



XXXI International Scientific Conference
Strategic Management
 and Decision Support Systems
 in Strategic Management
Sm2026

Subotica (Serbia), May 18, 2026

Nenad Benović

PhD student
 University of Novi Sad, Faculty of Economics
 in Subotica,
 Subotica, Republic of Serbia

e-mail: nenad.benovic@gmail.com

Participation (direct/virtual):

virtual

JEL:

COMPARATIVE ANALYSIS OF DETERMINANTS OF PUBLIC DEBT IN SELECTED COUNTRIES OF THE WESTERN BALKANS

Abstract: The excessive accumulation of public debt of many countries in the past few decades, especially in the context of financial instability and low rates of economic growth, has increased the need for a deeper analysis of the factors influencing the dynamics of public debt. The aim of this paper is to identify the impact of specific variables on the level of public debt in selected countries of the Western Balkans. The paper analyzes studies that focus on determinants of public debt, and it defines four fundamental independent variables. The panel data regression model is used to interpret the impact of these variables on the public debt as a dependent variable, while it uses data from 2002 to 2024. The research results provide an empirical basis for a better understanding of the dynamics of public debt and its main drivers and can be significant for policymakers in defining activities aimed at maintaining the stability of public debt.

Keywords: public debt, determinants of public debt, panel regression, the Western Balkans.

1. INTRODUCTION

The excessive accumulation of public debt of many countries in the past few decades, especially in the context of financial instability and low rates of economic growth, has increased the need for a deeper analysis of the factors influencing the dynamics of public debt. Global public debt, which has been rising since the global financial crisis, is a significant economic problem. Both developed and developing countries are currently facing an increase in debt, worsened by the COVID-19 pandemic, energy shocks, and monetary tightening that led to expansive fiscal policy. High levels of public debt significantly impact the Western Balkans countries, which are developing economies. One of the impacts is that it makes it more difficult for a country to handle future economic crises. Countries with high debt levels find it challenging to borrow additional money and boost spending in order to sustain their economies in crisis. Furthermore, excessive levels of public debt may raise interest rates, making borrowing more expensive for both individuals and corporations. Higher unemployment rates and reduced GDP growth may follow from these circumstances. The aim of this paper is to identify the impact of specific variables on the level of public debt in selected countries of the Western Balkans. The structure of the paper is as follows: After the introduction, the second section of the paper offers a summary of the literature, which includes studies on how different macroeconomic factors affect public debt. The third section describes the data and methodology used to analyze the relationship between public debt, GDP growth, inflation, current account balance, and unemployment in selected countries of the Western Balkans. The results of the econometric models are presented in the paper's fourth and most significant section. A summary of the study's key findings and suggestions for more research on the subject are included at the end of the report.

