THE THRESHOLD EFFECT OF PUBLIC DEBT ON ECONOMIC GROWTH: THE CASE OF THE NEW EUROPEAN UNION MEMBER STATES

Gazmore Rexhepi *, Valbona Zeqiraj **

* University of Gjakova "Fehmi Agani", Gjakova, the Republic of Kosovo
** *Corresponding author*, University "Kadri Zeka", Gjilan, the Republic of Kosovo
Contact details: University "Kadri Zeka", Rr. ZijaShemsiu, 60000 Gjilan, the Republic of Kosovo

OPEN ACCESS

How to cite this paper: Rexhepi, G., & Zeqiraj, V. (2023). The threshold effect of public debt on economic growth: The case of the new European Union member states. *Journal of Governance & Regulation, 12*(2), 194–199.
https://doi.org/10.22495/jgrv12i2art18

ISSN Print: 2220-9352
ISSN Online: 2306-6784

Received: 30.12.2022
Accepted: 05.06.2023

JEL Classification: E62, H63, O47
DOI: 10.22495/jgrv12i2art18

Abstract

The aim of this paper is to analyze the impact of public debt on economic growth and the possible existence of a non-linear relationship in eleven European Union (EU) new member states (NMS) for the period 2000–2019. If we compare this study with the studies of Reinhart and Rogoff (2010) and Kumar and Woo (2010), in this study, we will use more recent data that will enable us to perceive the relationship between public debt and economic growth in the new EU countries. The results of our study show that the debt turning point is roughly between 40.16 and 61.2 percent of GDP, dependent on which subgroup we have analyzed. This paper contributes to determining the point of public debt that would contribute to the economic growth of the new EU member states.

Keywords: Public Debt, Economic Growth, EU New Member States, System GMM

Authors' individual contribution: Conceptualization — G.R. and V.Z.; Methodology — G.R. and V.Z.; Formal Analysis — G.R. and V.Z.; Investigation — G.R. and V.Z.; Resources — G.R. and V.Z.; Writing — G.R. and V.Z.; Supervision — G.R. and V.Z.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

After the Great Recession of 2008, public debt became a significant issue in many countries around the world, as many governments increased their borrowing to finance fiscal stimulus measures and stabilize their economies. This led to more intense discussions and research on the impact of public debt on economic growth, as well as on the long-term consequences of high levels of debt on fiscal sustainability and macroeconomic stability. Similar trends have been observed in the countries of new European Union (EU) member states, where one of the main features is the stronger growth dynamics of the debt level than the achieved rates of economic growth that is the economic inefficiency of borrowing. These countries were generating economic growth in the EU in the pre-crisis period, while, at the same time, managing to preserve a relatively low level of indebtedness. However, the crisis that occurred in 2008 caused serious economic distortions, primarily due to the high trade openness of these countries and their financial dependence on the "old" EU member states. Given the large drop in gross domestic product (GDP) growth rates and the sharp increase in unemployment and the public debt ratio, the new member states (NMS) decisively implemented severe fiscal consolidation measures in the post-crisis period.

In this paper, we empirically explore the effects of public debt on economic growth in eleven NMS in the EU (Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia) over the years 2000–2019, covering the period pre- and after the Global Crisis that occurred at the end of 2007.

This paper will follow the studies of Checherita and Rother (2010) and Mencinger et al. (2014), and we have applied the system generalized method of moments (GMM) model. In order to provide the robustness of the results we have also a fixed effects model. In this paper, we will also estimate the non-linear relationship between public debt and economic growth.

The remainder of this paper is structured as follows. Section 2 overviews the relevant literature. Section 3 explains the data and model specification. Section 4 presents the results and discusses the findings. Section 5 concludes the paper and suggests several topics for future investigation.

