

The Statistical Analysis of the Relationship Between Poverty and Public Expenses in the European Union Countries

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Abstract

The 2020 Europe strategy has among its objectives the reduction of poverty. This study aims to observe if the European Union countries distribute and perform the public expenses by state functions so that it influences the reduction of poverty. The study also tackles the identification of the types of public expenses by state functions which have the greatest effect in the poverty reduction. The analysis is performed on 27 of the 28 countries of the European Union. The variables for Cyprus have extreme values and that is why this country has been excluded from the analysis. The results obtained confirm that in 2015, the expenses performed by state functions have a significant influence on poverty reduction. The greatest influence is held by the expenses for social protection and they are followed by the health care, business and education-related expenses. Thus, the EU countries should distribute their public expenses prevalently towards these state functions in order to minimize poverty.

Key words: poverty, public expenses, regression analysis.

J.E.L. classification: I38, C01, H19

1. Introduction

One of the main objectives of the 2020 Europe Strategy was poverty reduction. If each citizen of a country wishes to reduce poverty, individual measures will not have any consequence. But, governmental decisions can lead to strategies that should eventually reduce the poverty in a country (Van de Walle, D., 1995). A leverage in this case is offered by structuring the public expenses by state functions so that they determine the reduction of disparities between citizens' incomes and implicitly, the reduction of poverty.

Studies show that the incentives granted by the state in the field of education, health care and social protection (Van de Walle, D., 1995) are "at least progressive", because they have a higher level for the poor. The benefits are also growing continuously: the number of the poor is reduced with the disappearance of social inequalities. Van de Walle (1995) states that usually the level of public expenses is higher in the urban areas than in the rural ones.

In most of the developed countries, the poor families tend to have more children than the richer ones and most of them do not graduate middle school. Milanovic, B. (1992) ascertains that the level of development often depends on the public expenses performed on education. Generally speaking, a higher education level in a country and a more developed private economic sector, the more public expenses can reduce poverty.

As regards the health sector, the public expenses allocated for the primary medical centres that ensure preventive and curative care are usually more pro-poverty than the expenses for the hospitalization (Van de Walle, D., 1995).

Social transfers (pensions, allowances, compensation) represent an important income source for certain persons especially in the East European countries. Milanovic (1992) states that pensions and allocations have opposite incidences. Thus, public expenses for the pensions of the old are against poverty while family allowances are pro-poverty. These aspects are quite logical because it is obvious that the pensions help the old live a decent life and contribute to the reduction of poverty for this group of people while family allowances determine the young to give up the idea of having a job and live only on social transfers. This aspect leads to unemployment, poor living standards, lack of an adequate education for children, reduction of work productivity and eventually, to the increase in poverty rate.

2. The relationship between public expenses and poverty

The study of the relationship between poverty and public expenses has become more and more debated by researchers in the last couple of years, having in view that poverty reduction is one of the main objectives of the Europe 2020 Strategy and public expenses may influence the poverty in a country.

In the specialty literature there are numerous studies that deal with public expenses (some of them expressed in public investments), economic growth and the poverty phenomenon. Public expenses affect poverty both directly and indirectly.

Public expenditure influence poverty *directly* through economic growth, occupation of workforce and wages (Ketebo, 2012). The investments in the human and physical capital have influence on the economic growth. In its turn, economic growth implies a GDP increase as well as an increase in national productivity and all these have influence the workforce occupation and the salary level. as a consequence, the national level of poverty also changes. *Indirectly*, poverty is influenced by the public expenses through the social transfers to households and the expenses for social services and private investments.

A comparative analysis of public expenses before and after the budgetary reform in 2004 in Indonesia as well as its relationship with the poverty rate highlights that before 2004 there was a significant inverse correlation between poverty rate and public expenditure in education and industry (Birowo, 2011). After the reclassification of state functions, it was noticed that the poverty rate has a negative correlation with the level of expenses for education, general services, order and safety. The study used as control variables the population growth and economic growth that also indicated a significant inverse correlation with poverty rate.

