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Economic Growth and Income Convergence: Impact of European Integration

Master Thesis in Economics and Business Administration

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This thesis was written as a part of the master program at NHH. Neither the institution, the supervisor, nor the censors are - through the approval of this thesis - responsible for neither the theories and methods used, nor results and conclusions drawn in this work.

Foreword

When I started thinking about topic for my master thesis my main motivation was to analyze issues related to welfare and standards of living among European citizens and countries. Since I traveled a lot across Europe during my studies I observed substantial differences in income levels among different countries. My interest in the topic was further enhanced by the size and magnitude of these differences.

Quite early during my studies I got also interested in the process of European integration and its effects on European economies. In this thesis I tried to connect those two interests of mine and analyze effects of European integration on welfare of European citizens.

This work would have been difficult without help of certain people who surrounded me all the way through this thesis.

I hereby want to express special thanks to my academic advisor Michal Zdenek, who was guiding and supporting me throughout thesis writing process and giving valuable feedback.

I would also like to thank Peter Molnar for intellectually stimulating discussions related to my thesis.

Finally, I would like to express my deepest gratitude to my family and all the people who have been supporting me throughout these years.

Abstract

This thesis analyzes and explains international patterns of income growth among European countries and evaluates influence of European integration on income convergence among its member states. In the first part of the thesis relevant theories are presented. Then empirical analysis of economic growth among European countries is performed. Results of analysis reveal evidence of income convergence within EU-25, i.e. data show negative relationship between the initial level of GDP per capita and subsequent GDP per capita growth rate among European countries. In addition to that, analysis suggests that European countries benefit from EU membership through faster economic growth.

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1 Introduction

1.1 Background and Motivation

One of the most fundamental questions of contemporary economics is related to why some countries are poor while others are rich. Income differs substantially between countries; and so does income growth. For example, during 1960-2000 some European and Asian Tiger¹ economies grew almost several times faster than some industrialized European countries and the USA. At the same time, the group of high-income European countries experienced a slower economic growth (Gärtner, 2006). This fact has attracted much attention among researchers who posed the question “why do some countries grow relatively slowly, while others impress by their growth rates?” The subsequent research has uncovered that lower income countries tend to grow faster than the higher income ones. As a result of that, their incomes are expected to converge at some point in future (Gärtner, 2006). Nonetheless, there was found contradictory evidence - that convergence is not always the case, and its property is not robust across different continents and cultures (for example, even though Asian economies were expected to grow at similar rates, they grew much faster than their European counterparts with similar incomes in 1960).

So why do economies grow? The importance and complexity of this question provoked development of numerous theories of economic growth such as Solow’s exogenous growth model (the neo-classical growth model) and endogenous theory of economic growth (the new growth theory), which aim at explaining economic growth patterns that are found in cross-country data (Gärtner, 2006; Romer, 2006; Burda & Wyplosz, 2009). In addition to growth theories, there have also been developed theoretical frameworks that examine effects of the process of integration on income growth of countries (member states) involved in it. However, likewise, they are far from being conclusive about question of whether the process of integration makes Europe more “equal” in terms of income. According to Mendes (1987), studies on this subject can be divided into three categories: ones that propose that integration increases inequalities among countries (e.g. Seers (1979), Secchi (1982), Denton (1982)); others claiming that the process of integration reduces inequalities among countries (e.g. Hallet (1982) and Whitbread (1981)); and ones being inconclusive (e.g. Keeble et al (1982)). Mendes, (1987, p. 9)

¹ Hong Kong, Singapore, Taiwan, and South Korea

claims that not all of the EU countries show a trend to converge and that there exists some ground to suggest that “integration even might have induced some divergence”. Even though Mendes (1987) admits that his evidence is probably not sufficient to draw any solid conclusions, it contributes to the set of controversies related to the topic. The main reason of differing conclusions lies in the initial difficulty of the research question and deficiencies of the methods of research.

From the set of previous arguments it is reasonable to argue that understanding economic growth and development is both an intellectually challenging enterprise and at the same time highly topical issue from policy perspective. Designing policies that would help poor countries start to grow and prosper is one of the most challenging issues that our global society is facing nowadays. The road to prosperity is a thorny and complex process: a lot of separate problems have to be analyzed and understood before one can claim that s/he has grasped what are the forces behind economic growth.

1.2 Research Purpose and Research Questions

My thesis attempts to analyze one of the forces that could contribute to economic growth among European countries. I study how economic growth and income inequality can be affected by economic integration. The purpose of the thesis is thus to analyze and explain international patterns of income growth among European countries and evaluate influence of European integration (EU-25) on income convergence among its member states.

To fulfill the purpose of the thesis, I have identified the following research questions:

- 1) Research question 1 (EC/EU membership and income growth):

“What is the effect of joining EC/EU on income growth of European countries?”

- 2) Research question 2 (income convergence within EU-25):

“Do incomes of EU-25 countries converge?”

In my research, I study theories related to economic growth and its determinants and focus my analysis on a group of countries that now form European economic union (EU-25).

When it comes to theoretical framework, theoretical and empirical literature related to the topic of economic growth is considerable. On the theoretical front, seminal contributions to the

common knowledge are, for instance, Solow and endogenous growth theories. On the empirical part, the major breakthrough is Mankiw, Romer, and Weil (1992). In my thesis, I build on both strands of literature.

1.3 Structure of the Thesis

This thesis is organized as follows:

- Section 2 presents relevant growth and integration theories. Theories include the Solow growth model, endogenous growth theory, and theories of integration. They are later supplemented by the presentation of the EC/EU-25 case (in section 3).
- Section 3 presents “The Case of European Integration” giving a brief overview of the process of European integration.
- Section 4 describes the methodology that is used to answer the two research questions.
- Section 5 provides analysis of empirical findings and discusses obtained results. In this section, I examine how economic growth of European countries was affected by economic integration. Additionally, I test the prediction of Solow’s growth model regarding income per capita convergence across EU-25 countries to determine whether European countries’ income levels are on the way to approaching each other.
- Section 6 summarizes the research’s results, provides recommendations for European Union to improve economic growth, and identifies direction for further research on the topic.

2 Theoretical Framework

2.2 Economic Growth

According to Mankiw (2003), economic growth is the most important determinant of the economic well-being of countries. To determine which factors govern economic growth of a country, several macro-economic models and frameworks were suggested. The most prominent of them are the Solow growth model and the endogenous growth model which explain how saving, consumption, population growth, and technological progress influence the level of growth of a country's standard of living (Mankiw, 2003). These two models are discussed in greater details in the following section.

2.2.1 Production Function

According to Gärtner (2006) and Burda and Wyplosz (2009), the production function is the most common tool in the economic growth analysis. It relates the output of an economy (its GDP) to its productive inputs - physical capital stock (K) and labor employed (L). Thus the real output Y is a function F of the capital stock K (in real terms) and labor L:

$$Y = F(K, L)$$

There are three assumptions related to the production function:

- a) Economy output increases as either factor increases or both factors increase;
- b) If one factor remains fixed, increases in the other factor yield smaller and smaller output gains;
- c) If both factors increase by the same percentage, output also rises by this percentage (Gärtner, 2006, p. 231).

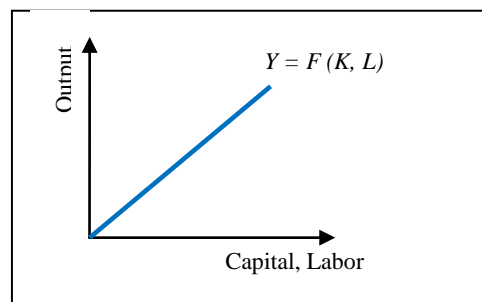


Figure 1 Simple Production Function

Cobb-Douglas function

Simple production function is not sufficient for the analysis of economic growth. Instead, Cobb-Douglas production function is widely used, which formalizes the relationship between inputs of capital and labor and the GDP output: $Y = AK^\alpha L^{1-\alpha}$, where α is a parameter denoting elasticity of output with respect to capital; $0 < \alpha < 1$ (Burda and Wyplosz, 2009).

Income is related to the factor inputs of K and L and to the production technology (or productivity) denoted by A. Thus economic growth can occur by:

- a) Expansions in capital stock and growing labor force (endogenously);
- b) Improvements in technology/productivity (Gärtner, 2006).

It is useful to keep this function in mind when dealing with the Solow growth model presented further.

2.2.2 The Solow Growth Model

2.2.2.1 Central Assumptions

The Solow growth model, or the neoclassical growth model, is a traditional starting point for almost all the analyses of economic growth in countries and regions (Romer, 2006; Gärtner, 2006). The production function in Solow's model looks as follows:

$Y(t) = F(K(t), A(t)L(t))$, where $A(t)L(t)$ denotes effective labor or technological progress.

The central assumptions in the Solow's model are related to the properties and evolution of the inputs into the production function – K (capital), L (labor), and A (knowledge or productivity) (Romer, 2006). The main assumption of the model is that countries use their resources efficiently (Gärtner, 2006) and its two arguments – capital and labor have constant returns to scale, meaning that increase in the amount of capital or labor causes the same increase in the amount produced:

$$F(cK, cAL) = cF(K, AL), \text{ where } c \text{ is a non-negative constant.}$$

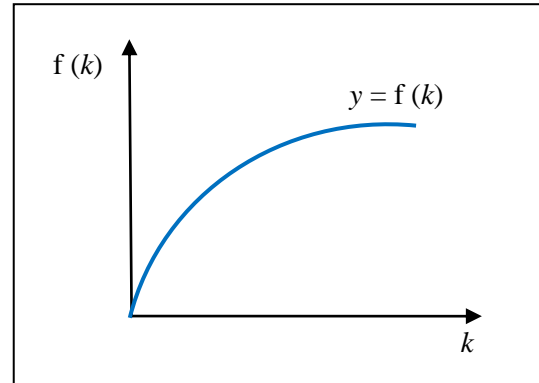
With the constant returns to scale output per unit of effective labor, $y = Y/AL$, is a function of capital per unit of effective labor ($K/AL = k$): $f(k) = F(k, 1)$. Consequently,

$$y = f(k) \text{ (Romer, 2006; Burda and Wyplosz, 2009)}$$

It is important to note that the marginal product of capital is positive ($f'(k) > 0$), but it declines as capital per unit of effective labor rises ($f''(k) < 0$). Thus the marginal product of capital stays large when capital stock is small and becomes very small when capital stock becomes large, which obeys the law of the diminishing returns to capital (see figure 2) (Romer, 2006).

Another assumption of the model is that the rates of savings, capital depreciation, population growth, and technological progress are constant, and n , g , and s are exogenous parameters:

- δ = capital depreciation rate; $\delta = \text{const.}$
- n = growth rate of active labor force (L);
 $n = \text{const.}$
- g = growth rate of technology (A); $g = \text{const.}$
- s = fraction of output devoted to investment



(diminishing returns to capital) (savings rate); **Figure 2 Partial Production Function**
 $s = \text{const.}$

Besides that, although there are no restrictions on n , g , and s , the model assumes their sum is positive:

$$(n + g + \delta) > 0 \text{ (Romer, 2006)}$$

It should be noted that this assumption can create a potential basis for criticism of the model since in reality factors such as savings rate, population growth, and rate of technological progress are subjects to change. Limitations of the model and its potential drawbacks will be discussed in the latter part of this section.

2.2.2.2 The Dynamics of Capital

Since n and g are exogenous parameters, to characterize the behavior of the economy, one should take a closer look at the dynamics of capital (Romer, 2006).

Given that $\Delta K = I - (n + g + \delta) K$,

Where I = current gross investment = actual investment = $sY = sF(K,L)$, we get:

$$\Delta K = sF(K,L) - (n + g + \delta) K$$

i.e.: $\Delta K = \text{savings (actual investment)} - \text{depreciation}^2 \text{ (required or break-even investment)}$

and: $\Delta k(t) = sf(k(t)) - (n + g + \delta) k(t)$,

where $\Delta k(t)$ is the rate of change in the capital stock per unit of labor

² Depreciation here denotes the sum of $(n + g + \delta)$.

The capital stock grows when private savings (or gross actual investment) exceeds the amount of capital that is being lost through depreciation and falls when actual investment falls short of required investment. When the two are equal, k is constant and equal to k^* (Gärtner, 2006; Romer, 2006). The sequence can be seen on figure 3.

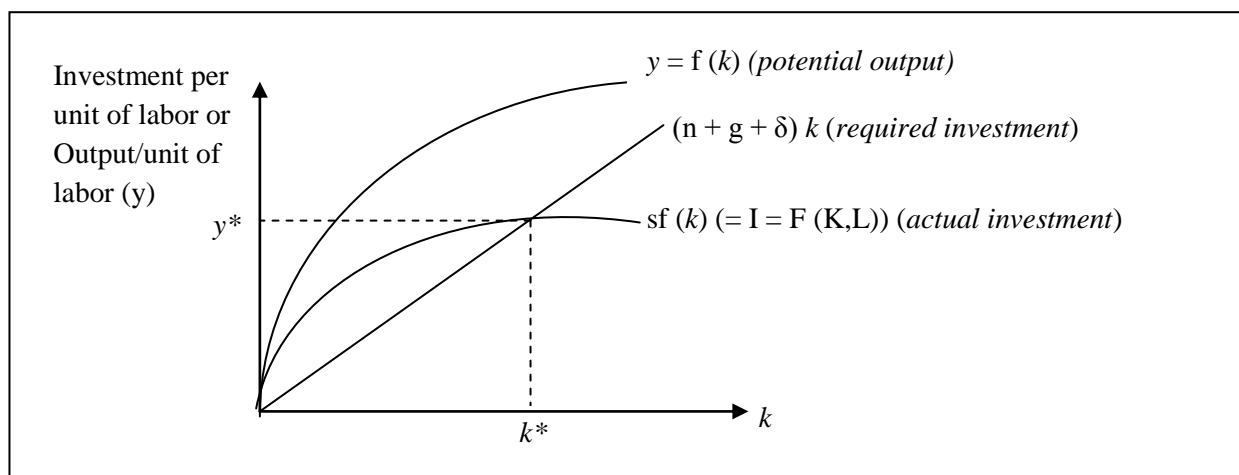


Figure 3 The Solow Model. Source: self- adapted from Gärtner (2006, p.238)

According to the model, regardless of where k starts, the economy will reach a steady state, where k converges to k^* and capital per capita k is constant. At the steady state, the output does not change as well ($y^* = \text{const}$) (Gärtner, 2006; Romer, 2006).

2.2.2.3 Savings and Output

According to Romer (2006), changes in government policies in relation to the division of its purchases between consumption and investment goods, revenues between taxes and borrowing, and its tax policies related to saving and investment can affect the fraction of output that is being invested. The more country saves, the more it can potentially invest; the more it invests, the higher is its expected steady-state capital-output ratio, and consequently, a higher output-labor ratio. Thus, theoretically, countries with higher savings and investment rates should have higher incomes per capita (Burda and Wyplosz, 2009).

The Solow growth model explains this logic in the following way: if savings rate (s) increases, actual investment line ($sf(k)$) shifts upward, and, economy reaches a higher steady level of capital per capita (k^* rises). When savings rate decreases the opposite sequence takes place.

It is important to note that according to the model a permanent increase in savings rate causes only a temporary increase in the growth rate of output per worker: “ k is rising for a time, but

eventually it increases to the point where the additional saving is devoted entirely to maintaining the higher level of k^* (Romer, 2006, p. 18). Thus after savings rate increase in level, output per worker increases temporarily until it takes place on a higher path parallel to the initial one, which produces level effect (not growth effect) in the amount of output per capita. Burda and Wyplosz (2009) explain it by the law of diminishing returns to capital, where increased capital stock causes more capital to depreciate and to be replaced. To maintain capital stock constant at its higher level an increased amount of investment is needed, but since there are diminishing returns to capital, further additions in capital generate smaller and smaller increases in income and therefore in savings. Economy ends up on a higher output path (Burda & Wyplosz, 2009).

2.2.2.4 Savings and Consumption

Mankiw (2003) states that according to Solow model, how much country saves and invests is a key determinant of its households' standard of living. Since the ultimate goal of economy is to maximize welfare rather than output, it is important to introduce households into the model, where their consumption would reflect their welfare. In order to become richer, household has to save and invest more. However, saving more today does not necessarily imply more consumption in future. While a higher savings rate leads to higher income, it also leaves a smaller share of this income to be allocated for consumption (Gärtner, 2006).

From $c = f(k) * (1-s)$ can be seen that consumption per unit of effective labor (c) is equal to output per unit of labor ($f(k)$) multiplied by the fraction of output that is consumed ($1-s$) (Romer, 2006). Thus when $s = 0$ or $s = 1$, in a long run consumption is equal to zero:

- When $s = 0$, households consume all the income making no investments at t_0 , which leads to exhaustion of capital, where no more income can be produced and consumption at t_1 thus equals zero.
- When $s = 1$ no income is available for consumption since households save and invest all the income they get (Romer, 2006; Gärtner, 2006).

Thus it can be seen that in order to reach maximum level of consumption savings rate should be in between 0 and 1. According to Romer (2006) and Burda and Wyplosz (2009), the maximal level of consumption is achieved at such level of savings where $MPK = \delta$, in other words, where $f'(k^*) = (n + g + \delta)$. In this case, a marginal change in s has no effect on consumption in the long run, and consumption reaches its maximal level on the balanced growth path (Gärtner, 2006;

Romer, 2006; Burda & Wyplosz, 2009). This is called the *Golden rule* of capital accumulation and corresponding level of k^* is known as the *Golden-rule level of the capital stock* (Romer, 2006). If we take technological progress into account, the Golden rule of capital can be defined as “the steady state that maximizes consumption per effective worker”: $c^* = f(k^*) - (n + g + \delta)k^*$ (Mankiw, 2003, p. 210).

If the actual savings rate does not correspond to the Golden rule rate of savings, two situations may take place depending on whether marginal product of capital exceeds or falls behind the depreciation rate ($n + g + \delta$):

- If $f'(k^*) < (n + g + \delta)$, then the additional output from the increased capital is not enough to maintain the capital stock at its higher level. In this case consumption falls to maintain the higher level of capital stock (savings rate is high). In this case economy is *dynamically inefficient* because it saves and invests too much and consumes too little.
- If $f'(k^*) > (n + g + \delta)$ and savings rate is low, there is an excess output to maintain capital stock at its higher level. An increase in savings rate raises consumption in a long run. The economy is *dynamically efficient* (Gärtner, 2006; Romer, 2006).

