Econometric Modeling of the Effect of Budget Deficit and Public Debt on GDP within Romanian Economy

Camelia Moraru
"Dimitrie Cantemir,, Christian University Constanta
cami.moraru@yahoo.com
Dorinela Nancu
"Ovidius" University of Constanta
cusudorinela@yahoo.com

Abstract

In recent years, most countries have experienced an economic crisis that was characterized by significantly increasing public debt and budget deficit, these two indicators being the most affected by this crisis. In this regard, questions about the effects of deficits, the influence of public debt on future generations or the existence of sustainable economic growth are justified.

To analyze the influence of the budget deficit and public debt on economic growth, below we have achieved an econometric analysis of the link between these three macroeconomic indicators in Romania's case, one of the countries affected by the economic crisis.

1. Introduction

The purpose of this empirical analysis is to test what theory regarding the impact of the budget deficit on economic growth applies in the case of Romania: Keynesian theory, that support a positive relationship between the budget deficit and economic growth, the neoclassical theory which claims that between budget deficit and economic growth is established a negative relationship or the Ricardian theory which says that between the budget deficit and economic growth there is no significant relationship. Also, by using regression we wanted to determine whether the public debt and economic growth are linked, the nature of the relationship between the two indicators (positive or negative) and also if the bond strength is strong or insignificant (Dincă, 2013, p.17).

In the specialized literature was found an impressive number of researches and analysis that were focused on the impact of public spending or revenue, or that of the budget deficit or public debt on economic growth. Results of the studies are distinct and controversial from one country to another, from one methodology to another, from one period to another (Braşoveanu, Braşoveanu, 2008, p.54).

2. Data and research methodology

Martin and Fardmanesch (1990) proposed the concomitant use in the analysis of the effect of fiscal policy on economic growth of three fiscal variables such as revenues, expenditures and deficit as reducing taxes does not necessarily imply the growth of economic activity, as any spending increase does not ensure the development of the economy (Martin, Fardmanesch, 1990, p. 243).

Public revenues represent some of the components of a budget constraint, so any mitigation of these taxes and fees should be accompanied by an increase of other revenues (non-tax) or a reduction in expenditure or an increase in budget deficit. Similarly, increasing public expenditure

should be associated with increased taxes or non-tax revenues and / or the increase of the budget deficit. In this way, the effect of a change in spending or public revenues can not be analyzed without taking into account appropriate fiscal policies (Enache, 2009, p.508).

Simultaneous use of these three fiscal variables may lead to different results from those obtained previously in specialized literature. The impact of government revenue over GDP is assumed to be negative, when rising incomes aims reducing the budget deficit, but we can embrace the co-existence of a higher rate of economic growth. The positive correlation between productive public expenditure and economic growth can turn into a negative one when referring to the impact on the budget deficit. Budget deficit indicator is considered in the literature to have a negative effect on the economy and the increase of government revenue and reduction of public spending in order to reduce deficits value shows an expansionary effect on GDP.

So, in order to estimate this model we used as a starting point the model of *Martin and Fardmanesch (1990)*, but that we have developed. We added within the category of public expenditure the productive and unproductive expenditure and, and regarding the ways of financing these expenditure in public income category we have included non- distortionary and distortionary public revenues. Also, in the model we included public debt, and besides all the variables of interest mentioned above, we included a control variable, the gross fixed capital formation, as we felt that between that and economic growth there is a significant statistical relationship and by including this variable in the model our purpose was to mitigate the risk to obtain unrelevant data (Martin, Fardmanesch, 1990, p. 244).

In order to obtain a relevant analysis we chose to use quarterly data and the source are publications of the National Institute of Statistics and Eurostat. The database has been optimized with additional data from the NBR basis, International Monetary Fund and the Ministry of Finance.

To determine the effect of fiscal variables on growth, must be estimated multifactorial linear regression coefficients, where GDP variable changes can be interpreted by independent instrumental variables changes.

Econometric analysis is based on the following relationship:

$$PIB = \alpha + \beta_1 \times VEN\_dist + \beta_2 \times VEN\_nondist + \beta_3 \times CHP\_prod + \beta_4 \times CHP\_neprod + \beta_5 \times DB + \beta_6 \times DP + \beta_7 \times FBCF + \varepsilon,$$ where:

GDP = gross domestic product, the dependent variable;
α = free period;
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ = coefficients of independent variables;
VEN_dist = distortionary government revenue;
VEN_nondist = non-distortionary government revenue;
CHP_prod = productive expenditures;
CHP_neprod = unproductive expenditures;
DB = deficit;
DP = debt;
GFCF = gross fixed capital formation;
ε = error term of the equation.

The study can be divided as follows: in the first part of the empirical research we presented the descriptive statistics of data series and we tested them of seasonality variables. The second part of the analysis involves testing the actual empirically impact of the abovementioned variables on growth by applying an econometric model which is based on linear regression multifactorial.

