AN EMPIRICAL ANALYSIS OF THE IMPACT OF BILATERAL DEBT ON ECONOMIC GROWTH IN NIGERIA

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ABSTRACT

This study empirically investigates the impact of bilateral debt on Nigeria's economic growth from 2007Q_1 to 2024Q_2, employing the Autoregressive Distributed Lag (ARDL) bounds testing method. The analysis is grounded in the Endogenous Growth and Debt Overhang theories, with real GDP modelled as a function of bilateral debt stock, debt service payment, exchange rate, inflation, and gross capital formation. Quarterly data sourced from the Central Bank of Nigeria, Debt Management Office, and World Bank were tested for stationarity using ADF, PP, and KPSS tests, while model robustness was validated through diagnostic and stability checks, including CUSUM and CUSUM of Squares tests. The findings reveal that bilateral debt and debt servicing exert significant negative effects on Nigeria's economic growth in both the short and long run, supporting the Debt Overhang Hypothesis. Exchange rate depreciation similarly suppresses growth by amplifying debt burdens, while inflation has a modest positive short-run impact but is contractionary in the long run. Conversely, gross capital formation consistently drives economic growth across all time horizons, highlighting the necessity of channeling debt into productive investment. The error correction term (-0.407) confirms a stable long-run equilibrium, with about 41% of short-run disequilibria corrected each quarter. The study recommends prudent bilateral debt management, prioritization of concessional loans tied to productive projects, stabilization of the exchange rate through export diversification and foreign reserve accumulation, and strengthening of the Debt Management Office's oversight. Capital formation must remain central to borrowing strategies to mitigate debt overhang effects and foster sustainable growth.

Keywords: Bilateral debt, Debt overhang theory, Debt service, growth, capital formation

1.0 Introduction

In the past, Nigeria had increasingly depended on foreign borrowing to fund infrastructural development, stabilize the economy, and address fiscal imbalances. Among the components of external debt is bilateral debt the debt owed to individual countries such as China, India, France, and Germany as this debt has gained prominence in Nigeria's debt portfolio, particularly since the global financial crisis of 2008 and the oil price shock of 2014 (Debt Management Office [DMO], 2023).

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While bilateral loans often come with semi-concessional terms, their long-term implications for economic growth remain a subject of empirical and policy debate.

Economic growth measured as the increase in a country's real Gross Domestic Product (GDP) is widely regarded as the central objective of macroeconomic policy. Classical and neoclassical growth theories posit that capital accumulation, whether domestic or foreign-funded, can shoot the economic expansion (Solow, 1956; Todaro & Smith, 2015). Debt, particularly when used efficiently, can help bridge investment gaps. However, excessive borrowing without corresponding growth in revenue or productive capacity could lead to debt overhang and crowding out of private sector investment (Krugman, 1988; Reinhart & Rogoff, 2010).

Bilateral Debt: This refers to debt owed by the Nigerian government to individual foreign countries through formal lending agreements, often involving infrastructure or development financing. It is a subset of external debt, typically negotiated on concessional or semi-concessional terms (DMO, 2023). Economic Growth is seen as the sustained increase in the production of goods and services in an economy over time. It is typically measured by the growth rate of real GDP (Todaro & Smith, 2015). The rate at which the naira exchanges for other currencies, which affects debt servicing and foreign capital flows is known as Exchange Rate, while inflation rate is the macroeconomic indicator that reflects the rate of increase in general price levels, which can influence the cost of borrowing and investment decisions. More importantly, Gross fixed capital formation (GFCF) represents investment in physical assets and infrastructure. It is often used as a proxy for capital accumulation in growth studies.

In Nigeria, bilateral debt has been particularly controversial due to its increasing volume, opacity of terms, and concentration in specific sectors like transport and energy, especially those funded by Chinese lenders (Ezenwa & Okonkwo, 2022). This raises critical concerns about whether such debt actually stimulates growth or exacerbates macroeconomic vulnerabilities.

Despite an increase in bilateral debt from ₦122 billion in 2007 to over ₦6.5 trillion in 2023, Nigeria continues to experience low and unstable economic growth, with real GDP growth fluctuating between 2% and -1.8% over the last decade (DMO, 2023; World Bank, 2023). This raises concerns about the effectiveness of bilateral borrowing as a tool for economic development. While bilateral loans have been used to fund critical infrastructure projects such as railways, airports, and power stations, questions remain about the economic returns of these investments, their transparency, and their sustainability. Additionally, Nigeria's rising debt service-to-revenue ratio, which exceeded 90% in 2022, suggests a growing fiscal vulnerability (IMF, 2022).

