



The Impact of Public Debt on Economic Growth in Burundi: An ARDL Approach

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Abstract: This study investigates the relationship between the public debt and economic growth in Burundi by employing the Autoregressive Distributed Lag (ARDL) approach and quarterly time series data from 2008 to 2023. The study examines both the short-run and long-run dynamics between domestic debt, external debt, and economic growth. The findings reveal a positive and statistically significant long-run relationship between domestic debt and economic growth while the external debt shows a positive but statistically insignificant impact in the long run. On the other hand, in the short run, the domestic debt of the country exhibits a positive but insignificant effect, while external debt demonstrates a negative and significant impact on economic growth. The error correction term indicates an adjustment speed of approximately 62.3% per quarter, suggesting that the economy is relatively resilient to short-term shocks. These results imply that while domestic borrowing contributes to economic growth of Burundi, external debt may not be effectively utilized for productive investments that support sustainable economic development. The study recommends strategic debt management policies focused on prioritizing domestic debt, improving the efficiency of public investments, enhancing revenue mobilization, and strengthening institutional capacity for debt management.

Keywords: Public Debt, Economic Growth, Domestic Debt, External Debt, ARDL, Burundi

I. Introduction

Public debt can be described as the total amount of money that a government owes to external creditors and domestic lenders. It emerges when government revenues, primarily taxes and social security contributions, are insufficient to meet budgetary needs, necessitating borrowing through domestic financial institutions or international creditors. Public debt can be an essential tool for financing development but its management significantly influences a country's economic stability and growth potential, potentially contributing either to economic growth or economic decline.

Public debt plays a important role in the financial strategy of governments, particularly in developing countries, as a means of financing budget deficits and stimulating economic growth. According to Mustafa et al. (2023), public debt serves as a supplementary source of public finances, enabling state governments to finance economic activities and meet public demands. It facilitates domestic investment and remittances, which are crucial for development.

Generally, public debt is categorized into two main components: domestic debt and external debt. Domestic debt represents borrowing within a country's borders, usually through government bonds or loans from local financial institutions or commercial banks, denominated in local currency. This type of debt generally poses lower risks since it doesn't expose the government to foreign exchange fluctuations. However, Aiyedogbon et al. (2022) highlight that excessive domestic borrowing can lead to crowding out of private investment and potentially trigger inflationary pressures in the domestic economy.

External debt comprises obligations to foreign creditors, including international financial institutions, foreign governments, and private foreign companies. Panizza and Presbitero (2012) noted that external debt, typically denominated in foreign currencies, introduces additional risks through exchange rate fluctuations, particularly for developing economies. For these countries, external debt is often used to finance large-scale infrastructure projects like construction of roads, public buildings, or other infrastructure and development projects that domestic resources or revenues alone cannot fund. However, Mhlaba and Phiri (2019) emphasized that heavy reliance on external debt can make countries vulnerable to international market fluctuations and external shocks.

The global landscape of public debt has evolved significantly, with rising debt levels becoming a central issue in both developed and developing economies. According to the UNCTAD (United Nations Conference on Trade and Development) report, "World of Debt," global public debt surged from 70% of global GDP in 2007 to more than 100% by 2020, driven by factors such as economic crises, increased borrowing for development projects, and the economic fallout from the COVID-19 pandemic. Low- and middle-income countries have been particularly affected, with their external debt rising by over 150% between 2000 and 2020. These countries often face high levels of external debt denominated in foreign currencies, which, coupled with weak domestic revenue generation, increases the risk of debt distress.

In developing countries, particularly in sub-Saharan Africa, public debt management presents unique challenges. Ndoricimpa (2020) stated that many African countries face the dual challenge of financing their development needs while maintaining sustainable debt levels. This situation is often complicated by factors such as commodity price fluctuations, changing global interest rates, corruption, and limited domestic revenue generation capacity.

Burundi, as a low-income country like many other sub-Saharan countries, faces considerable challenges regarding public debt management. According to data from the Bank of the Republic of Burundi (BRB), the country's debt has evolved significantly since 2008, with both domestic and external components playing crucial roles in financing public expenditure. The domestic debt is primarily held by local financial institutions and tends to be short-term in nature, while external debt is mainly concessional, provided by institutions like the World Bank and the African Development Bank, featuring lower interest rates and longer repayment periods.

The country has experienced significant economic difficulties since 2015. The country's domestic debt has highly increased when donor aid, mostly from the European Union, which previously contributed about half of the government's total revenue, was severely reduced. Following the 2015 political and security crisis, donors withdrew budget support and suspended most project financing. According to the International Monetary Fund report in 2023, over the period from 2014 to 2016, aid fell sharply from 8.9% of GDP to 2.4% of GDP. The economy initially contracted sharply and has been recovering only slowly since then.

