Cross-Cultural Management Journal
Volume XXI, Issue 1 / 2019

Iulia ROȘOIU
Academy of Economic Studies, Bucharest, Romania

THE IMPACT OF PUBLIC DEBT ON ECONOMIC GROWTH

Case Study

Keywords
Public debt;
Economic growth;
Simple VAR model

JEL Classification
H63, H60, H20

Abstract

The aim of this study is to investigate the impact of public debt on the economic growth, government expenditures and revenues in Romania over the period 1995-2020. The estimation is performed using simple Vector Autoregressive model. The results indicate that the economy is discouraged for the first period, starting to grow after. The effects on government expenditures and revenues are positive for two periods, afterwards they decrease. The significance of the impact is similar on the aggregate fiscal and budget variables and more important compared to the one on the economic growth.

INTRODUCTION

Because financial resources collected from taxes are not always enough for total public expenses needed to be performed, government can use internal (domestic) or external loans and thus the debt is formed. Over the years, this process generates for most governments large outstanding debts.
It is well-known that external finance is needed for the development of most poor or emerging countries. Even if all of them may have access to this type of financial support, the economic literature emphasizes the fact that this instrument is managed differently in each country.
Obtaining resources through loans helps in the short term, with covering the needed expenses, but in the long term it determines their increase, due to the reimbursement and the interest. It is recommended that this type of resources to be allocated to capital expenditures that will generate future income sources to the state.
External financing should be contacted due to the need of financing the budget deficit, making investments of national interest, refinancing the existing public debt and other necessities approved by the law.
Since public debt has a significant effect on capital accumulation, economic growth, unemployment, stability and much more, it is important to consider it an instrument of economic policy and to understand what is the best way of using it.
Section 2 focuses on the conclusions described by other economic analysts. Section 3 explains the econometric methodology used and variables transformations. Section 4 presents the results of the estimation and section 5 summarizes the findings.

THEORETICAL LITERATURE

Public debt is an import alternative source of financial resources and it should be considered depending on the purposes for which the funds will be used. Okoduwa (1997) summarizes some of the situations of government borrowing:

- to finance recurrent expenditures
- to meet emergencies like war or depression
- to finance capital expenditure (performed for certain public services)

Akhanolu et al. (2018) analyses the government debt on economic growth in Nigeria over the period 1982-2017. The results showed that external debt has a negative impact on the economy, while the internal debt has a positive effect.
Dumitriu and Stefanescu (2013) focused their study on the evolution of Romanian's foreign debt in three periods of time: during communism regime, in the transition period and the one when the country become member of European Union. It is concluded that political regime, the efficiency of allocating the borrowed founds or the international context have major role in the external debt management.
Bokemeier and Stoian (2016) conclude that the debt trajectory in Romania indicates unstable dynamics over the period 1997-2013.
Campeanu and Miricescu (2008), Dobranschi (2010) have found evidence that Romanian debt sustainability is weak.

ECONOMETRIC METHODOLOGY AND DATA USED

In order to analyse the impact of fiscal policy on economic growth in Romania, annual variables published by AMECO databases over the period 1995-2020 are used (with estimated values for 2019 and 2020). The economic growth is measured by the growth rate of real GDP.
Vector Autoregressive models (VAR) framework is used for this analysis (Brooks, 2002). The standard VAR model is described in the equation (1):

$$Y_t = A(L)*Y_{t-1} + B(L)*X_t + v_t. \quad (1)$$

where:

- Y_t – the endogenous variables vector;
- X_t – the exogenous variables vector;
- v_t – the errors vector;
- A(L) and B(L) – the coefficients of the endogenous and exogenous variables vector.

Table no. 1 shows the notations of the variables used for estimating the VAR models.
It can be seen in table no. 2 the descriptive statistic of the five variables used in the estimated models. Standard deviation shows whether series are volatile or not over the period considered. Gross debt is the most volatile, followed by the real GDP growth rate and total government expenditure. According to the values of the Skewness and Kurtosis coefficients, variables do not follow the normal distributed, even if Jarque-Bera probability is higher than 5%. For a variable to follow the normal distribution, Skewness coefficient should equal zero and Kurtosis coefficient three.
The correlation matrix of the variables used in the analysis (table no. 3) shows a negative relationship between gross debt and real GDP growth rate or unemployment rate and a positive one with government expenditures and revenues.
Before estimating VAR model, it is important to ensure that data series are stationary. The results of the tests performed are presented in table no. 4. It is not necessarily to check for seasonal adjustment because annual data is used. Hodrick-Prescott filter is used first, with the purpose of removing the trend from the series and it was applied for gross debt and unemployment rate (probability is smaller than 5%).

