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## Article

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# How Does Public Debt Affect Economic Growth? The Case of the New EU Member States

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### ABSTRACT

**Purpose:** This study investigates how public debt affects economic growth in eleven new EU member states in Central and South-Eastern Europe from 2000 to 2021. These countries are categorized into the Balkan, Baltic, and Visegrad groups based on their economic characteristics.

**Design/methodology/approach:** The analysis employs a panel Autoregressive Distributed Lag (ARDL) model to explore the relationship between public debt and GDP growth, accounting for variables such as trade openness, population growth, inflation, and foreign direct investment.

**Findings:** The results indicate a significant negative correlation between increasing public debt levels and GDP growth, with the effect being especially pronounced in Balkan countries. This negative association is evident both in the short term and long term, highlighting a greater sensitivity to public debt in less economically developed regions.

**Research limitations/implications:** The study is limited by its use of annual data and its focus on specific geographic areas. Despite these limitations, the research provides valuable insights into the complex relationship between public debt and economic growth in new EU member states.

**Originality/value:** This research offers important perspectives on the nuanced dynamics of public debt and economic growth within the context of new EU member states, enhancing the understanding of these relationships in different economic settings.

*Keywords:* Public debt, Economic growth, EU new member states, ARDL

## I. Introduction

Investigating the issue of public debt and its impact on economic growth is crucial, particularly in light of the significant rise in debt levels following the 2008-2009 financial crisis. This surge in public debt,

especially pronounced in European nations, was driven by a combination of factors including liquidity shortages, expansionary fiscal policies, and bank recapitalization efforts. These developments have raised widespread concerns about fiscal sustainability and potential negative impacts on financial markets and economic growth across Europe.

Understanding the role of public debt is essential as it is a key determinant of economic growth, alongside other factors such as trade openness, population growth, inflation, unemployment, and

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foreign direct investment. Despite extensive academic and economic discussions prompted by the 2008 crisis, empirical studies examining the effects of public debt on economic growth have predominantly focused on heavily indebted peripheral Eurozone countries. Consequently, the new EU member states have received relatively little attention in this context.

This paper aims to address this gap by empirically investigating the impact of public debt on economic growth in these newly admitted EU member states, comparing the significance of public debt against other economic growth determinants. Before the crisis, these nations experienced economic expansion while maintaining relatively low levels of debt. However, the 2008 crisis brought significant economic disruptions, largely due to these countries' extensive trade openness and financial interconnectedness with the established EU member states. As a result, faced with declining GDP growth rates, rising unemployment, and increasing public debt burdens, the new EU member states implemented stringent fiscal consolidation measures in the aftermath of the crisis. This economic downturn notably affected labor-intensive sectors such as construction, manufacturing, and retail services. For instance, the Czech Republic initially retained surplus staff on payrolls until the severity of the crisis became apparent (Petkovski et al., 2018).

Our empirical analysis examines the effects of public debt on economic growth in 11 new EU member states (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia) from 2000 to 2021. Recognizing the significant economic and financial differences among these nations, we categorize them into three more homogeneous groups: Balkan countries (BAL-4), Baltic countries (B-3), and Visegrad countries (VIS-4). To our knowledge, this study is the first to divide new EU member states into subsamples for separate analysis. We employ the pooled mean group (PMG) estimation technique to analyze the relationship between the variables.

The structure of the paper includes a brief review of relevant literature in Section 2, an introduction to the empirical methodology and data in Section

3, presentation and interpretation of results in Section 4, and concluding remarks and policy recommendations in Section 5.

## II. Literature Review

The empirical literature examining the relationship between public debt and economic growth in the new EU member states (NMS) offers inconclusive results, with outcomes varying based on the countries included, the time periods studied, and the methodologies applied. Notable recent panel data studies illuminate this complex relationship:

Miszta (2010) employs a VAR methodology and Granger causality test to analyze EU member states' dynamics from 2000 to 2010. Their findings indicate that a 1% increase in public debt relative to GDP correlates with a 0.3 percentage point reduction in GDP growth, and vice versa.

Checherita-Westphal and Rother (2012) examine 12 European countries, highlighting a non-linear relationship between debt and economic growth. They suggest that once debt surpasses approximately 90-100% of GDP, it negatively impacts long-term growth.

Čech Časni et al. (2014) investigate Central, Eastern, and Southeastern European countries from 2000 to 2011, revealing statistically significant negative effects of public debt on growth rates in both the short and long term. They recommend policies that enhance exports, investments, and fiscal consolidation to stimulate economic growth.

Regarding empirical studies, Schclarek (2014) uses a sample of 24 industrial countries with averaged data over seven five-year periods between 1970 and does not find any significant relationship between public debt and economic growth in industrial countries. However, Reinhart and Rogoff (2010) show that the relationship between public debt and growth can be represented by an inverted U-shaped pattern: low levels of public debt positively affect economic

growth, but high levels have a negative impact. Using a database of 44 countries over 200 years, they suggest that the relationship is weak for public debt ratios below 90% of GDP, but growth rates decrease substantially above this threshold.

Panizza and Presbitero (2014) detect a negative association between public debt and growth across a sample of OECD countries. However, when addressing endogeneity issues, the causal effect of public debt on GDP growth diminishes.

Mencinger, Aristovnik, and Verbić (2014) analyze a panel dataset of 25 EU member states, highlighting a statistically significant non-linear impact of public debt on GDP growth. They note that the threshold value for NMS is lower compared to 'old' member states.

Bilan and Ihnatov (2015) investigate a non-linear (quadratic) relationship across a panel of 33 European countries from 1990 to 2011. They identify a wide debt threshold, particularly lower in less developed countries such as Bulgaria and Romania.

