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Determining the Threshold of Public Debt in the Western Balkan Countries

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Abstract

Public debt is a very important tool that allows countries to access finance and reach their goals. However, taking a high amount of debt, more than a country can handle, can hamper economic growth or even cause an economic downturn. That is why it is very important for countries to manage their debt effectively so that the debt is sustainable and contributes to economic growth. Each country can tolerate a different level of debt without it causing trouble for its economy, and it is quite important for them to find the point where if the public debt exceeds, it might negatively impact their economy. This research paper intended to find if public debt affects economic growth by using the fixed effect and random effects model and then using the Hausman test to decide which model is more appropriate, as well as the threshold of public debt in Western Balkan countries, by using the pooled OLS model, to determine if a non-linear relationship exists between public debt and economic growth and finding the turning point. According to the obtained results, a non-linear inverted U-shaped relationship exists, and the results suggest that public debt positively impacts economic growth until it reaches 46% of the GDP, and if the debt exceeds this level, it starts to negatively impact economic growth.

Keywords: debt, public, threshold, growth, economy

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Introduction

Public debt is a very important aspect of the economy of a country since it plays a crucial role in economic development. It allows governments to overcome economic challenges effectively, ensuring to not delay or obstruct the achievement of long-term development goals of a country. Public debt needs to be properly managed and involves strategic planning and mitigation of various risks associated with borrowing, such as interest rate risk, exchange rate risk, and default risk.

This research investigates whether public debt is managed effectively in Western Balkan countries and if it affects economic growth. Public debt can be used sustainably, meaning to finance and support areas that will continue to contribute to the long-term development and growth of the country, such as investments in education systems, healthcare facilities, and basic utility infrastructures, and job creation, which will create value and increase the development of its population, and as a result, the countries economy. However, if the public debt only supports activities that do not generate value in the future, such as payments for unemployment benefits, pensions, debt, etc., it can widen the budget deficit and accumulate high levels of debt. This, in turn, can have very negative effects on its economy and population since a high level of debt can result in higher taxation for its citizens as a means for paying back the interest and debt, which reduces the disposable income for the citizens, as well as, funds can be diverted towards paying up the debt, away from productive investments in education, healthcare, and infrastructure, etc.

Problem Statement

The increasing levels of public debt raise concerns regarding the potential impacts on economic growth, and this topic is widely researched throughout the literature. There are concerns that debt is not used in a productive way and that accumulating debt will negatively impact economic growth. This research will reveal the level of debt that positively affects the economic growth in Western Balkan Countries. Determining this point is quite important for a country as it allows it to borrow responsibly since borrowing more than a country can handle can lead to economic stagnation or even economic decline.

Research Questions and Research Hypothesis

This research intends to answer the following questions:

- Does public debt impact economic growth in Western Balkan Countries?
- What is the threshold of public debt in Western Balkan Countries?

By testing the following hypothesis:

- H0: Public debt has no significant effect on the economic growth
- Ha: Public debt has a significant effect on the economic growth

Literature Review

Public debt is an important aspect of a country's economy that needs to be analyzed and has been widely researched. Most of the authors investigate the impact that public debt would have on economic growth. Other authors try to find the level of public debt that would contribute positively to economic growth. Different countries, depending on their size, development, and economy, have different thresholds and can handle different debt levels without negatively impacting their economic growth. Finding the threshold of public debt on economic growth helps countries to understand their capacity and to foster long-term economic stability, growth, and development without falling into too much debt, which might negatively impact them. For example, Caner et al. (2019) analyzed data from 1995-2014 across 29 OECD countries, and the analysis revealed a negative and statistically significant relationship between public and private debt variables and economic growth when this level reaches 137% of the GDP. However, Lim (2019), by analyzing data from 41 countries over 64 years, found a negative relationship between growth and debt. Other authors found that debt negatively impacts economic growth in the long term but positively affects economic growth in the short term (Abubakar & Mamman, 2020), while Jacobs et al. (2020) found that negative growth rates increase public debt levels and not the other way around.

