 43–58; and own calculations from Eurostat. Data for 2005 based on Eurostat forecasts.

The acceleration of the convergence process during the 1990s can be explained by the implementation of the structural funds since the enlargement in 1986 and also the launching of the Cohesion Fund in 1994 with a special aim to support the convergence of poor countries. The financial intervention supporting cohesion (=convergence) makes up around one third of the EU budget. The four countries eligible for extra support from the Cohesion Fund benefited from EU support to various degrees. The following table 6 presents the share of EU financial support in the GDP and gross fixed capital formation of these countries. The support to Greece and Portugal has been invariably high, ranging around 3 per cent annually, while in case of Ireland it has declined from 2.5 per cent to 0.6 per cent and in case of Spain it has been stable around 1.5 per cent per year.

Table 6. Economic effects of the structural and cohesion funds. Share of EU funding in the GDP and gross fixed capital formation (in per cent)

	Greece	**Ireland**	**Spain**	**Portugal**	**Four cohesion countries**
Share of EU funding in the GDP in per cent					
1989–1993	2.6	2.5	0.7	3.0	1.4
1994–1999	3.0	1.9	1.5	3.3	2.0
2000–2006	2.8	0.6	1.3	2.9	1.6
Share of EU funding in gross capital formation in per cent					
1989–1993	11.8	15.0	2.9	12.4	5.5
1994–1999	14.6	9.6	6.7	14.2	8.9
2000–2006	12.3	2.6	5.5	11.4	6.9

Source: Unity, solidarity, diversity for Europe, its people and its territory: Second report on Economic and Social Cohesion (Luxembourg, 2001), p. 122.

The data in table 6 reflect only transfers from the structural funds and consequently do not fully describe the entire financial support extended to the cohesion countries. For example, it excludes the whole transfer mechanism the Common Agricultural Policy and its role in supporting the convergence process in the EU. Hence a new table 7 has been constructed using the net budget approach, deducting from the gross revenues national payments to the EU budget. Table 7 gives an insight into how strong financial tools were used in order to support the convergence process in the EU-15.

The net support documented in the table 7 indicates that the current accession countries will not be able to benefit from EU financial support to the same degree as the cohesion countries up to year 2000. The potential package of support is limited by the structural funds with the 4 per cent of GDP limit. If one also

considers the compulsory payment of 1.1 per cent of GDP to the EU budget, the *maximum* net support from the EU may be no more than 3 per cent.

Table 7. Annual net budgetary balance in three financial planning periods (per cent of GDP)

	1989–1993	**1994–1999**	**2000–2001**
Belgium	–0.3	–0.4	–0.6
Denmark	0.3	0.0	–0.2
Germany	–0.6	–0.6	–0.5
Greece	*4.3*	*4.0*	*3.4*
Spain	*0.5*	*1.2*	*0.9*
France	–0.2	–0.1	–0.2
Ireland	*5.2*	*3.2*	*1.2*
Italy	–0.1	–0.2	–0.1
Luxembourg	–0.6	–0.5	–0.6
Netherlands	–0.1	–0.8	–0.9
Austria		–0.3	–0.3
Portugal	*2.3*	*2.8*	*1.5*
Finland		–0.1	0.0
Sweden		–0.4	–0.6
United Kingdom	–0.3	–0.3	–0.3

Source: *Unity, solidarity, diversity for Europe, its people and its territory: Second report on Economic and Social Cohesion* (Luxembourg, 2001), p. 128

As the next step in the analysis the starting situations of Ireland, Spain, Portugal, Greece and the 2004 accession countries on the eve of joining the EU will be analysed. The aim is to ascertain the level of preparedness of the current enlargement countries and to obtain a certain understanding from the analysis about how successful integration into the EU may be for the new members.

The starting positions of the cohesion countries will be analysed in terms of following aspects

1. Initial growth experience — the economic convergence before joining the EU;
2. Macroeconomic stability — measured here as inflation rate;
3. Openness — the share of export of goods and services in the GDP;
4. Propensity to invest — Gross fixed capital formation in the GDP;
5. Attractiveness to foreign investors — FDI stock in the GDP;
6. Quality of human capital — measured by two indicators: total population which has completed at least upper secondary education (from people aged 25−64, per cent); youth education attainment — people aged 20−24 who have completed at least upper secondary education;
7. Employment level;
8. Use of telecommunication infrastructure — internet users.