2. LITERATURE REVIEW

The paper analyzes studies that focus on determinants of public debt. Those determinants are most commonly macroeconomic, political, institutional, and structural variables. There are numerous studies that analyzed the effects of GDP growth on the level of public debt. Research conducted by Law, Ng, Kutan, and Law (2021); Lim (2019); De Vita, Trachanas, and Luo (2018); Gomez and Rivero (2017); Gomez and Rivero (2015); Bell Johnston and Jones (2015); and Ajojin and Navarro (2015) determined a negative impact of GDP growth on public debt. The research by Gargouri and Ksantini (2016) was conducted on a sample of 12 European countries and indicated a statistically significant and negative impact of GDP growth on public debt. Benović and Milenković (2024) analyzed determinants of public debt in the Republic of Serbia and found that there is a statistically significant negative impact of GDP growth on public debt and that the increase in GDP growth by 1% causes a decrease in public debt by 0.702646%. Using AMECO data, Pegkas, Staikouras, and Tsamadias (2020) conclude that public debt has a negative long-term impact on economic growth. The findings show that public debt and GDP growth are causally related in both directions over the long term. Twelve economies in the Eurozone were included in the sample. The authors advise the Eurozone economies to conduct a fiscal consolidation. Abubakar and Mamman (2020) used a regression model to analyze the impact of public debt on GDP growth in 37 OECD countries. The authors investigate the permanent versus transitory effects of public debt on GDP growth. They found a significant negative permanent and positive transitory effect of public debt on GDP growth. Ghourchian and Yilmazkuday (2020) compare the impact of public debt on GDP growth in 83 economies between 1960 and 2014 using the two-stage least squares methodology. According to the findings, real GDP growth would be lowered by roughly 0.01% on average across economies for every 1% increase in the debt-to-GDP ratio. Checherita-Westphal and Rother (2012) employ a two-stage least squares regression model with a control variable for long-term real interest rates and fiscal balance. The authors examine how public debt affected the increase of GDP in twelve Euro Area nations between 1970 and 2011. They found that public debt has a nonlinear effect on GDP growth, with a turning point at roughly 90 to 100 percent of GDP beyond which the debt-to-GDP ratio negatively affects long-term growth. Soo, Kueh, Ab-Rahim, and Tan-Hwang Yau (2023) assess the impact of the public debt threshold on the current account balance and fiscal balance in selected ASEAN countries (Indonesia, Malaysia, Philippines, Singapore, Thailand, and Vietnam) by using annual data from 1990 to 2021. The results indicate that the public debt threshold level is at 63.36%. When the public debt threshold is below 63.36%, there is a negative relationship between the current account balance and fiscal balance, whereas when the public debt threshold is higher than 63.36%, there is a positive nexus between the current account balance and fiscal balance. Tang and Issahaku (2024) assess the role of institutional quality in the relationship between public debt and unemployment in the SSA region. The study used annual panel data of 36 selected SSA economies covering 1996–2020. The System Generalized Method of Moments was used as the main empirical estimation tool. The findings from the study indicated that public debt acquisition is not contributing to reducing the unemployment situation in the SSA region.

3. MATERIAL AND METHODS

The subject of this study is a comparative analysis of the impact of macroeconomic factors such as GDP growth, inflation, current account balance, and unemployment on the public debt of a selected group of Western Balkans countries, which includes Albania, Bosnia and Herzegovina, Montenegro, North Macedonia, and the Republic of Serbia. In this section, the dependent and independent variables used in this study are defined, and the hypotheses and main models that are the subject of testing are stated, as well as the formulas of the diagnostic test used.

3.1. Data description

The econometric analysis, based on annual data from 2002 to 2024, includes the general government gross debt as a percentage of gross domestic product as a dependent variable and four selected macroeconomic indicators incorporated into the model as independent variables. All the data used was downloaded from the websites of the International Monetary Fund and the World Bank. The description of variables is presented in Table 1.

Table 1: Description of the selected variables

Variable name	Notation	Calculation	Role of variable
General government gross debt	DEBT	% of GDP	Dependent
Real GDP growth	GDP	Annual % change	Independent
Inflation rate, end of period consumer prices	INF	Annual % change	Independent
Current account balance	CAB	% of GDP	Independent
Unemployment	UNEMPLOY	% of total labor force	Independent

Source: Author

3.2. Hypothesis and tests

The findings of earlier theoretical and practical research and studies in this field served as a foundation for choosing the variables and the initial hypotheses, as well as for deriving conclusions about the impact of the chosen variables on the level of public debt in selected countries of the Western Balkans. The research is based on the following hypotheses:

H01: Real GDP growth has a statistically significant impact on the public debt of Western Balkans countries.

H02: The inflation rate has a statistically significant impact on the public debt of Western Balkans countries.

H03: The current account balance has a statistically significant impact on the public debt of Western Balkans countries.

H04: Unemployment has a statistically significant impact on the public debt of Western Balkans countries.

For the purpose of the analysis, Stata software was used. After presenting descriptive data, a number of diagnostic tests were used to reject non-stationarity and multicollinearity hypotheses, including the unit root test and correlation matrix derivation. Finally, the influence of independent variables on the dependent variable was interpreted using the fixed effects and random effects models to derive an adequate regression model.

After defining research hypotheses and reviewing the diagnostic tests, the following regression model, which represents the subject of this study, is derived:

$$DEBT_t = \alpha + \beta_1 GDP_t + \beta_2 INF_t + \beta_3 CAB_t + \beta_4 UNEMPLOY_t + \epsilon_t \quad (1)$$

Where:

- $DEBT_t$, as a dependent variable, is the level of general government gross debt as a % of GDP at time t .
- GDP_t is the annual real GDP growth rate in % at time t .
- INF_t is the annual inflation rate in % at time t .
- CAB_t is the current account balance as a % of GDP at time t .
- $UNEMPLOY_t$ is the unemployment rate as a % of the total labor force at time t .
- ϵ_t is the white noise process.

