

THE EVOLUTION OF THE ROMANIAN PUBLIC DEBT DURING THE LAST 10 YEARS

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Abstract: The purpose of this paper is to analyze the correlation between the evolution of the Romanian public debt and several variables which, in our opinion, might influence it, such as: the GDP, the volume of the public revenues and expenditures, the budgetary deficit as a ratio of GDP and as an absolute value, the public debt service, the Leu-Euro exchange rate and the implicit interest rate for public debt. In the econometric test of the relation between the public debt and the fore mentioned variables we used the multiple regression method. The results obtained from testing the model have shown that the public debt is greatly influenced by the public debt service, the exchange rate and the interest rate for public loans. In the same time, the model allows forecasts regarding the evolution of the public debt according to evolution of the significant variables.

JEL classification: H62, H63, O11

Key words: public debt; economic growth; public deficit; sustainability of the public finance; regression

1. INTRODUCTION

The problem of public debt is not a recent one; its evolution has been marked by stages that sometimes have been proven to be true tragedies for the debtor countries, generated by the mismanagement of public funds or by the creditors themselves. The large amount of public debt generated by EU countries in the last years has raised serious question marks regarding the health of public finances and sustainability of the European fiscal and budgetary policies. Policy makers in most of this countries face the necessity of rethinking their approach, adopting a policy of prudence in which public debt is situated at a sustainable level and the portfolio of debt is adequately suited to the particularities of the country in question taking in account costs, maturity, risk and sources.

We should not overlook the moral dilemma generated by debt, facing the fact that future European generations will be responsible with the refund of the debt in question facing possible low employment rates and aging population.

Rising public debt levels has generated intense international debates regarding the identification of sustainable levels. Many researchers have argued that the level of sustainability has been surpassed in 2008. From the moment a government confronts financial problems in the sense of having difficulties in achieving budgetary obligations or it has to bear excessive costs when issuing loans we will see effects on the entirety of the

economy, point proven by the recent macroeconomic turmoil seen in different countries. (Balibek & Koksalan, 2010)

In order to identify the potential impact on the budget and state financial obligations it is necessary to ensure that specialized governmental bodies have realized in depth complex analysis on the structure of public debt taking in account its maturity, associated risks and the currency used. Developed and emerging countries issue most of their loans on international markets in foreign currency. (Bordo at all, 2010)

Public finances have taken center stage after years of dominance from monetary policies. As we all know healthy public finances contribute to macroeconomic stability and help monetary policies in maintaining stable price levels and low interest rates. Healthy public finances thru the reduction of public debt and the burden of their interest rates create the necessary fiscal space for cuts of distortionary taxes or for productive public spending. They can also positively affect economic growth and job creation in the long run. Thus helping states face the added pressure generated by rising public spending with healthcare and pension plans as a result of an aging population.

Economic theory presents three main channels through which government debt can affect long term growth: (i) a crowding out effect on private investment, as national savings are reduced and interest rates increase; (ii) an increase in distortionary taxes which are needed to services, the debt; (iii) an increase in the risk premium paid by governments which increase the burden that debt presents (European Commission, 2010).

2. LITERATURE REVIEW

The connection between economic growth and public debt has been analyzed by many researchers including Robert Barro's (1979) straightforward approach. Assuming there is a need to raise taxes to sustain the service of public debt; this decision will adversely affect potential GDP. Governments have the possibility of lowering public expenditures leading to a contraction in economic activity.