The information needed for this type of comparison is presented in tables 8 and 9. The economic convergence data about previous cohesion countries were obtained from Barry, 2003, who used 12 years period and therefore it was impossible to use for 2004 accession countries similar length of period. Therefore the period for the latter group of countries was shorter by one year. While table 8 concentrates on macroeconomic indicators, table 9 involves human capital and infrastructure development. The results of table 8 reveal a much better starting situation of the 2004 accession countries by comparison with the previous cohesion countries. The previous pre-entry convergence experience is completely different in the two groups of countries. Ireland's relative income level decreased by 2 per cent compared with EU average during the 12-year period before joining the EU, Spain underwent a 6 per cent decrease, Portugal 4 per cent, and Greece had virtually no catching up at all. The 2004 accession countries have been much more successful and their convergence process is very dynamic, the convergence of income ranging between 3 and 16 per cent.

Table 8. Comparative analysis of the starting situations of the previous cohesion and current accession countries — macro-economic indicators

	Economic conver-gence prior to joining the EU (%)	**Inflation, CPI (%)**	**Share of export of goods and services in the GDP (%)**	**Gross fixed capital formation from GDP (%)**	**FDI inward stock in the GDP (%)**
Slovenia	11	6	57	22.62	23
Czech R.	4	3.5	62	25.91	55
Hungary	12	5	66	23.4	38
Slovakia	9	8.8	75	27.62	43
Poland	10	1.1	31	19.01	24
Estonia	17	1.4	89	28.53	66
Lithuania	16	1	56	20.43	31
Latvia	14	2.5	50	26.39	32
Romania	3	15.2	38	21.14	21
Bulgaria	4	4.5	56	18.27	24
Ireland	*–2*	13	36	16.5	155
Spain	*–6*	15	19	21.1	5
Portugal	*–4*	22	32	22.3	19
Greece	*0*	19	19	18.7	20
Data comments					
Accession countries	1995–2005	2003	2002	2002	2002
Ireland	1961–1973	Average of period 1974–1986	1973	2002	1980
Greece	1973–1985		1987	1994	1985
Spain	1973–1985		1987	1994	1985
Portugal	1973–1985		1987	1994	1985

Sources: compiled and calculated by authors on the basis of Eurostat; *World Investment Report 2003* (New York and Geneva, 2003); and F. Barry, 'Economic Integration and Convergence Processes in the EU Cohesion Countries', *Journal Common Market Studies*, 41/5 (2003): 897–921.

The average annual inflation rate of the cohesion countries in 1974–1986 lay between 13 per cent in Ireland and 22 per cent in Spain compared with 9.9 per cent of the EU area (though this was a period of high worldwide inflation). The comparative inflation rates of the current accession countries are below 10 per cent in all but Romania. The openness of countries measured as the share of exports of goods and services in the GDP varied between 19 and 36 per cent among the old enlargement countries at their entry to the EU in 1973 (Ireland) and 1987 (the other countries). By comparison, the openness ratio of the current accession countries in 2002 lies between 31 per cent in Poland and 89 per cent in Estonia. The share of gross fixed capital formation in GDP is also higher in the new accession countries. The propensity of the old cohesion countries to attract FDI was generally much lower than that of the current accession countries. The only exception was Ireland, where in 1980 the share of FDI to GDP was 155 per cent.

A more striking difference between the old and new accession countries appears when comparing the indicators of human capital, infrastructure and R&D expenditures. The following table 9 gives only a few examples of the situations in the cohesion countries from the earliest possible data compared with the 2002 data of the current accession countries. The share of population (aged 25−64) having completed at least upper secondary education was extremely low in Portugal and Greece — 20 per cent and 24 per cent, respectively, in the period 1974–1986. However, even the Irish level was only 42 per cent, which is well below the weakest level among the current accession countries — 71 per cent in Bulgaria, Romania and Hungary. A similar situation occurs if one looks at another human capital indicator, youth's education attainment — people aged 20−24 having completed at least upper secondary education. In 1987, this was only 20 per cent in Portugal and 38 per cent in Spain. In 2002, this indicator was highest in Slovakia − 94 per cent and lowest in Latvia −72 per cent. The good starting position of the current accession countries is also revealed by the data about internet users per 100 inhabitants, using the 2001 and 2002 data. The top here is Slovenia with 40, followed by Estonia with 39, Ireland with 31 and Spain with 29.