3. Results and discussions

To obtain a valid econometric model, the first step is testing the seasonality of variables, because the data used are quarterly. If the variables are affected by seasonality, immediately following step involves applying the tool Tramo / Seats from Eviews 7.1 software to seasonally adjusted series. Thus, after analyzing data sets, we found that, of the four macroeconomic variables, only gross fixed capital formation and the budget deficit shows seasonal. The figures below show the two variables seasonally adjusted.

Figure no. 1. Gross fixed capital formation and budget deficit seasonally adjusted
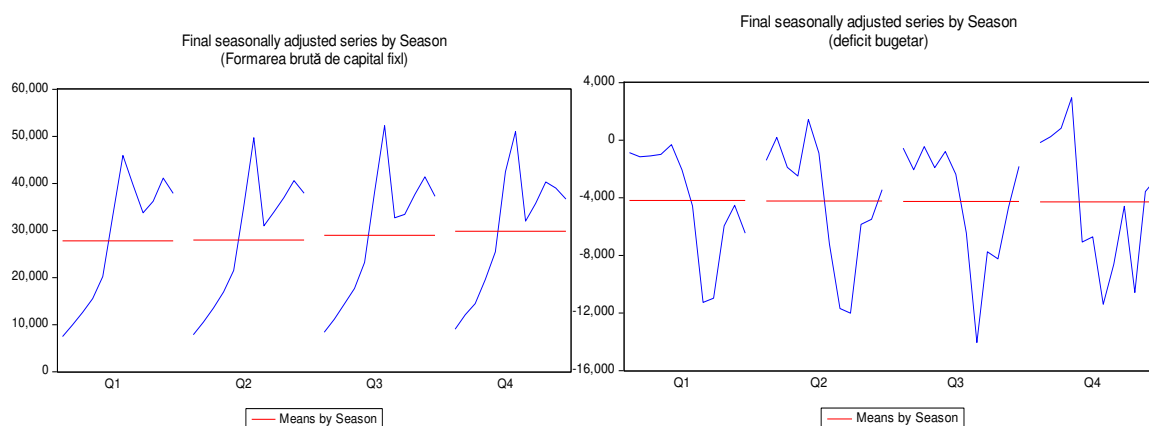
Source: made by the authors using Eviews 7.1.

An auxiliary stage that allows obtaining additional information on the data sets used in the model is the descriptive statistics. The characteristics of the data sets used in the regression analysis are shown in the table below.

Table no. 1. Descriptive statistics of the budget deficit, public debt and GDP

	Budget deficit	**Public debt**	**GDP**
Mean	-5,5770	10,4216	10,2714
Maximum	9,5506	11,9711	10,4364
Minimum	-9,8668	9,1767	9,9925
Std. Dev.	5,5682	0,9396	0,1273
Skewness	1,8751	0,4521	-0,7939
Kurtosis	4,8553	1,5445	2,2946
Jarque-Bera	35,01526	5,8720	6,0383
Probability	0,0000	0,0430	0,0488

Source: made by the authors using Eviews 7.1.

The table provides information about the average and standard deviations of the main variables. Distribution of gross domestic product and public debt is a platykurtic one, while the budget deficit has a leptokurtic distribution.

Next, using seasonally adjusted data, using software Eviews 7.1. we estimated the regression model to determine whether there is a direct or indirect relationship between the budget deficit, public debt and growth, thereby fulfilling the main goal of this empirical analysis. Therefore, the information obtained by applying the least squares are summarized in the table below:

Table no. 2. The regression results on the influence of the budget deficit and public debt on economic growth in Romania

Dependent Variable: PIB
Method: Least Squares
Sample: 2002Q1 2013Q4
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7,683834	0,082983	92,59527	0,0000
Venituri distorsionare	-0,955218	0,215091	-3,888395	0,0193
Venituri non-distorsionare	-0,715218	0,495091	-1,588395	0,0193
Cheltuieli productive	-0,151246	0,728444	-0,317256	0,0070
Cheltuieli neproductive	0,131800	0,525784	0,341245	0,0372
Deficit bugetar	2,236300	0,313154	7,549124	0,0308

Datorie publică	-1,131190	0,805808	-1,369822	0,0270
FBCF	0,129727	0,015804	1,208600	0,0000

R-squared	0,989199	Mean dependent var	10,27143
Adjusted R-squared	0,987309	S.D. dependent var	0,127394
S.E. of regression	0,014352	Akaike info criterion	-5,498879
Sum squared resid	0,008239	Schwarz criterion	-5,187012
Log likelihood	139,9731	Hannan-Quinn criter.	-5,381024
F-statistic	523,3251	Durbin-Watson stat	1,364292
Prob(F-statistic)	0,000000		

Source: made by the authors using Eviews 7.1.

