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Comparative Analysis of Factors Affecting Government Debt Using the Examples of Slovenia and Armenia

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Abstract

This paper examines the macroeconomic determinants of government debt in two small open economies with distinct institutional frameworks—Armenia and Slovenia. The analysis focuses on key fiscal variables (budget balance and GDP growth) and monetary factors (inflation and interest rates). Using quarterly data for the period 2004–2025 and an Autoregressive Distributed Lag (ARDL) approach, the results provide robust evidence of cointegration between government debt and its macroeconomic drivers. The findings reveal distinct debt dynamics across the two countries. In Armenia, debt is predominantly growth-driven: higher GDP growth significantly reduces debt levels, while rising interest rates increase debt burdens, with fiscal balance and inflation showing limited long-run significance. In contrast, Slovenia's debt dynamics are shaped by Eurozone-constrained monetary and fiscal conditions, inflation persistence, and accession-related structural shifts. While GDP growth, fiscal balance, and inflation have only marginal long-run effects, short-run dynamics are influenced by inflation persistence and the structural impact of Euro adoption. Error-correction mechanisms confirm stable long-run convergence in both models. The results highlight that debt sustainability in small open economies is highly context-dependent, reflecting the interaction between macroeconomic fundamentals and institutional constraints. The study contributes to the literature by offering a comparative ARDL-based analysis and by distinguishing between growth-driven and institution-driven debt regimes, while also providing policy-relevant insights for balancing growth, fiscal discipline, and institutional compliance.

Keywords: government debt; ARDL model; debt sustainability; small open economies; Eurozone

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1. Introduction

Government debt has become a central issue in macroeconomic policy, particularly in the aftermath of successive global shocks, including financial crises, pandemics, and geopolitical disruptions. Increasing reliance on public borrowing to finance fiscal deficits, stabilize economies during downturns, and support long-run development has led to historically elevated levels of government debt. This trend has intensified concerns regarding fiscal sustainability, debt-servicing capacity, and long-run economic growth. These challenges are especially pronounced in small open economies, which are inherently more exposed to external shocks, capital-flow volatility, and global financial conditions. While advanced

economies typically benefit from deeper financial markets and stronger institutional frameworks, smaller and emerging economies often face tighter constraints in managing rising debt burdens and maintaining macroeconomic stability.

The selection of Armenia and Slovenia is based on a comparative case-study logic rather than on the representativeness of all Eurozone and non-Eurozone economies. Both countries are small open post-transition economies exposed to external shocks, capital-flow volatility, and constraints associated with relatively small domestic financial markets. At the same time, they differ substantially in their monetary and institutional arrangements. Slovenia is integrated into the European Union and the Eurozone and therefore operates under supranational monetary policy and EU fiscal governance. Armenia, by contrast, retains monetary policy autonomy and a national currency but faces greater exposure to exchange-rate volatility, external borrowing conditions, and external financial shocks. This combination of similarities and differences makes the two countries suitable for a comparative analysis of how macroeconomic fundamentals interact with monetary and institutional frameworks in shaping government debt dynamics.