2.2.2.5 Population Growth and Technological Progress

The Solow model shows that capital accumulation is not a sufficient factor to explain continuous economic growth due to the fact that high saving rate causes economic growth temporary till economy approaches new steady state where capital and output do not grow anymore. Therefore to explain sustained economic growth Mankiw (2003) and Romer (2006) suggest expanding Solow growth model by adding two more sources of economic growth: population growth (n) and technological progress (g).

Solow model states that sustained growth in income per unit of labor comes from technological progress. The model, however, treats technological progress as an exogenous factor and does not explain it (Mankiw, 2003). In order to explain influence of population growth and technological progress on the growth of the economy, let us consider the following Solow growth model equation:

$$\Delta k = i - (n + g + \delta) k = sy - (n + g + \delta) k \text{ (Romer, 2006)}$$

From this equation it can be seen that investment (i) and savings (s) increase capital stock per unit of worker, while depreciation (δ) and population growth (n) decrease it. Population growth reduces capital stock per worker by spreading capital stock more sparsely among larger number of workers. According to Mankiw (2003), population growth might be one of the answers for why standards of living vary across nations so much. According to Solow model, country with a high population growth is expected to have low level of income per labor unit. High population growth tends to impoverish country because it is difficult to maintain capital stock per person at a high level when population is growing intensively (Mankiw, 2003; Gärtner, 2006). As population growth increases economy reaches new steady state, where there is less capital and lower output per worker: $(n + g + \delta)k$ line bends to the left; n % addition to the labor force makes the available capital stock for each worker fall by $n \times k$ (Gärtner, 2006, p. 247). It can be seen on figure 4 in appendix.

Technological progress, or growth in the effectiveness of labor, (g), on the other hand, leads to sustained increase in standards of living. According to Solow model, “only technological progress can explain persistently rising living standards” (Mankiw, 2003, p. 210). Barro and Grilli (1994) state that one-time improvement in technology suggests that the economy can sustain long-term per capita growth if the production function shifts upwards continually. If producers discover new ways of how to increase production output operating more efficiently, that can lead to technological improvements and thus generate economic growth.

In order to stimulate technological progress, governments can design policies to encourage private sector to invest in technological innovations. Examples of such measures include: an appropriate patent system to give a temporary monopoly to investors of new products, tax code offering tax breaks to companies engaging in research and development, government agencies subsidizing research in universities, and others (Mankiw, 2003). In order to be able to make suggestions on how to stimulate technological development in economy it is important to understand what factors drive producers to carry out research and develop new products and discover new production ways.

2.2.2.6 Critical Assessment of the Solow Growth Model

The Solow growth model seems to be a reasonable framework for analyzing and explaining the main determinants of economic growth. However, in line with many other scientific theories, it

is a relatively simplified theoretical view of a much more complex world, which means that the model does not include all the possible variations of macroeconomic circumstances. For example, the Solow model assumes that government is absent, fluctuations in employment do not exist, production function has only three inputs (labor, capital, and technology), the rates of savings, depreciation, population growth, and technological progress are constant (Romer, 2006). The other assumption of Solow's model according to Gärtner (2006) is that it implies that all the people are employed and unemployment rate is equal to 0 percent. Thus the number of workers equals the population. It is not something what is in the real world.

Also, according to the model, there are differences in the productivity of capital across countries. However, if rates of return on capital would be larger in poor countries than in the rich ones, there would be an immense incentive to invest in poor countries; capital would flow from richer to poorer countries. In the real world, however, we do not observe such flows, and differences in physical capital per worker cannot totally explain differences in output per worker (Romer, 2006).

The main point of criticism of Solow is that the model treats the growth of effectiveness of labor or production technology as an exogenous parameter, while this is the variable that identifies the main driving force of the economy (Romer, 2006).

It is clear that the model has its limitations. However, in line with them the Solow model's proposition has also been confirmed to a great extent. For example, according to Gärtner (2006), scientists usually find that approximately 60% of the income differences can be explained by differences in investment and population growth, which is proposed by the model. Thus even though there is a large part of data unexplained by the Solow model, the model still gives a relatively good insight into the topic.

When it comes to the convergence hypothesis, empirical research shows that there is no absolute convergence across nations, meaning that there is no much evidence of worldwide convergence. Nevertheless, there is evidence of relative convergence meaning that within groups of homogenous countries (that have similar religions, history, culture, political systems, etc.) absolute incomes appear to converge (Gärtner, 2006). For more details see figure 5 in appendix.

To conclude, even though the Solow model has its limitations and drawbacks, it seems to be a sufficient framework to be used to explain macroeconomic foundations of economic growth. The

main purpose of the model is not really to be completely realistic, but to provide insights about certain features of the world. Therefore it is well-suited for addressing the research questions proposed in the thesis.

2.2.3 Convergence

The key prediction of the Solow growth model is that poorer economies, with lower values of initial GDP ($Y(0)$) and capital stock ($K(0)$), tend to catch up to the richer ones, i.e. converge. According to Barro and Grilli (1994), this tendency towards convergence means that the lower are the initial values of $Y(0)$ and $K(0)$ in countries, the faster grows their income, and, conversely, the higher are the values of $Y(0)$ and $K(0)$, the slower countries grow. Thus one day these countries are expected to reach the point where their incomes converge.

The model suggests that growth rates are high when capital per worker is low and declines as capital rises. A low amount of capital per worker also implies a high marginal product of capital and therefore a high interest rate, r (Barro & Grilli, 1994). Thus, as economy grows, the real interest rate should decline together with the capital's marginal product.

Romer (2006) states that there are three reasons that provide explanation for why economies should converge and poor countries should catch up with rich ones:

- 1) Countries' convergence to their balanced growth paths (due to differences in output per worker);
- 2) Lower rate of return on capital in richer countries with more capital per worker (providing incentives for capital flows from richer to poorer countries thus causing convergence);
- 3) Lags in the diffusion of knowledge (when poorer countries gain access to new technologies and methods to increase labor productivity, it can stimulate economic development).

To the question of whether economies converge over time have been devoted relatively much attention. Even though empirical research shows contradictory results depending on samples and measurement techniques used, when researchers analyze samples of economies with similar cultures and policies (e.g. homogenous samples), economies tend to converge to one another at a rate of about 2 percent per annum (Mankiw, 2003; Gärtner, 2006; Burda & Wyplosz, 2009). It should be mentioned, however, that when sample includes large number of countries, research generates relatively little evidence of convergence, i.e. poorer countries do not seem to grow

faster than the richer ones. Nonetheless, Mankiw (2003) notes that if research controls for such determinants of steady state as saving rates, population growth rates, and educational attainments, then results again show convergence of about 2 percent per annum. Thus, countries of the world exhibit conditional, or relative, convergence (see figure 5 in appendix).

2.2.4 Endogenous Growth Theory

Solow growth model states that economic growth arises from technological progress. However, it does not explain where technological progress comes from. It treats it as an exogenous factor, assuming that it is determined from “outside” (Mankiw, 2003; Barro & Grilli, 1994). Since technological progress is the main factor that drives economic development, it is necessary to go beyond the Solow model and develop models that explain technological progress. Models that study technological progress are called endogenous growth models, and they explain how technological progress or human capital are generated endogenously (Mankiw, 2003; Gärtner, 2006).

The AK model

The production function in the Endogenous growth model looks as follows:

$$Y = AK \text{ (in per capita terms: } y = Ak),$$

where Y is output, A is a constant measuring the amount of output produced for each unit of capital, and K is the capital stock.

In the endogenous growth model, there are no diminishing returns to capital, which means that one extra unit of capital produces A extra units of output and marginal product of capital does not decrease as the capital stock rises. Output per capita increases linearly with the capital stock: the partial production ($y = Ak$) and actual investment ($sy = sAk$) functions are straight lines (Gärtner, 2006). This is one of the main differences from the Solow’s growth model (Mankiw, 2003).

Formally, the marginal product of capital is given by $MPK = \frac{\Delta Y}{\Delta K} = \alpha A$, where $A > \alpha A$. Thus MPK is the same for all countries and is independent of the savings rate and poor countries will not attract foreign investment that would increase their income (Gärtner, 2006).

The growth accounting equation in the endogenous growth model looks as follows:

$$\frac{\Delta y}{y} = \frac{\Delta A}{A} + sA - \delta - n$$

Thus, the higher is the savings rate the higher is expected country's income growth per capita, and the higher is its population growth, the lower is expected country's income growth per capita (Gärtner, 2006). These implications are congruent with the Solow model predictions with the main difference that in the Solow model s and n affect income *levels*, while in the Endogenous growth model they affect income growth.

2.3 Integration

2.3.1 Definition

“Economic integration is defined as the elimination of economic frontiers between two or more economies, where economic frontier is any demarcation over which actual and potential mobility of goods, services, and production factors, as well as communication flows, is relatively low” (Pelkmans, 1997, p.2). According to Pelkmans (1997), European economic integration is driven by efforts to decrease or eliminate completely the public role of territorial and economic frontiers with European neighbors. The process of integration within Europe refers to both political and economic integration. The main impetuses for European integration were preceding historical events in the first half of 19th century as well as threat from communism and the Cold War.

Integration process touches several areas. These areas include: product market integration, services market integration, and factor market integration (technologies, labor force, financial capital, corporate control, and mobility of tangible assets) (Pelkmans, 1997). Market integration is an essence of an economic integration and it refers to market conditions when activities of market participants are set in motion by supply and demand. As for policy integration, it includes different types of economic policies and instruments. Its degree can vary from cooperation and consultation to establishment of common policies and full centralization (Pelkmans, 1997).

Since there are different degrees of intensity of integration, analysts distinguish the following stages of economic integration (see table 1):

Table 1 Stages of Economic Integration (Pelkmans, 1997, page 7; Pelkmans, 2006, page 7; Mendes, 1987, p.2)

Stage	Definition	Characteristics
Free Trade Area (FTA)	<ul style="list-style-type: none"> - Tariffs and quotas removed for imports from area members; - Area members retain national tariffs (and quotas) against third countries 	<ul style="list-style-type: none"> - Essence of GATT definition; no positive³ integration.
Customs Union (CU)	<ul style="list-style-type: none"> - Suppressing discrimination for CU members in product markets; - Equalization of tariffs (and no/common quotas) in trade with non-members 	<ul style="list-style-type: none"> - Essence of GATT definition; no positive integration.
Common Market (CM)	<ul style="list-style-type: none"> - A customs union (CU) which also abolishes restrictions on factor movements 	<ul style="list-style-type: none"> - Is “beyond” GATT; definition should also include services; no positive integration.
Economic Union	<ul style="list-style-type: none"> - A common market (CM) with “some degree of harmonization of national economic policies in order to remove discrimination [...] due to disparities in these policies” 	<ul style="list-style-type: none"> - Positive integration introduced; extremely vague.
Total economic integration	<ul style="list-style-type: none"> - “Unification” of monetary, fiscal, social, and counter cyclical policies - Setting up of a supranational authority where decisions are binding for the member states 	<ul style="list-style-type: none"> - Centralist; vision of unitary state - Supranationality is only introduced here.

It is important to note that these stages represent only an approximate set of alternatives of how the process of integration might take place. In practical life this process does not always follow these stages and there is no reason to follow them strictly. For example, in addition to European Free Trade Association (EFTA), which was established as a free trade area, EEC (and EU) was started as a customs union with the aim to create a common market and, consequently, become an economic union. This sequence is not completely in line with what predicts table 1 (Pelkmans, 1997, 2006; Mendes, 1987).

³ The words “positive” and “negative” do not have any normative value with respect to “welfare” and other way around. *Positive integration* refers to the transfer to common institutions, or the joint exercise, of at least some powers. *Negative integration* denotes the removal of discrimination in national economic rules and policies under joint surveillance (Pelkmans, 2006, p.7)

2.3.2 Effects of Integration

When country is taking a decision whether to join union, possibly the main economic considerations to think of are:

- 1) How that would affect its income per capita in a short- and long-term?
- 2) How that would benefit the national welfare?

In addition to these concerns Mendes (1987) offers to consider additional effects of integration – dynamic effects. These effects include:

- 1) Increased level of investment resulting from the expansion of trade. Balassa (1972) claims that without integration the share of gross fixed investment in the GNP of a country is expected to be smaller (cited in Mendes, 1987). According to Faulhaber and Tamburini (1991), increase in integration increases dissemination of technology between activities and countries through foreign direct investment (FDI) and multinational enterprises (MNEs). Pelkmans (2006) believes that FDI is an important channel for the transfer of know-how and resources which may be underprovided in less economically developed regions. FDI can increase organizational expertise, fuel product innovation, and in general can serve as a catalyst of organizational improvements. In addition to FDI, multinational enterprises (MNEs) play an important role in developing and transferring technological progress among countries. Dunning and Cantwell (1991) state that steady growth of MNEs, especially since 1950s, has been associated with new and improved relationships between international creation and transfer of technology (Faulhaber & Tamburini, 1991). The extent and speed of technological diffusion among countries depends on geographical location, strength of companies, and structure of an industry (Faulhaber & Tamburini, 1991).

- 2) Expansion of exports as well as discouragement of import-competing inefficient activities due to increased level of competition and enlarged service and product markets. This, in turn, leads to an opportunity for some firms to exploit economies of scale, focus on technological development to increase efficiency, increase concentration, and specialization. Mendes (1987) notes, however, that with increase of integration, member states can become very similar, which can reduce the positive income distribution effects resulting from integration.

3) Terms of trade effects are considered to be an important outcome of integration. These effects can be positive or negative for country depending on country's relative competitiveness in production and other factors. Pelkmans (2006) states that terms of trade effects are relevant because single market increases competitive exposure which on the first stage may be destructive for weaker companies and industries. Yet, in the long run, it will probably leave the strongest market players in a competitive advantage and will strengthen those who survived even more.

4) The balance of payments effect. Mendes (1987, p. 31) states that even though there is no comprehensive explanation for this effect, "the importance of this effect is mostly seen in the context of introducing the implications of the agricultural policy and budget contributions".

5) Wage-price effects, which refer to the resource cost of membership (Klador & Miller, 1971) (cited in Mendes, 1987). Pelkmans (2006) believes that membership in the union exerts an upwards pressure on productivity and wages of workers with skills demanded for export production. Before membership in the union, country's capital and technology resources may be scarce. However, market integration is expected to make them cheaper, which should boost development of a higher value-added production (Pelkmans, 2006).

In addition to the "dynamic effects" of membership in the integrated area, Pelkmans (2006) offers to consider the effect of reducing distortions:

6) The effect of reducing distortions refers to the situation when union in order to keep internal market functioning well prohibits number of national measures taken by countries to "distort" EU competition. It can be both beneficial and destructing. Pelkmans (2006) believes that removal of distortions usually benefits members, especially peripheral ones if they had distortions in relation to the core market.

To conclude, the topic of integration and its economic effects is much broader and much more complex than is suggested in the following framework. To analyze effects of integration on member states' economies, alternative approaches have been suggested such as "resource costs/benefits, balance of payments (BOP), net capital flow/cost" analysis (Kaldor, 1971), or "analysis of gradual per GDP capita effects of integration" (Nugent, 1974) (cited in Mendes, 1987). However, in this thesis I include only Mendes's (1987) framework supplemented by Pelkmans's (2006) suggestions since their combination provides an ample insight into the topic of integration and its effects on member states' economies.

3 The Case of European Integration

3.1 European Integration and EU formation

EU is the key actor in the process of European integration since it affects many aspects of the economic and social activities of the member states (McDonald & Dearden, 2005). The process of European integration started from the alliance of France and Germany that was founded with the goal to promote European integration and rebuild shattered economic systems that were damaged heavily by the World War II. Franco-German alliance was the key determinant in developing European unity movement, which was later supported by Belgium, Holland, Luxembourg (Benelux), and Italy that ultimately led to EU formation (McDonald & Dearden, 2005). These were the original six members that created European Coal and Steel community (ECSC) which came into force after the Treaty of Paris in July of 1952 with the goal to unify post-war Europe (Pelkmans, 1997). Later, in 1957, during the Treaty of Rome, these members founded the European Economic Community (EEC) and the European Atomic Energy Community (EURATOM). In 1965, these communities were merged to found European Community (EC) (Pelkmans, 1997). In 1987, after the revision of the Treaty of Rome, EEC members have signed the Single European Act that formally established the Single European Market (i.e. Common Market) and the European Political Cooperation. These actions have noticeably contributed to the process of European integration.. Nonetheless, the Communities had still been greatly independent of each other till they have eventually been transformed into European Union in 1993 with the Treaty of Maastricht (Pelkmans, 2006). At present, EU encompasses integration and cooperation work by its member states, which is governed by common institutions (e.g. EU Parliament) and coordinated by common policies set by its member states (McDonald & Dearden, 2005).

3.2 Development of EC and EU

Since their foundation, European Community (EC) and European Union (EU) have been developing along the following three paths: deepening, widening, and enlargement.

Deepening refers to establishment of common regulation, policies, commitments, and prohibitions of the member states, extension of EU-policy competencies, and strengthening EU institutions (Nugent, Paterson, & Wright, 2004; Pelkmans, 1997). *Widening* implies widening of

the scope of economic and other powers. *Enlargement* means accession of new member states to EU (Pelkmans, 1997).

Examples of these activities include: acceleration of the tariff cuts (deepening), development of the common agricultural policy (deepening), introduction of Euro in EU member states (deepening), establishment of EC Regional Fund (widening), common fisheries policy (widening), ESPERIT programme (widening), Maastricht Treaty negotiations (widening), increased membership (enlargement).

Enlargement

Enlargement was consistently one of the main questions on the EU/EC agenda. Since the community was founded in 1950s, European countries have been gradually applying for EC/EU membership (Nugent et al, 2004). Membership applications have been pending constantly and Community/Union institutions have been considering whether potential new member states corresponded to their criteria and should be accepted. Therefore EU/EC enlargement is usually seen as an ongoing process (Nugent et al, 2004).

Since its foundation (till 2009), EC/EU has expanded from the original six (France, Germany, Italy, Luxembourg, Belgium, Netherlands) to twenty seven members. It took place through four enlargement rounds which are presented in table 2:

Table 2 EC/EU Enlargement Rounds. Source: self- adapted from Nugent et al (2004)

Round (year)	Countries joined
1) The First enlargement round (1973)	The United Kingdom (UK), Denmark, and Ireland
2) The Mediterranean enlargement round (1981 and 1986)	Greece (1981), Portugal (1986), and Spain (1986)
3) The EFTA enlargement round (1995)	Austria, Finland, and Sweden
4) The 10 + 2 enlargement round (2004 and 2007)	Hungary (2004), Poland (2004), Latvia (2004), Lithuania (2004), Estonia (2004), Czech Republic (2004), Slovakia (2004), Slovenia (2004), Cyprus (2004), Malta (2004), Bulgaria (2007), and Romania (2007)

Given the four official enlargement rounds, it is important to note that the process of European integration was much more complex and the four EU enlargement rounds were just part of it.