Table 9. Comparative analysis of the starting positions: human capital and infrastructure development

	Employed persons aged 15–64 as a share of the total population of the same age group	**Share of population having completed at least upper secondary education (aged 25 to 64, %)**	**Youth's education – people aged 20–24 having completed at least upper secondary education**	**Internet users per 100 inhabitants**	**R&D expenditures (% GDP)**	
Slovenia	63.4	76.8	88.9	40	1.57	
Czech R.	65.4	87.8	91.4	28	1.22	
Hungary	56.6	71.4	85.1	17	0.95	
Slovakia	56.8	85.8	94.2	24	0.58	
Poland	51.5	80.8	88.5	18	0.59	
Estonia	62	87.5	80.4	39	0.78	
Lithuania	59.9	84.8	80.9	18	0.69	
Latvia	60.4	82.6	72.5	17	0.44	
Romania	57.6	71.1	75.5	12	0.39	
Bulgaria	50.6	71.5	77.1	9	0.47	
Ireland	51	42	56	31	1.00	
Spain	49	24	38	29	0.70	
Portugal	66	20	20	16	0.53	
Greece	54	37	52	15	0.37	
Data comments						
Accesion countries	2002	2002		2002	2002	2002
Ireland	1992	Average of the period 1974–1986		1987	2001	1992
Greece	1992			1987	2001	1993
Spain	1992			1987	2001	1992
Portugal	1992			1987	2001	1992

Sources: compiled and calculated by authors on the basis of Eurostat; *World Investment Report 2003* (New York and Geneva, 2003); and F. Barry, 'Economic Integration and Convergence Processes in the EU Cohesion Countries', *Journal Common Market Studies*, 41/5 (2003): 897–921.

Finally, a comparison of R&D expenditures in GDP (R&D intensity) shows that the current accession countries, Slovenia and the Czech Republic, spend more in this area than do all the old cohesion countries, and the level of Hungary in 2002 equals that of Ireland in 1992.

6. The speed of catching up process

In the discussions about the convergence, an important question is always the length of the process of catching up. The studies in the early and mid-nineties were rather pessimistic about the speed of convergence. As a typical example, the following quotation may be used: 'For most countries convergence to the set the threshold would take between 4 and 9 decades if they maintain their current growth determinants. The sole exceptions are Poland, for which convergence would never be accomplished, and the Czech Republic, which will converge in about 15 years.'[10] Randveer[11] calculated how long it would take for the transition countries to reach the income level of EU-15. He based his calculations on the growth equations of Fisher; Sahay and Vegh[12], where different options about the share of investments and government expenditures from GDP were used. The results of Randveer showed that it would take Estonia, for example, 40 years to achieve the long-term growth rate of the EU, of 2.5 per cent.

In this section the number of years it will take to converge to attain 75 per cent and 100 per cent of the EU average income per capita level will be calculated. The equation adopted from Rajasalu[13] will be used for these calculations:

$$c_0 * (g_C)^n = c_T * (g_{EU})^n, \qquad (4)$$

[10] Barbone and Zalduendo, *EU Accession and Economic Growth*, p.21

[11] M. Randveer, *Tulutaseme konvergents Euroopa Liidu ja liituda soovivate riikide vahel* (Tallinn, 2000), p. 22.

[12] S. Fisher, R. Sahay, and C. Vegh, *How Far is Eastern Europe from Brussels?* (Washington, D.C, 1998).

