

## **Statistical – Econometric Analysis of the Correlations between the Social Security Budget and the Main Macroeconomic Aggregates in Romania\***

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**Abstract.** *This paper analyses the correlation between social security budget and the main macroeconomic indicators (like GDP, monthly average gross earnings, unemployment) in Romania during the period 2000 – 2009. Romania faces a more severe economic recession than originally anticipated. Although the implementation of anti-crisis program was able to lead to normalization of financial conditions, the contraction of economic activity is higher than initial projections. Because of the great policy debate in Romania about the impact of the reduction of pensions and salaries and increases of taxations on the reduction of budget deficit, we have explained in our paper the basic sides of the balanced budget debate. There are three basic sides to the balanced budget debate. The traditionalists argue for a reduction of the budget deficit since it harms the economy. Another group holds the Ricardian view of government debt in believing that there is no real harm done to the economy by the national debt. A third group claims one way or another that the budget deficit is not*

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*an adequate measure of fiscal policy. We will argue which of these views is most reasonable, based on a study case.*

*The study is based on official data published by the National Institute of Statistics, with the specification that they are transformed into real values in order to assure the data comparability. The methodology used is the correlation analysis, the factorial analysis and the regression analysis, in order to evaluate the impact of some macroeconomic policies on the budget deficit. Three hypotheses on macroeconomic policies are discussed in the paper and their influences on the budget deficit. The main problem in Romania was that the macroeconomic policies didn't give enough attention to budget deficit in order to keep it under control. This is the main cause of the actual unfavourable economical situation in Romania, with a huge budget deficit, with a decrease in economic activity, with increases of inflation and unemployment.*

*Among the variables used in the study we mention: total incomes, total expenditure, budgetary deficit, unemployment rate, monthly average net earnings, average number of pensioners and social allowance recipients, monthly average pension of pensioners and social allowance recipients, economically active population, monthly average inflation rate.*

*By analysing the correlation between all the studied variables we observe that there is a strong correlation between monthly average pension and monthly average net earnings. Increases in the level of earnings will determine the increase of budget deficit. At first view the macroeconomic policy adopted by the actual government in Romania (the cut with 25 % of salaries in the budgetary system, VAT increase) will have as a result the decrease of budget deficit. Since the monthly average net earnings is correlated with unemployment and inflation rate, the reduction of the general level of earnings will determine the increase of unemployment and inflation. Therefore this policy should be applied with caution, taking in parallel measures to compensate its adverse effects. The impact of some of the macroeconomic policies on budget deficit is studied using two regression functions. After an econometric analysis we shall conclude about the influence of the dependent variables of these functions on the Romanian budgetary deficit.*

**Keywords:** social security budget; gross domestic product; correlation coefficient; regression analysis.

**JEL Codes:** E01, E2, H55, H61, H62.

**REL Codes:** 3B, 8B.

## Introduction

Romania faces a more severe economic recession than originally anticipated. Although the implementation of anti-crisis program was able to lead to normalization of financial conditions, the contraction of economic activity is higher than initial projections. The total revenues continued to decline in 2010 due to lower incomes collected from VAT, social contributions and non-tax revenue. Due to the significant decrease of the budget revenues the budget deficit increases. Because of the great policy debate in Romania about the impact of the reduction of pensions and salaries and increases of taxations on the reduction of budget deficit, we have started our paper by explaining which are the three basic sides of the balanced budget debate. Then we have analysed the correlation between social security budget and the main macroeconomic indicators (like GDP, FDI, unemployment) in Romania during the period 2000 – 2009. Three hypotheses on macroeconomic policies are discussed in the paper and their influences on the budget deficit.

### 1. Balanced budget debate

The budget deficit is defined as the difference between what the government spends (salaries, defence spending, aid programs, and other cash outflows) and what the government collects (take the form of taxes). When the government spends more than it collects, a budget deficit exists. The opposite of a budget deficit is a budget surplus.