4. RESULTS AND DISCUSSION

In this part of the study, a descriptive analysis of the variables used in the sample of Western Balkans countries that are the subject of this study is presented. Empirical analysis is based on panel analysis containing 5 cross-sectional units (5 Western Balkans economies) during the period 2002-2024. Therefore, the number of observations included in the panel is 115. In addition to the descriptive analysis, the movement of the general government gross debt in selected Western Balkans countries in the period 2002-2024 is graphically illustrated. The data was collected from the websites of the International Monetary Fund and the World Bank. Table 2 shows the descriptive analysis of the variables in the example of selected Western Balkans countries. It is noticeable that the largest amount of standard deviation is present in the variable of public debt (16.62%), which means that there is the largest spread between the minimum and maximum values of the indicator. The highest amount of public debt was achieved by Montenegro (108.40% of GDP) in 2020, while the lowest amount of public debt was achieved by Bosnia and Herzegovina (18.20% of GDP) in 2007. The highest rate of real GDP growth was achieved by Montenegro (13.00%) in 2021, while the highest inflation rate was achieved by North Macedonia (18.70%) in 2022. The highest amount of current account deficit was achieved by Montenegro (-49.50% of GDP) in 2008, while the highest unemployment rate was achieved by North Macedonia (37.30%) in 2005.

Table 2: Descriptive statistics of the selected variables

Variables	Obs	Mean	Std. Dev.	Min	Max
DEBT	115	49.21565	16.61918	18.20000	108.40000
GDP	115	3.160000	3.351271	-15.00000	13.000000
INF	115	3.500000	3.977877	-2.200000	18.700000
CAB	115	-9.007017	7.646516	-49.50000	0.3810000
UNEMPLOY	115	19.92261	7.555689	7.200000	37.300000

Source: Author

In addition to the descriptive analysis, the movement of public debt in selected Western Balkans countries in the period 2002-2024 is shown in Picture 1. Until the global financial crisis, there was a gradual downward trend in public debt in all of the selected countries of the Western Balkans; however, there was an increase starting in 2009 and continuing until 2015, followed by a substantial decline. Again, in 2020, due to the crisis caused by the COVID-19 pandemic, there was an increase in public debt, followed by its stabilization and a more moderate decline over the period 2021–2024.



Picture 1: Movement of the general government gross debt in selected Western Balkans countries in the period 2002-2024.

Source: Author

Certainly, one of the main conditions for performing a correct panel regression model is the absence of multicollinearity of the used variables. Both the variance inflation factor (VIF) test and the correlation matrix were used to prove the absence of multicollinearity. The correlation matrix that displays the relationship between the independent and dependent variables is shown in Table 3. It is noticeable that the level of correlation between the independent variables does not exceed the threshold of 0.80.

Table 3: Correlation matrix

	DEBT	GDP	INF	CAB	UNEMPLOY
DEBT	1.0000				
GDP	-0.1497	1.0000			
INF	-0.0349	0.2484	1.0000		
CAB	-0.0617	-0.0575	-0.0838	1.0000	
UNEMPLOY	-0.5115	-0.0343	-0.1943	0.0001	1.0000

Source: Author

The absence of multicollinearity can also be confirmed by using the variance inflation factor, which is a frequently used collinearity test. Table 4 shows that the value of VIF does not exceed the threshold value of 10, so the absence of multicollinearity of the used variables is confirmed.

Table 4: Variance inflation factor

Variables	VIF	1/VIF
GDP	1.07	0.936770
INF	1.11	0.898838
CAB	1.01	0.991287
UNEMPLOY	1.04	0.961783
Mean VIF	1.06	

Source: Author

One of the most important requirements for an econometric analysis of time series is stationary data, which is crucial for the econometric approach (Mushtaq, 2011). The mean and variance of time series must be constant values. If the p-value is more than 0.05, the data is not steady and has a unit root. The unit root test is used to eliminate non-stationary data since it can result in an unfavorable regression model (spurious regression). The order of integration of the variables is determined using the Levin-Lin-Chu and Im-Pesaran-Shin unit root tests. The test findings are summarized in Table 5. The results of the unit root test show that, with the exception of the public debt and unemployment rate, all variables are stationary at level because the probability does not exceed the 5% significance level, while the public debt and unemployment rate data become stationary after performing the first difference.