The purpose of this study is to examine the impact of key macroeconomic determinants—budget balance, GDP growth, inflation, and interest rates—on government debt and to provide a comparative analysis of two structurally different small open economies: Armenia and Slovenia. By focusing on these two countries, the paper explores how differing institutional and monetary frameworks shape debt dynamics. Despite their structural differences, both Armenia and Slovenia face significant challenges in balancing debt sustainability with economic growth. Their vulnerability to external shocks and changing global financial conditions underscores the importance of understanding the drivers of government debt in small open economies. The two countries differ markedly in their institutional and monetary arrangements. Slovenia, as a member of the European Union and the Eurozone, operates within a supranational monetary framework governed by the European Central Bank (ECB), which ensures access to relatively stable and low-cost financing but limits monetary policy autonomy. In contrast, Armenia maintains an independent monetary policy and national currency, allowing greater flexibility in responding to domestic and external shocks, albeit with increased exposure to exchange rate and financial market risks. These monetary and institutional differences may help explain differences in the evolution of government debt, although debt dynamics are also shaped by broader macroeconomic, fiscal, and external conditions. In Slovenia, debt increased significantly following the global financial crisis and banking sector recapitalization, highlighting the fiscal costs of financial instability. In Armenia, debt accumulation has been driven primarily by persistent fiscal deficits, limited domestic savings, and reliance on external borrowing, making it more sensitive to interest rate and exchange rate fluctuations. Methodologically, the study employs an Autoregressive Distributed Lag (ARDL) framework using quarterly data for the period 2004–2025. This approach allows for the identification of both long-run relationships and short-run dynamics between government debt and its macroeconomic determinants. By adopting a comparative perspective, this paper contributes to the literature by examining how macroeconomic fundamentals and institutional frameworks jointly shape debt dynamics in small open economies. It distinguishes between growth-driven and institution-driven debt regimes, providing new insights into the context-specific nature of debt sustainability.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature, Section 3 presents the data and methodology, Section 4 discusses the empirical results, and the final section concludes with policy implications.

2. State of the Art and Literature Review

The determinants of government debt have been extensively examined in both theoretical and empirical literature, with particular emphasis on the interaction between fiscal policy, economic growth, monetary conditions, and institutional frameworks. Despite the breadth of this research, there is still no consensus on the relative importance of these factors, especially in the context of small open economies characterized by structural and institutional heterogeneity. From a theoretical perspective, the role of public debt in shaping optimal fiscal and monetary policy has been widely analyzed. Adam (2011) demonstrates that higher levels of government debt increase fiscal vulnerability and expose public finances to shocks, particularly those affecting the tax base. This creates incentives for gradual debt reduction, although the optimal adjustment path is nonlinear and depends on institutional constraints and the responsiveness of fiscal policy instruments. Similarly, Murphy and Young (2025) highlight the inherent tension between fiscal discipline and macroeconomic stabilization. Their results suggest that strict debt limits may be effective in preventing excessive borrowing during normal periods but can significantly constrain the ability of governments to implement countercyclical fiscal policies during economic downturns, particularly when monetary policy is constrained by the zero lower bound. A substantial body of empirical literature focuses on the relationship between government debt and economic growth. Kumar and Woo (2010) and Reinhart and Rogoff (2010) provide evidence of a negative association between high levels of public debt and long-run economic growth, identifying threshold effects beyond which debt becomes particularly detrimental. These findings have been influential in shaping policy debates on fiscal consolidation. However, more recent research questions the universality of such thresholds. Hojdan (2024), using a panel ARDL approach, finds no common debt threshold across high-income economies, emphasizing that the impact of debt on growth is highly context-dependent. Blanchard (2019) further challenges traditional views by arguing that in environments where interest rates remain persistently below growth rates, public debt may impose limited fiscal costs, thereby altering the conventional understanding of debt sustainability.

In addition to growth effects, the literature highlights the importance of fiscal and monetary variables in determining debt dynamics. Persistent fiscal deficits are widely recognized as a primary driver of debt accumulation, while sustained budget surpluses contribute to debt reduction. Inflation may reduce the real burden of debt in the short run, although its long-run effects remain ambiguous and depend on monetary policy credibility. Interest rates play a critical role through their direct impact on debt servicing costs, particularly in economies with high levels of external borrowing or limited fiscal space. Annicchiarico et al. (2023) emphasize the importance of feedback mechanisms between debt and fiscal balances, showing that uncertainty in the interaction between interest rates and growth complicates debt stabilization strategies. Fotiou (2022) further demonstrates that the effectiveness of fiscal consolidation depends on initial debt levels, with expenditure-based adjustments being more effective in high-debt environments, while tax-based adjustments may have adverse effects on growth and debt dynamics.

