

AN ECONOMETRIC ANALYSIS OF THE EVOLUTION OF SOCIAL PROTECTION EXPENDITURE IN ROMANIA

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***Abstract:** Social protection is an area, and an important direction, in the policy of any government regardless of its political orientation. Taking into account the regulations of the European Parliament and the Council on ESSPROS, the paper analyzes the evolution of Social protection expenditures in Romania after 2000, both as a whole and on social protection functions. The analyzed period was characterized by an upward trend in social protection expenditure per capita as well as a change in the share of expenditure on function on social protection.*

***Keywords:** social protection, social protection benefits, function on social protection,*

***JEL classification:** H50, H60, C20*

Introduction

Social protection is an important objective both in Europe and America and in all civilized states. Although social policy is not yet strongly integrated within the EU, there are similarities between the Member States' social protection systems [Dobre-Baron, 2014]. This is an opportunity for a common social policy. An important step in this direction was made on 8 January 2008 through the implementation of the Regulation (EC) No 458/2007 of the European Parliament and of the Council on the European System of integrated Social Protection Statistics [ESSPROS, 2008] and his Manual and User guidelines.

The analysis of evolution and the characteristics of Social protection expenditure have been the subject of many papers and analyzes. The analysis revealed the phenomena of increasing the Social protection expenditure per capita in both absolute values [Buz, 2012] and percentage in GDP. On the other hand, the differences between their structure in the group of EU15 countries and those that later joined are analyzed [Wójcik, 2016].

On the other hand growth of Social Protection Expenditure at a rate greater than the growth strong pressure on decision-making forums [Tudose 2014]. However, social protection is a tool for the elimination of poverty, inequality and social injustice, and the promotion of social inclusion [Tudose, 2016].

Starting from these considerations, the paper analyzes in a first part the evolution of Social Protection Expenditure with an emphasis on social protection benefits in Romania during 2000 - 2015. The characteristics of the expenditure trends of the eight functions as well as the mutations in their weight in the Total social protection benefits. This first part of the paper is endorsed by testing the hypothesis on the linearity of the evolution of expenditures per capita for the functions of Social protection benefits.

A second objective of the paper is to test the hypothesis that there are no significant differences in the social protection benefits of former communist states. It also seeks to identify

possible clusters to highlight the similarities and differences between these states regarding Social protection benefits.

Methodology

The analysis is based on information available in section Social protection of the Eurostat website [CE, 2018] available in August 2018. According to ESSPROS, Social protection expenditure is broken down in Social benefits, Administration cost and other expenditure. In its turn, Social protection benefits are structured in the main social protection function, namely: Sickness/Health care, Disability, Old age, Survivors, Family/Children, Unemployment, Housing and Social exclusion not elsewhere classified.

In the analysis, two hypotheses were tested:

H_{0_1} : The evolution of the variables considered in the characterization of the Social protection expenditure trend in Romania was linear.

H_{0_2} : There are no significant differences between Romania and other former communist states in Europe in terms of Total social protection benefits.

To test the hypothesis H_{0_1} , in the analysis carried out, ten variables were included, the encodings of which are shown in Table 1.

Table 1 List of variables included in the analysis

Variable	Cod	Unit
Total social protection expenditure	TSPE	Euro per inhabitant
Total social protection benefits	TSPB	Euro per inhabitant
Sickness/Health care	SHC	Euro per inhabitant
Disability	DSB	Euro per inhabitant
Old age	OAG	Euro per inhabitant
Survivors	SRV	Euro per inhabitant
Family/Children	FCD	Euro per inhabitant
Unemployment	UEM	Euro per inhabitant
Housing	HOU	Euro per inhabitant
Social exclusion	ESC	Euro per inhabitant

The analysis is based on 16 series of data covering the period 2000-2015 [CE, 2018] (Noteworthy that in August 2018 the last year for which information was available was 2015). Taking this into account, matrix $P = \|p_{i,j}\|_{i=1,n, j=1,m}$ was created, where n represents the number of variables included in the analysis (n = 10), and m is the length of the time interval (m = 16).

