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LONG-TERM EFFECTS OF THE SELECTED ECONOMIC VARIABLES ON SERBIA PUBLIC DEBT

Dugoročni efekti odabranih ekonomskih varijabli na javni dug Srbije

Abstract

Public debt control is one of the most important challenges which global economies face. The aim of this paper is to examine the long-term relationship between public debt and the selected economic variables in the Republic of Serbia by using the autoregressive distributed lag (ARDL) approach. The empirical analysis conducted on the basis of the annual data in the period from 2000 to 2019 includes, apart from the debt-to-GDP ratio as the dependent variable, 6 selected economic indicators, used in the model as independent variables. The obtained results indicate that economic growth and gross fixed capital formation have a statistically significant negative long-term effect on the public debt, while general government final consumption expenditure (% of GDP) and trade openness (% of GDP) show a statistically significant positive long-term effect on the public debt. The estimated long-run coefficients related to inflation and unemployment have the expected sign, but they are statistically insignificant. The results of the study can be important to policy makers when defining the activities aimed at establishing public debt stability and achieving long-term sustainable economic results.

Keywords: *public debt, economic growth, ARDL approach, error-correction model*

Sažetak

Kontrola javnog duga je jedan od najvažnijih izazova sa kojima se suočavaju sve svetske ekonomije. Cilj ovog rada je da se ispita dugoročna veza između javnog duga i odabranih ekonomskih varijabli u Republici Srbiji koristeći autoregressive distributed lag (ARDL) pristup. Empirijska analiza sprovedena na osnovu godišnjih podataka u periodu od 2000. do 2019. godine obuhvata pored učešća javnog duga u bruto domaćem proizvodu, kao zavisne promenljive, 6 izabranih ekonomskih indikatora, koji su u modelu uključeni kao nezavisne promenljive. Dobijeni rezultati ukazuju da ekonomski rast i učešće bruto investicija u stalna sredstva u bruto domaćem proizvodu imaju statistički značajan negativan dugoročni efekat na javni dug, dok učešće izdataka za krajnju potrošnju vlade u bruto domaćem proizvodu i učešće izvoza i uvoz roba i usluga u bruto domaćem proizvodu, imaju statistički značajan dugoročni pozitivan efekat na javni dug. Procenjeni dugoročni koeficijenti vezani za pokazatelje inflacije i nezaposlenosti imaju očekivani predznak, ali nisu statistički značajni. Rezultati ove studije mogu biti od značaja kreatorima politika prilikom definisanja aktivnosti usmerenih na uspostavljanje stabilnosti javnog duga i postizanja dugoročno održivih ekonomskih rezultata.

Ključne reči: *javni dug, ekonomski rast, ARDL pristup, model korekcije greške*

Introduction

Public debt is one of the most important indicators of financial and economic weakness of countries. In general, there is a growing tendency of countries to borrow money at a limited level. Simultaneously, a large number of factors can affect excessive public debt growth in relation to economic growth. The most significant example of this claim is the 2008 economic crisis, when several European countries had a significant increase in the public debt-to-GDP ratio [17, pp. 111-124].

A lot of countries are facing a public debt crisis, leading to a great deal of debate regarding its causes and consequences. At the same time, there is a need for greater fiscal constraints and greater efforts regarding fiscal consolidation based on the main model of the economic policy of the European Union [34, pp. 81-97].

Public debt in the Republic of Serbia reached a peak of 76 % of GDP in 2015, after which it declined due to fiscal adjustment and fiscal discipline. By the end of 2018, public debt amounted to 54.4 % of GDP, and in the report of the International Monetary Fund [21, p. 65] it is underlined that fiscal primary surplus as well as economic growth were the main reasons for this decrease.

According to the data from 2017, the largest part of the public debt was denominated in euros with a share of 41.5%, followed by the most traded currency the US dollar with 30.8%, the dinar with 22%. The rest of the debt comprised special drawing rights with 3.3% and other currencies with 2.4%. The interest rate on the 79.0% of Serbia public debt is fixed; whereas 20.7% is for the variable interest rate. As much as 74.4% of the total public debt with variable interest rates relates to EUROBOR and LIBOR per euro. [42, p. 45].

The paper aims to analyse the impact of GDP per capita growth (annual %), gross fixed capital formation (% of GDP), trade openness (% of GDP), general government final consumption expenditure (% of GDP), inflation, consumer prices (annual %), unemployment, total (% of total labour force) on Serbia total public debt (% of GDP).

After the introductory part we will give an overview of the literature which presents the researches on the relationship between the selected economic variables and public debt in developed and underdeveloped countries. Afterwards, we will focus on the description of the methodology used to examine the long-term relationship between public debt, economic growth and the selected economic variables in the Republic of Serbia, which is one of the main aims of this paper. The paper uses the data published by the World Bank. The following part of the paper presents the results of the application of the autoregressive distributed lag (ARDL) method. In the final part of the paper, the results are analyzed both from the theoretical and practical aspects and the proposal of possible future researches was given. Our research can be immensely important for policy makers and all employees in the competent authorities of the Republic of Serbia.