Another important strand of literature examines the role of institutional frameworks and monetary regimes in shaping debt sustainability. In the context of the Eurozone, Catarino et al. (2024) show that fiscal rules and institutional discipline contribute to maintaining fiscal sustainability, even during periods of increased flexibility such as the COVID-19 pandemic. Bénassy-Quéré et al. (2018) argue that effective debt management within a monetary union requires a balance between market discipline and risk-sharing mechanisms, supported by credible institutional frameworks. Corsetti et al. (2013) further highlight the interaction between sovereign risk and macroeconomic stability, demonstrat-

ing how high levels of public debt can amplify financial vulnerabilities within a currency union. These findings suggest that institutional constraints play a decisive role in shaping debt dynamics in Eurozone economies.

In contrast, economies with independent monetary policy operate under different constraints and opportunities. Galí and Monacelli (2005) show that small open economies with flexible exchange rate regimes can use monetary policy to stabilize output and inflation, although at the cost of increased exchange rate volatility. This flexibility allows for more active macroeconomic management but also increases exposure to external financial conditions. In such environments, debt dynamics are often more sensitive to interest rate fluctuations and capital flow volatility, particularly in countries with less developed financial markets.

Debt dynamics are also closely linked to broader macroeconomic relationships, including external balances and fiscal multipliers. Zestos et al. (2024) demonstrate that public debt can have asymmetric effects on economic growth, particularly in advanced economies where increases in debt have stronger negative effects than reductions have positive effects. Ilzetzki et al. (2013) show that the effectiveness of fiscal policy depends critically on structural characteristics such as economic openness, exchange rate regimes, and the level of public debt, with fiscal multipliers being smaller in highly open or indebted economies. Werner (2014) proposes alternative approaches to debt management, emphasizing the potential role of domestic banking systems in providing stable financing and supporting economic recovery without relying heavily on volatile financial markets.

From a methodological perspective, the analysis of government debt has increasingly relied on time-series econometric techniques capable of capturing both short-run dynamics and long-run relationships. The Autoregressive Distributed Lag (ARDL) approach, developed by Pesaran et al. (2001), is particularly suitable in this context, as it allows for the estimation of cointegration relationships without requiring pre-testing of the order of integration of variables. Narayan (2005) further demonstrates the robustness of the ARDL framework in small samples, making it especially relevant for the analysis of small open economies. More recent extensions, such as nonlinear ARDL models (Zestos et al., 2024), highlight the importance of capturing asymmetries and nonlinearities in the relationship between debt and macroeconomic variables.

Despite the extensive body of research, a significant gap remains in the literature. Most studies focus on large advanced economies, "safe-haven" countries such as Germany, or broad regional aggregates such as the European Union. Relatively little attention has been paid to small open economies with distinct institutional and monetary arrangements. Furthermore, existing studies rarely examine the joint interaction of fiscal and monetary determinants of government debt within a comparative framework that explicitly accounts for institutional differences.

This study addresses these gaps by analyzing the combined effects of key macroeconomic variables—budget balance, GDP growth, inflation, and interest rates—on government debt in two structurally different small open economies: Armenia and Slovenia. By integrating econometric analysis with institutional context, the paper provides new insights into how debt sustainability is shaped by both macroeconomic fundamentals and policy frameworks. In doing so, it contributes to the literature by distinguishing between growth-driven and institution-driven debt dynamics and by offering a comparative perspective that remains underexplored in existing research.

3. Methodology and Data

This study applies country-specific ARDL models using quarterly macroeconomic data for Armenia and Slovenia. The datasets, covering the 2004 to 2025 quarters, are

obtained from reputable sources to ensure reliability. The dependent variable in both cases is government debt as a percent of GDP. In contrast, the independent variables include (1) government deficit (−) or surplus (+), percent of GDP; (2) GDP growth; (3) inflation; and (4) interest rate. Data sources include the European Central Bank (n.d.), the Statistical Committee of the Republic of Armenia (n.d.) (Armstat), the Statistical Office of Slovenia (Sistat), and the Central Bank of Armenia (n.d.). The Armenian quarterly government debt-to-GDP ratio was calculated as the absolute value of government debt divided by GDP, as published by Armstat, and then multiplied by 100%. The budget deficit was also calculated using the same principle: the absolute value of the budget deficit divided by GDP, then multiplied by 100%. GDP growth was taken from Armstat's official data. The inflation index was calculated using monthly data from the Central Bank of the Republic of Armenia and the Statistical Committee of Slovenia, with quarterly averages derived from the previous period in both cases. For the interest rate, the Central Bank of Armenia's refinancing rate was used; if there were changes during the quarter, an average was calculated; if not, the published figures were used as is. The theoretical and empirical literature on debt sustainability suggests that fiscal, real, and monetary factors influence government debt. In line with this framework, the following hypotheses are formulated for econometric analysis:

- H_1a: $\beta_j < 0$—A higher government budget surplus reduces debt accumulation.
- H_1b: $\gamma_k < 0$—Higher GDP growth lowers government debt by improving fiscal capacity.
- H_1c: $\delta_l > 0$—Higher inflation increases debt through rising nominal interest costs and fiscal pressures.
- H_1d: $\phi_m > 0$—Higher interest rates raise debt servicing costs, thereby increasing overall debt.

The null hypothesis (H_0) posits that government debt is not significantly related to the selected macroeconomic variables:

$$H_0 : \beta_j = \gamma_k = \delta_l = \phi_m = 0$$

The analysis is based on a dynamic ARDL framework, in which government debt is modeled as a function of its own lags and lagged macroeconomic variables, capturing both short-run dynamics and long-run relationships.

$$GD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i GD_{t-i} + \sum_{j=0}^{q_1} \beta_j BD_{t-j} + \sum_{k=0}^{q_2} \gamma_k GDPG_{t-k} + \sum_{l=0}^{q_3} \delta_l INF_{t-l} + \sum_{m=0}^{q_4} \phi_m I_{t-m} + \varepsilon_t$$

where GD_t denotes the level of government debt at the time t; BD_{t-j}, $GDPG_{t-k}$, INF_{t-l}, and I_{t-m} represent current and lagged values of the explanatory variables; the lag orders p, q_1, q_2, q_3, and q_4 are selected using standard information criteria; and ε_t is an independently and identically distributed error term.

Description of Null and Alternative Hypotheses: For Slovenia, the same model is used with the addition of a dummy variable:

$$GD_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i GD_{t-i} + \sum_{j=0}^{q_1} \beta_j BD_{t-j} + \sum_{k=0}^{q_2} \gamma_k GDPG_{t-k} + \sum_{l=0}^{q_3} \delta_l INF_{t-l} + \sum_{m=0}^{q_4} \phi_m I_{t-m} + \psi D_t + \varepsilon_t$$

where D_t is a dummy variable equal to 1 from 2007 Q1 onward and 0 otherwise, capturing Slovenia's accession to the euro area and the associated shift in the monetary policy and interest rate regime. The coefficient ψ measures the average shift in the dependent variable after euro adoption, holding other macroeconomic factors constant.

H_0: $\psi = 0$;

H_1: $\psi \neq 0$;
H_1a: $\psi < 0 \rightarrow$ Euro adoption reduced government debt;
H_1b: $\psi > 0 \rightarrow$ Euro adoption increased government debt.

We want to determine the impact of Slovenia's 2007 Eurozone membership on key macroeconomic indicators, including government debt, government deficit, GDP growth, inflation, and interest rates, by comparing Slovenia's performance after joining the Eurozone with that of Armenia. A statistically significant psi indicates that Eurozone membership led to a structural change in monetary policy transmission and interest rate dynamics, reflecting the loss of independent monetary policy and alignment with the European Central Bank's framework. Conversely, an insignificant coefficient would suggest that the accession did not materially alter the behavior of the monetary policy indicator beyond what is explained by other macroeconomic variables.