The concern is whether such high debt burdens, particularly from bilateral sources, are crowding out social spending and private investment, ultimately undermining long-term growth.

Moreover, existing empirical literature often focuses on total external debt or domestic debt, failing to isolate the impact of bilateral debt. The use of annual data in most studies also obscures short-term fluctuations and cyclical economic responses. Consequently, policymakers lack robust, timely, and disaggregated evidence to inform decisions on debt sustainability and development financing. This study aims to bridge this gap by investigating the impact of bilateral debt on economic growth in Nigeria using quarterly data from 2007Q1 to 2024Q2.

2.0 Literature Review

2.1 Conceptual Framework

2.11 Bilateral Debt

A bilateral debt in general is a loan arrangement between a single borrower and a single lender. Such loans are called "bilateral" because there are only two parties to the loan, each with an obligation to the other: In this case, one country will provide a specific amount of money under the terms of the loan agreement, and the other will repay the money as provided for in that same agreement (Mauro, 2015; and, Merritt, 2017). This study contextually refers bilateral debt as the quarterly summation of all outstanding loans obtained by Nigeria from a single lender under mutual agreement within the period of 2007Q1 to 2024Q2. Specifically, the bilateral debt is made up of loans from China (Exim Bank of China), France (AgenceFrancaise Development), Japan (Japan International Cooperation Agency), India (Exim Bank of India), Germany (Kreditanstalt Fur Wiederaufbua).

2.2 Theorical Literature

This study adopts the Endogenous Growth Theory and the Debt Overhang Theory to examine the relationship between bilateral debt and economic growth in Nigeria. The Endogenous Growth Theory, developed by Romer and Lucas, emphasizes the role of internal factors such as capital formation, technology, and institutional quality in driving long-term economic growth. It suggests that policy choices, investments in human capital, and innovation are central to sustaining growth, making debt beneficial only if it enhances these productive capacities. On the other hand, the Debt Overhang Theory, popularized by Krugman (1988)

and Sachs (1989), argues that when a country's debt level surpasses its repayment ability, the expected future tax burden discourages private investment, thereby hampering economic growth. Debt, in this context, becomes a drag on growth unless it is efficiently managed and used for productive purposes.

2.3 Empirical Review

Edward & Amadi (2024) examined the relationship between public debt and the development of the Nigerian economy from 1990 to 2021. They analyzed classes of public debt such as treasury bills, treasury bonds, multilateral debt, and bilateral debt, using the human development index (HDI) as a measure of economic performance. Data was sourced from the Central Bank of Nigeria's statistical bulletin and the World Bank, and various statistical analyses were conducted. The results showed that treasury bills, treasury bonds, and bilateral debts had positive effects on HDI in Nigeria in both the short and long run, while multilateral debt had a negative impact. The study recommended that strong laws be enacted to prevent embezzlement of public funds by public office holders, and that those who engage in such acts should be punished effectively.

Ikwuo et al. (2024) investigated the nexus between multilateral debt and economic development in Nigeria from 2000 to 2023. Applying regression analysis, the study revealed a long-term equilibrium nexus between multilateral loan stock and economic development, but observed that multilateral loan stock had statistically insignificant and negative effect on economic development. The study recommended that the Federal Government should exercise caution in accumulating more loans from multilateral windows. However, they noted that the limited number of observations used in the analysis may lead to unreliable regression results.

Okekwu and Adejoh (2024) used quarterly data (1996Q1–2022Q4) within the ARDL framework to investigate external debt burden and Nigeria’s economic growth and discovered that external debt had no significant short- or long-run effects on growth. They went further to reaffirm that external debt had an insignificant long-run impact on growth but that investment played a more pivotal role. To achieve a sustainable growth, they emphasized strengthening capital formation, investment and institutional capacity. A major critique of this study is its generalized categorization of external debt without disaggregating the debt into creditor or loan type. This limits the depth of insight for policymakers.

