Testing the validity of the Ricardian approach to deficits in Romania – Historical Evidences

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Abstract. This paper follows the Ricardian approach to deficits in Romania for the period 1993 – 2014. In order to test the Ricardian approach to deficits, we have used a Vector Autoregression with two variables, gross national savings rate and budget balance. The Ricardian view is confirmed when an increase in the budget deficits produces a positive shift in national savings. Our results show that Ricardian approach to deficits cannot confirm itself as valid macroeconomic theory for the Romanian economy.

1. Introduction

In the current times, after passing the first phase of the financial crisis, the issue of the deficits became very problematic for the economists, as well as for the practitioners and theoreticians. Many of them are considering the deficits problem as a determinant factor for the crisis start in United States and in Europe. For instance, Daniel Thornton (2012) explains how the debt/deficit problem started in USA, back then in 1970, when the government increased the spending, without a corresponding adjustment in revenues. Until the actual crisis began, big periods of deficits were associated only with wars: the War of 1812, Civil War, and World Wars I and II. Every period of big deficits was followed by an upturn, being created budget surpluses. All, except the Great Depression from 1929 -1933. The main problem for the United States was the period between 1970 and 2007, when the growth rate of the deficit surpassed the growth rate of the GDP (Thornton, 2012).

In the moment of writing this paper, Germans, Greeks and the European Union are trying to create a reasonable plan Greece, but one question remains still open for the debate: are the structural problems that caused a lot of fiscal trouble for the countries in Europe going to be managed and solved in a proper way? This paper is analyzing the deficit issue, using the Ricardian approach to deficits, in Romania.

2. Literature review.

The Ricardian equivalence is an economic theory, which began back in 1877, with the David Ricardo's. *On the Principles of Political Economy and Taxation*. In his writings, Ricardo asked himself which is the best way to finance a war: by creating new government debt or through a new temporary tax? His answer was that through both of these ways, you have one certain fact: debt. So, it does not exist any differnce between the ways of financing. After one century (1974), Robert Barro, having as a starting point Ricardo's dilemma, he asked himself if the bonds are considered net wealth (Belingher and Moroianu, 2015). Two years later, sensing the similarities between the scientific work of the ones remembered, Buchanan propose a name for this kind of equivalence: Ricardian Equivalence. Rose and Hakes (1995) are considering the Ricardian Equivalence the logical extension of the permanent income/life cycle hypothesis.

In 1996, one of the founders of the neo-classical school of economic thinking, the same Robert Barro introduces to the economic theory "The Ricardian Approach to Budget Deficits", in which he explains larger his Ricardian view, facing the standard model of the budgetary deficits. By sketching the standard model, this represents an explanation of why, when a government decides to create a deficit to finance the current taxation, the aggregate demand should grow. With other words, the private saving drops less than the taxation cut and in accordance to this the national savings must grow (Barro, 1996).

The antithesis of the standard model, is the Ricardian approach: when a government spending is financed through deficit, this will reflect in future in bigger taxes, which will have the same value with initial tax cut. This effect is caused by the budgetary constraint, mainly and in economy there is no such thing as free meal! Every spending you generate must be paid now or later. Second, consumers are trying to maximize the present value of lifetime consumption (according to the permanent-income/life cycle hypothesis).

Rose and Hakes (1995) are showing in their paper, that one of the implications of the Ricardian Equivalence Hypothesis (REH) is that the deficits are neutral. In order to this, the deficits could not affect other macroeconomic variable, such as the interest rate. They agree to the fact that the deficit neutrality to the interest rate is a necessary condition to the Ricardian Equivalence, but not sufficient.

Other authors who also tested REH are Patinkin (1965), Bayley (1971) or Kotchin (1973). A similar model, but on a microeconomic scale was introduced by Modigliani and Miller (1958), which assumes that in perfect competition market conditions, the companies are indifferent to the way of financing: through own capitals or debts. Also Bernheim (1987) and Seater (1993) are stating that fiscal policies used to stimulate the aggregate demand are useless. Emendorf and Mankiw (1999) disagree the two authors, demonstrating that their results are irrelevant.

