The Influence of Public Debt on Performance:
Lesson from Romanian Counties

Larissa Batrancea
"Babes-Bolyai" University, Faculty of Business, Cluj-Napoca, Romania
larissa.batrancea@ubbcluj.ro

Abstract

A financial crisis has significant consequences on governmental resources. In the recent decade, especially after the 2007 global financial crisis, numerous studies on public debt have emerged in the literature. Moreover, an important part of a country's public debt is the level of public debt registered by regional authorities such as counties. For this reason, the article empirically investigates the impact of local public debt on the performance of six Romanian counties. By using annual data spanning the period 2007–2016, the impact is analyzed through a panel data approach. Overall results suggested that local public debt had a negative impact on the performance of local government authorities. The empirical analysis offers considerable support in relation to the sovereign debt crisis started in 2010.

Key words: public debt; repayment capacity; performance
J.E.L. classification: H72

1. Introduction

The topic of public debt is of great significance for nowadays societies around the world and has been investigated through various lenses, from economic and financial to geographical, psychological or political ones (e.g., Baglan and Yoldas, 2016; Cafiso, 2016; Cafiso and Cellini, 2014; Churchman, 1999; Citron, 1995; De Mello, 2010; Dunayev, 2013; Ferreira de Mendonça and Pereira Duarte Nunes, 2011; Gürbüz, Jobert and Tuncer, 2007; Jawadi and Sousa, 2015; Jordà, Schularick and Taylor, 2014; Kuhle, 2014; Levine, Mandilaras and Wang, 2008; Oguro and Sato, 2014; Schaltegger and Torgler, 2005; Tagkalakis, 2014; Trionfetti, 2015; Weizsacker, 2013; Woo and Kumar, 2015).

Public debt is classified into two categories, namely government debt (i.e., state authorities' obligations) and local public debt. The former includes all internal and external financial obligations of the state at a time, from direct loans or loans guaranteed by the government (through the Ministry of Finance) to the ones guaranteed by the domestic and foreign financial markets. The latter comprises all internal and external financial obligations of local authorities at a time, which are part of the country's public debt and are generated from loans contracted or guaranteed by financial markets but are not contracted by the government itself.

In terms of maturity, public debt is classified as follows: a) short-term public debt (floating); b) medium and long-term public debt (consolidated). Depending on creditors' quality, debt can be: a) gross public debt, encompassing all loans, regardless of their placement; b) net public debt, which is the decreasing value of loans placed in state institutions. The total public debt is recorded into the register of public debt and it is shown in the general account of public debt.

Public debt as a share of GDP has been rising in almost all EU countries since 2007, when the global financial crisis began (Bătrâncea, Bătrâncea and Moscviciov, 2009; Bătrâncea *et al*, 2013). The crisis has caused an important growth in public debt in countries all around the world. By the end of 2013, the level of public debt had reached almost 107% of GDP across advanced economies, which was the highest level ever reached for the past 50 years. As economic practice reveals, developed countries have the tendency to amend citizens' living standards by considerably

diminishing social security funds and by augmenting public debt through monetary instruments (e.g., lower inflation rate; stronger currency) as opposed to increasing production and adding new jobs into the economy.

At that time, the magnitude of the crisis prompted EU governments to increase public spending in a concerted manner. Governments were forced to recapitalize banks, take over a large part of the debts belonging to failing financial institutions and introduce stimulus programs to revive demand. The coordinated effort resulting in higher budget deficits and public borrowing had two consequences: on the one hand, it prevented the recession following the financial crisis to becoming another great depression; on the other hand, it triggered the sovereign debt crisis, which started from Greece. Romania was among the countries affected by the sovereign debt crisis, along with Italy, Spain and Portugal. The public debt level doubled in four years, a reality that influenced the future regional development of the country. Although the level of this economic indicator fell comfortably within the requirements of the Maastricht Treaty (i.e., 60% of GDP), its growth rate still remained worrying.

Nevertheless, the origin of the sovereign debt crisis goes deeper than fiscal imbalances of EU member states. As Vis, Woldendorp and Keman (2007) argued, miraculous economic performance usually is triggered by excellence regarding economic growth, employment and public debt.

In the case of Romania, the level of public debt comprises internal and external financial obligations of the state resulting from loans contracted or guaranteed by the government (through the Ministry of Finance), or local authorities, which are obtained from different lenders – resident or non-resident of Romania. Obligations represent commitments arising from borrowing, i.e., repayment of principal, payment of interest, fees and special benefits granted to creditors.