Economists' views about the relationship between budget deficit and economic growth are divided: some are in favor of deficit, considering it beneficial to growth, while others consider it a blessing for the economy just the surplus budget.

The rigid structure of public expenditures did not allowed rapid adjustments designed to treat acute contractions of income and production reflected in public debt and excessive budget deficits.

If strictly correlate rates of growth with dynamic public debt stock from *Reinhart and Rogoff's model (2010)*, we conclude that the level of stress of Romanian debt falling well below 60% of GDP under the Maastricht rules. But if we consider the current performance of the Romanian economy it can be establish a sustainable level of public debt around 40% of GDP, any value above this threshold being transformed into a disturbing factor for economic growth. (Reinhart, Rogoff, 2010, p.70)

Another aspect which has not been allocated sufficient attention to financing budget deficits - this is not a free act. Moreover, the interest on debt contracted, and its timetable are two aspects, since they risk becoming burdensome, possibly contracted debt level is comparable with the level of interest.

In the results from table no. 2., the overall significance of the model is high - coefficient values R and R^2 adjusted are great - allowing the following interpretation: up to 98% of the variation in GDP can be explained by the evolution of public debt, budget deficit, public revenue and expenditure.

This study revealed that the budget deficit and public debt are channels of influence of fiscal policy on growth, whereas the probability associated with these variables is below the materiality threshold of 5%.

4. Conclusions

The empirical study conducted concluded that between budget deficit and economic growth there is a clear relationship, but the surprising result is the positive value recorded by the coefficient which determines the nature of the relationship between these two indicators so that the budget deficit has a positive impact on economic growth. Therefore, an increase in budget deficit by one percentage point corresponds to an increase of GDP by 2.23 percentage points, so that the result obtained in the research supports the Keynesian hypothesis.

In Romanian economy, especially in the period under review, has persistently exhibited a tendency of higher level of public expenditure than the public revenue raised at the state budget. Our country has promoted a pro-cyclical fiscal policy that was based on unrealistic assessments of income and increased expenditures that have led to macroeconomic imbalances. However, government revenues overestimated, accompanied by expenditure undertaken beyond the available funds were not directed towards productive activities, but were channeled to expenditures on goods and services and personnel expenses. By improving the tax system in Romania and / or increase the share of direct taxes, there can be obtain an increases in government revenues and the correct allocation of this revenue could help alleviate budget deficits.

Although the results indicate a direct and positive relationship between the two macroeconomic variables, we believe it necessary to implement measures to control and keep the deficit within limits as low as possible and achieve a certain level of growth. More efficient and rational use of

resources can solve the budget deficit problem as attracting loans is not a viable long-term solution to finance public expenditure.

Regarding public debt, taking into account the value of estimated coefficients, we conclude that a 1% increase in public debt will reduce annual GDP growth of 1.13% and as channels of influence we can mention public investment, private savings or total factor productivity. The results show that public debt tends to have a negative impact on economic growth in Romania regardless of the method used for measuring economic growth. The results are consistent with other studies on the subject.

Regarding public debt, Romania is apparent in an "comfortable" area because its value is far below the target of 60% of GDP. However, the Romanian economy is vulnerable when talking about indebtedness. The 60% is an acceptable threshold for developed countries, but for a country like Romania the limit should be set at a lower level. In addition, Romania entered the crisis with a debt level reduced, however, from 2008 to the present, its value has increased almost three times. If our country had stepped into crisis with the current level of indebtedness, it would have been necessary even harsher austerity measures, along with an even more restrictive fiscal policy.

According to the theory, in times of crisis is desired to increase public spending in order to revive economic activity, to contribute to increase the employment of labor and reduce unemployment. Thus, taking into account past experience, we believe that economic growth model needs to be rethought and oriented in sectors with investments and high added value.

5. References

1. Braşoveanu, I., Obreja Braşoveanu, L., Păun Cristian. 2008. Correlations Between Fiscal Policy And Macroeconomic Indicators In Romania, *Theoretical and Applied Economics*, Vol.11, No.528, p. 51-59;
2. Dincă, MS., Dincă, G. 2013. The Impact of Government Expenditures Upon Economic Growth in Post-Communist Countries, *Economic Sciences Annals of „Alexandru Ioan Cuza" University*, Vol.60, No. 1, p.1-9;
3. Enache, C. 2009. Fiscal Policy and Economic Growth in Romania, *Annales Universitatis Apulensis Series Oeconomica*, Vol. 11, No. 1, p. 502 – 512;
4. Martin, R. Fardmanesh, M. 1990. Fiscal Variables and Growth: A Crosss-Sectional Analysis, *Public Choice*, Vol. 64, No. 3, p239-251;
5. Reinhart, MC., Rogoff, KS. 2010. Growth in a Time of Debt, *National Bureau of Economic Research* 15639;
6. *** www.insse.ro
7. *** www.imf.org