The level of public debt that can contribute to economic growth depends also on the institutional development of the countries. Vinokurov (2020) went one step ahead and split countries based on their institutional development, and the estimates for the debt threshold for countries with weak institutions is 35-40% of the GDP, while for the countries with strong institutional development, the threshold

is 50-60% of the GDP. The threshold for transition countries of Western Balkans is 58.2% of the GDP, for Eastern Europe is 71.9%, and for Central European countries is 81.6% (Fetai et al., 2020). Rexhepi and Zeqiraj (2023) found that the threshold is between 40-61% of the GDP, but in the Balkan countries, this threshold is lower when compared to the Visegrad Countries and Baltic Countries, and the negative impact on economic growth if raising the debt above the threshold is stronger than in the other groups of countries analyzed. Based on these analyses, the more developed the country is, it can sustain a higher level of debt and better manage the public debt to contribute to economic growth. Srivastava et al. (2021) found out that Japan has a debt sustainability threshold of 176% of the GDP. Japan currently is operating with a debt of 260% of its GDP, indicating that this high level of debt might not be contributing to economic growth effectively. When analyzing the threshold for North Macedonia, studies found that the debt contributes to economic growth when it reaches around 30% of the GDP, while levels above that point will negatively impact the growth (Kjosev, et al, 2021). When analyzing the debt threshold of Western Balkan countries, Bexheti et al. (2020) found that public debt positively affects Western Balkan economies until it reaches 50.87% of the GDP, and if it exceeds this level, it will deteriorate economic growth.

Research Data and Methodology

The main purpose of this paper is to investigate the relationship between public debt and economic growth for the last two decades and determine the so-called 'threshold', more specifically by analyzing data from 2002-2022 for the Western Balkan Countries, namely, North Macedonia, Albania, Serbia, Bosnia and Herzegovina, and Montenegro. Kosovo was excluded due to missing data in several of the indicators used in this analysis. In order to test if public debt affects economic growth, to what degree, and in which direction, panel data analysis using the fixed effect and random effect models was used, and the Hausman test was performed to choose the more appropriate model. In order to test if a non-linear relationship exists between economic growth and debt, another model, the pooled OLS model, was used, which included the squared values of debt.

As a dependent variable, the economic growth is measured by gross domestic product annual growth, obtained by the World Bank database, while the independent variable was the level of Public Debt, measured by the General Government Debt as % of GDP indicator, obtained from the International Monetary Fund. As control

variables in the model, the following indicators were used: trade as a percentage of GDP, Gross Fixed Capital Formation, Population Growth, and Life expectancy.

The following table presents the variables included in this research, including a brief explanation regarding the acronyms, how they are measured, and the source from where they were obtained.

Table 1

Variables and Explanation

Variable	Acronym	Measured in:	Source
Gross Domestic Product Growth	GDPG	Percentage (annual growth)	World Bank
Public Debt	D	General Government Debt as % of GDP	IMF
Debt Squared	D^2	Percentage	Own calculation
Trade	T	Percentage of GDP	World Bank
Gross Fixed Capital Formation	GFCF	Percentage of GDP	World Bank
Population Growth	PG	Annual growth in %	World Bank
Life Expectancy	LE	Years	World Bank

Source: authors calculations

The following equation model was taken into consideration:

$$GDPG=\beta_0+\beta_1 D+ \beta_2 GDPG_1+ \beta_3 T+ \beta_4 GFCF+ \beta_5 PG+ \beta_6 LE \quad (1)$$

$$GDPG=\beta_0+\beta_1 D+ \beta_2 D^2+ \beta_3 GDPG_1+ \beta_4 T+ \beta_5 GFCF+ \beta_6 PG+ \beta_7 LE \quad (2)$$

Where we have:

GDPG- representing the dependent variable, measuring the economic growth

GDPG_1- representing the GDP growth from the previous period

D- representing the independent variable, the level of Debt

D^2- representing the independent variable, the squared level of Debt

T- representing the control variable, trade as % of GDP

GFCF -representing the control variable, gross fixed capital formation % of GDP

PG- representing the control variable, population growth

LE-representing the control variable, life expectancy

The following table represents the descriptive statistics of the data included in the analysis. The period analyzed is from 2002-2022, with 105 observations. The average annual economic growth in Western Balkan Countries in the analyzed period is 3.17%, with a standard deviation of 3.48, reaching a minimum economic decrease of 15% and reaching a maximum value of 13%. The level of debt in Western Balkan countries, on average, is 49% of the GDP, and its maximum value reaches 107% of the GDP. Trade in Western Balkan countries, on average, reaches 93% of the GDP, while the gross fixed capital formation, on average, is 23% of the GDP.