However, the country's debt management capacity is constrained by several structural factors. These include relatively low levels of revenue generation, limited access to international capital markets, and periods of political instability that have affected economic performance. The country's heavy reliance on foreign aid and commodity exports, combined with a low tax base, makes it difficult to generate sufficient revenue to meet debt obligations without additional borrowing. These challenges are similar to those faced by other low-income countries, as documented by Were (2001) in studies of debt management in developing economies. This study aims to examine the relationship between public debt and economic growth in Burundi using quarterly data from 2008 to 2023. The research employs the Autoregressive Distributed Lag (ARDL) approach to analyze both the short-run and long-run dynamics between domestic debt, external debt, and economic growth. The findings will contribute to the existing literature on the debt-growth nexus in developing economies and provide valuable insights for policymakers tasked with managing public debt sustainably while promoting economic growth.

II. Literature Review

The relationship between public debt and economic growth has long been a crucial research topic in economic literature, with several researchers presenting different perspectives. The most conventional view, supported by Modigliani (1961) and Diamond (1965), affirms that public debt has a negative impact on economic

growth because public debt financing stifles private investment. This negative relationship translates through mechanisms such as reduced capital accumulation, increased long-term interest rates, and a heavier tax burden (Elmendorf & Mankiw, 1999).

In contrast, Keynesian theorists argue that public debt can have positive effects on economic growth as long as resources are employed productively, because deficit financing increases aggregate demand (Presbitero, 2012). This disagreement between these theories regarding the directional impact of debt on growth has shaped much of the subsequent empirical research, with later studies often finding evidence in favor of one view or the other depending on the country context, period, and methodology employed.

As for the Ricardian Equivalence Hypothesis, proposed by Barro (1989), it offers a third perspective by suggesting that there is no relationship between public debt and economic growth, because according to this hypothesis the impact of this relationship is neutralized by interest rates and private consumption which remain unchanged (Sulaiman & Azeez, 2012). This theoretical divergence perfectly illustrates how empirical results have been so varied across research studies.

The debt overhang hypothesis, initially proposed by Myers (1977) and later extended to sovereign debt by Krugman (1988), presents a negative view of the impact of public debt, particularly relevant for developing economies. This theory suggests that accumulated debt creates disincentives for investment and economic reforms. According to this theory, when debt levels become excessive, potential returns on investments would partially revert to existing creditors rather than generating new economic activity, thus creating a disincentive to investment.

Empirical studies on the relationship between public debt and economic growth have yielded mixed results across different countries and regions. One of the most influential studies was conducted by Reinhart and Rogoff (2010), who suggested a critical debt threshold of 90% of GDP, beyond which economic growth rates decrease significantly. Their work sparked considerable debate on debt thresholds, but Herndon et al. (2013) challenged these results by demonstrating that after correcting for coding errors and selective exclusion of available data, GDP growth for public debt/GDP ratios above 90% is not dramatically different from that observed when debt/GDP ratios are lower. This methodological debate highlighted the importance of rigorous analysis in establishing debt-growth relationships.

In 2013, Égert added nuance to the discussion on thresholds by discovering that negative non-linear effects of public debt could emerge at much lower levels than previously thought, according to him, between 20% and 60% of GDP. This discovery challenged previous assumptions about safe debt levels, particularly for developing economies. Checherita-Westphal and Rother (2012) conducted a comprehensive study in the eurozone that aligned with Reinhart and Rogoff's general conclusion regarding threshold effects. They thus discovered evidence of a non-linear impact of debt on growth with a turning point at approximately 90-100% of GDP. The convergence of these results around similar threshold values provided some confidence in the non-linear conceptualization, despite methodological disagreements.

Eberhardt and Presbitero (2015) made an important contribution by highlighting country-specific characteristics that affect the debt-growth relationship. Their study revealed that while there may be negative relationships between debt and growth, there is no evidence of systematic threshold effects in the debt-growth relationship that are common to all countries. This discovery directly challenged the notion of universal thresholds proposed by earlier studies and emphasized the importance of country-specific studies.

Panizza and Presbitero (2014) provided important insights on the debt-growth relationship in OECD countries. Using an instrumental variable approach, they found no evidence that public debt has a causal effect on economic growth. The result of their research suggests that the negative correlation between debt and growth observed in previous studies probably reflects the effect of growth on debt rather than the reverse, challenging conventional wisdom regarding the harmful impact of debt on growth. This causality question has remained controversial, with studies using various methodological approaches to address it.

According to Were (2001), he found that the accumulation of external debt had a negative impact on Kenya's economic growth and private investment, confirming the existence of a debt overhang problem. Building on Were's work, Mbalu and Matanda (2021) revealed that, while domestic borrowing showed positive effects,

external debt demonstrated strong negative impacts on Kenya's growth. These studies highlight an important distinction between domestic and external debt that has become increasingly central in the literature.