Based on quarterly data from two countries, an empirical analysis was conducted for research purposes. For each country and each variable, Augmented Dickey–Fuller (ADF) and Phillips–Perron unit root tests were performed to examine the variables' stationarity. A series of econometric and diagnostic tests was applied to validate the ARDL models and ensure the robustness of the results. The analysis included the bounds cointegration test to confirm long-run relationships and the error-correction model (ECM) to capture short-run dynamics. Model adequacy was checked using the Ramsey RESET test for specification and the CUSUM/CUSUM of Squares tests for parameter stability. To address potential issues, heteroskedasticity tests (Breusch–Pagan and White), the Jarque–Bera test for normality, Durbin–Watson, Breusch–Godfrey tests for autocorrelation, and variance inflation factors (VIFs) for multicollinearity were conducted, with HAC/Newey–West robust errors applied where necessary. These tests confirm correct specification, stability, and causal directionality, reinforcing the credibility of the empirical findings.

4. Results

The Augmented Dickey–Fuller and Phillips–Perron unit root tests at the I(0) level reveal that several indicators have p-values greater than 0.05, indicating non-stationarity. However, after first differencing (I(1)), all variables exhibit p-values below 0.05, confirming stationarity and enabling the application of correlation–regression models and the ARDL framework. Specifically, in Armenia, government debt ($p = 0.6609$) and interest rates ($p = 0.1077$) are non-stationary in levels, while all variables become stationary after first differencing ($p < 0.01$), confirming integration of order one. Similarly, in Slovenia, government debt ($p = 0.6490$) and inflation ($p = 0.2541$) are non-stationary in levels but stationary in first differences, with government debt ($p = 0.0002$) and interest rates ($p = 0.0003$) showing strong statistical significance. These findings validate the use of ARDL bounds testing, given the mixed order of integration. Furthermore, the Engle–Granger cointegration tests fail to reject the null hypothesis of no cointegration ($p = 0.98$ for both countries), reinforcing the robustness of the ARDL approach. The ARDL bounds testing procedure confirms the existence of a long-run equilibrium relationship between government debt and its macroeconomic determinants in both Armenia and Slovenia. The results are reported in Table 1.

Overall, the hypotheses receive different levels of empirical support across the two countries. For Armenia, the hypothesis that higher GDP growth reduces government debt is strongly supported, while the hypothesis that higher interest rates increase debt is also confirmed. The expected negative effect of a budget surplus and the expected positive effect of inflation are not supported in the long-run specification, as these variables are statistically insignificant.

Table 1. ARDL estimation results (long-run and short-run coefficients).

	Armenia				Slovenia			
	Long-Run		Short-Run		Long-Run		Short-Run	
Variable	**t-Stat**	***p*-Values**	**t-Stat**	***p*-Values**	**t-Stat**	***p*-Values**	**t-Stat**	***p*-Values**
Constant (C)	0.87	0.3871	0.6	0.5492	1.66	0.1004	2.32	0.0231
Government Deficit	−1.09	0.2785	−1.13	0.2602	−1.69	0.095	−2.6	0.0113
GDP Growth	−3.69	0.0004	−9.5	0	−1.86	0.0668	−4.72	0
Inflation (L)	−0.85	0.3989	−0.59	0.5589	−1.65	0.1027	−2.3	0.0241
Interest Rate	3.08	0.0029	1.93	0.0578	−1.32	0.1893	−1.09	0.2792
Dummy (D2007)	–	–	–	–	0.24	0.8102	2.2	0.0308
Dummy (−1)	–	–	–	–	–	–	−2.7	0.0085
F-Bounds Test (overall coint.)	F = 22.27	$p < 0.01$ (significant)	–	–	F = 12.76	$p < 0.01$ (significant)	–	–

Source: Authors' calculations based on data from the European Central Bank, Armstat, SiStat, and the Central Bank of Armenia.

For Slovenia, the evidence is weaker and more nuanced. GDP growth, fiscal balance, and inflation show only borderline long-run effects, while interest rates are not statistically significant. Therefore, the Slovenian results provide only partial support for the proposed hypotheses and suggest that debt dynamics are mediated by Eurozone-related monetary and institutional constraints.

For Armenia, the F-statistic (22.27) far exceeds the upper critical bounds, validating cointegration. Long-run estimates show that GDP growth (−0.169, $p < 0.001$) has a significant negative effect on debt, consistent with a growth-led debt dynamic. In contrast, interest rates (0.139, $p = 0.003$) have a positive effect on debt accumulation. Fiscal deficit and inflation are statistically insignificant in the long-run specification.