In a paper published in 1987 H. Zee analyzed the optimality and sustainability of public debt in the context of closed economies. He theorized that a sustainable level of public debt would be the one that will allow an economy in the lack of unexpected exogenous shocks to reach a state of equilibrium. (Zee, 1987)

The relation between economic growth, public debt and inflation has been the main subject of an ample research conducted by Reinhart and Rogoff (2010). The two have analyzed the mentioned indicators and the relation between them on an interval of almost 200 years on 44 countries. Their findings have been published in *Growth in Time of Debt* and mark the following main aspects:

First, the relationship between government debt and real GDP growth is weak for the debt/GDP ratios below a threshold of 90 percent of GDP. Above 90 percent, median growth rates fall by one percent, and average growth falls considerably more. We find that the threshold for public debt is similar in advanced and emerging economies. Second, emerging markets face lower thresholds for external debt (public and private)—which is usually denominated in a foreign currency. When external debt reaches 60 percent of GDP, annual growth declines by about two percent; for higher levels, growth rates are roughly cut in half. Third, there is no apparent contemporaneous link between inflation and public debt levels for the advanced countries as a group (some countries, such as the United States, have experienced higher inflation when the debt/GDP ratio is high). The story is entirely different for emerging markets, where inflation rises sharply as debt increases (Reinhart & Rogoff, 2010). These results have generated extensive discussions mainly in

the fields of policy and media. In their article Airons and Bivens (2010) raise the relevance of the 90% threshold on economic growth mentioned by Reinhart & Rogoff and draw attention on the fact that potential dangers are not brought on by the service of public debt or by the effort of supporting budgetary deficits but instead the inability of policy due to fears generated by deficits.

Researchers preoccupied by public debt and economic growth outline the direct link between budgetary deficit and interest rates. Gale & Orszag (2004) draw attention that present deficits will affect future interest rates. Governments need to contract loans in order to address current deficits which in turn influence demand of borrowed capital thus adding pressure on interest rates. This in turn leads to a fall in saving rates and investment in the private sector. (Reinhart & Rogoff, 2011)

Different models have been elaborated to show the link and causality between budgetary deficits, public debt, economic growth and their sustainability. (Chalk, 2000; Rankin & Roffa, 2003; Brauningner, 2005) A budgetary rule which sets the economy on a path of balanced growth is considered sustainable. (Eredem, 2010)

3. OBJECTIVES

In this paper we propose to debate the following objectives: the analysis of the possible correlation between public debt in Romania and certain variables that could influence its volume such as: GDP, the volume of public revenue and expenditures, public deficit as a percentage of GDP and as a global value, the service of public debt, leu/euro exchange rate and interest rates for public loans.

4. METHODOLOGY

This study is based on documenting and researching speciality literature. The data used has been collected from national and international databases, from published papers and on-going academic working papers. The analyses and processing of statistic data has led to graphic representations and the use of descriptive statistical instruments.

For the econometric testing of the connection between public debt and the previously mentioned variables the multiple regression method has been used.

5. PUBLIC DEBT AND BUDGET DEFICIT IN ROMANIA AND THE EU

The principle causes of rising public debt are specific to economic phases such as budgetary deficit, unemployment, discretionary fiscal policies adopted as a part of the European recovery plan meant to prevent the effects of the global financial crisis. Likewise public income has decreased more than the degree with which economic growth has slowed down. This has led to a rethink of fiscal policies in some European countries.