Second test used is Augmented Dickey-Fuller (ADF), which indicates that variables are stationary when probability is smaller than 5%. The results indicate that gross debt must be integrated to the first order (I(1)) and unemployment rate to the second order (I(2)).
The impact of gross debt on economic growth is analyzed by estimating the VAR model described in the equation 2 (model is stable for lag length equal 2).

$$VAR(1): Y_t = [rata\_PIB_t, ch\_bug_t, v\_bug_t, dat\_bruta_t, somaj_t] \quad (2)$$

Table no. 5 summarizes the results obtained during checking whether the VAR model is statistically significant or not. The hypotheses that are verified are: residual series follow a normal distribution, residual series is not autocorrelated and residual series is homoscedastic. Tests probabilities greater than 5% indicate that models respect the hypotheses. It is important that the residual series is not autocorrelated in order to continue the analysis with estimating an unrestricted VAR morel. If this is not the case, the econometric literature recommends other type of VAR models.

RESULTS OF THE VAR MODELS ESTIMATED

Since the analysis focuses on the impact of public debt on economic growth, the results regarding these 2 variables are emphasized.
Table no. 6 shows the results for the VAR model estimation using number of lag equal to 2. Public debt has positive impact on real GDP growth rate. The results regarding the impact on total government expenditures and revenues and unemployment rate are ambiguous.
Figure no. 1 shows the impulse response functions of the variables to a shock into public debt. An unexpected increase of the gross debt has a negative impact on real GDP growth rate, value of the dept multiplier is -0.34 after first period. Total government expenditures are stimulated, dept multiplier being equal with 0.13 after one period. Also total government revenues are increasing, dept multiplier value of 0.15 indicates that the effect is stronger compared with the one on government expenditures. The impact on unemployment rate is negative but it is not significant. The value of the debt multiplier is -0.001.

CONCLUSIONS

The results from this empirical study are sensitive to the sample period under examination as shown also in the economic literature.
The objective of this research is to analyse the impact of the public debt on economic growth in Romania over the period 1995-2020. As econometric methodology, unrestricted VAR model was used.
It was found that economic growth is stimulated by the public debt, however an uncontrolled increase will negatively impact the economy. Thus, it is important that the government to borrow funds only for exceptional situations and allocate them efficiently with a focus on capital expenses.
The public debt increase also influences total government expenditures and revenues. The effects are positive on the short-term.

REFERENCES

[1] Akhanolu et al. (2018). The Effect of Public Debt on Economic Growth in Nigeria: An Empirical Investigation, International Business Management 12 (6): 436-441
[2] Bokemeier, B., Stoian, A. (2016). Debt Sustainability Issues in the Central and Eastern European Countries, Working Papers in Economics and Management, No. 07-2016
[3] Brooks, C. (2002). Introductory econometrics for finance, Marea Britanie: editura Cambridge University Press
[4] Campeanu, E., Miricescu, E. (2008). Analyzing the relationship between public and external debt sustainability: case study Romania, Empirica, June 2008, pp. 148 – 154
[5] Dobranschi, M. (2010). The sustainability of public debt in Romania in economic and financial crisis, Studies and Scientific Researches - Economic Edition, no. 15
[6] Dumitriu, R., Stefanescu, R. (2013). External debt management in Romania, MPRA Paper No. 52475
[7] Okoduwa, A. P. (1997). Introduction to International Finance and Policy. Best Printers Ltd., Benin City, Nigeria

TABLES & FIGURES

Table No. 1
Variables notations used in the regression analysis

Notations	**Variables (not seasonally adjusted data)**
$rata\_PIB_t$	Real GDP growth rate (%)
ch_bug_t	Total government expenditures (% of GDP)
v_bug_t	Total government revenues (% of GDP)
dat_bruta_t	General government consolidate gross debt (% of GDP)
$somaj_t$	Unemployment rate (%)

*Note: "**T**" at the end of variable notation - variables for which Hodrick-Prescott filter was applied with the purpose of removing the trend from the series;*

*"**DIF**" at the end of variable notation - variables that are integrated at first order and were differentiated once in order to become stationary.*