The error-correction term (−0.043, $p < 0.001$) is negative and highly significant, confirming convergence toward equilibrium at a moderate speed of adjustment. Diagnostic tests—including Breusch–Pagan and White—indicate no major violations of homoskedasticity, while the RESET test validates correct model specification. Stability is confirmed by CUSUM and CUSUM of Squares plots, which remain within the 5% bounds. Granger causality analysis reveals that fiscal deficit (F = 10.69, $p = 0.0016$) and GDP growth (F = 46.39, $p < 0.001$) Granger-cause debt, while debt does not Granger-cause these variables, underscoring unidirectional causality. Overall, Armenia's debt trajectory is driven by growth performance and fiscal imbalances, highlighting the importance of sustained economic expansion and prudent fiscal management.

In Slovenia, the bounds test also confirms cointegration, with an F-statistic of 12.76 that exceeds the critical values. Long-run coefficients suggest that GDP growth (−0.169, $p = 0.067$), inflation (−132.73, $p = 0.103$), and fiscal deficit (−0.125, $p = 0.095$) exert borderline effects on debt, while interest rates are insignificant. The insignificant long-run coefficient of interest rates in Slovenia should not be interpreted as evidence that monetary conditions are irrelevant for debt dynamics. Rather, it suggests that, after Eurozone accession, Slovenia's borrowing environment became increasingly shaped by Eurozone-wide financial conditions and ECB monetary policy, reducing the direct explanatory power of the domestic interest-rate variable used in the model. By contrast, GDP growth and inflation may continue to influence debt dynamics through fiscal revenues, automatic stabilizers, nominal GDP

effects, and the denominator of the debt-to-GDP ratio. Therefore, the Slovenian results point to a more indirect monetary transmission channel rather than to the absence of monetary effects. The inclusion of a structural dummy (D2007) captures the Eurozone accession effect, though its long-run impact is not statistically significant. The error-correction term (−0.035, $p < 0.001$) is negative and highly significant, confirming stable long-run convergence. Diagnostic tests reveal mild heteroskedasticity under the Breusch–Pagan test ($p = 0.024$), but the White test does not reject homoskedasticity. The RESET test validates correct specification ($p = 0.960$), and CUSUM diagnostics confirm stability. Granger causality results show that GDP growth (F = 25.76, $p < 0.001$), interest rates (F = 8.58, $p = 0.004$), and fiscal deficit (F = 7.15, $p = 0.009$) Granger-cause debt, while debt does not Granger-cause these variables. This reflects a rule-bound debt dynamic shaped by growth, monetary conditions, and fiscal discipline under EU institutional constraints. Table 2 summarizes the results of the econometric tests conducted.

Table 2. ARDL analysis and model diagnostics.

Country	**Significant Predictors (Long-Run)**	**Significant Predictors (Short-Run)**	**Robust Estimation (HC1)**	**Multicollinearity (VIF)**
Armenia	GDP Growth (−), Interest Rate (+)	Fiscal Deficit (−), GDP Growth (−)	HAC/Newey–West robust SE applied	Centered VIF < 3 (no serious multicollinearity)
Slovenia	GDP Growth (−), Fiscal Deficit (−), Inflation (−, borderline)	Inflation lag (−), Fiscal Deficit (−), GDP Growth (−), D2007 dummy	HAC/Newey–West robust SE applied	Centered VIF < 3 (no serious multicollinearity)
Country	**Normality (JB)**	**Autocorrelation (DW/BG)**	**Heteroskedasticity**	**R2/Adj. R2**
Armenia	JB $p = 0.0018 \rightarrow$ non-normal residuals	DW = 2.33, BG not significant → no autocorrelation	Breusch–Pagan $p =$ 0.29 (no heteroskedasticity); White test borderline	R2 = 0.684, Adj. R2 = 0.668
Slovenia	JB $p = 0.0436 \rightarrow$ mild non-normality	DW = 2.51, BG not significant → no autocorrelation	Breusch–Pagan $p =$ 0.024 (mild heteroskedasticity); White test not significant	R2 = 0.574, Adj. R2 = 0.552

Source: Authors' calculations based on data from the European Central Bank, Armstat, SiStat, and the Central Bank of Armenia.

