



www.sjm06.com

Serbian Journal of Management 13 (2) (2018) 251 - 262

Serbian
Journal
of
Management

PUBLIC DEBT GROWTH, GREAT RECESSION AND FISCAL CONSOLIDATION-THE SERBIAN EPISODE

Vladimir Andrić* and Jelena Minović

Institute of Economic Sciences, Zmaj Jovina 12, 11000 Belgrade, Serbia

(Received 11 September 2018; accepted 28 October 2018)

Abstract

This paper analyses the dynamics of public debt growth in Serbia between the fourth quarter of 2004 (2004Q4) and the same quarter of 2017 (2017Q4). The empirical estimates capture the upward shift in public debt growth from the onset of the Great Recession. The results also show how policy makers have managed to curb the growth of public indebtedness in Serbia between 2014Q4-2017Q4. The government should, however, put greater fiscal efforts to reduce the overall share of public debt in gross domestic product in accordance with the fiscal rules of the Republic of Serbia and the Maastricht convergence criteria.

Keywords: public debt growth, great recession, fiscal consolidation, Serbia

1. INTRODUCTION

This paper investigates the dynamics of public debt growth in Serbia between 2004Q4 and 2017Q4. The overall public indebtedness in Serbia exhibited one of the fastest increases among emerging European economies from the onset of the Great Recession (Andric et al., 2016a). In particular, public debt-to-GDP ratio declined sharply before the crisis, since the government accompanied debt write-offs by Paris and London club of creditors with the use of privatization proceeds for deficit

financing (Andric et al., 2016b). After the crisis hit Serbian economy in the second half of 2008, narrowing output gap and absorption gap reduced the share of government revenues in GDP. Consequently, fiscal deficit widened, and the growth of public debt accelerated (Arsic et al., 2013). Between 2008Q4 and 2014Q4, public debt-to-GDP ratio increased for approximately 40 percentage points: in 2008Q4, public debt stood at around 30% of GDP, while in 2014Q4 it consumed approximately 70% of GDP (Andric et al., 2016b). In 2012Q1, public debt breached its upper limit of 45%

* Corresponding author: vladimir.andric@ien.bg.ac.rs

DOI: 10.5937/sjm13-18826

of GDP defined in fiscal rules. In 2014Q1, public debt breached yet another threshold—the upper limit of 60% of GDP defined in Maastricht convergence criteria (Andrić et al., 2016a).¹

Faced with aforementioned public finance trends, the Serbian government launched a fiscal consolidation programme at the end of 2014. The government managed to curb the growth of public indebtedness which led to the stabilization of public debt around 70% of GDP in the first 2 years of fiscal consolidation programme, and its subsequent decline to around 65% of GDP at the end of 2017. The analysis presented in this paper search, hence, for potential structural breaks in the dynamics of public debt growth between 2004Q4 and 2017Q4.

This study adds two contributions to the existing empirical literature on fiscal sustainability. *First*, this paper is one of the first to analyse the growth of public indebtedness in the case of small open transition economy from Southeastern Europe. Uctum et al. (2006) assess, for example, fiscal sustainability in the case of G7 and some Asian and Latin American economies between 1970 and 2002. Afonso and Jalles (2012) extend fiscal sustainability analysis to OECD economies for the period 1970-2010. Yildiz and Yildirim (2014) analyze fiscal sustainability in Eurozone, i.e., in EMU 12 countries, using annual panel data set between 1995 and 2011. Despotovic and Durkalic (2017) compare budget deficits of 34 European economies with respect to numerous statistical and public finance criteria. Lovre et al. (2017) analyze public sector efficiency in 19 developed economies focusing on the relation between government expenditures and economic growth during the global financial crisis. Martins and Duarte (2017) stress the importance of public

debt sustainability from historical perspective in the case of The First Portuguese Republic. Finally, Jawadi and Sousa (2013) analyse public debt dynamics in the United Kingdom (UK) and the United States (US) for the period 1962Q4-2009Q2 and 1970Q1-2009Q2, respectively. *Second*, the empirical model presented in this paper captures the dynamics of public debt growth both before and after the Great Recession. The approach outlined in this paper is, hence, similar to the one of Krajewski et al. (2016) who consider a panel of 10 emerging economies from Central and Eastern Europe between 1990 and 2012. Contrary to Krajewski et al. (2016), the focus of this paper is on a single economy which enables the analysis of fiscal developments in a greater detail, with a particular emphasis on the Great Recession and the fiscal consolidation package launched at the end of 2014.

