

## Macroeconomic Effects of the Europe 2020 Strategy

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### Abstract

The paper aims at analysing the macroeconomic effects of the Europe 2020 Strategy taking into account economic growth theories. The research problem relates to defining differences how various EU policies, materializing themselves through statistical indicators, impact the EU economic growth as well as how different EU member states are regarding the implementation of Europe 2020. It consists of 3 interrelated parts. The first one presents the analysis framework, i.e. describes the theories of economic growth and methods, such as correlation analysis and cluster analysis, and a data set, i.e. GDP indicators, Europe 2020, macroeconomic imbalances, fiscal indicators and the innovation index. The second part analyses the results of correlation analysis between GDP growth rates and GDP per capita as a dependant variable and 17 other indicators. On the EU level the level of innovations, energy efficiency, current account balance and expenditures for R&D over 2000-2010 has the strongest impact on economic growth with the correlation coefficient above 0.7. The third part presents the results of cluster analysis. The EU member states are quite different regarding the Europe 2020 indicators, thus 5 identical clusters were obtained, such as the power of Europe, Scandinavian excellence, the Southern path, the middle class Europe, the poverty Europe.

**Key words:** Europe 2020, macroeconomic imbalances, economic growth, correlation analysis, cluster analysis.

### Introduction

#### Towards of the New Vision of the European Economy

Europe 2020 is the strategy of the global EU development over 2011-2020 of three interrelated parts of smart, sustainable and inclusive growth. It has been launched by the European Commission in March 2010 (European Commission, 2010) and aimed at increasing economic growth while solving structural problems of the EU. The lack of growth and productivity, inadequate participation of population in the labour market, rather incomplete accommodation of constraints linked to ageing have nevertheless persisted whilst new worries were appearing, in

particular a greater competition of the emerging economies and the challenges linked to climate change and the management of natural resources.

In brief Europa 2020 focuses around 5 main targets to be reached by year 2020:

- Employment: 75% of 20-64 year-olds to be employed,
- R&D/innovation: 3% of the EU's GDP (public and private combined) to be invested in R&D/innovation,
- Climate change/energy: greenhouse gas emissions lower by 20% (or even 30%, if a satisfactory international agreement can be achieved to follow Kyoto) than in 1990; 20% of energy comes from renewables, 20% increase of energy efficiency,
- Education: reducing of school drop-out rates below 10% and at least 40% of 30-34-year-olds completing third level (or equivalent) education,
- Poverty/social exclusion: at least 20 million fewer people in or at risk of poverty and social exclusion.

The paper aims at finding out the impact of Europe 2020 indicators upon the economic growth of the European Union, measured in term of the ratios of GDP growth or the dynamics of GDP per capita<sup>1</sup>. In this way **the research problem** relates to defining the *differences* how various EU policies, materializing themselves through statistical indicators, impact upon EU economic growth as well as how different EU member states are regarding the implementation of Europe 2020. The puzzle is that if the EU economy is driven by growth factors, depending on the theory of new economic growth, then R&D and innovations shall have the greatest impact. In particular, the paper aims at answering the following **research questions**:

- Which headline indicators of the Europe 2020 Strategy have the strongest impact upon GDP growth in the EU?

<sup>1</sup> In our paper the definition „impact” in its narrow meaning is used since empirical results relate to correlation analysis, demonstrating linkage between 2 variables.

- Do sustainable and smart growth indicators add towards EU economic growth or vice versa and how that can be explained?
- What impact macroeconomic imbalances along with fiscal indicators have upon EU economic growth?
- How similar or different are EU member states regarding the implementation of the Europe 2020 strategy? What typical clusters can be drawn up?

To answer these questions a set of statistical methods, in particular correlation analysis and clustering, were used to find out correlations between GDP growth and Europe 2020 indicators, the indicators of macroeconomic imbalances and fiscal indicators as well as to define similar groups of countries. GDP growth as the ratio of yearly change and GDP per capita act as dependant variables, and 8 indicators of Europe 2020, 6 indicators of macroeconomic imbalances, 2 fiscal indicators, and 1 indicator of the innovations index act as independent variables in the set of correlation analysis. The same variables were used in cluster analysis. All statistical data were taken from the Eurostat except for the innovations index which was taken from the European Commission. All statistical calculations were done using the Statgraph software.

Although the Europe 2020 Strategy has been considered as the headline strategy of EU development over the decade, up to recent it has attracted little attention of researchers for such reasons as the political nature of the strategy, attention given to the Euro zone crisis, and simply because it is too early to measure its effects. At the same time various EU institutions driven think tanks such as Lisbon Council, Bruegel, etc., produced theoretical and policy analysis based works related to the framework policies of Europe 2020, such as the European semester, the economic governance of the EU, etc. However, neither of them has attempted to do statistical analysis of raw data using correlation or clustering in order to measure the effects.

The nature of the paper is *policy rather than scientific analysis*, thus it focuses on empirical findings related to the policies working in the area of the Europe 2020 Strategy coordination and implementation. In a wider set, since the paper is drawn from a wider study, the theories and earlier works related to the relationship between economic growth and the financial as well as fiscal situation of the countries have been reviewed.

## 1. Framework of the research

### 1.1. Main theories of economic growth

Economic growth is an increase of the amount of goods and services produced by an economy over

time. It is conventionally measured as a percent rate of increase in real gross domestic product (GDP). Or growth can be described as the process of transformation, being uneven and unbalanced. But in any case economic growth relates to long-term growth, thus does not take into account short-term economic trends.

In the early of 20th century it became the policy of most nations to encourage growth, and a long-run path of economic development became one of the central questions of economies (Sullivan, Sheffrin, 2003). Over long periods of time even small rates of annual growth may have large effects on wealth. A growth rate of 2.5% per annum will lead to doubling of GDP within 28 years, whilst a growth rate of 8% per annum will lead to doubling of GDP within 9 years.

The theories of growth are in a continuous development since new sources as well as aspects of growth emerge from time to time. The classical growth theory was inspired by two great economists, Adam Smith and David Ricardo, and is associated with the factors of production, especially with the increase of physical capital as well as with the opening of the economies, international trade (Jones, 2002).

Growth facilitated by increasing stocks of capital goods was also codified in the early version of neo-classical growth models, the most prominent of which was invented by Solow (Solow, 1956) and Swan (Swan, 1956) in the 1950s. In this model an increasing rate of employment is a crucial factor of growth along with capital intensity. In the long term output per capita and labor productivity grow at an exogenously given rate of technological progress. But, since technological progress is entirely exogenous, in reality economic growth was left unexplained.