[13] T. Rajasalu, 'Convergence in the European Union and Some Guidelines for Institutional Reforms in Estonia', in, *Factors of Convergence: a Collection for the Analysis of Estonian Socio–Economic and Institutional Evolution* (Tallinn, 2001), pp. 3–37.

where c_0 is the initial level of GDP per capita relative to the EU level (for example 0.61 for the Czech Republic), c_T is the targeted level for the accession country (either 1 for EU-15 average or 0.75 for the 75 per cent average of the 15 'old' EU members), g_C and g_{EU} are the expected average annual growth indices for the accession country and EU-15, n is the number of years needed to reach the target level.

The number of years needed to reach the targeted level can be calculated from the last equation as:

$$n = \frac{\ln(c_T) - \ln(c_0)}{\ln(g_C) - \ln(g_{EU})}. \qquad (5)$$

This formula highlights that the time frame of convergence will depend on the initial level of the GDP and the growth differential between the accession countries and EU-15. The results are summarized in table 10.

Table 10. Speed of convergence (years) to reach full EU income level

Countries	GDP per capita from EU-15	Growth forecast for 2004*	Years until 100 per cent of EU level		
			Using long-run growth rate		
			2004 growth rate forecast	2004 rate plus extra 1%	2004 rate plus extra 2%
Slovenia	72	3.2	42	19	12
Czech R.	61	3.3	56	27	18
Hungary	53	3.2	82	36	24
Slovakia	52	4.5	32	22	17
Poland	41	4	58	36	26
Estonia	*46*	*5.2*	*29*	*21*	*17*
Lithuania	41	6	26	20	17
Latvia	35	6	42	30	24
Romania	26	5	54	39	31
Bulgaria	33	5	44	32	25
EU-15	100	2.4			

Source: own calculations using WIIW 2003, Eurostat 2004.

It follows from equation (5) and table 10 that (assuming a 2.4 per cent long-term growth rate for EU-15) the years needed to catch up vary a lot among the transition economies, depending heavily on their long-term growth rates. In the case where the growth rates forecast for the year 2004 are used, the first country to reach the EU's 75 per cent level in GDP per capita is — obviously — Slovenia (whose 2003 level was already 72 per cent of the EU level), followed by Lithuania (17 years), Estonia (18 years) and Slovakia (18 years). If the long-term growth rate for Hungary is 3.2 per cent (that is, one of the lowest among the transition economies) and that of the EU is 2.4 per cent, it will take Hungary (despite its relatively high GDP per capita among the transition economies) longest — 45 years − to reach the 75 per cent EU level. However, a 1 percentage point or 2 percentage points extra long-term growth will significantly reduce the number of years needed for convergence with the EU level.

The results largely depend on the choice of forecast growth rates. Hence one has to use certain expectations about the potential growth bonus from joining the EU. There are several examples of modelling the potential impact of joining on the speed of economic growth in transition countries. For example, Breuss[14] concluded that considering all possible integration effects involved in the enlargement using the Oxford World Macroeconomic Model, Hungary and Poland will increase their real GDP by nearly 1 percent yearly during the period 2001–2010. The Czech Republic will gain somewhat less — about 0.5–0.8 per cent per year. It is relatively similar to the results reached by some other authors, who concluded that annual extra growth after joining the EU may be within the range of 0.6−1.2 per cent annually.

[14] F. Breuss, *Macroeconomic Effects of EU Enlargement for Old and New Members* (Athens, 2001), p. 14.

Table 11. Speed of convergence of Estonia by different long-term growth rates

Estonia's long-term growth rate	**EU's long-term growth rate = 1.4**		**EU's long-term growth rate = 2.4**	
	Years until 75% of EU level	**Years until 100 % EU level**	**Years until 75% of EU level**	**Years until 100 % EU level**
3	31	50	84	133
4	19	31	32	50
5.2	*13*	*21*	*18*	*29*
6	11	18	14	22
7	9	14	11	18

Source: own calculations.

Consequently, with additional GDP growth by 1 percentage point, the years needed for transition economies in Central and Eastern Europe to reach 75 per cent of the EU level in per capita GDP, range from 2 (Slovenia) to 31 (Romania). The corresponding range for reaching 75 per cent of EU level with 2 percentage points higher growth rates is: from 2 (Slovenia) to 24 years (Romania). If Estonia could achieve a 7.2 per cent GDP growth rate per year, it would take it only 11 years to reach the EU's 75 per cent level, and 17 years to catch up with the EU. The number of years needed for catching up with the EU varies for different countries from 12 to 82 years, depending on their growth rate.

