SUSTAINABILITY OF SERBIAN PUBLIC DEBT IN REGARD TO ECONOMIC CRISIS[1]

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Abstract: Despite the considerably low share of public debt-to-GDP in Serbia relative to EU average, rapid increase in indebtedness since global crisis has emerged, as well as Greek debt crisis experience, raise the questions about Serbian public debt sustainability and possibility of "Greek scenario" occurrence. In this paper we analyze mid-term sustainability of Serbian public debt in regard to the DSA methodology of IMF for Market Access Countries taking into account main contributing variables of public debt growth. We conclude that Serbia obviously not in the position to significantly improve its public finance in the years to follow and thus do not have considerable options to avoid the new increase in debt-to-GDP ratio if the second wave of crisis emerged. However, with regards to the analysis of dynamics of variables that contribute to debt growth, it is encouraging that experience of "Greek scenario" for Serbia is not probable scenario in the medium-run, although in the long-run without cutting public finance expenditures and decreasing in the level of debt denominated in foreign currency unsustainable path of public debt dynamic could become reality.

keywords: public debt sustainability, economic crisis, currency structure, Serbia

Introduction

The sustainability of public debt has emerged as the major economic issue since sovereign debt crisis hit the several European countries and put the major threat to spread worldwide, similar to the extension of US subprime mortgage crisis to global economic crisis in late 2000s. The bailout actions

taken by policy makers in many European countries in order to alleviate recession have left the high level of public indebtedness, deteriorated government finance and high interest rate on sovereign debt. The escalating yield spreads in the euro area in 2010 have underlined how suddenly these mechanisms can cut off a sovereign borrower from the capital markets and raise the concerns about sovereigns default.

Serbian public debt is still on the significantly lower level than European average, but during the only three years raised from 25% to around 45%. The data on both IMF and Ministry of Finance projections of public debt increase in the previous years showed to be too optimistic in this regard. However, lessons learned from this episode could be used for making the more realistic projections keeping in mind threat from emergence of new economic crisis.

The concept of fiscal sustainability draws on the idea that public debt cannot keep on growing relative to national income because this would require governments to constantly increase taxes and reduce spending on goods and services (Akyüz 2007). There is the waste of academic and policy making literature discussing the most appropriate methodology for the projection of public debt dynamics and sustainability in medium and long run. One of the widely used is IMF methodology called Debt Sustainability Assessment (DSA), which relies on IMF stuff projections of main fiscal variables and scenario analysis of possible adverse shocks. DSA was widely criticized, from the conceptual level (Wyplosz, 2011) to methodological level, as it is highly standardized and implemented in deterministic manner with quite unrealistic assumptions on size and probabilities of possible shocks (Debrun, Celasun and Ostry, 2006; Gray at al, 2008). Despite its shortcomings, the IMF's framework for fiscal sustainability analysis is found to be quite useful to the practicing economist (Burnside 2004).

In this paper we analyze sustainability of Serbian public debt in regard to the DSA methodology of IMF for Market Access Countries taking into account main contributing variables of public debt growth. First section presents methodology of public debt measuring and the few basic indicators on public debt in Serbia. Second section briefly presents DSA methodology. Third section deals with the analysis of main public debt risks factors dynamics in Serbia during the crisis. In the concluding section we give an overview of possible influence of second wave of crisis, based on previous analysis.

1. Public debt level and structure in Serbia

Public debt is generally considered as the debt of the government and other institutions under direct control of the Government. However, interpretation of particular elements that should be taken into account when public debt is computed is not so straightforward in practice and depends on particular methodology of the institutions which measures the debt. According to Law on Public Debt, public debt in Serbia is defined either as direct sovereign borrowing (by contracting or security issue), or guarantees for state-owned companies and local governments, which could be interpreted as the public debt of central government enlarged by debt guarantees of the Republic. This is in a way different than methodology for public debt coverage stated by the Law on Budget System, which comprises public debt in broader sense, including the debt of local government and funds of social securities, which together with central government obligations makes the general government debt. On the other side, international institutions like International Monetary Fund and European Union propose methodology for public debt measurement which cover the general government debt plus activated guarantees (without non-activated guarantees which is also known as contingent liabilities). The differences of the methodology in public debt coverage are illustrated in Table 1.