Eberhardt and Presbitero (2015) explore the debt-to-GDP ratio in 118 developing countries, emerging, and advanced economies, finding some evidence for nonlinearity. They argue that there is no common debt threshold for all countries over time. Moreover, Égert (2015) presents empirical evidence suggesting that 90% is not a magic number, as the threshold may be lower and the nonlinearity may vary across different samples and specifications. Finally, examining the causal bi-directional direction between debt and growth in a sample of eleven European countries, Gómez-Puig and Sosvilla-Rivero (2015) find that public debt has a negative effect on growth from an endogenously determined breakpoint and above a debt threshold varying between 56% and 103%, depending on the country.

Gál and Babos (2014) conduct a comparative analysis of public debt effects on economic growth in Western European and EU NMS from 2000 to 2013. Their findings emphasize the heightened harm of high public debt levels for NMS, underscoring the importance of debt management in these countries.

Globan and Matosec (2016) use a panel model

with random effects and quarterly data from 2000:Q1 to 2015:Q1 to assess the impact of fiscal consolidation and economic growth on the debt-to-GDP ratio across all 13 NMS. They find that achieving a balanced government budget leads to a slight decrease in public debt growth.

Ndoricimpa (2017) applies the nondynamic panel threshold regression model of Hansen (1999) and a dynamic panel threshold regression model following Kremer et al.'s (2013) study to find the threshold of debt on growth for selected African countries. The results show a threshold of 92% for some countries, while for others, it is 102% of GDP. The findings reveal that the estimated threshold of debt is sensitive to the model applied and the growth control variables incorporated in the estimation. Nonetheless, he contends that low debt is either neutral or enhances growth, while high government debt is consistently harmful to growth for all the countries considered. Ndoricimpa (2020) revisits the threshold effect of public debt on economic growth for middle- and low-income countries, employing a PSTAR technique. The findings confirm a threshold effect averaging 62-66% for the whole sample and 58-63% for all middle-income countries from 2012 to 2017. However, using a dynamic panel threshold model, the results conclude a threshold of 74.3%. Furthermore, Makhoba et al. (2022) analyze the asymmetric effects of public debt on economic growth for selected emerging and frontier SADC countries. They use a symmetric transition regression model (STAR) and find an inverted U-shaped relationship between debt and growth for South Africa. Meanwhile, for Botswana, Namibia, and others, the findings vary.

Simeonovski et al. (2022) investigate 16 Central and Southeast European countries from 2009 to 2018, revealing a concave growth function concerning government debt. They identify a debt threshold ranging from 69.4 to 74.1% of GDP when considering fiscal balances.

Despite these studies, several gaps remain in the literature on the debt-growth nexus in NMS. Many studies are repetitive, focusing on different time periods and estimation methods. While considerable

attention has been given to identifying a debt threshold, less effort has been directed towards understanding the complex transmission mechanisms. Additionally, endogeneity issues, particularly reverse causality and omitted variable bias, have not been adequately addressed. These gaps present opportunities for further research.

### III. Data and Methodology

Our study dataset consists of a sample of 11 NMS from Central and South-Eastern Europe (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia) using annual data for the period 2000 - 2021. In this study we adopt panel data analysis. According to Maddala (1999), panel data offers a distinct advantage over other types of data as it permits the testing and adjustment of assumptions implicit in cross-sectional analysis.

The selection of countries is primarily guided by similarities in historical trajectories, as well as shared geographical and cultural ties, which significantly shape their economic interactions. Despite a common socialist past, these countries do not constitute a uniform bloc; rather, they exhibit notable diversity, particularly in key metrics such as public debt levels, annual GDP per capita growth, and overall GDP expansion.

To address these substantial economic and financial divergences among the countries under consideration, we classify them into three more coherent groups: Balkan countries (BAL-4), Baltic countries (B-3), and Visegrad countries (V-4). The Visegrad Group comprises Hungary, Slovakia, the Czech Republic, and Poland; the Baltic countries group encompasses Lithuania, Latvia, and Estonia; and the Balkan countries group includes Bulgaria, Croatia, Romania, and Slovenia. This segmentation is underpinned by robust economic rationale, taking into account the coherence of group members, and serves as the basis

for the comparative analysis delineated in this paper. The determinants selected for analysis are commonly used in the literature (Clements et al., 2003; Kumar and Woo, 2010; Checherita and Rother, 2010). Hence, we will employ real GDP growth (annual percentage of GDP growth-GDPG) as a measure of economic growth, while utilizing the following control determinants:

- Public debt as a % of GDP-PD;
- Trade openness (as a percentage of GDP)-TRADE;
- Inflation (consumer prices annual %)-INF;
- Foreign direct investment, net inflows (% of GDP)-FDI;
- Population growth (annual %)-PG;
- Unemployment (% of total labor force)-UNP
- Dummy variable -which represent global economic crises 2008/2009 have value of 1 for 2008 and 2009 and 0 for the rest of the period-DUM

Significant disparities exist among the 11 NMS in terms of economic development, as evidenced by variations in annual real GDP growth rates. Some countries experienced peak GDP growth of nearly 12%, while others saw declines of up to 15%. Similarly, public debt levels vary considerably, ranging from a minimum of 3.7% to a maximum of 86% of GDP. To better understand the impact of public debt on GDP growth amidst these differences, we categorized the sample countries into more homogeneous groups (Tables 1-3).

Regarding GDP growth, the Baltic countries exhibited the highest average growth rate at 4.0%, followed by the Visegrad Group countries at 3.6%, while the Balkan countries had the lowest average at 3.0%.