Table 2

Descriptive Statistics

Western Balkan Countries					
Variables	**Obs**	**Mean**	**Stand dev**	**Min value**	**Max value**
GDPG	105	3.173794	3.483175	-15.30689	13.04346
D	105	49.37445	17.09681	18.70922	107.3498
T	105	93.54624	20.54113	56.86639	168.8249
GFCF	105	23.58971	5.283001	13.3	39.22
PG	105	-.5379729	.5463871	-2.517058	.4007508
LE	105	75.68127	1.586994	72.28536	79.282

Source: Authors Calculations.

The data were analyzed by using the two models, the fixed/random (1) model to check if public debt affects economic growth, and the pooled OLS (2) model to test if there exists a non-linear relationship between public debt and economic growth.

The results from the regression analysis will serve as a base for analyzing the turning point, also called the "threshold," where the effect of debt on economic growth starts changing. The threshold is found using the following formula:

Threshold= (-β1)/2β2

Where:

β_1 is the coefficient of the linear debt variable

β_2 is the coefficient of the squared debt variable

If $\beta_1 < 0$ and $\beta_2 > 0$, and both coefficients are significant, then a non-linear U-shaped relationship exists between the variables

If $\beta_1 > 0$ and $\beta_2 < 0$, and both coefficients are significant, then a non-linear, inverted U-shaped relationship exists between the variables.

Empirical Findings

Since this research intends to evaluate if the public debt is used effectively and if this translates to a better economy for the country, this section reveals the results of the analysis made using the fixed and random effect model. The results reveal important information about the relationship between the analyzed variables, how they are related, and in what direction. The following table presents the results of the fixed effect mode.

Table 3

Results from the Fixed and Random Effects Model.

	FIXED EFFECTS model	RANDOM EFFECTS model
GDPG_1	-.2161607	-.1924701
Debt	-.0809815	-.0333793
Trade	.0933018	.0066607
GFCF	.0582467	.2300914
PG	1.410622	.3732961
LE	-1.303747	-.4241244
p > | t |	(0.000)	(0.0275)
Observation Nr. of groups	99 5	1039 38
F test	6.18	
Chi 2		3.48
Model	FE	RE
testparm	F(4,88) = 5.32 Prob > F = 0.0007	
Hausman test		
chi2(1) Prob>chi2	23.54 0.0006	

Source: Authors' calculations

The number of observations in this analysis is 99, and they are grouped into five groups. Based on the results obtained from the Hausman test, having a value of p=0.0006, the fixed model is more suitable for this analysis at a 1% significance lev-

el. Based on this model, there is a significant negative relationship between public debt and economic growth, so a one percentage point increase in the public debt as a percentage of GDP decreases economic growth by 0.08 percentage points. According to the results of the analysis, the results indicate that increasing levels of public debt may impede economic growth. According to the results, H0 is rejected and Ha, that public debt affects economic growth is accepted.

The next part of the analysis by using the pooled OLS model, tends to investigate if there exists a non-linear relationship between public debt and economic growth. In this model, the squared value of debt is introduced.

Table 4

Results of the pooled OLS model testing if a non-linear relationship exists between Debt and Economic Growth in Western Balkan Countries in the period 2002-2022.