The present article aims to answer the following questions: Assuming that a Romanian county wished to lower its public debt ratio, what could local authorities learn from other counties that managed to overcome the economic downturn of the global financial crisis? And, if it were possible to reduce public debt by reducing county debt, how frequent have such approaches been used? Moreover, how can local authorities increase performance of Romanian counties?

The article consists of the following sections. The second section describes the methodology and variables of interest. The third section details on the method and empirical results. The last section draws main conclusions, mentions study limitations and describes future avenues of research.

2. Research methodology

For the purpose of this research, performance ratios are the outcome variables and public debt ratios are the regressors. EViews version 9.0 was the software used to analyze data. Data covered the period 2007–2016 and were retrieved from the balance sheet and patrimonial result account of six Romanian counties from the north-western part of Romania, namely: Bihor, Bistriţa-Năsăud, Cluj, Maramureş, Sălaj, Satu Mare.

The research provides important insights by assessing and understanding how public debt influences the performance of the Romanian counties before, during and after the financial crisis. Moreover, in order to assess the degree to which an economy is influenced by high levels of debt caused by external economic and financial shocks, we used specific indicators.

Performance levels of local authorities depend heavily on the financial structure favored by these authorities, namely on how work is financed by both equity and loans. According to classical theory, there is an optimal ratio between the two funding sources that generate a decrease in the capital cost of a particular local administration.

The following variables of interest were considered:
a) Short-term Public Debt to Operating Revenues ratio (PSDP);
b) Short-term Public Debt to Operating Expenses ratio (PSDC);
c) Long-term Public Debt to Operating Expenses ratio (PLDC);
d) Public Debt to GDP ratio (RSDLP);
e) Return on Assets ratio (ROA), calculated as a ratio between profit and total assets;
f) Return on Equity ratio (ROE), calculated as a ratio between profit and equity;
g) Profit Margin (MP), calculated as a ratio between profit and operating revenues;
h) Profit to Expenses ratio (RRG), calculated as a ratio between profit and total expenses.

3. Findings

Empirical analyses were conducted with Panel EGLS (cross-section weights), specific for investigating time series data.

Table no. 1. Descriptive statistics for predictor and outcome variables

	ROA	ROE	MP	RRG	PSDP	PSDC	PLDC	RSDLP
Mean	0.6600	0.6921	1.0328	1.0899	0.9127	0.9973	–0.2001	–0.4678
Median	0.6045	0.6564	1.0756	1.1453	0.9668	0.9960	0.2723	–0.4028
Maximum	1.4461	1.4723	1.6440	1.8316	1.7876	1.9893	1.6569	1.6325
Minimum	–0.5881	–0.5528	–0.4685	–0.4685	0.0380	0.0580	–3.3504	–3.5229
Std. Dev.	0.3966	0.3703	0.3757	0.4072	0.3862	0.4465	1.4410	1.5773
Skewness	–0.2728	–0.6425	–1.2795	–1.0847	–0.2232	0.0348	–0.8298	–0.3097
Kurtosis	3.8336	4.2311	5.8892	5.2964	2.3952	2.3673	2.5565	1.9038
Jarque-Bera	2.4815*	7.9173***	37.2407***	24.9485***	1.4129*	1.0129*	7.3772**	3.9631*
Sum	39.5998	41.5254	61.9699	65.3992	54.7595	59.8383	–12.0036	–28.0657
Sum sq. dev.	9.2813	8.0887	8.3284	9.7847	8.8021	11.7603	122.5142	146.7835
Observations	60	60	60	60	60	60	60	60

Source: Author's computations.

Note: ***, ** and * show significance at the 1%, 5% and 10% levels.

Table 1 displays the mean, median and standard deviation values for all the predictors and outcome variables. Regarding the fluctuation of the time series, one can notice that RSDLP registered the largest volatility, followed by PLDC, while PSDC had the lowest volatility. One variable was skewed to the right, while seven variables were skewed to the left.

Since the kurtosis values of ROA, ROE, MP and RRG were above the benchmark of 3, these variables had a leptokurtic distribution. The other variables had platykurtic distributions. According to the Jarque-Bera test, data were non-normally distributed.

Table 2 shows the correlations between the variables of interest.