Literature review

One of the key goals of underdeveloped and transition economies is to achieve high and sustainable economic growth. Given the pandemic that all countries worldwide have been facing for the last two years, there is a tendency of increased domestic and external borrowing, which significantly affects public debt growth. So far, a large number of studies have pointed to a linear relationship between economic growth and public debt, proving that this relationship can be positive, negative, and insignificant.

The research by Gargouri & Xanthini [17, pp. 111-124] was conducted on a sample of twelve European countries and indicated a statistically significant and negative impact of GDP on public debt, and a statistically significant and positive impact of imports on public debt. Emphasizing the importance of the export-led growth hypothesis [16, pp. 46-65], it is pointed to the existence of a one-way causality from exports to economic growth, as well as from exports and economic growth to public debt, with exports being a significant factor for economic development. The export-led growth hypothesis, suggesting that real export growth affects economic growth, cannot be rejected by the research conducted by Cetintas, and Barisik [14, pp. 636–649] and Santos, Ribeiro, and Carvalho [37, pp. 1-31]. The results of this research indicate a positive and significant impact of exports on economic growth, with exports directly and indirectly affecting public debt through economic

growth. The research by Bernardin, Fiagbe, and Quartey [7, pp. 61-69] indicates a positive and significant impact of exports on economic growth and an indirect effect on public debt reduction.

Analysing the impact of certain macroeconomic determinants on the indebtedness of Ethiopia, Beyene & Kotosz [8, pp. 313-332] indicate that in the long run the savings-investment gap, trade deficit, fiscal deficit, and debt service will have a positive and significant impact on external indebtedness. Moreover, the obtained results prove that the growth rate of gross domestic product, trade openness, and inflation have a negative and statistically significant impact on Ethiopia's indebtedness. A similar study in Ethiopia was conducted by Mulugeta [28, pp. 1-28] proving that per capita GDP growth has a positive and significant impact on indebtedness. Per capita GDP growth also has a significant short-term and long-term impact on debt growth, while openness and infrastructure development have a significant and negative impact on indebtedness. The research conducted in Turkey by Özat [32, pp. 134-143] shows that the impact of interest rates, savings, exchange rates and budget deficits have a statistically significant impact on Turkey's indebtedness in the short and long run.

Jordan Al-Fawwaz [2, pp. 116-123] proves that the variables trade openness, term of trade, exchange rate have a positive and statistically significant impact on indebtedness, while gross domestic product per capita has a significant and negative impact on indebtedness of Jordan. The empirical results conducted by Abdullahi, Bakar, & Hassan [1, pp. 745-752] in Nigeria prove that exchange rate, interest rate, saving and budget deficit can affect indebtedness significantly. The research conducted by Azolibe [4, pp. 1-16] on a sample of 39 extremely poor countries, proves that high rate of corruption, high dependence on foreign aids, government expenditure, population growth and unemployment rate significantly and positively affect the increase in indebtedness. Further, external reserves and gross domestic product reduce the indebtedness of extremely poor countries. In a sample of 32 Asian economies in development and transition, Dawood, Baidoo, & Shah [15, pp. 253-263] show that in the short and long run economic growth and investment can affect the

reduction of public debt; whereas, exchange rate, trade, and government expenditure affect the growth of public debt. A study conducted by Waheed [41, pp. 234-240] on two samples consisting of 12 countries, exporters of oil and gas and importers of oil and gas, proves that economic growth, foreign exchange reserves, general government revenue, oil prices, and domestic investment significantly reduce indebtedness in the countries exporting oil and gas; while current account deficit, general government expenditure and inflation lead to debt growth. In the countries which import oil and gas, economic growth, general government revenue, and gross domestic savings reduce indebtedness; while the increase in trade deficit, international oil prices, interest payments affect public debt; FDI and domestic investment result in higher external debt in the countries which import oil and gas. A similar study conducted by Waheed & Abbas [41, pp. 1-11] on a sample of ten Islamic countries exporting oil and gas and nine countries importing oil and gas indicate that for Islamic countries which export oil and gas economic growth, central government revenue, FDI, and population have a negative impact on indebtedness; whereas central government expenditure, trade openness, inflation, and current account balance have a positive impact on indebtedness. In Islamic countries that import oil and gas, economic growth, central government revenue, current account balance, domestic investment, and labour force have a negative impact on indebtedness; and FDI and foreign exchange have a positive impact on indebtedness. South African debt is a consequence of slow economic growth and a high level of government infrastructure spending. The analysis conducted by Murwirapachena & Kapingura [29, pp. 138-152] shows that the increase in economic activity and foreign exchange reserves has a significant impact on reducing indebtedness, while the budget deficit and the increase in government infrastructure spending significantly increase the indebtedness of South Africa. In the countries of the European Economic and Monetary Union (EMU), Pjanić, et al. [36, pp. 3562–3579] prove that inflow of foreign direct investment and domestic credits to the private sector have a statistically significant and negative impact on public debt, while domestic credits by the financial sector and unemployment have a positive impact

on public debt. In the countries that are not the members of the EMU, gross domestic savings and unemployment have a statistically significant and negative impact on public debt, while interest rates have a significant and positive impact on public debt.

