ANALYSIS OF CONTEMPORARY ROMANIAN PUBLIC DEBT

Flavia BARNA
West University of Timişoara, Faculty of Economics and Business Administration
flavia.barna@feaa.uvt.ro
Ovidiu MURA
West University of Timişoara, Faculty of Economics and Business Administration
ovidiu.mura@feaa.uvt.ro

Abstract:
Modern research on sustainability of debt policies that apply statistical tests has started with the contribution by Hamilton and Falvin (1986) who analyzed whether the series of public debt in the USA contains a bubble term. Since then a great many papers have been written that try to answer the question of whether given debt policies can be considered as sustainable. The interest in that question is in part due to the fact that the latter question is not only of academic interest, but that it has practical relevance, too. Hence, if tests reach the conclusion that given debt policies cannot be considered as sustainable, governments should undertake corrective actions.

Keywords: *fiscal revenues, public expenditure, fiscal policy sustainability, cointegration test, seasonal adjustment.*

JEL Classification: *H50, H20, G18.*

INTRODUCTION

„Addressing long-term sustainability of public finances is one of the main drivers of our strategy to end the crisis", said the European Commissioner for Economic and Monetary Affairs, Joaquin Almunia. „We should support the economic recovery, but - in the context of a strong deterioration of public finances – the measures taken to increase the confidence and the support of the demand can yield results only if they are perceived by the public opinion and different markets as temporary and consistent with the long-term sustainability. By developing strategies for the period following the crisis, we will increase the effectiveness of short-term support measures and we will create conditions for a sustained and balanced economic growth."

Long-term sustainability of public finances is a concern to all EU countries, to an extent which however differs greatly, from one country to another. Sustainability weaknesses have become increasingly important in most countries due to economic crisis and more countries are now in a class of higher long term risk. Fiscal strategy to end the crisis, which aims to achieve ambitious and realistic medium-term targets, has to be developed now and implemented in a coordinated manner once the recovery is confirmed, taking into account the specific situation of each country. To support the necessary reforms and to enhance credibility of fiscal adjustment, and this will inevitably spread to a number of years, Member States may also have to develop their own budgetary frameworks. Regarding the Stability and Growth Pact, debt sustainability should acquire a clear and proeminent role within the monitoring procedures.

To check the sustainability of budgetary policy in Romania, we initially test if time series of differences of order 1 of the debt stock is stationary. For this we turned to the ADF stationary test (Augmented Dickey-Fuller). We also tested the existence of a relationship of Cointegration between two variables (income and public expenditure) for a disclosure of a long-term equilibrium relationship. The results lead us to conclude that the two time series to Cointegration relationship exists and the budget deficit is sustainable.

LITERATURE REVIEW

Fiscal policy is the practical expression of the vision of government authorities on the sources and practical means of establishing the public revenues, the allocation of public funds on existing destinations and, possibly, to supplement the resources collected through taxation by

resorting to public loans. The sustainability of fiscal policy is sometimes confused with the financial solvability of the government. In practice however, what the empirical literature ends up testing is whether both public expenditures and government revenues may continue to display in the future their historical growth patterns. This seems really to be the issue here, not so much a question of solvability.

If a given fiscal policy turns out to be unsustainable, it has to change in order to guarantee that the future primary balances are consistent with the budget constraint.(1) Theoretically, any value for the budget deficit would be possible if the government could rise its liabilities without limit. Obviously, that is impossible since the government is faced with the present value of its own budget constraint.

In the beginning of the 20s, when writing about the public debt problem faced by France, Keynes (1923) alerted to the need for the French government to conduct a sustainable fiscal policy in order to satisfy its budget constraint. Keynes stated that the absence of sustainability would be evident when "the State's contractual liabilities (…) have reached an excessive proportion of the national income" (p. 54).

In modern terms, sustainability is challenged when the debt-to-GDP ratio reaches an excessive value. There is a problem of sustainability when the government revenues are not enough to keep on financing the costs associated to new issuance of public debt or, in Keynes's words, when "it has become clear that the claims of the bond-holders are more than the tax payers can support" (p. 55). At that stage the government will have to take measures that allow regaining the sustainability of fiscal policy, that is the State "must come in due course to some compromise between increasing taxation, and diminishing expenditure, and reducing what (…) [it] owe[s]" (p. 59).