Table no. 2. Correlation matrix

	ROA	ROE	MP	RRG	PSDP	PSDC	PLDC	RSDLP
ROA	1							
ROE	0.925	1						
MP	0.634	0.609	1					
RRG	0.606	0.613	0.985	1				
PSDP	–0.017	–0.062	0.445	0.453	1			
PSDC	–0.118	–0.099	0.442	0.461	0.924	1		
PLDC	–0.368	–0.354	–0.111	–0.140	0.066	0.082	1	
RSDLP	–0.455	–0.398	–0.277	–0.312	–0.034	0.019	0.866	1

Source: Author's computations.

As can be seen from Table 2, the variables of interest are moderately correlated, the highest correlation was set between RRG and PSDC ($r = 0.46$). Hence, it can be concluded that data showed no multicollinearity problems.

Within this context, the following research hypothesis was advanced:

H: There is a linear relationship between public debt ratios (PSDP, PSDC, PLDC, RSDLP) and performance ratios (ROA, ROE, MP, RRG).

The general form of the econometric model was the following:
$$Y_{it} = a_0 + a_1 X_{1\,it} + a_2 X_{2it} + a_3 X_{3it} + a_4 X_{4it} + \delta_i + \theta_t + \varepsilon_{it}$$
with:
- ➢ a_0 representing the intercept;
- ➢ a_i representing the parameter of the independent variable;

> ➢ X representing the independent variable;
> ➢ i referring to the activity of the county;
> ➢ t referring to the time frame analyzed (2007–2016);
> ➢ δ_i representing the fixed effects that intended to control for time-invariant county-specific factors;
> ➢ θ_t representing the fixed effects that control for common shocks (such as the global financial crisis);
> ➢ ε_{it} representing the error term.

Table 3 displays the estimations of the econometric models testing the relationship between public debt ratios and performance ratios for the six Romanian counties.

Table no. 3. Econometric models testing the relationship between public debt and performance

	Model 1: ROA $= a_0 + a_1 PSDP$ $+ a_2 PSDC$ $+ a_3 PLDC$ $+ a_4 RSDLP$	Model 2: ROE $= a_0 + a_1 PSDP$ $+ a_2 PSDC$ $+ a_3 PLDC$ $+ a_4 RSDLP$	Model 3: MP $= a_0 + a_1 PSDP$ $+ a_2 PSDC$ $+ a_3 PLDC$ $+ a_4 RSDLP$	Model 4: RRG $= a_0 + a_1 PSDP$ $+ a_2 PSDC$ $+ a_3 PLDC$ $+ a_4 RSDLP$
Constant	0.7038*** (14.0232)	0.7911*** (14.1048)	0.6502*** (6.2594)	0.6522*** (5.5630)
$PSDP$	0.5620** (2.4894)	0.1997 (1.0138)	0.1741 (0.7764)	0.0028 (0.0101)
$PSDC$	−0.5716*** (−2.7433)	−0.2803 (−1.4705)	0.1832 (0.7594)	0.3920 (1.3576)
$PLDC$	0.0248 (0.6534)	0.0021 (0.0508)	0.1139*** (2.7066)	0.1257** (2.4725)
$RSDLP$	−0.1065** (−2.6315)	−0.0828** (−1.9713)	−0.1662*** (−4.1419)	−0.1895*** (−3.9506)
Prob.>F	0.0016	0.0154	0.0000	0.0000
R^2	0.2684	0.1969	0.4531	0.4817
Adjusted R-squared	0.2152	0.1385	0.4134	0.4440
F-statistic	5.0448	3.3720	11.3928	12.7807
Observations	60	60	60	60

Source: Author's computations.

Note: Robust *t*-statistics are displayed in parentheses; *, **, *** denote statistical significance at the 10%, 5% and 1% levels. For all models, the variance inflation test was used to investigate the hypothesis of multicollinearity. No major risk of multicollinearity was detected. Homoskedasticity was investigated with the Glejser and ARCH tests, which rejected the null hypothesis of homoskedasticity.

Empirical results will be detailed in the following paragraphs with the help of the four estimated econometric models.

According to *Model 1*, three out of the four public debt ratios had a significant impact on the performance level of Romanian countries ($F = 5.045$, $p < .05$) and accounted for 21.52% of the variance in performance. That is, if PSDP increased by one unit, county performance measured via return on assets would increase by 0.562 units. The impact of both PSDC and RSDLP was negative: when these predictors registered a rise of one unit, the level of performance at county level would decrease by 0.572 and 0.106 units, respectively.

Model 2 showed that only RSDLP had a significant influence on return on equity ($F = 3.37$, $p < .05$). Namely, when RSDLP had a growth of one unit, the level of performance would decrease by 0.083 units. Judging by the size of the adjusted *R*-squared, it can be stated that 13.85% of the change in return on equity was due to the ratio of public debt to GDP.