An empirical study conducted by Knapkova, Kiaba & Hudec [24, pp. 734-753] indicates that GDP growth has a positive effect on public debt, where there is a negative relationship between GDP growth and public debt growth, the unemployment rate negatively affects public debt.

The results of the previous researches served us as a basis for the selection of the variables and the initial hypothesis from which we started our research, as well as for making conclusions regarding the effect of the selected variables on the public debt of Serbia.

Methodology and data

As previously emphasized, the aim of the paper is to examine the impact of GDP growth rate and the selected variables on Serbia public debt. While selecting the variables, we focused on previous theoretical and practical researches in this area, including the research by Dawood et al. [15, pp. 253-263]. In their research, these authors used total external debt to gross domestic product as the dependent variable and 6 independent variables: real gross domestic product per capita, exchange rate, gross fixed capital formation as a share of gross domestic product, sum of exports and imports of goods and services measured as a share of gross domestic product, inflation, and general government final consumption expenditure as a share of gross domestic product. In our paper, instead of total external debt to gross domestic product as the dependent

variable we used total public debt to gross domestic product. As an independent variable we included unemployment rate which was used in the research by Pjanić et al. [36, pp. 3562-3579], and we did not include dinar as a national currency (RSD) to American dollar (USD) exchange rate, because the results of the VIF test conducted by using *Stata 13 software package* were 11.95, pointing to the problem of multicollinearity.

The presentation of the influence of the selected indicators on Serbia public debt is based on the annual statistics by the World Bank taking into account the period 2000-2019.

Graph 1 illustrates the movement of public debt in % of gross domestic product and annual GDP growth rate for the period from 2000 to 2019. Until the global financial crisis there was gradual downward trend of public debt; however, there was an increase followed by a more moderate decline starting from 2009 until 2015. The financial crisis had a negative impact on the annual GDP growth rate (the most significant decline was recorded in 2009) as well as on the other selected variables (Graph 2).

The research is based on the following hypotheses:

$H_0 1$: There is a negative long-run relationship between economic growth and public debt.

$H_0 2$: There is a negative long-run relationship between gross fixed capital formation and public debt.

$H_0 3$: There is a positive long-run relationship between trade openness and public debt.

$H_0 4$: There is a positive long-run relationship between general government final consumption expenditure and public debt.

$H_0 5$: There is a negative long-run relationship between inflation and public debt.

Table 1: Description of the researched variables

| Variable name	Notation	Role of variable
Public debt, total (% of GDP)	PD	dependent
GDP per capita growth (annual %)	GDP	independent
Gross fixed capital formation (% of GDP)	GFCF	independent
Trade openness (% of GDP)	TO	independent
General government final consumption expenditure (% of GDP)	GEX	independent
Inflation, consumer prices (annual %)	INF	independent
Unemployment, total (% of total labour force)	UNE	independent

Source: [39].

Graph 1. Movement of PD and GDP in the period 2000-2019
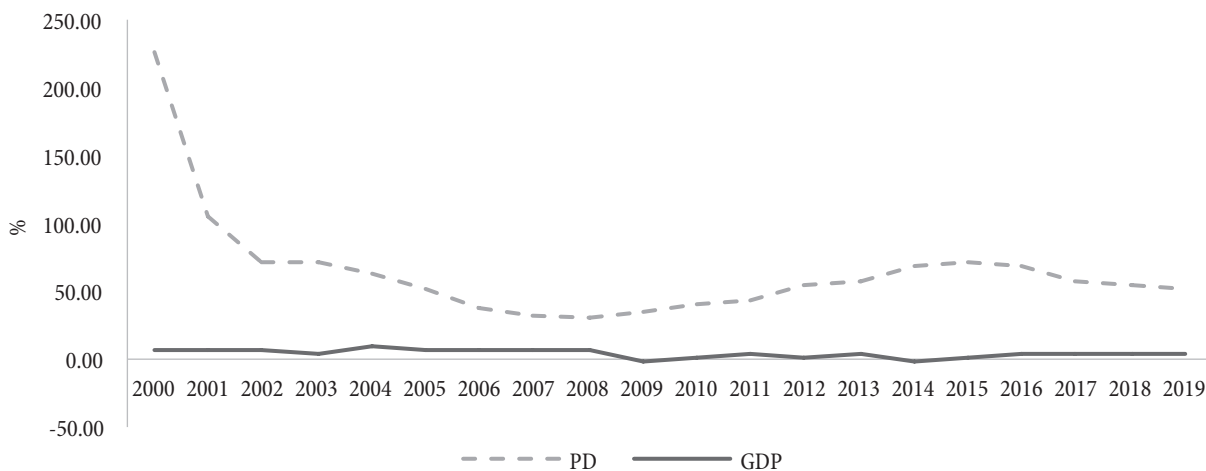
Source: [39].