Kolawole (2024), on his part, examined debt-growth relations using ARDL over the period 1981–2021 and reaffirmed the negative impact of external debt, while highlighting the positive contribution of domestic investment. He recommended accessing zero real-interest debt and boosting local investment. However,

critics may argue that pursuing zero-interest borrowing is practically unrealistic as interest and principal repayment are the basic terms of all loans worldwide. Gimba *et al* (2024) assess the effect of Nigerian foreign loan stock, proxied bilateral and multilateral debt stocks on inflation rate for the period 2008 to 2023. Quarterly time series data were obtained from the Debt Management Office reports 2023 and CBN Statistical Bulletin. Applying multiple regression, the study revealed a negative significant effect of bilateral debt on inflation rate. Accordingly, the study recommended that the Federal Government should accumulate bilateral loans to execute capital projects. Although the study recommended bilateral loans to finance infrastructure, it should be noted that not all bilateral loans are concessional.

Olasehinde and Afolabi (2023) applied ARDL and Granger causality tests for the period 1981–2022 and found out that external reserves positively affect long-run growth while external debt Granger-causes growth. They suggested discouraging unproductive loans and promoting export-oriented trade. However, the study lacks differentiation between types of external debt, limiting its policy utility. In addition, using the ARDL–ECM model spanning 1985 to 2020, Okonta and Ishioro (2023) investigated public debt, exports, and economic growth and concluded that domestic debt and export performance promote growth, while external debt exerts a deflationary impact. Their recommended debt financing for infrastructure projects while maintaining strict fiscal discipline. This study fails to distinguish between debt types or creditor sources, limiting its policy precision.

Obi et al. (2022) introduced a new angle by studying the moderating role of FDI between external debt and economic growth, using ARDL on data for the period 1986–2019. They found that foreign direct investment can cushion the negative effect of debt and recommended leveraging on it to improve debt efficiency. The shortcoming of this study is its reliance on yearly data which limits insight necessary for detecting short-term fluctuations. Ijeoma et al. (2022) explored the historical evolution of debt between 1979 and 2020. Applying OLS and VECM, they revealed that debt incurred during civilian regimes had a more positive effect on infrastructure than during military regimes. They proposed enhancing debt transparency and promoting civilian fiscal management. However, the study used aggregated annual data without accounting for quarterly variations thereby masking short-term policy impacts.

Efayena and Olele (2021) provided further regional evidence using Pedroni and DOLS estimators, focusing on South-South, Nigeria. Their results consistently showed that both domestic and external debt adversely affect regional growth. They underscored the need for enhanced sub-national debt oversight frameworks.

Nevertheless, the study's regional focus and brief time coverage (2014–2019) using annual data limit its generalization at the national level. Extending the literature, Adekunle et al. (2021) investigated non-linear relationships using a threshold regression technique and found that external debt impacts growth following a Laffer curve, with an optimal threshold at 6.8% of GNI. They recommended capping external debt near this threshold and prioritizing zero-interest loans. However, this optimal ratio might have shifted post-2015 due to macroeconomic changes, rendering the recommendation potentially outdated.

In the same vein, Ideh and Uzonwanne (2021) employed the OLS method using data from 1985 to 2019 and discovered a negative but statistically insignificant effect of external debt on growth. They recommended enhancing revenue utilization, promoting foreign direct investment (FDI), and developing infrastructure. However, their methodology may be prone to endogeneity bias, which limits the robustness of their results.

Moreover, Onifade et al. (2020) used the ARDL model to explore how government expenditure channels the effect of debt on growth. They found that the debt-to-GDP ratio influences growth through public spending and urged for a restructured fiscal framework. However, their study does not distinguish between different forms or sources of debt and their individual impact. Ohiomu (2020) employed ARDL bounds testing and unit root analysis and found evidence of debt overhang and crowding-out effects in the Nigerian context. He recommended enforcing policies geared toward debt reduction while simultaneously boosting public and private investment. Despite its strengths, the study did not distinguish debts by creditor type, which is crucial for targeted debt management strategies.

Employing the OLS model on data from 1980–2016, Obayori et al. (2019) concluded that debt inflows in Nigeria were not translating into economic growth due to inefficiencies in project execution. They advocated for better screening of projects and debt linked to specific investments. Nonetheless, the lack of dynamic modeling such as ARDL weakens causal inference.