Starting from *Model 3*, one can notice that PLDC and RSDLP established a significant relationship with performance measured by profit margin, while the other two independent variables did not reach significance ($F = 11.39$, $p < .001$). Therefore, if PLDC increased by one unit, profit margin would augment by 0.114. At the same time, when RSDLP grew by one unit, profit margin

would decrease by 0.166 units. The value of the adjusted R-squared indicated that 41.34% of the variance in performance was triggered by the significant predictors, namely long-term public debt to operating expenses ratio and public debt to GDP ratio.

As in the case of the previous estimations, Model 4 reported that PLDC and RSDLP were again main determinants of performance at county level ($F = 12.78$, $p < .001$). Based on the estimated coefficients, it could be stated that a one-unit rise in PLDC would be followed by a 0.126-unit increase in RRG. Moreover, should RSDLP increase by one unit, performance measured through RRG would decrease by 0.190 units. Empirical results revealed that the combined influence of the ratio of long-term public debt to operating expenses and the ratio of public debt to GDP was ultimately 44.4%. Hence, this particular econometric model has registered the highest variance in the level of performance on the account of the two significant predictors.

4. Conclusions

The management of public debt requires proper strategies in order to mobilize the necessary amounts of funding, conduct risk analyses and set cost goals (Bătrâncea and Bătrâncea, 2006; Bătrâncea, Bătrâncea and Borlea, 2007; Bătrâncea *et al*, 2007, 2010; Bătrâncea, 2009). Hence, managers of local public administrations pay their financial obligations at a cost as low as possible on the medium and long term, while maintaining risks at a tolerable level. In this line of thought, local administrations should avoid dangerous loan structures and strategies that entail default risks, which in turn would decrease public authorities' credibility and capacity to mobilize internal and external resources. Moreover, a change in the benchmark ceiling of local public debt would minimize borrowing capacity and also the size of the local public debt. Concerning specific risks related to managing the level of local public debt (i.e., market risk, refinancing risk, operational risk), these must be subject to careful monitoring and evaluation.

The present study has revealed the importance of using financial ratios with the purpose of analyzing the impact of public debt on the performance of local government authorities. For that matter, a special focus on the activity of local governments and public debt represents a subject of great interest in the context of the sovereign debt crisis. Results obtained by local government authorities depend mainly on the manner in which activities are financed though equity and loans.

Empirical results showed that the performance level of local government authorities in Romanian counties was negatively influenced by the public debt to GDP ratio. At the same time, the short-term public debt to operating revenues ratio had a positive influence on return on assets, meaning that in the period 2007–2016 the increase in operating revenues matched the increase in short-term public debt, thus it positively impacted on ROA. Moreover, the significantly negative influence of the short-term public debt to operating expenses ratio was due to an increase in operating expenses, which triggered a diminished level of return on assets. Overall, the negative impact of the public debt to GDP indicator can be explained by means of a faster increase in public debt as compared to GDP, which implies the payment of higher interest rates for loans. As expected, local government authorities registered a mitigation in their profit level and a decrease in performance level measured by return on assets, return on equity, profit margin and profit to total expenses ratios.

In terms of study limitations, one could mention the sample size and the time frame investigated, which spread across a decade. In this line of thought, future research could consider expanding the analyses to all 41 countries in Romania and running comparative analyses in order to identify the most performant regions in the country. Regarding the time span, upcoming research could analyze a two-decade period and cover also the COVID-19 pandemic crisis.

The following avenues for future research would be of interest for researchers, practitioners and the general public: a comparative investigation between different regions within the European Union, to single out the most performant regional authorities; investigations on various risks associated with local public debt and their influence on EU citizens, with a special focus on unemployment, income and expenses levels, living standards, quality of life, etc.

All in all, the current empirical study provides interesting insights into how local government authorities manage to maintain a balance between obtaining revenues to provide public goods through loans and to ensure an adequate level of financial performance for their local activities.