Before applying econometric techniques, it's crucial to ensure the stationarity of selected variables. In this paper, we employ panel unit root tests, specifically the IPS test by Im, Pesaran, and Shin (2003), and the Fisher-Type test using ADF and PP-tests by Maddala and Wu (1999). These tests accommodate deterministic and dynamic effects that may vary across panel members. We use a 10% level

**Table 1.** Descriptive statistics (new 11 EU member countries)

	GDPG	PD	TRADE	INF	FDI	UNP	PG
Mean	3.390212	39.45	118.8362	3.634483	4.887698	9.225413	-0.39956
Median	3.729841	38.1	122.1821	2.795988	3.641769	7.895	-0.26876
Maximum	11.8881	89	190.4182	45.66659	54.64873	19.92	0.903876
Minimum	-14.8142	3.7	48.52133	-1.5448	-41.5082	2.02	-3.84767
Std. Dev.	3.857712	21.23547	33.17851	4.622071	7.730125	4.196569	0.647297
Observations	220	242	242	242	220	242	242

Source: Authors' calculations

**Table 2.** Descriptive statistics (Visegradcountries)

	GDPG	PD	TRADE	INF	FDI	UNP	PG
Mean	3.280289	49.24318	132.1422	3.19531	5.362861	8.942727	-0.03032
Median	3.605256	48.55	136.8236	2.803992	3.886721	7.615	-0.03249
Maximum	10.83203	80.7	190.4182	12.03578	54.64873	19.89	0.829413
Minimum	-6.69956	17	58.07519	-0.87413	-41.5082	2.02	-1.04434
Std. Dev.	2.689091	15.23674	35.44374	2.539192	11.39367	4.739512	0.24813
Observations	80	88	88	88	80	88	88

Source: Authors' calculations

**Table 3.** Descriptive statistics (Balkan countries)

	GDPG	PD	TRADE	INF	FDI	UNP	PG
Mean	3.032614	42.45	100.3014	4.504556	4.444168	8.864205	-0.4793
Median	3.494651	36.8	92.89995	2.782535	2.842196	7.265	-0.50167
Maximum	10.42811	89	161.7432	45.66659	31.24702	19.92	0.903876
Minimum	-7.54844	12.3	48.52133	-1.5448	-0.68887	3.91	-3.84767
Std. Dev.	3.302612	23.06085	28.73365	6.686073	4.858033	3.812038	0.761712
Observations	80	88	88	88	80	88	88

Source: Authors' calculations

**Table 4.** Descriptive statistics (Baltic countries)

	GDPG	PD	TRADE	INF	FDI	UNP	PG
Mean	4.013574	22.39242	125.808	3.059951	4.845519	10.08394	-0.78557
Median	4.266201	18.4	126.0893	2.795988	3.852749	9.755	-0.82132
Maximum	11.8881	47.4	169.4918	15.40232	21.68739	19.48	0.483707
Minimum	-14.8142	3.7	81.78953	-1.13431	-3.10412	4.25	-2.25846
Std. Dev.	5.510692	14.55918	23.25534	3.020682	3.975592	3.840284	0.591625
Observations	60	66	66	66	60	66	66

Source: Authors' calculations

of significance to determine stationary time series (Tables 5-7).

Next, we proceed with two cointegration tests

(Pedroni, 1999; Pedroni, 2004 and Kao, 1999) With these tests we are testing null hypothesis that there are no cointegration between selected determinants

**Table 5.** Panel unit root tests (Balkan countries)

Determinants	Im, Pesaran and Shin W-stat		ADF-Fisher Chi square		PP-Fisher Chi square		Conclusion
	At the level	First differentiation	At the level	First differentiation	At the level	First differentiation	
GDPG	-0.87	-4.07***	9.58	30.98***	17.37**		I(1)orI(0)
PD	-0.16	3.43**	8.65	19.25**	7.31	45.85***	I(1)
TRADE	0.31	-2.78***	4.89	21.91***	3.133	30.73***	I(1)
PG	-0.62	-4.94***	14.79***		33.27***		I(0)or I(1)
INF	-1.31*		13.59*		32.70**		I(0)
FDI	-0.89	-3.92***	10.43	30.63***	15.88**		I(0) or I(1)
UNP	-2.589***		22.28***		5.055		I(0) or I(1)

\*,\*\*and\*\*\*indicates test statistic is significant at the 10%, 5% and 1% level

Source: Authors' calculations

**Table 6.** Panel unit root tests (Baltic countries)

Determinants	Im, Pesaran and Shin W-stat		ADF-Fisher Chi square		PP-Fisher Chi square		Conclusion
	At the level	First differentiation	At the level	First differentiation	At the level	First differentiation	
GDPG	2.546**		6.93**		9.853	42.52***	I(0) or I(1)
PD	0.749	-1.834*	0.235	12.90**	1.348*		I(0) or I(1)
TRADE	0.227	-1.90**	0.441	13.32***	3.281	20.76***	I(1)
PG	-1.327*		3.01**		12.16**		I(0)
INF	0.904	-4.343***	0.797	28.43***	.288	50.58***	I(1)
FDI	0.853	-3.21***	0.07	21.40***	0.26	45.76***	I(1)
UNP	-2.472**		16.43***		7.042		I(0) or I(1)

\*,\*\*and\*\*\*indicates test statistic is significant at the 10%, 5% and 1% level

Source: Authors' calculations

**Table 7.** Panel unit root tests (Visegradcountries)

Determinants	Im, Pesaran and Shin W-stat		ADF-Fisher Chi square		PP-Fisher Chi square		Conclusion
	At the level	First differentiation	At the level	First differentiation	At the level	First differentiation	
GDPG	1.636**		14.15*		18.90***		I(0)
PD	0.587	2.830**	4.916	10.25**	7.185	17.76**	I(1)
TRADE	.016	4.135***	2.687	31.44***	2.218	40.99***	I(1)
PG	3.743***		28.99***		271.3***		I(0)
INF	1.502***		13.49*		20.51***		I(0)
FDI	1.390*		13.25*		20.11***		I(0)
UNP	-0.292	-3.171***	7.093	25.11***	2.323	19.52	I(1)

\*,\*\*and\*\*\*indicates test statistic is significant at the 10%, 5% and 1% level

Source: Authors' calculations

(Table 8). Table 9 provides a succinct overview of the outcomes derived from the panel cointegration tests.

