



# Assessment Model of the Effect of Factors Determining Rates of the Economic Growth in Groups of European Union Converging Countries

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**Abstract:** Identification and assessment of factors, determining rates of economic growth from the aspect of convergence offers factors contributing to ensuring the approach of the level of expansion of economics with the lower development to the level of more developed countries and to revealing possibilities for economics with different levels of development to converge.

The model for assessment of the effect of factors, determining rates of the economic growth in groups of converging European Union countries was formed. Upon identification of convergence clubs by neoclassical model of  $\beta$  absolute convergence in the European Union it was defined in what groups of countries the similarity of economics is happening. Importance of the direct foreign investments and the productivity of working factors on the growth rates of countries in the European Union as well as on the assurance of convergence process between economics with different development rate were substantiated.

**Index Terms:** economic growth, convergence, growth factors, economic growth model.

## I. INTRODUCTION

**Relevance of research, investigation level, scientific problem.** International organisations (United Nations, the World Bank and etc.) have been expressing the greater concern in unevenness of the World development. Notes of the World Committee for the development concerning “the joint future” indicate one of the main World problems as the growing unevenness in income and assets. This problem is obvious in countries of the European Union (EU). Strategic aim for the economic development of the majority of new EU countries is more oriented towards the reduction of retardation from countries with more developed level of economics. In order to attain the convergence of economics, the economic growth rates of less developed countries are to be more rapid if compared to the more developed ones.

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During the long period, differences of the economic growth determine uneven level of development of countries, therefore also the level of wealth of citizens and the cost of living. Convergence of economics of EU countries with a better level of the economic development as well as member states with the lower level of economic development is important, because it is the essential condition for the assurance of wealth and stability of citizens, encouragement of united economic and social development. Identification and assessment of factors, determining rates of economic growth from the aspect of convergence offer factors contributing to ensuring the approach of the level of expansion of economics with the lower development to the level of more developed countries and to revealing possibilities for economics with different levels of development to converge.

Implemented surveys (Capolupo, 1998; Caminada, Goudswaard, Vliet, 2010; Dufrenot, Mignon, Naccache, 2011 et al.) note that the absolute convergence when the similar level of balance is approached is rare and is observed only in groups of homogeneous countries. Conditional convergence is more typical when different balances are approached. The compromise between the absolute and conditional convergence is the club convergence that is observed when economics with similar initial structural characteristics converge to the similar balance. In such case it is possible that some economics can form one while others – the other club of convergence and the absolute convergence would take place inside them between economics while the conditional convergence would be observed between clubs. In case groups of countries with economics approaching the same level of balance would be identified, it would be possible to assess specific features of factors, determining rates of economic growth. In other worlds, it would be possible to determine if the selected group of countries has other factors determining rates of the economic growth if compared to all other groups. This would allow assessing causes of unevenness in clubs of economic development convergence more thoroughly.

Aspects of economic growth have been widely analysed in works of scientists by distinguishing factors of growth and analysing their effect on rates of the economic growth as well

as determining parts of economic growth, solving problems of regulating economic growth, assessing positive and negative consequences of economic growth. Since 6<sup>th</sup> decade of XX century the greater attention has been given to globalisation, integration and economic convergence by assessing links of the latter with economic growth by revealing advantages and disadvantages of the growth and etc. The relevance to reveal not only factors of the economic growth has been increasing in scientific researches as well as reasons why rates of economic growth during some appropriate periods of some countries are more rapid if compared to others and what are possibilities for the convergence of economics with different development rate.

Many scientific surveys from the mentioned aspects have been implemented in countries of the European Union, where researches are directed towards implementation of criterion of the Maastricht Convergence. Problems linked with implementation of convergence criterion arise because it is difficult to regulate economics the way to meet all criterions and to ensure various rates of the economic growth at one time. As indicated by practice of full members of the Economic and Monetary Union, countries with relatively low inflation rate have a high debt of the government sector and the budget deficit in percents if compared to the gross domestic product and vice versa. Also apprehensions have been more often expressed that the timely implementation of Maastricht Convergence criterion in the current period is hardly implementable due to the incompatibility. Other relevant problem is the issue how to ensure the long term longevity, the convergence not only on some appropriate moment but also for the long period in countries of the European Union with high and lower level of economic development.

Upon analysing rates of the economic development many issues for discussion appear: what is the trend for economics of the lower development level to grow and therefore to unify living standards; how valid the hypothesis is that more developed economics shall become richer while those poor ones – poorer; how “the club of rich” shall expand to the extent that every country in the World is the full member.

The following issues are analysed next to previous ones: why the economic growth of some countries is more rapid than in others; why interregional economic differences exist and etc. It is important to note that these issues are analysed by representatives of various schools of theory of economics.