2. LITERATURE REVIEW

The debt-growth nexus has been attractive for researchers for decades. However, despite the vast empirical literature on this issue, there is still no consensus on the direction or magnitude of the impact and the results can be heavily influenced by the set of countries, the time period, and the estimation method (Asteriou et al., 2021). Bearing in mind that there are many studies that have investigated this topic, in this section, we will focus only on the literature of recent years (2019–2022).

In the paper of Caner et al. (2019), the interaction of public and private debt influences on economic growth was analyzed. Both debt variables are treated as endogenous and subject to regime switch, with the interaction term being the threshold variable. They test whether this interaction variable causes a nonlinear relationship. They find strong evidence for a threshold effect. The threshold variable is endogenous, unlike its treatment in the previous literature. Using data from 29 Organisation for Economic Co-operation and Development (OECD) countries from 1995–2014, the threshold effect of the interaction between the public and private debt variables and economic growth is found to be negative and significant when it reaches the level of 137%.

Using the panel vector autoregression (VAR) model and GMM for 41 countries from 1952 to 2016 Lim (2019) investigated the relationship between debt and growth. The results showed that there is a negative relationship between these two variables.

Vinokurov et al. (2020), in their study, analysed a sample of more than 100 countries in order to contribute to the debate on the debt–growth nexus. They split their sample into three groups depending on countries' institutional development and estimated the debt threshold for each of those groups separately. They showed the significant role institutional development plays in countries' economic performance. However, their debt threshold estimates are 35–40% of GDP for countries with weak institutions and 50–60% of GDP for those with sound institutional development.

By using two-stage least square regression, Abubakar and Mamman (2020) investigated the relationship between public debt and economic growth in 37 OECD countries. Their findings showed that debt exerts a significant negative permanent and positive transitory effect on economic growth.

Some studies have failed to find any causal link between debt and growth. For example, Jacobs et al. (2020), for 31 EU and OECD countries, found no causal link and actually found a causal link from growth to debt, suggesting that negative growth rates increase public debt levels.

Gashi (2020) investigated the impact of public debt on economic growth in 6 Southeastern European countries for the period 2008–2017. The results showed that the maximum debt threshold is about 58% of GDP.

Fetai et al. (2020) examined 13 countries in Europe for the period from 1995 to 2017 using several methods. The results showed that threshold values are 58.2%, 71.9%, and 81.6% of GDP, for the transition countries of Western Balkans, Eastern Europe, and Central Europe countries, respectively.

In the most recent research, Simeonovski et al. (2022) explored 16 countries from Central and Southeastern Europe in the aftermath of the Global Crisis (from 2009 to 2018) using a quadratic dynamic panel-regression model and a GMM approach. They found a debt threshold ranging from 69.4% to 80.7% depending on the method and covariates used.

3. DATA AND METHODOLOGY

Our study dataset consists of a sample of 11 NMS (Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic, and Slovenia) for the period 2000–2019. Although all of them are former socialist countries, they do not constitute a homogenous group. On the contrary, they are quite heterogeneous countries and high disparities among them could be observed with respect to some key variables, such as the level of public debt, annual growth of GDP per capita, GDP growth, etc. Bearing this in mind, we split them into three more homogenous groups: Balkan countries (*BAL-4*), Baltic countries (*B-3*), and Visegrad countries (*V-4*). Hungary, the Slovak Republic, the Czech Republic, and Poland constitute the Visegrad Group; Lithuania, Latvia, and Estonia are part of the Baltic countries group, while Bulgaria, Croatia, Romania, and Slovenia are Balkan countries.

As a measure of economic growth, we will use real GDP per capita — growth *GDPPCG*. As control determinants, we will use trade openness (*TRADE*), gross fixed capital formation (% of GDP, *GFCFG*), inflation (*INF*), and population growth (*PG*). The data are obtained from the World Development Indicators (WDI) database. Table 1 presents the descriptive statistics for all the variables used in the regressions.