Based on the findings outlined in Table 6, we robustly reject the null hypothesis of no cointegration for the variables under examination. Consequently,

**Table 8.** Panel unit root tests (new 11 EU member countries)

Determinants	Im, Pesaran and Shin W-stat		ADF-Fisher Chi square		PP-Fisher Chi square		Conclusion
	At the level	First differentiation	At the level	First differentiation	At the level	First differentiation	
GDPG	2.842**		40.67***		5.31***		I(0)
PD	0.063	1.57*	19.81	29.56*	5.84	40.92***	I(1)
TRADE	.922	5.16***	11.30	66.68***	.633	92.47***	I(1)
PG	3.31***		56.80***		16.7***		I(0)
INF	2.17**		34.88***		2.50***		I(0)
FDI	1.82**		33.76***		6.25***		I(0)
UNP	0.029	4.788***	45.81***	62.61***	4.42	65.49***	I(1)

\*\*\*and\*\* indicates test statistic is significant at the 10%, 5% and 1% level

Source: Authors' calculations

**Table 9.** Panel cointegration tests results

Group of countries	Tests	Pedroni panel PP-Statistic (p-value)		Kao Residual Cointegration Test (p-value)	
Balkan			0.0008		0.0438
Baltic			0.0291		0.0002
Visegrad			0.0000		0.0003
New 11 EU member countries			0.0000		0.000

Source: Authors' calculations

we are poised to assess both the long-term and short-term effects of public debt, trade openness, population growth, inflation, and foreign direct investment on GDP growth. To undertake this analysis, we choose to employ the panel Autoregressive Distributed Lag (ARDL) model, which allows for the estimation of both long-run and short-run relationships. This choice is supported by several factors. First, examination of Tables 2-5 reveals that the selected determinants in this study are integrated either at level I (0) or at the first degree I (1), with none exhibiting integration at the second degree I (2). According to Pesaran and Pesaran (1997) and Pesaran and Shin (1997), the ARDL method remains applicable regardless of whether the variables are stationary. This is crucial, as the ARDL model would be rendered inapplicable if any determinant were integrated at the second degree.

Second, employing OLS estimators would assume strong homogeneity among countries, imposing a single slope coefficient in pooled estimation, which

may not be appropriate given potential country heterogeneity (Časni et al., 2014). Third, for panels with a greater number of time periods (T), the dynamic estimator of Generalized Method of Moments (GMM) may not be as effective, as it requires a larger number of sections than time series dimensions (Fazli and Abbazi, 2018). With 16 years of time dimension and 11 countries, the dynamic mean group estimators (MG and PMG) are more suitable. Ndambendia and Njoupouognigni (2010) suggest that the pooled mean group estimator (PMG) is particularly consistent when both slopes and intercepts are allowed to vary across countries, while PMGE assumes long-run slope homogeneity.

PMG, as outlined by Pesaran et al. (1999), is attractive for its assumptions of a long-run relationship between dependent and explanatory variables, serially uncorrelated error terms independent of regressors, and consistent long-run parameters across countries. Moreover, Loayza (2004) notes PMG's usefulness in situations where long-run conditions are expected



to be homogeneous across countries, while short-run adjustments depend on country-specific characteristics.

Considering the variations in economic policies among selected countries, we opt for the PMG estimator. This choice is justified as PMG is less sensitive to outliers when N is small and can simultaneously address serial autocorrelation and endogenous regressor issues (Pesaran et al., 1999).

Given the focus on capturing the relationship between public debt and economic growth in both the long and short-run, we estimate the following equation empirically:

$$GDPG_{it} = \gamma_0 i + \gamma_1 PD_{it} + \gamma_2 TRADE_{it} + \gamma_3 PG_{it} + \gamma_4 INF_{it} + \gamma_5 FDI_{it} + \epsilon_{it},$$

$$i = 1, 2, \dots, N; t = 1, 2, \dots, T \quad (1)$$

where GDPG is GDP growth, PD is the public debt, TRADE represents trade openness, PG (population growth), INF is consumer prices and foreign direct investment, net inflows. The subscripts  $i$  and  $t$  denote country and time respectively, suggesting an unbalanced panel.

Given the focus on capturing the relationship between public debt and economic growth in both the long and short run, we estimate the following equation empirically:

$$GDPG_{it} = \gamma_0 i + \gamma_1 PD_{it} + \gamma_2 TRADE_{it} + \gamma_3 PG_{it} + \gamma_4 INF_{it} + \gamma_5 FDI_{it} + \gamma_6 UNP_{it} + \epsilon_{it}$$

$$(2)$$

where GDPG is GDP growth, PD is public debt, TRADE represents trade openness, PG is population growth, INF is inflation, FDI is foreign direct investment, and UNP is unemployment. The subscripts  $i$  and  $t$  denote country and time, respectively, suggesting an unbalanced panel. Following these elucidations, we utilize the Pooled Mean Group Estimator (PMGE) in this study. Equation (1) can be reformulated into a panel Autoregressive Distributed Lag (ARDL) form as presented below:

The general form of the ARDL(p, q) model is:

$$Y_t = a + \sum_{i=1}^p \beta_i Y_{t-i} + \sum_{j=0}^q \delta_j X_{t-j} + \epsilon_t \quad (3)$$

where  $Y_t$  is the dependent variable (GDP growth),  $X_t$  are the independent variables,  $p$  and  $q$  are the lag lengths, and  $\epsilon_t$  is the error term.