The mentioned problem issues have been analysed by the following scientists: Tsion, 2000; Martin, 2001; Dowrick, Rogers, 2002; Geroski, Gugler, 2004; Chen, 2006; Hall, Liudwig, 2006; Živko, 2006; Metcalfe, Foster, Ramlogan, 2006; Bhaduri, 2006; McQuinn, Whelan, 2007; Gundlach, 2007; Teles, 2007; Andreopoulos, 2009 and others. Their works, next to new scientific researches, review and assess earlier works on issues of growth of economics by such scientists, as: Domar, 1957; Harod, 1939; Hansen, 1951; Samuelson, Solow, 1960; Hicks, 1937; Meade, 1961; Lucas, 1988; Barro, 1990, 1991, 1997; Romer, 1986, 1990; Barro, X.Sala-i-Martin, 1991, 1992, 1999; Mankiw, Romer, Weil,

1992; Stavros, Costas, 1997; O’Leary, 1997; Capolupo, 1998; Pitel, 1998; Cesaratto, 1999 and others.

Assessing the mentioned topics of the implemented scientific surveys from the aspect of rates of the economic growth, it is possible to note that no complex surveys have been developed in scientific works where factors, determining the rate of the economic growth within the European Union with the higher level of the economic development and in countries with the lower level of economic development, would be defined. Also there is a lack of surveys for the assessment of factors on convergence clubs of identified European Union countries when countries, being members of the same clubs have similar course of growth and convergence while countries in different clubs – different. The most often scientific surveys were encountered upon analysis of groups of countries, formed without any clear criterion (e.g., Klenow, Rodriquez, 1997; Hall, Jones, 1999; Carkovic, Levine, 2002; Lee, Ricci, Rigobono, 2004; Felbermayr, 2005; Awokuse, 2007 and others), EBPO countries (e.g., de la Fuente, Dome’nech, 2000; Bassanini, Scarpetta, 2001; Aiginger, Falk, 2005 and others) or in some separate country (e.g., Jorgenson, Fraumeni, 1992; Aiginger, 2003; Herrerias, Vicente, 2011 and others). Within surveys of the European Union, countries have also been grouped without any clear criterion (e.g., Aiginger, 2003; Timmer, O’Mahony, van Ark, 2007; Caminada, Goudswaard, Vliet, 2010 and others). Issues of identifying assessment and convergence of the effect of factors on rates of economic growth of countries have been separately analysed in scientific surveys. It was noted that there is no complex assessment of effect of factors, determining rates of the economic growth within groups of converging countries, enabling to predict the factors that lead to the ensuring the approach of economic development levels of group of the European Union countries with a lower development level to the more developed level of economics of other group of the European Union countries with revelation of possibilities for convergence of economics with different development levels.

**Scientific problem:** which factors have effect on rates of economic growth in groups of converging European Union countries and how to assess the effect of these factors in the economic growth.

**Object of the survey** is the assessment of factors, determining rates of the economic growth.

**Aim of the survey** is to prepare the model on the base of the analysed scientific researches which assess the effect of determining factors on rates of the economic growth, except convergence clubs in the European Union.

**Tasks of the survey:**

1. To reveal the arise assumptions of the theory of convergence by generalizing the economic growth models by revealing factors, determining rates of the economic growth.
2. To generalize assessment indicators of economic growth rates and factors, determining them.
3. To generalize assessment indicators of economic convergence.



4. To form the model for assessment of the effect of factors, determining rates of the economic growth in groups of converging European Union countries.

5. To identify groups of countries within the European Union where economic convergence is taking place by verifying the prepared model and to implement the assessment of effect of factors, determining rates of the economic growth.

**Limitations of the survey.** Geographical (e.g., natural resources, climate, topography and etc.), socio-cultural (e.g., social capital, social networks, patriotism, changes of marital status or social status and etc.) factors were dissociated in the survey that have not been analysed in neo-Keynesian, neo-classical, endogenous and evolutionary growth theories. Factors, determining rates of growth have been analysed by applying only quantitatively measurable factors. The survey dissociates from assessment of effect of qualitative economic factors.

There are many factors determining rates of the economic growth and only those were included to the survey that were selected in empiric surveys of other scientists as the most valid upon the real convergence. Factors of the short period convergence are not analysed.

**The following survey methods were used in the work.** Comparative analysis of appropriate empiric surveys and scientific literature, synthesis (meta-analysis) and generalisation were used. Method of scientific modelling was applied during formation of the model of effect of factors determining rates of the economic growth in the group of converging European Union countries.