Sajuyigbe et al. (2018) explored the relationship between external debt and Nigeria’s economic growth using the ADF, Johansen, VECM, and Granger causality techniques covering the period 1999–2015. Their findings revealed that external debt had a negative impact on economic growth. They recommended empowering the Debt Management Office, curbing corruption, and ensuring proper utilization of borrowed funds. However, the limitation of the study lies in its relatively short timeframe, which ends in 2015, and the absence of a bilateral-specific debt breakdown. Likewise, Jibir et al. (2018) revisited the debt-growth nexus through the ARDL technique over the 1981–2016 period and found a persistently negative link between external debt and

economic growth. The authors advocated for maintaining debt service obligations below foreign exchange earnings and stressed productive investments. Although valuable, the findings of the study echoed Sajuyigbe et al. (2018) conclusions without significantly expanding the analytical scope.

Farooq, Khan and Akram (2017) evaluated the effect of components of public borrowings at the disaggregated level and debt servicing on the economic growth of Pakistan. The study used types of debt such as Paris Club Debt, Multilateral Debt and Bilateral Debt. The ARDL technique on time series data of Pakistan between 1976 and 2015 was applied. The outcome of the analysis indicated that bilateral loan has adverse effect on the economic development of Pakistan. The study recommended that in order to improve the economic growth, Pakistan may go for Permanent Debt and Paris Club Debt instead of bilateral and multilateral debt. The major setback of the study is the scope used as data was readily available for the period not covered by the study.

In another study in Nigeria, Adedoyin et al. (2016) employed the ARDL and Granger causality approach using annual data from 1981 to 2014. Although the study identified a long-run co-integration between debt and growth, it found no evidence of causality. The authors emphasized the importance of prudent debt inflows and channeling borrowed resources toward productive sectors. Nevertheless, the use of annual data limited the study's ability to capture short-run fluctuations and more granular dynamics. On their part, Udoffia and Akpanah (2016), using ADF and Johansen VECM techniques, found that external debt adversely affects growth in Nigeria. They recommended strengthening debt management and diversifying Nigeria's revenue base. A major limitation of their work is that it covers only up to 2016 and does not differentiate debt types.

2.4 Research Gap

Most of the empirical studies on Nigeria's external and bilateral debt largely confirm the Debt Overhang Theory, showing a negative impact on GDP, especially when debt isn't channeled into productive projects. Researchers like Sajuyigbe et al. (2018) and Adedoyin et al. (2016) used ARDL and VECM models with annual data, often overlooking specific debt types. While some studies identify thresholds or moderating variables (e.g., FDI, government regimes), bilateral debt is rarely isolated. Moreover, few studies employ quarterly data. This study fills that gap by assessing both short-run and long-run effects of bilateral debt, debt service payment, exchange rate, inflation, and gross capital formation on Nigeria's economic growth from 2007Q1 to 2024Q2.

3.0 . Methodology and Sources of Data

3.1 Model specification

The theoretical basis for this study leads to a model where economic growth (proxied by real GDP) is influenced by bilateral debt stock (BD_t), debt service payment (DSP_t), exchange rate (EXR_t), inflation rate (INF_t), and gross capital formation (GCF_t). Mathematically, this can be specified as:

$$RGDP_t = \beta_0 + \beta_1 BD_t + \beta_2 DSP_t + \beta_3 EXR_t + \beta_4 INF_t + \beta_5 GCF_t + \mu_t$$

This functional form is consistent with the empirical approach of Sulaiman and Azeez (2012), who modeled the impact of external debt on Nigeria's economic growth using a similar structure, linking theoretical assumptions to econometric models. Their findings showed that while some components of debt had a positive effect when channeled into productive investment, excessive debt servicing had a crowding-out effect on growth.

3.2 Sources of Data

This study utilizes time-series quarterly data from 2007Q1 to 2024Q2. The data were sourced from reputable institutions, including the Central Bank of Nigeria Statistical Bulletin, Debt Management Office, and the World Bank Development Indicators. This time frame is considered because it captured the post Paris Club relieve era and the fact that federal government of Nigeria pays more attention to growth in Nigeria. All variables were tested for stationarity using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, and the study employed ARDL bounds testing to determine both short-run and long-run relationships. The methodological framework thus bridges theory and empirical evidence by testing the validity of the debt-growth nexus within Nigeria's macroeconomic context α_0 is intercept, α_1 to α_3 are the slope of the coefficient of independent variables and ε represents the error term, The theoretical a priori expectations are expressed geometrically as α_1, α_2 & α_3 <0 .