Graph 2. Movement of the GFCF, UNE, GEX, TO and INF in the period 2000-2019
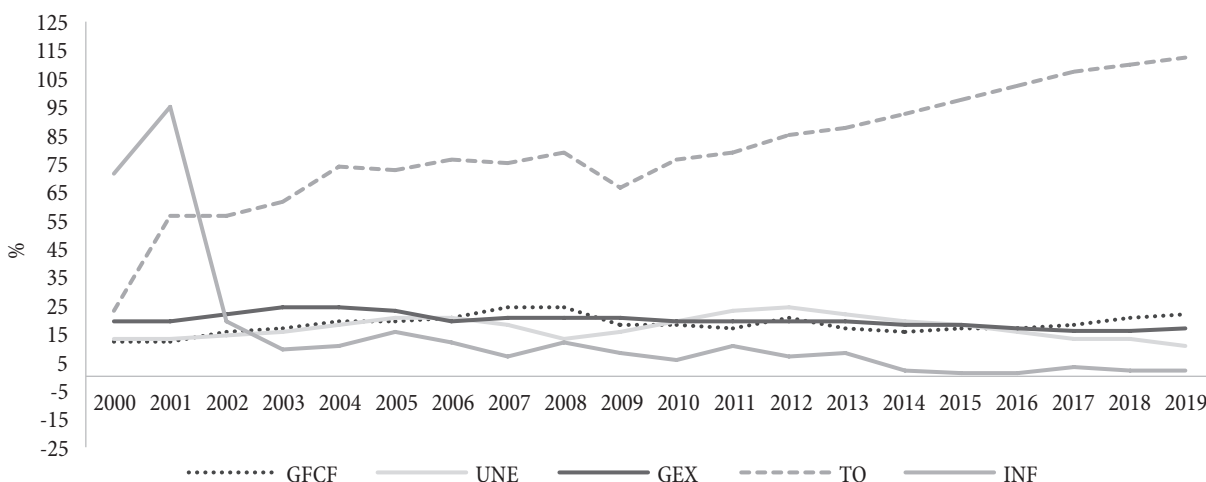
Source: [39].

H₀6: There is a positive long-run relationship between unemployment and public debt.

In order to analyse the presence of a long-term relationship between public debt and economic growth, we are going to use the autoregressive distributed lag (ARDL) method which was used in our research as well as in the following researches: [1, pp. 745 – 752], [2, pp. 116-123], [3, pp. 270–287], [8, pp. 313-332], [28, pp. 1-28], [32, pp. 134–143].

The logarithmic transformation of the used variables was conducted as in the previous paper, since all the negative values were corrected ba adding the constant M as explained in Mickey et al.[26, p. 448].

The autoregressive distributed lag (ARDL) method is applicable in the cases where the variables are integrated of order 0 -I (0) or order 1- I (1); however, it is not applicable in the cases where the variables are integrated of order 2 or higher [30, pp. 1-3]. Prior to analysing the presence of a long-term relationship between public debt and economic growth, it is necessary to examine stationarity. [20, pp. 814-820].

The testing of the presence of a long-term relationship between the variables on the basis of the bounds test is suggested by Pesaran, Shin, and Smith [35, pp. 289-326]. After determining the existence of a long-term relationship between the observed variables, the long-run and short-run coefficients are evaluated. The abovementioned methodology was also used in the paper Mitrašević et al. [27, pp. 395–420] which dealt with the relationship between insurance market and economic growth in the European Union.

The existence of serial correlation is going to be examined when applying the Breusch-Godfrey LM test [11, pp. 334-355; 18, pp. 1303-1310].

Likewise, the Jarque-Bera normality test [22, pp. 255–259] and the Breusch-Pagan-Godfrey heteroscedasticity test [19, pp. 227–236], [12, pp. 1287–1294] were performed.

To use this methodology, the software package EViews v. 10.0 and Stata 13 were applied.

Empirical results

Testing for Multicollinearity

In the first stage of our analysis, we check the presence of multicollinearity among independent variables. The results of the VIF test (Table 2) show that there is no problem of multicollinearity following the proposed rule of thumb in literature [40, p. 132].