In order to test the hypothesis on the linearity of the evolution over time of the variables analyzed, models of the form were used:

$$R_k(t) = f(t) + \varepsilon, \quad t = \overline{1,m}, \quad f(t) = a + b \cdot t, \quad \varepsilon \sim N(0, \sigma_\varepsilon^2), \quad k = \overline{1,n}, \quad t_{2000} = 1. \quad (1)$$

Determination of model parameters (1) was performed with the lowest squares method, the validation test of the obtained models being performed with the ANOVA methodology [Moore & McCabe, 2003], F and t-Test.

To test hypothesis H_{0_2} , matrix $B = \|b_{i,j}\|_{i=1,k, j=1,m}$ was created, where k represents the number of states included in the analysis. These are: Bulgaria, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia. For testing the H_{0_2} hypothesis, Levene's Test (Test of Homogeneity of Variance) was applied initially. After accepting the

homogeneity hypothesis, the ANOVA methodology and the F test were used to test the $H_{0,2}$ hypothesis.

Under hypothesis rejection the analysis was extended by applying the Hierarchical Cluster Analysis method. In the Proximity Matrix was used the Euclidian distance, and for the distance between clusters, Between-groups linkage method was used. For testing the statistical significance of cluster variables, Levene's test and ANOVA were also used.

Testing both null hypotheses was performed for a threshold of $\alpha = 0.05$ (Confidence level 95%). In some exceptional cases, the threshold $\alpha = 0.10$ (Confidence level 90%) was also accepted.

Results and discussions

During the analyzed period for most of the indicators analyzed (Figure 1), their values (expressed in per capita expenditures) increased significantly. Thus, TSPE and TSPB increased 2.94 and 2.95 times, with an average annual index of 1.0747, which corresponds to an average annual rate of 7.47% and 7.50%, respectively. In absolute terms, in 2015 Total social protection expenditure was 719.27 euro per capita higher than in 2000, and Total social protection benefits grew by 704.37 euro per capita. It has to be underlined that during the period under the chapter “Other expenditure” there were reductions, which led to a higher annual average growth rate for TSPB compared to TSPE.

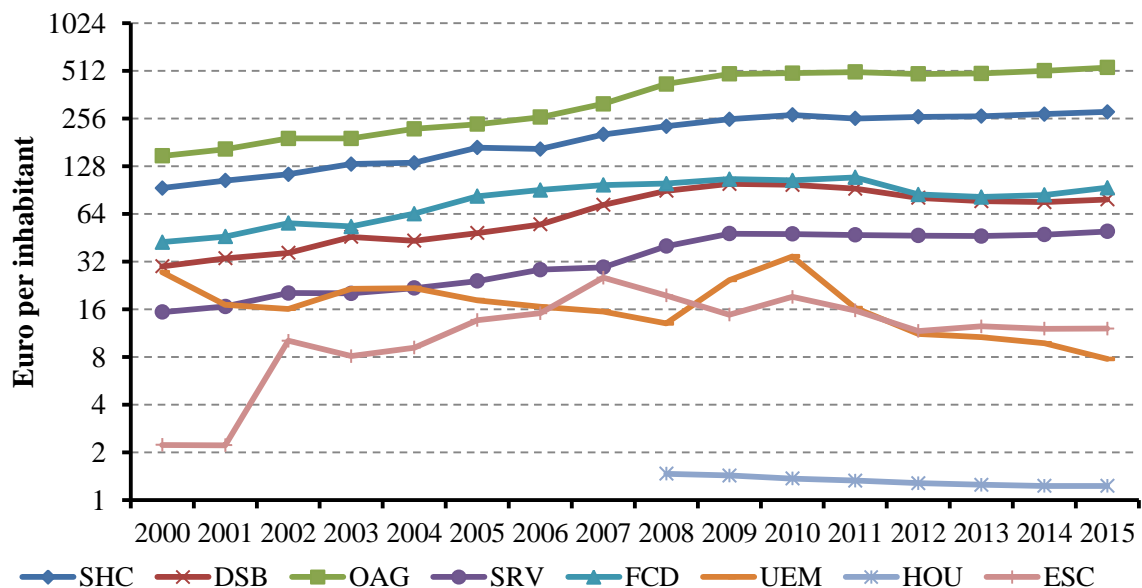


Figure 1 The Evolution of social protection benefits by functions in period 2000-2015

Concerning the expenditures allocated for the eight social functions included in the TSPB, there were both increases and decreases in expenditures. Thus, the highest absolute increase of 388.69 Euros per capita was registered in the Old Age (OAG), which corresponds to an average annual rate of 8.93%, followed by Sickness / Healthcare (SHC), where the increase was 189.36 euro per inhabitant.