## II. THE CONVERGENCE IN THE CONTEXT OF ECONOMIC GROWTH THEORIES EVOLUTION

In most discussions by economists (Sachs, Warner, 1995; Gundlach, 2007; Lau Chi-Keung, 2009 etc.), the economic development involves the questions of convergence (lat. convergens – getting together, assimilation). For example, the following hypothesis are raised in scientific discussion: what is the tendency for economics with the lower development level to grow much faster than in economics with the higher development level and therefore to equate the living standards; to which extent the tendency is based that economics with the high development level shall become more prosperous while those with the low development level – more poor and the divergence shall appear and etc. The process of convergence is confirmed if differences between countries are reducing from the aspect of the economic

factor. In other case the divergence is happening. As noted by Butkus (2012), the concept of convergence is not exceptionally economic, it is used in many scientific disciplines and has almost unified definition, but peculiar meaning. This concept is often used, for example, in the context of the issues of politics, culture, social sphere, etc. In accordance to Maniokas (2003), the concept of convergence is defined as standartization or homogenisation and is related to theory of modernization. It, in its turn, implicates the linear development of society regulated by certain principles of social and institutional development according to logics which may be defined as the logics of rationalization. Rudckiene and Burinskiene (2007) explain the convergence as the process when the organized systems research the inner possibilities of development while exchanging the energy, materials and information with others systems. Abramovitz and David (1996), while analyzing the convergence, treat it as the assimilation of different economies in the group of regions. In Ahmad's (2008) opinion, this is the homogenization of GDP rates of some countries. In the present survey, only economic convergence is analyzed, which, in accordance to author's opinion, may be defined as the assimilation of different economic developments of the countries or growth of economies.

Considering the fact that the perception and treatment of the conception of convergence in economics changed in parallel manner with the development of the growth theories, models, analysed here may be revealed in a more comprehensive manner (Picture 1).

The theory of convergence is raised from the neoclassical theory of economic growth which developed to the perception of various conditions necessary for the similarity of economics, with later models, applied in endogenous and evolutionary theories. According to the opinion of the author of the survey, neo-classical theory stresses the limitedness of physical resources and the fact that in case of no investments to technological changes the inevitable consequence follows – the decreasing income. Neo-classical theory confirms that it is not possible to maintain the growth by accumulation of the physical capital only. It is necessary to develop technologies and to accumulate the human capital. Also the creative use of resources is necessary, linked with the evolutionary growth theory where the productiveness of human resources and the innovativeness are obligatory.

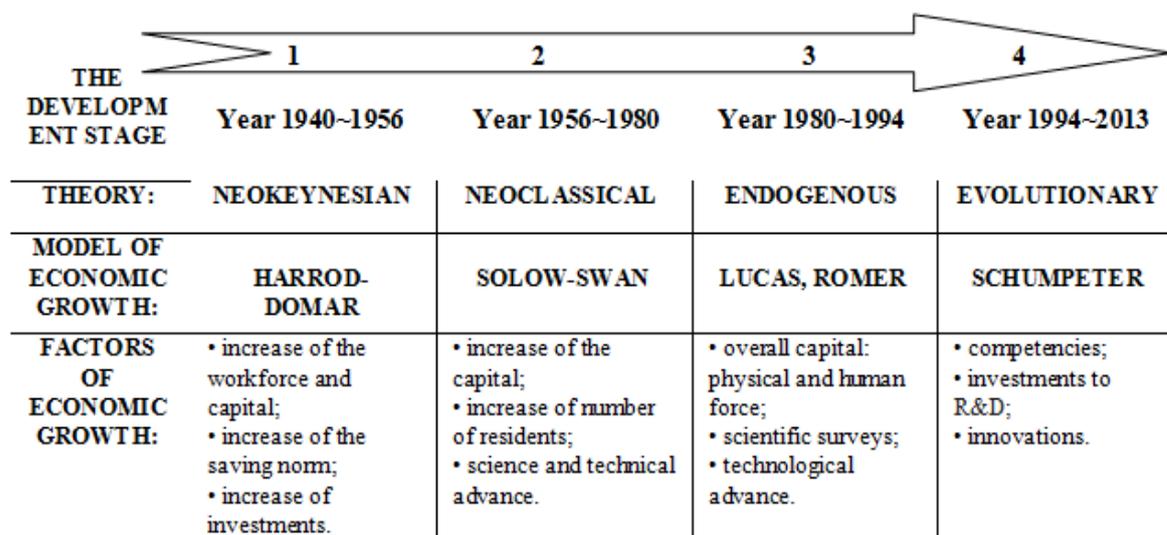


Fig. 1. Theories of the economic growth

Relevance of models, generalized in theories of the economic growth for the model for assessment of the effect of factors, determining rates of the economic growth in groups of converging European Union countries was defined by the author upon formation of the main provisions of the survey. Convergence possibilities of economics of European Union countries were foreseen to be predicted on the base of neo-classical theory of economical growth, where the attention is given to the long period. The importance of this theory is based on the fact that it is the origin of the convergence theory. On the other hand, it was defined that the growth is modelled by neo-classics in closed economics in many cases without consideration of the mobility of goods, services and production factors. During the last decades the world economics has become open and are more and more interrelated therefore the modelling of the growth of economics under the same neo-classical provisions is impossible. It is important to assess the growth factors analysed in endogenous and evolutionary theories that explain possibilities of the convergence of economics better. On the base of theoretical approaches analysed in the first chart of survey towards the fact what factors affect rates of the economic growth and under what conditions the economic convergence may appear, the assessment model was further formed.