Table 2. VIF test results

Variable	VIF
logGDP	1.75
logINF	3.92
logTO	3.87
logGEX	2.17
logGFCF	1.93
logUNE	1.73

Source: Authors' calculation using Stata 13 software package.

Unit roots tests

After establishing that there is no problem of multicollinearity, we are going to test the time series of the selected variables for the existence of a unit root by using Augmented Dickey Fuller (1979) tests, starting from the null hypothesis that the observed variable contains a unit root. If the p-values of the used tests are less than the selected significance level (10%, 5% and 1%), the null hypothesis can be rejected and it can be concluded that the observed series is stationary. During the implementation, we used Automatic lag length selection based on Akaike Information Criterion (AIC). The aim of conducting this test is to determine the level of integration of the variables, because the Autoregressive distributed lag (ARDL) method is not applicable in the

cases when the order of the integration of variables is greater than one.

Table 3: The results of Augmented Dickey Fuller (ADF) tests

Variable	Models	t-Statistic	
		At Level	At 1st difference
logPD	Intercept	-2.704416*	
	Intercept and trend	-1.708110	-1.320390*
	No intercept and trend	0.432448	-1.330132*
logGDP	Intercept	-2.312635	-4.124888***
	Intercept and trend	-2.328636	-4.140240**
	No intercept and trend	-0.968354	-4.249177***
logINF	Intercept	-1.796899	-4.825545***
	Intercept and trend	-2.937907	-4.918745***
	No intercept and trend	-2.086398**	
logTO	Intercept	-1.373035	-13.05296***
	Intercept and trend	-2.059957	-12.01020***
	No intercept and trend	2.243169	-3.598643***
logGEX	Intercept	-0.692968	-4.377095***
	Intercept and trend	-5.688659***	
	No intercept and trend	-2.276337**	
logGFCF	Intercept	-2.482400	-3.267536**
	Intercept and trend	-1.939313	-3.244814*
	No intercept and trend	1.092867	-3.121550***
logUNE	Intercept	-1.978637	-3.661504**
	Intercept and trend	-1.668388	-3.463302**
	No intercept and trend	-0.513021	-3.957834***

Note *, **, and *** indicate significance at 10%, 5%, and 1%
Source: Authors' calculation using software package EViews v. 10.0

The results show that the time series are integrated of order 0 and 1, where the results of the conducted test also depend on whether we include a constant or a linear trend in the model or we choose not to include any of them. Since the results show that we have a combination of variables I(0) and I(1), this allows us to apply the ARDL approach to analyse the long-run relationship between public debt and economic growth.

ARDL Bounds tests for cointegration

The initial stage of the ARDL approach indicates the presence of the long-term relationship between the observed variables [35, pp. 289-326]. The null hypothesis states that there is no cointegration relationship between the examined variables, regardless of whether they are

explanatory variables pure I(0) or I(1). If the calculated F statistic exceeds the lower and upper limit of the critical values, the null hypothesis is rejected. Based on the above criteria, using the selected variables, we create a model with a restricted constant and no trend which will be analysed in the following part of the paper.

The results prove the presence of cointegration between the variables (F-statistic exceeds the upper limit at all significance levels: 10%, 5%, 2.5%, and 1%); therefore,

Table 4. Bounds testing for cointegration

F-statistic	Significance level	Bounds test critical values	
		I(0)	I(1)
	10%	1.99	2.94
31.77191	5%	2.27	3.28
	2.5%	2.55	3.61
	1%	2.88	3.99

Source: Authors' calculation using software package EViews v. 10.0

Table 5. The results regarding ARDL regression

Variable	Coefficient (Std. Error)
logPD(-1)	0.697259*** (0.084219)
logGDP	-0.127207*** (0.038588)
logINF	-0.039907 (0.031102)
logTO	0.759169*** (0.234908)
logGEX	1.745686*** (0.360089)
logGEX(-1)	-0.654204** (0.319921)
logGFCF	-0.482393** (0.237247)
logUNE	0.039926 (0.104095)
C	-3.887792** (1.661979)
Adjusted R-squared	0.962737
Jarque-Bera Test	0.275875 [0.871153]
Breusch-Godfrey Serial Correlation LM Test	1.899150 [0.2015]
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.502332 [0.8294]

Note *, **, and *** indicate significance at 10%, 5%, and 1%. The p-values are given in square braces
Source: Authors' calculation using software package EViews v. 10.0

the evaluation of long-run and short-run coefficients could be performed.

Table 5 depicts the ARDL regression results. To evaluate the optimal number of lags for each variable, the Akaike Information Criterion is applied (maximum lag length=1) When determining the maximum lag length of an estimated model, the leg length at which no autocorrelation can be found is taken into account. The optimal number of lags for the variables in the selected ARDL model is (1, 0, 0, 0, 1, 0, 0).