Table 1: Public debt coverage according to the government levels and instruments

	Central government	Local government	Social security funds	Activated guarantees	Non-activated guarantees
Law on public debt	+	-	-	+	+
Law on budget system	+	+	+	+	+
International standards	+	+	+	+	-

Source: Fiscal Council

As the public debt is usually indicated as the share of GDP, it is also worthy to mention that even when public debt is covered in the same way, the different institutions could calculate different values of this indicator during the year if they use different methodologies of GDP estimation.

This is in Serbia case with the Ministry of Finance (MF, in charge for public debt management) and National Bank of Serbia (NBS), which both evident public debt according to the Law on Public Debt, but due to the different estimations of GDP produce different values of debt-to-GDP ratio during the calendar year: MF is using during the whole year estimated value of GDP at the beginning of the year, while NBS is using the rolling GDP estimation as a sum of previous four quarterly values of GDP.

In regard to the previous remarks, by the end of 2011, even four different values of debt-to-GDP values were presented to the public, which is illustrated in Table 2.

Table 2: Debt-to-GDP share in 2011, according to the different methodologies

Institution	Debt calculation	GDP estimation	Debt-to-GDP 2011
Ministry of Finance	Law on Public Debt	Estimation at the beginning of the year	45.1
National Bank of Serbia	Law on Public Debt	Rolling sum of previous for quarters	45.8
Fiscal Council	Law on Budget System	Rolling sum of previous for quarters	46.6
Ministry of Finance	Maastricht's criterion	Estimation at the beginning of the year	42.5

Source: Fiscal Council

This was a bit confusing, as the Law on Budget System states 45% of debt-to-GDP as the upper limit of borrowing; thus it stays unclear if this Law is eventually violated.

However, in this paper we will further proceed with data on public debt produced by Ministry of Finance, if not differently stated. We briefly presented some basic statistics, the most relevant for the debt sustainability assessment, comprising the period from last quarter 2007 to third quarter of 2011, more specifically public debt-to-GDP ratio and interest and currency structure. Public debt-to-GDP ratio shows steady trend of increase since the crisis emerged, growing from 25% to the critical level around 45%, which is shown in Figure 1.
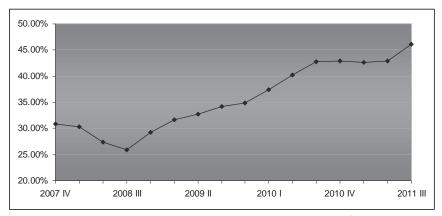
Figure 1: Public debt-to-GDP, IV:2007 – III: 2011[2]

Risk analysis of public debt literature usually underlined interest rates, exchange rates and inflation as the main market risk drivers, in addition to fiscal risks. As the inflation-indexed financial instruments were recently introduced in Serbian public debt portfolio, they still do not have important share in total value of debt. Oppositely, debt instruments denominated in foreign currencies, as presented in Figure 2 (upper line), still prevail in debt portfolio, although their share has been declining in the time of crisis. In addition, fixed interest loans participation (bottom line) also declined in recent period, but still dominates interest rate structure.

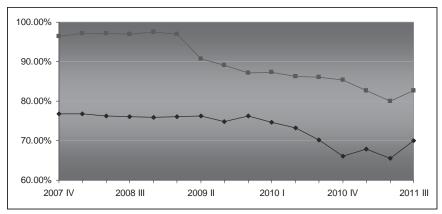[2] Source: MF, SSO (Serbian Statistical Office), authors' calculations

Figure 2: Foreign currency denominated debt and fixed interest debt share in total debt, IV:2007 – III: 2011[3]

First look on the basic debt statistics indicates potentially larger influence of exchange rate risk than interest rate risk on public debt increase in observed period, however full picture couldn't be completed without taking into account fiscal risks, and in that sense DSA methodology, presented in the following section, provides the more comprehensive framework for such kind of analysis.