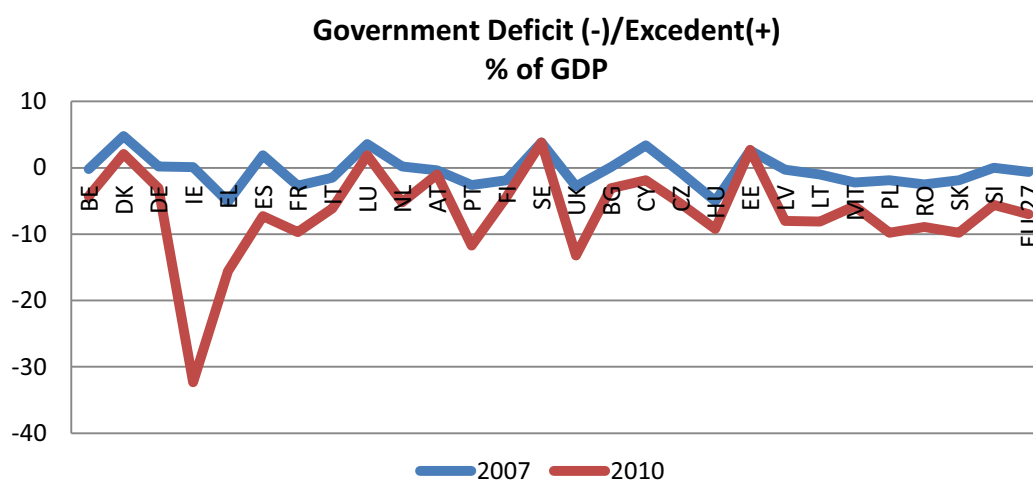
A large amount of short term public debt or of the one contracted with variable interest rates will generate vulnerabilities in the service of public debt when interest rates rise and additional risk due to difficulties in refinancing the current public debt at a reasonable cost. For this reason we have to take in account the risk posed by an inadequate portfolio of public debt, analysing the said structure of public debt by source, initial maturity of the portfolio, instruments of debt and structure of debt service.

Public debt may be useful in financial development until a certain threshold; past this threshold it may actually prove harmful. Furthermore the possibility of public debt adversely affecting financial development has to do with the financial system itself which can be repressed or free. (Hauner, 2009)

Data regarding the correlation between public debt and economic growth is limited, most research focusing on emerging markets and less on developed nations. Although the correlation between debt and growth tends to indicate there is a negative link between the two. Accumulated public debt being an economic stress for the future thus sovereign debt surely becomes a burden for future generations as a low income flux from decreased private capital.

At the end of 2010 public debt in the EU rose at an alarming level reaching 80% of GDP in the case of UE27 countries and 85% in the case of EA16 countries over the convened 60% mark outlined in the European growth and stability pact.

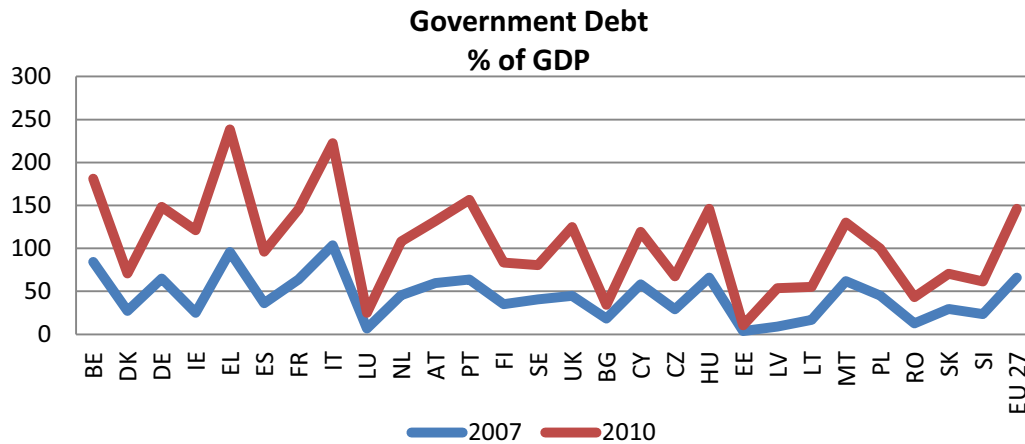
In figures no.1 and no.2 we have graphically represented the evolution of outstanding sovereign debt and budgetary deficits at the end of 2010 relative to 2007 in the EU countries.



Source: European Commission, Government Statistics, 2011

Figure no.1 The evolution of the EU countries' government deficit 2007-2010

From the countries that reported significant deficits at the end of 2010 we must mention Ireland with a budget deficit of 32,4%, Greece 10,5%, United Kingdom 10,4%, Spain 9,2%, Portugal 9,1% and France 7%. All of them being developed countries and old member states. In opposition we find Estonia with a tiny budget surplus of 0,1% of GDP and Sweden which closed 2010 with a balanced budget.



