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Relationship between Structural Funds and Economic Indicators of the European Union

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Economic and social cohesion is one of the economic objectives of the European Union (EU). Therefore it is important to analyse the influence of the European Union policies on the cohesion. The common market itself is not able to solve the economic and social problems that are relevant for the EU countries. The EU structural funds should encourage the employment and development of the region. The cohesion policy provides the possibility to finance various activities in order to promote economic growth in the European Union Member States. The convergence, regional competitiveness, employment and European territorial cooperation are the three main objectives of the current EU development aims. The cohesion policy can be helpful instrument for achieving economic convergence. The EU investments are meant to support the innovations as well as education and training in urban and rural areas, create sustainable high-quality jobs in order to reduce the unemployment and pursue low-carbon economy. In summary, the funds should lead to economic growth.
This article presents the analysis of the relationship between the structural support and economic indicators of the EU. The research methods used in the article include the analysis of literature and statistical data, and correlation analysis. The analysis showed that correlation between main economic indicators and the funds is not significant and it may show the insufficient use of the support.

Keywords: *Economic and Social Cohesion, EU Cohesion Policy, EU Structural Funds, Economic Growth, EU Economics.*

Introduction

The participants of any system experience losses or wins due to redistribution which is practised in all the political systems and by different methods. The participants may include countries, regions, different social groups and even individuals. The right distribution may be an important factor determining the continuity of the integration process. The increasing effort is being made seeking for sustainable development including regional integration in the European Union. The EU regional policy tries to reduce the social and economic differences between the Member States. It supports job creation, encourages competitiveness, economic growth, pursuit of higher life standards and sustainable development. The objectives of economic and social cohesion are extremely important for strengthening political and economic development in the EU Member States (Basile *et al.*, 2007).

The reduction of the gap between different regions and particularly the reduction of the differences between developing and developed regions is the main objective of cohesion policy. It is the instrument of financial solidarity and the measure of economic integration. The objective "to promote economic, social and territorial cohesion and solidarity of the Member States" was confirmed by The Treaty of Lisbon. Economic, social and territorial cohesion means the reduction of the differences of economic and social development in different regions. The European cohesion policy is more than just redistribution of funds. It about increasing efficiency in the developing regions. The Strategy "Europe 2020" introduces three initiatives of growth: the smart growth (the promotion of knowledge, innovation, education and digital society), the sustainable development (sustainable use of resources, the increase of economic competitiveness) and the integral growth (to achieve high employment and economic growth ensuring social and territorial cohesion).

The Treaty of Rome notes the homogenous development of the economic activities and sustainable development. The aim of the general policies of agriculture, transport, competition and trade is to reduce the differences between the countries and regions. Today, the main aim of the European Union in order to seek the social and economic cohesion still remains the promotion of economic growth and efficiency integrating the factors of production and goods markets. The aim of EU investments is to reduce unemployment by creating sustainable high-quality jobs and increase the economic growth by supporting innovation, low-carbon economy as well as education and training in both urban and rural areas. The promotion of entrepreneurship and social exclusion is important contribution to an environmentally friendly and resource-efficient economy as well. At the same time, structural changes can negatively influence the particular society sectors. Therefore, the issues of redistribution are the constant subject of the political debates.

The theories of economic growth were analysed by (Cho 2004; Krugman, 2003; Rugman, 2005; Cartwright, 2001) and others. The problems of economic growth in Lithuania were studied by (Lydeka & Gineitas, 1994;

Snieska, 2008; Dumciuviene, 2011; Semetiene, 2011) and others. In spite of the great interest in the issues of economic growth, the theoretical argumentation remains one of the most difficult and complicated issues. It can be seen from the variety of theories that explain the economic growth.

The authors discuss the impact of the EU cohesion policy on economic growth in this article. The effectiveness of different types of cohesion policies and the usefulness of funds for separate countries were analysed by several authors (Ederveen *et al*., 2006; Dawid *et al., 2014;* Bachtler *et al., 2014;* Florio *et al.,* 2014; Bouayad-Agha *et al.,* 2013; Moreno-Enguix *et al.,* 2013; Aiello & Pupo, 2012; Varga & Veld, 2011; Gallo *et al*., 2011; Mohl *et al*., 2010; Becker *et al*., 2010; Lolos, 2009; Katsaitis &, Doulos, 2009; Santos, 2008; Bahr, 2008; Dall'erba & Gallo, 2008). The economic efficiency in relation with political motives, the possibility to use the Structural Funds in the public sector changing the public sector's investment projects, the regional policies development seeking to enable the regions to increase their competitiveness and development, the employment growth in the business activities are the objectives of the research done in the area concerned. But unambiguous answers to the main questions were not found. It shows that more research is needed. *The aim of this work* is to analyse the relationship between the EU Structural Funds and economic development of all EU as a region in terms of economic indicators. *The research methods* used in the article include literature and statistical data analysis, correlation analysis.