This distinction between the impacts of domestic and external debt has emerged as a crucial consideration. In Nigeria, Olagunju et al. (2022) conducted a study on debt threshold effects in Nigeria, finding that domestic debt had a positive but non-significant impact on growth in the short term while external debt hindered the country's economic performance. These results align with those of Ohiomu (2020), who found that external debt exerts a negative long-term and short-term effect on economic growth in Nigeria, while domestic debt demonstrated positive effects in both time horizons.

Other research such as that of Naeem Akramen in 2013 found that external debt as a percentage of GDP and debt service as a percentage of GDP both have significant negative impacts on the growth of Asian economies, without comparing these effects to those of domestic debt. Similarly, Abu Siddique et al. (2015) discovered that external debt has a significant negative impact on economic growth both in the long term and short term in 40 highly indebted poor countries, again without comparison with domestic debt. From these studies, we note that external debt tends to have more negative effects than domestic debt.

Country-specific studies such as in Nigeria have shown particularly varied results, suggesting the importance of methodological choices and periods studied. Abula and Ben-Daddy (2016) found that external debt and debt service have a negative but non-significant relationship on economic growth. While Onakoya and Ogunade (2017) concluded that neither external debt nor debt service had a significant impact on Nigerian economic growth. However, in the same year, Paul (2017) contradicted these results, showing that debt stock has a significant positive impact on Nigerian economic growth in the long term, while debt service has a negative but non-significant impact.

These contrasting results for the same country highlight how methodological differences, periods studied, and control variables included can lead to divergent conclusions.

Additional research conducted by Yusuf and Saidatulakmal (2021) attempted to reconcile some of these contradictions by demonstrating that domestic debt negatively and significantly impacted Nigeria's economic growth in the short term but had positive impacts in the long term, while external debt delayed growth in the long term. This temporal distinction between short-term and long-term effects helps explain some of the contradictory findings in earlier studies that did not differentiate between time horizons.

Similarly, Favour et al. (2019) studied the relationship between public debt and economic growth in Nigeria using the Vector Error Correction Model (VECM) and the Granger causality test. They concluded that public debt had a negative impact on the economy and attributed this negative result to poor allocation of borrowed funds. This explanation underscores the importance of debt utilization, not just its levels, in determining growth outcomes.

In Ethiopia, Dagnachew (2017) found that external debt stock did not significantly affect economic growth. Contradicting this, Amsalu (2017) was able to demonstrate that external debt stock has a significant positive long-term relationship with Ethiopian economic growth, but its squared term had a significant unfavorable relationship with GDP, thus suggesting a non-linear relationship. The inclusion of squared terms to capture non-linearity in this study, absent in Dagnachew's work, could explain the different conclusions.

More recent work by Akashaya (2018) found that external debt stock contributes positively to Ethiopia's economic growth, contradicting the findings of Mohammed Endris Awol (2022), who revealed that external public debt stock had a significant negative impact on Ethiopia's economic growth both in the long term and short term. These contradictory findings may reflect evolving economic conditions, different control variables, or methodological variations.

In Sierra Leone, Haffner et al. (2017) used the ARDL method to analyze the impact of domestic public debt from 1970 to 2015 on the country, they concluded that domestic debt had a significant negative impact on economic growth both in the short term and long term. A more comprehensive study by Hadji et al. (2024) covering the period from 1973 to 2023 confirmed Haffner's findings, showing that both domestic and external public debt had negative impacts on Sierra Leone's economic growth in both time horizons, suggesting that the negative relationship has become more established over time.

In East Africa, several studies have provided particularly relevant analyses for understanding debt- growth relationships in the region. Rutayisire (2023) studied Rwanda's public debt-growth dynamics using both quadratic polynomial functions and ARDL approaches. His results revealed a crucial threshold level of 53.6% of GDP, beyond which the negative impact of public debt on economic growth begins to manifest. This threshold is notably close to the 57% threshold identified by Sanusi, Hassan, and Meyer (2019) for the Southern African Development Community, suggesting some regional consistency in threshold effects despite Eberhardt and Presbitero's (2015) skepticism regarding universal thresholds.

From Tanzania, Lotto and Mmari (2018) used OLS regression to study the impact of domestic debt on economic growth from 1990 to 2015. They found an inverse but non-significant relationship between domestic debt and economic growth, attributing this to factors such as increasing domestic borrowing trends, inefficient use of borrowed funds, and crowding-out effects due to the dominance of commercial banks. Their findings on public debt confirm the observations established by Favour et al. (2019) for Nigeria, suggesting that debt management plays as important a role as the amount of accumulated debt.

Mwaniki (2016) provided additional analysis through research on Kenya's experience, emphasizing that the impact of debt varies considerably depending on usage patterns. His study found that debt directed toward productive investments and infrastructure development tends to produce positive growth effects, while debt used for consumption or non-productive purposes often leads to growth deterioration.