The empirical findings highlight distinct pathways for debt sustainability in Armenia and Slovenia, necessitating differentiated policy responses. In Armenia, debt dynamics are primarily growth-led and fiscally driven: GDP growth exerts a strong negative effect on debt, while fiscal deficits reinforce debt accumulation. The significant role of interest rates further underscores the sensitivity of debt dynamics to borrowing costs. In Slovenia, debt dynamics are shaped by institutional constraints within the Eurozone. GDP growth, fiscal deficits, and interest rates exert causal influence on debt; however, policy implementation is conditioned by EU fiscal rules and monetary policy set by the European Central Bank. The ARDL bounds test confirms a long-run equilibrium relationship between government debt and its macroeconomic determinants (F = 12.76). The inclusion of the D2007 dummy variable, capturing Eurozone accession, provides additional insights into institutional effects. Although not significant in the long run, its short-run dynamics are statistically significant, suggesting that Eurozone membership introduced structural discipline through fiscal and

monetary coordination. The significance of the D2007 dummy in the short-run specification, combined with its insignificance in the long-run equation, suggests that euro adoption generated adjustment effects during the transition to Eurozone membership rather than a permanent direct shift in debt levels. This finding supports a more nuanced interpretation: Eurozone accession influenced the short-run adjustment mechanism and policy environment, while long-run debt dynamics remained linked to broader macroeconomic fundamentals and fiscal developments.

The long-run results for Slovenia indicate that GDP growth, fiscal deficit, and inflation exert borderline effects on government debt, while interest rates remain insignificant—reflecting the limited national control over monetary policy. The error-correction term (-0.035, $p < 0.001$) is negative and highly significant, confirming convergence toward long-run equilibrium and the stabilizing role of EU institutional frameworks.

Granger causality results further support this interpretation: GDP growth, fiscal deficit, and interest rates Granger-cause government debt, while no reverse causality is detected. This unidirectional relationship underscores Slovenia's rule-based debt dynamics, where macroeconomic fundamentals drive debt outcomes. By contrast, Armenia's debt trajectory is more volatile yet more responsive to domestic macroeconomic conditions. GDP growth emerges as the strongest determinant of debt reduction, while interest rates have a significant positive effect on debt accumulation. Fiscal deficits and inflation exhibit weaker long-run effects, reflecting Armenia's reliance on external borrowing and limited fiscal space. The error-correction term suggests relatively faster adjustment toward equilibrium compared to Slovenia. Granger causality tests confirm that GDP growth and fiscal deficits drive debt, with no feedback effects observed from debt to other macroeconomic variables.

Taken together, the comparative results underscore two distinct debt sustainability regimes. Armenia's debt dynamics are growth-dependent and sensitive to macroeconomic fluctuations, whereas Slovenia's debt dynamics are institution-driven and constrained by Eurozone fiscal and monetary frameworks. In both cases, the ARDL models are correctly specified, stable, and supported by robust error-correction mechanisms.

From a policy perspective, the implications differ substantially. Armenia should prioritize growth-oriented fiscal consolidation, including investment in productivity-enhancing sectors, strengthened revenue mobilization, and countercyclical fiscal policies. At the same time, coordination between fiscal and monetary authorities remains essential to contain borrowing costs. Slovenia, in contrast, should focus on maintaining fiscal discipline within EU constraints, strengthening fiscal buffers, and improving expenditure efficiency, while supporting long-run growth through structural reforms and innovation-driven investment.

The contribution of this study lies in its comparative analysis of two small open economies operating under distinct institutional frameworks. While prior research has predominantly focused on large advanced economies or regional aggregates, this study demonstrates that debt sustainability pathways diverge significantly when fiscal and monetary determinants are examined jointly in structurally constrained environments. The findings show that Armenia's debt dynamics are growth-driven and sensitive to interest rates, whereas Slovenia's debt is institution-driven, shaped by Eurozone governance and policy constraints.