A group of models, the so-called new growth theories that emerged in the course of the 1980s, explain long-term economic growth endogenously by providing for the assumption of diminishing returns on capital and by rendering technological progress endogenous to the model. In his pioneering paper Romer postulated that a firm's production function is defined by firm-specific variables (capital, labor, research and development inputs) and a shift term (index of technology), which is the function of the stock of knowledge available to all firms (Romer, 1990). Thus the endogenous growth theory takes into account a variety of factors enabling innovation, and first of all research and development as the basics for economic growth. Theory also suggests that international diffusion of knowledge increases the growth of output and productivity. Research found that more than 50% of productivity growth in each of the 19 OECD countries can be attributed to

innovations from just three countries: USA, Germany and Japan.

A recent evolutionary approach to growth draws attention to aspects that are neglected in both, neo-classical and endogenous growth models (Nelson, 1998). It states that growth should be based on a more realistic theory of the firm that stresses its strategic capabilities in a broader sense rather than just investment in human capital and research and development. It must take into account the institutional framework that presumably strongly contributes to the explanation of cross-country differences in economic growth. To create value and gain a competitive edge firms use a whole set of specific assets, among which research and development is only one but important. Others are: marketing, organizational and managerial skills, individual and collective learning capabilities, social capital (trust, etc.), networking, property rights, etc. That ensures sustainability of economic growth, which will be discussed in the part below.

## 1.2. Statistical framework

Macroeconomic impact of the Europe 2020 Strategy may be measured in different ways: using econometric models, methods of inductive statistics as well as soft qualitative methods of expert estimation. For a long time and still today economists worldwide are used to apply hard methods of econometric and statistical analysis to draw conclusions since they provide for measures with some degree of confidence (Kedaitis, 2009). On the other hand, today's economic reality and its development in the future contain a certain degree of increasing uncertainty, as with the entire set of today's factors, such as

globalization, modern technologies, knowledge and information, speed as well as influence of politics, which often prevail economic rationality affecting economic growth, have come into force, which cannot be completely taken into account by statistics and econometrics. In this situation the importance of qualitative methods based on expert opinions of focus groups, interviews or surveys has been increasing since they can help understand the underlying reasons of economic reality as well as emerging factors which may affect development in the future. An ideal situation is the combination of hard and soft methods in economic estimations. In our case statistical analysis based on the methods of correlation was used to estimate the relationship between the statistical variables of GDP, the Europe 2020 Strategy, macroeconomic imbalances and fiscal indicators. Furthermore, cluster analysis helps to identify the groups of the EU member states, which might require different strategies.

Correlation analysis was done using the Pearson correlation coefficient, measuring the linear relation between 2 variables<sup>2</sup>. The results of correlation analysis analyzed below takes into account only statistically significant Pearson correlation coefficients, with 95% statistical confidence, and a small number of Pearson correlation coefficients, for which p exceeds 0.05, but is still below 0.2. The dataset contained 19 variables for 27 EU member states, during 11 years of 2000-2010. The analyzed variables, all taken from the Eurostat and the European Commission (SII indicator), are presented in the table below (Table 1).

Table 1

### List of the statistical indicators used for correlation, regression and cluster analysis

Variable	Measure	Abbreviation
<b>Macroeconomic</b>		
GDP annual growth rates	In % to previous year	GDP
GDP per capita in PPS	In % of 100, given for total of EU-27	GDP-1
<b>Europe 2020</b>		
Employment rate, age group 20-64, total	In % of total population and the age group of 20-64	EMPL
Gross annual domestic expenditure for research and development	In % of GDP	RESEARCH/RES
Summary innovation index (SII)	Complex indicator containing 25 different indicators elaborated by the European Commission	INOV/INO

<sup>2</sup> The statistical framework has certain delimitations, in sense, that the measures of correlation do not take into account other parameters such as co-variance, etc., but just a linear relationship between 2 variables.

Early leavers from education and training, age group 18-24, total	In % of population and the age group of 18-24, with lower secondary education and not in further education and training	EDUC/EDU
Tertiary education attainment, age group 30-34, total	In % of population of the age group of 30-34, with higher university education	STUD
Greenhouse gas emissions, base year 1990	In % of base year 1990, with gas emissions index equal 100	GAS
Energy intensity of the economy	Gross inland consumption of energy divided by GDP, in kilograms of oil equivalent per 1000 Euro of GDP	ENERG/ENER
Share of renewable energy	In % of gross final energy consumption	RENEW/REN
People at risk of poverty or social exclusion	In % of total population	POVERTY/POV
<b>Misbalances</b>		
Current account balance	In % of GDP, average of 3 years backward	CURAC
Net international investments position vis-à-vis the rest of the world, as liabilities minus assets	In % of GDP, end of the year	INVEST
Share of world exports of goods and services	In %, as the change of share over 5 years	EXPORT/EXPO
Private credit flow for non-financial corporations, households and non-profit institutions	In % of annual GDP	CREDIT/CRED
Nominal unit labour costs	In %, as the change over 3 years of remuneration to employees divided by productivity (GDP per employment)	LABOUR/LAB
Private debt as the stock of liabilities in the form of loans and securities other than shares, held by non-financial corporations, households and non-profit institutions	In % of annual GDP	PRIVDEBT/PRIVD
<b>Fiscal indicators</b>		
General government budget deficit/surplus	In % of annual GDP	BUDGET/BUD
General government gross debt	In % of annual GDP	DEBT

Source: own design based on Eurostat

While taking correlation analysis into account, because EU member states are very different regarding some indicators like GDP per capita, we slightly modified some data sets of high variation taking away 1-2 extreme variables to avoid distortions of correlation affected by high variability as well as the lack of a normal distribution tendency. For all years we calculated the correlation coefficients of GDP per capita with other variables without the GDP per capita for Luxembourg, which is as much as approx. 2.5 times higher the EU-27 average. Nevertheless, in some cases we allowed for a slight in-normality of the data sets, especially for school drop-outs, higher education, poverty and exclusion, labour costs as well as for a higher variability of the data sets, especially for GDP per capita. However, these distortions affected less than 1/4 of the data sets for all years, thus the correlation coefficients obtained, although they could not be absolutely, however, correct in direction (positive-negative) and the class of correlations strengths (minor, medium or strong). In general, they can be used to draw policy conclusions on the EU level.