Source: European Commission, Government Statistics, 2011

Figure no.2 The evolution of the EU countries' government debt, 2007-2010

Public debt in EU countries in the last 10 years has seen a dangerous sharp increase jeopardising the health of sovereign public finances. This trend has been marked by the end of 2010 of public debt figures of 142,8% of GDP for Greece, 119% of GDP for Italy, 96% of GDP for Belgium and 96,2% of GDP in the case of Ireland. The lowest levels of public debt are seen in the case of countries such as Estonia with a mere 6,1% of GDP, Luxembourg with 17,2% of GDP and also Bulgaria with 18% of GDP.

In Romania the evolution of public finances is depicted in table no.1.

Table no. 1. The evolution of public finances in Romania

Romania	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
GDP (mrd euro)	45,4	48,6	52,6	61,1	79,8	97,7	124,7	139,8	117,5	121,9	131,9
GDP (mrd PPS)	123,2	131,2	141	160,2	170	195,8	223,4	251,3	233,3	235,8	243
Gov. revenues (% of GDP)	32,7	33	32	32,3	32,4	33,3	33,7	32,6	32,1	34,3	34,1
Gov. expenditures (% of GDP)	36,2	35	33,5	33,6	33,6	35,5	36,3	38,3	40,6	40,8	38,8
Gov. Deficit (-)/Excedent (+)	-3,5	-2	-1,5	-1,2	-1,2	-2,2	-2,6	-5,7	-8,5	-6,4	-4,7
Gov. debt (% of GDP)	25,7	24,9	21,5	18,70	15,8	12,4	12,6	13,4	23,6	30,8	33,7
Growth of GDP	5,7	5,1	5,2	8,5	4,2	7,9	6,3	7,3	-7,1	-1,3	1,5
Interest	3,4	2,5	1,6	1,5	1,2	0,8	0,7	0,7	1,5	1,6	1,8

payments (%GDP)											
Implicit interest rate *	22,2	12,3	8,4	8,6	7,7	6,3	7,3	6,9	11,1	6,8	6,2
Primary deficit	0,1	-0,5	-0,1	-0,3	-0,1	1,4	1,9	5	7	4,9	2,9
Global public debt (mrd euro)	11,66	12,10	11,30	11,43	12,6	12,11	15,71	18,73	27,73	37,55	44,45
Public deficit (mrd euro)	1,58	0,97	0,79	0,733	0,95	2,149	3,242	7,97	9,99	7,80	6,19
Overall revenues (mrd euro)	14,84	16,04	16,83	19,73	25,85	32,53	42,02	45,57	37,72	41,81	44,98
Global expenditure (mrd euro)	16,43	17,01	17,62	20,53	26,8	34,68	45,26	53,54	47,70	49,73	51,17
Debt service (mrd lei)	6,04	7	8,3	7,7	5,7	5,2	5,3	6,3	10	11	11,2
Debt service (mrd euro)	2,16	2,00	2,01	1,94	1,55	1,54	1,47	1,58	2,36	2,57	2,57
debt service/total revenues (%)	14,59	12,49	11,99	9,837	5,99	4,73	3,49	3,47	6,270	6,14	5,72
Debt service/GDP (%)	4,77	4,125	3,83	3,177	1,94	1,574	1,18	1,131	2,013	2,10	1,95
Exchange rate at the end of reporting period EUR/RON	2,78	3,49	4,11	3,96	3,67	3,38	3,61	3,98	4,23	4,28	4,35

Source: Romanian Public Budget during 2001-2011; European Commission, Government Statistics, 2011; National Bank of Romania

The Government deficit has seen a growth trend starting with the year 2005 from 1,2% of GDP to a peak of 8,5% of GDP in 2009 and a small correction to 6,4% of GDP in 2010. Meanwhile public debt has seen a rapid evolution in the past years from 13% of GDP in 2007 to 30,8% in 2010 and to a forecasted level of 36% for the end of 2011. Although government debt is still situated under the 60% limit outlined by the European growth and stability pact, we must express our concerns if the pace with which public debt is accumulated is maintained especially if Romanian authorities will not effectively manage public finances and will not adequately focus on investment.