In a study on poverty in Ghana (Adjasi and Osei, 2007), it was discovered that the poverty level is more reduced in urban households and where the head of the family has a longer education. There are also fewer chances of poverty in the households where the head of the family is employed in the management or administrative sector in comparison with those where the head of the family was employed in services, sales or agriculture. A more accentuated poverty level was observed in larger households as well as in those where a woman was the family provider. If the Government cannot interfere in the personal life of its citizens and on the labour force market there must be employees in the all the fields of activity, it can invest in the population's education and the state urbanization in order to fight current poverty. An efficient educational system develops the skills and competences required on the labour market, stimulating thus the future employees to work better and be productive. Without proper education, unemployment and implicitly, the risk of poverty increase both for the households and for the entire country.

The relationship between unemployment and poverty has been underlined by a study concluded by Ukpere and Slabbert in 2009. The authors demonstrate that unemployment has a significant influence on the inequality of population's incomes and the third world poverty. In the era of globalization, the phenomenon of social inequality becomes more accentuated by means of favouring the exploitation of global work which determines the increase in poverty rate.

As for the types of public expenses which contribute to the poverty reduction, the most relevant for Nigeria are those from the sector of social services, health care and education. Theoretically, for each 1% spent from the GDP on social sectors, the poverty rate should reduce by 0.5% (Carter, 2015).

The investments in the health sector contribute to the insurance of human rights and are essential for poverty reduction. The public expenses must be oriented also towards the acquisition of vaccines and medicine, to the construction and equipment of hospitals or medical centres where these do not exist or are not sufficient, the personnel training (which is also part of the educational sector). The efficient expenses performed in this sector contribute to the economic development of the country by means of the increase in labour force productivity and the reduction of poverty rate risk. Special attention must be granted to children's health because the healthy children from today are the productive adults from tomorrow.

The public expenses in education are also important for the reduction of poverty because knowledge lasts in time and it is not lost easily. The most important step is the primary education where children learn the basis of education. An efficient educational system develops their skills and competences needed on the labour market and stimulates the future employees to work better, be productive and be rewarded accordingly. Moreover, a good education has a positive impact on people's health because they know how to prevent diseases, the importance of hygiene and sports for the human body.

The studies undertaken for the Organisation for Economic Co-operation and Development (OECD) by Förster and Mira present in 2005 that in the countries where the expenses for social services (excepting the health expenses) are higher, the poverty rate among the active population is lower in comparison with the other states. An important role in the poverty reduction in the OECD states is also played by the expenses for education (Afonso et al., 2010). These lead at the same time to the efficiency of expenses in the social sector.

Shengen analysed in 2008 the relationship between public expenses, poverty and economic growth in the developing countries and determined the fact that the richer a country, the more it allocates a bigger weight of its GDP for health and implicitly, poverty rate in these countries is more reduced.

In this paper, the authors analyse the relationship between the poverty rate in the European Union and the public expenses by state functions. The main goal is to determine the sectors whose expenses have influence on the poverty in Europe in order to know exactly the areas that require greater financial allocation for future poverty reduction.

3. Empirical analysis

In this paper, the expenses for the ten state functions are analysed. The state functions mean the well-functioning of a country and the insurance of population's wellbeing while public expenditure are an instrument to manage the activities that aim to accomplish the general objectives of the Government. The functional classification of public expenses focuses on ten areas where the public money is invested. The public expenses are classified by UNO in: expenses for general services (*Gnr*), public expenses for defense (*Apar*), expenses for public order and safety (*Ord*), public expenses for businesses (*Af_ec*), public expenses for environment protection (*Med*), expenses for housing and community facilities (*Loc*), public expenses for health care (*Snt*), expenses for recreation, culture and religion (*Recr*), public expenses for education (*Educ*), public expenses for social protection (*Soc*).

The data for the public expenses by state functions and for the rate of poverty risk for the European Union member states for the year 2010 and the year 2015 were taken from the Eurostat database.

In order to create an overall image and to perform a general presentation of public expenses in the EU member states, we present the total public expenses in the years 2010 and 2015, expressed as a percentage of the GDP. The country distribution in the European Union according to the total public expenses is presented in figure 1.