2. DSA methodology for the assessment of public debt risk exposure

IMF Sustainability Assessment (DSA) framework for Market Access Countries[4] (MAC) was introduced in 2002 and refined in 2003 and 2005.

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[3] Source: MF, authors' calculations

[4] See Assessing Sustainability, Information Note on Modifications to the Fund's Debt Sustainability Assessment Framework for Market-Access Countries (2002), Sustainability Assessments – Review of Application (2003) and Methodological Refinements (2005)

The latter framework for low income countries[5] (LIC) was developed jointly with the World Bank in 2005. DSA framework is primarily based on debt accumulation equation and thus belongs to the financing gap approach[6] to public debt sustainability assessment (Tran-Nguyen and Tola, 2009). Essentially, it allows sensitivity analysis and stress testing of debt under different scenarios of economic policies and macroeconomic shocks. Stress testing of the public finance to the particular macroeconomic shocks was already the subject of the academic research prior to 2000s, e.g. see Jemec at al. (2011) for overview of the literature on effects of fiscal shocks; however, DSA provides more comprehensive framework for such analysis.

According to the DSA, change in public debt could be decomposed into the regular part, comprised of identified debt-creating flows and irregular, comprised of unidentified residuals and change of asset. Identified part is further decomposed to automatic debt dynamics, i.e. contribution of interest rate, real GDP growth and change of exchange rate, then primary balance contribution and other identified flows, manly privatization receipts and recognition of contingent liabilities.

Slightly modified version of quantitative framework of DSA methodology is briefly presented in this section. It starts with the equation of debt accumulation is given as:

$$D_t = \left[\left(1 + \varepsilon_t\right)\left(1 + r_t^f\right) D_{t-1}^f \right] + \left(1 + r_t^d\right) D_{t-1}^d + PB_t \qquad (1)$$

D_t - total stock of debt

PB_t - primary balance

D_{t-1}^f - foreign-currency debt in previous period

D_{t-1}^d - domestic-currency debt in previous period

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[5] See Operational Framework for Debt Sustainability Assessments in Low-Income Countries - Further Considerations (2005)

[6] For detailed discussion on main approaches to public debt sustainability, see Tran-Nguyen and Tola (2009)

r_t^f - foreign interest rate

r_t^d - domestic interest rate

ε_t - depreciation of exchange rate

Equation could be switched from the absolute values to values relative to current nominal GDP:

$$d_t = \left[\left(1+\varepsilon_t\right)\left(1+r_t^f\right)\frac{D_{t-1}^f}{Y_t} \right] + \left(1+r_t^d\right)\frac{D_{t-1}^d}{Y_t} + pb_t \tag{2}$$

where d_t and pb_t denote the values of debt and primary balance relative GDP, respectively.

As the nominal GDP at time t equals nominal GDP from previous period enlarged by real growth and growth of inflation:

$$Y_t = \left(1+g_t\right)\left(1+\pi_t\right)Y_{t-1} \tag{3}$$

where g_t and π_t are real GDP growth and inflation measured by change of GDP deflator. Equation on relative debt dynamics then could be rewritten as:

$$d_t = \left[\frac{\left(1+\varepsilon_t\right)\left(1+r_t^f\right)}{\left(1+g_t\right)\left(1+\pi_t\right)}d_{t-1}^f \right] + \frac{\left(1+r_t^d\right)}{\left(1+g_t\right)\left(1+\pi_t\right)}d_{t-1}^d + pb_t \tag{4}$$

If we denote d_{t-1}^f as the share of foreign-currency debt in total debt in previous period α_{t-1}, $d_{t-1}^f = \alpha_{t-1}d_{t-1}$ then previous equation could be further rearranged as:

$$d_t = \frac{1}{\left(1+g_t\right)\left(1+\pi_t\right)}\left[d_{t-1} + \varepsilon_t\left(1+r_t^f\right)\alpha_{t-1}d_{t-1} + r_t^f\alpha_{t-1}d_{t-1} + r_t^d\left(1-\alpha_{t-1}\right)d_{t-1} \right] + pb_t \tag{5}$$