Table 1. Descriptive statistics

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
GDPPCG	3.811905	3.995898	-14.2688	12.91914
CGD	38.12909	20.82381	3.7	86.3
PG	-0.40286	0.626204	-3.84767	0.903876
TRADE	117.4177	33.28518	48.52133	190.4182
GFCFGROWTH	4.648594	11.49196	-38.9026	50.99759
INF	3.726264	4.809477	-1.5448	45.66659

The average level of public debt in relation to GDP in all analyzed countries was 28.9%, ranging between the highest level of 86.6% in Croatia and the lowest level of 3.7% in Estonia. Analyzing the groups, we found that the most indebted countries were the Balkan countries with an average public debt level of 48.3% of GDP, Visegrad Group

countries with 40.83% of GDP, while the least indebted were the Baltic countries where the average public debt was only 21.03% of GDP.

In terms of GDP per capita growth, the Baltic countries recorded the highest average GDP growth of 4.89%, in Visegrad Group countries it was 3.50%, while the average was the lowest in the Balkan countries with the amount of 3.32%.

In our paper, we will use a panel analysis. According to Maddala and Wu (1999), one of the main advantages of panel data, compared to other types of data, is that the approach allows the testing and adjustment of the assumptions that are implicit in crossectional analysis.

We start with pooled OLS estimator. But this method, according to Pattillo et al. (2002), produces inconsistent and biased results. Bearing this in mind we continue with the estimation with fixed effects model (FEM) and random effects model (REM). The methods of fixed and random effects make it possible to control the effects of individual observation units (such as persons, firms, countries, etc.) and time effects (such as seasonal variations) in the analysis of panel data.

The fixed effects method is used to model effects that are fixed to individual observation units, which means that they are considered constant over time. This method assumes that the effects of individual units of observation influence the variable under study, but do not change over time.

The random effects method is used to model effects that are random to individual observation units, which means they are considered variable over time. This method assumes that the effects of individual observation units are random and distributed according to a certain distribution.

The advantage of the fixed method is controlling the effects of individual observation units, which can be useful in situations where the effects of observation units are significant and an unwanted source of variability. The advantages of the random effects method are that it allows modeling the random effects of individual observation units, which can be useful in situations where the effects of observation units are less important or negligible.

But according to Pattillo et al. (2002), one of the challenges in panel data analysis is the possibility of endogeneity, which refers to the situation when there is a correlation between explanatory variables and model errors, which can lead to unreliable parameter estimates. Endogeneity can be a problem in panel data analysis because the effects of fixed effects, which are considered constant over time, can be related to explanatory variables in the model, which can lead to a correlation between fixed effects and model errors. This can result in inconsistent parameter estimates and skewed statistical tests. As a result, the use of OLS, FEM, and REM is not suitable in this case.

In order to solve the problem of endogeneity, we used the instrumental variable (IV) approach. As instruments, we will follow Checherita and Rother (2010) and Pattillo et al. (2002, 2004) and we will use the lagged debt-to-GDP ratio.

The IV econometric technique is a powerful tool for estimating causal relationships between variables when traditional regression methods are inadequate.

One of the main advantages of IV estimation is that it can help to overcome endogeneity problems that arise in many empirical studies. Endogeneity occurs when two or more variables are jointly determined, making it difficult to estimate the causal effect of one variable on another using traditional regression methods.

The IV estimation helps to address endogeneity by finding an instrumental variable that is correlated with the endogenous variable but is not directly related to the outcome variable. The instrumental variable serves as a proxy for the endogenous variable, allowing the researcher to estimate the causal effect of the endogenous variable on the outcome variable.

Another advantage of IV estimation is that it can help to identify and quantify the presence of unobserved confounding variables that may bias estimates in traditional regression models. IV estimation can help to isolate the effect of a specific variable on the outcome variable, even in the presence of unobserved confounding variables.

Overall, the IV econometric technique is a powerful tool for estimating causal relationships between variables, particularly in situations where traditional regression methods are inadequate due to endogeneity or unobserved confounding variables.