Theories of Economic Growth

The distribution of welfare between the participants of the integration process is an important political and economic problem. The main aim is to promote the economic growth in developing countries. Theoretical arguments are used to explain how the integration influences the differences of the economic development.

Heckscher Oglin-Samuelson model shows that the countries will be exporting the products that have been manufactured using their abundant and cheap resources, and will be importing the products that have been manufactured using the limited resources of the country. This theory explains the convergence in the open markets. It works under the influence of the customs union and a single market.

According to the theory of convergence, economics converge under the influence of rather strong regulation mechanisms (Rehme, 2006). It means that there is not any necessity to conduct the regional policies. The competition policy and the removal of the barriers for the free movement of goods, resources and technologies are sufficient tools to reduce regional differences.

Another theoretical explanation states that the divergence is also possible. It depends on the development of the countries (regions). The regions that have the technological advantages attract the investments. At the same time, the labour force is inclined to move to the regions or territories where the conditions for career are better (Eckel, 2007). This deepens the regional differences further. The supporters of the theory state that the governmental actions are necessary to the regional convergence.

The new theory of growth emphasises the significance of the market access, the technological changes, the human capital, the international competitiveness, the economy of scale and the institutional efficiency (Kutan *et al*., 2007).

The issues of redistribution can occur within the regions or countries and between individuals. The resources must be redistributed between the sectors inside the regions, and the companies must transfer their activities from the non-competitive sectors to the other sectors where the rate of employment would increase. Both winners and losers can appear in the process of integration if such redistribution is not performed. The inability of the regions to transfer the resources from one business to other shows the inflexibility of the internal structures. According to this view, the integration itself does not ensure the convergence: the political actions and measures must be invoked (Hall *et al*, 2001).

Hence, the governments pursue the policy which impacts the redistribution of the welfare between the individuals and the regions. The member states can use three main variables by choosing the redistribution schemes: the selection of the supported territory, the intensity of the support in these territories and the selection of the size of budget for the regional policy. The efficiency and the justice are two reasons for the implementation of such policy. Both of them contain the regional and social aspects, for instance, the governmental program for higher workforce mobility or the staff retraining program in the case of restructuring of the industry (Farrell, 2004).

The Impact of the EU Structural Funds on the Economic Environment

Following the program of European Single Market, the border controls for goods, services and capital were abolished since January 1, 1993.

The particular policies have also been engaged regarding the implementation of the program of European Single Market. The EU competition policy controls the mergers, the monopolies and the governmental support (Snieska, 2002). The promotion of efficient functioning of market forces by limiting the domination of big corporations and the governmental intervention is the aim of such policy (Krugman, 1996; Hassler *et al.,* 2005). The removal of the barriers for competition has the consequences similar to the removal of the trade barriers.

The advantages of free trade encouraged the founders of the EU to follow the principle of free internal movement of goods. The multilateral trade policy is implemented through the World Trade Organisation. The contracts have been made with the countries that join the EU, and at the same time the EU developed the agreements of free trade with the third countries.

The EU promotes the policy of research and technological development (R&TD). It is implemented arranging the joint long-term research programs. The efficient development of R&TD in the production sector enables to reduce the dependency of the countries on the low-skilled labour force as well as on the low-tech activities. The development of R&TD as well as the

development of infrastructure can contribute to the increase of competition in the particular sectors.

Whether the use of EU support enables to achieve the objectives depends on several factors. The purposeful and efficient use of EU funds should be the main criterion for the access of EU Structural Funds. It is important to use the EU funds efficiently in all the country and to ensure that the developed activities meet the national priorities.

The investment from the EU Structural Funds can cause the adverse economic consequences. It should be considered that the projects 'applications are selected by the special criterions, but not by the market needs. However, the market priorities can change faster than the period of project preparation and implementation as well.

The use of the EU funds can contribute to the business development. The structural support is assigned only for the sectors that have the priority of the EU support. The sectors not assigned for such funding face the increasing difficulties to compete in the market. The companies that have got the EU funding work under the exceptional conditions and successfully compete with the ones that haven't got the funding. Thus, EU funds become a tool by which the government (not the market) distributes the resources for the formation of economic structure.