## 2. Correlation analysis

### 2.1. With the indicators of GDP

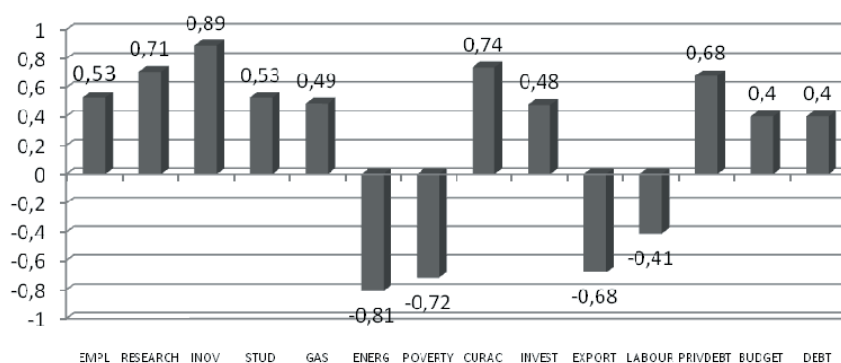
Taking GDP growth rates into account, it is unclear which precisely factors affect economic growth on the EU level. Unfortunately, in this regard, except for greenhouse emissions, any Europe 2020 headline indicators got either significant for the years 2000-2010, taking correlation coefficients with GDP growth into account, or, if they were significant for some years, the tendency was not logical enough. A positive impact was made by environmental indicators, i.e. by decreasing greenhouse emissions with the average correlation coefficient of 0.53. Furthermore, some indicators of macroeconomic imbalances could be considered as stronger factors of economic growth on the EU level, especially the share of world export, private and governmental debt, i.e. lesser private and governmental debt as well as an increasing share of world export were affecting GDP growth for at least half of the decade positively with the average Pearson correlation coefficient, for world export being +0.66, for private debt -0.47 and for governmental debt –

0.62. Obviously, the dimensions of sustainability, whether it be environmental, macroeconomic or fiscal as well as an increasing share of international trade, i.e. the external dimension of Europe 2020, add towards greater economic growth. However, again correlations are of medium strength, thus the number of growth triggers remained somewhere outside of the given set, what also means outside of Europe 2020.

Some better tendencies were obtained for the correlations between GDP per capita and the indicators of the given analysis set. GDP per capita in PPP captures not just wealth and living standards of EU member states, but also, to some extent, GDP growth rates, since the indicator is considered in the dynamics of 11 years as well as takes into account differences in the price level in the EU member states.

The number of correlation coefficients got significant for GDP per capita in PPS as well as for the number of years while demonstrating similar strengths (Figure 1). Taking into account the indicators of Europe 2020, the major positive impact upon GDP in

EU-27, thus upon economic growth, or vice versa, is done by increasing the level of R&D and innovations (respectively 0.71 and 0.89), by reducing the level of energy consumption, i.e. by input efficiency (-0.81) and by reducing poverty and exclusion (-0.72). Increasing the level of employment (0.53) along with increasing the level of higher educational of population (0.53) had a medium strength positive impact upon GDP growth. The indicator of early school leavers was not significant in this regard, and the level of green gas emissions, unfortunately, gave an opposite as expected effect of medium strength, meaning that the EU member states with higher emission levels had better GDP per capita in PPS. This could mean that wealth of the EU member states, which established over long years since the end of WWII and especially over the Golden Age of 1950-1973, based on rapid industrial growth, with a higher level of green gas emissions, has not been yet overcome completely by the tendency of economy greening, although the new growth, especially in the EU new member states, is already driven by that.



EMPL	RES	INOV	STUD	GAS	ENERG	POV	CURA	INV	EXP	LAB	PRIVD	BUD	DEB
0.53	0.71	0.89	0.53	0.49	-0.81	-0.72	0.74	0.48	-0.68	-0.41	0.68	0.4	0.4

**Fig 1.** Average correlation coefficients for GDP per capita in PPS with the indicators of Europe 2020, misbalances and fiscal situation for 2000-2010, EU-27

Source: author's design, 2012

Thus, according to this data, EU economy is driven up by modern factors of economic growth, belonging to the new growth theories, i.e. by innovations and R&D, thus speeding up expenditure for R&D, which may boost the innovation level, and attaining R&D targets by the member states included in the national programs of Europe 2020, and could be a solution to greater EU economic growth in long-run as well as to the competitiveness of the EU economy.

Other EU policies, which may require attention, are social and energy related. The correlation between GDP and the poverty level could be both ways, i.e. richer EU member states have fewer people who

live below the poverty line following the Kuznets curve that poverty reducers with increasing wealth of nations. But, on the other hand, reduction of poverty and exclusion, especially in those EU member states, which still have high disparity of income and a large share of population living on the poverty line, could be a solution to greater economic growth since reduction of poverty also means more consumers, better health of population and a greater genofond, more input into employment and higher education as well as, indirectly, into science and innovation and fewer lost talents. That also means fewer tensions in society as well as more peaceful co-existence of its members with greater equality, lesser emigration,

who, instead of fighting between, work together for the benefit of countries. Here we may remember social economy in the Scandinavian countries, which ensure wealth for everyone and that no citizen, for example, of Denmark, is forgotten or considered as unimportant, everyone is adequately involved in the economic, social and cultural life, has free access to education, what is considered as the essential human right in those countries. And, indeed, the Scandinavian countries are well known for their high level of living standards and innovations as well as networked societies with the established social capital, and, according to opinion polls, are the one of the happiest in the world. With the factor of poverty reduction, belonging to inclusive growth, Europe gets by with the theories of evolutionary economic growth, which consider also the framework conditions of growth, i.e. networks, social capital, management, etc.

Another indicator, which is very important for EU economic growth, is energy efficiency, thus a desirable attention to further reduction of energy use and to energy savings would work for greater EU economic growth. In this regard we may remember the Porters hypothesis that a more efficient use of resources is beneficial for the wealth of nations and that that works in Europe.

Taking into account macroeconomic misbalances, we found a number of significant correlations regarding GDP growth per capita in PPS. However, in this case analysis of some of these relationships, due to some indicators of misbalances, are provided as the ratios of change, and even as averages of these ratios (the share of world export and nominal labour costs), could be problematic, as the tendency could diverge from that if we would take into account natural indicators, especially the share of global export. In general, the EU member states, which have fewer problems with the current account balance, i.e. they are exporting rather than importing, have higher GDP per capita in PPS and better dynamics of it, i.e. they are developing faster. This relationship is very strong, with the average Pearson correlation coefficient + 0.74, and has been constant and statistically significant over 2000-2010 on the EU-27 level. This means that EU economic growth is also driven by the external dimension, i.e. by how strongly the EU member states play on the stage of global economic relations in terms of trade, equally to R&D. On the other hand, taking into account mere GDP growth rates, economic growth in the EU during 5 years out of 11 (2000-2010) has been driven by negative correlation with current account balance, which averaged to - 0.47, and just in 2010 this correlation got positive to 0.57. That means that wealth of the EU member states and

stability have been attained by increasing opening of the EU economies as well as by looking upon current account balance. But this is not unchangeable, since during some years increasing import, especially of industrial goods, could trigger higher economic growth, and especially in lower development countries and emerging industries, which still need high industrial investments and world class know-how. Current account deficit is not always a problem. The Pitchford thesis states that current account deficit does not matter if it is driven by the private sector. It is also known as the “consenting adults” view of current account, as it holds that deficits are not a problem if they result from private sector agents engaged in a mutually beneficial trade.