Bearing the above in mind, we employ two different models: baseline fixed effects (FE) panel regression specification to control the heterogeneity is as follows in Eq. (1).

Second, we apply the IV dynamic panel regression specification to control for endogeneity as follows in Eq. (2).

$$g_{i,t} = \alpha_i + \beta(GDPPC)_t + y_1 CGD_{i,t} + y_2 CGD^2_{i,t} + \delta X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (1)$$

$$g_{i,t} = \alpha_i + \beta(GDPPC)_{t-1} + y_1 CGD_{i,t} + y_2 CGD^2_{i,t} + \delta X_{i,t} + \eta_i + \varepsilon_{i,t} \quad (2)$$

where, *GDPPC* and *CGD* are the annual change of GDP per capita and initial government debt as a share of GDP (note that subscripts *i* and *t* denote the country and time), while the quadratic equation in debt $CGD^2_{i,t}$ is a non-linear relationship between government debt and growth. We expected the debt variable to be positive whereas the coefficient of the debt variable squared to be negative. The *X* vector includes the initial level of GDP per capita — *TRADE*, gross fixed capital formation — *GFCFG*, inflation — *INF*, and population growth — *PG*.

4. RESULTS AND DISCUSSION

In Table 2, we present the relationship between the variables. Bearing in mind our previous discussion, we prefer the IV model and will analyse only these results.

Table 2. Empirical results

Regions / Variables	Balkan (4)		Baltic (3)		Visegrad (4)		Total (11)	
	FEM	IV	FEM	IV	FEM	IV	FEM	IV
GDPPCG(-1)		-0.1726** (0.1325)		-0.2721*** (0.1347)		-0.2412** (0.1279)		-0.2329*** (0.0457)
CGD	0.2452** (0.645)	0.2271*** (0.0852)	0.0652* (0.2509)	0.0872** (0.2872)	0.0691 (0.9941)	0.0612 (0.0871)	0.0723** (0.0499)	0.0692*** (0.0391)
CGD²	-0.0025*** (0.0006)	-0.0021*** (0.0011)	-0.0006 (0.0043)	-0.0008* (0.0037)	-0.0006* (0.0009)	-0.0005** (0.0015)	-0.0009* (0.0005)	-0.0007** (0.0003)
PG	-1.6317*** (0.4804)	-1.4753*** (0.5641)	-0.4797 (0.9104)	-1.7052 (0.9439)	-2.1372* (1.1401)	-3.6342*** (1.271)	-0.9345*** (0.4042)	-1.160*** (0.1542)
TRADE	0.2291 (0.0188)	0.0192*** (0.0189)	0.1167 (0.0280)	0.0012 (0.0165)	0.0343*** (0.0149)	0.0071 (0.0026)	0.0032 (0.0101)	0.0141*** (0.0032)
GFCFG	0.2049*** (0.0225)	0.1843*** (0.0314)	0.3179 (0.0244)	0.2759*** (0.0194)	0.1711*** (0.2777)	0.1817*** (0.0122)	0.2634*** (0.0143)	0.2179*** (0.0217)
INF	0.0094 (0.0454)	-0.0517 (0.0575)	-0.2153 (0.1126)	-0.4122*** (0.1120)	0.3428 (0.0965)	-0.0575 (0.1245)	-0.0413 (0.3913)	-0.0429 (0.0538)
C	-0.3713 (2.5620)	-6.148*** (1.934)	7.9325 (3.4181)	1.269*** (3.0291)	6.8578*** (2.7986)	2.729 (1.973)	4.8594*** (1.3781)	-0.7753 (1.935)
Turning point	49.04%	54.10%	54.33%	54.50%	57.58%	61.2%	40.16%	49.4%
Hansen test (p-value)		0.542		0.845		0.714		0.970

*Note: *, **, and *** indicate test statistic significance at the 10%, 5%, and 1% levels. Standard errors are in parentheses.*

The lagged value of GDP per capita has a negative and significant impact on economic growth in all the models. This result is consistent with the convergence theory, explained by the neoclassical model. It claims, "the lower the starting level of real per capita gross domestic product, the higher is the predicted growth rate" (Barro, 1996, p. 4).