However, real beneficiaries are often not the ones to whom the support has been assigned. It happens when the significant funds assigned for one sector artificially raise the demand of resources in this sector which, in turn, raises the price. Thus, the resource providers become the real beneficiaries. It means that the EU support payments in particular sectors cannot be accurately captured.

The access to EU funds can also change the motivation of the private sector. The use of such funds can become not a solution of, let's say, the lack of knowledge or skills, but one of the main business aims and the way to survive. The resources that could be used to create the value added for the economics would compete not for the quality of goods or services that meet the needs of customers, but for the support which does not create any value added.

The market participants can influence the decisions of the managers of EU funds on the fund assignment, the control of absorption and so forth in order to seek the benefit for themselves. Thus, the absorption of the EU funds makes the conditions of higher corruption in the country.

The Efficiency of the Use of EU Structural Funds and the Benefit for the Economics of EU

The efficiency of the use of EU Structural Funds has been widely investigated in the recent years. The researches show that the impact of these funds on the economic growth is conditional and depends on the quality of the institutions of the receiving countries. In the countries with poor institutional quality, the effect of EU support on the economic growth is negative. The reason is that the Structural Funds affect the allocation of recourses and the misallocation of resources might worsen in the countries with the poor institutional quality. For example, the corruption might divert the funds from the productive activities; the increased opportunities for rent seeking might absorb resources and so on (Katsaitis & Doulos, 2009).

Ederveen and others (2006) also declared that – on average – Structural Funds are ineffective. For the countries with a 'proper' institutional framework, however, the Structural Funds are effective.

Mohl and Hagen (2010) analysed the use of the EU funds for regional development. The authors state that EU Structural Funds often finance the projects that are not economically efficient because they have been affected by the political motives. What is more, since the projects financed from the EU Structural Funds have to be co-financed, the opportunity to use the Structural Funds in the public sector changes the public sector's investment projects which would be more economically efficient. Such projects would be implemented without EU funding. It can damage the regional development.

The regional policies seek to enable the regions to increase their competitiveness and development, and as such one priority objective of activities financed by Structural Funds is higher employment, higher productivity and economic activity (Moreno-Enguix *et al*., 2012).

Florio and others (2014) investigated the employment growth in the business activities that were supported by the European Cohesion Policy. They examined the cross-industry, the cross-regional variations in fourteen manufacturing industries and seventy EU regions (in Germany, Italy and Spain) for the period 2000–2006. They showed that the business support positively correlates with the employment growth in the industries that are initially smaller and have higher growth opportunities. This leads to the conclusion that the direct support to businesses by the European Cohesion Policy helps to increase the employment in the different industries.

With fully integrated labour markets the human capital policy positively affects the economically stronger region but reduces the production in the targeted weaker region. Subsidies for high technology investment in the weaker region have a positive local output effect and a negative effect on the neighbouring region, thereby fostering convergence. When the labour markets are not integrated both policies support the convergence (Dawid *et al*., 2014).

Most researches are made on the analysis of the efficiency of the EU support in 2000–-2006. The Structural Fund for the period of 2000–2006 was designed for three priority objectives:

- priority 1: to promote the development and structural adjustment of regions whose are less developed;
- priority 2: to support the economic and social development of regions experiencing structural difficulties;
- priority 3: to support the development of education, training and employment policies and systems in areas not eligible under priority 1.

Mohl and others (2010) showed that Priority 1 payments, promote the regional economic growth, whereas the total amount of Priorities 1, 2, and 3 do not have a positive and significant impact on the EU regions' growth rates.

Bouayad-Agha and other (2013) suggest that Priority 1 programs have a direct effect on regional gross domestic

product per capita growth rates, whereas the total Structural Funds do not. Becker and others (2010) also found positive per capita GDP growth effects of Priority 1 transfers, but no employment growth effects.

How efficiently the regions apply the funds is a fundamental issue for the development and continuity of regional policies. Moreno-Enguix and others (2012) therefore considered that determining the efficiency of European regional policies is an issue of high importance. They calculated the technical efficiency and inefficiency of the Structural Funds applied in the Priority 1 regions for the period 2000–2006. Furthermore, they wish to estimate if the regions have been more efficient increasing their level of employment or in increasing productivity. The study disclosed that only eight regions were efficient.

Aiello & Pupo (2012) p contributed to the discussion on the role of European Union cohesion policy in Italy. The focus was on the regional effects of European Structural Funds from 1996 to 2007. They found that Structural Funds have had a greater impact in the South compared to the Centre-North of the country. However, they have not contributed to reducing the productivity differences in Italy.