If we make further simplification that $r_t = \alpha_{t-1}r_t^f + (1 - \alpha_{t-1})r_t^d$, and that approximately r_t^f is equal to r_t, after several arithmetic transformation, equation on relative debt increment turns to be:

$$d_t - d_{t-1} = \frac{\left[r_t - \pi_t(1 + g_t) - g_t + \varepsilon_t \alpha_{t-1}(1 + r_t) \right]}{(1 + g_t)(1 + \pi_t)} d_{t-1} + pb_t \tag{6}$$

First part of the right side of equation represents the automatic debt creating flows, more specifically:

$\dfrac{r_t - \pi_t(1 + g_t)}{(1 + g_t)(1 + \pi_t)} d_{t-1}$ - real interest rate contribution to change in public debt,

$\dfrac{-g_t}{(1 + g_t)(1 + \pi_t)} d_{t-1}$ - real GDP growth contribution to change in public debt,

$\dfrac{\left[\varepsilon_t \alpha_{t-1}(1 + r_t) \right]}{(1 + g_t)(1 + \pi_t)} d_{t-1}$ - exchange rate depreciation contribution to change in public debt.

Decomposition of Serbian public debt[7] according to DSA methodology for the period 2006-2008 is illustrated in Table 3 in more details.

Table 3: Decomposition of Serbian public debt by IMF, 2006 - 2008

	Balance Items	2006	2007	2008
I (1+4+9)	Identified debt-creating flows	-17.5	-7.7	-0.8
1 (3-2)	Primary deficit	0	-1.1	-1.9
2	Revenue and grants	43.8	42.4	40.9
3	Primary (non-interest) expenditure	43.8	43.5	42.8

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[7] Measured in accordance to international standards given in Table 2.

4 (5+8)	Automatic debt dynamics	-9.8	-6.1	-1.5
5 (6+7)	Contribution from interest rate/growth differential	-6.8	-6.2	-4.5
6	Of which contribution from real interest rate	-4.3	-3.7	-2.9
7	Of which contribution from real GDP growth	-2.5	-2.5	-1.6
8	Contribution from exchange rate depreciation	-3	0.1	3
9 (10+11+12)	Other identified debt-creating flows	-7.8	-2.8	-1.2
10	Privatization receipts (negative)	-7.8	-2.8	-1.2
11	Recognition of implicit or contingent liabilities	0.0	0.0	0.0
12	Other (specify, e.g. bank recapitalization)	0.0	0.0	0.0
II	Residual, including asset changes	4	-1.6	-0.9

Source: IMF Country Report No. 10/25, January 2010

Obviously, from the DSA methodology, risk of unexpected increase in interest rate, depreciation of domestic currency, lowering of GDP growth or increase in primary balance are seen as the main risk factors for the increase in public debt above some targeted value. According to the original methodology of IMF, real interest rate is measured in implicit manner, as nominal interest expenditure divided by previous period debt stock minus inflation rate. Inflation rate is measured by change of GDP deflator.

3.   Analysis of main risk factors dynamics during the crisis

Effects of recent global crisis on these main risk factors dynamics offers a solid background for the analysis of possible future effects that could occur if second wave of the crisis emerges. In this section we will proceed analysis of dynamics of risk factors, following the DSA methodology and definitions of variables.

3.1.   Real interest rate

Annualized real implicit interest rate is computed on quarterly basis in several steps, in regard to the different datasets and frequency of the variable measuring. First, annualized values of nominal interest expenditures and public debt, both in current prices, are obtained as the rolling sum of monthly values for the previous 12 months, as these data are announced on monthly basis by Ministry of Finance. Nominal implicit interest rate is computed as annualized nominal expenditures for given

quarter divided by annualized GDP[8] (as the sum of rolling quarterly values) in the same quarter one year lagged. GDP deflator is computed as ratio of nominal and chain linked GDP (in relative price in 2005) values, and inflation as change of GDP deflator relative to its value in the same quarter in previous year. Data on real interest rate, in the period IV:2007 – III:2011, on public debt are given in Figure 3.
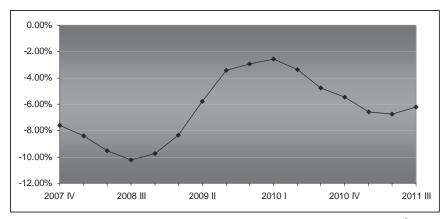
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[8] We use data on GDP announced by SSO