Other indicators of macroeconomic imbalances, which correlate positively with GDP per capita, relate to different dimensions of debt, i.e. to private and governmental debt, governmental budget deficit and net international investment position, which is a some alternative indicator to capital account, capturing foreign direct investments. First of all, it is clear that wealth of the EU member states has been established and maintained by increasing indebtedness of the private sector (correlation coefficient 0.68), and by an increasing level of governmental debt and increasing budget spending (correlation coefficients in both cases 0.4). This tendency is somehow opposed by the correlation of GDP per capita and net international investments position, which demonstrates the ratio of liabilities over assets related to international investments, to GDP. In this case lesser indebtedness of domestic sectors related to investments, facilitate higher economic growth, or in other ways, higher inflow of foreign capital compared to outflow, affected economic growth on the EU level, with medium strengths of 0.48 of the Pearson correlation coefficient.

The correlation between GDP per capita in PPS and nominal labour costs on average equalled to -0.48 over 2000-2010, on EU-27 level. The indicator of nominal labour costs in this regard captures the dynamics (percentage change) of the relationship between compensation to employees and productivity, i.e. when it increases it means that the member state has started paying more to employees compared to increase of productivity, i.e. earnings get higher the economically deserved level. In our case a negative correlation coefficient means that wealth creation and its stability in the EU member states are affected positively by smaller increase in employees' compensation compared to productivity, i.e. when employees are paid depending on how well they work and how productive they are. Undeserved benefits lower GDP and its growth.

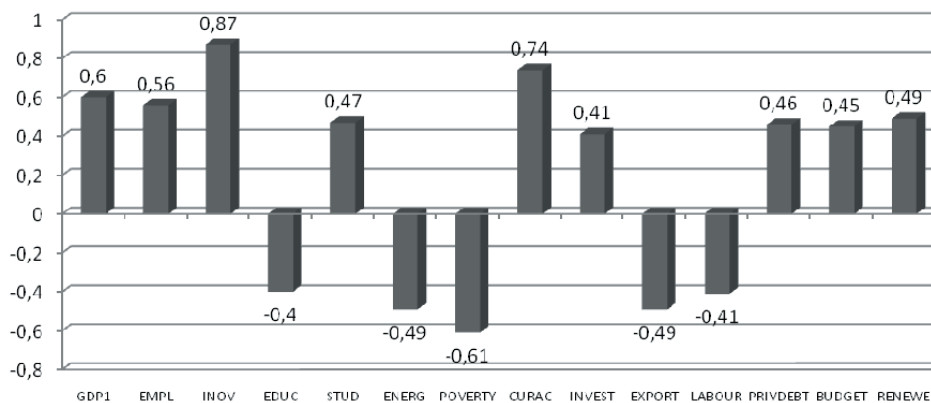
What relates to indicators of world export share, our calculations showed that its correlation with GDP per capita is strongly negative, of  $-0.68$ , what means that those countries, where the world trade share decreased most, had higher economic growth. And indeed, looking at raw data, the share of the most EU-15 countries has been steadily decreasing and those of EU-10 member states – increasing. This was affected by changing world trade patterns, that a number of emerging and transitional countries came to the stage of global international relations over the past decade, by relatively lowering the share of the world export of EU-15 countries, but that does not mean that the absolute value of world trade decreased in EU-15. On the other hand, that could mean that decreasing participation in international trade is not so crucial for wealthy member states of the European Union, and that GDP growth in this case can be compensated by domestic factors, such as R&D. Increasing opening of economies is important for small countries as well as for those where development is still lacking.

Surprisingly however, availability of private credit seems has not played GDP growth except for the year 2010 as well as increasing use of renewable resources has been insignificant for the years 2000-2010.

## 2.2. With the indicators of R&D and employment

Since expenditures for R&D make great impact upon EU economic growth we will have to look what factors affect these expenditures or vice versa. The results of the Pearson correlation coefficient of expenditures for R&D with those of GDP per capita, Europe 2020, misbalances and fiscal indicators, show that the relationships are similar to those we got earlier for GDP per capita, just somehow weaker (Figure 2).

Of course, the highest impact upon research and development is made by the level of innovations and vice versa - R&D affects the level of innovations. The remaining indicators of Europe 2020 affect R&D positively but with medium strengths. The Pearson correlation coefficient with the level of employment equals to  $0.56$ , with the level of higher education – to  $0.47$ , with secondary education drop-outs – to  $-0.4$  (it is significant in this case), with the energy efficiency – to  $-0.49$ , with renewable energy – to  $0.49$  (it is significant in this case), and with poverty – to  $-0.61$ . That means that R&D is fostered and fosters a higher level of employment and a higher level of university education, fewer drop-outs from secondary schools, higher energy efficiency and a higher share of renewable energy as well as lesser poverty and social exclusion.



GDP1	EMPL	INOV	EDU	STUD	ENERG	POV	CURA	INV	EXP	LAB	PRIVD	BUD	RENW
0.6	0.56	0.87	-0.4	0.47	-0.49	-0.61	0.74	0.41	-0.49	-0.41	0.46	0.45	0.49

**Fig 2.** Average correlation coefficients for expenditures for R&D with GDP per capita, indicators of Europe 2020, misbalances and fiscal situation for 2000-2010, EU-27

Source: author's design, 2012

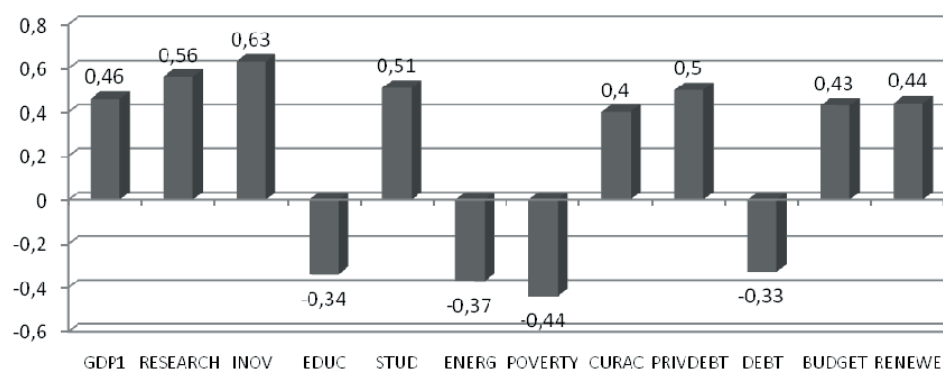
Furthermore, taking into account the indicators of misbalances, R&D is positively affected by the balance of current account ( $0.74$ ) and with medium strengths – by the remaining indicators, except for the share of world export. Taking into account fiscal indicators, just correlation with higher budget deficit is significant; however, the relationship is quite weak. All that draws to the conclusion that the

EU member states in their policies for R&D shall seriously consider policies related to innovations since that has the highest mutual impact as well as an attempt at increasing correlation with, for example, the level of higher education, since that is considered as a huge source of R&D growth, which is obviously underexploited possibly because of poor management of the vertical chain of R&D. On the other hand,

R&D seems to draw on the use of renewable energy. Obviously, exploitation of renewable energy sources is rather a scientific field that requires efforts of academic and industrial scientists. Furthermore, R&D adds significantly towards balanced current account hopefully because of an effect upon increasing competitiveness of the EU economy thus increasing the value of export over import as well as the development of domestic industries what means less demand for imports.