Lolos (2009) made research on the impact of EU structural policy on the regional income growth in Greece over the period 1990–2005. This period was important for the European integration process, with a main role assigned to the EU structural support to less developed countries and regions. The empirical results showed a positive impact of Structural Funds support on regional growth while the income convergence was enhanced. In addition, a significant influence of spatial income and unemployment spillovers on regional income growth was evidenced, illustrating the recent growth performance in Greece. His results leaved ample room for European regional policy to operate for the promotion of growth and the reduction of regional disparities.

Varga & Veld (2011) provided a model-based research of the macroeconomic impact of the financial transfers using a micro-founded dynamic general equilibrium model with endogenous growth and endogenous human capital accumulation. The simulations showed the potential benefits of Structural Funds with significant output gains in the long run due to sizable productivity improvements. The condition that recipient countries co-finance part of the funding is found to raise the long-term output effects. The delays in spending due to the slow absorption of available funding reduce the potential gains.

Gallo and others (2011) indicate that Structural Funds have a weak global impact on the European Union regional growth process, but that their local impacts are very diverse, with a positive influence on the growth of British, Greek, and southern Italian regions.

The EU budget review, launched by the Commission in 2007, is a unique opportunity to critically examine EU policies and instruments. Structural Funds are at the heart of the EU's cohesion efforts, and amount to almost one-third of the Community's budget. They have two declared objectives, economic growth and regional convergence, but these do not always complement each other. The allocation of the Structural Funds is not efficient from a pure growth standpoint, and a large proportion of transfers take place within regions. With enlargement, cross-country transfers increased significantly to 40 % of total flows, and intra-regional redistribution decreased. In a more diverse EU, this is a step to the right direction. Yet, almost three-quarters of intra-country redistribution still happen within regions (Santos, 2008).

The bad thing is that the results of recent research are similar to those, that are got decade ago. Dall'erba & Gallo (2008) paper evaluated the impact of Structural Funds on the convergence process between 145 European regions over 1989–1999. The presence of spillover effects was investigated with spatial econometric methods, which assess the impact of the funds on the targeted region and its neighbours. Their estimation results indicated that significant convergence takes place, but that the funds have no impact on it. Simulation experiments showed how investments targeted to the peripheral regions never spill over to their neighbours, which called for a reconsideration of current regional policy tools.

Bahr's (2008) paper contributes to the research in focusing the investigation on the role of the member states' federal structure. A discussion focuses mainly on the theory of fiscal federalism provided the basis for an empirical model. Using a sample of thirteen European member states in the period from 1975–1995 they estimated the effect varying decentralization among them has on the conditional effectiveness of Structural Funds expenditure. The results suggested that Structural Funds were more effective in promoting growth when the member states show a higher degree of decentralization.

Summarizing the analysis of the impact of EU Structural Funds on the economics, it can be stated that the benefits of EU Structural Funds depend on how and where these funds are used. Similar results of the research that evaluate the benefit and efficiency of the use of EU funds now and ten years ago show that the situation is not changing in the right direction. So it is important to make more research in order to find the inefficient spheres of the use of EU funds and to take bold decisions in order to get the maximum benefit from the funds.

The Methodology of Testing the Correlation between Structural Funds and Economic Indicators of EU

As the EU funds are allocated for various countries, industries and fields of activities it needs a lot of detail research in order to determine the insufficient ones. But also it is important to estimate the benefit of EU support for the European Union generally.

General domestic product (GDP) is the key indicator for the division of the support for the countries, so it is very important to test whether the Structural Fund helps to increase the GDP and improve other economic indicators.

This question will be analysed by the following steps:

- *Correlation analysis*. It will show, is the significant linear relationship between the EU funds and economic indicators of the region or not. In order to check that, Pearson correlation coefficient will be calculated. Then the Student (t) statistics and the probability for Student's t-distribution will be calculated in order to evaluate the significance of correlation coefficients. The calculated probability is compared with the significance level that is

chosen 0.05. It indicates a 5% risk that null hypothesis (H_0: correlation coefficient is equal to 0) will be rejected when it is correct. The significance of Pearson correlation coefficient will be made according to the rule: if probability is less than 0.05, then significant linear relationship between variables exist and if probability is more then 0.05, then significant linear relationship between variables does not exist. In order to avoid spurious correlation, the stationarity tests will be made and all the indicators that are not stationary processes will be differentiated.

- *Granger causality test*. The correlation analysis does not show which of the indicators is factor and which is outcome (result). While the causality analysis allows to identify that and supplements the correlation analysis. This will help to make the conclusions about the impact of the EU fund on economic indicators of the region.