5. References

- Baglan, D. and Yoldas, E., 2016. Public debt and macroeconomic activity: A predictive analysis for advanced economies. *Studies in Nonlinear Dynamics & Econometrics*, 20(3), pp.301–324.
- Bătrâncea, I., Dumbravă, P., Bătrâncea, L.M. and Borlea, S.N., 2007. *Controlul şi auditul financiar al entităţii economice [The financial control and audit of the economic entity]*. Cluj-Napoca: Risoprint.
- Bătrâncea, L., 2009. *Teoria jocurilor. Comportament economic. Experimente [Game theory. Economic behavior. Experiments]*. Cluj-Napoca: Risoprint.
- Bătrâncea, I., Bătrâncea, L.M. and Borlea, S.N., 2007. *Analiza financiară a entităţii economice [The financial analysis of the economic entity]*. Cluj-Napoca: Risoprint.
- Bătrâncea, I., Moscviciov, A., Bătrâncea, L.M. and Bătrâncea, M., 2010. *Raportarea şi analiza financiară a entităţii economice [Financial reporting and analysis of the economic entity]*. Cluj-Napoca: Risoprint.
- Bătrâncea, I., Moscviciov, A., Sabău, C. and Bătrâncea, L.M., 2013. Banking crisis: Causes, characteristics and solutions. *Proceedings of the DIEM 2013 Scientific Conference on Innovative Approaches to the Contemporary Economic Problems*, pp.16–29.
- Bătrâncea, L., Bătrâncea, I. and Moscviciov, A., 2009. The roots of the world financial crisis. *Annals of Faculty of Economics*, 3(1), pp.57–62.
- Bătrâncea, M. and Bătrâncea, L.M., 2006. *Standing financiar-bancar [Financial-banking standing]*. Cluj-Napoca: Risoprint.
- Cafiso, G., 2016. Non-residents' holdings, market volatility and public debt sustainability. An analysis with data for Italy. *Review of International Economics*, 24(3), pp.484–513.
- Cafiso, G. and Cellini, R., 2014. Fiscal consolidations and public debt in Europe. *International Tax Public Finance*, 21, pp.614–644.
- Churchman, N., 1999. Public debt policy and public extravagance: The Ricardo-Malthus debate. *History of Political Economy*, 31(4), pp.653–673.
- Citron, D.B., 1995. The incidence of accounting-based covenants in UK public debt contracts: An empirical analysis. *Accounting & Business Research*, 25(99), pp.139–150.
- De Mello, L., 2010. Estimating a fiscal reaction function: the case of debt sustainability in Brazil. *Applied Economics*, 40(3), pp.271–284.
- Dunayev, B.B., 2013. Dynamics of public debt management. *Cybernetics and Systems Analysis*, 49(6), pp.865–876.
- Ferreira de Mendonça, H. and Pereira Duarte Nunes, M., 2011. Public debt and risk premium. An analysis from an emerging economy. *Journal of Economic Studies*, 38(2), pp.203–217.
- Greiner, A., 2008. Human capital formation, public debt and economic growth. *Journal of Macroeconomics*, 30(1), pp.415–427.
- Gürbüz, Y., Jobert, T. and Tuncer, R., 2007. Public debt in Turkey: Evaluation and perspectives. *Applied Economics*, 39(3), pp.343–359.
- Jawadi, F. and Sousa, R.M., 2015. Structural breaks and nonlinearity in US and UK public debts. *Applied Economics Letters*, 20(7), pp.653–657.
- Jordà, Ò., Schularick, M. and Taylor, A.M., 2014. Private credit and public debt in financial crises. *FRBSF Economic Letter*, 7, pp.1–4.
- Kuhle, W., 2014. The optimal structure for public debt. *Metroeconomica*, 65(2), pp.321–348.
- Levine, P., Mandilaras, A. and Wang, J., 2008. Public debt maturity and currency crises. *Scottish Journal of Political Economy*, 55(1), pp.79–106.
- Oguro, K. and Sato, M., 2014. Public debt accumulation and fiscal consolidation. *Applied Economics*, 46(7), pp.663–673.
- Schaltegger, C.A. and Torgler, B., 2005. Trust in government and public debt: An empirical analysis. *Proceedings of the 98th Annual Conference on Taxation*, Miami, Florida, USA, pp.217–222.
- Tagkalakis, A.O., 2014. Financial stability indicators and public debt developments. *The Quarterly Review of Economics and Finance*, 54, pp.158–179.
- Trionfetti, F., 2015. Public debt and economic geography. *International Regional Science Review*, 38(1), pp.92–113.
- Vis, B., Woldendorp, J. and Keman, H., 2007. Do miracles exist? Analyzing economic performance comparatively. *Journal of Business Research*, 60(5), pp.531–538.
- Weizsacker, C.Ch., 2013. Public debt and price stability. *German Economic Review*, 15(1), pp.42–61.
- Woo, J. and Kumar, M.S., 2015. Public debt and growth. *Economica*, 82(327), pp.1-2.