Reformulating Equation (2) into a more specific panel ARDL model, we have:

$$\begin{aligned} \Delta GDPG_{it} &= \alpha i + \beta_1 \Delta DEBT_{it} + \beta_2 \Delta TRADE_{it} \\ &+ \beta_3 \Delta POP_{it} + \beta_4 \Delta INF_{it} \\ &+ \beta_5 \Delta FDI_{it} + \beta_6 \Delta UNP_{it+j} \\ &= 1 \sum p \gamma_j \Delta GDPG_{it-j+j} \\ &= 1 \sum p \delta_j \Delta DEBT_{it-j+j} \\ &= 1 \sum p \eta_j \Delta TRADE_{it-j+j} \\ &= 1 \sum p \theta_j \Delta POP_{it-j+j} \\ &= 1 \sum p \lambda_j \Delta INF_{it-j+j} \\ &= 1 \sum p \mu_j \Delta FDI_{it-j+j} \\ &= 1 \sum p \nu_j \Delta UNP_{it-j+j} + \epsilon_{it} \end{aligned} \quad (4)$$

where  $\Delta GDPG_{it}$  denotes the dependent variable (GDP growth),  $X_{it}$  represents the  $(k \times 1)$  vector of regressors for group  $i$ , and  $\alpha i$  signifies the country-specific effects (fixed effects). This model can be further reparametrized into a Vector Error Correction Model (VECM) system. The VECM permits drawing outcomes of long-run estimates while other traditional techniques of cointegration do not allow such kinds of inferences (Jehangir et al., 2020):

$$\begin{aligned} \Delta GDPG_{it} &= \beta_{0i} + \sum_{j=1}^k \beta_{ji} \Delta X_{it-j} \\ &+ \sum_{j=1}^k a_{ji} (ECM_{it-j}) + \epsilon_{it} \end{aligned} \quad (5)$$

The ECM representation of the ARDL model is:

$$\begin{aligned} \Delta Y_t &= a + \sum_{i=1}^{p-1} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q-1} \delta_j \Delta X_{t-j} \\ &+ \lambda (Y_{t-1} - \theta_0 - \theta_1 X_{t-1}) + \epsilon_t \end{aligned} \quad (6)$$

where  $\Delta$  denotes the first difference, and  $\lambda$  is the error correction term indicating the speed of

adjustment to the long-run equilibrium.

Bearing in mind that GDP growth may be influenced by various factors, including lagged GDP growth and country-specific characteristics, which could lead to endogeneity issues, we plan to address this concern by employing appropriate econometric techniques. Namely, lagged GDP growth as a potential determinant to account for growth persistence (Ruho and Beha, 2024). Specifically, we will use an instrumental variable (IV) dynamic panel regression specification to correct for endogeneity and ensure the validity of our results. To address endogeneity, we will use the difference Generalized Method of Moments (GMM) estimator introduced by Arellano and Bond (1991), capturing the persistence of GDP growth (GDPG) and eliminating fixed effects by differencing the model. We will utilize the one-step GMM estimator, as it produces smaller bias and standard deviation compared to the two-step estimator (Judson and Owen, 1999). In the differenced model, correlation may still exist between lagged values of the dependent variable ( $\Delta y_{i,t-j}$ ) and the differenced errors ( $\Delta \varepsilon_{it}$ ), leading to biased estimates (Nickell, 1981). To address this, we will employ the system-GMM estimator based on Arellano and Bover (1995) and Blundell and Bond (1998), which mitigates the endogeneity problem. To avoid having too many instruments relative to the number of groups (Roodman, 2009), we will limit the number of instruments by using a maximum of two lags. This helps prevent bias due to instrument proliferation. The validity of the selected instruments will be tested using the Hansen test, and we will check for serial correlations in the differenced residuals, specifically first-order (AR1) and second-order (AR2) serial correlations. According to Arellano and Bond (1991), first-order autocorrelation in the differenced residuals does not imply inconsistent estimates, but second-order autocorrelation would indicate inconsistency.

## IV. Results and Discussion

Using the general-to-specific modeling approach, we developed models incorporating different numbers of lags for the distinct determinants, maintaining consistency by employing an equal number of lags for all factors. Given the constraints of our sample size and the considerable number of independent determinants, we restricted the maximum lag order of the Autoregressive Distributed Lag (ARDL) model to two lags.

The selection of the ARDL model was guided by the Akaike Information Criterion (AIC), which tends to yield a smaller standard deviation compared to the Schwarz Bayesian Criterion (SBC) when incorporated into the model (Pesaran and Pesaran, 1997). Employing the AIC criterion, we determined the optimal number of lags for each determinant in specifications 1, 2, and 3 as ARDL (1, 1, 1, 1, 1, 1,1), and in the fourth specification as ARDL (2, 1, 1, 1, 1, 1,1).

Following the approach outlined in Pesaran and Pesaran (1997), we evaluated the long-term relationship (as depicted in Table 10) and estimated the short-term dynamics. Additionally, we conducted the Hausman test to assess the long-run homogeneity of coefficients and determine the most appropriate estimator. As indicated in Table 7, the data did not reject the homogeneity restriction, indicating that the PMG estimator is efficient under the null hypothesis and is thus preferred over the MG estimator across all models.

The findings of this study confirm the prevailing notion in the literature regarding the negative impact of public debt on economic growth in the long run. Our results indicate that increasing public debt adversely affects economic growth both in the short and long term, with exceptions noted for the short-run impact in the Baltic countries (Simeonovski et al., 2022). In the long run, escalating public debt tends to diminish public savings, leading to a decline in national savings and total investment, thereby negatively influencing GDP growth. Conversely, in