Blanchard et al (1990) present as a definition of sustainable fiscal policy one that allows, in the short term, that the debt-to-GDP ratio returns to its original level after some excessive variation. Put another way, for a fiscal policy to be sustainable, after having accumulated debt in the past, the government must run primary surpluses in the future.

It is worthwhile noticing that the hypothesis of fiscal policy sustainability is related to the condition that the trajectory of the main macroeconomic variables is not affected by the choice between the issuance of public debt or the increase in taxation. Under such conditions, it would therefore be irrelevant how the deficits are financed, implying also the validation of the Ricardian Equivalence issue.(2)

Hakkio and Rush (1991, pp. 430) support that an analysis based on ratios is more appropriated for growing economies: "(...) in addition to examining revenue and spending directly, we also use normalize these variables using real GNP and population. This is an important extension beyond previous work since McCallum [1984], among others, deems these ratios - per capita spending and revenue, and spending and revenue as a fraction of GNP - as more pertinent for a growing economy."

The literature exhibits generically two main approaches to test the sustainability hypothesis: tests similar to the one suggested by Trehan and Walsh (1991) and tests like the one credited to Hakkio and Rush (1991).

Trehan and Walsh (1991) suggest that in order to test empirically the absence of Ponzi games (3), the authors propose to test the stationarity of the first difference of the stock of public debt. To test for the stationarity of the process, it is possible to use the unit root tests developed by Dickey and Fuller (1979, 1981). Trehan and Walsh (1991) assume also that the real interest rate is not constant, and that a stochastic process may represent it. (4) If the null hypothesis is rejected, then the process is stationary and the sustainability hypothesis may be accepted. If on the other hand the null is not rejected, then the process may only be stationary in the first differences, which can mean sustainability problems. As observed by Trehan and Walsh (1991), the stationarity of the variation of the stock of public debt is a sufficient condition, and stationarity rejection does not necessarily imply the absence of sustainability of the government accounts.

Hakkio and Rush (1991) initially developed the empirical approach of the sustainability of fiscal policy through co-integration tests. The implicit hypothesis concerning the real interest rate, with mean *r*, is also stationarity. The empirical results may allow establishing several conclusions concerning the sustainability of the intertemporal budget constraint:

i) when there is no co-integration the fiscal deficit is not sustainable;

ii) when there is co-integration with b=1, the deficit is sustainable;

iii) when there is co-integration, with b < 1, government expenditures ar growing faster than government revenues, and the deficit may not be sustainable.(5)

SOME EMPIRICAL EVIDENCES

In this paper we tested the sustainability of fiscal policy in Romania; fiscal policy is considered sustainable if the fiscal revenues and the public expenditure are cointegrate (there are 2 non-stationary time series which have a stationary linear relationship). For this purpose we collected and processed data related to income and expenditure for the period January 2003 - November 2009, data presented in Table 1 and Table 2:

Table 1. Budget revenues during 2003-2009

- mil. RON -

	ian	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2009	6358	9355	11790	18191	21881	25495	31021	34339	39109	45450	49965	
2008	7282	10882	14966	22262	26561	30601	38711	43203	48237	55831	58554,7	61030,2
2007	3942	5866	8384	14007	18222	22014	28084	32015	36208	42488	46582	48985
2006	3701	6613	9546	13157	16837	19537	24371	27658	31229	36507	39728	40698
2005	3099	5066	7687	11240	14063	16604	20085	23359	26526	30884	34063	36600
2004	2926	4823	6874	10055	12321	14354	18155	20642	23514	27092	29602	32195
2003	2121	3577	5098	7402	9477	10927	13956	15972	18332	21415	23559	25245

Source: The monthly bulletins NBR.