Methodologically, the application of ARDL modeling to quarterly data in small open economies strengthens the empirical literature in contexts characterized by mixed integration orders and relatively limited sample sizes. By integrating econometric evidence with institutional analysis, this study provides new insights into the mechanisms of debt adjustment and sustainability in economies that are often underrepresented in the existing literature.

Policy Implications

The findings have several policy implications. In Armenia, debt sustainability depends strongly on economic growth and borrowing costs. Policy should therefore focus on growth-oriented fiscal consolidation, including productivity-enhancing public investment, improved tax collection, and stronger medium-term fiscal planning. Given the significant role of interest rates, closer coordination between fiscal and monetary authorities is also necessary to prevent rising debt-servicing costs from weakening fiscal sustainability.

For Slovenia, the results suggest that debt sustainability is shaped by the interaction between domestic fiscal policy and Eurozone-level monetary and institutional constraints. Since national monetary policy autonomy is limited, fiscal policy plays a central role in maintaining debt sustainability. Slovenia should therefore continue strengthening fiscal buffers, improving expenditure efficiency, and ensuring compliance with EU fiscal rules, while supporting long-run growth through structural reforms, innovation, and productivity-enhancing investment.

More broadly, the results show that debt management strategies in small open economies cannot follow a universal model. Countries with monetary policy autonomy may need to focus more strongly on interest-rate and exchange-rate risks, while Eurozone members must pay greater attention to fiscal discipline, institutional compliance, and growth-enhancing reforms within a shared monetary framework.

5. Conclusions

This study employs ARDL modeling with quarterly data from 2004 to 2025 to analyze the determinants of government debt in Armenia and Slovenia. The results confirm stable long-run cointegration between government debt and key macroeconomic fundamentals in both economies, although the underlying drivers of debt sustainability differ substantially. In Armenia, debt dynamics are predominantly growth-driven. Higher GDP growth significantly reduces debt burdens, while rising interest rates increase them, underscoring the vulnerability of a transition economy to borrowing costs and external financial conditions. Fiscal deficits and inflation exert weaker long-run effects, reflecting Armenia's reliance on external financing and limited fiscal space. In Slovenia, government debt dynamics are shaped by institutional constraints associated with Eurozone membership. Fiscal deficits, inflation, and GDP growth exert only marginal long-run effects, while inflation lags and the structural impact of Eurozone accession play a more prominent role in short-run adjustments. The error-correction terms confirm convergence toward equilibrium in both models, with Armenia exhibiting faster adjustment speeds, indicating greater responsiveness but also higher volatility. Granger causality results further support these findings, showing that macroeconomic fundamentals—particularly growth and fiscal balance—drive debt dynamics, with no evidence of reverse causality. The comparative evidence highlights two distinct pathways to debt sustainability. Armenia requires growth-oriented fiscal consolidation combined with careful management of borrowing costs to reduce dependence on external debt and mitigate exposure to interest rate shocks. Slovenia, by contrast, must operate within the constraints of EU fiscal rules and maintain institutional discipline within a supranational monetary framework.

These findings contribute to the literature on debt sustainability in small open economies by demonstrating that stable debt–macroeconomic relationships are inherently context-specific and shaped by institutional arrangements. Future research could extend this analysis in several directions. First, incorporating additional variables—such as current account balances, government expenditure and revenue structures, and debt composition (external versus domestic, short-run versus long-run)—would provide a more comprehensive understanding of debt sustainability. For Armenia, exchange rate dynamics

are particularly relevant given its exposure to external shocks and capital-flow volatility. Second, exploring nonlinearities and threshold effects—such as critical debt levels beyond which the impact on economic growth changes—would further enrich the analysis. Finally, examining the role of external shocks, including global financial crises, pandemics, and geopolitical tensions, would offer valuable insights into the resilience of debt dynamics under stress conditions. Such extensions would not only strengthen the robustness of the present findings but also enhance their policy relevance across diverse institutional settings.

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