The importance of even a 1 percentage point higher annual long-term GDP growth rate becomes obvious if one takes a look at each country in turn and vary the long-term growth rate both for this country and the eu. Table 11 presents several alternative scenarios for different growth rates of Estonia and eu-15. If Estonia's annual GDP growth were to be 3 per cent and that of the EU 2.4 per cent, it would take the country more than a century to catch up. With Estonian growth rate 7 per cent per year, it would only take 18 years (for 2.4 per cent growth rates

of the eu). As table 11 indicates, the number of years needed for catching up varies a lot for different scenarios of future growth rates.

The current enlargement of the EU is proceeding under different sets of conditions. For example, the number of new member countries is much larger than before and their economic distance from the other EU members may be rather large. Consequently, the whole current EU's structural and cohesion funds system will be subject to a reorientation. The EU's total agricultural policy will be changed to become less protectionist. The internal market has now been a reality for a decade, and new members will have to accept all the Community regulations and practices associated with it. This means that the potential speed of convergence may be higher than at the time of the previous enlargements. All this will have a beneficial effect on the whole EU, and it will not be just the accession countries that will feel the positive effects.

CONCLUSIONS

The possibility of convergence stems from the neoclassical growth model, which implies that poor countries will grow faster than rich countries and this process will lead to the equalisation of per capita output between countries. In the convergence literature this is known as the absolute or unconditional convergence hypothesis. Convergence in terms of both growth rate and income level is called β (beta) convergence. On the other hand, the new growth model does not predict that income convergence between rich and poor countries is an automatic outcome. In the neoclassical setting, the integration will have positive effects only in the short run. The new growth theory provides a new approach to the role of economic integration in growth, insisting that the creation of a newly enlarged market will allow better use of economies of scale with a lasting positive effect on growth. Instead of the diminishing returns to

investment stipulated by the Solow model, knowledge spill-overs will produce increasing returns to scale from capital accumulation in the new growth model. In short — the economic integration of Europe continuously supports economic growth.

The current paper has tried to analyse what has happened to the relative income level of the countries that joined the EU in May 2004, plus Romania and Bulgaria by comparison with the EU-15 level, but also vis-à-vis convergence among themselves (σ convergence). The analysed countries' levels of real per capita GDP based on PPP have converged towards the EU-15 level at a comparatively high speed. The most rapid process of reducing the gap with the EU income levels occurred between 1995 and 2005 in the Baltic countries — Estonia 17.8, Lithuania 15.9, and Latvia 13.9 per cent. This group was closely followed by Hungary and Slovenia, which succedded in reducing the gap with the EU average by 12.2 and 11.2 per cent, respectively. The speed of converging with the EU level was especially remarkable during the period 2001–2004 when the growth differential between EU-15 and the accession countries was around 2.2 per cent.

During the analysed period existed a negative correlation between the initial ratio of the countries' per capita GDP to the EU level and the sub-period average yearly growth rate. It is indicating on the unconditional β convergence across the transition economies in 1993–2004. One could also discover a reduction in the dispersion of income levels between the accession countries, or, in other words, sigma-convergence also existed. This type of convergence became clearly evident during the period 1996–2000.

The convergence experience of the current accession countries has also been compared with that of the cohesion countries — Ireland, Spain, Portugal and Greece. Judging by income level, the starting position of Spain vis-à-vis the average of EU-12 in 1985 was practically the same as that of Slovenia in 2004. In a similar way, the positions of Ireland and Greece at the time of EU accession were comparable to those of the Czech Republic

and Hungary; Portugal was slightly above the current income level of Slovakia, the Baltic countries and Poland.

Before accession to the EU, the previous cohesion countries experienced completely different convergence paths. The Irish relative income level declined in the period 1960–1973 by two per cent by comparison with the EU average, while Spain had a 6 per cent reduction in 1973–1985, Portugal 4 per cent and Greece experienced virtually no catching up at all. The current accession countries have been much more successful and their convergence process has been very dynamic — the convergence of income ranging from 3 to 16 per cent.