The main economic indicators that can be mostly influenced by EU funds and are usually mentioned in various sources of literature will be chosen for the analysis. The data from 2000 till 2013 of all 28 members of EU will be analysed. Calculations will be done with statistical software EViews.

Correlation Analysis between Structural Funds and Economic Indicators of EU

The statistical data show that funding for regional and cohesion policy increases every year. It amounts to €347bn in 2007–2013 and €225bn in 2000–2006. The long-term tendency of GDP growth of all EU is also increasing (Figure 1). That's why the hypothesis that the Structural Funds help to achieve the economic growth can be formulated.

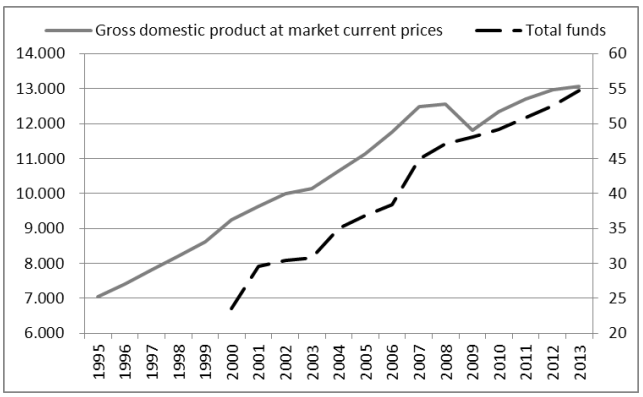

Figure 1. The tendency of GDP and structural support of EU in billion euro
Note: the data of GDP of all 28 countries are available from 1995 and the data of funding are available from 2000
Source: made by authors based on Eurostat data

The correlation coefficient between GDP and funding is high and is equal 0,97. But if we look at the growth of GDP and the growth of the funds they are not adequate (Figure 2). The support of EU increases 132 % during the fourteen years starting from 2000, but GDP increases only 41 % during the same period of time. Of course the increase of funds can be greater because of the lower base of calculations, so the more detailed analysis should be done.

The comparison of the changes of GDP and funding year on year shows that the tendencies of both indicators coincide in most periods. When the support decreases comparing with the previous year, the growth of GDP also decreases. The exceptions are 2006, 2011, 2012 and 2013 years. Generally the correlation between the changes in GDP and the changes in funds is not strong. The correlation coefficient is equal only to 0.40. The fact that the growth of GDP decreases despite of the increase of the support can show the problems with the use of the funds. That's why we think that the analysis of efficiency of the use of the support in each country is strongly recommended.

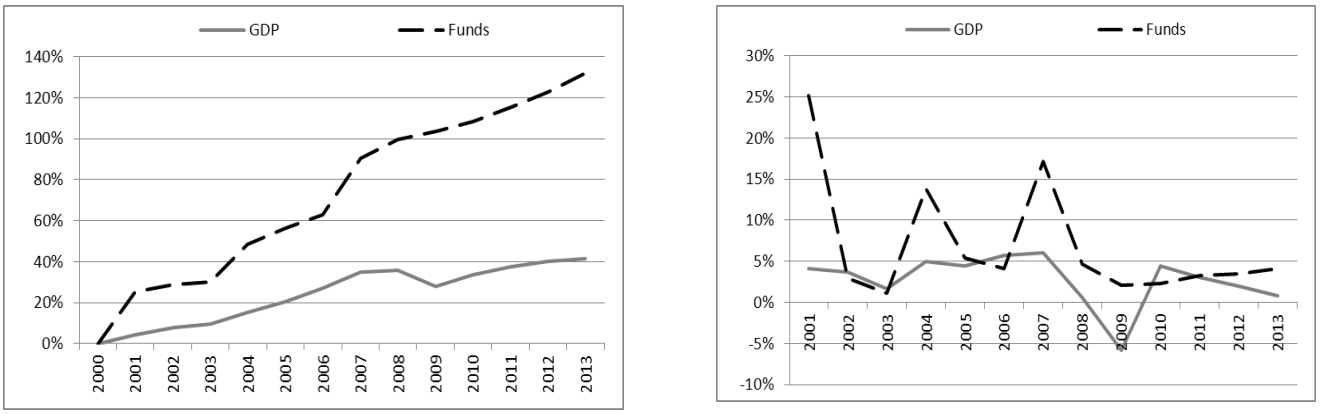

Figure 2. The growth of GDP and funding on the base of 2000 year (on the left side) and year on year (on the right side)
Source: made by authors based on Eurostat data

The tendency analysis of GDP amount generated by one euro of the Structural Funds, i.e. *GDP/Funds*, can give the additional information about the benefit of the support. Ratio of GDP and funds shows the decreasing usefulness of the support (Figure 3). The additional euro of the support helps to create less and less GDP every year. We can see that the efficiency of the support decreases by log-function. That's why the strict control of the use of funds is necessary.