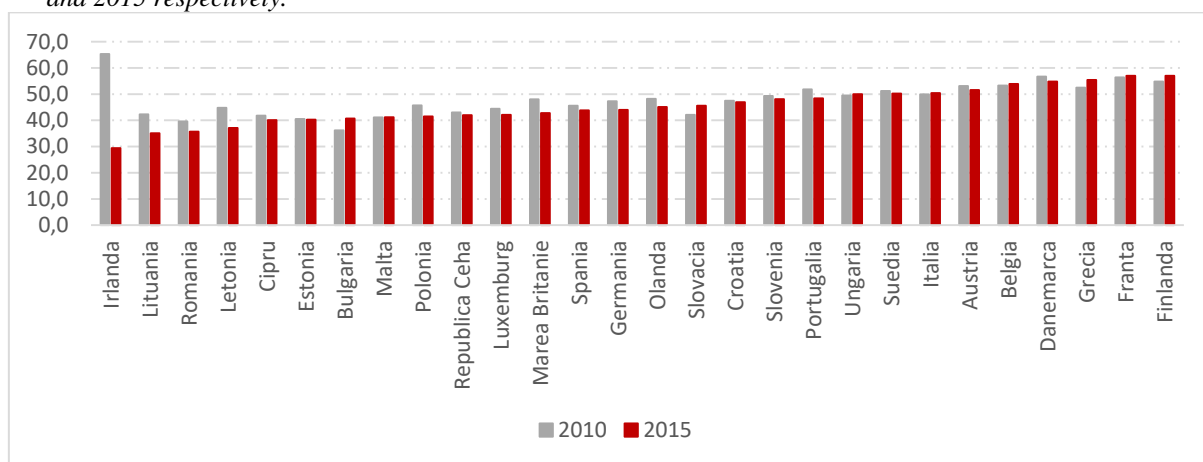
Each state manages its expenses in compliance with the objectives and development policies it adopts for their performance. In the European Union, the greatest weight of the GDP in 2015 is allocated for public expenses in Finland, being followed by France and Greece. The countries that in 2015 allocate a greater share of the GDP for total public expenses in comparison with 2010 are Bulgaria, Slovakia Hungary and Italy. If in 2010 Ireland allocated the greatest weight of the GDP to public expenses, in 2015 this is the country with the lowest weight. Countries such as Lithuania,

Romania, Latvia, Cyprus and Estonia are the countries with the lowest weights allocated for total public expenses in 2015, being even lower in comparison with 2010.

The distributions of the weights of public expenses by state functions within total expenses are analysed in a graphical way by means of boxplot diagrams which especially are helpful in the determination of potential extreme values and provide information about the asymmetry of distributions. The boxplot diagrams for the weights of public expenses by the ten state functions are presented in figure 2.

Figure 2 suggests the possibility of the existence of some extreme values in the case of expenses related to general public services, to environment protection, housing, health care and recreation. Before making any decision regarding the extreme values of the variables, their existence is also verified numerically.

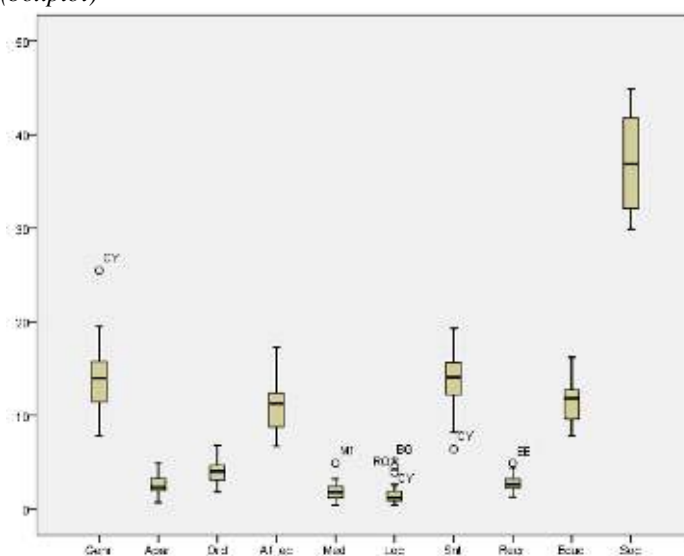
Figure no. 1. The weight of total public expenses in the GDP for the UE member states for the year 2010 and 2015 respectively.