The econometric estimates quantify the jump of public debt growth in Serbia from the onset of the Great Recession. In particular, the growth of public debt in Serbia trended around its mean value of -1.75% of GDP before the global financial crisis. After the crisis hit Serbia in the second half of 2008, the growth of public debt has fluctuated around its mean value of 1.82% of GDP. The results, hence, capture the sharp decrease of public debt growth in Serbia before the crisis, as well as its abrupt increase after the crisis. In addition, the findings do not change if the fiscal consolidation package between 2014Q4-2017Q4 is taken into account. Policy makers managed to curb the growth of government debt in Serbia between 2014Q4-2017Q4, but the government should put further fiscal efforts to reduce its overall indebtedness in accordance with the fiscal rules of the Republic of Serbia and Maastricht

¹For details, see Budget system law of the Republic of Serbia, as well as Maastricht convergence criteria available at <https://www.ecb.europa.eu/ecb/orga/escb/html/convergence-criteria.en.html>.

convergence criteria.

The rest of the paper is organized as follows. The second section provides theoretical background for subsequent empirical estimates. The third section presents baseline results, as well as the results of sensitivity analysis. The fourth section concludes.

2. ECONOMETRIC METHODOLOGY

Cafiso (2012) defines the growth of public debt ΔB_t as:

$$\Delta B_t = B_t - B_{t-1} = -PB_t + i_t B_{t-1} + SFA_t \quad (1)$$

In equation (1), B_t stands for the stock of public debt at time t , B_{t-1} is the stock of public debt from the previous time period $t-1$, PB_t denotes primary fiscal balance, defined as the difference between overall government revenues and primary government expenditures, while i_t represents implicit nominal interest rate in time period t on B_{t-1} . Finally, SFA_t measures stock-flow adjustments which are equal to the difference between public debt growth and the officially reported overall fiscal deficit. In particular, these adjustments include all the operations which influence the debt, but do not generate the deficit, and vice versa. Von Hagen and Wolff (2006) provide empirical evidence for the case of advanced European economies that engaged in creative accounting practices by covering large fiscal deficits with stock-flow adjustments after the Stability and Growth Pact was agreed upon in 1998. Izák (2009) also reports how the analysis of stock-flow adjustments has become more important as the EU budgetary surveillance may have provided incentives

for shifting items from the officially reported fiscal deficit to the stock-flow adjustments. Finally, Bornhorst et al. (2011) stress the importance of one-off operations such as the re-evaluation of financial assets and liabilities due to exchange rate changes. Since the Serbian government has issued around 80% of its debt in foreign currency, and given the sensitivity of Serbian real effective exchange rate to net capital flows, the change in public debt is chosen as the primary measure of public indebtedness growth (Andric et al., 2016a).

Bai (1997) and Bai and Perron (1998, 2003a, 2003b) consider a multiple linear regression model with T periods and m potential structural breaks, i.e., $m+1$ regimes. In particular, for the observations in the regime j , Bai (1997) and Bai and Perron (1998, 2003a, 2003b) estimate the following least squares regression:

$$y_t = X_t^T \beta + Z_t^T \delta_j + \varepsilon_t \quad (2)$$

for the regimes $j=0,1,2,\dots,m$, and white noise process ε_t . The model in (2) is presented in its most general form, since variables corresponding to vector X_t do not vary across regimes, while variables corresponding to vector Z_t are allowed to vary across regimes. For a specific set of m breaks, Bai (1997) and Bai and Perron (1998, 2003a, 2003b) minimize the following sum of squared residuals:

$$S(\beta, \delta|\{T\}) = \sum_{j=0}^m \left\{ \sum_{t=T_j}^{T_{j+1}-1} y_t - X_t^T \beta - Z_t^T \delta_j \right\}^2 \quad (3)$$

using standard least squares regression to obtain estimates $(\hat{\beta}, \hat{\delta})$. The global m -break optimizers are the set of breaks and corresponding coefficient estimates that

minimize sum of squared residuals across all possible sets of m -break partitions (Bai and Perron 1998, 2003a, 2003b).

Following Jawadi and Sousa (2013), who apply described Bai-Perron testing procedure in the cases of U.S. and the UK, the mean-shift model with m potential structural breaks (T_1, T_2, \dots, T_m) is estimated:

$$\Delta B_t = \mu_j + \varepsilon_t \quad (4)$$

in which $j=1,2,\dots,m+1$, $T_0=0$ and $T_{m+1}=T$, μ_j refers to the regression coefficients with property $\mu_i \neq \mu_{i+1}$ ($1 \leq i \leq m$) and ε_t corresponds to the error term.