Table 2. Budget expenditure during 2003-2009

- mil. RON -

	ian	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
2009	6020	13931	21826	28749	34305	40949	49380	56226	64664	72046	80822	
2008	7504	13115	19107	25036	31808	37947	43788	49765	56610	64323	72 297,1	80 889,9
2007	3741	8324	12607	16765	21509	26351	31641	36316	41471	48881	57582	64374
2006	2851	5761	9074	12483	16006	19982	23816	27666	31779	36066	41013	51236
2005	3017	5588	8360	11245	14298	17330	20341	23308	26123	29520	33410	38782
2004	2543	5087	7467	10046	12974	15788	18862	21581	24294	27769	30805	34074
2003	1961	3804	5870	8140	10510	12580	15176	17071	19467	22529	25325	28145

Source: The monthly bulletins NBR.

To test the sustainability of fiscal policy, we went through the following steps:

- **Step 1:** deseasonalisation premium time series using the ***TRAMO/SEATS*** procedure**.**

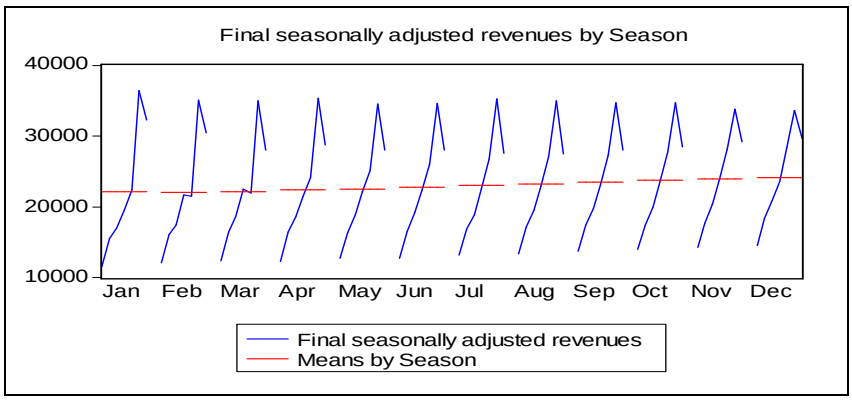

Figure 1. Seasonally adjusted revenues

Source: Eviews 5.0., author's calculation

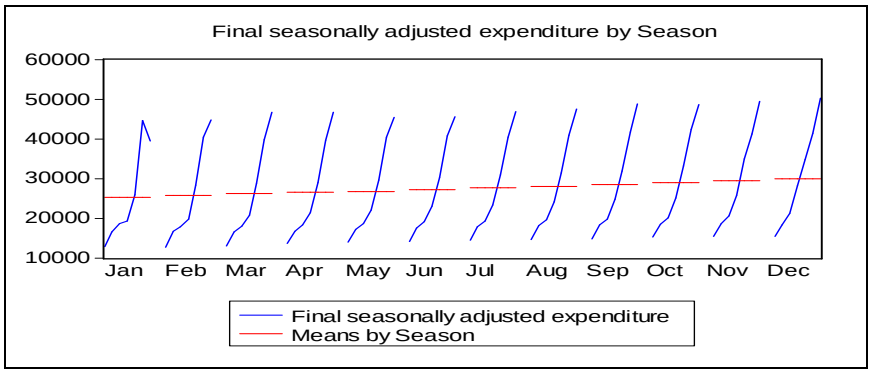

Figure 2. Seasonally adjusted expenditure

Source: Eviews 5.0., author's calculation

- **Step 2:** Testing the stationarity for seasonal adjusted series.

A) Expenditure

Table 3. ADF Test for public expenditure

Null Hypothesis: D(EXPENDITURE_SA) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-12.34931	0.0001
Test critical values:	1% level		-3.512290	
	5% level		-2.897223	
	10% level		-2.585861	
*MacKinnon (1996) one-sided p-values.				

Source: Eviews 5.0., author's calculation

B) Revenues

Table 4. ADF Test for public revenues

Null Hypothesis: D(REVENUES_SA) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic based on SIC, MAXLAG=11)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.190654	0.0000
Test critical values:	1% level		-3.512290	

	5% level		-2.897223	
	10% level		-2.585861	
*MacKinnon (1996) one-sided p-values.				