The need for balance

It was already mentioned before that since EC/EU was founded, it has developed far beyond the original EEC treaty and has more than doubled its membership (Pelkmans, 1997). In this connection Nugent et al (2004) state that enlargement could potentially threaten deepening of the EU because with accession of new member states EU becomes more and more diverse; and the less cohesive it becomes, the more complex becomes decision making and policy implementation. On the other hand, deepening also to a certain extent hinders enlargement since deepening raises barriers for new potential member states by making entry conditions difficult to meet.

It can be seen that both deepening/widening and enlargement are interrelated: in some situations they complement each other; in others, they encumber themselves (Nugent et al, 2004). Thus is important to keep control over these development paths and keep them in balance not letting either of them to overweight the other.

3.3 Effects of European Integration

Entry of new members in the EC/EU provides benefits and costs for both its incoming and existing members. Experience has shown that the majority of European countries are striving for the EU/EC membership, which makes it reasonable to assume that, in general, estimated benefits from EC/EU membership overweight its potential costs for both existing and new members. These costs and benefits constitute the combination of political and economic arguments and can be divided into three categories: economic, security, and political opportunities and challenges. Each of them is described below.

3.3.1 New Members

- **Economic opportunities:** Nugent et al (2004) believe that enlargement of EU offers very limited economic gains for the original EU-15 at the same time offering proportionately more economic opportunities for new EU members. They explain it by the fact that since new EU members are starting from a lower economic base and are geographically smaller than the majority of EU-15 ones, they potentially have much more to obtain from their membership. The gains appear from increased trade as well as increased investment, technology transfers, and

skills' enhancement owing to the Single European Market (which nowadays is EU) that ensures free movement of goods, capital, labor, and businesses (Piazolo, 2001). Nugent et al (2004) support this opinion by claiming that the main economic reason for seeking membership in EU/EC has been success of EU/EC in terms of promoting trade, economic growth, and prosperity, which is highly desirable by emerging European economies. For some members, EC/EU is also a potential source of regional funding for development (Baimbridge, Harrop & Philippidis, 2004).

According to Piazolo (2001), effects from integration of new member states can be classified into two categories: allocation (standing for static effects) and accumulation (representing dynamic effects). Both of the effects are expected to be beneficial for entering countries. Allocation effects lead to the reallocation of resources and expenditures in response to changing relative prices and conditions. Accumulation effects cause changes in the amount or accessible resources (for example, through increases/decreases in the capital stock caused by changes in the profitability of investments) (Piazolo, 2001).

Nugent et al (2004), however, states that there is also a disadvantage of membership in EU/EC in terms of restrictions that are placed on national economic maneuverability. Initially (in 1960s), these restrictions applied only on the sphere of trade. Nowadays they apply to the most economic decisions of the Union ranging from competition law to macro-economic management.

- **Security:** accession to the EU is associated with insurance of “the lasting peace and stability of the European continent and neighboring regions” since the process of European integration from its beginning has been seen as a process of bringing the continent together on a more stable and secure basis (Nugent et al, 2004).

- **Political reasons:** there are at least two political reasons that are associated with EU/EC membership. First, by becoming EU/EC member, country joins an organization with a potential to exercise a considerable influence on the world stage. Second, EU offers the prospect of supporting fledgling democracies as well as soft security protection to its member states (Nugent et al, 2004). The negative side of joining the union is the fact that membership in such a powerful organization might damage national interests of separate member states.

3.3.2 Existing Members

Just as new EU/EC members, existing members of the union also have reasons for why to keep accepting new members to the EC/EU organization. These reasons, similarly, have political and economic character.

- **Political reasons:** with the expansion of EC/EU, it gains capacity to play a greater role in a global political arena as well as it creates security advantages by bringing together the European continent. Baimbridge et al (2004) and McDonald & Dearden (2005), however, believe that enlargement of the EU and its accession of relatively poorer states creates more severe regional problems and causes number of new problems for the European integration hampering further political and economic deepening.

- **Economic opportunities and challenges:** the main economic reason for accepting new members is opportunities and advantages from widening the internal market. Besides that, some “richer” new members have a sufficient financial and economic capacity to contribute to the EU budget (UK, for example, was a net contributor to EC-6) (Nugent et al, 2004).

Economic challenges that are associated with accession of new members to EU/EC include bringing more diversity into the Union, increasing EU/EC population, and rising economic disparities. Nugent et al (2004) state that by enlarging from EU-15 to EU-25 population of the Union increased by a quarter, while the new members appended only 8 % to the EU-15 GDP. Economic disparities appear in a form of extending range of poverty and wealth in the Union: acceding members of 2004 had income level of only in between one-fourth to two-thirds of the EU-15 average income. This can be seen on figure 6.

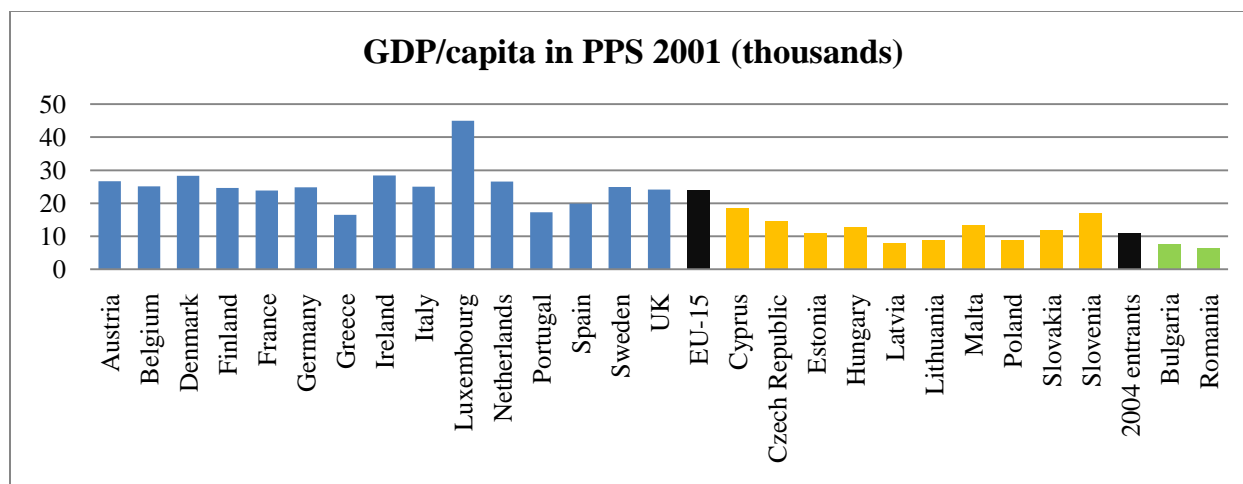


Figure 6 GDP per Capita in PPS⁴ 2001 (thousands) Relative to EU-15. Source: Eurostat, 2010

From figure 6 can be seen that if EU is enlarging, due to growing income disparities associated with accession of new members, it should pay attention to its economic policies and structure them in a proper way to help new member states catch up with old richer ones.

As far as unemployment rates are concerned, in general, they are higher in those countries that entered EU in and after 2004. This is especially seen in the rural areas of these countries (Nugent et al, 2004). Nugent et al (2004) believe that the main problem of these markets are geographical and skills' mismatches⁵ with the EU-15 members, which are characterized by the lack of sufficient transport links, flexible housing markets, and skills to take new employment opportunities in developing sectors. Differences in unemployment rates among EU members can be seen on figure 7 in appendix.

Figure 7 shows that from 1990 to 2001 unemployment rate has decreased dramatically in both Ireland and the Netherlands, while in Sweden and Finland it has increased noticeably during the same period. When it comes to the new 10 (9 on the graph) EU members, their position is relatively mixed: in some countries such as Lithuania, Poland, Slovakia, and Latvia unemployment rate has increased, while in Hungary and Slovenia it has decreased. However, in general, comparing situations in 1998 and 2001, relative unemployment rate has strongly increased in most new member states and, on average, in new EU member states it is higher than in the original ones.

⁴ PPS denotes Purchasing Power Standard. A unit representing the same volume of goods and services in a country, irrespective of price levels. The value of 1 PPS is approximately 1 Euro

⁵ Skills' mismatches in this context mean technological and productivity mismatches

3.4 Income Disparities between Core and Peripheral Regions

According to Baimbridge et al (2004), there are notable disparities in income between EU countries and current EU-25 can be divided into core (i.e. central) and peripheral regions.

The central region is called the *Golden Triangle* and it lies in north-west Europe stretching from London to Paris. It includes the most of Belgium, the Netherlands, western part of Germany, Austria, and northern Italy. This region is classified by high income and employment rates, which can be partly explained by the presence of high technology activities and concentration of industries such as electronics, aerospace, medical equipment, pharmaceuticals, biotechnology, and telecommunications. These industries tend to have high levels of investment in research and development as well as highly skilled and well-paid employees (Baimbridge et al, 2004).

When it comes to the periphery, it is considered to be a “poorer” region of Europe, and it is more dependent on agriculture and fisheries. According to Baimbridge et al (2004), this region seeks to develop by means of its comparative advantage such as cheap labor force and developing tourism sector. Periphery tends to have a relatively low capacity to create new work places, and it usually results in low activity rates. A higher rate of unemployment in these regions causes emigration of workers to more economically sound regions – to the core (Baimbridge et al, 2004). These days the peripheral region includes both more developed EU countries such as Ireland, Spain, or Greece and less prosperous states such as Central and Eastern European countries (CEEC). One of the distinctive features of CEEC is that they have inherited the post-Soviet policy practices (being former communist countries) and have considerably smaller income levels in comparison to the rest of the EU members (see figure 8 in appendix).

Figure 8 shows that during 1990s disparities in national per capita income levels narrowed down among the EU-15 member states. Ireland, Portugal, Spain, and Greece experienced relatively high income growth during 90s; whereas in Germany and France income slightly decreased over the same period. The peripheral Republic of Ireland can be considered as one of the most successful examples of economic growth since its economic situation has been improving dramatically after its accession to the European Union in 1973. In 2004, it was described as one of Europe’s tiger economies with rapid economic growth especially with respect to the attraction of MNCs in high technology sectors (Baimbridge et al, 2004).

When it comes to the ten last EU members during period from 1990 to 2000, their incomes have slightly increased (except for Cyprus, Czech Republic, and Slovakia) (figure 8). However, even in 2000, their GDP per capita levels were still below EU-15 average (for the majority of CEEC, below 50% of the EU-15 average). It shows that even though CEEC economies are growing, there is still a relatively large discrepancy in income levels among the 25 EU countries. The highest difference in incomes is observed between the most developed central European and former communist countries (CEEC).

As far as regions and smaller geographic areas (NUTS II) are concerned, it is important to note that there are observed even greater income discrepancies than those among countries. According to McDonald and Dearden (2005), these differences can approach the size of five incomes (for example, the difference between the poorest EU region (Ipeiros, Greece) and the richest one (inner London) was more than 1 to 5.1 in 2000), and, unlike national income disparities, tended to widen during 90s.

To conclude, regional income data show that there are noticeable socio-economic disparities between EU countries. Besides that, in many new EU member countries low income rates are supplemented with high unemployment rates.

3.5 Convergence versus Divergence

The *convergence* theory predicts that factor incomes (e.g. wages, returns on capital, income levels) within an integrated economic area are expected to eventually converge, provided that there are strong mechanisms in the form of goods and factor movements within that integrating area (McDonald & Dearden, 2005). According to this theory, integration should lead to identical production technologies in all the countries of the integration area and thus to identical payments to labor and capital.

Divergence theories, on the contrary, claim that there is a heterogeneous economic landscape within the integration area with different factor returns between central and peripheral areas. McDonald and Dearden (2005) state that this leads to the migration of mobile factors from “poorer” to “richer” areas, which is expected to increase disparities between countries even further.

McDonald and Dearden (2005) claim that as far as European case is concerned, empirical observations seem to provide support for both theories. European Commission (2000, 2001) finds evidence in favor of income convergence within EU members, but less at the regional level (partly because income gaps have increased between the regions of member states). When it comes to divergence, McDonald and Dearden (2005) state that external agglomeration affects as well as transport and transaction costs cause emergence of divergence between countries and regions. The other strong determinants of divergence are historical events and location of important inventions (e.g. first-mover advantage).

Baimbridge et al (2004), on the other hand, believe that there is a clear tendency towards convergence. They stick to the opinion that economic growth will be faster in poorer regions, and per capita income levels will converge in the long run independently of their initial state thanks to the European integration via mechanisms of trade liberalization. They believe that capital will flow into economically poorer areas to take the advantage of lower factor prices (wage costs and rents), while labor will emigrate from those regions lessening the excess supply of it and, accordingly, raising wages.

The process of migration can be beneficial for the peripheral member states because it reduces overpopulation and improves agricultural efficiency through increased capital intensity. In addition to that, those migrants who return back home also bring back their new and improved skills and financial capital (e.g. through remittances).

The other factor that, according to Baimbridge et al (2004), contributes to European convergence is the process of integration. One of the benefits that periphery obtains from its integration with a more capital abundant core are gains in the amount of investment. Baimbridge et al (2004) state that capital is highly mobile and peripheral areas are increasingly attractive for multinational companies. Therefore they often concentrate their low-skill operations in less economically developed regions. This is, however, a conditional advantage because it only brings benefits in economically stable times; whereas in times of economic downturn, capital flows to peripheral regions are reduced noticeably since MNEs usually close their distant branches first (Pelkmans, 2006).

Even though, according to Baimbridge et al (2004), there seems to be a general trend for catching up, some European countries such as Portugal and Spain have experienced relatively

little improvement in regional economic performance. For example, in Portugal the most of the investment has been concentrated in the Setubal region, while the other parts of the country were suffering lack of investment. Another example is Italy, where has been relatively little improvement in the southern part of the country (Baimbridge et al, 2004). This can be explained by the fact that, even though there is number of benefits that peripheral countries can gain from European integration, core regions can retain their benefits pursuing development at the expense of the exploited periphery as well. These benefits include continuous technical progress, increasing returns to scale based on economies of scale, and positive spillover effects from the concentration of firms in one particular geographical location. These factors can contribute to the process of divergence (Baimbridge et al, 2004).

In general, while McDonald and Dearden (2005) believe that there is no clear-cut answer on whether there is a tendency towards convergence or divergence among EU member states, Baimbridge et al (2004) state that convergence is a realistic phenomenon which is dependent on economic circumstances within the region. It is clear, however, that in times of economic recession tendency towards convergence is constrained since economically weaker regions usually suffer from economic downturn more than more progressive ones. Nonetheless, the process of economic integration seems to create ponderable benefits for both core and peripheral regions, turning periphery into a more central location.

4 Methodology

4.1 Research Design

4.1.1 Research Approach

One of the starting points in developing the right research design is defining which research approach to use. In this connection, Saunders, Lewis & Thornhill (2007) and Bryman & Bell (2003) suggest choosing between one the two major approaches - deductive or inductive (with possible combination of the two). My thesis objective is to examine the effect of EC/EU entry on countries' income levels and determine whether there is a trend towards convergence among the EU-25 member states. Since I develop hypotheses and test relevant theories on the topic aiming to explain casual relationships between variables representing economic growth, the deductive approach is the most suitable to use to achieve my thesis objective.

4.1.2 Research Strategy

According to Saunders et al (2007), there are two types of research strategies – qualitative and quantitative. The distinction between the two provides a good starting point for the development of a research plan (Bryman & Bell, 2003). In my research, I use quantitative strategy because it is in line with the purpose of my thesis and provides the right framework for answering my research questions. This strategy is usually associated with the deductive research approach and it allows utilizing data that contains large number of observations with the objective to test theories, examine the relationship among variables, build a framework to avoid/reduce potential bias, generalize, and replicate findings (Creswell, 2009; Hair, Bush, & Ortinau, 2003).

4.1.3 Research Purpose

There are three types of research purposes: exploratory, explanatory, and descriptive (Saunders et al, 2007). According to Saunders et al (2007), the purpose of explanatory studies is studying a problem with the goal to establish causal relationships between variables, while descriptive research aims at providing an accurate description of persons, events, and situations that can serve as a basis for the explanatory research.

The purpose of my research is explanatory, supplemented by some elements of description of the EU-25 economic situation portrayed in section “the Case of European Integration”. To reach my

thesis purpose, I address two sets of questions. First, I examine whether EC/EU entry by a member state increases its income per capita. Second, I test the Solow growth model to define whether there is a trend within EU-25 towards income convergence.

To fulfill thesis objective, I answer the following research questions:

1) **Research question 1 (EC/EU membership and income growth)**

“What is the effect of joining EC/EU on income growth of European countries?” i.e.

“Does joining EU help countries grow faster?”

To answer this research question, I formulated the following hypothesis:

H₁: Joining EC/EU increases *average real GDP per capita growth rate* of a new member state.

2) **Research question 2 (income convergence within EU-25)**

“Do incomes of EU-25 countries converge?” i.e.

“Do poorer countries tend to grow faster than rich ones (in terms of real GDP per capita)?”

To answer this research question, I formulated the following hypothesis:

H₂: GDP per capita of poorer European countries *grows faster* than GDP per capita of richer ones.

4.2 Data

4.2.1 Population

Since the main thesis objective is to provide an analysis and empirical evidence of economic effects of European integration on the living standards in the EC/EU countries, I consider EU-27 as a population because nowadays EU consists of 27 member states.

4.2.2 Sample

My sample consists of 24 EU countries (out of 27). I will not include into my sample two countries: Bulgaria and Romania. These countries are excluded from the data set since they joined EU only in 2007 and hence been there only for a little more than two years, which I perceive as an insufficiently long period to draw any significant conclusions about. For the list of countries included in the research refer to table 3 in appendix.

In addition to Bulgaria and Romania, I also exclude Luxembourg. Luxembourg is excluded because it is usually considered as an outlier since it is a very small state and income statistics might be misleading.