An analysis of the starting positions of the current accession countries against those of the previous cohesion countries led to the conclusion that the new members have been more adequately prepared for the enlargement. This could be inferred on the basis of a comparison of different macroeconomic, human capital, and infrastructure indicators of the previous cohesion countries with those of the current ones. However, better preparedness derives also from the fact that the current *acquis communautaire* is much more demanding than a decade ago. The new member countries had to harmonise their economies more deeply than the old cohesion countries before their entry to the EU.

The studies in the early and mid-1990s were rather pessimistic about the speed of convergence, forecasting the time span for catching up with the EU-15 income level to be between 40 and 90 years. However, these calculations seriously undervalued the fact that the current accession countries are relatively well endowed with natural resources and high levels of human capital. They have likewise managed to implement all major economic reforms that are necessary for guaranteeing macroeconomic stability. Taking into consideration these above aspects and also the impact of the structural funds, it can be said that the new accession countries face an opportunity to achieve a considerably more rapid convergence process − between 20 and 35 years — to reach the income level of the EU.

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KOKKUVÕTE

Siirderiikide majandusliku konvergentsi protsessi analüüs

Käesolevas töös analüüsiti uute Euroopa Liidu liikmesriikide tulutasemete konvergentsiprotsessi. Absoluutse ehk tingimusteta konvergentsi hüpotees tuleneb neoklassikalisest majanduskasvu mudelist, mille järgi peaksid vaesed riigid omama kiiremat majanduskasvu kui rikkad riigid ja antud protsessi tulemusena riikide tulutasemed ühtlustuvad. Konvergentsi nii majanduse kasvumäära kui ka tulutaseme osas nimetatakse beeta (β) konvergentsiks. Endogeense majanduskasvu mudelid ei toeta absoluutse konvergentsi hüpoteesi, vaid rõhutavad, et konvergentsi toimumine oleneb riikide erinevustest inimkapitali ja institutsioonide osas.

Käesolevas töös analüüsiti tulutaseme konvergentsi uutes liikmesriikides võrdlevalt Euroopa Liidu keskmisega liitumiseelsel perioodil 1995–2004. Analüüsi tulemusena selgus, et EL-i uute liikmesriikide tulutaseme konvergents, mõõdetuna reaalse sisemajanduse koguproduktina ühe elaniku kohta, on lähenenud EL-15 tasemele küllaltki kiiresti. Tulutaseme lõhe EL-15 tasemest on perioodil 1995–2004 kahanenud eriti kiiresti Balti riikides — Eestis 17,8, Leedus 15,9 ja Lätis 13,9 protsendipunkti võrra. Järgnevas riikide grupis olid Ungari, kus tulutaseme erinevus kahanes 12,2 ja Sloveenia 11,2 protsendipunkti võrra. Tulutasemete konvergents EL-i keskmise taseme suhtes kiirenes eriti perioodil 2001–2004. Läbiviidud analüüs osutas nende siirderiikide puhul ka β-konvergentsi olemasolule ehk madalama algse tulutasemega siirderiikides on konvergents olnud kiirem. Lisaks ilmnes ka tulutasemete erinevuste vähene-

mine uute EL-i liikmesriikide vahel ehk ilmnes sigma (σ) konvergents.

Käesolevas töös uuriti tulutaseme konvergentsi 2004. aastal Euroopa Liiduga ühinenud uutes liikmesriikides võrdlevalt varasemate liitujatega (Iirimaa, Kreeka, Portugal, Hispaania). Lisaks võrreldi uusi ja varasemaid liitujaid makromajanduslike, infrastruktuuri kui ka inimkapitali arengu alaste näitajate alusel EL-iga ühinemise eelsel perioodil. Analüüsi tulemused näitasid, et uued EL liikmesriigid on tunduvalt paremal lähtepositsioonil kui varasemad liitujad 1970. ja 1980. aastatel. See võimaldab väita, et uute EL liikmesriikide konvergentsiprotsess kujuneb lühemaks kui senistes uurimustes on väidetud ning EL-15 tulutasemele järelejõudmiseks on vajalikud 20 kuni 35 aastat.