Bai (1997) was the first to derive the consistency, rate of convergence and asymptotic distribution of the ordinary least squares (OLS) estimates of a change point model from equation (2). The OLS estimates are consistent even if the disturbances are dependent and heteroscedastic. In addition, Bai (1997) and Bai and Perron (2003a) construct confidence intervals for the OLS estimated break dates (T_1, T_2, \dots, T_m) .

Building on the paper of Bai (1997), Bai and Perron (1998) have introduced several structural break tests. First, Bai and Perron (1998) propose two double maximum tests of the null hypothesis of no structural break against an unknown number of breaks given some upper bound M .² The upper bound M for the number of breaks is inversely proportional to the size of trimming percentage ϵ , $\epsilon = h/T$, in which h represents the minimal length of each sub-regime. As Bai and Perron (2003b) show, larger values of trimming percentage ϵ are needed to achieve tests with correct size in finite samples, especially if one allows for heterogeneity across segments and/or serial correlation in the errors. Second, Bai and

Perron (1998) construct a test of ℓ versus $\ell+1$ breaks, labelled $supF_T(\ell+1|\ell)$ test. The test assumes the application of $(\ell+1)$ tests of the null hypothesis of no structural change vs. the alternative hypothesis of a single change.

Finally, Bai and Perron (2003a, 2003b) propose the following algorithm for determining the overall number of structural breaks: 1) prespecify the upper bound for the number of breaks M by setting the value of trimming percentage ϵ ; 2) test the null hypothesis of no structural break against the alternative of a prespecified number of breaks defined in step 1) by using double maximum tests of Bai and Perron (1998); 3) if double maximum tests indicate the presence of at least one structural break, proceed with the application of $supF_T(\ell+1|\ell)$ test by selecting M such that $supF_T(\ell+1|\ell)$ is insignificant for $\ell \geq M$.

An alternative approach to the one proposed in Bai (1997) would be to use unit root tests with endogenously determined breakpoints, such as those developed in Zivot and Andrews (1992), Vogelsang and Perron (1998), Lumsdaine and Papell (1997) and Lee and Strazicich (2003). The results presented in Bai (1997), and later developed in Bai and Perron (1998, 2003a, 2003b), hold, however, for both nonstationary and trending regressors. In addition, the results of Bai (1997) support more general forms of non-linearity, especially with respect to the number of breakpoints and with respect to the statistical properties of disturbance terms.³

3. EMPIRICAL EVIDENCE

This section consists of three subsections. Subsection 3.1 discusses major stylised facts

² The double maximum tests introduced by Bai & Perron (1998) are known as UDmax and WDmax tests. For their statistical properties, see Bai and Perron (1998).

³ For more details about the shortcomings of non-linear unit root tests, see Mahadeva and Robinson (2004).

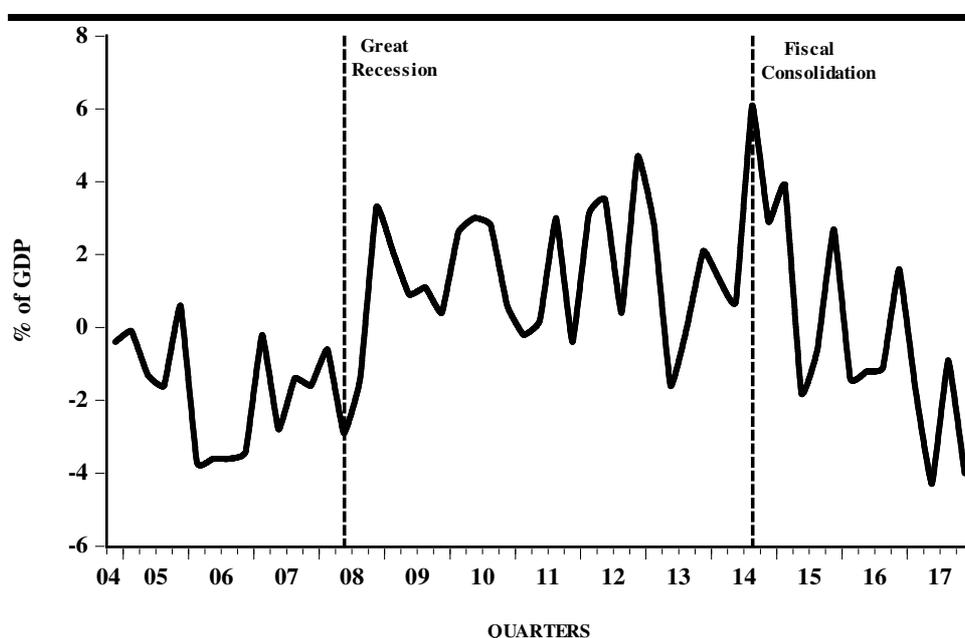
regarding the dynamics of public debt growth. Subsection 3.2 presents a mean-shift model which captures stylized facts from subsection 3.1. Finally, subsection 3.3 provides the findings of sensitivity analysis.