3.3 Estimation Techniques

The paper employed both descriptive statistics, correlation analysis and Autoregressive distributive lag model using E-views 10.0 econometric package to examine the characteristic and the dynamic relationship between Bilateral debt and economic growth in Nigeria. Having found that all the variables were integrated of mixed order, the paper determined the optimum lag and proceeded to specify an autoregressive distributive lag (ARDL) model.

Thus the general ARDL(p, q_1, q_2, q_3, q_4, q_5) model is expressed as:

$$\Delta RGDPt = \alpha 0 + \sum_{i=1}^{p} \phi i \Delta RGDPt - I + \sum_{j=0}^{q1} \beta j \Delta BDt - j + \sum_{k=0}^{q2} \theta k \Delta DSPt - k + \sum_{l=0}^{q3} \delta l \Delta EXRt - l + \sum_{m=0}^{q4} \gamma m \Delta INFt - m + \sum_{n=0}^{q5} \lambda n \Delta GCFt - n + Ecmt - 1 + \psi 1 RGDPt - 1 + \psi 2 BDt - 1 + \psi 3 DSPt - 1 + \psi 4 EXRt - 1 + \psi 5 INFt - 1 + \psi 6 GCFt - 1 + \varepsilon t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.1$$

Where

GDP_t = Real Gross Domestic Product at time t

EXR_t = Exchange Rate

BD_t = Bilateral Debt

INF_t = Inflation Rate

DSP_t = Debt Service Payment

GCF_t = Gross Capital Formation

Ecm_{t-1} = The error correction mechanism lagged for one period.

LOG = Logarithm function

Φi, βjθkδlγmλn, ψ2 to ψ6

The coefficients ψ_2,ψ_3,ψ_4 are theoretically expected to be negative (α_1, α_2, $\alpha_3 < 0$) due to debt overhang and macroeconomic volatility effects, while ψ_6 (GCF) is expected to be positive, reflecting capital-driven growth.

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4.0 Analysis and Discussion of Results

4.1 Analysis

The descriptive statistics summarize the behavior of the key variables over the study period (2007Q1–2024Q2). The log of debt service payment (LDSP) has a mean value of 23.64, with a relatively small standard deviation (0.28), indicating stable debt servicing across quarters. Real GDP (LGDP) shows moderate variation with Std. Dev.of 0.52, while bilateral debt (LBD) and gross capital formation (LGCF) display greater dispersion (0.75 and 1.06, respectively), reflecting fluctuations in borrowing levels and investment patterns over time. The exchange rate (EXR) averages ₦415.62 per US dollar, with substantial variation of Std. Dev. = 185.34, suggesting significant exchange rate volatility during the period, which may influence debt servicing costs and inflationary pressures. Inflation (INF) has a mean of 12.16% and a relatively moderate spread (3.40%), indicating episodes of both moderate and high inflation.

Table 4.11: Descriptive Statistics

Descriptive Statistics						
Variable(s)	**LGDP**	**LBD**	**LDSP**	**LGCF**	**EXR**	**INF**
Mean	11.274	8.2841	23.644	7.7122	415.62	12.156
Median	11.355	8.4832	23.518	8.0677	412.45	12.066
Maximum	12.064	9.4104	24.320	9.0023	780.15	18.453
Minimum	10.445	6.9464	23.349	5.6904	150.27	4.3660

Std. Dev.	0.5226	0.7451	0.2762	1.0642	185.34	3.4067
Skewness	-0.2049	-0.3642	1.1555	-0.4474	0.3145	-0.1534
Kurtosis	1.8043	1.9465	3.2424	1.6851	2.4251	2.3506
Jarque-Bera	4.2605	4.3746	14.398	6.7460	2.9824	1.3756
Probability	0.1188	0.1122	0.0007	0.0342	0.2257	0.5026
Sum	721.56	530.18	1513.2	493.58	29,093.2	777.98
Sum Sq. Dev.	17.212	34.976	4.8084	71.354	2,394,270	731.17
Observations	70	70	70	70	70	70

Source: *Author's Computation using E-view 10, 2025*

Skewness results indicate that LDSP and EXR are positively skewed (long right tail), implying occasional spikes in debt payments and exchange rate depreciation. LGDP, LBD, LGCF, and INF are negatively skewed, indicating values concentrated above their means. Kurtosis values below 3 (except LDSP) imply that most variables exhibit platykurtic distributions (flatter than normal), while LDSP is closer to a normal distribution (3.24). The Jarque-Bera test reveals that LDSP ($p = 0.0007$) and LGCF ($p = 0.0342$) significantly deviate from normality, while the other variables, including EXR and INF, do not reject the null of normal distribution. Overall, the summary suggests high volatility in exchange rates and moderate inflation trends, factors that could have substantial implications for the debt-growth nexus.