For the Romanian economy, Ricardian Equivalence Hypothesis, was tested in a previous paper by Belingher and Moroianu (2015). The consumption function used for the analysis is described below:

$$VHHC_t = a_0 + a_1 * VG_t + a_2 * VDD_t + a_3 * DDum_t + \varepsilon_t \quad (1)$$

where VHHC is the growth rate of the households consumption, VG is the g.r. of the government spending, VDD is the g.r. of the disposable income and DDum is a dummy variable, which is a filter used to investigate only the deficit periods.

The tested period started in 2004:4 and it ends in 2012:3. Their results show that they were not able to identify Ricardian Equivalence for the Romanian Economy.

3. Research methodology and econometric evidence

In accordance to Rose and Hakes (1995) paper, an increase in the budget deficit should increase household saving. Other said, "households should respond to an increase in the deficit with rightward shift in the credit supply locus so that future consumption need not to be reduced to accommodate future taxes".

The model introduced in this paper is a Vector Autoregression with 1 lag (a VAR(1)) with two macroeconomic endogenous variables. A VAR in reduced form can be described as:

$$y_t = c + A_1 y_{t-1} + A_2 y_{t-2} + \cdots + A_p y_{t-p} + e_t \quad (2)$$

The corresponding matrix for a VAR(1) model is:

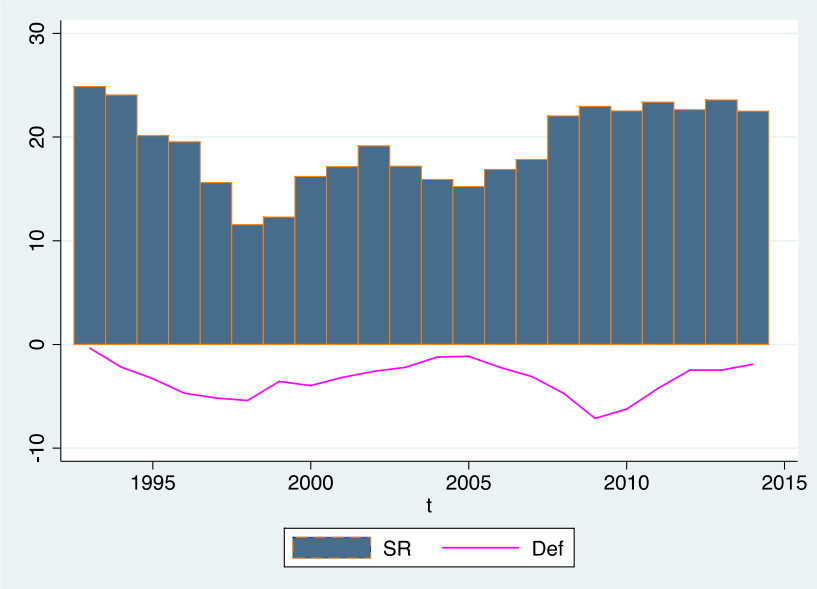
$$\begin{bmatrix} y_{1,t} \\ y_{2,t} \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} A_{1,1} & A_{1,2} \\ A_{2,1} & A_{2,2} \end{bmatrix} \begin{bmatrix} y_{1,t-1} \\ y_{2,t-1} \end{bmatrix} + \begin{bmatrix} e_{1,t} \\ e_{2,t} \end{bmatrix} \quad (3)$$

The variables we have used in this study have been chosen in accordance to their availability in the databases. The main database used was The Economist Intelligence Unit. The variables are:

- **Gross National Savings Rate (%);**
- **Budget Balance (% GDP).**

The data is yearly and starts with 1993 and it ends in 2014. According to the EIU, the data for 2014 is not final. The following chart describes the evolution of the analyzed variable for the time interval:

Fig. 1: Gross National Savings Rate and Budget Balance in Romania (1993 – 2004)



Source: own computations, using the data supplied by EIU

In the econometric model we have used the first differences of the variables, obtained by applying the "D1" operator in the Stata 12 software. Further, for simplicity, we will use the following acronyms for the time series: ***DSR*** (for the gross national savings rate) and ***DDef*** (for the deficit).

The first step was to test the two time series for stationarity. According to the Dickey-Fuller test, the data were stationary in difference.