3.1. Stylized Facts

The empirical estimates are based on quarterly data set between 2004Q4 and 2017Q4. More precisely, the analysis presented in this paper search for potential structural breaks in the dynamics of public debt growth between 2004Q4 and 2017Q4. The availability of official quarterly data from the Ministry of Finance of the Republic of Serbia determines both the beginning and the end of the sample span. The baseline estimates refer to the period 2004Q4-2014Q4, while the robustness checks refer to the period 2004Q4-2017Q4, taking into account, hence, the period of fiscal consolidation package between 2014Q4-

2017Q4. The growth of public debt is measured as % of GDP, following the leads of Hakkio and Rush (1991) and Bohn (2005). Hakkio and Rush (1991) argue how shares of GDP represent the most appropriate measure for growing economies. This measure is, hence, suitable in the case of Serbia, given its high GDP growth rates in the pre-crisis period. Bohn (2005) supports the claims of Hakkio and Rush (1991) by documenting how standard deviations of GDP ratios are much less volatile with respect to the standard deviations of nominal and real variables.

Figure 1 displays three distinctive sub-periods in the dynamics of public debt growth: i) the first sub-period spans from 2004Q3 to 2008Q2, and captures the period before the crisis; ii) the second sub-period spans from 2008Q3 to 2014Q3, and captures the period after the crisis up to the beginning of fiscal consolidation programme in 2014Q4; iii) the third sub-period spans from



Source: authors' calculations

Figure 1: The Growth of Public Debt (% of GDP) in Serbia, 2004Q4-2017Q4

2014Q4-2017Q4, and captures the period of fiscal consolidation programme.

The first sub-period consists of two short sub-samples. The first sub-sample spans from 2004Q3 to 2005Q4, while the second sub-sample spans from 2006Q1 to 2008Q2. The first sub-sample refers, partially, to a 3-year fiscal stabilization programme supported by the IMF's Extended Arrangement in which public debt growth exhibited a declining trend. Coccozza et al. (2011) and Koczan (2015) describe both cyclical and discretionary factors which led to a downward trend in public debt growth in Serbia. The most important cyclical factors were widening absorption gap and output gap which led to a spike in both indirect and direct government revenues. The most important discretionary factors encompassed the use of massive privatization revenues for deficit financing and politically motivated debt write-offs towards international creditors, as documented in Coccozza et al. (2011). In the second sub-sample, between 2006Q1 and 2008Q2, the government conducted procyclical fiscal policy, creating, thus, a structural fiscal deficit in Serbian public finances. Arsic et al. (2013) document how increases in public sector wages, accompanied with reductions in payroll tax and the introduction of non-taxable wage threshold, increased the structural fiscal deficit in Serbia for approximately 1.7% of GDP. Similar procyclical practices were observed in other economies from Central and Eastern Europe, as documented in Darvas (2009).

The second sub-period between 2008Q3 and 2014Q3 witnessed a sharp increase in public debt growth. Darvas (2009), Berglöf et al. (2009), Bakker and Christiansen (2011) and Dimova et al. (2016) describe both cyclical and discretionary factors which led

to an upward shift in public debt growth in Serbia. The most important cyclical factors were narrowing absorption and output gap, accompanied with the rebalancing of the economy towards net exports due to the depreciation of real effective exchange rate. The most important discretionary factors encompassed the extraordinary increase in public wages and pensions in the wake of the Great Recession, accompanied with the reduction in custom rates on imported goods from the European Union (EU). Although the government implemented some ad-hoc fiscal consolidation measures between 2008Q3 and 2014Q3, it failed to curb the growth of public indebtedness in Serbia. Ad-hoc fiscal consolidation measures on the revenue side encompassed the hikes in standard VAT rate, corporate income tax rate and excise taxes on tobacco, oil, and oil derivatives. Ad-hoc fiscal consolidation measures on the expenditure side encompassed slower than inflation indexation scheme for public wages and pensions, public sector hiring freezes and reductions in monthly governmental salaries which exceeded 60.000 RSD during 2014.⁴

Finally, in 2014Q4, at the beginning of the third sub-period, the Serbian government launched a 3-year fiscal consolidation package. The package centred on the reduction of public sector wages and pensions. In particular, government reduced nominal pensions by 5% and public sector wages by 10%. As a result of introduced fiscal austerity measures, the government curbed the growth of public debt in Serbia in the first two years of fiscal consolidation programme, and managed to stabilize public debt-to-GDP ratio around 70% of GDP. Finally, in the last year of fiscal consolidation programme, public debt declined to around 65% of GDP.