4.2 Correlation Analysis

The correlation matrix reveals several notable relationships among the variables. Bilateral debt and real GDP are highly and positively correlated (0.987), as are gross capital formation and real GDP (0.970). This suggests that economic growth in Nigeria is closely tied to rising debt inflows and capital formation during the study period, though this does not confirm causation. Debt service payments also exhibit a strong positive correlation with GDP (0.722) and LBD (0.667), indicating that periods of higher output and borrowing are typically associated with greater repayment obligations. Inflation shows moderate positive correlations with GDP (0.450), LBD (0.461), and LDSP (0.336), reflecting the inflationary pressures linked to debt accumulation and repayment.

Table 4.21: **Correlation Analysis**

	Correlation coefficients					
Variable(s)	**LDSP**	**LGDP**	**LBD**	**LNBD**	**EXR**	**INF**
LDSP	1.0000					
LGDP	0.7216	1.0000				
LBD	0.6666	0.9869	1.0000			
LGCF	0.6074	0.9697	0.9572	1.0000		
EXR	0.5123	-0.4388	-0.4022	-0.3579	1.0000	
INF	0.3359	0.4497	0.4610	0.3720		1.0000

Source: *Author's Computation using E-view 10, (2025)*

The exchange rate (EXR) displays a negative correlation with GDP (-0.439), LBD (-0.402), and LGCF (-0.358), suggesting that exchange rate depreciation coincides with weaker output and lower investment, potentially due to increased debt servicing costs and imported inflation. EXR's positive but weak correlation with inflation (0.213) indicates that currency depreciation contributes modestly to price pressures. While most variables show strong associations, the high correlations among LGDP, LBD, and LGCF may signal potential multicollinearity, which justifies the use of ARDL (which can handle such issues) rather than OLS.

4.3 Pre-estimation Test

The unit root tests, using Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski-Phillips-Schmidt-Shin (KPSS), reveal that most variables real GDP (InGDP), bilateral debt (InBD), debt service payments (InDSP), gross capital formation (InGCF), and exchange rate (EXR) are non-stationary at level but become stationary after first differencing, indicating they are integrated of order one, I(1).

Inflation (INF), however, is stationary at level (I(0)) under both ADF and KPSS, which does not require differencing for stationarity. This mixture of integration orders (I(0) and I(1)) justifies the use of the ARDL bounds testing approach, which accommodates variables with different levels of integration but avoids I(2) series (none present here).

Table 4.31 Unit Root Test of Variables of the Study

	Test I			**Test II**			**Test III**		
	ADF			**PP**			**KPSS**		
Variables	Level	1st diff	Order	Level	1st diff	Order	Level	1st dif	Order
InGDP	-1.6027	-0.4569***	I(1)	-0.42717	-12.3082	I(1)	1.0047	0.1287*	I(1)
InBD	3.7265	-23988**	I(1)	3.6842	-6.8591*	I(1)	0.9980	0.0829*	I(1)
InDSP	0.5528	-8.0333*	I(1)	0.6611	-8.0367*	I(1)	0.6420	0.3870***	I(1)
InGCF	2.5736	-32895*	I(1)	3.6842	-6.8591*	I(1)	0.9514	0.1983*	I(1)
EXR	-1.8472	-7.6521*	I(1)	-1.7740	-7.6445*	I(1)	0.8846	0.1241*	I(1)
Inf	-3.031*		I(0)	-2.1543-	-45938*	I(1)	0.3320*		I(0)