The level of employment is another important indicator of the Europe 2020 Strategy, thus we will have to look at the factors that affect its growth (Figure 3). What we got is that the Pearson correlation coefficients are weaker especially with the indicators of misbalances, meanwhile a state debt affects

the employment level negatively, i.e. a lower debt provides for higher employment. The highest impact upon employment growth is made by a higher level of innovations (0.63), by expenditures for R&D (0.56) and by university graduates (0.51). Surprisingly, however, a higher level of employment reduces poverty in a smaller way compared to R&D, what can be explained by a rather high level of poverty of working people who are earning just minimum wages, that are insufficient for adequate living in number of EU member states, A higher employment level also fosters the development of renewable energy or vice versa, since this emerging industry is the source of employment. But, in general, employment on the EU level is fostered by the entire set of factors that are acting with medium strengths.



GDP1	RES	INOV	EDU	STUD	ENERG	POV	CURA	PRIVD	DEB	BUD	RENEW
0.46	0.56	0.63	-0.34	0.51	-0.37	-0.44	0.4	0.5	-0.33	0.43	0.44

**Fig. 3.** Average correlation coefficients for expenditures for the level of employment with GDP per capita, indicators of Europe 2020, misbalances and fiscal situation for 2000-2010, EU-27

Source: author's design, 2012

### 3. Cluster analysis

Cluster analysis, applying Ward's method, aimed at identifying the clusters of the EU member states that are similar by their characteristics, following the Europe 2020 indicators, misbalances and fiscal indicators. The Ward method was chosen because it fitted the aims of this particular research to group countries in the most logical way. Besides, it has been already tested in the previous works of the authors related to the Lisbon strategy.

We took two years (2007 and 2010) and two data sets (Europe 2020 indicators and GDP per capita and all indicators under analysis, including GDP per capita and GDP growth rates) to draw up clusters. For Europe 2020 related indicators we drew up 5 clusters and for all indicators – 3 clusters for each year because in this case the member states better fitted in 3 clusters instead of 5, meanwhile clusters 4 and 5 comprised just 1 member state.

#### 3.1. Cluster analysis of all indicators

Following cluster analysis of all indicators, we identified 3 groups of countries, both for the years 2010 and 2007, following the same methodology of the Ward method. We labelled them (Table 2):

1. Advanced growth: Belgium, Denmark, Germany, France, Luxembourg, Netherlands, Austria, Finland, Sweden, UK,
2. Catching-up growth: Bulgaria, Czechoslovakia, Estonia, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia,
3. Problematic growth: Ireland, Greece, Spain, Italy, Cyprus, Hungary, Malta, Portugal.

The first group, advanced growth, comprises the most advanced EU member states, while reflecting upon the true sense of Europe 2020 strategy, i.e. smart, sustainable, inclusive and, in addition, rather rapid growth, taking into account that GDP growth rates for this group averaged to 2.74%. These are also wealthy countries with GDP per capita 135%, the average of EU 100%. Almost all indicators of



this group are good in economic sense, the essential characteristics being:

High level of:

- Employment (73.5%),
- Expenditures for R&D (2.5%),
- Index of innovations SII (0.64),
- Persons with higher education (41%),
- Investments (21.1%),
- Current account (2.99%).

Low level of:

- Energy consumption (157.3),
- Poverty (18.2%),
- Budget deficit (-4.2%)

On the other hand, these countries were reducing their world export share most rapidly as well as they have rather high level of private and state debt.

The second group, catching-up growth, comprises 9 new EU member states reflect upon catching-up growth in the EU. In 2010 they had quite average GDP growth, of 1.6% but their GDP per capita remained low, just some 62.7% of the EU average along with expenditures for R&D (1% of GDP) and the level of innovations (SII index 0.49). The group also has the highest poverty level (28.6%) and low effectiveness of energy use. However, differently to the group of problematic growth, this cluster has better indicators of macroeconomic imbalances as well as a better fiscal situation. Compared to other clusters, this cluster comprises the member states which have good environmental indicators (renewable energy and greenhouse gas emissions) as well as an increasing share of world export, and highest indicator of nominal unit of labour costs, what means that wages in these countries were growing rapidly compared to labour productivity. Economically that is not a very safe group because their economic growth is based on increasing openness of economies (export), increasing labour pay and somehow better balanced macroeconomic indicators based on savings (debt and budget expenditures) but not on science and innovations, what, if the situation remains similar, can cause serious problems of underperformance and an economically frozen situation. In general, that is still a very grey zone, with countries, fearing to apply any other policy than austerity of spending, what will keep them away from a higher level of innovations. And, if the macroeconomic indicators of these countries get misbalanced, especially current account (through a worse situation on world export markets), private and state debt levels, these countries will get to serious troubles, what we see now in Greece, Portugal, Spain, Italy or Ireland.

The third group, problematic growth, comprises 8 EU member states, from the old and new member states, which got to troubled economic growth due to the recent financial-economic crisis, as well as some of the new EU member states of the most advanced level (Cyprus, Malta and Hungary),

which got problematic growth due to internal policies (Hungary) because they are small island economies (Malta) or because of the influence of Greek crisis (Cyprus). This group is characterized by low growth rates of GDP (below 1%) or negative growth. On the other hand, the cluster has higher living standards (GDP per capita 93.3% of the EU level), higher expenditures for R&D (1.2%), higher level of innovations (SII index 0.42) compared to the catching-up growth group. However, the cluster has the highest level of secondary education drop-outs (20%), a very high level of greenhouse emissions (121%) and a very small share of renewable energy (9%). Taking into account economic imbalances, the cluster has a worse current account balance (-6.9%), the highest level of private and governmental debts (215.3% and 86.5% respectively) and the highest level of budget deficit (-9.9%). Obviously, the group has attempted at overcoming the financial-economic crisis, based on ineffective and/or obligatory (bailout of banks in Ireland) expenditures, stemming from doubtful economic growth policies in the past. They also have investment related problems but, on the other hand, have managed to keep up a modest labour pay growth compared to labour productivity. Indeed, having some mixture in place, it is hard to tell without detailed analysis what policies shall be used in these countries. Clearly, they shall look upon the fiscal situation, current account and investments as well as speed up green energy, what will boost the level of employment and innovations, reducing the impact of the crisis. It is also very important to look after the educational level. All that means that the countries of this cluster need targeted structural reforms directed towards effectiveness and green energy economy, what, on a sound basis of their former prosperity, especially of Ireland, Spain, Italy and Portugal, would boost their economic growth.