### III. THE INDICATORS OF ECONOMIC GROWTH RATES AND FACTORS, DETERMINING THEM

There are many problems in develop and adapt of models. The main of them is which variables to select to develop a model. Therefore, it is important to include variables that reflect the situation which are analyzing. Analysis of empiric

surveys where factors determining rates of the economic growth during the long period substantiated, that the economic growth is more complex phenomenon of the long term perspective and it should not be mixed with cyclic variations that are characteristic during the short period. Economic growth in the general sense is perceived as the increase of the real product during some appropriate period of time. Various absolute and relative indicators that are selected according to aims of the implemented survey can be applied for the assessment of rates of the economic growth. The whole of factors determining rates of the economic growth may be divided in various ways, depending on the aspect to be separated, for example short or long period, the nature of development, the nature of resources and etc. The result variable in regression model of this survey – growth rates of gross domestic product per capita.

Analysis of empiric surveys where factors determining rates of the economic growth during the long period substantiated, that the process of convergence is mostly intensified by the mobility of goods and services as well as mobility of the work force and investments to the capital (physical and the human force).

Considering the fact that the growth in many cases is modelled by neo-classics in the closed economics, growth factors within endogenous and evolutionary theories have been analysed in the survey that better explain convergence possibilities of open economics. Growth factors, identified in the neo-classical theory, expanded in endogenous and evolutionary theories by the analysed ones, the following measuring indicators were generalised: openness to the international trade (OIT); trade conditions (TC); part of monetary remittances of migrants within the gross domestic product (MRM); part of direct foreign investment within the gross domestic product (FDI); part of investments within the

gross domestic product (GFC); intellectuality level of the production (ILP); indicator of the innovation fund level (IFL); part of human resources in the sphere of science and technology among employed residents (HRS); productivity of the labour factors (PLF); part of work income within the gross domestic product (WIP); development level of the country economics at the beginning of the analysed period (GDPpc,t). The growth factors and indicators measuring them were chose as a result of other surveys (Berthelemy, Demurger, 2000; Nair-Reichert, Weinhold, 2001; Rodriguez, Rodrik, 2001; Lane, 2001; Carkovic, Levine, 2002; Irwin, Tervio, 2002; Vamvakidis, 2002; Aiginger, 2003; Awokuse, 2003; Alfaro, 2003; Dollar, Kraay, 2003; Vetlov, 2003; Alcala, Ciccone, 2004; Dollar, Kraay, 2004; Lee, Ricci, Rigobono, 2004; Felbermayr, 2005; Varblane, Vahter, 2005; Cornett, 2005; Johnson, 2005; Busse, Groizard, 2006; Baharumshah, Thanoon, 2006; Awokuse, 2007; Unit, Mustafa, 2007; Šeputienė, 2009; Čegyte, Miečinskie, 2009; Ugurlu, 2010; Čiburienė, 2010; Bond and others, 2010; Chen, Funke, 2012) where were indicated the statistically significant relationship between them and economic growth.

IV. THE INDICATORS OF ECONOMIC CONVERGENCE

There are much more surveys of convergence in contexts of countries of the European Union if compared to cases when the convergence among countries is assessed. It was determined that the convergence may be analysed in various ways: under the nature (real, nominal, industrial), geographical scope (world, continent, regions of the country and etc.), causality (determined, stochastic), indicators (general productivity of production factors, income and etc.) and others. From the scope of assessment methods,  $\beta$  absolute convergence is possible as well as  $\beta$  conditional convergence or  $\sigma$  convergence. Compromise between the absolute and conditional convergences is the club convergence when countries, belonging to the same club have similar course of growth and convergence while countries in different clubs – different. Upon formation of the assessment model were provided indicate absolute and conditional convergence which assessment indicators generalized in the table 1 of this survey.

TABLE 1. THE ASSESSMENT INDICATORS OF B CONVERGENCE

INDICATORS	FORMULA	No.
$\beta$ absolute convergence	$\left(\frac{1}{T}\right) \ln \left(\frac{Y_{i,t+T}}{Y_{i,t}}\right) = \alpha + \beta \ln(Y_{i,t}) + \varepsilon_{i,t}$	1
$\beta$ conditional convergence	$\left(\frac{1}{T}\right) \ln \left(\frac{Y_{i,t+T}}{Y_{i,t}}\right) = \alpha + \beta \ln(Y_{i,t}) + \sum_{j=1}^n \gamma_j d_{j,i} + \varepsilon_{i,t}$	2
Where: $Y_{i,t} = \frac{GDPpc_{i,t}}{GDPpc_t}$ – the gross domestic product per capita of $i$ country in proportion to European Union (or group of countries) average of gross domestic product per capita. $\sum_{j=1}^n \gamma_j d_{j,i}$ – factors that were selected as statistically significant and possibly determining rates of the economic growth.		