**Table 10.** Pool mean group estimation

Variables \ Regions	Balkan (4)	Baltic(3)	Visegrad(4)	Total(11)
	ARDL(1, 1, 1, 1, 1, 1,1)	ARDL(1, 1,1, 1, 1, 1,1)	ARDL(1, 1, 1,1, 1, 1,1)	ARDL(2, 1, 1, 1, 1, 1,1)
<i>Long Run Equation</i>				
PD	-0.589*** (0.026)	-0.294*** (0.057)	-0.252*** (0.031)	-0.058* (0.022)
TRADE	0.227*** (0.063)	0.135*** (0.021)	0.027 (0.017)	0.031* (0.023)
PG	-2.112*** (0.551)	0.833 (0.617)	-1.089 (0.895)	-5.058*** (0.878)
INF	0.083 (0.055)	-0.220*** (0.172)	-0.435*** (0.103)	-0.238*** (0.074 )
FDI	0.457 (0.116)	1.075*** (0.253)	0.006 (0.020)	0.091 (0.056)
UNP	0.082 (0.092)	0.005 (0.130)	0.104* (0.058)	0.087 (0.066)
DUM	-4.335*** (1.030)	-20.62*** (1.744)	-3.422*** (1.105)	-4.843*** (1.439)
<i>Short Run Equation</i>				
ECM	-0.681*** (0.184)	-0.703** (0.326)	-0.915*** (0.203)	-0.535* ( 0.094)
PD	-0.270*** (0.100)	-0.303 (0.505)	-0.179** (0.069)	-0.171*** (0.161)
TRADE	0.168 (0.103)	0.236*** (0.066)	0.146*** (0.020)	0.191** (0.077)
PG	-3.013 (1.829)	2.288 (2.675)	4.483 (4.004)	1.079 (2.129)
INF	0.065 (0.145)	0.921 (0.791)	0.206 (0.150)	0.283 (0.206)
FDI	0.315** (0.138)	0.285 (0.547)	0.060 (0.120)	0.282** (0.128)
UNP	0.004 (0.096)	0.077 (0.096)	0.104* (0.058)	0.086 (0.066)
DUM	-3.845*** ( 1.106)	-17.96*** (1.418)	-3.429*** (1.092)	-4.946*** (1.440)
C	6.648*** (1.681)	1.656 (3.609)	13.81*** (4.634)	4.862*** (1.131)
Hausman test				
PMG p-value	0.179	0.245	0.145	0.214

\*\*\*and\*\* indicates test statistic is significant at the 10%, 5% and 1% level.  
Standard errors in ()

the short term, public debt may exert a negative influence on GDP growth due to factors such as increased inflation or financial repression.

Our analysis highlights significant disparities among subgroups of countries concerning the threshold level of public debt beyond which its effects

on economic growth turn negative. Particularly, the Balkan countries, being relatively less developed on average compared to Visegrad and Baltic countries, experience a stronger negative impact in both the short and long run. This aligns with previous research suggesting that less developed nations are more

susceptible to the adverse effects of high public debt due to factors like lower credibility, higher vulnerability to shocks, and greater reliance on external capital transfers (Bilan and Ihnatov, 2015).

The Visegrad countries, which include the Czech Republic, Hungary, Poland, and Slovakia, display a somewhat moderated impact, reflecting their relatively higher economic stability and institutional robustness. These countries tend to have better-developed financial markets and stronger governance structures, which can mitigate some of the negative effects of high public debt. The Baltic countries, comprising Estonia, Latvia, and Lithuania, show a distinct pattern where the short-term impacts of public debt are less pronounced, possibly due to their strong fiscal policies and early adoption of austerity measures post-crisis.

The positive relationship between trade openness and GDP growth is evident across all subgroups, particularly in the Baltic countries. Trade openness facilitates technology transfer, efficient resource allocation, and the dissemination of ideas, which collectively enhance economic growth (Edwards, 1997; Musembi and Chun, 2020). In the Baltic countries, high levels of trade openness have been instrumental in their rapid economic development and resilience during economic downturns.

Population growth emerges as a statistically significant determinant in the long run and in select specifications, with a negative sign consistent with pessimistic and Malthusian trap theories (Dao, 2012). This finding suggests that in the long run, higher population growth could strain resources and hinder economic growth, especially in the less developed Balkan region where resources and infrastructure may be insufficient to support a rapidly growing population.

Inflation's statistically significant negative impact on economic growth in the long run underscores the importance of maintaining an optimal inflation level conducive to economic growth (Drazen, 1979). This is particularly evident in the Visegrad and Balkan countries, where controlling inflation remains a critical policy focus. High inflation can erode purchasing power, distort investment decisions, and create

economic uncertainty, all of which are detrimental to sustainable economic growth.

The variable UNP represents the impact of unemployment on economic growth in different regions and is significant only in the Visegrad countries. In the Visegrad region, the coefficient is positive and significant, indicating that higher unemployment rates were associated with a small but significant increase in economic growth. This counterintuitive result could suggest that during the period studied, the labor market adjustments in these countries may have led to productivity improvements or structural changes that temporarily boosted economic output. In contrast, the unemployment variable is not significant in the Balkan and Baltic regions, indicating that unemployment did not have a discernible impact on economic growth in these areas.

The variable DUM represents the impact of the global economic crises of 2008/2009 on the economic growth in different regions. In the Balkan region, the negative and significant coefficient indicates a substantial adverse impact on economic growth, suggesting severe disruption during the crises. The Baltic region experienced a pronounced negative impact, with economies among the hardest hit, indicating severe economic contractions. The Visegrad countries also faced a negative impact, though relatively less severe, indicating notable but smaller declines in economic growth. When considering all regions combined, the significant negative coefficient suggests widespread economic downturns across new EU member countries, with varying degrees of severity.

The positive relationship between foreign direct investment (FDI) and economic growth, especially in the short run for Baltic countries and in the long run for Balkan countries and the total 11 NMS, aligns with existing literature emphasizing the role of FDI in fostering economic growth (Ahlborn and Schweickert, 2016; Majid et al., 2020). FDI brings in capital, technology, and management expertise, which are crucial for economic development. The Baltic countries have been particularly successful in attracting FDI, which has been a significant driver

of their economic growth.