In relative terms, significant increases were recorded in the chapters Survivors (SRV), 3.22 times (annual average rate of 8.13%), Disability (DSB), 2.64 times (6.71% average annual rate), and Family / Child (FCD), 2.21 times (average annual rate of 8.542%).

During the same period, the unemployment rate registered an average annual rate of -8.05% for the Unemployment (EMU) chapter, so that in 2015 the expenditures spent for this chapter were by 19.64 euro per inhabitant lower than in 2000. This is due to a part of the reduction of

unemployment (positive phenomenon) and, on the other hand, the migration of coinage to other states (a phenomenon with significant negative implications, both economically and socially).

Regarding the other two social protection functions, Housing (HOU) and “Social exclusion not elsewhere classified” (ESC), no significant changes in the expenditure incurred during the analyzed period.

On the other hand, there were changes in the share of expenditures on social protection functions in the total Social protection benefits (Figure 2).

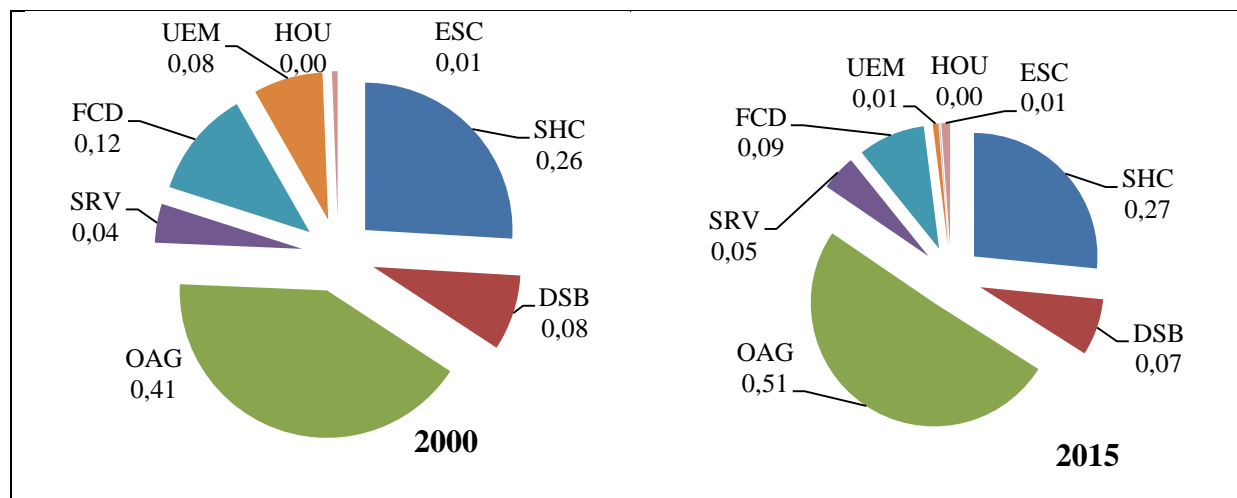


Figure 2 Share of expenditures on social protection functions in Romania in 2000 and 2015

In the 15 years included in the analysis, the share of expenditure per capita for the Old Age increased from 41% to 51% (an increase of 10 percentage points) and a one-percent increase in Sickness / Healthcare (from 26% , to 27%). The most significant weight reductions were registered for Unemployment, from 8% to 1% (7 percentage points) and Family / Children, from 12% to 9%, a decrease of 3 percentage points.

From the data presented here it follows that, apart from the EMU, during the analyzed period the expenditures for the other seven social protection benefits functions increased.

Starting from this observation, for the H_{0_1} hypothesis test, the econometric models of the type (1) were generated. Their characteristics as well as the results of the tests are shown in Table 2.

The results presented in Table 2 show that for eight of the ten variables analyzed, for the $\alpha = 0.05$ (Confidence level 95%) the null hypothesis H_{0_1} can be accepted: the evolution of the variables was linear.

In the case of HOU variables the coefficient a (intercept) is not statistically significant. This fact has no implications on the validity of the model because it represents the point of intersection between the regression line and the OY axis, and in this case it has no practical significance.