Recent research has increasingly focused on the composition of public debt rather than simply its level, providing more nuanced perspectives. Saungweme and Odhiambo (2020) found that domestic debt negatively affected Zimbabwe's economic growth to a higher proportion than external debt. This finding contradicts the pattern observed in Nigeria by Olagunju et al. (2022) and Ohiomu (2020), who found that external debt was more harmful than domestic debt. These contradictory findings suggest that the relative impacts of domestic versus external debt may be highly context-dependent.

Mohanty and Panda (2019) discovered that domestic debt had a more unfavorable effect on the Indian economy than external debt, aligning with Saungweme and Odhiambo's findings for Zimbabwe but contradicting the Nigerian pattern. In contrast, Madhuhansi and Shantha (2021) found that in Sri Lanka, domestic debt showed stronger negative effects in the long term, while the negative impact of external debt was more pronounced in the short term. This temporal distinction adds some complexity to understanding debt impacts.

The notable divergence of results across different countries underscores the importance of country-specific and economy-specific factors in determining the debt-growth relationship, as highlighted by Eberhardt and Presbitero (2015). While many studies show a negative relationship between public debt and economic growth, particularly at high debt levels, the threshold at which debt becomes harmful, the relative impacts of domestic versus external debt, as well as effects in different time horizons can vary significantly between countries.

Despite a large number of studies on the relationship between public debt and economic growth, work specifically focusing on Burundi remains very rare, particularly using the ARDL methodology that has proven effective in similar studies for other countries. Moreover, the few existing studies do not adequately address the separate impacts of domestic and external debt on economic growth in Burundi's specific context.

Given the importance of country-specific factors as highlighted by Eberhardt and Presbitero (2015), the contradictory findings regarding the relative impacts of domestic versus external debt, the different threshold levels identified in various studies, and the potential importance of debt usage patterns highlighted by Mwaniki (2016) and others, there is a clear need for a detailed analysis of Burundi's unique economic conditions and debt structure to understand its debt-growth relationship comprehensively.

III. Methodology

3.1 Data and Variables

This study employs quarterly time series data spanning from 2008Q1 to 2023Q4, comprising 64 observations.

The variables under investigation are:

- Gross Domestic Product (GDP) in millions of Burundian francs
- Domestic Debt (DOM) in millions of Burundian francs
- External Debt (EXT) in millions of Burundian francs

All variables are transformed into natural logarithms to reduce heteroscedasticity and allow for interpretation of coefficients as elasticities (Gujarati & Porter, 2009). Therefore, the variables used in the analysis are LNGDP, LNDOM, and LNEXT, representing the natural logarithms of GDP, domestic debt, and external debt, respectively. The data for this study were obtained from two main sources:

- The National Institute of Statistics of Burundi (INSBU) for GDP data
- The Bank of the Republic of Burundi (BRB) for domestic and external debt data

3.2 Econometric Model Specification

Following Pesaran et al. (2001), this study employs an ARDL bounds testing approach to investigate the relationship between economic growth and public debt components in Burundi. The baseline ARDL (p,q,r) model is specified as:

$$\Delta \ln GDP_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \ln GDP_{t-i} + \sum_{i=0}^q \beta_{2i} \Delta \ln DD_{t-i} + \sum_{i=0}^r \beta_{3i} \Delta \ln ED_{t-i} + \alpha_1 \ln GDP_{t-1} + \alpha_2 \ln DD_{t-1} + \alpha_3 \ln ED_{t-1} + \varepsilon_t$$

Where:

- $\ln GDP$ is the natural logarithm of real GDP
- $\ln DD$ is the natural logarithm of domestic debt
- $\ln ED$ is the natural logarithm of external debt
- Δ denotes the first difference operator
- β_0 the constant term or intercept.
- $\beta_{1i}, \beta_{2i}, \beta_{3i}$ represent short-run dynamic coefficients
- $\alpha_1, \alpha_2, \alpha_3$ the coefficients of the levels of the respective variables (GDP, domestic debt, external debt) at time t-1. These capture the long-run relationship between the variables
- ε_t is the white noise error term
- p, q, r, are optimal lag orders

The corresponding error correction representation of the ARDL model is:

$$\Delta \ln \text{GDP}_t = \beta_0 + \sum_{i=1}^p \beta_{1i} \Delta \ln \text{GDP}_{t-i} + \sum_{i=0}^q \beta_{2i} \Delta \ln \text{DD}_{t-i} + \sum_{i=0}^r \beta_{3i} \Delta \ln \text{ED}_{t-i} + \lambda \text{ECT}_{t-1} + u_t \quad (2)$$

Where ECT_{t-1} is the error correction term derived from the long-run equilibrium relationship:

$$\text{ECT}_{t-1} = \ln \text{GDP}_{t-1} - \theta_0 - \theta_1 \ln \text{DD}_{t-1} - \theta_2 \ln \text{ED}_{t-1} \quad (3)$$

The coefficient λ represents the speed of adjustment toward long-run equilibrium after a short-run shock.