One variable that yielded contrary results to our initial hypothesis is the short-run impact of public debt in the Baltic countries. While we expected a negative impact, the results indicate that public debt does not significantly hinder short-term economic growth in these countries. This anomaly can be attributed to the Baltic countries' robust fiscal policies and strong institutional frameworks, which may offset the adverse effects of increased debt levels. These countries implemented significant austerity measures and structural reforms early on, which helped stabilize their economies and maintain investor confidence.

In the short run, unemployment (*UNP*) exhibits varied impacts across regions.

In the Balkan and Baltic regions, unemployment shows non-significant positive coefficients of 0.004 (SE: 0.096) and 0.077 (SE: 0.096) respectively, suggesting no significant effect on short-term

economic growth.

However, in the Visegrad region, unemployment demonstrates a significant positive coefficient of 0.104 (SE: 0.058), indicating that higher unemployment rates are associated with a small but significant increase in economic growth in the short run.

Regarding the variable representing the global economic crises of 2008/2009 (*DUM*), its coefficients in all regions are negative and highly significant, indicating a significant negative impact on short-term economic growth during that period.

The error correction mechanism (ECM) results indicate the speed of adjustment towards equilibrium, with faster corrections observed in Visegrad countries compared to Baltic, Balkan, and the total 11 NMS. This underscores the differences in adjustment dynamics across subgroups of countries (Pesaran and Pesaran, 1997). The faster adjustment in Visegrad countries may be attributed to their more resilient

**Table 11.** Empirical results (system GMM)

Variables \ Regions	Balkan (4)	Baltic(3)	Visegrad(4)	Total(11)
GDPG(-1)	-0.393** (0.089)	-0.329*** (0.052)	-0.152** (0.047)	-0.125*** (0.093)
PD	-0.189*** (0.133)	-0.142** (0.079)	-0.147 (0.101)	-0.273*** (0.127)
TRADE	0.045** (0.021)	0.035** (0.032)	0.034* (0.016)	0.010 (0.011)
PG	-2.583*** (0.256)	-1.546 (0.644)	-4.063*** (1.872)	-2.111*** (0.301)
INF	0.046** (0.009)	0.004 (0.006)	-0.023** (0.010)	-0.018*** (0.012)
FDI	0.185*** (0.048)	0.310 (0.025)	0.260*** (0.042)	0.248*** (0.026)
UNP	0.100 (0.025)	-0.089*** (0.136)	0.033 (0.063)	0.112 (0.068)
DUM	-3.924*** (1.249)	-19.45*** (1.572)	-4.625*** (1.482)	-5.293*** (1.492)
C	0.832*** (2.615)	2.641*** (1.332)	6.837 *** (2.300)	-3.598*** ( 3.542)
Test for AR(1) errors	0.080	0.091	0.090	0.007
Test for AR(2) errors	0.273	0.376	0.288	0.390
Hansen test (p-value)	0.542	0.497	0.270	0.136

\*,\*\*and\*\*\*indicates test statistic is significant at the 10%, 5% and 1% level.  
Standard errors in ()

economic structures and better policy frameworks, which enable quicker responses to economic imbalances and shocks.

In the continuation of the paper, we will also present the results obtained from the system GMM estimation method. However, considering the length constraints of the paper, we will provide a concise discussion of these results.

As observed from Table 11, the coefficients obtained were nearly identical to those derived from the ARDL model, except for the lagged GDPG variable, which was not utilized. Notably, the lagged value of GDP growth exhibited a consistent negative and significant impact on economic growth across all models. This finding aligns with the predictions of the neoclassical growth model, indicating that countries approaching their steady state output level tend to experience a deceleration in growth (conditional convergence). As per the neoclassical growth model, "the lower the initial level of real per capita gross domestic product, the higher the predicted growth rate" (Barro, 1996). These results are consistent with previous findings, such as those by Mencinger et al. (2014), which reported coefficients ranging from 1.271 for NMS (Fetai et al., 2020), to 0.15% for countries in Eastern Europe.

## V. Conclusions

To summarize, this study sought to examine how public debt affects economic growth in 11 New Member States of the European Union, utilizing data from 2000 to 2021. The analysis categorized these states into three groups—Balkan, Baltic, and Visegrad countries—to assess the impact of public debt within each subgroup. Using a pooled mean group estimation technique, the findings consistently indicated that increasing levels of public debt have a negative effect on economic growth in both the short and long term across all groups, except for the short term in the Baltic countries. Notably, the detrimental impact of

public debt was particularly pronounced in Balkan countries, which generally exhibit lower levels of development compared to Baltic and Visegrad countries. The results regarding other tested variables align with previous empirical literature, with foreign trade and foreign direct investments showing positive effects on economic growth. Inflation exhibited statistically significant negative effects only in the long run, while population growth was statistically significant with a negative sign solely in the long run and in two specifications (Balkan countries and the total sample of 11 NMS countries). The examination of fiscal indicators highlighted significant concerns regarding public debt sustainability following the crisis, evident across nearly all New Member States (excluding Estonia). While each country's experience varies and there is no uniform behavioral pattern among all New Member States, certain overarching tendencies towards the adoption of restrictive fiscal policies can be discerned.

This research contributes to the existing literature by introducing subgroup analysis, providing detailed insights into the diverse impacts of public debt on economic growth among NMS. However, it is subject to limitations stemming from data constraints and a static timeframe. Future research avenues could explore causality, dynamic analyses, policy implications, and external factors to deepen our understanding of the complex relationship between public debt and economic growth in NMS.

Overall, this study underscores the importance of considering country heterogeneity and subgroup analysis in assessing the impact of public debt on economic growth, especially within the context of the European Union's new member states. The findings have significant implications for macroeconomic policy, particularly in terms of fiscal sustainability and future economic challenges faced by these countries.