Taking into account the Eurozone, the countries, which adopted the Euro, are spread along all the 3 clusters, with the majority in the advanced growth group. That means that the Eurozone, unfortunately, became scattered, and economic situations require different strategies.

Has this situation changed compared to 2007? Slightly (Table 3). In general, we have the same clusters in place, i.e. of advanced growth, catching-up growth and problematic growth. Some member states have moved from one cluster to another. In 2007 Cyprus and Ireland were in the cluster of advanced growth and passed to problematic growth in 2010, hopefully affected by sharply lowering GDP growth rates and worse fiscal indicators.

What is characteristic for the cluster of problematic growth is that already in 2007 it demonstrated some specificity related to low employment rates, high rates of school drop-outs, poor environmental indicators (greenhouse emissions and share of renewable

Clusters of EU member states (Ward method), by 19 indicators of the research, 2010

Member states/centroids of indicators	GDP	GDP-1	EMPL	RES	INO	EDU	STUD	GAS	ENER	REN	POV	CURAC	INVEST	EXPO	CRED	LAB	PRIVDE	BUD	DEBT
<b>Advanced growth:</b> Belgium, Denmark, Germany, France, Luxembourg, Netherlands, Austria, Finland, Sweden, UK	2,74	135,2	73,5	2,5	0,64	10,8	41,0	88,0	157,3	16,4	18,2	2,99	21,1	-13,22	0,1	9,7	203,0	-4,1	62,7
<b>Catching-up growth:</b> Bulgaria, Czechoslovakia, Estonia, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia	1,6	62,7	66,1	1,0	0,31	9,5	30,5	60,6	494,8	16,9	28,6	-4,0	-65,1	12,46	-2,93	11,5	110,2	-5,7	34,3
<b>Problematic growth:</b> Ireland, Greece, Spain, Italy, Cyprus, Hungary, Malta, Portugal	0,49	93,3	64,9	1,2	0,42	20,0	31,8	121,0	195,7	9,05	25,8	-6,9	-68,9	-12,1	5,8	5,7	215,3	-9,9	86,5

Clusters of EU member states (Ward method), by 19 indicators of the research, 2007

Member states/centroids of indicators	GDP	GDP-1	EMPL	RES	INO	EDU	STUD	GAS	ENER	REN	POV	CURAC	INVEST	EXPO	CRED	LAB	PRIVDE	BUD	DEBT
<b>Advanced growth:</b> Belgium, Denmark, Germany, Ireland, France, Cyprus, Luxembourg, Netherlands, Austria, Finland, Sweden, UK	3,89	132,8	74,3	2,11	0,601	12,21	38,4	105,7	159,0	12,9	19,05	2,37	4,93	-4,87	30,4	5,0	204,55	1,23	46,39
<b>Catching-up growth:</b> Bulgaria, Czechoslovakia, Estonia, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia	7,72	62,2	70,2	0,82	0,288	9,99	24,8	68,3	519,6	14,1	31,32	-9,92	-53,9	40,37	25,01	23,36	99,32	-0,57	20,57
<b>Problematic growth:</b> Greece, Spain, Italy, Hungary, Malta, Portugal	2,5	86,0	65,3	86,0	0,341	25,3	24,3	124,7	217,1	8,7	24,28	-7,87	-62,43	-0,95	17,7	7,33	163,27	-2,8	74,05

Source: author's calculation based on Eurostat data, 2012

energy), a rather high level of poverty, problems related to current account and investments, high private and state debt levels, budget deficit and low credit rate. In general, already at the start of the financial-economic crisis, the group of these countries was very problematic in sense of almost all indicators of macroeconomic misbalances, fiscal situation as well as of employment, social and environmental policies. Thus, recent situation in these countries is just to some extent a consequence of the crisis but mostly it is the result of some path-of-dependency of policies that did not provide for good results even in good times. On the other hand, Ireland and Cyprus passed to the problematic group in 2010 mostly because of the crisis and recently these member states were catching up rapidly.

### 3.2. Cluster analysis of Europe 2020 indicators

Taking into account only Europe 2020 indicators, the picture is slightly different. In this case we took 10 indicators, i.e. 9 headline indicators of the Europe 2020 Strategy and GDP per capita, while

clustering the EU member states into 5 clusters for 2 years, 2007 and 2010 (Table 4). GDP growth rates were not taken into account in this case because we attempted at finding out similarities and differences among the EU member states following their success implementing the Europe 2020 Strategy while eliminating the impact of the crisis.

The EU member states got divided into the following clusters:

- Power of Europe,
- Scandinavian excellence,
- Southern path,
- Middle class Europe,
- Poverty Europe.

The first cluster, the power of Europe, during 2010 and 2007 comprised 10 advanced EU member states (8 old and 2 new), which have the highest centroid for GDP per capita, about 130% of GDP compared to the EU average, however, all other indicators are good but somehow worse compared to the cluster of Scandinavian excellence, especially expenditures for R&D (what causes a somewhat lower innovations level) and the share of renewable energy.

Table 4

Clusters of the EU member states (Ward method), by Europe 2020 indicators, 2010

Member states/ centroids of indicators	GDP-1	EMPL	RES	INO	EDU	STUD	GAS	ENER	REN	POV
<b>Power of Europe:</b> Belgium, Ireland, Germany, France, Cyprus, Luxembourg, Netherlands, Austria, Slovenia, UK	129.9	71.8	1.95	0.58	10.5	40.2	101.0	166.9	9.3	20.3
<b>Scandinavian excellence:</b> Denmark, Finland, Sweden	121.6	75.9	3.45	0.73	10.2	46.2	89.0	158.9	32.5	16.7
<b>Southern path:</b> Greece, Spain, Italy, Malta, Portugal	90.8	63.6	1.17	0.39	25.3	26.8	121.4	166.2	11.02	24.7
<b>Middle class Europe:</b> Czechoslovakia, Estonia, Hungary, Poland, Slovakia	69.2	65.3	1.14	0.35	7.4	28.7	64.0	478.9	11.6	22.9
<b>Poverty Europe:</b> Bulgaria, Latvia, Lithuania, Romania	49.5	64.5	0.62	0.22	13.4	30.5	47.3	554.9	21.3	38.6

Source: author's calculation based on Eurostat data, 2012

Table 5

**Clusters of the EU member states (Ward method), by Europe 2020 indicators, 2007**

<b>Member states/ centroids of indicators</b>	<b>GDP-1</b>	<b>EMPL</b>	<b>RES</b>	<b>INO</b>	<b>EDU</b>	<b>STUD</b>	<b>GAS</b>	<b>ENER</b>	<b>REN</b>	<b>POV</b>
<b>Power of Europe:</b> Belgium, Germany, Ireland, France, Cyprus, Luxembourg, Netherlands, Austria, Slovenia, UK	131.5	73.0	1.74	0.55	11.7	36.1	107.9	167.5	8.0	19.8
<b>Scandinavian excellence</b> Denmark, Finland, Sweden	122.0	78.03	3.15	0.71	11.3	43.6	100.0	162.0	30.3	16.0
<b>Southern path</b> Greece, Spain, Italy, Malta, Portugal	90.8	65.9	0.96	0.5	28.1	25.1	134.0	177.7	9.22	23.3
<b>Middle class Europe</b> Czechoslovakia, Estonia, Latvia, Lithuania, Hungary, Poland, Slovakia	64.5	69.9	0.85	0.30	9.3	24.6	65.1	457.3	12.8	26.8
<b>Poverty Europe:</b> Bulgaria, Romania	41.0	66.4	0.49	0.19	16.1	19.9	63.0	818.3	13.8	53.3