⁴ For details, see Arsic et al. (2013) and Andric et al. (2016a, 2016b).

3.2. Baseline Estimates

The empirical estimates build on the previous contributions of Arsic et al. (2013) and Andric et al. (2016a, 2016b) which are concerned with the sustainability of fiscal policy in Serbia after the year 2000. The baseline estimates, which are obtained for the period 2004Q4-2014Q4, consist of two sets of results. First, unit root tests are implemented to determine the persistence of shocks to public debt growth. If the shocks to public debt growth are transitory, i.e., if public debt growth is stationary stochastic process, then the dynamics of public debt growth is predictable, and policy makers can control movements in public debt with discretionary fiscal policy measures, and vice versa. Second, the equation (4) is estimated in accordance with the methodology developed in Bai (1997) and Bai and Perron (1998, 2003a, 2003b).

Table 1 presents the results of unit root tests. In particular, table 1 shows the results of point-optimal invariant unit root tests proposed in Elliott et al. (1996), as well as the results of M-unit root tests proposed in Ng and Perron (2001). The results from table 1 support the stationarity hypothesis, i.e., the hypothesis about the transitory nature of public debt growth innovations. This finding is consistent with the sample autocorrelation function of public debt growth with the first lag autocorrelation

coefficient of only 0.46. These particular unit root tests are chosen since they are robust to small sample bias. The data are first detrended by generalized least squares (GLS), since Elliott et al. (1996) show how GLS detrending yields power gains for unit root tests and allows for a more precise autoregressive spectral density estimate, especially in the case of an unknown mean. In addition, the number of lags in unit root testing regressions is determined in accordance with the modified Akaike criterion (MAIC) in which the maximum number of lags is set to 4, since the analysis is based on quarterly data. Ng and Perron (2001) show how MAIC leads to substantial size improvements over standard information criteria.

Since shocks to public debt growth are transitory, then policy makers can use discretionary fiscal policy to control the growth of overall public indebtedness. To investigate the nature of these measures in a greater detail, the mean-shift model from equation (4) is estimated.

Table 2 presents the estimates of the mean-shift model for the period 2004Q4-2014Q4. The estimated econometric specification explains 53% of variations of public debt growth. The structural break in the dynamics of public debt growth occurred in 2008Q4 which coincides with the arrival of the global financial crisis to Serbia.⁵ The results from table 2 are somewhat consistent

Table 1. Unit Root Tests, 2004Q4-2014Q4

Tests	Statistics	Specification	Lags	Criterion
ERS	6.55***	Intercept	2	MAIC
MZ α	-3.79	Intercept	2	MAIC
MZ t	-1.28	Intercept	2	MAIC
MP T	6.52***	Intercept	2	MAIC
MSB	0.34***	Intercept	2	MAIC

Notes: Authors' calculations. *** denotes significance at 1% level, ** denotes significance at 5% level, * denotes significance at 10% level. ERS: Elliott-Rothenberg-Stock unit root test from Elliott et al. (1996); MZ α , MZ t , MP T , MSB: M-unit root tests from Ng & Perron (2001).

⁵ The 95% confidence interval for the break date is [2008Q2 – 2009Q2]. The confidence interval is calculated according to the formula $[\hat{t}_i - [c/\hat{L}_i] - 1, \hat{t}_i + [c/\hat{L}_i] + 1]$, in which \hat{t}_i is the estimated break date, $[c/\hat{L}_i]$ is the integer part of c/\hat{L}_i , c is the 97.5th quintile from the symmetric case CDF for which $c = 11$ and $\hat{L}_i = ((\mu_{2004Q4-2008Q3} - \mu_{2008Q4-2014Q4})^2 \Delta B_{\hat{t}_i}^2) / \sigma_{\epsilon}^2$ is a scale factor with $\mu_{2004Q4-2008Q3}$, $\mu_{2008Q4-2014Q4}$ and σ_{ϵ}^2 defined as the public debt growth coefficient before the break point, public debt growth coefficient after the break point and the estimated variance of ϵ_t from (2.4), respectively. The use of symmetric CDF is appropriate, since the model's residuals are stationary on the whole sample. The results of ADF test, which are available from the authors upon request, confirm this finding.

with the findings of Andric et al. (2016a, 2016b) who detect the sharp decline of primary fiscal balance response to public debt accumulation, interest payments and implied effective interest rate on Serbian government bonds after the Great Recession hit Serbian economy.