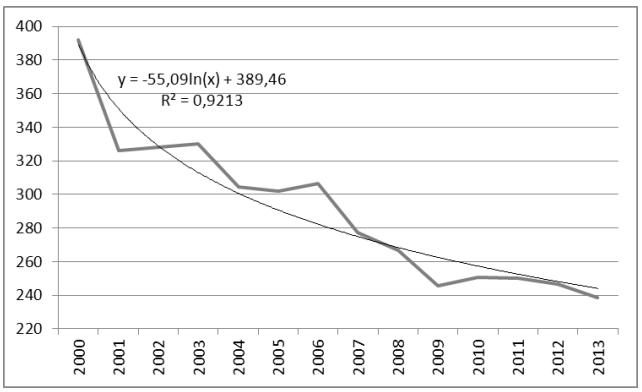

Figure 3. The tendency of the ratio *GDP/Funds*
Source: made by authors

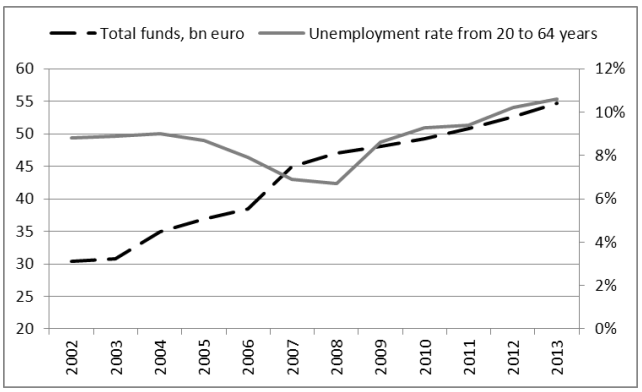

Figure 4. The comparison of tendencies of funds and unemployment in EU
Source: made by authors based on Eurostat data

Also the usefulness of the support to the other economic indicators of the region must be analysed. As some economic indicators such as real GDP, GDP per inhabitant, final consumption expenditure, total intramural R&D expenditure are highly correlated with GDP (the correlation coefficient is 0,97 and higher), so the results of the correlation analysis between these indicators and the EU funds will be identical to the written above.

One of the largest problems of EU is unemployment. Much effort is being made to reduce it. But constantly increasing funds can't help to reduce it (Figure 4). It is obvious that the consequences of the last financial crisis are felt so far. The unemployment rate increases from 2009 till now despite the EU support increases 16 % during the last five years starting from 2008.

Final consumption expenditure and final consumption expenditure per inhabitant as far as total intramural R&D expenditure of all sectors and total intramural R&D expenditure of all sectors per inhabitant increase every year over the last 18 years. Only 2009 was an exception. So the close relationship between these indicators and funds can be suspected. Final consumption expenditure increases 44 % and final consumption expenditure per inhabitant increases 38 % during the last 13 years while funds increases 132 % during the same period of time. Total intramural R&D expenditure of all sectors increases 57 % and total intramural R&D expenditure of all sectors per inhabitant increase 51 % during twelve years (note: there are not data of these ratios in 2013 years) while funds increases 123 % during the same period of time.

But the relationship between the support and final consumption expenditure as a percentage of GDP and total intramural R&D expenditure in all sectors as the percentage of GDP is doubtful (Figure 5).

