ANALYSIS OF CORRELATION BETWEEN THE EXPENSES OF SOCIAL PROTECTION AND THE ANTICIPATED OLD AGE PENSION

Nicolae Daniel Militaru Ph. D

Abstract: In this article, I have analysed two components of our social protection system in our country: the expenses of social protection and the anticipated old age pension. The main goal of the study is the analysis of the correlation that exists between the expenses with social protection and the anticipated old age pension, while the secondary goal of the study consists of the identification of the way in which the pension increases to an increase of the expenses with social protection by one unit. In order to analyse this correlation, I will use a linear unifactorial regression model which consists of two variables, the expenses with social protection and the anticipated old age pension, and as duration, I will consider a period of ten years.

JEL classification: G28, H55

Key words: social protection, pension, expenses, linear regression, variables, anticipated old age pension

1. INTRODUCTION

I introduced the anticipated old age pension in my analysis, because at the end of the fourth quarter, in 2014, the number of the social insurance pensioners in Romania was 5.341.000, of which the number of the anticipated old age pensioners was 21.000, namely almost 0.39% of the total number of the social insurance pensioners. The number of people that benefit of early pension has increased in 2014 with 5.000 people compared to 2013. If we consider the conditions that must be met to qualify for anticipated old age pension: it is granted with a maximum of 5 years before having the standard retirement age, provided that the beneficiary to exceed the complete contribution stage by at least 8 years, and the fact that the beneficiary of anticipated old age pension cannot cumulate the pension income with other professional incomes, and by considering the size of the anticipated old age pension, we can say that the beneficiaries of this type of pension are a social disadvantaged category.

The expenses of social protection recorded an increasing trend during the analysed period, 2003-2012, increasing from 318.25 EUR per resident in 2003 to approximately 1.023 EUR per resident in 2012. A spectacular increase is recorded between 2006 and 2007, when the expenses with social protection recorded the highest growth of 218 EUR per resident, those reaching 13.55% of GDP at the end of 2007.

The expenses with anticipated old age pension in the analysed period recorded an increasing trend in 2003-2009, when they increased from 0.56 EUR per resident in 2003 to 1,15 EUR per resident in 2009. The year of 2010 records a decrease of anticipated old age pension from 1.15 EUR in 2009 to 1,10 per resident in 2010, and later in 2011 would reach 1,06 per resident, as the level of 2008.

In the last year included in the analysis, the anticipated old age pension increased to 1.17 EUR per resident, which represents the highest recorded value during the period of 10 years included in the analysis.

2. OBJECTIVES

In this study, I've followed two goals: to identify the existing relationship between the expanses with the social protection and the anticipated old age pension in our country, in the years of 2003-2012, and last but not least to identify how much did the anticipated old age pension increased in the years of 2001-2012 if the expenses with the social protection increased by one unit. In order to reach the proposed goals, I've used in the analysis a linear unifactorial regression model with an independent variable – the expenses with the social protection, and a dependent variable – the anticipated old age pension, using Eviews 7.1 software.

3. METHODOLOGY

In order to reach the proposed desideratum, we used the linear unifactorial regression, and the used econometric model can be written in the following form:

$y_{d=} f(x_i)+u_r$

where:

y_d - represents the real values of the dependent variable;

x_i – represents the real values of the independent variable;

u_r – represents the residual variable, namely the other factors which have insignificant influence on y variable.

We note:

C_{ps} – the expenses with social protection;

P_a- the anticipated old age pension.

In this case, our model can be written in the following form:

$P_a= A+B*C_{ps}+U_r$

Where:

P_a- represents the real values of the dependent variable;

C_{ps}- represents the real values of the independent variable;

A,B – the parameters of the regression model;

U_r - represents the residual variable, namely the other factors which have insignificant influence on P_a variable.

In order to analyse this linear regression model, we will consider the values of the two indicators for the period of time included in the analysis.