3.4 Estimation Procedure and Testing

This study employs ADF tests to verify variable integration orders before applying ARDL bounds testing. Optimal lag structure is determined using information criteria while ensuring no serial correlation. Cointegration is tested with F-statistics against critical bounds. The validity of the model is confirmed through comprehensive diagnostic tests including serial correlation, heteroscedasticity, normality, and stability tests.

IV. Results and Discussion

4.1 Descriptive Statistics

The study utilizes quarterly time series data covering the period from 2008 to 2023, representing 64 observations. The three main variables under analysis are real GDP (LNGDP), which measures economic output, domestic debt (LNDOM), which captures government borrowing from internal sources, and external debt (LNEXT), which accounts for borrowing from foreign lenders. Table 1 presents the summary statistics for these variables.

Table 1: Summary Statistics of the Variables

	LNGDP	LNEXT	LNDOM
Mean	26.73209	27.45694	27.56864
Median	26.74957	27.37822	27.71405
Maximum	26.98597	28.23708	29.12218
Minimum	26.43104	26.77707	25.52062
Std. Dev.	0.157595	0.416701	1.076201
Skewness	-0.183635	0.316885	-0.373137
Kurtosis	1.967606	2.008391	2.079164
Jarque-Bera	3.201933	3.693211	3.731850
Probability	0.201701	0.157772	0.154753
Sum	1710.854	1757.244	1764.393
Sum Sq. Dev.	1.529138	10.93931	72.96713
Observations	64	64	64

Source: Author's computation

The mean value of LNGDP is 26.73, with a median of 26.75, indicating a relatively symmetric distribution. The maximum and minimum values are 26.99 and 26.43 respectively, with a standard deviation of 0.16, suggesting modest variation in Burundi's economic output during the study period.

External debt (LNEXT) shows a mean of 27.46 and median of 27.38, with maximum and minimum values of 28.24 and 26.78 respectively. Its standard deviation of 0.42 indicates moderate volatility in external debt obligations, approximately 2.6 times greater than GDP variation.

Domestic debt (LNDOM) demonstrates the highest variability with a standard deviation of 1.08. Its mean is 27.57,

with a median of 27.71, and maximum and minimum values of 29.12 and 25.52 respectively. This wider range suggests significant fluctuations in Burundi's domestic borrowing practices over time.

The skewness values for LNGDP (-0.18) and LNDOM (-0.37) indicate minor left skews, while LNEXT exhibits a slight right skew (0.32). All variables have kurtosis values around 2, below the normal distribution value of 3, indicating fewer extreme values than expected in normal distributions.

The Jarque-Bera test results for all variables exceed the 0.05 significance level (LNGDP: JB = 3.20, $p = 0.20$; LNEXT: JB = 3.69, $p = 0.16$; LNDOM: JB = 3.73, $p = 0.15$), suggesting that we cannot reject the normality hypothesis. This indicates that the distributions of all three variables approximate normal distributions, which is advantageous for subsequent regression analysis.

Table 2 presents the correlation matrix, which provides an initial indication of the relationships between the key variables.

Table 2: Correlation Matrix

	LNGDP	LNDOM	LNEXT
LNGDP	1.000	0.955	0.308
LNDOM	0.955	1.000	0.263
LNEXT	0.308	0.263	1.000

Source: Author's computation.

The correlation results indicate a strong positive relationship between GDP and domestic debt, with a coefficient of 0.955. This suggests that an increase in domestic debt is closely associated with economic growth in Burundi. Similarly, LNGDP and LNEXT exhibit a moderate positive correlation (0.308), indicating that external debt is somewhat linked to GDP growth. The correlation between domestic debt and external debt is relatively weaker (0.263), suggesting that these two forms of debt do not move in perfect synchronization.

While correlation provides useful preliminary insights, it does not establish causality. Therefore, further econometric analysis is required to examine the dynamic interactions between these variables.

4.2 Unit Root Tests

Before proceeding with the ARDL model estimation, we test for the stationarity of the variables using the Augmented Dickey-Fuller (ADF) test. The results are presented in Table 3.

Table 3: Augmented Dickey-Fuller (ADF) Test Results

Variables	Level (Intercept)	p-value	1st Difference (Intercept)	p-value
LNGDP	-3.1654	0.1027	-7.3845 *	0.0100
LNDOM	-1.8345	0.6420	-5.4944 *	0.0100
LNEXT	-3.2313	0.0906	-4.0943**	0.0113

Source: Author's computation.