There are three basic sides to the balanced budget debate. The traditionalists argue for a reduction of the budget deficit since it harms the economy. Another group holds the Ricardian view of government debt in believing that there is no real harm done to the economy by the national debt. A third group claims one way or another that the budget deficit is not an adequate measure of fiscal policy.

Traditionalists claim that when the government runs a budget deficit, it is spending more than it is collected. Therefore national savings decreases and investment also decreases. Lower investment leads to lower long-term economic growth and comes with higher domestic interest rates, which decreases net exports. Based on this logic, a budget deficit is a drain on the long-term economy.

Ricardian view of the budget deficit takes a much less negative position on this issue. Supporters of this view claim that a budget deficit represents trading taxes in the future for taxes today. Since the public is adjusting its spending and savings schedules to account for the necessary future increases in taxes, the budget deficit should have little long-term effect on economic growth.

The third position claims that the budget deficit is not a reasonable measure of fiscal policy. While these economists do believe that the government can affect spending, savings, and investment, they also believe that the budget deficit is simply an incomplete measure of these variables.

Which of these views is most reasonable? There is likely a bit of truth in all of them. The best view of the budget deficit comes from understanding the major positions on the issue and creating some sort of compromise between the traditional, Ricardian and fringe viewpoints.

## 2. Data description

The study is based on official data published by the National Institute of Statistics. The variables used in our correlation analysis are:

- Total incomes (million RON);
- Total expenditure (million RON);
- Budgetary deficit (million RON);
- Unemployment rate (%);
- Monthly average net earnings (RON);
- Average number of pensioners and social allowance recipients (thousand persons);
- Monthly average pension of pensioners and social allowance recipients (RON);
- Economically active population (thousand persons);
- Monthly average inflation rate (%).

All values are transformed in real values in order to assure the data comparability.

The investigation period of time is 1991-2009.

## 3. Empirical analysis

The methodology used is the correlation analysis, the factorial analysis and the regression analysis. The goal of this study is to evaluate the impact of some macroeconomic policies on the budget deficit.

By the graphical representation (Figure 1) it is observed that starting with 2005 year the budgetary deficit increases very quickly attaining unsustainable values. All the other indicators show that Romania was in a growth period. Salaries, pensions, active population increase while the unemployment and number of pensioners decreases. The main problem in Romania was that the macroeconomic policies didn't give enough attention to budget deficit in order to keep it under control. This is the main cause of the actual unfavourable economical situation in Romania, with a huge budget deficit, with a decrease in economic activity, with increases of inflation and unemployment.