Source: author's calculation based on Eurostat data, 2012

On the other hand, it is remarkable that in 2010 all indicators of Europe 2020, except for the share of employment and poverty level, got better for the cluster of power of Europe compared to 2007, what means that the economic crisis did not affect spending for R&D, innovations level, energy efficiency, share of renewables as well as the level of green gas emissions, i.e. did not affect the basis of EU economic growth, science and innovations in major EU economies, what means that Europe could avoid the scenario of the lost-decade (Table 5).

The second cluster, the Scandinavian excellence, shall be a follow-up example for all EU member states, what relates to the implementation of the Europe 2020 Strategy. This cluster has a slightly lower centroid for GDP per capita, about 122% of the EU average but, on the other hand, all other Europe 2020 related indicators are simply excellent, well balanced, what means that the Scandinavian countries have indeed smart economic policies in place and that high expenditure level for R&D makes an effect. As for the previous cluster, all Europe 2020 related indicators improved in 2010 compared to 2007, except for the share of employment and poverty level. In general, the cluster of the Scandinavian countries gets beyond the existing Europe 2020 Strategy. In other words, there is nothing to do for them in the framework of Europe 2020, thus probably they need separate attention, the establishment of a special advancement zone in the EU, some sort of the EU Silicon Valley with target development strategies, the

other EU member states could learn from.

The third cluster, the Southern path, comprises the EU member states of the Southern part of Europe, that recently had economic survival related problems, i.e. Greece, Italy, Spain, Portugal and Malta. What is typical for these countries, is rather misbalanced indicators of the Europe 2020 Strategy. On the one hand, they have higher GDP per capita than those of the 2 lowest groups (the middle-class Europe and the poverty of Europe), a little higher level of expenditures for R&D and innovations. But they have low educational indicators (high level of secondary schooling drop-outs and low level of higher education), what means that the input of human resources to their economies is unsatisfactory. These countries also have the highest level of green gas emissions and the lowest share of renewable energy as well as a rather high level of poverty. As for other clusters, some Europe 2020 indicators slightly improved in 2010 compared to 2007, however, a troubling sign is that along with increasing R&D expenditures the level of innovations dropped, what again means that these countries have problems related to effective spending and effective economy in general.

The fourth cluster, the middle-class Europe, comprises 5 EU member states from the intake of 2004. These are the so-called new EU member states, starting to get out from the grey zone of the EU. Some of Europe 2020 indicators are better compared to the Southern path group states, especially educational and

environmental. Other indicators are just nearby, what means that taking a better balanced macroeconomic situation, this group of the EU member states will hopefully already be the mid of Europe 2020 (in 2015) under the condition of keeping up and speeding up along the path, especially what relates to R&D and the level of innovations, could become the rising starts of Europe. That is not accidental, since the cluster has Estonia, the new Eurozone member, Poland, which became known by a perfectly managed economic situation of the crisis. Just probably Hungary could raise some concern, especially taking into account its macroeconomic situation. In 2007 Lithuania and Latvia belonged to this group, however, they passed to the poverty Europe because of the economic crisis. Taking into account how much GDP of these countries reduced in 2008-2009 they can remain in the lowest cluster for years if do not modify their policies towards higher R&D expenditures, innovations, employment, poverty reduction, etc. what could boost their GDP per capita to get higher.

The fifth cluster, the poverty of Europe, comprises 4 EU new member states from the intake of 2004 and 2007: Bulgaria, Romania, Latvia and Lithuania. A typical feature of this group is low GDP per capita, just some 50% of the EU average as well as low expenditures for R&D and a low level of innovations along with very ineffective energy use and a high poverty level. All this is interrelated. Obviously, these countries shall attempt at using the Europe 2020 framework to get higher R&D expenditures as well as increase energy efficiency and apply effective social policies to reduce poverty. It is easy to say but hard to implement. Nevertheless, if other countries of the Eastern and Central Europe, especially Estonia, being a former Soviet republic, with a very similar starting position managed to get up, that is possible for the countries of the poverty of Europe also, if they attempt at stopping to waist time for post-soviet time intrigues and policies, which very often trigger fulfilment of corruptive interests of political groups and block real economic growth initiatives.

In general, the European Union got away from a clear division of the EU old and new member states. Recently we can find these countries scattered along the clusters as well as the Eurozone countries got scattered. That means that the European Union is a very dynamic and ever-changing community of member states, where deep inside changes are taking place in the EU, and that success or failure of individual countries depends on their internal efforts and the ability to grasp the moment. On the other hand, high economic, social and environmental disparities, *inter alia* related to the domestic policies

of the EU member states, suggest that recent initiatives of the EU institutions to foster fiscal and economic integration could have a positive impact in sense of convergence and smarter policies for those countries, which recently lacked the will to do so.

## Conclusions

Macroeconomic impact of the Europe 2020 Strategy may be measured in a different way, using econometric models, the methods of inductive statistics as well as soft qualitative methods of expert estimation. In this paper, due to the availability of good quality data, we chose application of the methods of correlation and cluster analysis using 19 statistical indicators in total, including GDP growth, Europe 2020 indicators as well as those of macroeconomic imbalances, fiscal situation and innovations. Taking into account indicators of Europe 2020 as a major positive impact upon GDP in EU-27, thus upon economic growth or vice versa, was done by increasing the level of R&D and innovations (respectively 0.71 and 0.89), by reducing the level of energy consumption, i.e. by input efficiency (-0.81) and by reducing poverty and exclusion (-0.72). Increasing the level of employment (0.53) along with increasing a higher educational level of population (0.53) makes a positive impact of medium strength upon GDP growth. Thus, according to this data, EU economy is driven up by modern factors of economic growth belonging to new growth theories, i.e. by innovations and R&D, thus, speeding up spending for R&D which may boost the innovation level and attaining R&D targets by the member states included in the national programs of Europe 2020, could be the solution to greater EU economic growth in the long-run as well as to the competitiveness of the EU economy.