Note: * and ** denote significance at 1% and 5% levels, respectively.

The results from the ADF test indicate that GDP, domestic debt, and external debt are non-stationary at level since their p-values exceed the 5% significance level. However, after first differencing, all variables become stationary, as indicated by the highly significant p-values (less than 0.05). This confirms that all variables are integrated of order I(1), making the ARDL approach appropriate for analyzing their relationships.

4.3 Bounds Test for Cointegration

To test for the existence of a long-run relationship among the variables, we employ the ARDL bounds testing approach, developed by Pesaran, Shin, and Smith (2001). The results are presented in Table 4

Table 4: ARDL Bounds Test Results

Test Statistic	Value
F-statistic	10.09239

Critical Value Bounds

Significance Level	I(0) Lower Bound	I(1) Upper Bound
10%	2.63	3.35
5%	3.1	3.87
1%	4.13	5

Source: Author's computation.

The calculated F-statistic of 10.09239 is much higher than the upper bound critical value at the 1% significance level. This strong statistical evidence shows cointegration among GDP, domestic debt, and external debt variables, leading to reject the null hypothesis of no cointegration. This finding indicates that these economic variables maintain a long-run relationship rather than moving independently. While short-term fluctuations may occur due to economic shocks or policy changes, these variables will eventually return to their balanced relationship, making long-term economic planning more reliable and meaningful.

4.4 Long-Run ARDL Estimation

Given the confirmation of a long-run relationship, we estimate the long-run coefficients of the ARDL model. The results are presented in Table 5.

Table 5: Long-Run ARDL Model Estimates

Variable	Coefficient	t-Statistic	Prob.
LNDOM	0.147154	14.47077	0.0000
LNEXT	0.007355	0.294545	0.7695
C	22.50096	40.57163	0.0000

Source: Author's computation

The long-run ARDL estimation shows an important relationship between domestic debt and economic growth in Burundi. The domestic debt coefficient is 0.147154 and is statistically significant at the 1% level, meaning a 1% increase in domestic debt contributes to a 0.147% increase in GDP over the long run. This positive relationship suggests that the government is using its domestically borrowed funds effectively for productive investments and development projects that stimulate economic growth.

On the other hand, external debt shows a coefficient of 0.007355 but lacks statistical significance (with a p-value of 0.7695), indicating that foreign borrowing does not meaningfully impact the country's GDP in the long term. This contrast between domestic and external debt effects suggests that while Burundi manages its internal borrowing productively, its external loans might not be channeled into activities that contribute significantly to sustainable economic development.

The constant term (C) of 22.50096 represents the baseline level of GDP when all other variables are held at zero.

4.5 Error Correction Representation

To examine the short-run dynamics between the variables and the speed of adjustment toward long-run

equilibrium, we estimate the error correction model (ECM). The results are presented in Table 6.

Table 6: Error Correction Model Estimates

Variables	Coefficient	t-Statistic	Prob.
D(LNGDP (-1))	-0.338360	-3.741739	0.0005
D (LNGDP (-2))	-0.499253	-6.181035	0.0000
D (LNGDP (-3))	-0.509206	-6.453980	0.0000
D(LNDOM)	0.018870	0.898651	0.3731
D(LNEXT)	-0.138125	-4.696330	0.0000
CointEq (-1)*	-0.622934	-6.537909	0.0000

Source: Author's computation

The error correction term coefficient of -0.622934 is negative and statistically significant at the 1% level, showing that deviations from long-run equilibrium are corrected at a rate of about 62.3% each quarter. This quick adjustment demonstrates that Burundi's economy is resilient to short-term disruptions, as it returns to its long-term growth path relatively rapidly after experiencing shocks.

In the short run, domestic debt (LNDOM) has a small positive impact on GDP with a coefficient of 0.018870, though this effect isn't statistically significant. This suggests that while domestic borrowing might slightly stimulate immediate economic activity, it isn't a powerful driver of short-term growth by itself.

External debt (LNEXT), however, shows a negative and statistically significant short-run impact on GDP with a coefficient of -0.138125 (significant at 1% level). This means increased foreign borrowing actually reduces economic growth in the short term. This finding might result from inefficient use of external funds, the crowding out of private investment, or the burden of debt servicing costs and loan conditions that come with international borrowing.

All three lagged GDP variables are statistically significant with negative coefficients, indicating that Burundi's economic growth follows a complex pattern where past performance strongly influences current GDP, but in a way that suggests cyclical adjustments rather than steady growth.

4.6 Diagnostic Tests

To ensure the reliability and validity of the estimated ARDL model, we conduct several diagnostic tests. The results are presented in Table 7.