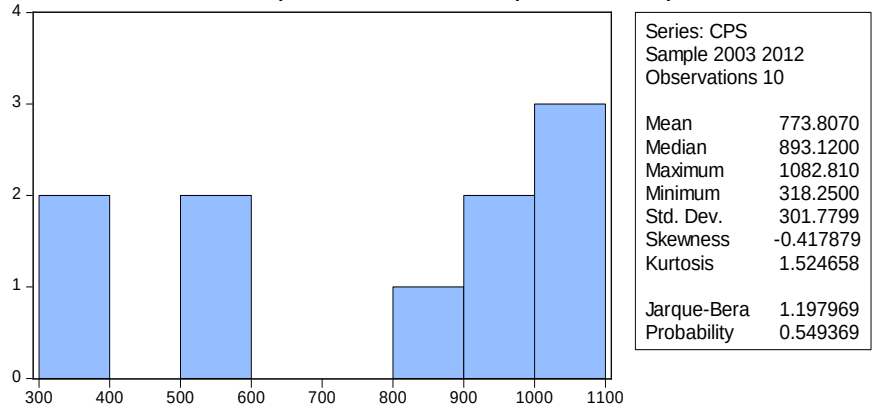
Table no. 1 The evolution of the expenses of social protection and anticipated old age pension in Romania, in 2003-2012 (EUR per resident)

Year	Social protection expenses	Anticipated old age pension
2003	318,25	0,56
2004	364,98	0,70
2005	503,01	0,72
2006	591,29	0,80
2007	809,40	0,93
2008	976,84	1,10
2009	998,03	1,15
2010	1.082,81	1,10
2011	1.070,21	1,06
2012	1.023,25	1,17

Source: conducted by the author of EUROSTAT source, http://ec.europa.eu/eurostat/data/database?node

Thus, in order to carry out a meaningful analysis on the correlation existing between the two indicators included in the analysis, in the first stage I've tried to highlight the particularities appeared in the indicators evolution in the analysed period, 2003-2012, and with the help of econometric software Eviews 7.1., I've conducted several statistical tests with the purpose of providing a clear and accurate image of the evolution of the two indicators.

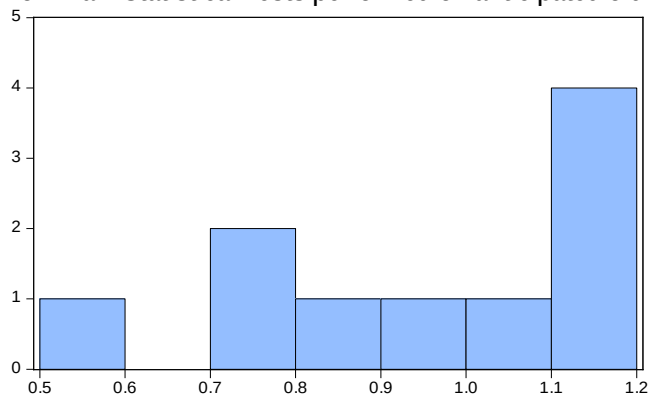
Figure no.1 Main Statistical Tests performed on social protection expenses in 2003-2012



Source: carried out by the author with the help of econometric software Eviews 7.1.

Following the analysis performed, it results that the average value of social protection expenses in the analysed period is 773.80 EUR per resident, with a range between a minimum of 318.25 and a maximum of 1082.81 EUR per resident. Skewness indicator, which represents the asymmetry coefficient is negative -0.41, which means that the indicator has a negative asymmetry or an asymmetry of right and a platikurtotic or even distribution.

Figure no.2 Main Statistical Tests performed on anticipated old age pension in 2003-2012



Source: carried out by the author with the help of econometric software Eviews 7.1.

Following the similar analysis performed on the carried out on the variable anticipated old age pension, it results that the average value of anticipated old age pension in the analysed period is 0.92 EUR per resident, with a range between 0.56 and 1.17 EUR per resident. Skewness indicator, which represent the asymmetry coefficient, is negative -0.40, which means that the indicator has a negative asymmetry or asymmetry of right and a platikurtotic or even distribution.

Following the statistical tests performed on social protection expenses and anticipated old age pension in Romania in 2003-2012, it can be seen that the evolution of the two variables is quite similar, which leads us to the conclusion that between the social protection expenses and the early pension it doesn't exist a strong interdependence.

For the two variables, the Jarque-Bera indicator, which tests if the variables are normally distributed, has a value between 1 and 1,19 with a probability between 0,54 and 0,60, which means that our variables are not normally distributed. In order to support this statement, we performed a representation of time stationarity of the two variables included in the analysis, using Augmented Dickey-Fuller to the unit root test type.

Table no.3 Time stationarity of the variable on the social protection expenses

Null Hypothesis: CPS has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.623.385	0.4324
Test critical values:	1% level		-4.420.595	
	5% level		-3.259.808	
	10% level		-2.771.129	
*MacKinnon (1996) one-sided p-values.				