The estimated coefficient before the crisis equals -1.75% of GDP, while the estimated coefficient after the crisis equals +1.82% of GDP. Reported estimates capture, hence, the abrupt shift in public debt dynamics after the global financial crisis. In obtaining the estimates from table 2 above, the upper bound for potential number of breaks is first specified, i.e., the minimal regime length is determined by setting the value of trimming percentage ϵ . Given the short sample span, the value of ϵ is set to 25%, which corresponds to a minimal regime length of approximately 13 quarters, i.e., to a maximum of two structural breaks $M=2$. Second, double maximum tests UD_{max} and WD_{max} from Bai and Perron (1998) are implemented in order to see if at least one break is present, given the ϵ -prespecified upper bound for the potential number of breaks. Both test statistics are statistically significant and equal 49.03 with an estimated structural break in 2008Q4. Finally, given the presence of a break in 2008Q4, the sequential test of $\ell+1$ versus ℓ globally determined breaks is applied, as in Bai and Perron (1998, 2003a, 2003b). The sequential

procedure reaffirms 2008Q4 as sole structural break in data generating process for public debt growth.

3.3. Sensitivity Analysis

To check for the robustness of the baseline estimates, the mean-shift model is modified to allow for heterogeneous errors across breaks, and the equation (4) is subsequently estimated for the period 2004Q4-2017Q4. Heterogeneous error distributions across breaks are justifiable due to regime changes induced by the Great Recession and fiscal consolidation. The inclusion of a period between 2014Q4 and 2017Q4 should evaluate achieved fiscal accomplishments of the 3-year consolidation programme.⁶

Table 3 shows the results of sensitivity analysis. The results are almost identical to those from table 2. Structural breaks occur, however, both in 2008Q4 and in 2014Q4, with the 95% confidence intervals between [2008Q2-2009Q2] and between [2014Q3-2015Q1], respectively. Coefficient estimates for the regimes [2004Q4-2008Q3] and [2008Q4-2014Q3] are identical to those from table 2. The coefficient estimate for the last regime, [2014Q4-2017Q4], is statistically insignificant even at 10% level, and equals -0.45% of GDP, which implies that government stopped the growth of public indebtedness in Serbia after fiscal

Table 2. The Mean-Shift Model for Debt Growth, 2004Q4-2014Q4

<i>Regressors</i>	<i>Coefficients</i>	<i>Standard Errors</i>	<i>t-stat.</i>
$\mu_{2004Q4-2008Q3}$	-1.75***	0.41	-4.26
$\mu_{2008Q4-2014Q4}$	1.82***	0.33	5.53
R^2	0.54	<i>S.E.</i>	1.64

Notes: Authors' calculations. Estimates from equation (4). OLS estimation procedure with homogeneous errors and structural break in 2008Q4. *** 1% significance level; ** 5% significance level; * 10% significance level. S.E.-standard error of regression.

⁶ In obtaining the results of sensitivity analysis, the same guidelines were followed as in obtaining the baseline estimates from subsection 3.2.

Table 3. The Mean-Shift Model for Debt Growth, 2004Q4-2017Q4

<i>Regressors</i>	<i>Coefficients</i>	<i>Standard Errors</i>	<i>t – stat.</i>
$\mu_{2004Q4-2008Q3}$	-1.75***	0.35	-4.96
$\mu_{2008Q4-2014Q3}$	1.77***	0.37	4.81
$\mu_{2014Q4-2017Q4}$	-0.45	0.70	-0.65
R^2	0.41	<i>S. E.</i>	1.90

Notes: Authors' calculations. Estimates from equation (4). OLS estimation procedure with heterogeneous errors across breaks in 2008Q4 and 2014Q4. *** 1% significance level; ** 5% significance level; * 10% significance level. S.E.-standard error of regression.

consolidation package has been initiated.

After two years of fiscal consolidation, the government has managed, hence, to stop further growth of public indebtedness in Serbia. Public debt has stabilized around 70% of GDP at the end of 2016, and declined to 65% of GDP at the end of 2017. Further fiscal efforts are needed, therefore, to reduce the share of public debt in GDP in accordance with the upper debt limit defined in fiscal rules (45% of GDP) and Maastricht convergence criteria (60% of GDP).