The value of Jarque-Bera Test shows that we cannot reject the hypothesis that the residuals are normally distributed. The residual diagnostic test displays that there is no serial correlation (Breusch-Godfrey Serial Correlation LM Test - lag 1) and heteroskedasticity (Heteroskedasticity Test: Breusch-Pagan-Godfrey) in the residuals. The values of the long-run coefficients are displayed in Table 6.

Our results show that GDP per capita growth (annual %) and gross fixed capital formation (% of GDP) have a statistically significant negative long-term effect on public debt, i.e. there is interdependence between these variables, which is negative and long-term, while inflation also has a negative impact and it is not statistically significant. Trade openness (% of GDP) and general government final consumption expenditure (% of GDP) show a statistically

Table 6. Estimated Long-run Coefficients Using the ARDL Approach

Variable	Coefficient
logGDP	-0.420185* (0.222520)
logINF	-0.131818 (0.114317)
logTO	2.507655** (0.918604)
logGEX	3.605340** (1.358659)
logGFCF	-1.593420*** (0.458671)
logUNE	0.131883 (0.355791)
C	-12.84200* (7.651875)

Note *, **, and *** indicate significance at 10%, 5%, and 1%
Source: Authors 'calculation using software package EViews v. 10.0

significant positive long-term effect on public debt. The results indicate that unemployment rate has an impact on the increase in public debt, but estimated long-run coefficients are not statistically significant.

After estimating the long-run coefficients, the next steps in the ARDL approach are error correction analysis and the estimation of short-run coefficients.

The following table (Table 7) shows the ARDL Error Correction Model (ARDL ECM). The model estimates the rate at which the dependent variable returns to long-term equilibrium after a change in other variables, and is based on the fact that the deviation from the last period of long-term equilibrium affects its short-term dynamics.

Table 7. Error-correction representation of the selected ARDL

Variable	Coefficient
C	-3.887792*** (0.201434)
D(GEX)	1.745686*** (0.225795)
CointEq(-1)*	-0.302741*** (0.015989)

Note *, **, and *** indicate significance at 10%, 5%, and 1%
Source: Authors' calculation using software package EViews v. 10.0

It should be emphasized that the coefficients with first difference variable indicate short-run coefficients.

Following part of the paper presents the aforementioned obtained results.

Discussion and concluding remarks

The main goal of this study was to examine the determinants of Serbia public debt in the period from 2000 to 2019 by employing the ARDL cointegration approach.

Our results of the long-run coefficients assessment using the ARDL approach indicate that we cannot reject H01 and that economic growth expressed as the indicator of GDP per capita growth (annual %) can affect the decrease in public debt. The results which outline the importance of the impact of economic growth on the decrease of the total public debt are in line with the economic theory. Murwirapachena & Kapingura [29, pp.138–152], Bittencourt [10, pp. 463-472], Al-Fawwaz [2, pp. 116-123], Gargouri & Xanthini [17, pp. 111-124], and Azolibe [4, pp. 249-264]

prove that an increase in GDP reduces external debt, while the research of Mulugeta [27, pp. 1-28] proves that economic growth increases public debt.

Further, our results show that gross fixed capital formation can affect the decrease in public debt meaning that we cannot reject H02. Waheed [6, pp. 234-240] states the same when it comes to the exporters of oil and gas, while with the countries which import oil and gas the investment affects public debt positively.

Our results indicate that inflation has a negative long-run coefficient, and it is not statistically significant. Bittencourt [10, pp. 463-472] also proves that inflation can affect the decrease in public debt, while Waheed & Abbas [41] state that inflation affects the increase in public debt.

The values of the long-term coefficient show that the growth of the unemployment rate has an impact on the growth of public debt; however, this impact is not statistically significant. Azolibe [4, pp. 249-264] states that this relationship is confirmed in economic theory, since in the conditions of high unemployment, governments are additionally indebted in order to invest in the projects that can provide additional jobs. Similarly, Pjanić et al. [36, pp. 3562-3579] prove that the unemployment rate has positive impact on public debt in the case of members and non-members of the EMU, and out of the selected 12 economic indicators only unemployment is statistically significant predictor of public debt in both groups of countries. Bearing in mind that EU countries are experiencing unemployment issue as their urgent problem, noticed by Marelli & Signorelli, [25, pp. 5–56], it is considered that the debt crisis will finish when unemployment rate gets to the level before the emergence of the crisis. [36, pp. 3562-3579].

Trade openness and general government final consumption expenditure show statistically significant impact on the growth of public debt, meaning that we cannot reject H03 and H04.

The impact of trade openness on the growth of public debt is also proved by Al-Fawwaz [2, pp. 116-123] and Waheed & Abbas [41]. On the other hand, Bittencourt [10, pp. 463-472], and Mulugeta [28, pp. 1-28] show that trade openness can affect the decrease in public debt.