Source: Performed by the authors

Since this paper aims to establish the correlations between poverty and public expenses, the analysis of extreme points uses the Leverage distances. According to the results obtained, the values of the variables for Cyprus are extreme points. In order not to influence subsequent analyses, the working sample is made up of 27 recordings – states of the European Union without Cyprus.

Figure no. 2. The weight of expenses by state functions within the total public expenses in the EU countries in 2015 (boxplot)

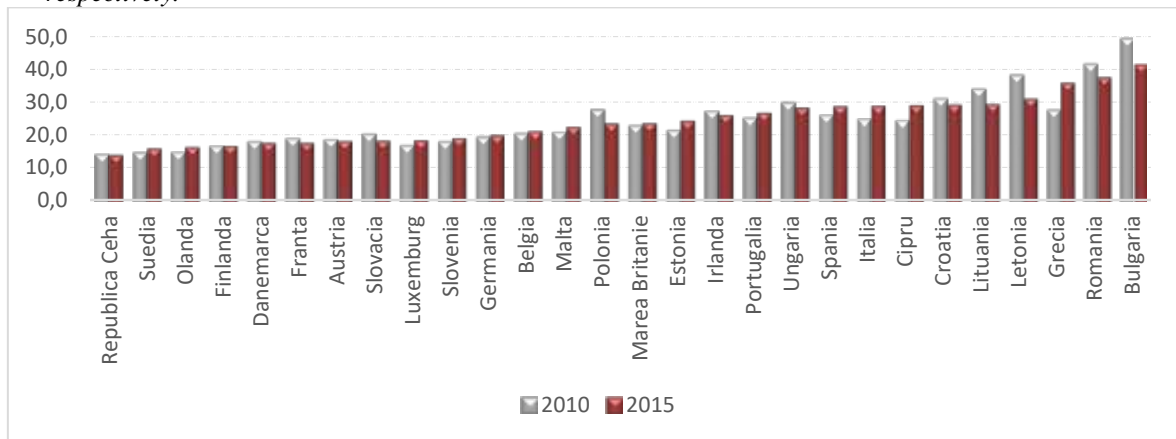


Source: Performed by the authors

The European Union makes considerable efforts to reduce poverty, using development strategies and policies of the different sectors correlated directly or not with the poverty phenomenon in the world. Each state aims to annually reduce poverty by a certain percentage and the objective can only be reached by adopting efficient policies at national level.

A general image on the rate of poverty risk in the European Union member states can be observed in figure 3 which presents the distribution of countries according to the poverty level from the years 2010 and 2015.

Figure no. 3. The distribution of the EU countries according to the rate of poverty risk in 2010 and 2015, respectively.



Source: Performed by the authors

Some states of the European Union have registered a reduction in the poverty risk in 2015 in comparison with 2010 while some others have registered growths of this indicator. In 2015, the highest rates of the poverty risk are registered by Bulgaria (41.3%), Romania (37.4%) and Greece (35.7%). If Bulgaria and Romania have made great progress as far as the reduction of poverty is concerned during 2010-2015, Greece is characterised by a significant increase in the rate of poverty risk, ranking on the 3rd place in the top of the poorest countries in the European Union. Considerable reductions of the poverty rate during 2010-2015 have been registered also in countries such as Latvia, Lithuania or Poland. At the opposite end, aside Greece, in Spain, Italy and Cyprus, the rate of poverty risk has increased in 2015 in comparison with 2010.

A spatial analysis of the poverty situation in the European Union allows the visualization of the most exposed countries to poverty. This is performed by means of the Quintile map which breaks down the distribution of the UE states in four intervals where an equal number of countries is distributed. Figure 4 presents the rate of poverty risk in 2015 in the European Union states.