Source: Varblane, Vahter, 2005; Phillips, Sul, 2009; Harris, 2011; Butkus, 2012; Cuaresma, Havettova, Labaj, 2012.

It was defined that there are such limitations and problems in surveys of convergence (especially in cases of the conditional convergence) as heterogeneity of parameters, missed variables, uncertainty of models, exception, correlations of mistakes, surplus of regions, endogenous features and corrections of measurements. Also drawbacks, linked with cyclic activities, limited benefits of tests of the conditional convergence and NUTS classification are identified. It was noted that tendencies of convergence or divergence may be dependent upon the selected interval of time; therefore cycles of business are to be fixed. It was defined that heterogeneity of economics may affect the

convergence of groups of clubs or regions with different growth rates of the long-term balance existing. In this case the main problem is the question how to identify one or other country (region) and to which club it is to be attributed to.

V. THE MODEL FOR ASSESSMENT OF THE EFFECT OF FACTORS, DETERMINING RATES OF THE ECONOMIC GROWTH IN GROUPS OF CONVERGING EUROPEAN UNION COUNTRIES

Upon formation of the assessment model, analysis of the structure of the object and functioning was implemented, aims were formed, limitations were defined, main variables were identified. During later stages the type of the model was selected and methods for solving were determined (Picture 2).

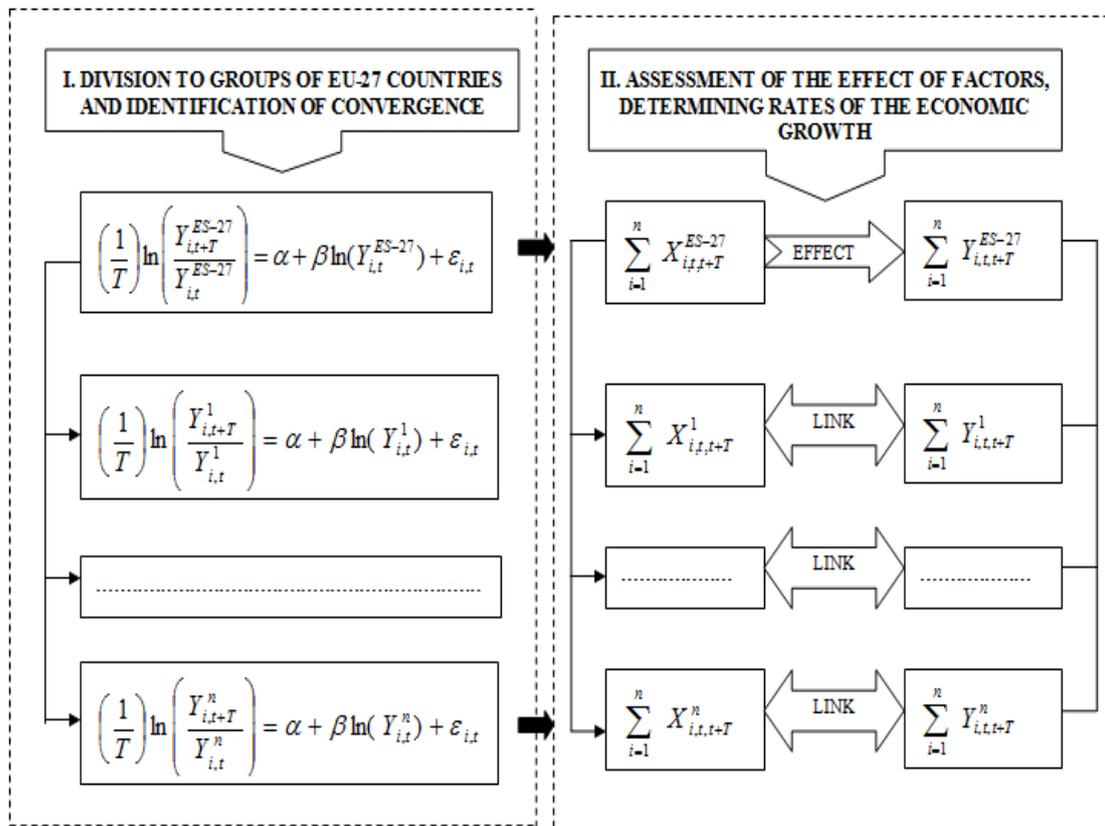


Fig. 2. Mathematical expression of the assessment model

Where:

$$\left(\frac{1}{T}\right) \ln \left( \frac{Y_{i,t+T}}{Y_{i,t}} \right) = \alpha + \beta \ln(Y_{i,t}) + \varepsilon_{i,t} - \beta \text{ model}$$

of the absolute convergence, respectively formed for EU-27 and selected groups ( $g=1, \dots, n$ ), where countries converge to the joint level of balance.