Source: *Authors Computation using E-view 10, (2025)*

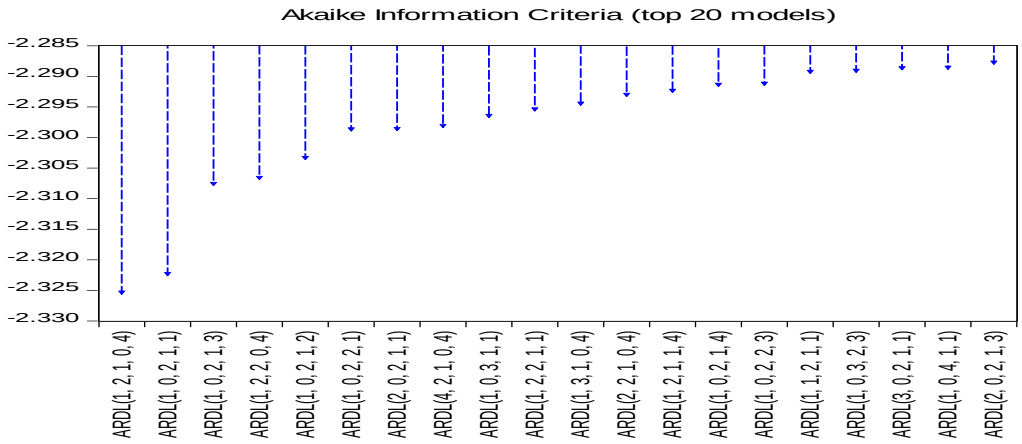
The findings of ADF was affirmed by PP in phase II and re-affirmed in test III of the table by KPSS. The results confirm that the data are appropriate for ARDL modeling, where long-run cointegration relationships can be tested while capturing short-run dynamics, without the risk of spurious regression

4.4 Lag Selection Criterion

Before the estimation of the ARDL bounds testing approach, it is important to identify an appropriate lag to calculate the F-statistics. The ARDL model is sensitive to the lag order. The AIC (Akaike information criterion) provides better results compared to other lag length criteria (Lütkepohl, 2006).

Figure 4.1: Optimal Lag Selection

The figure 4.1 present the list of top 20 best models, upon which the optimal one will be selected



Source: *Authors Computation using E-view 10, (2025)*

In figure 4.1, a summary of the top twenty (20) best models have been chosen by this method. Undoubtedly, all the selected models cannot be readily estimated. However the first best model as manifested in figure 4.2 is selected which is ARDL (1,2,1,0,4)), indicating that the optimal lag for the dependent variable (LGDP) is 1, and the optimal lag length for the independent variables (LBD, LDSP, LGCF and INF) are 2, 1, 0 and 4 respectively. Hence ARDL (1,2,1,0,4) is the model used for determining the short-run and long-run relationship among economic growth, bilateral debt, debt service payment, gross capital formation and inflation using bound testing approach with the critical values provided by Peasaran et al (2001) suitable for large sample data.

4.5 The ARDL Co-integration Analysis

The ARDL bounds testing results indicate an F-statistic of 6.1128, which exceeds the upper critical bound (I(1)) across all significance levels (10%, 5%, 2.5%, and 1%). Specifically, at the 5% level, the critical values are 2.56 (I(0)) and 3.49 (I(1)), confirming that the computed F-statistic lies well above the upper bound.

Table 4.51 ARDL Bound Test

F-Bound Test	No levels (Longrun) relationship			
Test Statistics	Value	Significant level	I(0) bound	I(1) bound
F-Statistic	6.112762	10%	2.2	3.09

K	4	5%	2.56	3.49
N	70	2.5%	2.88	3.87
		1%	3.29	4.37

Source: *Authors Computation using E-view 10, (2025)*

With K=4 regressors and 70 observations, the null hypothesis of no long-run relationship is rejected. This implies the existence of a stable long-run cointegrating relationship among real GDP, bilateral debt, debt service payments, exchange rate, inflation and gross capital formation in Nigeria over the study period (2007Q1–2024Q2).

4.6 ARDL Long Run Regression Analysis

The ARDL long-run results reveal several important dynamics regarding Nigeria's economic growth (proxied by LGDP) from 2007Q1–2024Q2. First, bilateral debt (LBD) exerts a negative and statistically significant impact on GDP (-0.141, p=0.02), consistent with the Debt Overhang Theory. This aligns with findings from Sajuyigbe et al. (2018), Jibir et al. (2018), and Kolawole (2024), who all reported a detrimental impact of external borrowing on growth, particularly when debt is not channeled into productive investment. However, it contrasts with Obi et al. (2022), who found that foreign direct investment (FDI) can offset debt's negative effects, a moderating factor not explicitly captured in this study. Secondly, debt service payments (LDSP) also have a negative long-run effect (-0.298, p=0.034), suggesting that heavy repayment obligations crowd out resources that could otherwise support domestic investment. This result supports Udoffia & Akpanah (2016) and Obayori et al. (2019), who all highlighted the burden of debt servicing on Nigeria's fiscal space, but diverges from Okekwu & Adejoh (2024), who found the long-run effect of total external debt (including service costs) to be statistically insignificant.