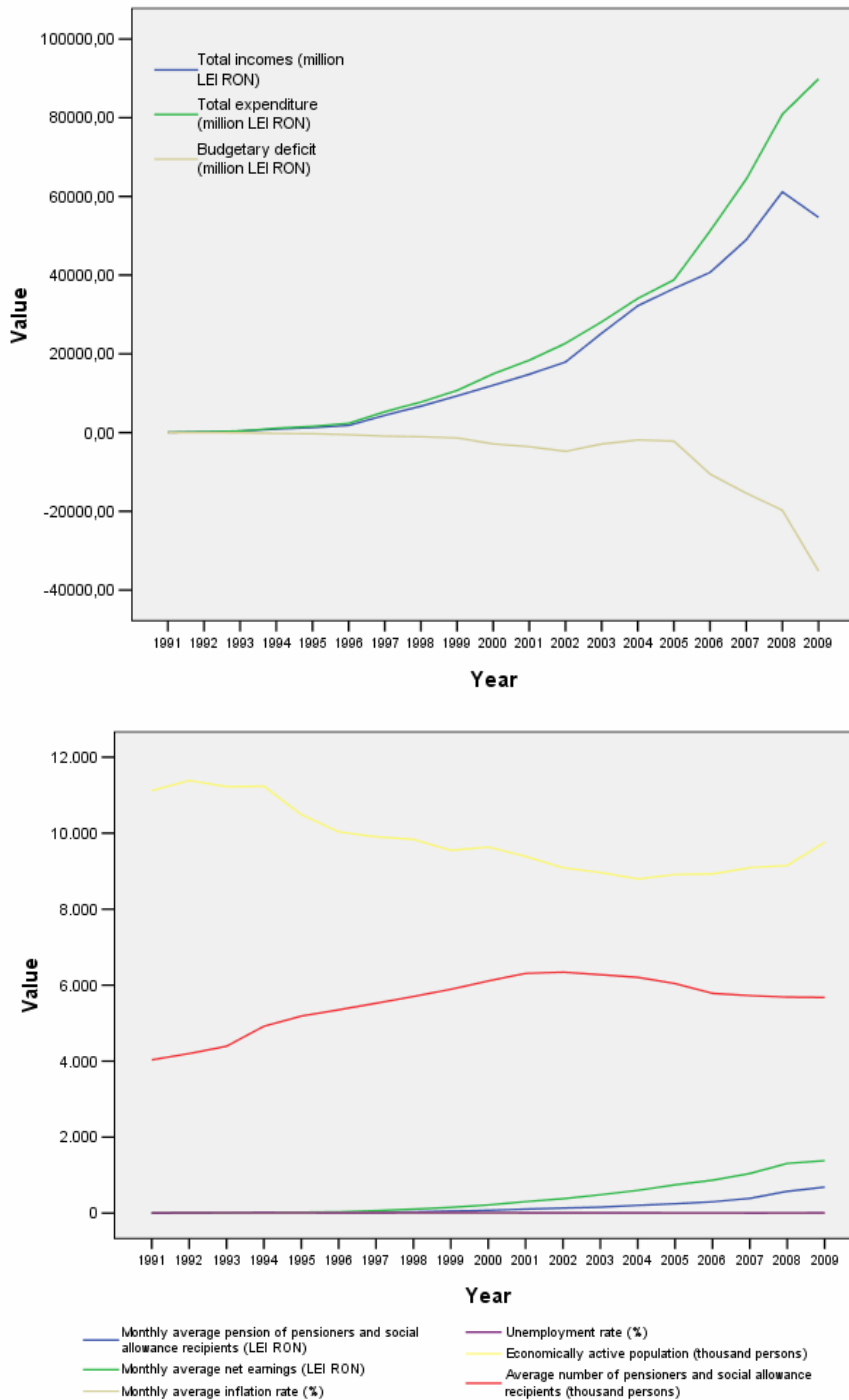


Figure 1. The evolution of macroeconomic indicators (1991-2009)

Table 1

## Matrix correlation between macroeconomic aggregates

		Correlations								
		Total incomes (million LEI RON)	Total expenditure (million LEI RON)	Budgetary deficit (million LEI RON)	Monthly average pension of pensioners and social allowance recipients (LEI RON)	Average number of pensioners and social allowance recipients (thousand persons)	Economically active population (thousand persons)	Unemploy- ment rate (%)	Monthly average net earnings (LEI RON)	Monthly average inflation rate (%)
Total incomes (million LEI RON)	Pearson Correlation	1	,983**	-,818**	,956**	,489*	-,694**	-,550*	,993**	-,694**
	Sig. (2-tailed)		,000	,000	,000	,034	,001	,015	,000	,001
	N	19	19	19	19	19	19	19	19	19
Total expenditure (million LEI RON)	Pearson Correlation	,983**	1	-,910**	,991**	,423	-,606**	-,504*	,997**	-,651**
	Sig. (2-tailed)	,000		,000	,000	,071	,006	,028	,000	,003
	N	19	19	19	19	19	19	19	19	19
Budgetary deficit (million LEI RON)	Pearson Correlation	-,818**	-,910**	1	-,942**	-,221	,329	,335	-,877**	,469*
	Sig. (2-tailed)	,000	,000		,000	,364	,169	,161	,000	,043
	N	19	19	19	19	19	19	19	19	19
Monthly average pension of pensioners and social allowance recipients (LEI RON)	Pearson Correlation	,956**	,991**	-,942**	1	,358	-,527*	-,474*	,983**	-,601**
	Sig. (2-tailed)	,000	,000	,000		,132	,020	,040	,000	,006
	N	19	19	19	19	19	19	19	19	19
Average number of pensioners and social allowance recipients (thousand persons)	Pearson Correlation	,489*	,423	-,221	,358	1	-,911**	,060	,439	-,820**
	Sig. (2-tailed)	,034	,071	,364	,132		,000	,808	,060	,000
	N	19	19	19	19	19	19	19	19	19
Economically active population (thousand persons)	Pearson Correlation	-,694**	-,606**	,329	-,527*	-,911**	1	,299	-,634**	,817**
	Sig. (2-tailed)	,001	,006	,169	,020	,000		,214	,004	,000
	N	19	19	19	19	19	19	19	19	19
Unemployment rate (%)	Pearson Correlation	-,550*	-,504*	,335	-,474*	,060	,299	1	-,533*	,187
	Sig. (2-tailed)	,015	,028	,161	,040	,808	,214		,019	,444
	N	19	19	19	19	19	19	19	19	19
Monthly average net earnings (LEI RON)	Pearson Correlation	,993**	,997**	-,877**	,983**	,439	-,634**	-,533*	1	-,666**
	Sig. (2-tailed)	,000	,000	,000	,000	,060	,004	,019		,002
	N	19	19	19	19	19	19	19	19	19
Monthly average inflation rate (%)	Pearson Correlation	-,694**	-,651**	,469*	-,601**	-,820**	,817**	,187	-,666**	1
	Sig. (2-tailed)	,001	,003	,043	,006	,000	,000	,444	,002	
	N	19	19	19	19	19	19	19	19	19