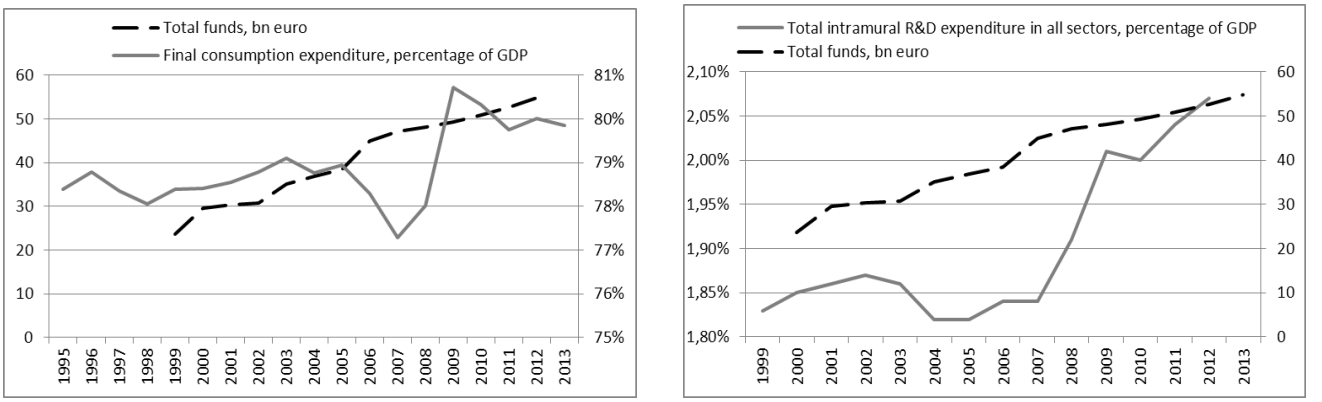

Figure 5. The comparison of tendencies of funds and final consumption expenditure as a percentage of GDP and total intramural R&D expenditure in all sectors as the percentage of GDP in EU
Source: made by authors based on Eurostat data

One of the purposes of Structural Funds is the increase in productivity. Since the real labour productivity per hour worked increased 15 % during the period 2000–2014, there is not significant relationship between the changes in funding and the changes in productivity. The correlation coefficient between the changes of these ratios is equal 0.26 (Figure 6).

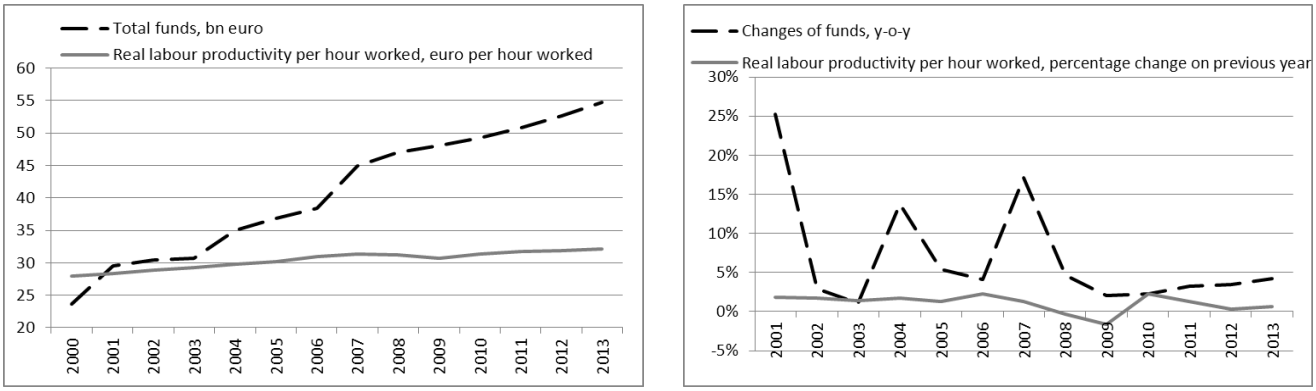

Figure 6. The comparison of changes of funds and real labour productivity per hour worked in EU
Source: made by authors based on Eurostat data

The correlation coefficients between EU funds and economic indicators that are analysed and the probabilities of Student criterion (probabilities that correlation coefficients are not significant) are presented in Table 1. It can be seen that only three correlation coefficients (with unemployment, final consumption expenditure as a percentage of GDP and real labour productivity per hour worked as a percentage change on previous year) are insignificant at the significant level 0,05.

But the problem is that all these economic indicators are not stationary processes at the significant level 0.05. That's why the results don't show the real relationship between these ratios. Unit root test showed that GDP, nominal GDP per capita, real GDP per capita, final consumption expenditure as a percentage of GDP, real labour productivity per hour worked as a percentage change on previous year, total intramural R&D expenditure in all sectors as a percentage of GDP become stationary after the first-order differentiation without trend and intercept. Funds, final consumption expenditure (in billion euro), total intramural R&D expenditure per inhabitant and total intramural R&D expenditure (in billion euro) become stationary after the first-order differentiation with intercept. Final consumption expenditure in euro per inhabitant, real labour productivity per hour worked and unemployment rate become stationary after the second-order differentiation without trend and intercept.

That's why these economic indicators were differentiated in order to get stationary processes and correlation coefficient were recalculated (Table 1).