Dependent variable *GDPG*	*β*	*Standard dev.*	*t*	*P>|t|*
GDPG_1	-.2031726	.1013349	-2.00	0.048
Debt	.2337516	.0967818	2.42	0.018
Debt Squared	-.002505	.0008814	-2.84	0.006
Trade	.0032627	.0179831	0.18	0.856
GFCF	.2589114	.0747013	3.47	0.001
PG	.3620057	.6620029	0.55	0.586
LE	-.5079559	.2593846	-1.96	0.053
Obs	99			
Prob > F	0.0033			
R-squared	0.2043			
Adj R-squared	0.1431			
Root MSE	3.2938			

Source: authors calculations

As the model suggests that there is a non-linear relationship, the next part will focus on finding the turning point, by using the vertex formula meaning to find the point until which debt positively affects economic growth. Based on the literature a U shape exists if both coefficients are significant, and B1 is negative, while B2 is positive. In case both coefficients are significant and B1 is positive, while B2 is negative, a non-linear, inverted U-shaped relationship exists. In this case, B1 is

positive, while B2 is negative, therefore, by using the results obtained from the regression analysis and inserting in the threshold equation then we have:

Threshold = (-0.2337516)/(2 × (-0.002505)) = 46.65%

Once we solve the equation, we obtain that the threshold of public debt in Western Balkan Countries is 46.65% of the GDP. This suggests that as debt levels increase to 46.65% level, it will have a positive effect on economic growth, but as debt exceeds this level, the effect of debt on growth starts to diminish and eventually turns negative, meaning it starts to negatively impact growth.

Discussion of the Results

The above results of the analysis made, investigating the relationship between public debt and economic growth show important information that there is a significant relationship between the analyzed variables, indicating that if public debt is managed effectively and if it reaches a certain level, in our case 46% of the GDP, it might contribute to the economic growth of Western Balkan Countries. The results indicate that a one percentage increase in the level of public debt is likely to approximately decrease economic growth by 0.08%, holding other factors constant. However, the results from the pooled OLS suggest that in Western Balkan countries, there is a non-linear relationship between debt and economic growth and that public debt positively impacts economic growth until it reaches a certain point, and as this point is exceeded, it starts to have a negative effect on the economic growth.

While debt can foster growth, the level of debt that one country can manage is quite important, since if debt reaches higher levels that the countries can handle, it becomes unsustainable, as payment of the interest can crowd out other productive spending that can contribute to economic growth. As different countries have different capacities, it is quite important for them to analyze the threshold of the public debt. Even though the Maastricht criteria recognize that the level of public debt should not exceed 60% of the country's GDP, each country has a different capacity. Therefore, knowing the limitations is crucial for managing the debt effectively and ensuring that it contributes positively to economic growth.

In the case of Western Balkans, according to the results of this analysis, the ideal level of public debt is less than what is foreseen with the Maastricht criteria, being at 46% of the GDP. This suggests that Western Balkan countries have the capacity to handle their debt obligations until they reach a level of around 46% of their GDP

without compromising economic growth. This reflects the level of debt that can be managed and the countries can afford interest payment, and ensure debt stability while increasing economic growth.

Conclusion

The analysis indicates a significant relationship between public debt and economic growth in the Western Balkan Countries. There is a non-linear, inverted U-shape relationship between the variables, indicating that public debt can positively impact economic growth until it reaches a certain level, in this case, 46% of the GDP. If the debt exceeds this level, it begins to negatively impact the economy. Public debt as a tool is quite important for economic growth, provided that it is managed effectively and is maintained within sustainable limits. According to the results, the null hypothesis (H0) that public debt has no significant effect on economic growth is rejected, and the alternative hypothesis is accepted. The results from the fixed effects model suggest that a 1 percentage point increase in public debt is likely to decrease GDP growth by 0.08%, holding other factors constant. However, the results from the pooled OLS suggest since there is a non-linear, inverted U-shape relationship between the variables, public debt positively affects the economic growth in Western Balkan countries until it reaches around 46% of the GDP, and if it exceeds this point, the effect on economic growth tends to become negative. The findings suggest that for Western Balkan Countries, the threshold is much lower, in comparison to the Maastricht criteria, and it has a more limited capacity to manage high levels of debt without jeopardizing economic stability.

Limitations of the Study

Even though the research provided important information on the relationship between the level of public debt and economic growth, which served as a base to establish the threshold of public debt in Western Balkan Countries, the study can be improved by including more variables that affect economic growth.

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