In the case of EMU and ESC variables, the linear models of type (1) are not valid for $\alpha = 0.05$, they can be accepted for $\alpha = 0.10$ (90% Confidence level). In fact, they are statistically significant for 94% Confidence level ($\alpha = 0.06$).

The analysis of regression coefficients (coefficients b) highlights the conclusions outlined above and some that 81% of the increase Total social protection benefits were allocated to Old age (about 55%) and Sickness / Health care (about 26%). These are widely followed by Disability and Family / Children (approximately 7% for each).

Table 2 Characteristics of the econometric models (1) regarding the evolution of the analyzed variables and the results of testing their statistical significance

Ind.	R ²	Sig. F	Coefficients		t Stat	P-value	Conf. interval		Acc. Hp.
				Value			Lower	Upper	
TSPE	0.9454	0.00	a	369.93	8.29	0.00	274.25	465.61	H _{0_1}
			b	55.03	10.86	0.00	44.16	65.89	
TSPB	0.9414	0.00	a	361.61	7.91	0.00	263.54	459.66	H _{0_1}
			b	54.27	10.45	0.00	43.14	65.41	
SHC	0.9675	0.00	a	95.36	11.06	0.00	76.87	113.84	H _{0_1}
			b	14.04	14.34	0.00	11.94	16.13	
OAG	0.9374	0.00	a	129.73	6.07	0.00	83.92	175.52	H _{0_1}
			b	30.08	12.39	0.00	24.87	35.27	
DSB	0.8163	0.00	a	35.34	5.16	0.00	20.67	49.99	H _{0_1}
			b	4.11	5.28	0.00	2.44	5.77	
SRV	0.9491	0.00	a	14.45	6.96	0.00	10.01	18.90	H _{0_1}
			b	2.66	11.27	0.00	2.15	3.16	
FCD	0.7345	0.00	a	55.72	7.55	0.00	39.90	71.53	H _{0_1}
			b	3.39	4.05	0.00	1.59	5.18	
UEM*	0.4737	0.06*	a	22.94	7.51	0.00	16.39	29.49	H _{1_1}
			b	-0.71	-2.03	0.06	-1.44	0.03	
HOU	0.8325	0.00	a	-0.23	-1.27	0.22	-0.64	0.16	H _{0_1}
			b	0.12	5.62	0.00	0.07	0.16	
ESC*	0.4718	0.06*	a	8.32	3.21	0.00	2.75	13.88	H _{1_1}
			b	0.58	1.99	0.06	-0.04	1.22	

* Models can be considered valid for a signification threshold $\alpha=0.10$ (90% Confidence level)

Source: Own design using SPSS.

To test the null hypothesis H_{0_2} the ANOVA methodology was originally used. The results obtained (table 3) led to its rejection. As a conclusion between the developments and budgets allocated to Social protection benefits in former communist countries in Europe, there are significant differences.

Table 3. The results of ANOVA and F-Test

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	128912243.5	8	16114030	163.4211	1.52E-65	2.007635
Within Groups	13311586.53	135	98604.34			
Total	142223830	143				

Source: own elaboration using SPSS

Under these circumstances, the analysis was extended by analyzing the group of ten former communist states in clusters according to the TSPB values recorded at the level of 2015. Following the tests carried out, five clusters were generated. Results of Homogeneity of Variance are presented in Table 4.

Considering that $\text{Sig} = 0505 > \alpha = 0.05$ it is assumed that the zero hypothesis is accepted (there is no significant difference between the data series dispersions). The results are shown in Table 5.

Table 4 Test of Homogeneity of Variance for TSPB in 2015

Levene Statistic	df1	df2	Sig.
0.786	2	5	0.505

a. Groups with only one case are ignored in computing the test of homogeneity of variance for VAR00043.

Source: own elaboration using SPSS

Table 5. Results of the ANOVA test on the statistical significance of the TSPB average values at cluster level

	Sum of Squares	df	Mean Square	F	Sig.