$\sum_{i=1}^n X_{i,t,t+T}^1, \dots, \sum_{i=1}^n X_{i,t,t+T}^n$  – factors, the link of which with rates of the economic growth of selected countries –  $\sum_{i=1}^n Y_{i,t,t+T}^1, \dots, \sum_{i=1}^n Y_{i,t,t+T}^n$  – is solid and

statistically significant.  $\sum_{i=1}^n X_{i,t,t+T}^{ES-27}$  – factors that were selected as statistically significant and possibly determining rates of the economic growth  $\sum_{i=1}^n Y_{i,t,t+T}^{ES-27}$  in EU-27 countries.

Data from EU-27 countries was to be included into the empiric verification of the assessment model of effect of factors, determining rates of the economic growth in groups of converging countries: EU-15 are so-called old-timers and EU-12 – new member states. In order to minimize the effect of business cycles, various external shocks on economic factors and because of the fact that changes of some factors affect economics only after some appropriate period of time, all analysed indicators were calculated as belonging to



the analysed period – 2000-2011; the average applied as the panel data collections of countries.

The developed assessment model of the effect of factors, determining rates of the economic growth in groups of converging countries serves as the substantiation of the scientific idea of the survey. From one hand, EU-27 is treated as the homogenous economic region because of gradually harmonised national institutions within countries of the European Union, monetary as well as fiscal policy and etc. From the other hand, countries differ not on the heterogeneity of own territories, historical development, initiation period of the moment of entering the European Union, multilayer balance where everything is respectively affected by primary conditions and etc. Considering the mentioned above, it is purposeful to identify more homogenous groups where economics of countries converge (diverge) and to assess the effect of factors, determining those processes.

It is important to notice that groups of countries can be separated on the base of various criterions, for example – considering similarity of the political situation, geopolitical state, cultural features, historical development, economical and social indicators and etc. Identification of the convergence club requires not only the identification of countries that are similar from the point of the analysed indicator. In case of the convergence club it is important that countries have similarities from the point of the analysed indicator and the course of growth as well as the approach towards the same level of balance. Therefore the conception of the group of countries is not similar to the convergence club. Only such group of countries can be identified as the convergence club that has the absolute convergence from the point of the analysed factor. It is important to identify convergence clubs, because it is likely that similarity of countries in different clubs from the point of the analysed indicator may be explained by the effect of different factors.

The assessment model of the effect of factors, determining rates of the economic growth in groups of converging countries covers two stages: the first – division of EU-27 countries into groups and identification of the convergence; the second – assessment of the effect of factors, determining rates of the economic growth. The assessment model, prepared in the Dissertation, may serve for the verification if there is a possibility for countries with the lower development level to attain the level of countries with the higher economical development level within the European Union as well as for identification of factors determining rates of the economic growth that countries with the lower economical development level should be oriented to, in order to approach the level of advanced economics.

Exceptionality of the first stage of the assessment model, if compared to other empiric surveys, may be explained by the fact that countries in the European Union are divided into groups considering not only the level of the economical development, but also by identifying the convergence clubs, assessing the course of economic growth of countries as

well as the multilayer balance. The novelty of the second stage is linked to the specification of the multiple regression model by including pseudo-variables, indicating the convergence club to which the *i*-country belongs to. This allows the assessment if the dependability between economic growth rates of EU-27 countries and separated determining factors remain unchanged when countries are divided into different groups. In other words, it is verified if there are other factors, determining rates of the economic growth, not defined in model within different groups of countries. Upon generalisation of both stages of the survey, the novelty is based on the fact that aspects of convergence and effect of factors of rates of the economic growth are assessed in a complex manner.

Upon preparation of the assessment model of the effect of factors, determining rates of the economic growth in groups of converging countries hypothesis were raised, the verification of which was implemented by aids of assessing significance of respective indicators of factors. Results of empirical verification of hypothesis, on the base of the prepared assessment model (Picture 2), are generalised in next chapter.