6. THE DEVELOPMENT OF AN ECONOMETRIC MODEL

In this section we have tried to build a linear regression model in order to determine which are the factors that influence public debt and to what extent. To this extent a series of variables with the ability to influence the variance of public debt have been taken in consideration. Variables such as: the evolution of GDP, the rate of GDP growth, income and expenditures, the percentage of expenditures in GDP, the percentage of income in GDP, government deficit as percentage of GDP, public deficit as an absolute value, debt service, the exchange rate at the end of a period, interest rates, population and GDP per capita.

Utilizing the multiple regression model we have determined that the variance of public debt is not explained by all of these variables because a series composed of compiled models abides the H_0 hypothesis which states that these variables do not influence the variance of public debt. These models have been rejected from the model, the probability that the regression model is significant being very low. (Sig F from the ANOVA table being very high) As a result by adding and subtracting variables a valid model has been achieved from an econometric point of view in which public debt is the dependent variable and the explanatory variables are: GDP evolution, Revenues, Expenditures, Government deficit, Public deficit, exchange rates and interest rates.

We mention that the service of the public debt used is due to the state budget for the period 2001-2011.

We are proposing the following econometric model:

$$\begin{aligned} \text{Public debt} = & \beta_0 + \beta_1 \text{GDP} + \beta_2 \text{Revenues} + \beta_3 \text{Expenditures} \\ & + \beta_4 \text{Government Deficit} + \beta_5 \text{Public Deficit} + \beta_6 \text{Debt Service} \\ & + \beta_7 \text{Exchange rate} + \beta_8 \text{Interest rates} \end{aligned}$$

Using the multiple regression tool from Excel data analysis we have obtained a valid linear econometric model in which the average intensity of the relationship between variables is of 99,8% (R from Regression Statistics). The model explains the variance of public debt in a percentage of 99,6 (R^2 from Regression Statistics). The Fisher test indicates that the model is significant starting from a significance threshold of 0.001 pointing with a probability of 99% that the regression is globally significant.

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0,99798
R Square	0,99596
Adjusted R Square	0,65322
Standard Error	2,74429
Observations	11

ANOVA					Significance	
	df	SS	MS	F	F	
Regression	8	5576,3984	697,04980	92,5557961	0,01073172	
Residual	3	22,5933922	7,5311307			
Total	11	5598,99179				

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
GDP	0,2467910	1,281710	0,1925481	0,8596101	-3,8321848	4,3257669	-3,8321848	4,3257666

Revenues	19,446612	34,89533	0,5572840	0,61621211	-91,605917	130,49914	-91,605917	130,4991
Expenditures	-19,780007	32,69966	-0,6048994	0,58793506	-123,84493	84,284915	-123,84493	84,28491
Gov. deficit	7,4298314	4,699989	1,5808188	0,21205543	-7,5276313	22,387294	-7,5276313	22,38729
Public deficit	25,256721	33,14199	0,7620760	0,50145142	-80,215902	130,72934	-80,215902	130,7293
Debt service	32,528869	9,638230	3,3749834	0,04325125	1,8557178	63,202021	1,8557178	63,20202
Exchange rate	-11,911614	5,980496	-1,9917435	0,14044602	-30,944222	7,120992	-30,944222	7,120992
Interest rate	-65,495105	59,0755329	-1,1086672	0,34846257	-253,49981	122,50960	-253,49981	122,5096