Following cluster analysis of all indicators (19), we identified 3 groups of countries, both for the years 2010 and 2007, following the same methodology of the Ward method: 1. Advanced growth: Belgium, Denmark, Germany, France, Luxembourg, Netherlands, Austria, Finland, Sweden, UK; 2. Catching-up growth: Bulgaria, Czechoslovakia, Estonia, Latvia, Lithuania, Poland, Romania, Slovenia, Slovakia; 3. Problematic growth: Ireland, Greece, Spain, Italy, Cyprus, Hungary, Malta, Portugal. Taking just Europe 2020 indicators into account (10), the EU member states got divided into the following clusters: 1. Power of Europe: Belgium, Ireland, Germany, France, Cyprus, Luxembourg, Netherlands, Austria, Slovenia, UK; 2. Scandinavian excellence: Denmark, Finland, Sweden; 3. Southern path: Greece, Spain, Italy, Malta, Portugal; 4. Middle class Europe: Czechoslovakia, Estonia, Hungary,

Poland, Slovakia; 5. Poverty Europe: Bulgaria, Latvia, Lithuania, Romania.

Cluster analysis shows that the European Union got away from a clear division of the EU old and new member states. Recently, we can find these countries scattered along the clusters as well as the Eurozone countries got scattered. That means that the European Union is a very dynamic and ever-changing community of member states, where deep inside changes are taking place in the EU, and that success or failure of individual countries depends on their internal efforts and the ability to grasp the moment. That also suggests that a further economic integration in the EU could serve reducing disparities while increasing convergence and providing for smarter decision making.

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## Makroekonominiai strategijos *Europa 2020* efektai

### Santrauka

Straipsnyje siekiama išanalizuoti strategijos *Europa 2020* makroekonominį poveikį, atsižvelgiant į ekonominio augimo teorijas, iškeliant difersifikaciją, kaip tyrimų problemą, siekiant nustatyti, kurios ES ekonomikos politikos, matuojamos įvairiais statistikos rodikliais, turi didžiausią įtaką ES ekonomikos augimui, taip pat kokie yra ES šalių narių skirtumai, įgyvendinant *Europa 2020* strategiją. Keliami tyrimų problema: jei *Europa 2020* rodikliai turi skirtingą įtaką ES ekonomikos augimui, tai tie, kurie atspindi naujos ekonomikos augimo teorijos išraišką, visų pirma, inovacijų ir mokslinių tyrimų lygis, turi didžiausią įtaką ES ekonomikos augimui.

Straipsnis susideda iš 3 tarpusavyje susijusių dalių. Pirmoje dalyje pristatoma tyrimų analizės sistema, t. y. aprašomi metodai, tokie kaip koreliacijos ir klasterinė analizės, bei statistinių duomenų rinkiniai, tokie kaip BVP rodikliai, *Europa 2020* ir makroekonominis disbalansų

rodikliai, taip pat fiskaliniai rodikliai ir inovacijų indeksas.

Antroje dalyje analizuojami koreliacinių tyrimų rezultatai, gauti matuojant statistinio ryšio stiprumą tarp BVP augimo tempų ir BVP vienam gyventojui, kaip priklausomų rodiklių, ir tarp 17 kitų rodiklių, kurie šioje analizėje yra nepriklausomi, tokių kaip *Europa 2020*, makroekonominis disbalansų, fiskalinės situacijos ir inovacijų lygio rodiklių. ES lygiu 2000–2010 m. išlaidų moksliniams tyrimams, inovacijų lygio, energijos naudojimo efektyvumo, einamosios sąskaitos balanso rodikliai turėjo didžiausią poveikį ekonomikos augimui, kai vidutinis Pearsono koreliacijos koeficientas visais atvejais viršijo 0,7. Didėjantis užimtumas (0,53) kartu su augančiu aukštojo mokslo išsilavinimo lygiu (0,53) darė vidutinio lygio įtaką BVP augimui. Tokiu būdu ES ekonomikos augimas yra veikiamas modernių ekonomikos augimo

veiksnių, priklausančių vadinamajai naujai ekonominio augimo teorijai. Didesnės išlaidos mokslo tyrimams ir aktyvesnė inovacinė veikla gali paskatinti ES ekonomikos augimą.

Trečioje dalyje pateikiami klasterinės analizės rezultatai. ES šalys narės buvo grupuotos pagal visus 19 statistinių rodiklių ir atskirai – tik pagal *Europa 2020* rodiklius. Grupuojant pagal visus rodiklius, buvo išskirti 3 klasteriai: *Pažangus augimas*, *Kylantis augimas*, *Problematinis augimas*, o pagal *Europa 2020* rodiklius – net 5 klasteriai: *Europos galia*, *Skandinavijos kompetencijos*, *Pietų kelias*, *Vidurinė klasė Europoje*, *Skurdas Europoje*. Šios šalių grupės turi išskirtines, tik joms būdingas charakteristikas. Pavyzdžiui, pirmas *Europa 2020* klasteris *Europos galia* 2007 m. ir 2010 m. apėmė 10 šalių narių (8 senas ir 2 naujas), turinčių didžiausią BVP vienam gyventojui, apie 130 proc., lyginant su ES vidurkiu. Visi likusieji rodikliai taip pat geri, nors šiek tiek blogesni, palyginus su Skandinavijos kompetencijos klasteriu, ypač išlaidos mokslui ir technologinei plėtrai, bei atsinaujinančios energijos dalis. Antras klasteris *Skandinavijos kompetencijos* jungia 3 Skandinavijos šalis. Tai septynis pavyzdys kitoms ES šalims narėms. Nors BVP

vienam gyventojui yra šiek tiek mažesnis – apie 122 proc., palyginus su ES vidurkiu, visi kiti *Europa 2020* rodikliai yra puikūs, subalansuoti, o tai reiškia, kad Skandinavijos šalys turi tinkamas valstybines politikas, o aukštos išlaidos mokslui ir technologinei plėtrai turi teigiamą efektą. Trečias klasteris *Pietų kelias* apima 5 šalis nares, atsirandančias Europos pietuose, turinčias ekonominio augimo problemų, taip pat išbalansuotus *Europa 2020* rodiklius. Ketvirtas klasteris *Vidurinė klasė Europoje* apima 5 naujas šalis nares, įstojusias 2004 m. Kai kurie šio klasterio rodikliai yra geresni nei Pietų kelio, ypač išsilavinimo ir aplinkosaugos, o tai reiškia, jog turėdamos dar ir geriau subalansuotą makroekonominę situaciją, šios šalys artimiausiu metu gali tapti ES ekonominės plėtros varikliu. Penktas klasteris *Skurdas Europoje* apima 4 naujas šalis nares, įstojusias 2004 m. ir 2007 m. Tipiškas šių šalių bruožas yra žemas BVP vienam gyventojui – tik apie 50 proc. ES vidurkio, žemos išlaidos mokslui ir technologinei plėtrai kartu su labai neefektyviu energijos naudojimu ir aukštu skurdo lygiu.

**Pagrindiniai žodžiai:** *Europa 2020*, makroekonominiai disbalansai, ekonomikos augimas, koreliacijos analizė, klasterinė analizė.

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