4.2.3 Subsamples

In my data set, I distinguish between 4 different subsamples among the 24 selected states. This choice is driven and motivated by the fact that European integration took place gradually over time in four distinct enlargement periods (rounds). In order to extract the causal effect of EC/EU entry by a member state it is necessary to understand how different groups of countries were affected by their membership in the union. It can be done by comparing economic situation (income level and its growth rate) before and after their EC/EU entry. The four subsamples are as follows:

Table 4 The Four EC/EU Enlargement Rounds and the Respective Subsamples

No	Countries	Year
1.	The United Kingdom (UK), Denmark, and Ireland	1973
2.	Greece (1981), Portugal (1986), and Spain (1986)	1981, 1986
3.	Austria, Finland, and Sweden	1995
4.	Hungary, Poland, Latvia, Lithuania, Estonia, Czech Republic, Slovakia, Slovenia, Cyprus, Malta	2004

4.2.4 Data Collection and Organization

Data for the research is collected from various official sources such as the World Data Bank (collected by the World Bank), the Penn World Tables, and Eurostat, and it contains an extensive number of observations representing a span of 49 years, from 1960 till 2008.

I use panel data in my research: gathered data embodies both cross sectional variation (i.e. multiple economic variables (see table 5 in appendix)) and time series variation (i.e. extended time period) across the 24 EU countries.

4.3 Research Method

Given the way in which the data is generated, the OLS estimator can be considered as the optimal estimator to reach my thesis objective⁶. In the analysis section of the thesis, I assume that the following assumptions behind the classical linear regression model are satisfied.

The basic assumptions about the data generating process are as follows:

- 1) Linearity. By linearity is meant that the dependent variable is a linear function of independent variables as well as the white noise term. In addition to that, the unknown coefficients that are estimated are assumed to be constant.

Some of the most severe violations of this assumption include situations when relevant independent variables are omitted; when the functional relationship between dependent and independent variables is nonlinear; and when the parameter vector is not constant (Kennedy, 1998).

- 2) Exogeneity of independent variables. It can be interpreted as an expected value of the error term to be equal to zero. In other words, independent variables do not provide any useful information about prediction of the error term (Greene, 2002).
- 3) Homoscedasticity and nonautocorrelation. Homoscedasticity refers to the situation when the error terms all have the same variance. Nonautocorrelation assumption postulates that error terms are not correlated with each other (Kennedy, 1998).
- 4) The observations on the independent variable are assumed to be fixed in repeated samples. In other words, it is feasible to replicate exactly the same sample with the same independent variable values.

If this assumption is not satisfied, I am likely to face the so called “errors in variables” or “simultaneous equation estimation situation” (Greene, 2002; Kennedy, 1998).

- 5) Full rank condition. It states that number of observations is bigger than the number of independent variables while there is no exact linear relationship among any of the independent variables (If this condition is not satisfied, it is referred to as the problem of multicollinearity) (Greene, 2002).

⁶ The OLS estimator satisfies many of the desired estimation criteria, such as unbiasedness and minimum mean square error making OLS the best linear unbiased estimator (Kennedy, 1998)

If the model satisfies these conditions, then OLS has properties of the Best Linear Unbiased Estimator (BLUE) – by the Gauss-Markov Theorem⁷ - making it the optimal research method for my thesis. More specifically, it means that the OLS estimator of parameter vector (β) is an unbiased estimator of the population values and OLS estimate of β has the “smallest” variance-covariance matrix. The other criteria that OLS in this case are expected to satisfy are: the highest R^2 and asymptotic efficiency⁸.

Possible limitation of OLS

It is important to be aware of certain limitations and potential drawbacks of the research strategy. One of the possible issues in case of using OLS is that OLS estimator is not the minimum mean square error estimator. In other words, it is possible to find a slightly biased estimator through which reduction in variance can be achieved. According to Kennedy (1998), this is the weakest point of OLS.

4.4 Data Processing and Analysis

4.4.1 Research Question 1: EC/EU Membership and Income Growth

I study the question of whether European economic integration has a positive long-term effect on growth of its member states. Subsequently, if EC/EU membership contributed towards economic growth in Europe, can one extract a set of countries that benefited more than others (on average)? Lastly, if there is such an asymmetric effect, is it a consequence of economic integration or it can be explained by country-specific developments?

To study the determinants of economic growth in Europe, I include the set of explanatory variables. I select those variables based on economic theory. The self-proposing candidates for explanatory variables are the “initial level of GDP per capita” ($Y_{0,t,i}/n_t$), the “investment rate” (INV), measures of human capital (“level of education” (EDU)), and a dummy (binary⁹) variable indicating whether country is a member of EC/EU.

⁷ In the classical linear regression model with regressor matrix X, the least squares estimator b is the minimum variance linear unbiased estimator of β . For any vector of constants w, the minimum variance linear unbiased estimator of $w'\beta$ in the classical regression model is $w'b$, where b is the least squares estimator (Greene, 2002, p. 47)

⁸ Asymptotic efficiency means that the variance-covariance matrix of β approaches zero as the sample size approaches infinity (Kennedy, 1998)

⁹ Binary variable takes only two values: 0 or 1

$$\frac{[\ln(y_{1,t,i}) - \ln(y_{0,t,i})]}{T} = \beta_1 \ln(y_{0,t,i}) + \beta_2 INV_{t,i} + \beta_3 EDU_{t,i} + \beta_4 EU + u_{t,i}, \quad (\text{Eq. 1})$$

where $u_{t,i}$ is an error term, T is number of years in period, and $y_{1,t,i}$ is GDP per capita in the last year of the period (based on Crespo-Cuaresma, Dimitz, & Ridzberger-Grunvald, 2002)

In addition to variables given above it is needed to control for other economic variables that can have impact on the economic growth of European countries. Therefore besides variables suggested above I also consider additional control variables such as the “inflation rate” (INF), “government consumption” (GOV), and “openness of economy” (OP) (measured as a volume of trade over GDP). The detailed explanation of variables is given in table 5 of appendix.

If growth depends negatively on the initial level of GDP, then the β coefficient in the regression must be negative – indication of β -convergence (Crespo-Cuaresma et al, 2002).

$$\frac{[\ln(y_{T,t,i}) - \ln(y_{0,t,i})]}{T} = \beta_1 \ln(y_{0,t,i}) + \beta_2 INV_{t,i} + \beta_3 EDU_{t,i} + \beta_4 INF_{t,i} + \beta_5 GOV_{t,i} + \beta_6 OP_{t,i} + \beta_7 EU + u_{t,i}, \quad (\text{Eq. 2})$$

where $u_{t,i}$ is an error term, T is number of years in period, and $y_{1,t,i}$ is GDP per capita in the last year of the period.

4.4.2 Research Question 2: Income Convergence within EU-25

By income convergence I mean the so called β -convergence, which was pioneered by Barro and Sala-i-Martin (1992). The concept of β -convergence is relevant when there is a negative correlation between the initial level of real GDP per capita and its average growth rate. It can be distinguished between conditional and unconditional β -convergence. Conditional convergence refers to the situation when economies move towards the same steady state; while absolute (unconditional) convergence refers to the scenario when poorer country always grows faster than the richer one (Rapacki & Prochniak, 2009). I argue that splitting up the sample of EU-24 into 4 different subsamples allows me to form a relatively homogeneous group of countries that are likely to follow similar economic policies and development paths hence sharing the same steady state.

In addition to β -convergence, there is a related concept of σ -convergence, which is complementary and refers to the decreased dispersion of real GDP per capita across units and

over time. σ -convergence takes place if income differences between countries tend to decrease over time. Income differences are typically measured by the standard deviation of GDP per capita (Crespo-Cuaresma et al, 2002; Rapacki & Prochniak, 2009). It is important to note that β -convergence is a necessary but not a sufficient condition for the σ -convergence. In order to estimate the β -convergence hypothesis, I run the following regression:

$$\frac{1}{T} \ln \frac{y_T}{y_0} = \alpha_0 + \alpha_1 \ln y_0, \text{ where (Eq. 3)}$$

y_0 is GDP level per capita in the 1st year, y_T is GDP level per capita in the last year, T is number of years in period, and α_1 is a measure of convergence.

If α_1 is negative, then there is evidence of convergence, and I can estimate what number of years will be needed for EU countries' GDP to converge. This can be done by applying the following equation (Rapacki & Prochniak, 2009):

$$\beta = -\frac{1}{T} \ln (1 + \alpha_1 T) \text{ (Eq. 4)}$$

The complementary technique that I use in addition to the β -convergence concept was developed by Mankiw, Romer, and Weil (1992). This approach is based on Solow growth model and initially was meant to discuss the predictions of the Solow theory in relation to cross-country differences in standards of living. The Mankiw et al (1992) specification is given as follows:

$$\ln\left(\frac{Y}{L}\right) = \alpha + \frac{\alpha}{1-\alpha} \ln(s) - \frac{\alpha}{1-\alpha} \ln(n + g + \delta) + \varepsilon, \text{ (Eq. 5) where}$$

$\frac{Y}{L}$ is GDP per capita, s is saving rate, n is population growth, g is technological progress, δ is the rate of capital depreciation, and ε is an error term.

In line with Mankiw et al (1992), I measure n (population growth) as an average growth of population in the country (%). I also follow Mankiw et al (1992) when measuring s (saving rate), meaning that s is measured as gross savings as a % of GDP. I assume that rates of saving and population growth are independent of country specific factors shifting the production function (i.e. that s and n are independent of ε). This assumption allows to estimate the equation 5 by OLS.

When it comes to g and δ , I assume that they are constant across countries. g reflects the advancement of knowledge, which is not country specific, and there is no reason to expect δ

(depreciation rate) to vary greatly across countries (country specific depreciation rates are difficult to estimate given the limitations of data). Therefore I follow suggestion of Mankiw et al (1992) and set value of $g + \delta = 0.5$ without loss of generality.

* * *

Since convergence refers to the reduction of income gap between “poorer” and “richer” countries, it is important to define what I mean by these two groups of states. Therefore I set the upper and lower limits of income per capita (thresholds) that characterize either of the groups. The criteria are as follows:

- Poor country: income per capita $\leq 10\,000$ \$ per capita;
- Rich country: income per capita $> 10\,000$ \$ per capita.

In order to obtain more robust results I move the threshold for what is meant to be “rich” or “poor” to:

- Poor country: income per capita $\leq 15\,000$ \$ per capita;
- Rich country: income per capita $> 15\,000$ \$ per capita.

The specification that I apply to test convergence between these groups of EC/EU countries is given in equation 3. Thus, equation 3 will first be run for the entire dataset. Afterwards, it will be tested on separate groups of countries (with different thresholds) to reveal additional trends.

5 Analysis

5.1 Descriptive Analysis

The first part of this section is devoted to descriptive analysis. More specifically, by having first look at data, I try to understand how economic integration affected different enlargement groups of European countries. This approach is later complemented by a more rigorous strategy of regression analysis.

5.1.1 Economic Performance of EC/EU Member States in the Four Enlargement Rounds

5.1.1.1 First Enlargement Round

In 1973, after European Community was founded by the six initial member countries (Germany, France, Italy, Luxembourg, Belgium, and Netherlands), the first enlargement round took place. In the first round, Denmark, United Kingdom, and Ireland joined former EC. Figure 9 shows the development of GDPs per capita of the initial 6 EC countries and of each of the three countries that joined EC in 1973. The vertical line in the graph shows the year when enlargement round took place.

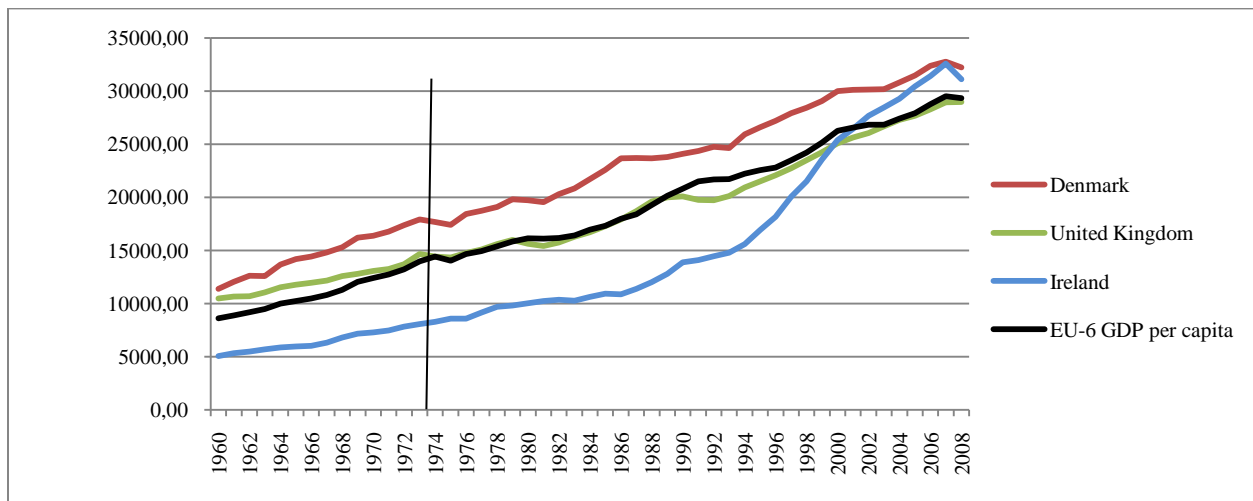


Figure 9 Dynamics of Development of Real GDP per Capita of EU-6 and the 3 Joining Members

From figure 9 it can be seen that GDP per capita of the initial 6 and 3 new member states have been growing steadily at approximately the same rate both before entry into EC and after. From the graph it is possible to assume that, in general, entry into EC has not changed prospects of economic development of the 3 countries significantly. However, it is worth to pay a closer

attention to Ireland, which starting from 1994 was growing at a rate between 6% and 10%. Ireland's initial (1973) GDP per capita level was almost twice smaller than that of EU-6¹⁰. Nonetheless, in 2000, it exceeded GDP per capita of EU-6, and was increasing until global financial crisis hit EU in 2007.

Some of the possible explanations for the impressive economic performance of the geographically peripheral Ireland during the whole decade could be its favorable business environment policies (tax system and industrial strategies) and access to/from other EC countries. Trade liberalization, which is a necessary attribute of EC/EU entry, especially after mid 90s, contributed to the inflow of numerous FDIs and MNEs to Ireland, which were attracted by Ireland's EC membership, low taxes, and relatively low wages. In addition to that, Irish government provided financial, technical, and social support for local start-up firms (Flanigan, 2008).

5.1.1.2 Second Enlargement Round

The second enlargement round is called the "Mediterranean Enlargement Round" and it took place in 1981 and in 1986. During this round Greece (1981), Portugal (1986), and Spain (1986) joined EC.

One of the peculiarities of this round is the fact that, unlike Denmark and UK which joined in the 1st enlargement round, the 3 new members (Greece, Portugal, and Spain) at the time of accession to the EC had twice smaller levels of GDP per capita (just like Ireland) than that of EU-9. Also, as in the 1st enlargement round case, accession of new countries to EC did not seem to influence their GDP per capita levels to a great extent. This can be seen on figure 10.

¹⁰ Average of the EU-6 members' GDP per capita

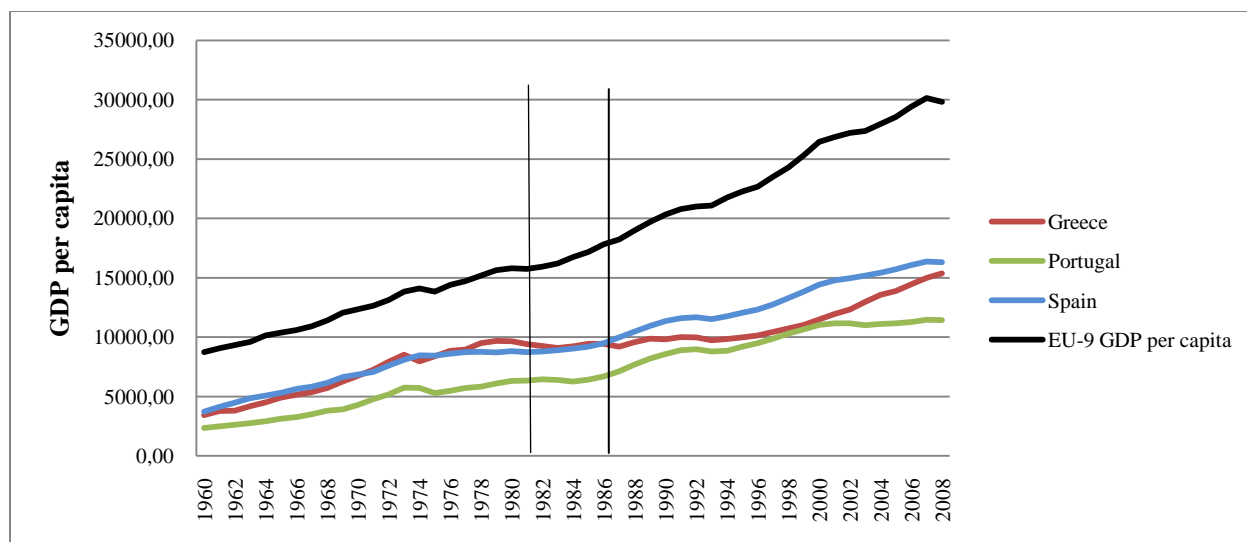


Figure 10 Dynamics of Development of Real GDP per Capita of EU-9 and the 3 Joining Members

Figure 10 shows that from all the three joining economies Portugal had the lowest level of GDP per capita, and it did not change significantly till the end of 2007. As far as the other two countries are concerned, their economic performance was not that intense in comparison to the EU-9’s either. These economies performed relatively poorly over the period from 1970 to 1995. However, even though none of the three joining countries approached EU-9’s average GDP per capita, the period from 1995 till 2001 was notable for increased growth in all of them. Bosworth and Kollintzas (2001) state that, when it comes to Greece, it achieved macroeconomic stabilization only after 1995 - after its admission to the Euro currency zone. One of the possible reasons for a relatively poor economic performance before 1995 is that Mediterranean economies at that time suffered from considerable economic inefficiencies and a dramatic deterioration in multi-factor productivity: macroeconomic policy took the form of large fiscal deficits at high rates of inflation, labor market was highly constrained, competitiveness of tradable goods was low, and unfavorable reputation of Mediterranean markets hindered from inflow of foreign capital (Bosworth & Kollintzas, 2001).

5.1.1.3 Third Enlargement Round

The third enlargement round took place in 1995 and received the name of “EFTAn enlargement round” (Nugent et al, 2004). By this round, EC have already been officially transformed into European Union (in 1993) and consisted of 12 European economies. In 1995, they were joined

by three additional ones: Austria, Finland, and Sweden. Economic performance of the 12 EU countries and the three joining ones in terms of level of GDP per capita is portrayed on figure 11.