The results confirmed a quadratic relationship between public debt and economic growth bearing in mind that both the coefficients associated with the explanatory variable debt (with a positive sign) and those of debt² (with a negative sign) are significant.

These results of debt and those of debt² imply that the relationship of the growth rate of GDP to the size of public debt is one of concave type, admitting the existence of a maximum value between 40% and 61% on average for the samples. This means that, on average, for the 11 NMS of the EU, public debt-to-GDP ratios above the such threshold would have a negative effect on economic growth. These results are in line with the results of Mencinger et al. (2014) where the results were between 40–70% for the "new" EU member states, respectively.

These results point to the existence of significant differences between subgroups of countries, regarding the maximum level of public debt beyond which its effects on economic growth become, on average, negative. In the Balkan countries, which are on average less developed than Visegrad and Baltic countries, the threshold is lower, compared with the countries in the other two subgroups. Some empirical studies also confirm that the negative effects of a high public debt occur more rapidly in less developed NMS than in the case of more developed NMS. Bilan (2015), analyzing a group of Central and Eastern European countries, explains the significant difference as less developed countries in the group suffer from lower credibility, higher vulnerability to shocks and depend more on external capital transfers than the more developed ones.

In addition, trade has a positive impact on GDP growth. The values were between 0.010 and 0.034 and were significant in almost all groups of countries. These results are consistent with the results of Bilan (2015), where values of trade were between 0.017 and 0.138 for 28 EU countries and 5 EU candidates (Fetai et al., 2020), (-0.020–0.700) for 20 Central, Eastern and Western Balkan countries. Checherita and Rother (2010) (0.030–0.197) for 12 European countries.

The population growth is statistically significant, in all models. Rapid population growth implies a swelling workforce. While this presents immense economic opportunities, it also comes with risks, particularly as difficulties absorbing new entrants to the job market could endanger social stability. In contrast, population ageing is set to put extra pressure on public finances, spark labor shortages and provoke profound shifts in consumption patterns. In both cases, the role of governments will be critical in allowing countries to ride out these demographic fluctuations. Historically, the rate of population growth had a downward trend, thanks to programs of developed countries aimed towards the underdeveloped, especially in terms of youth education. It is recommended for NMS is to invest in empowerment programs for women and the advancement of their political, economic and social status, as it will have the same effect on reducing fertility.

The results for inflation show that this determinant was statistically significant only in the case of Baltic countries, with a negative sign. The regression results show that a 1% change in inflation contributes to a 0.38% decline in the growth rate in Baltic countries. According to Drazen (1979), the optimal level of inflation can help spur economic growth especially a mild or creeping inflation rate of less than 6%.

As we expected, the empirical results indicate that there is a significant relationship between *GFCFG* and economic growth in all models. This result is in line with the study of Ahlborn and Schweickert (2016).

5. CONCLUSION

The main purpose of this paper was to empirically investigate the impact of public debt on economic growth in 11 NMS, for the period 2000–2019. The study confirmed the existence of an "inverted-U" relationship between public debt and economic growth, with a maximum debt threshold of about

44.63% of GDP for the whole group. Using a system IV estimation technique, we found that increasing debt level has a negative impact on economic growth in both, the short and long run in all specifications (except for the short run in the case of Baltic countries). We also found that in Balkan countries, which are on average less developed than Baltic and Visegrad countries, the negative impact is much stronger, and the threshold is lower compared with the countries in the other two subgroups. Such significant differences could be explained as less developed countries usually suffer from lower credibility and higher vulnerability to shocks, and depend more on external capital transfers than the more developed ones.

As with any research study, there are limitations to this study. Some of the limitations include the following.