The fact that central government expenditure can affect the increase in public debt due to budget deficits is proved by Waheed & Abbas [41] and Dawood [15, pp. 253-263], who propose an increase in tax revenues generated by additional increases in employment resulting from government investment in productive sectors as a measure to reduce excessive public debt.

When we look at the short-term coefficients obtained by using the ARDL error correction model shown in Table 7, we can conclude that general government final consumption expenditure also has the positive influence on public debt. This can result from additional borrowing of the government when it wants to cover excessive expenditure.

The value of Error correction coefficient (CointEq (-1)) shows that 30% of the short-term deviation of public debt variable from their long-term is left out on annual basis, and that it takes more than three years to achieve the balance. Therefore, policy makers ought to consider the stabilization of the selected factors whose influence we examined in this paper. Future researches should focus on examining the effects of economic crisis on Serbia public debt.

References

1. Abdullahi, M. M., Bakar, N. A. B. A., & Hassan, S. B. (2015). Determining the Macroeconomic Factors of External Debt Accumulation in Nigeria: An ARDL Bound Test Approach. Procedia - Social and Behavioral Sciences, 211, pp. 745–752. https://doi.org/10.1016/j.sbspro.2015.11.098.

2. Al-Fawwaz, T. M. (2016). Determinants of External Debt in Jordan: An Empirical Study (1990-2014), International Business Research, Canadian Center of Science and Education, vol. 9(7), pp. 116-123.

3. Asteriou, D., Pilbeam, K., & Pratiwi, C.E. (2021). Public Debt and Economic Growth: Panel Data Evidence for Asian countries. J Econ Finan 45, https://doi.org/10.1007/s12197-020-09515-7, 270–287.

4. Azolibe, C.B. (2021). Determinants of External Indebtedness in Heavily Indebted Poor Countries: What Macroeconomic and Socio-Economic Factors Matter? The American Economist, Sage Publications, vol. 66(2), pp. 249-264, https://doi.org/10.1177/0569434520938326

5. Barro, R. J. (1979). On the Determination of the Public Debt. The Journal of Political Economy, 87(5), http://dx.doi.org/10.1086/260807, 940-971.

6. Waheed, A. (2017). Determinants of External Debt: A Panel Data Analysis for Oil and Gas Exporting and Importing Countries, International Journal of Economics and Financial Issues, Econjournals, vol. 7(1), pp. 234-240.

7. Bernardin, S., Fiagbe, A. K., & Quartey, P. (2018). The effect of external debt on economic growth in Sub-Saharan Africa. International Journal of Business and Economic Sciences Applied Research (IJBESAR). Eastern Macedonia and Thrace Institute of Technology. Kavala, Vol. 11, Iss. 1, http://dx.doi.org/10.25103/ijbesar.111.07, 61-69.

8. Beyene, S. D. & Kotosz, B. (2020). Macroeconomic determinants of external indebtedness of Ethiopia: ARDL approach to co-integration, Society and Economy, Akadémiai Kiadó, Hungary, vol. 42(3), pp. 313-332.

9. Bhatta, G., & Mishra, A. (2020). Estimating Optimum Growth-Maximizing Public Debt Threshold for Nepal. NRB Economic Review, 32(2), https://doi.org/10.3126/nrber.v32i2.35298, 1-28.

10. Bittencourt, M. (2015). Determinants of Government and External Debt: Evidence from the Young Democracies of South America, Emerging Markets Finance and Trade, 51:3, pp. 463-472, DOI: 10.1080/1540496X.2015.1025667.

11. Breusch T. S. (1978). Testing for Autocorrelation in Dynamic Linear Models. Australian Economic Papers, 17, pp. 334-355.

12. Breusch, T.S., & Pagan, A.R., (1979). A Simple Test for Heteroscedasticity and Random Coefficient variation. Econometrica 47, pp. 1287–1294.

13. Butkus, M., & Seputiene, J. (2018). Growth Effect of Public Debt: The Role of Government Effectiveness and Trade Balance, Economies, 6 (62), https://doi.org/10.3390/economies6040062, 1-27.

14. Cetintas, H., & Barisik, S. (2009). Export, Import and Economic Growth: The Case of Transition Economies. Transition Studies Review, 15(4), https://doi.org/10.1007/s11300-008-0043-0, 636–649.

15. Dawood, M., Baidoo, S. T. & Shah, S. M. R. (2021). An empirical investigation into the determinants of external debt in Asian developing and transitioning economies, Development Studies Research, 8:1, pp. 253-263, DOI: 10.1080/21665095.2021.1976658

16. Dritsakis, N., & Stamatiou, P. (2017). Causal Nexus between Government Debt, Exports and Economic Growth for Three Eurozone Countries: A Panel Data Analysis. Journal of Economics and Public Finance, 3(1), https://doi.org/10.22158/jepf.v3n1p47, 46-65.