Table 7: Residual Diagnostic Test Results

Diagnostic Test	Test Statistic	p-value
Breusch-Godfrey Serial Correlation Test	1.985839	0.1121
Heteroskedasticity Test (Breusch-Pagan)	0.395718	0.9178
Shapiro-Wilk Normality Test	0.9894	0.8698
Ramsey RESET Test	0.362592	0.7184

Source: Author's computation

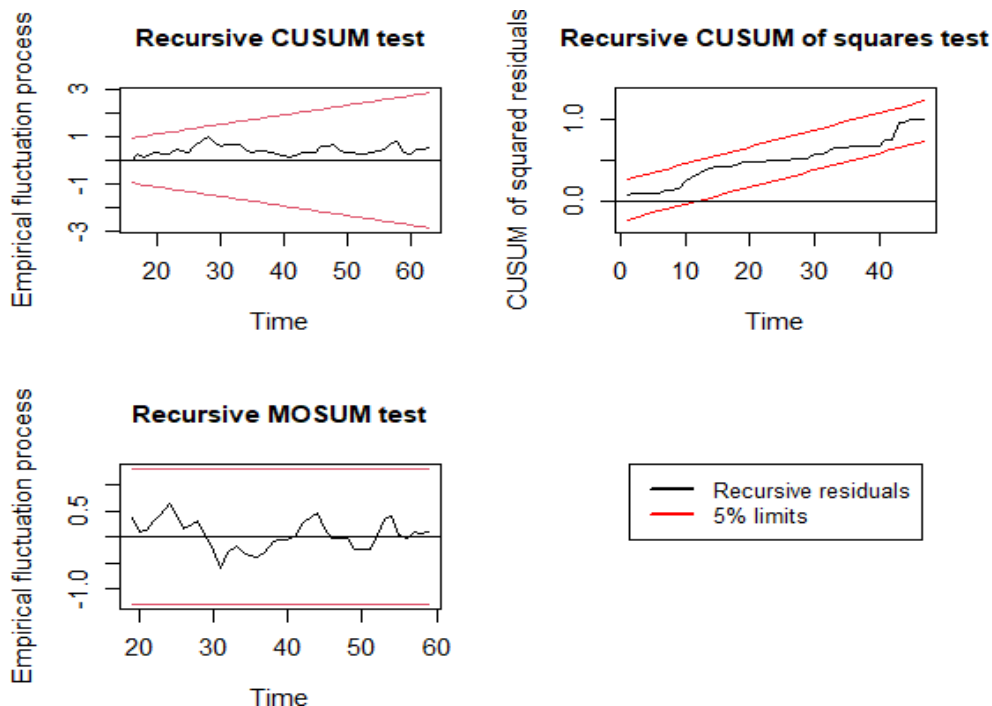
The Breusch-Godfrey serial correlation test shows a p-value of 0.1121, which is greater than the 0.05 significance level, indicating that there is no evidence of serial correlation in the residuals. This suggests that the error terms are independent.

The Breusch-Pagan test for heteroskedasticity produces a p-value of 0.9178, suggesting that the variance of the residuals remains constant across observations. This implies that heteroskedasticity is not a concern in the model.

The Shapiro-Wilk normality test results in a p-value of 0.8698, which is well above the 5% significance

level. This indicates that the residuals are normally distributed.

The Ramsey RESET test for functional form has a p-value of 0.7184, which is well above the 5% threshold. This suggests that the model does not suffer from specification errors, confirming that the functional form of the model is appropriate.



Additionally, the CUSUM and CUSUM of Squares tests indicate that the model is stable over time, as the plots remain within the 5% significance bounds.

Overall, the diagnostic tests confirm that the model meets key econometric assumptions, indicating that the estimated ARDL model provides robust and reliable results for analyzing the relationship between domestic debt, external debt, and economic growth in Burundi.

V. Conclusion and Policy Recommendations

5.1 Summary of Findings

This study investigated the impact of public debt on economic growth in Burundi, distinguishing between the effects of domestic and external debt components using quarterly data from 2008 to 2023. The ARDL bounds testing approach confirmed a strong long-run cointegrating relationship between GDP, domestic debt, and external debt.

The long-run estimates revealed that domestic debt has a positive and statistically significant impact on economic growth, with a coefficient of 0.147. This implies that a 1% increase in domestic debt is associated with a 0.147% increase in GDP in the long run, aligning with the theoretical expectation that domestic borrowing, when used for productive investments, can stimulate economic growth. In contrast, external debt exhibited a positive but statistically insignificant impact on GDP in the long run, with a coefficient of 0.007. This suggests that external borrowing may not be effectively utilized for productive investments that support long-term economic growth in Burundi.

In the short run, the error correction model revealed that domestic debt has a positive but statistically insignificant impact on GDP, with a coefficient of 0.019. External debt, however, had a negative and statistically significant short-run effect on GDP, with a coefficient of -0.138. This could be attributed to inefficiencies in the utilization of external funds, a crowding-out effect on private investment, or unfavorable conditionalities associated with external borrowing. The error correction term, with a coefficient of -0.623, indicated that

deviations from the long-run equilibrium are corrected at a relatively rapid pace, suggesting that Burundi's economy is resilient to short-term shocks.