## References

- Ahlborn, M., Ahrens, J., & Schwiicjert, R. (2016). Large-Scale Transition of Economic Systems - Do CEECs Converge Toward Western Prototypes? *Comparative Economic Studies*, 58(3), 430-454.
- Bilan, I., & Ihatov, I. (2015). Economic Consequences of Public Debt. The Case of Central and Eastern European Countries. *EURINT Proceedings*, 2, 36-51.
- Čeh, A. Č., Badurina, A. A., & Sertic, B. S. (2014). Public Debt and Growth: Evidence from Central, Eastern, and Southeastern European Countries. *Zbornik Radova Ekonomskog Fakulteta u Rijeci*, 32, 35-51.
- 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 1237). European Central Bank.
- Clements, B., Bhattacharya, R., & Nguyen T. Q. (2003). *External Debt, Public Investment and Growth in Low-Income Countries* (IMF Working Paper No. 249). Washington, D.C.
- Dao, M. (2012). Population and Economic Growth in Developing Countries. *International Journal of Academic Research in Business and the Social Sciences*, 2(1), 6-17.
- Darrat, A., Elkhail, K., & Al-Khateeb, F. (2010). Explaining Growth in an Emerging Market. *Global Business & Finance Review*, 15(1), 79-89.
- Drazen, A. (1979). The Optimal Rate of Inflation Revisited. *Journal of Monetary Economics*, 5, 231-48.
- Eberhardt, M., & Presbitero, A. F. (2015). Public Debt and Growth: Heterogeneity and Non-Linearity. *Journal of International Economics*, 97(1), 45-58.
- Fazli, P., & Abbasi, E. (2018). Analysis of the Validity of Kuznets Curve of Energy Intensity among D-8 Countries: Panel-ARDL Approach. *International Letters of Social and Humanistic Sciences*, 81, 1-12.
- 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. *Proceedings of the Faculty of Economics in Rijeka: Journal of Economics and Business*, 38(2), 381-406.
- Filipos, R., & Fejzula, B. (2024). Examining the Relationship between Bank Profitability and Economic Growth: Insights from Central and Eastern Europe. *Global Business and Finance Review*, 29(1), 31-43. doi:10.17549/gbfr.2024.29.1.31
- Gal, Z., & Babos, P. (2014). Avoiding the High Debt - Low Growth Trap: Lessons for the New Member States. *Verslo Sistemos ir Ekonomika, Business Systems and Economics*, 4(2), 154-167.
- Jehangir, M., Lee, S., & Park, S. W. (2020). Effect of Foreign Direct Investment on Economic Growth of Pakistan: The ARDL Approach. *Global Business & Finance Review*, 25(2), 19-36. doi:10.17549/gbfr.2020.25.2.19
- Krugman, P. (1988). Financing vs. Forgiving a Debt Overhang. *Journal of Development Economics*, 29(3), 253-268.
- Kumar, M. S., & Woo, J. (2010). *Public Debt and Growth* (IMF Working Paper No. 174). Washington, D.C.
- Loayza, N., Fajnzylber, P., & Calderon, C. (2004). *Economic Growth in Latin America and The Caribbean: Stylized Facts, Explanations, and Forecasts* (Working Papers No. 265). Central Bank of Chile.
- 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.
- Jehangir, M., Lee, S., & Park, S. W. (2020). Effect of Foreign Direct Investment on Economic Growth of Pakistan: The ARDL Approach. *Global Business and Finance Review*, 25(2), 19-36. doi:10.17549/gbfr.2020.25.2.19
- Matosec, M. (2016). Public Debt-to-GDP Ratio in New EU Member States: Cut the Numerator or Increase the Denominator? *Romanian Journal of Economic Forecasting*, 19(3), 57-72.
- Mencinger, J., Aristovnik, A., & Verbič, M. (2014). The Impact of Growing Public Debt on Economic Growth in the European Union. *Amfiteatru Economic*, 16(35), 403-414.
- Mencinger, J., Aristovnik, A., & Verbič, M. (2014). The Impact of Growing Public Debt on Economic Growth in the European Union. *Amfiteatru Economic*, 35(16), 403-414.
- Modigliani, F. (1961). Long-Run Implications of Alternative Fiscal Policies and the Burden of the National Debt. *Economic Journal*, 71(284), 730-755.
- Musembi G.R., & Chun, S. (2020) Long-Run Relationships among Financial Development, Financial Inclusion, and Economic Growth: Empirical Evidence from Kenya. *Global Business & Finance Review*, 25(4), 1-11. doi: 10.17549/gbfr.2020.25.4
- Panizza, U., & Presbitero, A. F. (2014). Public Debt and Economic Growth: Is there a Causal Effect? *Journal of Macroeconomics*, 41, 21-41.
- Patillo, C., Poirson, H., & Ricci, L. (2002). *External Debt and Growth* (IMF Working Paper 02/69). International Monetary Fund.
- Peseran, H. M., & Peseran, B. (1997). *Microfit 4.0*. Oxford University Press.
- Peseran, M. H., Shin, Y., & Smith, R. (1999). Pooled Mean Group Estimator of Dynamic Heterogeneous Panels. *Journal of the American Statistical Association*, 94, 621-634.
- Petkovski, M., Kjosovski, J., & Jovanovski, K. (2018). Empirical Panel Analysis of Non-Performing Loans in the Czech Republic: What are their Determinants and How Strong is Their Impact on the Real Economy? *Finance a úvěr-Czech Journal of Economics and Finance*, 68(5), 460-490.

- Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a Time of Debt. *American Economic Review: Papers and Proceedings*, 100, 573-578.
- Rohrs, S., & Winter, C. (2016). Reducing Government Debt in the Presence of Inequality. *Journal of Economic Dynamics and Control*, 82, 1-20. doi:10.1016/j.jedc.2017.05.007
- Schclarek, A. (2004). *Debt and Economic Growth in Developing and Industrial Countries* (Working Paper No. 34). Lund University Department of Economics.