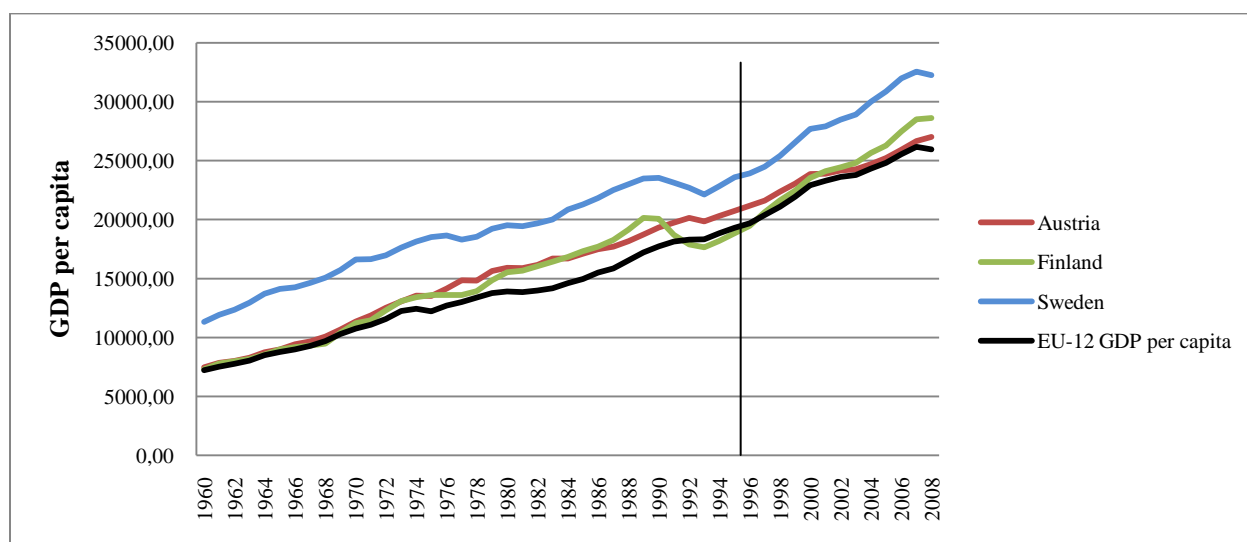


Figure 11 Dynamics of Development of Real GDP per Capita of EU-12 and the 3 Joining Members

From figure 11 can be seen that at a time of accession GDPs per capita of two out of the three new EC member states' (except for Finland) exceeded that of EU-12, and after they have joined EU-12, their economies continued to grow relatively smoothly. From the perspective of GDP per capita, Swedish economy performed the best of all of the three economies: by the end of 1994, Swedish GDP/capita comprised 121.11 % of that of EU-12 average, and by the end of 2007 it was 124.41 %; at the same time Austria's GDP per capita was 107.71% of the EU-12 average in 1994 and 101.88% in the end of 2007.

When it comes to the economic performance of the EC/EU after accession of new member states, the level of average GDP per capita in the union have been changing with every enlargement round (see figure 12).

While, after the 1st enlargement round, the level of GDP per capita has decreased by 0.156% (probably because of the accession of less economically prosperous Ireland at that time), after accession of Greece, Portugal, and Spain, the average GDP per capita of the EC/EU has decreased further by 13.15%. The 3rd accession round, with accession of Austria and Sweden, has brought positive changes to EU's average GDP/capita level by increasing it by 3.163%. When it comes to the 4th enlargement of EU (from 15 to 27 member states), it is reasonable to

argue that it has decreased the average GDP per capita to a great extent since members that joined EU-15 in 2004 and 2007 had significantly lower GDP levels.

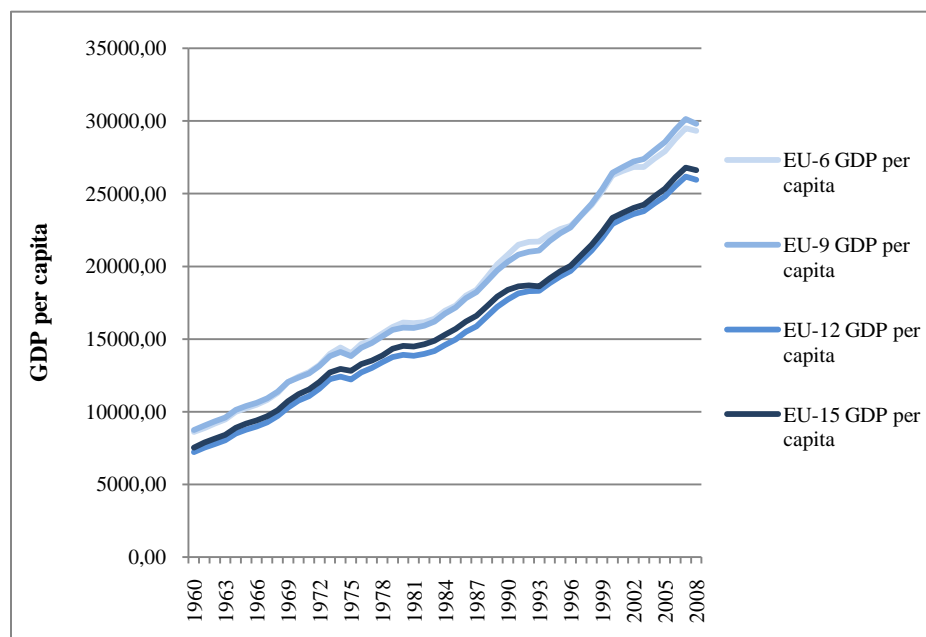


Figure 12 Scenarios of the Development of GDP per Capita from 1960 till 2008 for EU-6, EU-9, EU-12, and EU-15 (darker lines represent data from the most recent accession rounds)

These changes in GDP levels and average economic performance of the Union confirm Nugent's et al (2004) statement that accession of new member states, especially economically divergent ones, increases economic disparities within the union. Also, accession of economically diverse states might increase likelihood of occurrence of asymmetric shocks and lower EUs overall economic performance creating space for economic inefficiencies.

5.1.1.4 Fourth Enlargement Round

The fourth EU enlargement round took place in 2004 and in 2007 and received the name of "10+2 enlargement round". During this round twelve countries joined EU. These countries are: Latvia (2004), Lithuania (2004), Estonia (2004), Hungary (2004), Poland (2004), Czech Republic (2004), Slovak Republic (2004), Slovenia (2004), Cyprus (2004), Malta (2004), Bulgaria (2007), and Romania (2007). Within the scope of the thesis I focus on 10 of these countries and see how their GDPs/capita have been developing before and after EU entry (see figure 13).

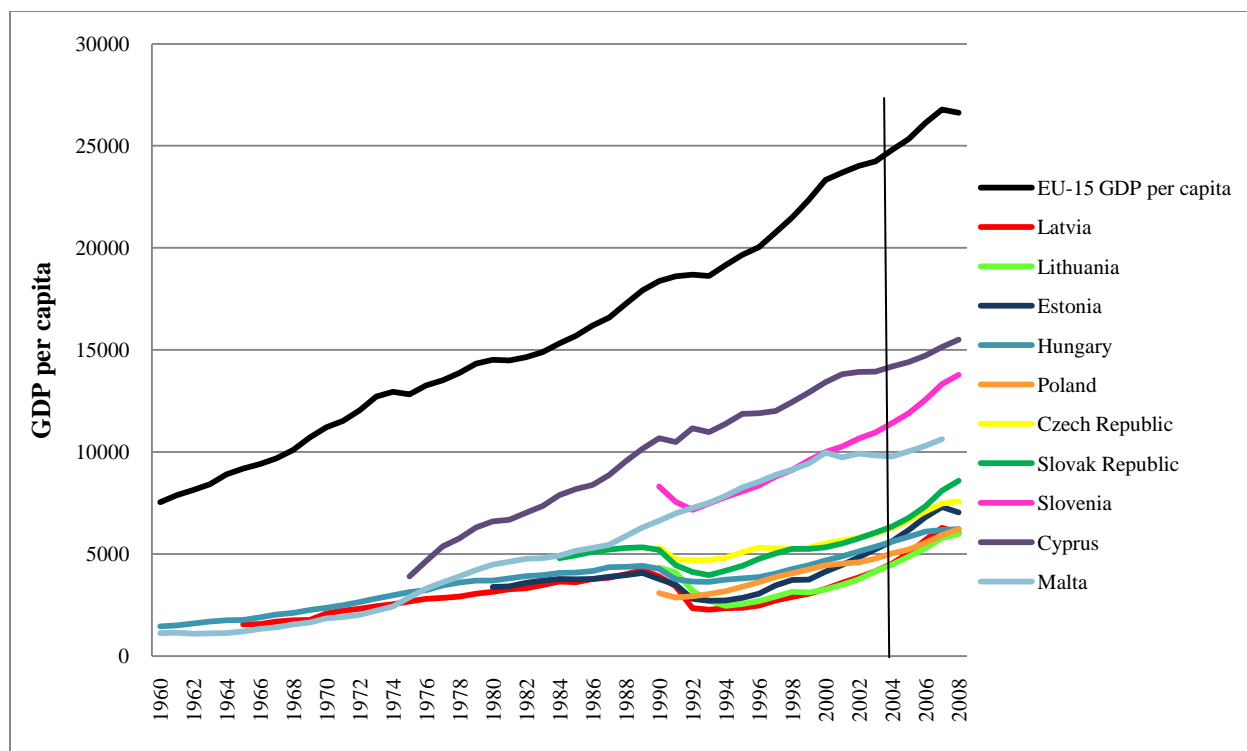


Figure 13 Dynamics of Development of Real GDP per Capita of EU-15 and the 10 Joining Members

Figure 13 shows that GDPs per capita of the 10 new member states are considerably smaller than that of EU-15. However, even though there still remains a large gap between income levels within EU-25, from 1999 till 2007 new members' GDPs per capita have been growing at surprisingly high rates. From figure 13 can be seen that GDP/capita levels of the majority of new member states represent only around 25% of the EU-15 average. The three of the new member states whose GDP per capita were the highest of all of the new entrants in 2004 were Cyprus (57.23% of EU-15 average GDP per capita), Slovenia (46.03%), and Malta (39.43%). It is important to note that with the exception of Slovenia, all of the former communist countries have the lowest GDPs/capita among all the 10 new member states. Malta and Cyprus, which were not touched by the communist influence managed to keep their incomes at higher levels.

As far as the trend of income convergence within EU-25 is concerned, it is difficult to tell from previously presented graphs whether incoming member states tend to approach current income levels of founding member states. It is the most uncertain when it comes to those member states that entered EU in 2004 (and 2007) since their income levels are noticeably smaller than those of

the other EU countries. Regression results presented in section 5.2 provide more precise results related to convergence of EU-25 member states.

5.1.2 Central and Eastern European Countries (CEECs)

Previously, I looked at how entry in EC/EU influenced the level of GDP per capita of the 25 EU member states. When it came to the first three enlargement rounds, new members' income levels were quite close to the average level of contemporary EC/EU states. However, the last enlargement round has brought the most divergence into EU in terms of variation of income levels. Countries whose incomes differ from EU-15 average the most are Central and Eastern European countries (CEECs). All of these countries are former communist countries with considerably lower income levels (except for Slovenia) (shown on figure 13). From figure 13 can be seen that one of the biggest challenges for them these days is to be able to catch up with more advanced EU economies. Since this group of countries is responsible for contributing to income inequality within EU the most, in this section, I pay attention to them and try to identify whether they have a prospect of approaching income levels of other EU member states.

5.1.2.1 Income Growth in CEECs

To be able to evaluate prospects of CEECs in terms of their expected income growth and convergence with other EU member states, it is necessary to analyze development of their economies over time.

During 1990-1994, CEEC countries experienced substantial transition costs moving from centrally planned economies. GDP per capita fell dramatically in each of these countries (see figure 14). Countries that suffered from transition the most were Baltic states (Estonia (-8.72%), Latvia (-11.09%), and Lithuania (-11.07%)). Slovenia, Slovakia, Hungary, and Czech Republic also suffered losses, but to a smaller extent (from -1.55 to -4.29%). Poland was the only CEEC country that managed to keep positive growth rate of GDP per capita during those years (1.15%).

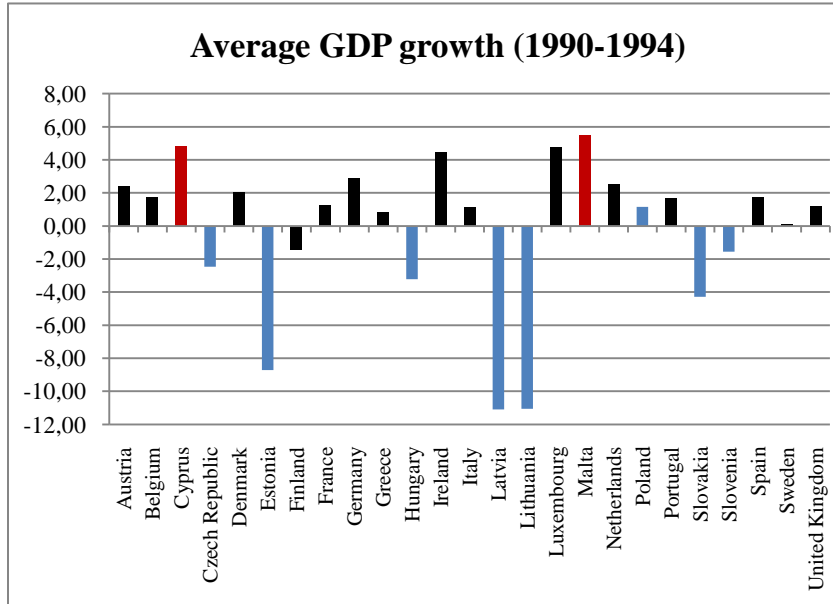


Figure 14 Growth in Real GDP per Capita in the 25 EU Member Countries (1990-1994)

After experienced noticeable output losses during transition period in the beginning of 90s, growth of the CEECs' GDP per capita rates has started to increase at impressive rates. It is shown on figure 15.

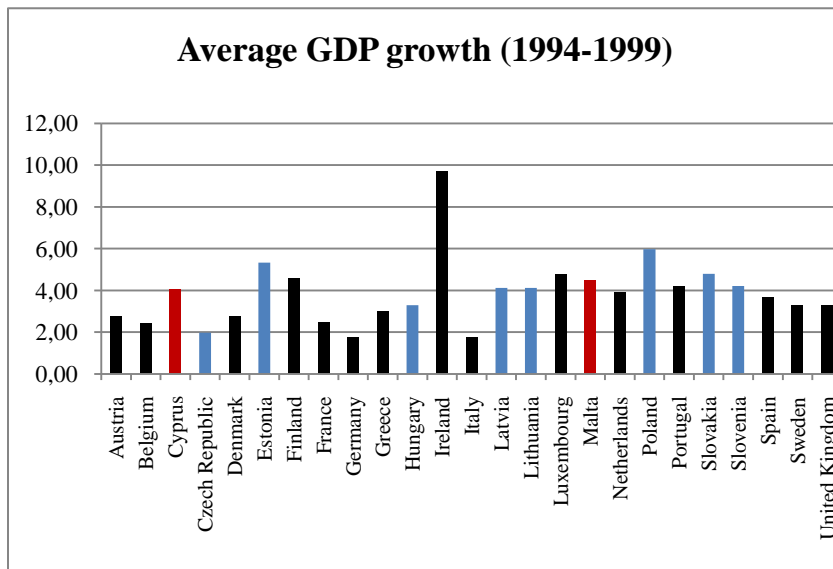


Figure 15 Growth in Real GDP per Capita in the 25 EU Member Countries (1994-1999)

From figure 15 can be seen that even with the Russian shock in 1998 all of the CEECs (except for Czech Republic and Hungary) managed to keep GDP per capita growth rates between 4.11% and 5.97% on average per year. After 2000, growth rates in the CEECs have increased even more and for some countries, like Baltics, ranged between 7.46% (in Lithuania) and 8.76% (in Latvia). Growth rates of the other CEECs were relatively high as well. In general, the majority of

CEECs' GDP per capita growth rates exceeded those of EU-15 member states' with an exception of Ireland and Luxembourg, whose GDP/capita growth rates approached 6.10% and 4.75% respectively (see figure 16).

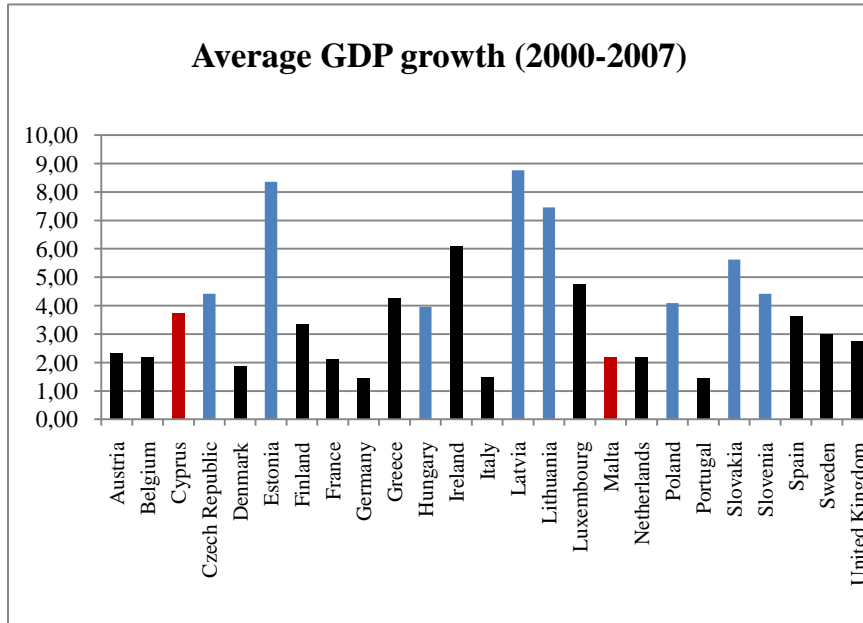


Figure 16 Growth in Real GDP per capita in the 25 EU member countries (2000-2007)

Taking into consideration high growth rates of CEECs from 2000 to 2007, it is reasonable to presume that if CEECs would continue to grow at higher rates than the other EU member countries, it would be possible for them to approach EU-15 income levels. In this case income convergence would be plausible among EU-25 countries. However, after the global financial crisis took place in the end of 2007, these prospects have become rather uncertain.

5.1.2.2 Income Effects of EU Entry on CEECs

According to theories presented in section 2 of the thesis, entry into European Union brings number of benefits to the joining members. Some of the positive effects that EU entry has provided to the CEEC include increased ability to draw foreign investment (i.e. savings), exchange of technologies, reduced currency risk for those countries that have adopted Euro currency (Slovenia and Slovakia), and EU growth-oriented policies that aim at increasing income levels and accelerating possible catch-up (Schadler, Mody, Abiad, & Leigh, 2006). In order to see how GDP per capita growth rates have changed in CEECs with their EU entry, let us see figure 17.