Data availability: The main limitation of our research is the short time series. Namely, since the data for the NMS countries are not available for all countries before 2000, our study was conducted over a period of 22 years.

Contextual factors: Public debt is influenced by a variety of contextual factors, such as economic conditions, political environment, and policy decisions. These factors can vary across different countries, regions, or time periods, and can significantly impact the findings of our study. Failure to adequately account for these contextual factors can limit the external validity and generalizability of the study's conclusions.

Political and social factors: Public debt is a politically and socially charged issue. Political considerations, such as policy decisions, ideologies, and power dynamics, can influence the accumulation, management, and impacts of public debt. Social factors, such as public perception, attitudes, and behaviors, can also play a role in shaping public debt dynamics. However, these factors may be difficult to quantify and incorporate into a research study, which can limit the comprehensiveness and accuracy of the findings.

Dynamic nature of public debt: Public debt is a dynamic phenomenon that can change over time. It can be influenced by a wide range of factors, including changes in government policies, economic conditions, interest rates, and global events. However, research studies on public debt often capture a snapshot of a particular period, which may not fully capture the dynamic nature of public debt and its impacts over time.

Ethical considerations: This study involves ethical considerations, such as the potential impact of the study findings on public policy, financial markets, and vulnerable populations. Ethical dilemmas may arise in terms of the data sources used, the potential biases in research methodologies, and the implications of the study findings for different stakeholders. Addressing these ethical considerations can be complex and challenging, and failure to do so may limit the validity and relevance of the study's findings.

In conclusion, this study has several limitations, including data availability, timeframe, contextual factors, methodological challenges, causality and endogeneity, political and social factors, the dynamic nature of the public debt, and ethical considerations.

Therefore, further research should incorporate more variables relevant to economic growth and productivity (private investment, interest rate, public investment, etc.) but also the impact of tax policy should be taken into account. Also, under the assumption that the data for the effective interest rate on the debt should be publicly available, the subject of research can be the sustainability of the public debt and its effects on fiscal policy. Also, further research may employ different econometric techniques such as panel VAR, panel autoregressive distributed lag (ARDL) model, system GMM, or some other techniques.

REFERENCES

1. Abubakar, A. B., & Mamman, O. S. (2020). Permanent and transitory effect of public debt on economic growth. *Journal of Economic Studies, 48*(5), 1064–1083. https://doi.org/10.1108/JES-04-2020-0154
2. Ahlborn, M., & Schweickert, R. (2016). *Public debt and economic growth — Economic systems matter*. https://doi.org/10.2139/ssrn.2740988
3. Asteriou, D., Pilbeam, K., & Pratiwi, C. E. (2021). Public debt and economic growth: Panel data evidence for Asian countries. *Journal of Economics and Finance, 45,* 270–287. https://doi.org/10.1007/s12197-020-09515-7
4. Barro, R. J. (1996). *Determinants of economic growth: A cross-country empirical study* (NBER Working Paper No. 5698). National Bureau of Economic Research. https://doi.org/10.3386/w5698
5. Bhimjee, D., & Leão, E. (2020). Public debt, GDP and the sovereign debt Laffer curve: A country-specific analysis for the euro area. *Journal of International Studies, 13*(3), 280–295. https://doi.org/10.14254/2071-8330.2020/13-3/18
6. Bilan, I. (2015). Economic consequences of public debt: The case of Central and Eastern European countries. In *EURINT Proceedings 2015* (pp. 36–51). Editura Universităţii "Alexandru Ioan Cuza". https://cse.uaic.ro/eurint/proceedings/index_htm_files/EURINT2015_BIL.pdf
7. Caner, M., Fan, Q., & Grennes, T. J. (2019). *Partners in debt: An endogenous nonlinear analysis of interaction of public and private debt on growth*. https://doi.org/10.2139/ssrn.3186077
8. Checherita, C., & Rother, P. (2010). *The impact of high and growing government debt on economic growth: An empirical investigation for the euro area* (Working Paper Series No. 1237). European Central Bank. https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1237.pdf
9. Clements, B., Bhattacharya, R., & Nguyen, T. Q. (2003). *External debt, public investment and growth in low-income countries* (IMF Working Paper No. 249). International Monetary Fund. https://doi.org/10.2139/ssrn.880959
10. Drazen, A. (1979). The optimal rate of inflation revisited. *Journal of Monetary Economics, 5*(2), 231–248. https://doi.org/10.1016/0304-3932(79)90005-9
11. Fetai, B., Avdimetaj, K., Bexheti, A., & Malaj, A. (2020). Threshold effect of public debt on economic growth: An empirical analysis in the European transition countries. *Zbornik Radova Ekonomskog Fakulteta u Rijeci, 38*(2), 381–406. https://doi.org/10.18045/zbefri.2020.2.381