These findings are consistent with several previous studies. The positive impact of domestic debt on economic growth aligns with the findings of Yusuf and Mohd (2021) in Nigeria and Gabriel (2020), who found that domestic debt had positive effects on economic growth in both short and long runs. The negative short-run impact of external debt is consistent with the findings of Mohammed Endris Awol (2022), who found that external debt had adverse effects on economic growth in Ethiopia.

The contrast between domestic debt's positive effects and external debt's limited or negative impacts highlights the importance of debt composition in determining growth outcomes. This finding supports the argument by Panizza and Presbitero (2012) that the source of debt significantly influences its impact on economic growth. Diagnostic tests confirmed the robustness of the model, with no evidence of serial correlation, heteroskedasticity, or specification errors. The CUSUM and CUSUMSQ stability tests indicated parameter stability throughout the sample period.

5.2 Policy Implications

Based on the study's findings, several policy recommendations are proposed to improve debt sustainability and enhance economic growth in Burundi:

First, the Government should prioritize domestic debt over external debt for financing development projects. The positive and significant long-run coefficient of domestic debt suggests that internal borrowing contributes more effectively to economic growth. This approach would also reduce exposure to exchange rate risks and external economic shocks, which are particularly relevant for a small, open economy like Burundi. To facilitate this, the government should focus on developing the domestic financial market, expanding opportunities for internal resource mobilization, and encouraging domestic savings.

Second, the government should implement a strategic approach to external debt management, given its negative short-run impact on GDP. External borrowing should be carefully evaluated and directed toward high-return projects that can generate sufficient foreign exchange to service the debt. Concessional loans with favorable terms should be prioritized over commercial borrowing to minimize debt servicing costs. Additionally, the government should negotiate favorable terms with international creditors, including longer repayment periods and lower interest rates, to reduce the burden of external debt.

Third, the efficiency of public investment financed by debt should be improved by strengthening project selection, implementation, and monitoring mechanisms. The government should establish a strong public investment management framework that ensures borrowed funds are allocated to productive sectors with high growth potential, such as infrastructure, agriculture, and manufacturing. This would involve conducting rigorous cost-benefit analyses for proposed projects, enhancing transparency in the allocation of funds, and implementing strict oversight mechanisms to prevent corruption and mismanagement.

Fourth, the government should boost revenue collection and reduce reliance on debt. This means broadening the tax base, improving tax administration, and fighting tax evasion. Modernizing tax collection systems, introducing fair tax policies, and encouraging compliance would help. The government should also cut wasteful spending and direct resources to activities that promote growth.

Fifth, the government should enhance debt transparency and accountability by regularly publishing comprehensive debt reports, including information on debt composition, servicing costs, and the allocation of borrowed funds. This would improve public confidence, attract investors, and facilitate better monitoring of debt sustainability. Lastly, the government should also strengthen institutional capacity for debt management by establishing a dedicated debt management office with qualified staff, advanced systems, and clear operational procedures. This would improve debt recording, analysis, and reporting, leading to more informed borrowing decisions and better coordination between fiscal and monetary policies.

5.3 Limitations and Suggestions for Future Research

While this study provides important insights into the relationship between public debt and economic growth in Burundi, it is not without limitations. Firstly, our study focused primarily on aggregate domestic and external debt, without examining specific components such as concessional versus non-concessional loans, or short-term versus long-term borrowing. Future research could disaggregate public debt to provide a more nuanced understanding of how different types of debt affect economic growth.

Secondly, While the ARDL model is appropriate for analyzing long-run and short-run relationships, alternative econometric approaches such as structural vector autoregression (SVAR) or nonlinear models could be explored to examine possible asymmetric effects of public debt on economic growth.

Thirdly, the study did not explicitly account for the quality of institutions or governance, which can significantly influence the effectiveness of public debt in promoting growth. Future research could incorporate institutional variables to examine how governance quality moderates the debt- growth relationship in Burundi.

Finally, future studies could explore the use of higher-frequency data or alternative data sources to enhance the robustness of the findings. Additionally, future research could incorporate additional control variables, such as inflation, interest rates, or trade openness, to provide a more comprehensive analysis of the factors influencing economic growth in Burundi.

Despite these limitations, this study contributes to the existing literature by providing empirical evidence on the relationship between public debt and economic growth in Burundi. The findings suggest that while domestic borrowing can contribute to economic development, external debt presents challenges, particularly in the short term. By implementing the proposed policy recommendations, Burundi can improve debt management, enhance economic growth, and advance towards sustainable development.

VI. References

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