After determining the coefficients the model becomes:

$$\begin{aligned} \text{Public debt} = & 0.247\text{GDP} + 19.45\text{Revenues} - 19.78\text{Expenditures} \\ & + 7.43\text{Government deficit} + 25.26\text{Public deficit} \\ & + 32.53\text{Debt service} - 11.91\text{Exchange rate} - 65.5\text{interest rates} \end{aligned}$$

We notice that all β coefficients are significantly different then 0 from an econometric point of view (Coefficients table) although the high P-value for some variables does indicate that the variance of public debt is not significantly explained by the variance of these variables. The P values can be looked at as a percentage which shows that the independent variable coefficient is randomly generated and may not express a real connection. So in the case of GDP the P value of 0.85 is very high indicating that the variance of GDP does not explain the variance of public debt for more than 15% of times, 85% of times just being randomly generated. This fact is corroborated even if we just look at the coefficient and standard error value. In the case of the GDP variable a coefficient of 0.24 and a standard error value of 1.28 which shows the standard deviation of the coefficient we can eliminate this variable from the model due to a higher deviation than the value itself. Similar action is taken in the case of Revenues with a P value of 0.61, Expenditures with a P value of 0.58 and lastly Public deficit with a P value of 0.50.

After eliminating these 3 variables we have a new econometric model:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0,98372592
R Square	0,96771668
Adjusted R Square	0,81102383
Standard Error	5,08153567
Observations	11

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	5418,237761	1354,55944	52,457563	8,41446E-05
Residual	7	180,7540335	25,82200479		
Total	11	5598,991794			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Deficit	-1,76136	0,779733	-2,258926	0,05842	-3,60513	0,0824	-3,6051	0,0824
Debt service	21,79785	5,903281	3,692498	0,00773	7,83881	35,7569	7,8388	35,7569

Exchange rate	-4,24285	2,422931	-1,751124	0,12339	-9,97217	1,4865	-9,9722	1,4865
Interest rate	-146,2481	37,460371	-3,904074	0,00587	234,82777	-57,6684	-234,8278	57,6684

$$Public\ debt = 1.76Deficit + 21.8Debt\ service - 4.24Exchange\ rate - 146.25Interest\ rates$$

The average intensity of the connection between variables is of 98.37%, the linear model explaining the variance of public debt with an accuracy of 96.77%.

The Fisher test showing that the regression model is significant starting from a significance threshold of $1.738.41446E-0.5 \approx 0$ pointing that the regression is globally significant with a probability of 100%.

All the coefficients are significantly different from zero from a statistical point of view with a P value close to 0. In the case of the Deficit variable P value is 0.05, 0.007 for the Debt service, 0.12 for the Exchange rate and 0.005 for Interest rates. These indicate that the chance that these variables are randomly generated is very slim, between 0-1%. If the debt service increases by one unit this determines the public debt to rise by 21.8 units. Similarly if deficit increases by one unit public debt will fall with 1.76 units due to the convention of passing deficit with minus and surplus with plus. In reality if one indicator decreases the other will follow due to this convention.

7. CONCLUSIONS

The sovereign debt crisis is a very actual problem for the EU, profoundly debated by EU officials and policy makers in the attempt of finding real solutions without destabilizing their economies. The amount of Greek sovereign debt estimated at over 300 billion euros has generated turbulence on European financial markets and has raised questions over the stability of the entire region and the European construction itself. As a result at the EU summit carried out in Bruxelles in October 2011 the decision of cutting 50% of Greece's debt was taken. The debt will be cut by the end of 2011 and the exposed banks will be recapitalised.

Even if the Romanian public debt is situated at a reasonable level of 36% of GDP for 2011, the issue of loans still remains a sensitive one as interest rate rise and the Ministry of Finance still is in need of such resources.

Thru this econometric model we have tried to identify the variables that strongly influence public debt and the correlation between these variables. As a result public debt is susceptible to the variance of Deficit as a percentage of GDP, exchange rates, debt service and interest rates.

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