Figure no. 4. The rate of poverty risk in the European Union in 2015



Source: Performed by the authors

Therefore, it can be observed that the South-East countries of Europe (Croatia, Greece, Cyprus, Bulgaria and Romania) and two countries in North Europe (Latvia and Lithuania) face the highest level of poverty in the EU. These countries have the rate of poverty risk comprised in the interval [28.9 ; 41.3]%. At the opposite end, the lowest rates of poverty risk are registered in Finland, Sweden, France, the Netherlands, Denmark, Czech Republic and Austria, with values between 14% and 18,3%. The countries from the „heart of Europe” (Belgium, Germany, Luxembourg, Poland, Slovakia and Slovenia) as well as Malta are characterised by rates of poverty risk lower than half of the EU states. They register values comprised in the interval [18.4 ; 23.4]%. The other seven states (Spain, Portugal, Ireland, Great Britain, Estonia, Hungary and Italy) have rates of poverty risk comprised in the interval [23.5 ; 28.7]%, being higher than the rates recorded for half of the countries in the European Union.

In order to determine what types of public expenses influence the rate of poverty risk, we estimated a multiple linear regression model between the rate of poverty risk and the weight of public expenses by state functions within the total public expenses. We estimated the model by means of the Backward method, which implies the introduction of all independent variables and the gradual elimination of the non-significant ones. The dependent variable is the rate of poverty risk and as independent variables we used the weight of public expenses by the ten state functions.

Of all the ten independent variables (the weight of the public expenses by the ten state functions within the total public expenses), in the regression models only four significant variables remained in the final model: the weight of public expenses for business (*Af_ec*), the weight of public expenses for health care (*Snt*), the weight of public expenses for education (*Educ*) and the weight of public expenses for social protection (*Soc*). Thus, in the European Union, these types of expenses have influence on the rate of poverty risk. The estimated regression model is of the form:

$$R_sar = \beta_0 + \beta_1 \cdot Af_ec + \beta_2 \cdot Snt + \beta_3 \cdot Educ + \beta_4 \cdot Soc + \varepsilon$$

The estimated model complies with all the hypotheses specific to the regression model.

Table no. 1 The estimation of the regression model

Parameters	Estimations	Estimations ¹	Tolerance	VIF
β_0	130.792***			
β_1	-1.374**	-0.554	0.296	3.377
β_2	-1.683***	-0.627	0.670	1.493
β_3	-1.615***	-0.501	0.658	1.521
β_4	-1.333***	-0.950	0.332	3.010

Note: ¹ represents estimations of the parameters of the regression equation with standardized variables
***, **, * - significantly for a taken risk of 1%, 5%, 10%

According to the results in table 1, there is an inverse correlation between the rate of poverty risk and the weight of public expenses for businesses, health care, education and social protection. As a consequence, the weight of the expenses in these sectors should be privileged if poverty reduction is desired. The estimated coefficients of the regression model with standardized variables highlight the fact that the public expenses for social protection have the highest influence in poverty reduction, being followed by the public expenses for health care, the public expenses for businesses and the public expenses for education.

The estimated equation of the regression model is of the form:

$$R_sar = 130.792 - 1.374 \cdot Af_ec - 1.683 \cdot Snt - 1.615 \cdot Educ - 1.333 \cdot Soc$$

The rate of poverty risk decreases on an average, by 1.37% when the weight of public expenses for businesses within the total of public expenses increases by 1%. At an increase of the weight for health care expenses by 1% of the total public expenses, the rate of poverty risk decreases, on an average by 1.61%. The rate of poverty risk also decreases by 1.33% when the weight of the expenses for social protection increases by 1% of the total public expenses. The determination ratio shows that 56.5% of the variation of the poverty rate in the EU countries is determined by the

simultaneous variation of the weight of the public expenses for businesses, health care, social protection and education within the total expenses.

4. Conclusions

Previous studies confirm that the distribution of public expenses by state functions may reduce poverty. In order to identify the existence of a correlation between the poverty rate and the expenses by state functions we analysed the regression and correlation analysis. In the estimation of the regression model we used the weights of the expenses by state functions within the total public expenses for comparison reasons among the European Union countries.

The empirical analysis for the year 2015 for the European Union countries confirm the results of the previous research. The public expenses for social protection, for health care, education and businesses have a significant influence in the reduction of poverty risk. The greatest influence is performed by the expenses with social protection and are followed by the public expenses for health care, businesses and education. Therefore, the distribution of public expenses prevalently towards these state functions will allow the significant reduction of poverty rate.

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