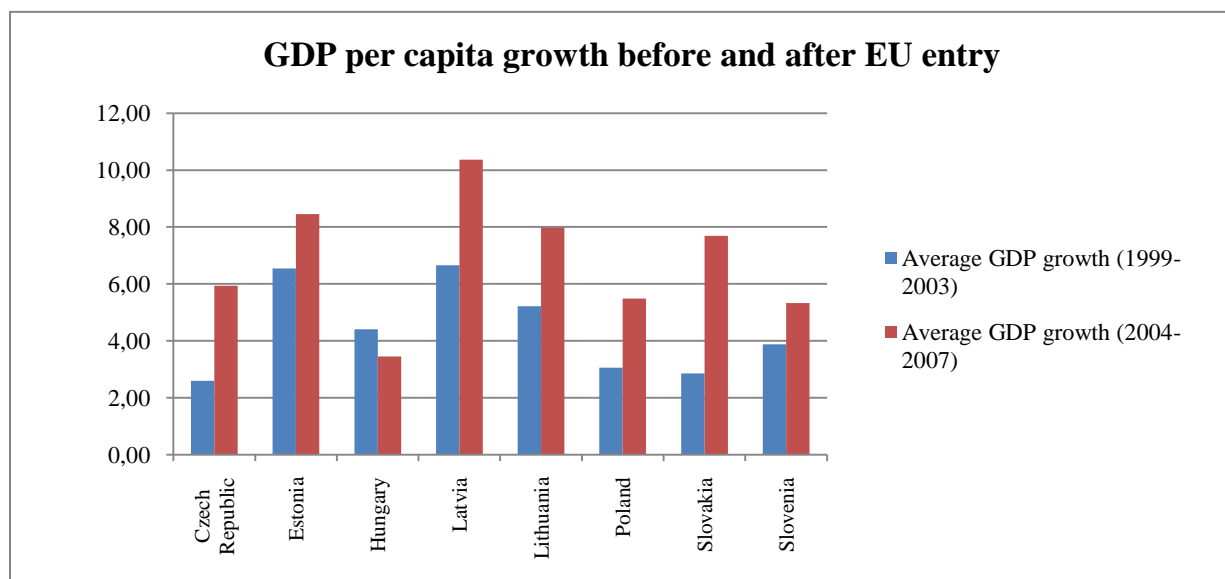


Figure 17 Growth in Real GDP per Capita in CEEC Before and After EU Entry

Figure 17 shows that average GDP/capita growth of CEECs has increased significantly after they have entered European Union in 2004 (growth rates are given in appendix in table 6). The only exception is Hungary: its average growth rate decreased from 4.4% to 3.45%. From figure 17 it is reasonable to argue that EU entry has been at least one of the factors that have contributed to economic growth of CEEC countries after 2004.

One of the reasons for the increased economic growth of CEEC countries related to their entry into EU is inflow of foreign investment. Despite of the fact that my OLS analysis has revealed a negative relationship between GDP growth and investment rates in (see table 10 and table 11), Schadler et al (2006, p. 9) state that capital has provided a substantial contribution to economic growth of Central and Eastern European countries since among the CEECs the range of investment has been large: “foreign savings have played a key role in several countries”. What is surprising is the fact that in combination to high investment rates, CEECs have quite low savings rates. It contradicts to Solow’s model which states that those countries that want to reach higher income levels should have higher saving and investment rates (Burda & Wyplosz, 2009). Central and Eastern European countries, however, managed to grow intensively, especially after 2000 even with relatively low levels of savings. After EU entry in 2004, except for Slovakia and Hungary, CEECs’ average saving and investment rates as a percentage of GDP have increased even more, with investment rates noticeably exceeding saving rates in all of the 8 countries. It can be seen on figure 18 (more details are provided in appendix in table 7 and table 8).

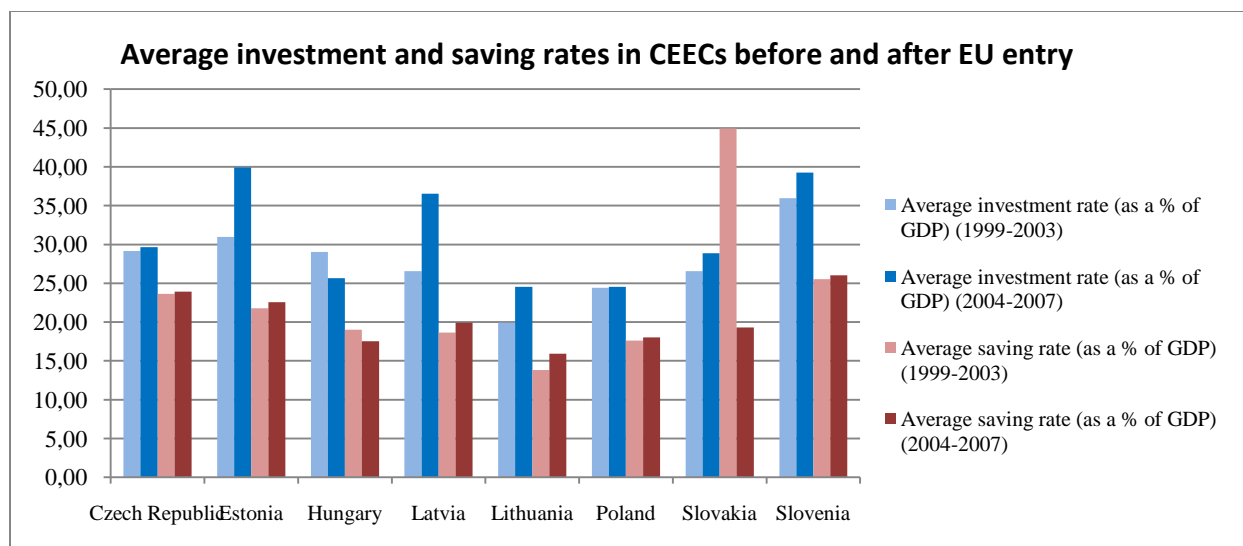


Figure 18 Average Investment and Saving Rates in CEECs Before and After EU Entry

Another factor that has contributed to CEECs' growth is high contribution of total factor productivity (TFP)¹¹. According to Schadler et al (2006), productivity gains have accounted for a large share of CEECs' growth, especially among Baltic States, whose performance stood out from other CEECs till they were hit by the global financial crisis in the end of 2007 (see figure 16).

5.1.2.3 Convergence

When it comes to the convergence question, based on high economic growth of CEEC countries over the last decade, it seems that it is a realistic aspiration. It was also confirmed by results of my regressions that I present in the next subsection. To define how much time will be needed for CEECs to catch up with other member states, Schadler et al (2006) made estimations based on GDP data of 2000-2004. The results are portrayed in table 9.

¹¹ In the Solow growth model TFP is denoted by A and means technological progress, gains in knowledge or productivity

Table 9 Time of convergence of CEEC to Euro zone¹². Source: Schadler, Mody, Abiad, and Leigh (2006), IMF

Country	Number of years to close 1/2 the GDP/capita gap	Number of years to reach GDP/capita ratio of 90%
Czech Republic	14	26
Estonia	6	16
Hungary	10	24
Latvia	7	22
Lithuania	7	21
Poland	27	79
Slovakia	17	45
Slovenia	8	12

From table 9 can be seen that speed at which GDP per capita gaps with the Euro zone could be closed varies across different CEECs. If incomes per capita continue to grow in the Euro zone at estimated 2 % per year ($\ln(2)$), then Slovenia (country with the highest GDP per capita among CEECs) could reach 90% of the Euro zone average in 12 years. Poland, on the other hand, would need 79 years to reach the same level of income per capita.

To conclude, even though EU membership provides number of positive spillovers to its incoming member states, approaching the other Union counterparts economically still remains a challenge for Central and Eastern European countries. Other countries that face similar challenge are Malta and Cyprus. In order to increase possibilities of catching-up with the other member states, it is crucial for these countries to increase productivity (TFP) and develop proficient economic policies that would boost economic development. I will discuss it in more details in the recommendations section 6.2.

¹² The convergence to close 1/2 income gap is calculated using $\ln(2)/\beta$, where $\beta = (g - g^*) / \ln(y/y^*)$, g is per capita GDP growth, y is the per capita GDP level expressed in PPP terms, and * indicates the Euro area.

5.2 Regression Analysis

In this section I present and discuss results of my OLS regressions to provide answers on my research questions.

5.2.1 Research Question 1: EC/EU Membership and Income Growth

The purpose of the research question 1 is to define how EC/EU entry affects economic growth of European countries. In this respect I have formulated the following hypothesis:

H₁: Joining EU increases *average real GDP per capita growth rate* of a new member state.

The results of the hypothesis are discussed below.

First, I have studied how entry into EC/EU influenced average growth rate of GPD per capita of a member state. I ran the regression given in equation 1. Results are presented in table 10.

Table 10 Result of Regression Based on Equation 1

```
. reg ln_avg_GDP_growth n_y0 INV EDU EU
```

Source	SS	df	MS			
Model	48.2314408	4	12.0578602	Number of obs =	47	
Residual	95.0552062	42	2.2632192	F(4, 42) =	5.33	
Total	143.286647	46	3.11492711	Prob > F =	0.0015	
				R-squared =	0.3366	
				Adj R-squared =	0.2734	
				Root MSE =	1.5044	

ln_avg_GDP_g	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_y0	-.0000309	.0001021	-0.30	0.764	-.0002368	.0001751
INV	-.1599219	.1163167	-1.37	0.176	-.3946586	.0748148
EDU	-2.41681	.9507758	-2.54	0.015	-4.335554	-.498067
EU	1.401806	1.017776	1.38	0.176	-.6521498	3.455762
_cons	19.75684	6.067689	3.26	0.002	7.511742	32.00193

From table 10 can be seen that the model has relatively high explanatory power (R squared adjusted is equal to 0.27) and estimated coefficients are statistically significant. More specifically, economic growth is negatively related to the initial level of GDP per capita, which supports theoretical predictions of economic growth models presented in section 2. It should be mentioned, however, that the relationship is quite weak since regression coefficient of ln_y0 takes a very small value. It means that some other factors have stronger influence on level of income per capita. Despite that, the initial GPD per capita and average growth rate of GPD per capita are still related negatively.

As for the investment rate, it is negatively related to the economic growth of EC/EU countries. This finding is somewhat surprising since economic theories state that higher rates of investment in a country lead to an increased stock of capital per capita, and, subsequently, higher income levels (Gärtner, 2006; Romer, 2006). One of the possible explanations of this phenomenon could be an inefficient use of investment. In this respect Poland in the beginning of 90s is a good example. After Poland abandoned central planning in 1991, it suffered from dynamic inefficiencies. Significant part of its investment was devoted to keep an excessive stock of its capital, investment resources were wasted in vain in terms of uninstalled equipment rusting in backyards, new machinery discarded for the lack of spare parts, inefficient reward systems to factory managers (Burda & Wyplosz, 2009). Even though Poland was receiving certain amounts of investment, it was not used efficiently enough to produce a sufficient positive change in the economic growth of country. Another possible explanation for the negative relation between investment rate and income level is misplacement of investment. It means that investment is made in unnecessary projects, while those areas that actually need investment suffer from underinvestment. In these situations investment is not put to its best use and instead of contributing to economic development deteriorates present stock of capital.

When it comes to human capital (education), it is negatively related to the economic growth of country as well. This result is also quite contradictory since it would be expected that development of human capital should boost economic growth. I should note that when measuring level of human capital development (education), I used data on “fraction of public spending on education as a % of GDP”. The reason for why I used exactly this measure is that from all data I could obtain by the present moment it was the most appropriate proxy for measuring the level development of human capital. Even though, in general, it would be expected that spending on education would boost economic growth of a country, some recent researches suggest that an excessive spending on education can actually slow down economic growth. According to Wolf (2002), many developed countries (including some of the current EU members) have moved beyond providing basic education. They spend noticeable amounts on higher education, adult training, and vocational programs increasing education budget over time. However, this excessive spending in education sector may actually be doing more harm than good for economies (Wolf, 2002). On the other hand, Feenstra (2004) states that country’s investment in creation of skilled and educated workforce is essential since this fraction of population is usually

more productive and is responsible for technological progress and economic advancement. Due to number of varying opinions on this issue, it would be useful to devote a separate research to this topic and perform an additional test using data on “years of education: average schooling years of population of over 25” as proposed by Crespo-Cuaresma et al (2002). This proxy could provide new insights into the relationship between human capital and income growth in EU countries.

As far as EC/EU membership is concerned, the regression reveals that EC/EU membership noticeably contributes to economic growth of its member countries. The result of the OLS regression confirms the hypothesis that joining EC/EU increases the average growth rate of GDP per capita of a new member state just as it was predicted by economic growth and integration theories.

As a next step of my analysis, to obtain deeper insights into relationship between EU membership and economic growth, I study a somewhat richer framework with additional explanatory variables: inflation rate (INF), government consumption (GOV), and openness of economy (OP). The choice of additional explanatory variables is guided by the economic theory and the fact that these variables are likely to be related to GDP growth. This time I run the regression as specified in equation 2. Results are presented in table 11.

Table 11 Result of Expanded Regression Based on Equation 2

```
. reg ln_avg_GDP_growth ln_y0 INV EDU INF GOV OP EU
```

Source	SS	df	MS	Number of obs = 46		
Model	75.5544725	7	10.7934961	F(7, 38) =	6.20	
Residual	66.1638428	38	1.74115376	Prob > F =	0.0001	
Total	141.718315	45	3.1492959	R-squared =	0.5331	
				Adj R-squared =	0.4471	
				Root MSE =	1.3195	

ln_avg_GDP_g	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_y0	.0007143	.0003924	1.82	0.077	-.0000801	.0015087
INV	-.362175	.1294334	-2.80	0.008	-.6241993	-.1001507
EDU	-.772345	1.02695	-0.75	0.457	-2.851296	1.306606
INF	-.2861682	.1285648	-2.23	0.032	-.5464341	-.0259024
GOV	-1.210882	.3507692	-3.45	0.001	-1.920977	-.5007871
OP	-.1033783	.0809148	-1.28	0.209	-.2671817	.0604251
EU	.1560366	.95123	0.16	0.871	-1.769628	2.081701
_cons	32.4857	6.304548	5.15	0.000	19.72281	45.24859

Table 11 shows that results of tested specification are somewhat mixed and differ from results of previous regression. Explanatory power of the model is again quite high; variation in explanatory variables accounts for 44% of variation in GDP growth rates. Somewhat surprising, however, is the fact that the initial level of GDP per capita is positively related to the subsequent growth of GDP per capita. It contradicts Solow growth model and other theoretical predictions related to economic growth. However, in this case, the possible explanation could be that those countries that initially have higher GDP per capita levels have higher prospects of reaching higher GDP levels in future than those countries that initially have lower income levels because they have been more efficient over continuous period of time and accumulated necessary knowledge and capital needed for development, while poorer countries lacked capital or other resources to pursue their development. The regression coefficient in this case is larger than that in the previous regression; however, it is less significant than the previous one (table 10).

As far as investment and education rates are concerned, they are negatively related to the growth rate of GDP per capita. This result is consistent with the result of the previous specification (based on equation 1). Explanations are the same: investment might be negatively related to the change in average GDP/capita growth due to inefficient use of investment or its misplacement; amount of spending on education is negatively related to the GDP per capita growth, probably, due to reasons mentioned by Wolf (2002). The regression result is puzzling from that perspective that increased spending on education should generate more skilled (educated) workers. Educated workers, whose productivity is higher than that of less skilled workers, are likely to contribute to technological progress (increase A) and boost economic growth (Feenstra, 2004). Burda and Wyplosz (2009) state that technological progress or labor productivity is one of the main features that distinguishes rich and fast-growing economies from poor and stagnant ones.

As for the three additional explanatory variables (INF, GOV, and OP), their coefficients are more in line with theory (see table 11). The results show that inflation and government spending are negatively related to future GDP per capita growth rates, which seems to be a reasonable prediction. The degree of openness of economy is negatively correlated with a long run economic growth. I should note, however, that this result is debatable since contemporary studies reveal mixed results on whether openness of economy stimulates economic growth or slows it down. Some economists like Dollar (1992), Sachs and Warner (1995), OECD (1998), and IMF (1997) propose that there is a positive relationship between openness of economy and its

economic growth; others, like Rodriguez and Rodrik (2000) and Yanikkaya (2003), state that openness of economy can deteriorate its development prospects (G. Corcos, International Economics lecture, 28.01.2010; Rodriguez & Rodrik, 2000).

Finally, but not least importantly, the dummy variable indicating whether country is a member of EC/EU, is related positively to the GDP per capita growth rate again. It means that EU membership contributes to economic growth of a country. The result is significant, and the regression coefficient is quite strong (table 11). Hence I can conclude that results of both regressions confirm that countries are more likely to benefit economically from EU membership, and hypothesis 1 can be confirmed.

From previous analysis it seems that in general country should benefit from its membership in EC/EU. However, when it comes to welfare effects, they are quite uncertain. In this connection Piazzolo (2001) talks about Poland. He states that even though Poland should benefit considerably from European integration, welfare effects are expected to be quite low. It is explained by the fact that reductions in tariff and border costs, technical barriers to trade, and net EU transfers contribute to higher level of consumption in the country (arising from the increased capital stock); however, since there is a need for current investment which takes place at the expense of foregone consumption, consumers cannot reap these benefits today (Piazzolo, 2001). Thus, it can be concluded that even though entering EU would probably increase prospects of developing of a country in a long term, it should be prepared to experience temporary losses in welfare in a short term.

5.2.2 Research Question 2: Income Convergence within EU-25

When it comes to the question of income convergence within EC/EU, I developed hypothesis 2 which is as follows:

H₂: GDP per capita of “poor” European countries *grows faster* than GDP per capita of “rich” ones.

The main goal of this question is to understand whether poorer countries tend to grow faster (in terms of real GDP per capita) than rich ones. To test this hypothesis, I use equation 3. The dependent variable in the specification is average annual growth rate of GDP per capita (\ln_Y_T).

The explanatory variable is initial level of GDP per capita (\ln_y0). Results are presented in table 12.