*"**DIF2**" at the end of variable notation - variables that are integrated at second order and were differentiated twice in order to become stationary.*
with the purpose of removing the trend from the series;

Table No. 2
Descriptive statistic of variables used for the analysis

	RATA_PIB	CH_BUG	V_BUG	DAT_BRUTA	SOMAJ
Mean	3,355385	35,88462	32,56538	25,18462	6,657692
Median	3,815000	35,45000	32,40000	23,60000	6,900000
Maximum	8,360000	40,00000	35,50000	39,20000	9,700000
Minimum	-5,910000	33,00000	29,40000	6,600000	4,100000
Std. Dev.	3,839474	2,155679	1,456006	10,5835	1,283798
Skewness	-0,908118	0,464421	-0,165647	-0,095283	-0,268352
Kurtosis	3,199951	2,175985	2,718496	1,571048	3,372276
Jarque-Bera	3,616917	1,670226	0,204750	2,251404	0,462195
Probability	0,163907	0,433825	0,902691	0,324425	0,793662
Observations	26	26	26	26	26

Source: author's estimations based on AMECO database

Table No. 3
Correlation matrix

	RATA_PIB	CH_BUG	V_BUG	DAT_BRUTA	SOMAJ
RATA_PIB	1,000000	-0,483420	0,138839	-0,100799	0,119055
CH_BUG	-0,483420	1,000000	0,476584	0,184292	-0,050254
V_BUG	0,138839	0,476584	1,000000	0,266991	0,268175
DAT_BRUTA	-0,100799	0,184292	0,266991	1,000000	-0,459368
SOMAJ	0,119055	-0,050254	0,268175	-0,459368	1,000000

Source: author's estimations based on AMECO database

Table No. 4
Analysis of variables stationarity

Hodrick-Prescott filter					
Variables	rata_PIB	ch_bug	v_bug	dat_bruta	somaj
Probability	0,5619	0,5259	0,4701	0,0000	0,0001
Variables obtained	-	-	-	*dat_bruta_T*	*somaj_T*

Augmented Dickey-Fuller test						
	with constant; MAXLAG=8		with constant; MAXLAG=8		with constant; MAXLAG=8	
Variables	**rata_PIB**		**ch_bug**		**v_bug**	
ADF test	t-statistic	Probability	t-statistic	Probability	t-statistic	Probability
Test critical values	-3,156364	0,0351	-3,365006	0,0228	-4,721064	0,0010
1%	-3,724070		-3,737853		-3,737853	
5%	-2,986225		-2,991878		-2,991878	
10%	-2,632604		-2,635542		-2,635542	
Variables obtained for I(1) or I(2)	-		-		-	

	with constant; MAXLAG=8		with constant; MAXLAG=8	
Variables	**dat_bruta_T**		**somaj_T**	
ADF test	t-statistic	Probability	t-statistic	Probability
Test critical values	1,458102	0,9982*	2,216195	0,9998**
1%	-3,886751		-3,808546	
5%	-3,052169		-3,020686	
10%	-2,666593		-2,650413	
Variables obtained for I(1) or I(2)	*dat_bruta_T_DIF*		*somaj_T_DIF2*	

***** series need to be differentiated once in order to become stationary
****** series need to be differentiated twice in order to become stationary

Source: author's estimations based on AMECO database

Table No. 5
VAR model hypotheses - tests results

Hypotheses	**Test**	**VAR(1)**
Normal distribution	Probability of JB's statistic	0,0043
Residual autocorrelation	Probability of LM's statistic (10 lag)	0,5785
Residual homoscedasticity	Probability of Chi-sq.'s statistic	0,3362

Source: author's estimations based on AMECO database

Table No. 6
VAR model results

	RATA_PIB	**CH_BUG**	**V_BUG**	**DAT_BRUTA_T_DIF**	**SOMAJ_T_DIF2**
RATA_PIB(-1)	-0,650790	0,027135	-0,077761	0,002305	-0,000406
RATA_PIB(-2)	-0,182109	-0,167614	-0,131330	0,000080	-0,000294
CH_BUG(-1)	-1,143844	0,562792	-0,139439	0,014354	-0,000893
CH_BUG(-2)	1,609060	-0,757628	-0,465053	-0,003379	-0,001019
V_BUG(-1)	1,923091	-0,212148	0,293403	-0,011413	-0,000196
V_BUG(-2)	-0,021307	0,334925	-0,100442	0,001888	0,001004
DAT_BRUTA_T_DIF(-1)	-6,919234	-3,549280	-1,121593	1,898104	0,002327
DAT_BRUTA_T_DIF(-2)	13,04777	1,892539	0,782469	-1,039568	0,001644
SOMAJ_T_DIF2(-1)	210,0052	-103,4484	-107,7959	-0,378406	1,293100
SOMAJ_T_DIF2(-2)	-215,3279	97,11553	68,47617	1,431094	-0,561669