In the second phase of our research we had to estimate the proper number of lags, which had to be used in the model with lag order selection test (pre-estimation) from Stata software. The results and the reason for which we have chosen one lag, may be found in following table:

Table 1: Lag order selection test (pre-estimation)

Selection-order criteria
Sample: 1996 - 2014 Number of obs = 19

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-70.8562				7.34129	7.66907	7.6859*	7.76849*
1	-66.6233	8.4657	4	0.076	7.2004*	7.64456*	7.69504	7.94281
2	-65.4425	2.3617	4	0.670	9.88403	7.94131	8.02544	8.43839

Endogenous: DDef DSR
Exogenous: _cons

Source: own computations

Third step was to test the data for cointegration, by using the Johansen test. The following equation describes the methodology proposed by Johansen (1988, 1991, 1995):

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \cdots + \Gamma_{k-1} \Delta X_{t-k+1} + \prod X_{t-k} + \mu + u_t \quad (4)$$

where:

X_t is a vector of variables, $\Delta \equiv$ (1- L) is the first difference operator; μ is a constant vector; $\prod$ is coefficient matrix with reduced rank r<k and $u_t$is a vector of innovations. The results for the Johansen test are found in table no. 2:

Table 2. Johansen cointegration test

Johansen tests for cointegration
Trend: constant Number of obs = 21
Sample: 1994 - 2014 Lags = 1

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	2	-80.089459	.	7.9016*	15.41
1	5	-77.389986	0.22670	2.5027	3.76
2	6	-76.138658	0.11235		

Source: own computations

According to the trace statistic (* value), one can see that the time series do not exhibit any cointegration in trend or constant (the results were similar for the both versions of the test). As a consequence of the lag selection criteria and of the Johansen test, the best fitted model is a VAR(1). The estimation of the econometric model is represented in table no. 3:

Unfortunately, we have found that there is poor correlation between the variables (R-squared = 0.22). Our interest here consists in the first equation and by using a 90 percent confidence interval, we can see that the all the lagged coefficients for this equation are statistically significant. Also the Wald lag exclusion statistics confirm us that our model is correct specified, having a *p-statistic* for the first equation of 0.06 and for the all equations joined a *p-statistic* of 0.01.

Table 3. VAR(1) for testing the Ricardian Approach to deficits in Romania

Vector autoregression

Sample:	1995 – 2014		No. of obs	= 20
Log likelihood	= −70.52057		AIC	= 7.652057
FPE	= 7.249005		HQIC	= 7.71037
Det(Sigma_ml)	= 3.960232		SBIC	= 7.950776

Equation	Parms	RMSE	R-sq	chi2	P>chi2
DSR	3	2.14427	0.2183	5.584249	0.0613
DDef	3	1.12159	0.2287	5.931657	0.0515

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
DSR						
DSR L1.	.3556137	.1983907	1.79	0.073	−.033225	.7444524
DDef L1.	.5807753	.3579599	1.62	0.105	−.1208132	1.282364
_cons	.0064993	.4439142	0.01	0.988	−.8635566	.8765552
DDef						
DSR L1.	−.0718421	.1037713	−0.69	0.489	−.27523	.1315459
DDef L1.	.4306235	.1872363	2.30	0.021	.0636471	.7975999
_cons	.0555123	.232196	0.24	0.811	−.3995836	.5106081

Source: own computations

Hence, we have decided to test the model for errors' autocorrelation, using Lagrange-multiplier test (until the 5th lag) and for model's stability, by using Eigenvalue stability condition. The results are showed further in table no. 4:

Table 4. VAR tests

Eigenvalue stability condition

Eigenvalue	Modulus
.3931186 + .2007921*i*	.441429
.3931186 − .2007921*i*	.441429

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	0.7345	4	0.94700
2	3.5029	4	0.47743
3	2.8749	4	0.57897
4	4.1717	4	0.38327
5	3.0746	4	0.54542