Figure 3: Real interest rate on Serbian public debt, IV:2007 – III:2011[9]

The real implicit interest rate has been negative during the whole observed period, continuing the same trend as presented in Table 3, based on the IMF calculations. Although since the beginning of crisis by the end of 2008 interest rate increased, it never reached positive values and even dropped again in 2010. Such low levels of real interest rate could be explained by high share of underpriced fixed interest rate loans obtained under the favorable conditions for the development purposes.

3.2.   Real GDP growth

Annualized data on GDP growth are computed on quarterly basis as the change in rolling sum of chain linked GDP values (in relative prices in 2005) relative to values one year lagged. Dynamic of GDP growth is shown in Figure 4.
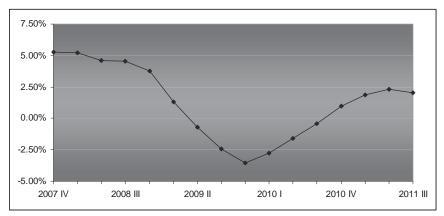
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[9] Source: Authors' calculations

Figure 4: Real GDP growth, IV:2007 – III:2011[10]

Real GDP growth was significantly affected by the crisis as it dropped from the level of 5% to around -4% at the beginning of 2009; however, it recovered during the 2010 to the positive value, and the positive contribution to public debt growth disappeared in 2011.

3.3.   Exchange rate

Exchange rate depreciation is computed simply as annual change of EUR exchange rate at the end of selected quarter, as the participation of EUR debt is the highest relative to other foreign currencies' denominated debt. Data on exchange rate depreciation are presented in Figure 5.
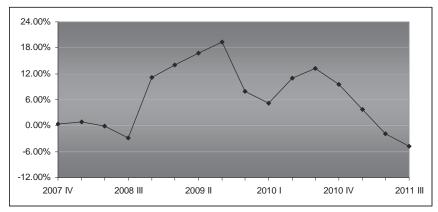
[10] Source: Authors' calculations

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Figure 5: EUR Exchange rate depreciation, IV:2007 – III:2011[11]

Since the beginning of the crisis, exchange rate sharply depreciated and even in 2010, whereby all other risk variables recorded recovering, it still continued to depreciate giving the positive contribution to increase of public debt.

3.4. Primary balance

Annualized data on primary deficit to GDP ratio are computed as rolling sum of primary balance monthly values (in current prices) for previous 12 months divided by corresponding annualized values of GDP in current prices. Dynamic of primary balance (deficit here take the positive values) is given in Figure 6.
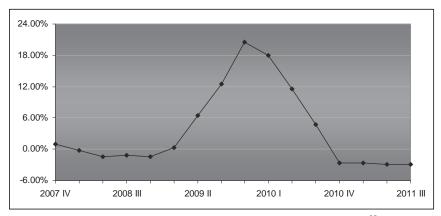
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[11] Source: Authors' calculations

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Figure 6: Primary deficit to GDP ratio, IV:2007 – III:2011[12]

Similar to the other variables, primary deficit increased significantly since the beginning of the crisis, and this increase in relative sense was additionally multiplied by the decrease in real GDP growth.

Conclusion

Particular analysis of risk factor dynamics in the period surrounding the recent crisis shows clearly that each of them was significantly affected by the adverse shock. Thus the correlation matrix presented in Table 4 shows existence of the significant correlations between each par of the risk variables.