17. Gargouri, I., & Ksantini, M. (2016). The Determinants of Public Debt. The Romanian Economic Journal, 18(59), pp. 111-124.

18. Godfrey L. G. (1978). Testing for Higher Order Serial Correlation in Regression Equations when the Regressors Include Lagged Dependent Variables. Econometrica, 46, pp. 1303-1310.

19. Godfrey, L.G. (1978). Testing for Multiplicative Heteroscedasticity. Journal of Econometrics 8, pp. 227–236.

20. Gujarati, D.N. (2004) Basic Econometrics. 4th Edition, McGraw-Hill Companies.

21. International Monetary Fund. (2019). Staff report for the 2019 article fourth consultation and second review under the policy coordination instrument—press release; staff report; informational annex; staff statement; and statement by the executive director for Republic of Serbia, IMF Country Report No. 19/238, p. 65.

22. Jarque, C., & Bera, A. (1980). Efficient Tests for Normality Homoscedasticity and Serial Independence of Regression Residuals. Econometric Letters 6, pp. 255–259.

23. Jarque, C., & Bera, A. (1987). A Test for Normality of Observations and Regression Residuals. International Statistical Review 55, http://dx.doi.org/10.2307/1403192, pp.163–172.

24. Knapkova, M., Kiaba, M., & Hudec, S. (2019). Impact of Macroeconomic Indicators on Public Debt of Slovak Republic, 20(4), https://doi.org/10.3846/jbem.2019.10184, pp. 734-753.

25. Marelli, E., & Signorelli, S. (2015). Convergence, crisis and unemployment in Europe: The need for innovative policies. Croatian Economic Survey, 17(2), pp. 5–56. https://doi.org/10.15179/ces.17.2.1

26. Mickey, R., Dunn, O., & Clark, V. (2004). Applied Statistics: Analysis of Variance and Regression. John Willey & Sons.

27. Mitrašević, M., &Pjanić, M.,&Novovic Burić, M. (2022). Relationship bet ween insurance market and economic growth in the European Union, Politická ekonomie, 70 (4), pp. 395–420. https://doi.org/ 10.18267/j.polek.1358.

28. Mulugeta, E. T. (2021), Macroeconomic Determinants of External Debt Accumulation in Ethiopia: An ARDL Bound Testing Approach. African Journal of Economics and Sustainable Development 4(2), pp. 1-28. DOI: 10.52589/AJESD-5CHIK2TR

29. Murwirapachena, G., & Kapingura, F.M. (2015). Determinants of external debt in South Africa: a VAR-based approach', Int. J. Economic Policy in Emerging Economies, Vol. 8, No. 2, pp.138–152.

30. Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) Cointegration Technique: Application and Interpretation. Journal of Statistical and Econometric Methods. SCIENPRESS Ltd, vol. 5(4), 1-3.

31. Özata, E. (2017). Determinants of external debt accumulation in Turkey: Evidence from an ARDL bound test approach. Journal of Business & Economic Policy, 4(4), pp. 134–143.

32. Panizza, U. & Presbitero, A. F. (2014). Public debt and economic growth: Is there a causal effect? Journal of Macroeconomics, Elsevier, vol. 41(C), 21-41.

33. Pečarić, M., Slišković, V., & Kusanović, T. (2018). Public Debt in New EU Member States – Panel Data Analysis and Managerial Implications. Management, 23(1), pp. 81-97. DOI: 10.30924/mjcmi/2018.23.2.81,

34. Pesaran, M.H., Shin, Y., & Smith, R. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. Journal of Applied Econometrics, 16, https://doi.org/10.1002/jae.616, 289-326.

35. Pjanić, M., Milenković, N., Andrašić, J., Kalaš B. & Mirović V. (2020). Public Debt's Predictors in EU: Evidence from Members and Non-members of European Monetary Union. Economic Research-Ekonomska Istraživanja, 33:1, pp. 3562-3579, DOI: 10.1080/1331677X.2020.1776137.

36. Santos, P. G., Ribeiro, A. P., & Carvalho, V. M. (2013). Export-led growth in Europe: Where and What to Export?. FEP Working Papers 479. Universidade do Porto. Faculdade de Economia do Porto, pp. 1-31.

37. Spilioti, S. (2015). The Relationship between the Government Debt and GDP growth: Evidence of the Euro Area Countries, 12(1), pp. 174-178.

38. The World Bank Database. (2020). https://data.worldbank.org/indicator.

39. Verma, J., & Abdel-Salam, A. (2019). Testing statistical assumptions in research. JohnWiley & Sons.

40. Waheed, A. & Abbas, S. (2021). Determinants and Sustainability of External Debt: A Panel Data Analysis for Selected Islamic Countries, MPRA Paper107486, University Library of Munich, Germany.

41. European Commission. (2018). Government of the Republic of Serbia, Economic Reform Programme for the Period 2018-2020.

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