Source: Eviews 5.0., author's calculation

It is noted that in accordance with the ADF test, the series adjusted for seasonal income and expenditure have a unit root (they are processes of type I (1) – stationary on the first-order differences). It is therefore possible to apply JOHANSEN Cointegration test for the study of connections between them..

- **Step 3:** The JOHANSEN Cointegration Study***. (6)***

Table 5. The JOHANSEN Cointegration Test

Sample (adjusted): 2003M04 2009M12				
Included observations: 81 after adjustments				
Trend assumption: No deterministic trend				
Series: REVENUES_SA EXPENDITURE_SA				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.173656	15.66626	12.32090	0.0133
At most 1	0.002663	0.216024	4.129906	0.6990
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.173656	15.45023	11.22480	0.0086
At most 1	0.002663	0.216024	4.129906	0.6990
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Source: Eviews 5.0., author's calculation

Both the Trace test and Max-eigenvalue test indicates a Cointegration relationship between expenditure and revenue. The form of this cointegration relationship is:

Table 6. The cointegration relationship

EXPENDITURE_SA(-1)	1.000000
REVENUES_SA(-1)	-1.098157
	(0.15382)
	[-7.13930]
C	4380.964
	(3351.12)
	[1.30731]

Source: Eviews 5.0., author's calculation

Based on the statistical significance of parameter Cointegration and its level close to "1", it can come off the notion that public expenditure and income are cointegrated that it may be presumed some sustainability of expenditure on tax and non-fiscal resources from the revenue. Of course, it is interesting to study the time evolution of the relationship parameter between the two.

More detail, this can be based on a relationship of type:

$$\textbf{Expenditure} = \alpha_t \textbf{Revenues}_t + \varepsilon_t \quad \textbf{(1)}$$

where ε_t - „white noise" (zero average and finite variance)

Based on the estimate of this relationship, we obtain the following evolution of the parameter alpha:

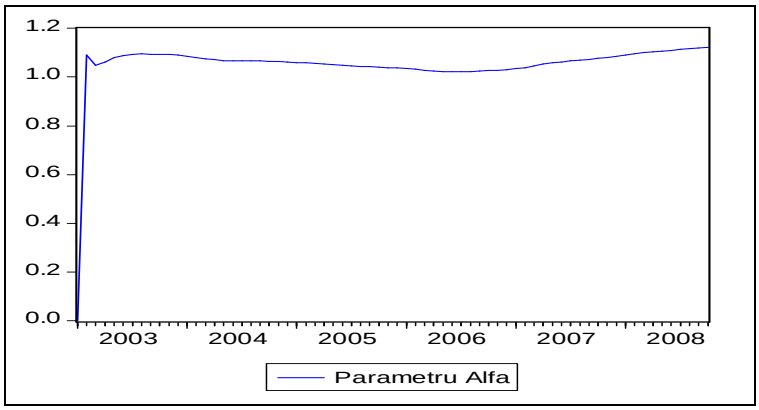

Figure 3. The Alfa Parameter

Source: Eviews 5.0., author's calculation

It is noted that for the whole period of analysis, parameter values fall on a relatively stable path maintaining supraunitare, but close to 1. Applying a test of "structural stability" (Chow Breaking Point Test) we can note that 2006 marks a point of "structural failure" in the connection between public revenues and expenditure:

Table 7. Chow Breakpoint Test

F-statistic	0.016164	Probability	0.899214
Log likelihood ratio	0.016649	Probability	0.897334

Source: Eviews 5.0., author's calculation

CONCLUSIONS

The global economic and financial crisis has sparked an unprecedentedly large, generalized fiscal policy response in practically all major industrial and emerging economies, which will change the fiscal and macroeconomic landscapes for some time to come. A desirable scenario for the medium term would see a sustained and sustainable growth rate which could allow for gradual withdrawal of fiscal stimulus and a decline in debt ratios. This scenario would imply a gradual shift from a policy driven recovery to self-sustained growth and would require a return to the global growth rates witnessed in the exceptional period before the housing bubble burst. Such a scenario, however, could be overly optimistic for at least two reasons. First, it is unlikely that the growth mechanism prevailing before the outbreak of the crisis can be restored. Second, as a consequence of the recession, potential output growth could fall in some if not all economies.