4. CONCLUSION

This paper modelled the dynamics of public debt growth in Serbia between 2004Q4 and 2017Q4. The presented empirical estimates capture the upward shift in public debt growth from the onset of the Great Recession. The results also show how policy makers have managed to curb the growth of public indebtedness in Serbia between 2014Q4-2017Q4. The government should, however, put greater fiscal efforts to reduce the overall share of public debt in gross domestic product in accordance with the fiscal rules of the Republic of Serbia and Maastricht convergence criteria. Consequently, the results are relevant for

public debt management, since lower public indebtedness implies lower borrowing costs, which is in accordance with the official public debt management strategy of the Republic of Serbia that stresses the provision of regular budgetary servicing at the lowest possible cost and at the acceptable level of risk.

This study is one of the first to analyse the growth of public indebtedness in the case of small open transition economy from Southeastern Europe. Other contributions from the literature predominantly focus on advanced OECD economies. The explicit focus on a single economy enables the analysis of fiscal developments in a greater detail, with a particular emphasis on the Great Recession and the fiscal consolidation package between 2014Q4-2017Q4.

The focus on a single national economy, however, has certain limitations. First and foremost, the short sample span puts certain constraints on making more general statements about the historical behaviour of public debt in Serbia. In addition, single case study means that the results cannot be easily extended to other emerging European economies. An important avenue for further research concerns, hence, the extension of the analysis presented in this paper to other economies from Central and Eastern Europe.

Acknowledgement

This paper was partly supported by funds from projects Challenges and Prospects of Structural Changes in Serbia: Strategic Directions of Economic Development and Harmonization with the EU Requirements (179015) and European Integrations and Socio-economic Changes in the economy of Serbia on the Way to the EU (47009) financed by the Ministry of Education, Science and Technological Development of Republic of Serbia.

References

- Afonso, A., & Jalles, J.T. (2012). Revisiting Fiscal Sustainability-Panel Cointegration and Structural Breaks in OECD Countries. European Central Bank. ECB Working Paper No. 1465.
- Andric, V., Arsic, M., & Nojkovic, A. (2016a). Public debt sustainability in Serbia before and during the global financial crisis. *Economic Annals*, 16(210), 47-78.
- Andric, V., Arsic, M., & Nojkovic, A. (2016b). Fiscal Reaction to Interest Payments-the Case of Serbia. *Industrija*, 44(3), 117-144.
- Arsic, M., Nojkovic, A., & Randjelovic, S. (2013). Would Economic Recovery Imply Fiscal Stabilization in Serbia? *Serbian Association of Economists Journal*, 3-4, 222-237.
- Bai, J. (1997). Estimation of a Change Point in Multiple Regression Models. *The Review of Economics and Statistics*, 79(4), 551-563.
- Bai, J., & Perron, P. (1998). Estimating and Testing Linear Models with Multiple Structural Changes. *Econometrica*, 66(1), 47-78.
- Bai, J., & Perron, P. (2003a). Computation and Analysis of Multiple Structural Change Models. *Journal of Applied Econometrics*, 18(1), 1-22.
- Bai, J., & Perron, P. (2003b). Critical values for multiple structural change tests. *Econometrics Journal*, 6(1), 72-78.
- Bakker, B.B., & Christiansen, L.E. (2011). Crisis and Consolidation-Fiscal Challenges in Emerging Europe, in Eller, M., Mooslechner, P. & Ritzberger-Grünwall, D. (Eds.), *Limited Fiscal Space in CESEE: Needs and Options for Post-Crisis Reform*. Vienna, Austria: Oesterreichische Nationalbank, 25-41.
- Berglöf, E., Korniyenko, Y., Plekhanov, A., & Zettelmeyer, J. (2009). Understanding the crisis in emerging Europe. European Bank for Reconstruction and Development. EBRD Working Paper No. 109.
- Bohn, H. (2005). The sustainability of fiscal policy in the United States. Ifo Institute-Leibniz Institute for Economic Research at the University of Munich. CESifo working papers No. 1446.
- Bornhorst, F., Dobrescu, G., Fedelino, A., Gottschalk, J., & Nakata, T. (2011). When and How to Adjust Beyond the Business Cycle? A Guide to Structural Fiscal Balances. International Monetary Fund. IMF Technical Notes and Manuals 11/02.
- Cafiso, G. (2012). A Guide to Public Debt equations. Mimeo, University of Catania. Available at <http://ssrn.com/abstract=1975710>.
- Cocozza, E., Colabella, A., & Spadafora, F. (2011). The Impact of the Global Crisis on South-Eastern Europe. International Monetary Fund. IMF Working Paper WP/11/300.
- Darvas, Z. (2009). The Impact of the Crisis on Budget Policy in Central and Eastern Europe. Bruegel. Bruegel Working Paper 0904.