Table 12 Result of Regression Based on Equation 3

. reg $\ln Y_T$ \ln_y0

Source	SS	df	MS			
Model	.001301241	1	.001301241	Number of obs =	25	
Residual	.007387429	23	.000321193	F(1, 23) =	4.05	
Total	.00868867	24	.000362028	Prob > F =	0.0560	
				R-squared =	0.1498	
				Adj R-squared =	0.1128	
				Root MSE =	.01792	

$\ln Y_T$	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
\ln_y0	-.0107723	.005352	-2.01	0.056	-.0218437	.0002991
_cons	.1397055	.04583	3.05	0.006	.0448989	.2345122

Results in the table 12 reveal that estimated α_1 is equal to approximately -0.01 . Negative sign in front of this coefficient can be interpreted as suggestive evidence in favor of existence of beta convergence in my sample consisting of the 25 EU countries. In other words, average annual growth rate of GDP per capita is inversely related to the initial level of GDP per capita. This is good news for the neoclassical model of economic growth, where prediction of Solow growth model is confirmed by the data: poorer countries within EU are expected to over time catch up with relatively more developed ones.

As a next step, to further understand the process of catching up within EU, I calculate the speed of convergence (based on equation 4). I find that income level convergence within enlarged EU is rather slow since the beta coefficient equals 1.53% (detailed calculations are shown in the appendix). It should be noted, however, that this relatively slow speed of convergence can be partly explained by one of the simplifying assumptions behind the neoclassical growth theory. Following Solow’s propositions in my empirical test, I assumed that all EU countries share the same steady state. However, this assumption can be considered too strong given the observed heterogeneity among EU countries. To further analyze beta convergence hypothesis one would be recommended to split EU-25 sample with respect to time periods and/or group of countries. In addition to that, one could also exclude some countries that can be considered as outliers from our sample – Luxembourg, Malta, Cyprus. Performing this type of additional analysis would

increase confidence in results and enhance their robustness. Due to the limited space that I am endowed for in this thesis I leave these issues for future research.

Alternative specification¹³

As a next step, I estimate equation 5 with and without restriction that $g + \delta = 0.05$. I use this approximation of these variables since Mankiw et al (1992) have shown that reasonable changes in this assumption would have little effect on estimates. Results of the regression are presented in table 13 and table 14.

Table 13 Result of Regression Based on Equation 5

. reg ln_y ln_sav_rate						
Source	SS	df	MS			
Model	.061820433	1	.061820433	Number of obs =	24	
Residual	8.92173768	22	.405533531	F(1, 22) =	0.15	
Total	8.98355811	23	.390589483	Prob > F =	0.7000	
				R-squared =	0.0069	
				Adj R-squared =	0.0063	
				Root MSE =	.63682	
ln_y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_sav_rate	.2378809	.6092659	0.39	0.700	-1.025659	1.501421
_cons	8.421894	1.891818	4.45	0.000	4.498503	12.34528

From table 13 can be seen that the coefficient of saving rate has a positive sign and is significant at 5% level, which provides support for the Solow model: the higher are savings the higher is income per capita. However, somewhat surprising is a relatively low value of R squared, indicating that variation in savings does not account for a large fraction of the cross country differences in income per capita. This limited success of Solow model to fit the data could be potentially explained by the limitations of the model – by omitting the human capital variable. In the present simple specification, following Mankiw et al (1992), I did not include measure of human capital. However, it is plausible to expect that inclusion of measures of human capital accumulation would increase empirical validity of Solow growth model.