Source: carried out by the author with the help of econometric software Eviews 7.1.

In the case of the variable of the social protection expenses, the value of the stationarity test is 1,623385, and the associated p value to this variable is 0,4324. Considering that the value of the test is higher than the critical value, our variable is non-steady.

Table no.4 Time stationarity of the variable on the anticipated old age pension

Null Hypothesis: PA has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.549.704	0.4654
Test critical values:	1% level		-4.420.595	
	5% level		-3.259.808	
	10% level		-2.771.129	
*MacKinnon (1996) one-sided p-values.				

Source: carried out by the author with the help of econometric software Eviews 7.1.

In the case of the variable on the anticipated old age pension, the value of the stationarity test is 1549704, and the associated p value to this variable is 0.4654. Considering that the test value is higher than the critical value, our variable is non-steady.

In the next stage we will determine the model's parameters with the help of the least squares method. So, we define as a resultant variable, the anticipated old age pension (Pa), and as a factorial variable, the social protection expenses (Cps) and a C free term.

Table no. 5 Least Squares method for the determination of the model's parameters

Dependent Variable: PA				
Method: Least Squares				
Date: 07/07/15 Time: 11:09				
Sample: 2003 2012				
Included observations: 10				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.383363	0.049869	7.687339	0.0001
CPS	0.000705	6.04E-05	11.66614	0.0000
R-squared	0.944483	Mean dependent var		0.929000
Adjusted R-squared	0.937543	S.D. dependent var		0.218960
S.E. of regression	0.054721	Akaike info criterion		-2.796277
Sum squared resid	0.023955	Schwarz criterion		-2.735760
Log likelihood	15.98138	Hannan-Quinn criter.		-2.862664
F-statistic	136.0988	Durbin-Watson stat		2.327184
Prob(F-statistic)	0.000003			

Source: carried out by the author with the help of econometric software Eviews 7.1.

Following these tests we can say that our linear regression model used to determine the correlation between the two variables is an accurate one and it reflects a

true evolution of the two variables in 2003-2012. As an argument we can invoke the value of the two indicators R-squared (94.44) and Adjusted R-squared (93.75), and in this case the linear regression model can be written as:

Pa= 0.38+0.000705 Cps

5. CONCLUSIONS

Following the carried out analysis, we can say that an increase by one unit of the social protection expenses in Romania in 2003-2012, the anticipated old age pension increased by 0.00075 units, provided that the evolution of the two indicators is asymmetrical. During the ten years included in the analysis, the social protection expenses recorded an increasing trend from 318.25 EUR per resident in 2003 to 1023.25 EUR per resident in 2012, while the anticipated old age pension increased from 0.56 EUR per resident in 2003 to 1.17 EUR per resident in 2012, provided that in 2003 in Romania was recorded, according to the National Statistics Institute, a number of 4.570.000 state social insurance pensioners of which 10.000 of anticipated old age pensioners, for as in 2004-2006 the pensioners number benefiting the anticipated old age pension to reach approximately 12.000. Between 2009 and 2011, the number of anticipated old age pension beneficiaries was 9.000, and later in 2012 their number increased to 11.000 people from 4.861.000 of state social insurance pensioners.

The number of the anticipated old age beneficiaries is high compared with the system affordability. Under these circumstances it is necessary a reduction of early pension beneficiaries simultaneous with the increasing of the old age, which will lead to the increase of replacement rate.

In order to cope with demographic changes beyond the two measures mentioned above, it is needed an encouragement of the continuous training throughout life, for people to cope with the new labour market requirements, avoiding the anticipated retirement, ensuring a character of adequacy and sustainability of the pension's system in our country.

Acknowledgement: This paper has been financially supported within the project entitled "**Horizon 2020 -Doctoral and Postdoctoral Studies: Promoting the National Interest through Excellence, Competitiveness and Responsibility in the Field of Romanian Fundamental and Applied Economic Research**", contract number POSDRU/159/1.5/S/140106. This project is co-financed by the European Social Fund through the Sectorial Operational Programme for Human Resources Development 2007-2013. **Investing in people!**

REFERENCES

1. Anghelache, C. (2011) *Economie teoretică şi aplicată.*Vol. XVIII, Nr.9.
2. Sims, C. (1980) *Macroeconomics and Reality*. Vol.48, Nr.1, Econometrica.
3. Stancu, S. (2011) *Econometrie, Teorie şi Aplicaţii utilizând Eviews*. Bucureşti: Editura ASE.