Table 4: Correlation matrix of main risk factors dynamic

	GDP real growth	Exchange rate change	PB to GDP ratio
Real interest rate	-0.9126	0.4203	0.7942
GDP real growth		-0.6092	-0.8324

[12] Source: Authors' calculations

Exchange rate change			0.4388

Source: Authors' calculations

However, concerning the levels and time length, the exchange rate and primary balance seems to be the most significant contributors to public debt-to-GDP ratio increase in observed period, especially in regard to the high participation of foreign currency indexed debt in total debt portfolio. On the other side, decrease in real GDP seems to have less contribution, while real interest rate, also worsened in this period, still has the negative effect on debt-to-GDP ratio growth.

If we raised the question what would happen if the second wave of the crisis hit the Serbian economy, generally two issues should be considered; first, what is the probability that the same scenario would happen again in regard to the debt dynamic and second, would it be sustainable this time in the medium run?

Regarding the first issue, in case of Serbia exchange rate dynamic reflects the current deficit financing problems while primary deficit reflects the increase in budget deficit due to financing of recession countercyclical police. As the prospective for the increase in economic activity and the improvement of external positions of Serbian economy does not get better significantly, we could not be optimistic toward this direction and expect that, in the case that second wave of crisis emerged, increase in exchange rate depreciation and in primary balance will remain main contributors to boost the public debt-to-GDP ratio to the level higher than 45%.

Regarding the second issue, emergence of crisis would require the new government borrowings and open the question about the possibility of "Greek scenario" occurrence, i.e. if it is possible that risk premiums for the new borrowings go so high that country could not survive without external assistance? In Serbian case, the new borrowings would be probably realized on the debt markets rather then loan taking, and under the higher price reflecting the expected increase in risk premium. Consequently, it would increase both interest rate on public debt and its sensitivity to interest rate risk. Nonetheless, as the implicit interest rate is still negative and share of fixed interest loan still very high, it is not reasonable to expect that in the medium-run risk premiums for Serbian sovereign debt could become so high to cut off Serbia from the international debt markets. In addition, level of Serbian public debt-to-

GDP ratio is still below the average of European Union, and thus Serbia still have enough possibilities for the new loans and debt issuance.

Taking altogether, Serbia is obviously not in the position to significantly improve its public finance in the years to follow and thus do not have considerable options to avoid the new increase in debt-to-GDP ratio if the second wave of crisis emerged. However, it is encouraging that experience of "Greek scenario" for Serbia is not probable scenario in the medium-run, although in the long-run without cutting public finance expenditures and decreasing in the level of debt denominated in foreign currency unsustainable path of public debt dynamic could become reality.

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ODRŽIVOST JAVNOG DUGA SRBIJE U USLOVIMA EKONOMSKE KRIZE

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Rezime: Iako se učešće javnog duga u bruto domaćem proizvodu srpske ekonomije ne može okarakterisati visokim u poređenju sa prosekom Evropske unije, rapidno uvećanje zaduživanja inicirano izbijanjem globalne krize, kao i iskustvo sa grčkom dužničkom krizom, otvorili su pitanja o održivosti javnog duga Srbije i o mogućnosti realizacije „grčkog scenarija". U ovom radu analiziramo srednjoročnu održivost javnog duga Srbije, uzimajući u obzir glavne varijable koje doprinose uvećanju duga na bazi metodologije MMF-a za procenu održivosti javnog duga (Debt Sustainability Assessment – DSA) za zemlje sa pristupom finansijskim tržištima. Naš je zaključak da u narednim godinama Srbija nije u mogućnosti da značajno poboljša svoje javne finansije i samim tim ni mogućnosti da spreči dalji rast učešća duga u BDP-u u slučaju novog talasa ekonomske krize. Uprkos tome, analiza dinamike varijabli koje doprinose uvećanju duga, implicira da mogućnost realizacije „grčkog scenarija" nije verovatna u srednjem roku, iako bi u dugom roku bez smanjenja javnih rashoda i smanjenja duga denominiranog u stranoj valuti neodrživa dinamika rasta javnog duga mogla postati realnost.

ključne reči: održivost javnog duga, ekonomska kriza, valutna struktura, Srbija

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