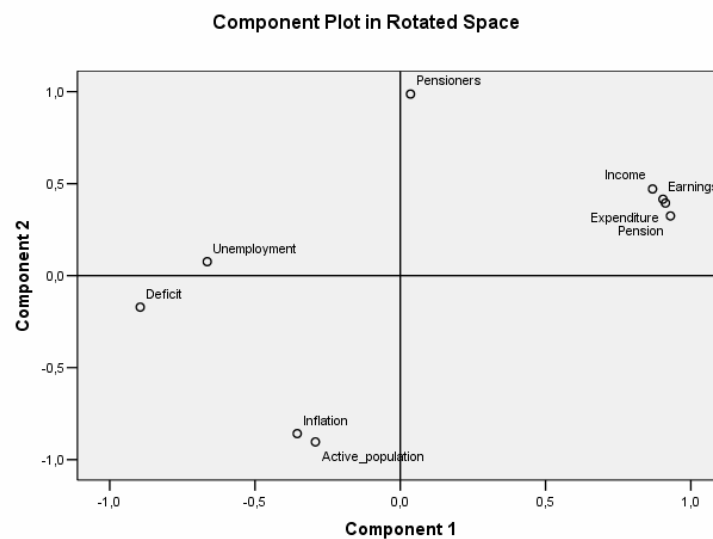
\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

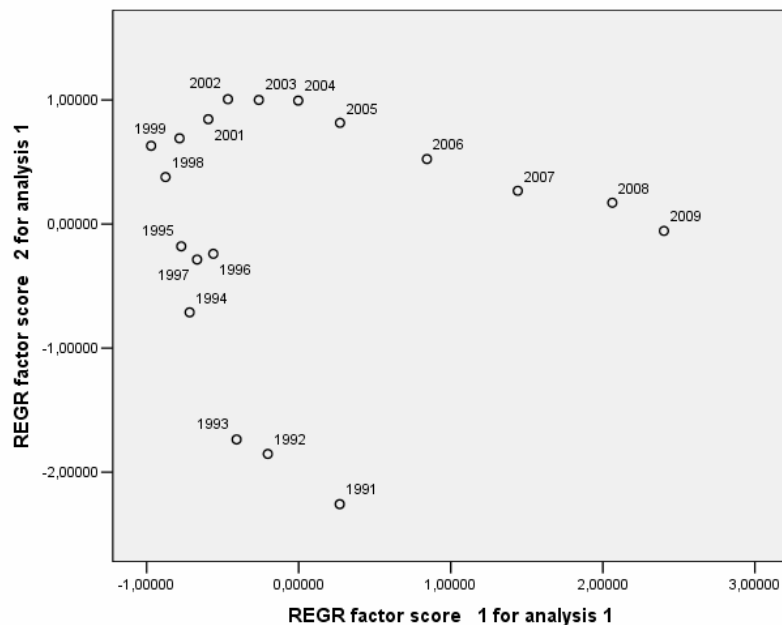
By analysing the correlation between all the studied variables we observe that there is a strong correlation between monthly average pension and monthly average net earnings. Increases in the level of earnings will determine the increase of budget deficit.