Source: author's estimations based on AMECO database

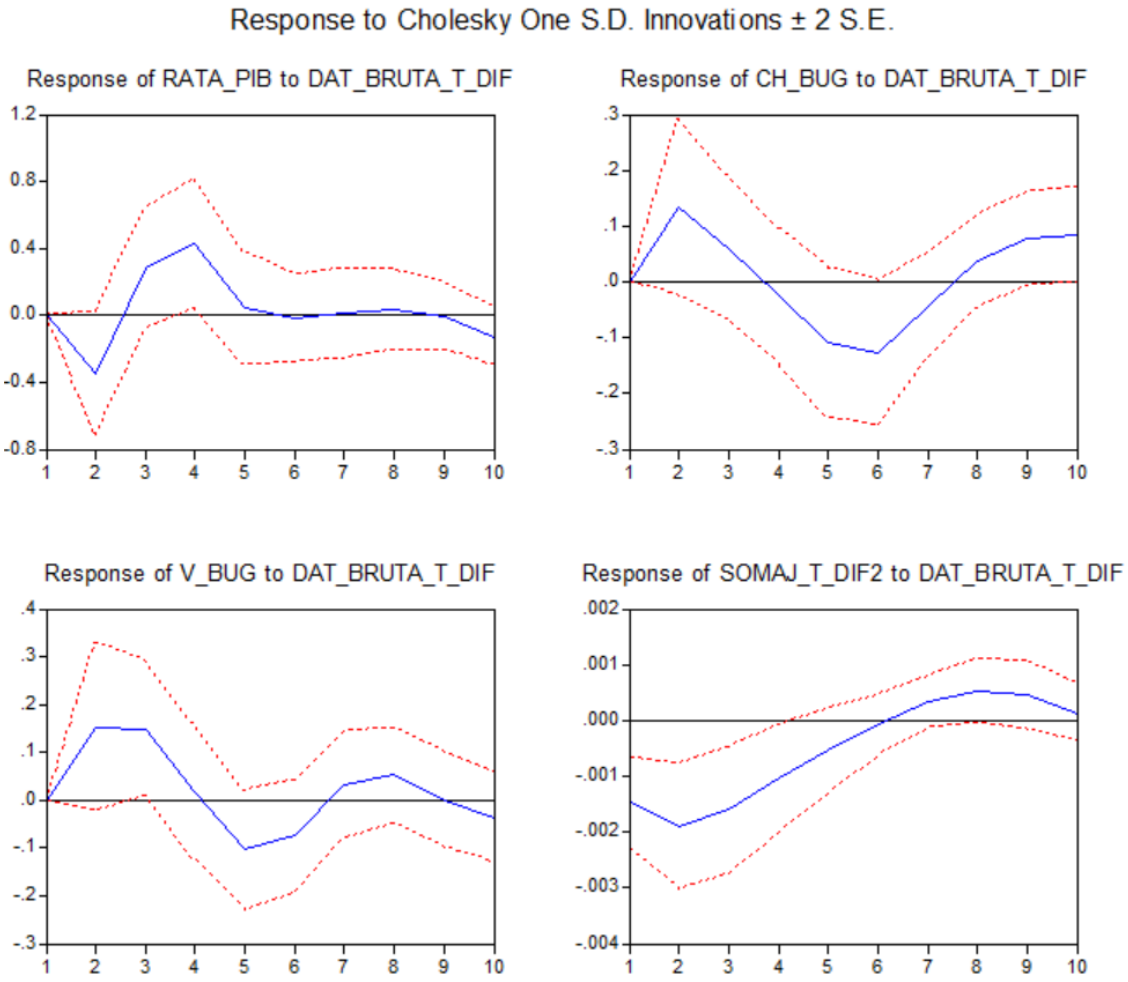

Figure No. 1
Impulse response functions to public debt shock
Source: author's estimations based on AMECO database