Table 1

Correlation coefficients with original values of the data and differentiated data and their significance

Economic indicator	Correlations with original values		Correlations after differentiation	
	Correlation coefficient	Probability |t|=0	Correlation coefficient	Probability |t|=0
Gross domestic product at market current prices, billion euro	0,971	0,000	0,403	0,172
Nominal GDP per capita, euro per inhabitant	0,962	0,000	0,430	0,143
Real GDP per capita, euro per inhabitant	0,865	0,000	0,381	0,199
Unemployment rate from 20 to 64 years	0,285	0,368	-0,115	0,753
Final consumption expenditure, euro per inhabitant	0,983	0,000	0,014	0,963
Final consumption expenditure, billion euro	0,986	0,000	0,389	0,189
Final consumption expenditure, percentage of GDP	0,489	0,084	-0,358	0,230
Total intramural R&D expenditure of all sectors, euro per inhabitant	0,985	0,000	0,313	0,323
Total intramural R&D expenditure of all sectors, billion euro	0,985	0,000	0,306	0,333
Total intramural R&D expenditure of all sectors, percentage of GDP	0,768	0,002	-0,298	0,347
Real labour productivity per hour worked, euro per hour worked	0,962	0,000	-0,193	0,547
Real labour productivity per hour worked, percentage change on previous year	-0,475	0,098	-0,193	0,547

Source: made by authors

The results show that all correlation coefficients between EU funds and economic indicators of the region after differentiation are not significant. So it also leads to the conclusion that EU support has not the significant influence on economic situation of the EU and it can be the reason of inefficient use of the funds.

Causality Analysis of Structural Funds and Economic Indicators

In order to supplement the results of correlation analysis, Granger causality test was made. Lag length was chosen 3 in order to evaluate the time over which one of the variables could help predict the other. It was the largest lag length that was suitable for all data series. The results are presented in Table 2.

Table 2

The results of Granger causality test

Economic indicator (y)	Probability of Null Hypothesis when lag is 3:	
	Funds do not Granger-cause y	y does not Granger-cause Funds
Gross domestic product at market current prices, billion euro	0,408	0,003
Nominal GDP per capita, euro per inhabitant	0,386	0,004
Real GDP per capita, euro per inhabitant	0,597	0,042
Unemployment rate from 20 to 64 years	0,516	0,203
Final consumption expenditure, euro per inhabitant	0,296	0,003
Final consumption expenditure, billion euro	0,341	0,004
Final consumption expenditure, percentage of GDP	0,511	0,097
Total intramural R&D expenditure of all sectors, euro per inhabitant	0,083	0,263
Total intramural R&D expenditure of all sectors, billion euro	0,148	0,179
Total intramural R&D expenditure of all sectors, percentage of GDP	0,022	0,368
Real labour productivity per hour worked, euro per hour worked	0,544	0,030
Real labour productivity per hour worked, percentage change on previous year	0,373	0,590

Source: made by authors

The results show that EU funds do not Granger-cause all the indicators that are analysed in this research except total intramural R&D expenditure of all sectors as a percentage of GDP. It means that EU support lets increase R&D expenditure as a percentage of GDP, but the significant relationship between the EU funds and other economic indicators was not found. So it can lead to the conclusion that the EU funds can be used ineffectively.

But there can be seen that reverse causality exist, i.e. GDP (final consumption expenditure and real labour productivity per hour worked, euro per hour worked as well) Granger-cause EU funds. As the correlation is positive it means that growing economics can expect greater support.

The situation probably will not change over the next few years as funding for regional and cohesion policy amounts to €351.8 billion in 2014–2020. Practically it is the same amount as in 2007–2013, so the check of the efficiency of the use of EU funds is strongly recommended in order to get more benefit from the support.

Conclusions

The EU funds are constantly increasing in order to provide the opportunity to promote the investment in the private sector, increase the competitiveness of the countries and make the conditions for the faster economic growth. The benefit of Structural Support and the effectiveness of use of the funds are widely discussed by the researchers, but these questions are still under consideration as the results of various research differ.

Our research showed that there is not significant correlation between the changes in funding and the changes in such economic indicators as final consumption expenditure, total intramural R&D expenditure, even labour productivity, unemployment and GDP of all the European Union. This research also showed the problem that the growth of GDP decreases for the last three years despite of the increase of the support. The causality test leads to the conclusions, that EU funds do not Granger-cause all the indicators that are analysed in this research except total intramural R&D expenditure of all sectors as a percentage of GDP, i.e. that EU support lets increase R&D expenditure as a percentage of GDP, but it doesn't help significantly to improve the GDP and other economic indicators. These results lead to the conclusion that the funds can be used ineffectively. If the growth of GDP that can be achieved by the additional euro of funds is assessed, than the efficiency of the funds decreases 39% from 2000 till 2013 years. That's why the analysis of efficiency of the use of the funds in each country is necessary.

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