At first view the macroeconomic policy adopted by the actual government in Romania (the cut with 25 % of salaries in the budgetary system) will have as a result the decrease of budget deficit. Since the monthly average net earnings is correlated with unemployment and inflation rate, the reduction of the general level of earnings will determine the increase of unemployment and inflation. Therefore this policy should be applied with caution, taking in parallel measures to compensate its adverse effects.

The same conclusions could be formulated by analysing the graphical representation (Figure 2) of all variables by using Factorial analysis (Principal Component Analysis).



**Figure 2.** *The plot of variables on correlation circle determined by the two first principal components (which explain 88% of the initial variation)*



**Figure 3.** The evolution of the main macroeconomic indicators represented on the determined by the two first principal components

During the period 1991-2004 the main variations were observed in active population, number of pensioners, inflation. In fact this was the period of transition, the period of the reconstruction of the economy. From 2005, Romania didn't well exploited the economic boom such that to continue to be on the ascending trend in economic development and to keep stable the inflation, the unemployment and the budgetary deficit (Figure 3).

In order to study the impact of two macroeconomic policies on budget deficit, two regression functions are determined.

First of all, we analyse the dependency between budget deficit and monthly average net earnings (LEI RON) and monthly average pension of pensioners and social allowance recipients (LEI RON). The regression equation is:

$$Deficit = -306 - 104.5 \times Pens + 27.8 \times Ern \quad R^2 = 0.96; F = 179.44$$

(-0.47)    (-8.39)                    (5.08)

The coefficients of variables monthly average pension and monthly average earnings are significant with a probability of 99%. The model could be validated with a probability of 99%. Therefore, if the monthly average net earnings decreases with 1 RON then the budgetary deficit increases with



27.83 RON, when all the other factors remain stable. This means that this measure is not good. If the monthly average pensions decreases with 1 RON then the budgetary deficit decreases with 104.5 RON, when all the other factors remain stable. But the budget deficit is 35,173 RON. In order to attain the equilibrium of the budget the average level of pensions should be reduced by 350 RON, which gives an average level of pensions of 350 RON. The policy of reducing the average level of pensions, correlated with other measures, could equilibrate the budget.

Secondly, we analyse the dependency between budget deficit and the unemployment rate and the number of pensioners. The regression equation is:

$$Deficit = -2.79 \times NPens + 1279 \times ur \quad R^2 = 0.4; F = 5.65$$

(-2.53)
(1.7)

The coefficients of variables unemployment rate and the number of pensioners are significant with a probability of 90%. Therefore, if the number of pensioners decreases with one thousand persons then the budgetary deficit decreases with 2.79 RON, when all the other factors remain stable. Using only this measure it is impossible to attain the equilibrium of the budget.

#### 4. Conclusions

The macroeconomic policies in Romania didn't give enough attention to budget deficit in order to keep it under control. This induced the actual unfavourable economical situation, with a huge budget deficit, with a decrease in economic activity, with increases of inflation and unemployment. The correlation analysis shows that there is a strong correlation between monthly average pension and monthly average net earnings. Our analysis reveals that the measure of decreasing the monthly average net earnings in order to reduce the budget deficit is not good. The policy of reducing the average level of pensions have to be correlated with other measures in order to equilibrate the budget. Also, reducing the number of pensioners will induce a decrease of the budgetary deficit, but this measure only cannot equilibrate the budget.

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