Table 5: Unit root test

Variables	Level		1st difference	
	Levin-Lin-Chu	Im-Pesaran-Shin	Levin-Lin-Chu	Im-Pesaran-Shin
DEBT	-4.2376 (0.2207)	-0.5472 (0.2921)	-6.4419 (0.0012)*	-3.0267 (0.0012)*
GDP	-6.6108 (0.0006)*	-3.2120 (0.0007)*	-13.5662 (0.0000)	-9.6474 (0.0000)
INF	-7.5360 (0.0000)*	-3.8386 (0.0001)*	-12.1507 (0.0000)	-8.3226 (0.0000)
CAB	-5.1365 (0.0034)*	-1.7956 (0.0363)*	-10.7435 (0.0000)	-7.3186 (0.0000)
UNEMPLOY	-1.0053 (0.7481)	1.2456 (0.8935)	-8.5520 (0.0000)*	-4.8020 (0.0000)*

Source: Author

After diagnostic tests of multicollinearity and unit root, fixed effects and random effects models were used to derive an adequate regression model. The results of the panel regression model are presented in Table 6.

Table 6: Panel regression model

Variables	Fixed effects	Random effects
GDP	-1.2252600 (0.000)*	-1.2376470 (0.000)
INF	-0.3304495 (0.024)*	-0.2914774 (0.030)
CAB	-0.3346700 (0.000)*	-0.1581511 (0.017)
dUNEMPLOY	-0.0419432 (0.888)	-0.0984712 (0.742)
C	1.5776680 (0.129)	3.023089 (0.001)
R - squared	0.4915	0.4712
Prob.	0.0473	-

Source: Author

The main test used to identify the adequacy of fixed effects and random effects models is the Hausman specification test. This test serves to show which of these two used models presents more adequate results. Based on the results from Table 7, it is noticeable that the probability does not exceed the threshold value of 0.05, so the fixed-effects model proved to be more adequate than the random-effects model. At the same time, the probability value of 0.0473 indicates that the fixed-effects model is more adequate than the pooled OLS model as well.

Table 7: Hausman specification test

Variables	Coefficients	
	Fixed effects	Random effects
GDP	-1.2252600	-1.2376470
INF	-0.3304495	-0.2914774
CAB	-0.3346700	-0.1581511
dUNEMPLOY	-0.0419432	-0.0984712
Prob>chi2	0.0431	

Source: Author

Based on the obtained results, it is noticeable that the influence of all independent variables, except the unemployment rate, proved to be statistically significant. Therefore, H01, H02, and H03 cannot be rejected, while H04 is rejected. It is noticeable that the increase in GDP growth, inflation rate, and current account balance by 1% causes a decrease in public debt by 1.2252600%, 0.3304495%, and 0.3346700%, respectively. The R-squared indicator of the regression model indicates that the given variables describe more than 49% of the changes in the public debt variable. The probability of the regression model is statistically significant ($p < 0.05$), which indicates that the model explains a significant amount of variance in the dependent variable.

5. CONCLUSION

The aim of this paper was to identify the impact of specific macroeconomic variables on the level of public debt in selected countries of the Western Balkans in the period from 2002 to 2024 by using the panel regression model. The results of the coefficients assessment using the fixed-effects model indicate that GDP growth, inflation rate, and positive current account balance can affect the decrease in public debt. Therefore, H01, H02, and H03 could not be rejected. The results, which outline the importance of the impact of GDP growth, inflation rate, and current account balance on the decrease of public debt, are in line with economic theory. Further, obtained results indicate that the unemployment rate has a negative coefficient and has no statistically significant influence on the public debt. Therefore, H04 was rejected. The regression is significant, and the signs of the main explanatory variables are those that are expected. This study provides an empirical basis for a better understanding of the dynamics of public debt and its main drivers and can be significant for policymakers in defining activities aimed at maintaining the stability of public debt. This research has certain limitations since the analysis was carried out in a small sample of countries and covered a rather short period of time. The suggestion for future research is the use of a larger number of countries that will be included in panel regression analysis, on the basis of which it could be concluded about the factors influencing the level of public debt in conditions of uncertainty.

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