¹³ Based on Mankiw et al (1992) equation 5

Table 14 Result of Expanded Regression Based on Equation 5

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. reg ln_y ln_sav_rate ln_deltagn
```

Source	SS	df	MS	Number of obs = 24		
Model	754356103	2	377178051	F(2, 37) =	209.54	
Residual	66602515.9	37	1800068	Prob > F =	0.0000	
Total	820958619	39	21050221	R-squared =	0.9189	
				Adj R-squared =	0.9145	
				Root MSE =	1341.7	

ln_y	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_sav_rate	.4642182	.0226783	20.47	0.872	.4182676	.5101687
ln_deltagn	.135979	.0308288	4.41	0.063	.0735139	.1984442
_cons	7150.727	761.9357	9.38	0.000	5606.899	8694.555

Table 14 seems to provide a more precise result since R squared takes a quite high value and the result related to the impact of saving rate on income per capita is significant. In this specification I used an additional variable “ln_deltagn”, which portrays depreciation (ascending from population growth n , capital depreciation δ , and advancement in knowledge g). According to Solow model, higher income levels per capita can be reached in those countries, where there are higher saving rates and lower values of depreciation $n + g + \delta$ (Mankiw et al, 1992). As far as saving rates are concerned, table 14 shows that they are positively related to income per capita, which goes well in line with the prediction of the Solow model. Those countries that save more, have potentially more capital stock to make investments in the development of economy; subsequently, income per capita increases. As for the positive correlation between the depreciation rate and income per capita, the result is quite surprising since, according to Solow model the relationship between these two variables should be negative. In this case, even though the relationship it is not that significant, it is still positive, which suggests that the more there is depreciation expense in the country, the higher is income per capita. One of the possible explanations for this result could be the fact that the depreciation measure, as it was mentioned before, includes three variables: population growth, capital depreciation, and advancement in knowledge. While population growth and capital depreciation are obviously shattering factors to economic growth, advancement in knowledge produces the positive effect. Hence, if depreciation increases GDP per capita, I can assume that in the EU case advancement in knowledge overweighs the negative effect of population growth and capital depreciation (thus $g > n + \delta$). Given the fact that current EU member states have been spending noticeable amounts of their budgets on education (from 3.55% in Greece (the least among EU-25) to 7.21% in

Sweden and 8.28% in Denmark (maximum among EU-25 member states))¹⁴, this could well be the case. I should note, however, that in line with this suggestion, there might be other effects that generate such at first sight illogical relationship between the two variables.

Income Thresholds

Now I introduce the concept of income thresholds to define whether the results from table 12 would hold after using different thresholds for defining what is a “poor” and what is a “rich” country. More specifically, I use two threshold levels: 10 000\$ (a) and 15 000 \$ (b), and run regression based on equation 3.

(a) Poor country if income per capita \leq 10 000 \$ per capita (rich country if income per capita $>$ 10 000 \$ per capita):

Firstly, I perform test with the threshold level equal to 10 000 \$ per capita a year (representing maximal income in the poor country group), and accordingly set ln_y0 equal to 10 000. The results are as follows (see table 15):

Table 15 Result of Regression Based on Equation 3 with the Threshold of 10 000\$ per Capita

Source	SS	df	MS			
Model	15142352.1	1	15142352.1	Number of obs =	24	
Residual	397375332	47	8454794.3	F(1, 47) =	1.79	
Total	412517684	48	8594118.42	Prob > F =	0.1872	
				R-squared =	0.0367	
				Adj R-squared =	0.0162	
				Root MSE =	2907.7	

lnY_T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_y0	1.660175	1.240534	1.34	0.187	-.8354578	4.155808
_cons	-214.2161	6998.389	-0.03	0.976	-14293.16	13864.73

From table 15 can be seen that the relationship between the initial level of GDP per capita (10 000\$/capita) and subsequent GDP per capita growth rates becomes positive after using 10 000 \$ per capita as a differentiating measure of the two income groups (when performed test using the whole dataset, it was negative). R squared equals only 3.67%; therefore explanatory power of this specification is quite low. When it comes to the positive relationship between the two variables, at first sight results seem to be in contradiction with predictions of the Solow growth model and my previous results (see table 12). However, after setting the threshold level of

¹⁴ Based on the average spending on education as a % of GDP from 1998 to 2006

income per capita to 15 000\$, it is reasonable to argue that results actually follow Solow's predictions. It will be discussed in a greater detail later.

(b) Poor country if income per capita \leq 15 000 \$ per capita (rich country if income per capita > 15 000 \$ per capita):

Secondly, I set the threshold level at the value of 15 000 \$ per capita and run another regression based on equation 3. The results are provided in the table 16.

Table 16 Result of Regression Based on Equation 3 with the Threshold of 15 000\$ per Capita

Source	SS	df	MS			
Model	13347279.2	1	13347279.2	Number of obs =	24	
Residual	397454013	46	8640304.63	F(1, 46) =	1.54	
				Prob > F =	0.2202	
				R-squared =	0.0325	
				Adj R-squared =	0.0115	
Total	410801292	47	8740453.03	Root MSE =	2939.4	

lnY_T	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
ln_y0	1.510398	1.215233	1.24	0.220	-.9357391	3.956535
_cons	549.4178	6899.123	0.08	0.937	-13337.8	14436.63

Table 16 shows that, just like in the case with the 10 000\$ per capita presented in table 15, there is a positive relationship between the initial income per capita (15 000\$ per capita as the maximal level of income/capita in poor countries) and expected income growth in this group of countries. R squared is again low and equal to only 3.25%, which suggests that explanatory power of this specification is rather limited.

Taking into consideration results of the two regressions, is important to note is that even though both regressions reveal a positive relationship between initial income levels (10 000\$/capita and 15 000 \$/capita) and the subsequent income growth (as opposing to the general regression presented in table 12), they may still be consistent with the theoretical predictions (and the Solow model). According to the theory, the lower is the initial level of income, the faster country will grow and by looking at the results of the two regressions separately, one can conclude that results of tests contradict theoretical predictions. However, if results of the two regressions are considered as an complementary framework, then one can notice that income per capita in a country group with lower threshold level (i.e. 10 000\$ as poorer countries) grows faster than that with the higher threshold level (i.e. 15 000\$ as poorer countries). It can be seen by the regression

coefficients, 1.66 and 1.51 respectively. Hence, relatively poorer countries do tend to grow at faster rates than richer ones, and results of the analysis support theoretical predictions.

Now, when it comes to the positive signs of the regression coefficients, I should note that results of the analysis of two thresholds are not sufficient to draw strong conclusions about influence of the initial income on economic growth due to low R levels. In addition to that, in my analysis, I have selected two threshold levels. Both of them are relatively high (10 000\$ and 15 000\$ per year). In reality, 50 years ago, income levels would be much smaller in all the EC/EU countries. In this connection, one of the possible suggestions for the future research of the income growth and convergence prospects in EU could be running additional regressions with much lower threshold levels of the initial GDP per capita. Based on results of my OLS analysis I would expect that they would generate negative relationship between the two variables.

To conclude, even though the analysis of different threshold levels reveals a positive relationship between GDP per capita growth rates and initial level of GDP per capita, results are of somewhat limited explanatory power. When they are considered as a joint framework, they actually support theoretical predictions. When it comes to the results of the full-sample test, results are significant and support predictions of negative relationship between the initial level of GDP per capita and its growth rate (see table 12). According to the analysis, it seems that EC/EU countries with lower income levels benefit from EC/EU membership more and grow faster than richer countries. Thus data exhibits the trend of income convergence within present EU.

5.3 Future Prospects and Economic Challenges

5.3.1 EU Membership and the Global Financial Crisis

As it was mentioned before, EU membership generates number of benefits for its member countries. According to theories presented in section 2 and EU case provided in section 3, new member states (especially less developed ones) enjoy positive spillover effects from other members. One of these effects is increased income growth. In this connection, analysis based on the economic performance of EU countries over the period from 1960 to 2007-2008 has revealed that even though some of the results are not significant, in general data shows that poorer European Union countries tend to grow faster than richer ones. Thus there is a trend towards income convergence among the 25 EU countries.

According to previous predictions, incomes of the EU countries should continue to grow and member states should become economically and politically more homogeneous at a certain point in time in the future. It should be mentioned, however, that after the global financial crisis started in the end of 2007, previously bright development prospects of many EU countries have been undermined. At present, it is difficult to judge about total losses that EU countries will bear. However, according to present estimations, some of the EU countries suffer substantial economic losses.

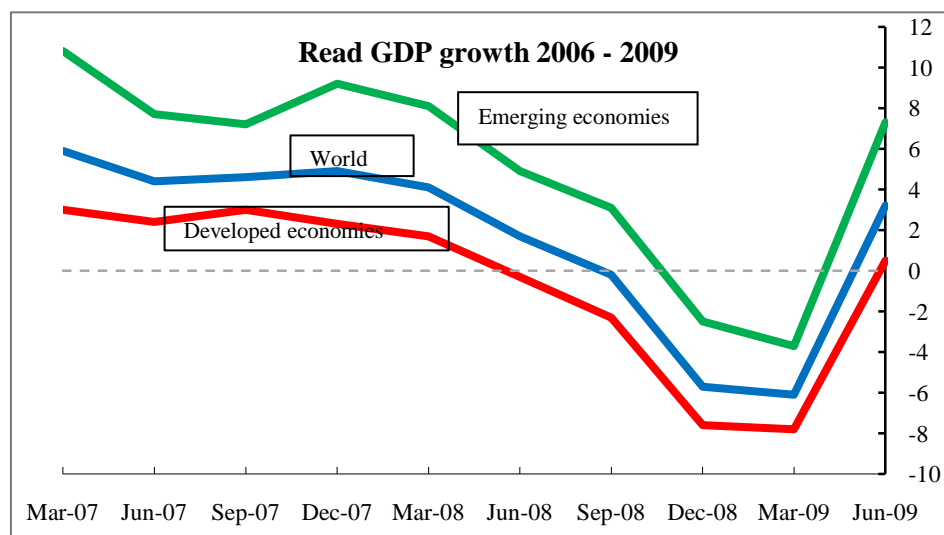


Figure 19 Real GDP Growth Rates in Developed, Emerging Economies, and World Average. Source: Blanchard (2009)

Blanchard (2009) states that even though financial crisis has hit economies worldwide, developed countries suffered from the global shock the most (it can be seen on figure 19). Fortunately, in the second half of 2009 the situation started to improve. According to IMF's (2010) estimates, the global growth is expected to restore in 2011. IMF (2010) claims that, following a more than 3% decline in output in 2009, advanced economies are expected to expand by 2¼% in 2010 and by 2½% in 2011. Growth in emerging and developing economies is expected to be over 6¼% during 2010–11, following a modest increase of 2½% in 2009. When it comes to EU countries in particular, Central and Eastern European countries (especially Baltics), Ireland, Greece, and Spain were hit by the crisis the most, and it is uncertain how much time will be needed for them to get back on previous track. Recovery of these countries continues to lag behind other EU economies. Therefore it might affect not only their economic growth in the future years, but also prospects of catching up with other EU members.

5.3.2 Other Challenges

In addition to the global financial crisis and its impact on European countries, there are additional issues that some EU countries will face on their way to approaching income levels of the richest EU member states. As it was mentioned previously, CEEC group of countries lags behind other EU countries the most.

Currently, one of the biggest challenges for this group of countries is fiscal challenge. According to Nugent et al (2004), economic growth of these countries can be constrained by the need to comply with expensive EU rules and regulations (e.g. environmental standards). Implementation of these rules can be costly for some economies since it increases EU-related spending. “They [poorer member states] would need a high rate of public investment in order to bring their infrastructure up to Western standards and modernize their pension, education, and health systems” (Nugent et al, 2004, p. 75).

Also, membership in such a powerful organization as EU may damage national interests and place restrictions on national economic maneuverability (for example, member state will have to follow EU budgetary constraints and financial provisions). Due to absence of tariffs and other non-tariff barriers among member states, competitiveness of some industries might be undermined hampering further economic development. Thus, the Maastricht criteria set by EU might not only slow down growth of new members who have to adjust to EU legislation, but also reduce medium and long-term growth potential of their economies due to increased EU-related spending, amplified expenditure of national budgets, and limited capacity to earn.

At last, although my analysis reveals positive prospects for the economic development of EU and its member states, one should bear in mind that this analysis is based on data excluding present financial crisis. Therefore, even though by the end of 2007 economic picture for EU member states looked quite positive, the current crisis may have contaminated these prospects. Due to limited data availability caused by temporal proximity to the crisis it is difficult to predict how economic situation will develop among EU member states in the upcoming several years. For that reason, it would be recommended to perform a new analysis after financial crisis is over and economies start to grow again.

6 Concluding remarks

6.1 Conclusion

One of the most topical questions that has driven this thesis was “why some economies grow fast, while others lag behind?” The importance of this question is substantial because finding answer on it could probably help improve income and welfare situation in many countries worldwide. Because of this reason researchers have devoted much attention to this question and there have been numerous attempts to find answers on it. Unfortunately, till present moment no clear-cut answer has been found due to the complexity of this topic.

My take on this topic lied in the attempt to assess how European integration has contributed to economic development of countries involved in the former European Community or present European Union. It is well known that one of the most important issues that EU is facing today is its heterogeneity in terms of income and country-specific economic policies. While some of the current EU member states earn sizeable incomes, other member states’ incomes are times smaller than those of their counterparts. For example, in the Central and Eastern European countries (CEECs) income levels represent only around 25% of the EU-15 average, which is one of the sources of income disparities within current EU. This peculiarity led me to the two thesis research questions: “what is the impact on standards of living from joining EC/EU?” and “is there a trend within current EU-25 for income convergence?”

Results of the analysis revealed that EC/EU membership contributes to economic growth of its member states. It was confirmed that joining EC/EU increases the average growth rate of GDP per capita of a new member state just as it was predicted by theory. Thus it seems that, in fact, it is beneficial for a country to join EU. However, it is important to note that even though entering EU would probably increase prospects of developing of a country in a long term, it should be prepared to experience temporal losses in welfare in a short term.

In addition to that, analysis suggests that there is evidence of income convergence within EU-25 meaning that average annual growth rate of GDP per capita is negatively related to the initial level of GDP per capita. Theoretical predictions claiming that poorer countries are expected to catch up with the richer ones are confirmed by EU-25 data. As far as speed of convergence is concerned, its pace within EU is rather slow (1.53% per annum). Also, those countries that have

higher saving rates tend to have higher incomes per capita. It supports predictions of the Solow growth model that claims that countries that save more have more capital to make investments in the development of economy.

Some of the most interesting findings related to EU were that investment, spending on education, and openness of economies are negatively related to the income growth of European countries. Even though theoretical literature provides certain explanations for such dependence, I find these results rather surprising given their contradiction to the common theoretical reasoning. Further research of these areas would be recommended since it could provide further insights into the topic of economic development of EU.

In general, the thesis has revealed that countries seem to benefit from their EC/EU entry, especially those of them that have lower levels of income. Also their incomes tend to grow faster than those of richer countries; therefore data exhibits the trend of income convergence within present EU. Despite of this fact, however, there are also some challenges associated with EU entry that countries' governments should be aware of before making decisions of EU entry. These challenges include limited maneuverability, damage of national interests, loss of competitiveness, and fiscal difficulties. In addition to these challenges, there are other factors that may influence development of union's member states. One of the most recent events that has influenced prospects of development of EU member states is the global financial crisis. After it has started in the end of 2007, it produced significant effects on economic performance of all the EU countries, especially on poorer ones. The total impact of the crisis on EU economies is not clear yet; however, it might have deteriorated growth perspectives of some member states to a great extent, at least temporarily.

6.2 Recommendations for EU Countries

Based on research findings of the thesis, I present some suggestions and recommendations that would be useful for EU to be able to increase income growth of lagging countries and enhance prospects of convergence in future. They are as follows:

- To promote economic development of countries, government should develop three key areas: human capital (in terms of education, training, and healthcare), public and social

infrastructure (availability of goods and services, communication networks, protection of human and property rights, safety) (Burda & Wyplosz, 2009).

- In order to catch up with rich EU economies, new EU members should massively invest in the development of technology and education moving from labor-intensive production to high technology goods and knowledge-based services (Nugent et al, 2004). Technological development can be stimulated by certain economic policies (for example, by reducing taxes in sectors involved in R&D, subsidizing those areas, investing in human capital development) (Mankiw, 2003).
- Catch-up will be helped by raising employment, but will depend to a great extent on increased capital-labor ratios and productivity of resource utilization. According to Schadler et al (2006), raising total factor productivity (TFP) is the most important factor for economic development of a country.
- Also it is important to develop proficient policies related to savings by evaluating them and changing their rates since an increase in savings rate can lead to permanently higher income growth (Burda & Wyplosz, 2009).
- Since petty corruption is still a problem within many of the CEECs, measures should be taken to reduce it. One of the methods of how to achieve it could be strengthening court system and trying to root out corruption at all the levels of governmental administration (Nugent et al, 2004).
- Finally, according to Schadler et al (2006), countries should not underestimate the importance of investment since higher rates of investment can contribute significantly to economic development.

6.3 Research Limitations and Further Research Suggestions

Research presented in this thesis revealed many useful insights into the topic of economic development within European Union. The methodological framework followed in the thesis suited well for finding answers on research questions. However, it is important to note that even though models used in the thesis were selected on a basis of thorough analysis and aimed at finding the best framework for analysis, they have certain limitations. In this connection I have several suggestions for further research.

First of all, during my research, I have discovered that there is a negative (not significant) relationship between spending on education and income growth among EU countries. Even though there is some theoretical support of this dependence, the result is still somewhat controversial. Therefore it would be useful to devote special attention to this topic and perform additional tests. One of the possible suggestions for further research would be using data on “years of education” or “average schooling years of population of age over 25” proposed by Crespo-Cuaresma et al (2009). Using this proxy to measure human capital in EU countries could provide new insights into the relationship between development of human capital and income growth in EU.

When it comes to the analysis of convergence and sample used in the research, I used a sample of the 24 EU countries, excluding Luxembourg because it is usually considered as an outlier from EU sample due to reasons mentioned in the methodology section. However, such countries as Malta and Cyprus could also be considered as outliers, even though not that radical ones. Also, when making quantitative analysis one could split sample with respect to different time periods and groups of countries due to different business cycles among EU countries and different economic performance.

As far as Mankiw et al (1992) regression analysis is concerned, results of the two different income threshold regressions generated low R squared levels, which assumes limited explanatory power of the specification. This outcome can be explained by the fact that the two threshold levels I used could possibly be too high to represent different income levels of EU countries 50 years ago. Therefore, in addition to my regression results, I would suggest running additional regressions by setting threshold levels at lower levels and observing how results would change.

Finally, to see how financial crisis have affected development prospects of EU countries, it would be recommended to perform an analogous analysis after financial crisis is over and economies start to grow again.

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Appendix

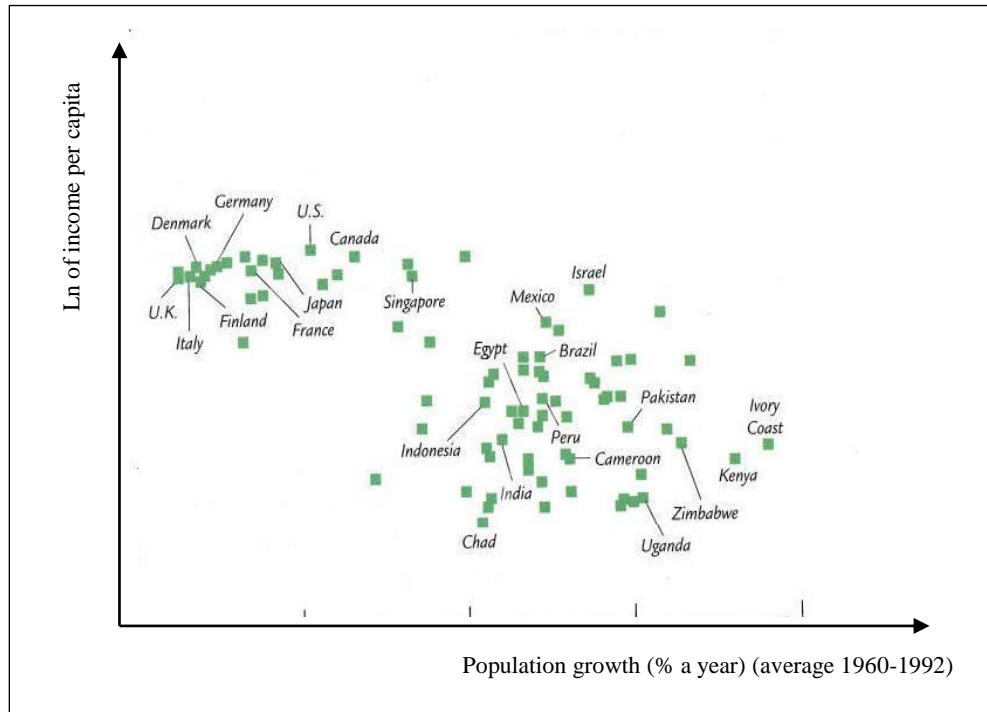


Figure 4 International Evidence on Population Growth and Income per Capita. Source: Mankiw (2003, p. 203)

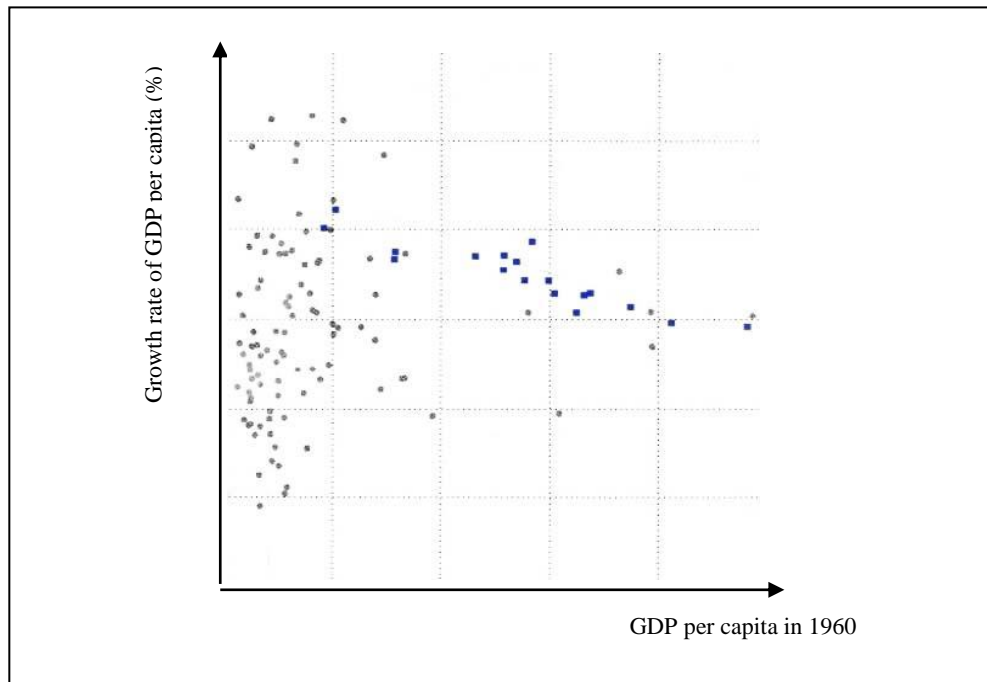


Figure 5 Evidence of Relative Convergence. Source: Gärtner (2006, p. 253)

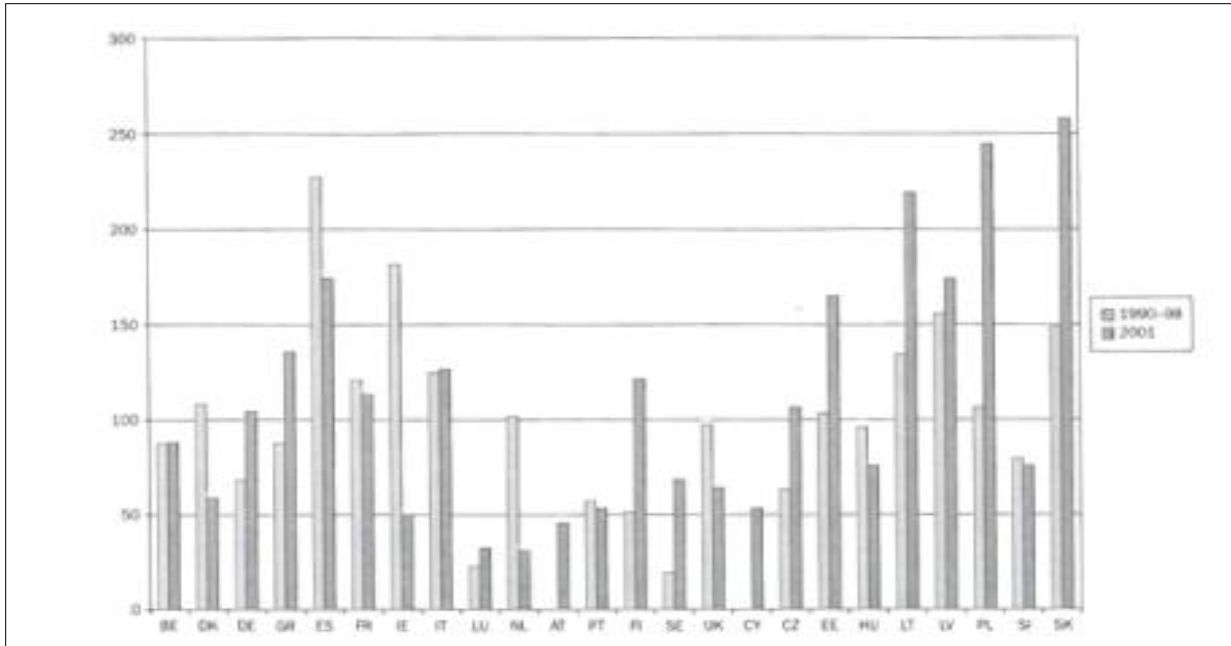


Figure 7 Unemployment Rates in EU-24 in 1990-1998 and 2001¹⁵. Source: McDonald and Dearden (2005, p. 232)

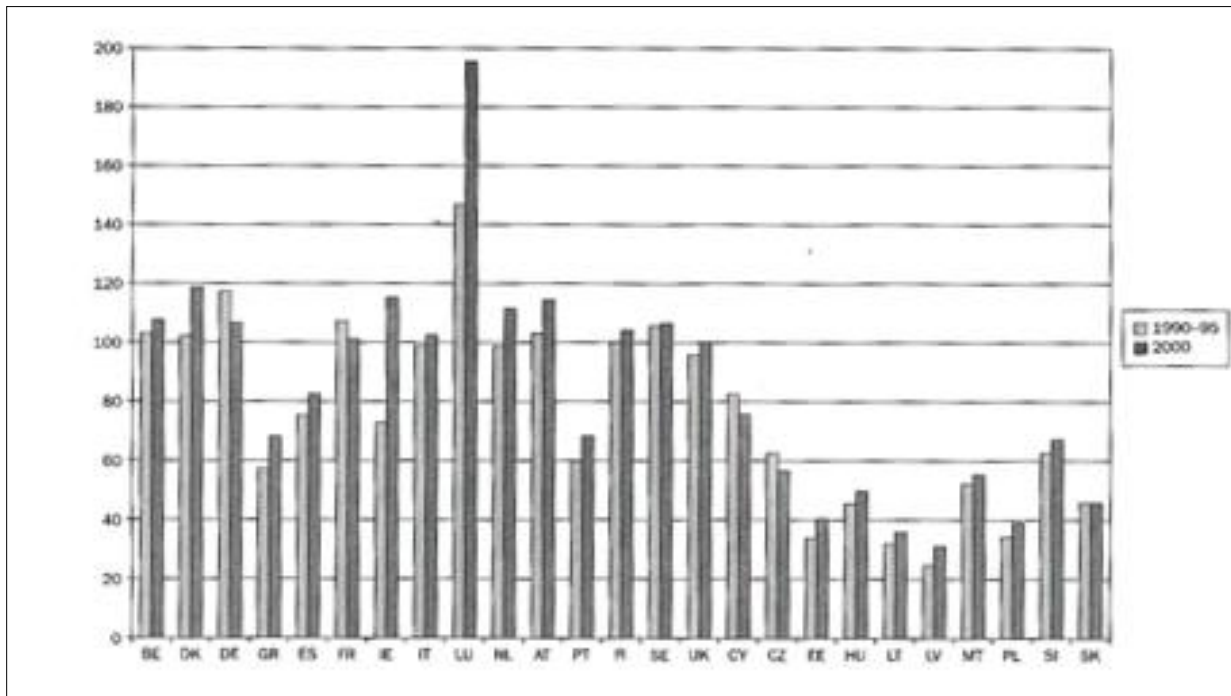


Figure 8 Income per Capita of the EU-25 Member States Relative to the EU-15 Average in 1990 and 2000¹⁶. Source: McDonald and Dearden (2005, p. 229)

¹⁵ Due to data limitations unemployment rates for the new 10 member states refer to 1998 and 2001 rather than to 1990 and 2001 as for the old EU-15 member states

¹⁶ The EU-15 average takes value of 100%

Table 3 European Countries Used in the Analysis

Nr.	Country
1	France
2	Germany
3	Italy
4	Luxembourg
5	Belgium
6	Netherlands
7	UK
8	Ireland
9	Denmark
10	Greece
11	Portugal
12	Spain
13	Austria
14	Finland
15	Sweden
16	Hungary
17	Poland
18	Latvia
19	Lithuania
20	Estonia
21	Czech Republic
22	Slovakia
23	Slovenia
24	Cyprus
25	Malta

Table 5 Notations and Definitions of the Variables Used in the Analysis

Variable	Notation		Definitions
	In equation	In STATA	
First year's level of real GDP per capita	$y_{0,t,i}, (\ln y_0)$	ln_y0	Level of real GDP per capita in a selected country in a 1 st year of a period
Last year's level of real GDP per capita	$y_{1,t,i}$	lnY_T	Level of real GDP per capita in a selected country in the last year of a period

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Number of years in the period	T	Years	Number of years in the selected period
Average real GDP per capita growth rate	$\frac{[(y_{1,t,i}) - (y_{0,t,i})]}{T}$	ln_avg_GDP_growth	Average real GDP per capita growth rate every year over period of T years
Investment rate	INV	INV	Investment rate
Level of education	EDU	EDU	Public spending on education, total (% of GDP)
Inflation rate	INF	INF	Average rate of inflation
Government consumption	GOV	GOV	Government consumption as a fraction of real GDP
Openness of economy	OP	OP	A volume of trade over real GDP
Dummy variable indicating membership	EU	EU	Dummy variable indicating membership in EC/EU. Value 1 (or EU) denotes membership; value 0 (no EU) – no membership
Real GDP per capita	$Y/L = y$	ln_y	Real GDP per capita measured in constant 2000 US \$
Population in a country	L	Popul	Population in a country in a certain year
Population growth rate	n	n	Average growth of population in the country (%)
Saving rate	s	ln_sav_rate	Gross savings (% of GDP)
Advancement in knowledge	g	Tech_prog	Advancement in knowledge (technological

Rate of depreciation	δ	delta	progress) Rate of depreciation of physical capital $g + \delta = 0.5$
Total depreciation	$\delta + g + n$	Indeltagn	The sum of g (technological progress), δ (capital depreciation rate), and n (population growth rate)
GDP per capita growth rate	$\frac{1}{T} \ln \frac{y_T}{y_0}$	$\ln Y_T$	Average annual growth rate of GDP per capita between period T and 0

All the GDP variables are expressed in real terms¹⁷.

Table 6 Growth of GDP per Capita in CEECs Before and After EU Entry

Country	Average GDP growth (1999-2003)	Average GDP growth (2004-2007)	Change after entry, %
Czech Republic	2.59	5.93	128.96
Estonia	6.54	8.45	29.20
Hungary	4.40	3.45	-21.59
Latvia	6.66	10.37	55.71
Lithuania	5.21	7.98	53.17
Poland	3.06	5.49	79.41
Slovakia	2.85	7.69	169.82
Slovenia	3.88	5.33	37.37

¹⁷ The real GDP level can be calculated from “Real GDP = (nominal GDP) / (GDP deflator)”

Table 7 Average Investment Rates in CEECs Before (1999-2003) and After (2004-2007) EU Entry

Country	Average investment rate (as a % of GDP) (1999-2003)	Average investment rate (as a % of GDP) (2004-2007)
Czech Republic	29.14	29.66
Estonia	30.99	39.91
Hungary	29.02	25.66
Latvia	26.54	36.55
Lithuania	19.91	24.54
Poland	24.43	24.53
Slovakia	26.57	28.88
Slovenia	35.97	39.24

Table 8 Average saving rates in CEECs before (1999-2003) and after (2004-2007) EU entry

Country	Average saving rate (as a % of GDP) (1999-2003)	Average saving rate (as a % of GDP) (2004-2007)
Czech Republic	23.62	23.93
Estonia	21.78	22.55
Hungary	19.01	17.55
Latvia	18.65	19.92
Lithuania	13.83	15.92
Poland	17.62	18.01
Slovakia	44.95	19.32
Slovenia	25.51	26.03

Calculation of speed of convergence for research question 2

Since α_1 obtained from testing equation 3 is negative and there is evidence of convergence among EC/EU countries, I can estimate what number of years will be needed for EU countries' GDP to converge using equation 4: $\beta = -\frac{1}{T} \ln(1 + \alpha_1 T)$.

T (number of years in the period) = 49

$$\alpha_1 = -0.0107723$$

$$\text{Thus } \beta = -\frac{1}{T} \ln(1 + \alpha_1 T) = -\frac{1}{49} \ln(1 - 0.0107723 \times 49) = 0.015315165 \approx 0.0153$$