Between Groups	7923709.52	4	1980927.37	123.6	0.000
Within Groups	80132.69	5	16026.54		
Total	8003842.21	9			

Source: own elaboration using SPSS

Taking into account the fact that $\text{Sig} = 0.00 < \alpha = 0.05$ results that clustering averages differ significantly and consequently are statistically significant. Under these conditions, the structure and characteristics of the clusters are presented in Table 6. The fact that the limits of 95% Confidence Interval for Mean have the same sign again highlights the statistical significance of the average values of TSPB at cluster level

Table 6 Structure and characteristics of TSPB clusters in 2015

Cluster structure	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
				Lower	Upper
Bulgaria, Romania	1044.19	28.24	19.96	790.52	1297.87
Latvia, Lithuania	1685.52	96.31	68.10	820.23	2550.81
Estonia, Hungary, Poland, Slovakia	2189.75	152.82	76.41	1946.59	2432.93
Czech Republic	2983.35
Slovenia	4234.76

Source: own elaboration using SPSS

The results presented in Table 5 highlight the significant differences between Total Social Protection Benefits per capita in the nine former communist states. Thus, in the first cluster of Bulgaria and Romania, the average Total Social Protection Benefits per capita is only 1044.19 euro per capita, being the lowest value of this indicator in the EU28.

The second cluster, made up of Latvia and Lithuania, allocated in 2015 for Social protection benefits an average of 1685.52 Euros per capita, with 641.33 Euro more than Romania and Bulgaria.

The three clusters includes Estonia, Hungary, Poland and Slovakia, with an average of 2189.75 euro per capita, 29.5% more than Latvia and Lithuania and 2.1 times more than Romania and Bulgaria.

Clusters four and five include only one state, namely Czech Republic and Slovenia. These countries are characterized by very high social protection benefits per capita, both in comparison with other former communist states and with some EU countries²⁸. Thus, in 2015 Slovenia allocated 4234.76 euro per capita, 1.41 times higher than in the Czech Republic, 1.94 times higher than the average recorded by Estonia, Poland and Slovakia and 2.5 times higher than in Latvia and Lithuania. As regards Bulgaria and Romania, Slovenia's value for social protection benefits covers the amounts allocated by Romania and Bulgaria for four years.

Conclusions

The paper has been developed taking into account that Social protection forms a system in which economic growth strategies interpenetrate and interrelate with equity (Arjona et al., 2002). In this context, the evolution of Social protection expenditures in Romania, during 2000-2015, was studied through eight basic social protection benefits. The results indicated a significant increase in TSPE and TSPB. At the same time, there was an increase of most of the analyzed variables, both in value form and as a share in the structural analysis: OAG, SHG, SRV, DSB. In terms of value, and percentage HOU ESC were constant, while EMU was observed a reduction in both value and

percentage. The only indicator with different evolution was FCD which, in value, registered an increase in the period 2000-2015, while structurally, in 2015 compared to 2005 the share decreased. The built econometric models revealed that each variable analyzed at Romania level in the period 2000-2015 has a linear tendency.

As regards the hypothesis applied to ex-communist countries in Europe, it can be mentioned that the results of its testing revealed significant differences between developments and budgets allocated to Social protection benefits. At 2015, the 10 former communist states included in the analysis are grouped against the TSPB variable values, resulting in 5 clusters. The cluster with the highest average values of the TSPB consists of Slovenia, followed at a long distance by the one that includes the Czech Republic. Estonia, Hungary, Poland, Slovakia, is grouped into a cluster with a TSPB average value positioned mid-term. Low average values for this indicator are recorded for the cluster with Latvia and Lithuania, respectively for Bulgaria and Romania.

Social concern is geared towards creating policy conditions that respond to three challenges: accessibility, growth and equity. Taking into account the binding budget constraints, poor countries should be able to offer social protection mainly to vulnerable citizens. At the same time, the achievement of the global poverty eradication target requires countries to apply pro-poor economic growth. Last but not least, governance systems should become more accountable to citizens, both towards the poorest and the richest, so that at each country's level, social development is oriented towards social development [Devereux & Sabates-Wheeler, 2004].

The diversity of workforce qualifications limits the market strategies of the products. In this context, employers support social protection and facilitate employee competency categories, resulting in increased product competitiveness at national and international level. Thus, social protection, qualification profiles among analyzed countries and clusters formed are associated with different distributional outcomes and labor market segmentation patterns specific to each state [Estevez-Abe et al., 1999].

Thus, there can be an extended vision of social protection through the management of social risk. It includes three approach strategies (with the stages of prevention, mitigation and combat) as well as three levels of formality (informal, market-based, public) plus many other actors (individuals, households, governments at different levels and international organizations), all placed in view of asymmetric information and different types of risks [Holzmann & Jørgensen, 2001].

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