## VI. THE RESULTS OF EMPIRICAL MODEL ADJUSTMENT

Upon implementation of the empiric survey it was defined that there is the significant inequality of income per capita in EU-27 countries during the analysed period of 2000-2011; however the convergence of the gross domestic product per capita was observed. In order to identify countries with similar characteristics in the European Union better, methods of the cluster and regression analysis were applied; they were divided into separate homogenous groups on the base of data of the average annual level of the real gross domestic product per capita during the period of 2000-2011. Upon implementation of the survey, three groups (I group of countries: Austria (AT), Belgium (BE), Germany (DE), Denmark (DK), Finland (FI), France (FR), Great Britain (GB), the Netherlands (NL), Luxembourg (LU), Sweden (SE). II group of countries: Cyprus (CY), the Czech Republic (CZ), Spain (ES), Ireland (IE), Italy (IT), Greece (GR), Malta (MT), Slovenia (SI). III group of countries: Bulgaria (BU), Estonia (EE), Hungary (HU), Lithuania (LT), Latvia (LV), Poland (PO), Romania (RO), Portugal (PT), Slovakia (SK)). Identified groups of countries in the European Union further mean convergence clubs were separated out where countries are similar not only by the level of the economical development, but also by the course of the economic growth and the multilayer balance. The highest part of residents of the European Union as well as the received income is observed in countries of the I group, while the lowest respective indicators are observed in countries of the III group.

Reduction (increase) of differences in economics in EU-27 countries was empirically defined by verifying the hypothesis ((H1): there is an inverse dependability between

the level of the economical development of countries in the European Union and rates of the economic growth during the period of 2000-2011) of the statistical significance of absolute convergence  $\beta$  coefficient. (H1) was verified in EU-27 and respectively in the context of countries from the separated groups on the base of indicators of the real and nominal gross domestic product per capita. It is important to note that upon verification in separated groups, the hypothesis (H1) was confirmed only from the point of countries in II and III groups. On the base of the data of countries in I group, the formed assessment model is statistically insignificant and tendencies opposite to the convergence, i.e. the divergence, are observed.

Was confirmed (H2): in the separated group of countries in the European Union with the greater annual variation of the income per capita, the more rapid annual convergence exists if compared to the group of countries where the average annual variation of the income per capita is lower. It was defined that in cases of the real as well as nominal convergence, the average annual variation level of the income per capita in III group of countries is higher if compared to the II group of countries, therefore  $\sigma$  and  $\beta$  convergence is more rapid.

After analysis of indicators of the dependable variable (EU-27 economic growth rates) and potential independent

variables from the formed model of the multiple regression, it was defined that rates of the economic growth in separated groups of countries during the analysed period were the most rapid in countries from the III group – EE, RO, BU, SK, LV, LT, while the slowest – IT, PT, DK, FR, IE, ES. Respectively it was defined that indicators of all potential independent variables mostly reduced or increased in the slowest manner within the context of analysed countries in the I group; while the most rapid growth was observed in countries from the III group.

After assessment of the strength of links between indicators of independent variable (EU-27 economic growth rates) and potential independent variables in EU-27 countries, it was defined that the most solid dependability of rates of the economic growth is observed with the openness to the international trade, remittances of migrants, direct foreign investments, productivity of the labour factors and the level of economical development of the country at the beginning of the analysed period. Dependability with all indicators is direct, except the level of economical development of the country at the beginning of the analysed period (Table 2).

TABLE 2. STRENGTH OF LINKS BETWEEN INDICATORS OF INDEPENDENT VARIABLE AND POTENTIAL INDEPENDENT VARIABLES IN THE REGRESSION MODEL

		CORRELATION COEFFICIENTS										
		OIT	TC	MRM	FDI	GFC	ILP	IFL	HRS	PLF	WIP	GDP pc,t
GROUPS	EU -27	<b>0,67</b>	0,37	<b>0,79</b>	<b>0,73</b>	0,34	-0,14	-0,06	-0,30	<b>0,97</b>	-0,35	-0,70
	I	0,04	<b>-0,64</b>	0,08	-0,003	0,16	0,03	-0,23	-0,40	<b>0,83</b>	-0,38	-0,12
	II	<b>0,61</b>	-0,09	0,25	<b>0,61</b>	0,06	-0,24	-0,07	0,08	<b>0,92</b>	-0,13	<b>-0,67</b>
	III	<b>0,67</b>	0,22	<b>0,63</b>	<b>0,64</b>	<b>0,59</b>	-0,12	-0,49	-0,49	<b>0,94</b>	-0,13	<b>-0,89</b>

When the significance level  $\alpha=0,05$  percents.

After assessing the strength of the link from the point of selected groups of countries, it was defined that rates of the economic growth in countries of the I group are solidly linked by the direct dependability with the productivity of labour factors and the inverse dependability with indicator of the trade conditions. Rates of the economic growth of countries in the II group are linked by the solid direct dependability with the openness to the international trade, direct foreign investments, productivity of labour factors and the inverse – with the level of economical development of the country at the beginning of the analysed period. In countries

from the III group, next to respective indicators mentioned in the II group, the direct solid link with monetary remittances of migrants and investments was determined.