РАСТ ЈАВНОГ ДУГА, ВЕЛИКА РЕЦЕСИЈА И ФИСКАЛНА КОНСОЛИДАЦИЈА - ПРИМЕР ИЗ СРБИЈЕ

Владимир Андрић и Јелена Миновић

Извод

У овом раду анализирана је динамика раста јавног дуга у Србији између четвртог квартала 2004. и истог квартала 2017. године. Емпиријске процене бележе узлазне помаке у расту јавног дуга од почетка велике рецесије. Резултати такође показују како су креатори политике успели да зауставе раст јавног дуга у Србији у овом периоду. Међутим, на основу овог истраживања је закључено и да би влада требало да уложи веће фискалне напоре на смањењу укупног учешћа јавног дуга у бруто домаћем производу у складу са фискалним правилима Републике Србије и критеријима конвергенције из Маастрихта.

Кључне речи: раст јавног дуга, велика рецесија, фискална консолидација, Србија

- Despotovic, D., & Durkalic, D. (2017). Analysis of budget deficit in the candidate countries for EU membership. *Serbian Journal of Management*, 12(2), 237-253.
- Dimova, D., Kongsamut, P., & Vandebussche, J. (2016). Macroeconomic Policies in Southeastern Europe. International Monetary Fund. IMF Working Paper No. WP/16/29.
- Elliott, G., Rothenberg, T.J., & Stock, J.H. (1996). Efficient Tests for an Autoregressive Unit Root. *Econometrica*, 64(4), 813-836.
- Hakkio, C.S., & Rush, M. (1991). Is the Budget Deficit "Too Large?" *Economic Inquiry*, 29(3), 429-445.
- Izák, V. (2009). Primary Balance, Public Debt and Fiscal Variables in Postsocialist Members of the European Union. *Prague Economic Papers*, 18(2), 114-130.
- Jawadi, F., & Sousa, R.M. (2013). Structural breaks and nonlinearity in US and UK public debts. *Applied Economic Letters*, 20(7), 653-657.
- Koczan, Z. (2015). Fiscal Deficit and Public Debt in the Western Balkans: 15 Years of Economic Transition. *International Monetary Fund. IMF Working Paper No. WP/15/172*.
- Krajewski, P., Mackiewicz, M., & Szymańska, A. (2016). Fiscal Sustainability in Central and Eastern European Countries- A Post-Crisis Assessment. *Prague Economic Papers*, 25(2), 175-188.
- Lee, J., & Strazicich, M.C. (2003). Minimum Lagrange Multiplier Unit Root Test with Two Structural Breaks. *The Review of Economics and Statistics*, 85(4), 1082-1089.
- Lovre, I., Munitlak Ivanović, O., & Mitić, P. (2017). Analysis of public sector efficiency in developed countries. *Economic analysis*, 50(1/2), 38-49.
- Lumsdaine, R.L., & Papell, D.H. (1997). Multiple Trend Breaks and the Unit-Root Hypothesis. *The Review of Economics and Statistics*, 79(2), 212-218.
- Mahadeva, L., & Robinson, P. (2004). Unit Root Testing to Help Model Building. *Centre for Central Banking Studies, Bank of England. Handbooks in Central Banking No. 22*.
- Martins, N.F., & Duarte, A.P. (2017). The

Public Finance and the Economic Growth in the First Portuguese Republic. *Economic analysis*, 47(1-2), 59-75.

Ng, S., & Perron, P. (2001). Lag Length Selection and the Construction of Unit Root Tests with Good Size and Power. *Econometrica*, 69(6), 1519-1554.

Uctum, M.A., Thurston, T., & Uctum, R. (2006). Public Debt, the Unit Root Hypothesis and Structural Breaks: A Multi-Country Analysis. *Economica*, 73(289), 129-156.

Vogelsang, T.J., & Perron, P. (1998). Additional Tests for a Unit Root Allowing for a Break in the Trend Function at an Unknown Time. *International Economic Review*, 39(4), 1073-1100.

Von Hagen, J., & Wolff, G.B. (2006). What do deficits tell us about debt? Empirical evidence on creative accounting with fiscal rules in the EU. *Journal of Banking & Finance*, 30(12), 3259-3279.

Yildiz, H., & Yildirim, Ç.D. (2014). An empirical study on fiscal sustainability in Eurozone. *Serbian Journal of Management*, 9(1), 59-70.

Zivot, E., & Andrews, D.W.K. (1992). Further Evidence on the Great Crash, the Oil-Price Shock, and the Unit-Root Hypothesis. *Journal of Business & Economic Statistics*, 10(3), 251-270.