The output of the previous section seems to be quite consistent in providing a good empirical support for the thesis that the Romanian fiscal policy during the past 7 years was sustainable. Of course, the proposed analysis has a lot of limitations both at theoretical as empirical level. Between these: the incomplete definitions of various concepts, which don't cover all the critical aspects; the limited time span and data etc. But despite all these caveats, we are arguing that the evidence makes plausible the thesis that it may be presumed some sustainability of expenditure on the revenues from both fiscal and non-fiscal resources.

ENDNOTES

(1) Cuddington (1997) and Hénin (1997) discuss this topic.
(2) Caporale (1995) mentions this question. Afonso (1999) presents some empirical results on the feasibility of Ricardian Equivalence in the Euro area.
(3) When can a government borrow a dollar and never pay back any interest or principal? We call such an arrangement under perfect foresight a rational Ponzi game.
(4) Hénin (1997), supports that in a deterministic context sustainability appears as a stability condition, while as in a stochastic context sustainability is perceived as the existence or not of a stationary process for public debt.
(5) Concerning this cointegration analysis approach Bohn (1991, 1995) argues that a sustainable fiscal policy in a certain environment, may bacome unsustainable under uncertainty.
(6) The results were generated using the Eviews 5.0 program.

REFERENCES

1. Afonso, A. (1999). *Public Debt Neutrality and Private Consumption: some Evidence from the Euro Area.* Research and Forecasting Department, Ministry of Finance of Portugal, Working Paper nº 11, June.
2. Blanchard, O., Chouraqui, J., Hagemann, R., Sartor, N. (1990). *The sustainability of fiscal policy: new answers to an old question.* OECD Economic Studies 15, Autumn: 7-36.
3. Bohn, H. (1991). *The Sustainability of Budget Deficits with Lump-Sum and with Income-Based Taxation.* Journal of Money, Credit, and Banking 23 (3), Part 2: 581- 604.
4. Bohn, H. (1995). *The Sustainability of Budget Deficits in a Stochastic Economy*. Journal of Money, Credit, and Banking 27 (1): 257-271.
5. Caporale, G. (1995). *Bubble finance and debt sustainability: a test of the government's intertemporal budget constraint.* Applied Economics 27 (12): 1135-1143.
6. Cuddington, J. (1997). *Analysing the Sustainability of Fiscal Deficits in Developing Countries.* Policy Research Working Paper nº 1784, World Bank.
7. Dickey, D., Fuller, W. (1979). *Distribution of Autoregressive Time Series with Unit Root.* Journal of the American Statistical Association 74: 427-431.
8. Dickey, D., Fuller, W. (1981). *The Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root.* Econometrica 49: 1057-1072.
9. Greiner Alfred, *Sustainability of public debt: Some theoretical considerations,* Department of Business Administration and Economics, Bielefeld University.
10. Hakkio, G., Rush, M. (1991). *Is the budget deficit „too large?"* Economic Inquiry XXIX (3): 429-445.
11. Hamilton, J.D. and M. Flavin (1986) *On the limitations of government borrowing: A framework for empirical testing,* The American Economic Review, Vol. 76: 808-819.
12. Hénin, P. (1997). *Soutenabilité des déficits et ajustements budgétaires.* Révue Économique 48 (3): 371-395.
13. Keynes, J. (1923). *A Tract on Monetary Reform*, in The Collected Writings of John Maynard Keynes, vol. IV, Macmillan, 1971.
14. McCallum, B. (1984). *Are Bond-Financed Deficits Inflationary? A Ricardian Analysis.* Journal of Political Economy 92: 123-135.
15. Trehan, B., Walsh, C. (1991). *Testing Intertemporal Budget Constraints: Theory and Applications to U.S. Federal Budget and Current Account Deficits.* Journal of Money, Credit, and Banking 23 (2): 206-223.