12. Gashi, B. (2020). The impact of public debt on the economic growth in South-Eastern Europe: An empirical panel investigation. *Economic Studies, 29*(2), 3–18. https://www.iki.bas.bg/Journals/EconomicStudies/2020/2020-2/1_Burim-Gashi_f-f.pdf
13. Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica, 46*(6), 1251–1271. https://doi.org/10.2307/1913827
14. Jacobs, J., Ogawa, K., Sterken, E., & Tokutsu, I. (2020). Public debt, economic growth and the real interest rate: A panel VAR approach to EU and OECD countries. *Applied Economics, 52*(12), 1377–1394. https://doi.org/10.1080/00036846.2019.1673301
15. Kumar, M. S., & Woo, J. (2010). *Public debt and growth* (IMF Working Paper No. 174). International Monetary Fund. https://doi.org/10.2139/ssrn.1653188
16. Lim, J. J. (2019). Growth in the shadow of debt. *Journal of Banking and Finance, 103,* 98–112. https://doi.org/10.1016/j.jbankfin.2019.04.002
17. Maddala, G. S., & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics, 61*(S1), 631–652. https://doi.org/10.1111/1468-0084.0610s1631
18. Mencinger, J., Aristovnik, A., & Verbic, M. (2014). The impact of growing public debt on economic growth in the European Union. *Amfiteatru Economic, 35*(16), 403–414. https://www.researchgate.net/publication/260012553_The_Impact_of_Growing_Public_Debt_on_Economic_Growth_in_the_European_Union
19. Panizza, U., & Presbitero, A. F. (2014). Public debt and economic growth: Is there a causal effect? *Journal of Macroeconomics, 41,* 21–41. https://doi.org/10.1016/j.jmacro.2014.03.009
20. Patillo, C., Poirson, H., & Ricci, L. (2002). *External debt and growth* (IMF Working Paper No. 02/69). International Monetary Fund. https://doi.org/10.5089/9781451849073.001
21. Pattillo, C., Poirson, H., & Ricci, L. (2004). *What are the channels through which external debt affects growth?* (IMF Working Paper No. 04/15). International Monetary Fund. https://doi.org/10.5089/9781451843293.001
22. Pattillo, C., Poirson, H., & Ricci, L. A. (2002). *External debt and growth* (IMF Working Paper No. 02-69). International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2002/wp0269.pdf
23. Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. *American Economic Review, 100*(2), 573–578. https://doi.org/10.1257/aer.100.2.573
24. Simeonovski, K., Fidanoski, F., Petkovski, M., & Sergi, B. (2022). Debt-growth link after an economic crisis: The case of Central and Southeast Europe. *Post-Communist Economies, 34*(3), 409–422. https://doi.org/10.1080/14631377.2021.2006492
25. Vinokurov, E., Lavrova, N., & Petrenko, V. (2020). *Optimal debt and the quality of institutions* (EFSD Working Paper No. 20/4). European Fund for Sustainable Development. https://doi.org/10.2139/ssrn.4030631