On the base of the scientific logics and results of assessing the cohesion of the link, assessment of effect of factors determining rates of the economic growth requires inclusion of indicators of the openness to the international trade, direct foreign investments, productivity of labour factors and level of the economical development of the country at the beginning of the analysed period into the empirical verification of the multiple regression model (Equation 1).

$$Y_{i,t,t+T} = \beta_0 + \sum_{i=1}^4 \beta_i x_{i,t,t+T} + \beta_5 D_{1,i} + \beta_6 D_{2,i} + \dots + \beta_n D_{n,i} + \varepsilon_i \quad (1)$$



Where:  $Y_{i,t,t+T}$  – dependable variable (average annual rates of the economic growth of countries that are assessed by the change of GDPpc indicator ( $Y_{i,t}$ ) from the primary  $t$  to the last  $t+T$  period);  $x_{i,t,t+T}$  – independent variables (OIT, FDI, PLF, GDPpc,t average annual rates of the change assessed by the change of the indicator ( $x_{i,t}$ ) from the primary  $t$  to the last  $t+T$  period);  $D_i$  – pseudo-variables, indicating the group of countries the  $i$ -country is belonging to;  $\varepsilon_i$  – random allowance.

After implementation of assessment of factors determining rates of the economic growth in EU-27 within groups of converging countries, the idea of the newest economical growth theory was based, where the productivity of human resources is stressed. It was defined that in case the average annual growth rate of productivity of the labour factors increases by 1 percent, the average rate of the economic growth in analysed countries would increase by 0,77 percents with other factors remaining unchanged. On the base of the standardised meanings of  $\beta$  coefficients, the effect of direct foreign investments on rates of the economic growth, if compared to the productivity of the labour factors, is slightly stronger. In case the average annual growth rate of the part of direct foreign investments in the gross domestic product increases by 1 percent, the average rate of the economic growth in analysed countries would increase by 0,10 percents with other factors remaining unchanged. In the opinion of the author of the Dissertation, effect of direct foreign investments is mainly expressed by other ways where one of them is the productivity of the labour factors. Also after implementation of the empiric verification of the multiple regression model for the assessment of factors determining rates of the economic growth, (H3: there are other factors determining rates of the economic growth in the selected group of countries if compared to all other groups) was rejected. With (H3) rejected it is possible to state that there are no specific factors determining rates of the economic growth in every group of countries (without those defined in the model).

## VII. CONCLUSIONS

After conducting the survey of empirical researches, it is noted that usually alongside the questions of economic development that aspects of economic convergence are analyzed as well. The concept of convergence is not exceptionally economic, it is used in many disciplines of science and has almost the same definition, however, peculiar meaning. This concept is often used in, for example, the areas of politics, culture, social sphere, and in the context of other fields. In the present survey, only economic convergence has been analyzed, which, in accordance to author's opinion, may be defined as the assimilation of different economic developments of the countries or growth of economies.

It was defined, that the theory of convergence is raised from the neoclassical theory of economic growth which developed to the perception of various conditions necessary for the similarity of economics, with later models, applied in endogenous and evolutionary theories. According to the opinion of the author of the survey, neo-classical theory stresses the limitedness of physical resources and the fact that in case of no investments to technological changes the inevitable consequence follows – the decreasing income. Neo-classical theory confirms that it is not possible to maintain the growth by accumulation of the physical capital only. It is necessary to develop technologies and to accumulate the human capital. Also the creative use of resources in necessary, linked with the evolutionary growth theory where the productiveness of human resources and the innovativeness are obligatory.

Economic growth in the general sense is perceived as the increase of the real product during some appropriate period of time. It was separated out that the economic growth is more complex phenomenon of the long term perspective and it should not be mixed with cyclic variations that are characteristic during the short period. Economic growth is the expression of the development of economic system, development and transformation.

The division of analysed countries to groups and clubs of convergence is done in the survey. The concept of the group of countries is not equivalent to the convergence club. In case countries in groups have similarities under the analysed criterion (political situation, geopolitical state, cultural features, historical development, similarity of economical and social indicators and other criterions), then countries in the convergence club are related by many criterions – not only similarity under the analysed criterion, but also the growth rate, approach to the similar level of balance. Within the context of separation of conceptions, such group of countries should be identified as the convergence club, which has the absolute convergence happening.

The exceptionality of the model for the assessment of the effect of factors, determining rates of the economic growth within groups of converging countries, if compared to other empiric surveys may be explained by facts, that: 1) countries of the European Union are divided and identified according to convergence clubs with the assessment of the economic growth of the country and the multilayer balance; 2) specification of the multiple regression model is expanded by including pseudo-variables, indicating what convergence club  $i$ -country belongs to and this allows assessing if there are specific factors, determining rates of the economic growth within the selected group of countries. Aspects of the convergence and effect of factors on rates of economic growth are assessed in a complex manner.

Upon identification of convergence clubs by neoclassical model of  $\beta$  absolute convergence in the European Union it was defined in what groups of countries the similarity of economics is happening. Importance of the direct foreign investments and the productivity of working factors on the growth rates of countries in the European Union as well as

on the assurance of convergence process between economics with different development rate were substantiated.

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