H0: no autocorrelation at lag order

Source: own computations

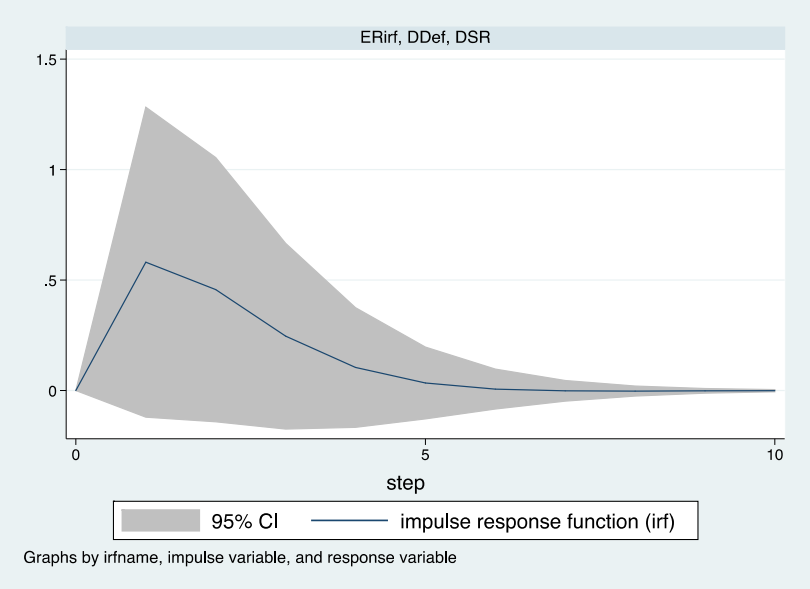
It resulted that there is no evidence of autocorrelation until the 5th lag (LM test) and VAR is stable (Eigenvalue).

The last step represents the core of this study. We will analyze what happens with is the response of the savings rate, when an impulse occurs in deficit. An impulse- response function can be described as:

$$y_{t+n} = \sum_{i=0}^{\infty} \Psi_i \epsilon_{t+n-1} \Leftrightarrow \{\Psi_n\}_{i,j} = \frac{\partial y_{it+n}}{\partial \epsilon_{jt+n}} \quad (5)$$

A graphic representation of the IRF may be found below:

Fig. 2. VAR's impulse-response function



Source: own computations

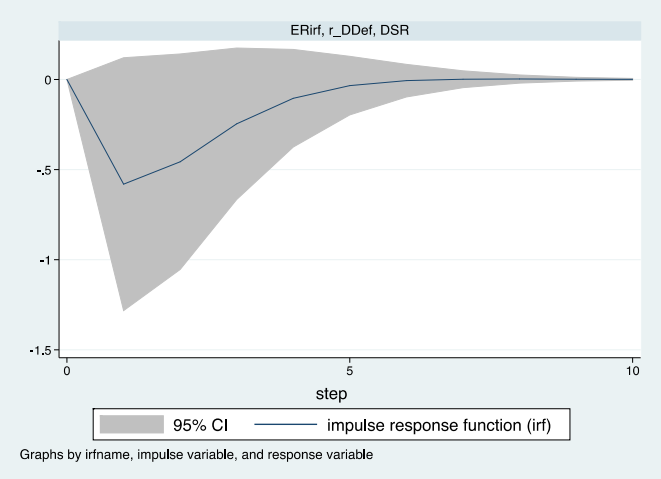
One may see that it do exists a positive shift in the savings rate when a shock in the deficit occurs, even though this change is very small. In order to understand the economic phenomena, this graphic should be watched upside-down, because a positive shock in the deficit variable, it means, in reality, a decrease in the deficit (deficits are negative). The following graphic is a representation of the re-done VAR with the Deficit variable multiplied by -1.

4. Concluding Observations and further development

The estimations of our model disagree Rose and Hakes (1995) paper, in which they are saying that an increase in the budget deficit should increase household saving. In order to obtain these results we have used a Vector Autoregression with one lag and based on its estimations, the impulse-response function was presented in the previous section. Our findings are in-line with the results of Belingher and Moroianu (2005), who are using a linear model of regression to establish a consumption function for the Romanian economy. They do not find any trail of the Ricardian Equivalence among the Romanian macroeconomic variables.

As a further development, our plan is to build another econometric model, most probably a Vector Error Correction Model, based on other variables (such as government revenues, government expenditures etc.) to test whether or not the new results correspond with the ones in this paper. Based on this paper, the deficit model, which stands for Romania's case, is the standard one.

Fig. 3. Re-done VAR's IRF with the Deficit variable multiplied by -1



Source: own computations.

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