Table 4.61 ARDL Long-Run Estimates

Dependent Variable: LGDP				
Selected Model: ARDL(1, 2, 1, 0,2, 4)				
Variable(s)	Coefficient	Standard Error	t-statistics	Prob
LGDPI(-1)	0.592892***	0.078367	7.565586	0.0000
LBSP(-2)	-0.298068**	0.136619	-2.181749	0.0342
LBD	-0.141263**	0.058667	-2.407890	0.0200
LGCF	1.146339***	0.219735	5.216923	0.0000
EXR	-0.062514**	0.027183	-2.299174	0.0251
INF(-4)	-0.019272**	0.008439	-2.283594	0.0270
C	0.744762	1.077159	0.691413	0.4927
R-squared	0.952427	Prob(F-statistic)	0.000000	

*Note: *** Statistical significance at the 1 per cent levels**Statistical significance at the 5 per cent levels. *Statistical significance at the 10 per cent levels,*

***Source**: Computed by the author using E-views. Version 10 (2025)*

Similarly, exchange rate (EXR) shows a negative and significant relationship with GDP having a coefficient of -0.063, with p-value of 0.025. Depreciation of the naira appears to exacerbate debt-related vulnerabilities, as most bilateral loans are dollar-denominated, raising servicing costs and stoking inflationary pressures. This outcome is consistent with Ohiomu (2020), who observed that exchange rate volatility magnifies the debt overhang effect, as well as Okonta & Ishioro (2023), who noted the deflationary burden of external debt via currency effects. On the positive side, gross capital formation (LGCF) has a strong positive effect on GDP (1.146, $p<0.01$), underscoring the growth-enhancing role of productive investments. This finding reinforces Kolawole (2024) and Okekwu & Adejoh (2024) recommendations of channeling borrowed funds into capital projects as a pathway to offset the debt burden.

Finally, inflation (INF) negatively influences growth (-0.019, $p=0.027$), suggesting that persistent price instability erodes the benefits of capital accumulation and foreign loans. This supports the argument by Efayena & Olele (2021) that macroeconomic instability amplifies the negative growth effects of debt. Overall, these findings largely support the Debt Overhang Hypothesis and the conclusions of most prior studies, while diverging from works like Obi et al. (2022), who highlighted FDI as a mitigating factor, and Okekwu & Adejoh (2024), who downplayed the long-run significance of external debt burdens

4.7 ARDL Short-Run Regression Analysis

The ARDL short-run estimates highlight the immediate impacts of bilateral debt and related macroeconomic variables on Nigeria's economic growth (ΔLGDP). Bilateral debt (ΔLBD) exerts a negative and highly significant effect (-0.141, $p<0.01$), consistent with the long-run findings and the Debt Overhang Theory. This reinforces the conclusions of Sajuyigbe et al. (2018) and Jibir et al. (2018), who reported that external borrowing depresses short-term growth when debt-financed inflows are not effectively utilized. Conversely, debt service payments (ΔLDSP) surprisingly show a positive short-run effect (0.298, $p=0.010$), suggesting that in the near term, active servicing of obligations may improve investor confidence and stimulate capital inflows, thereby boosting growth. This aligns with Onifade et al. (2020), who suggested that debt repayment, when combined with fiscal restructuring, can support output growth, though it contrasts with Udoffia & Akpanah (2016), who emphasized its contractionary burden.

Table 4.71 ARDL Short-Run Estimates

Dependent Variable: ΔLGDP				
Selected Model: ARDL(1, 2, 1, 0,2, 4)				
Variable(s)	Coefficient	Standard Error	t-statistics	Prob
Δ(LBSP(-1))	0.298068**	0.111399	2.675669	0.0102
Δ(LBD)	-0.141263***	0.052581	-2.686591	0.0099
Δ(LGCF)	-0.031542**	0.014689	-2.147389	0.0355
Δ(EXR)	0.015157**	0.007511	2.018092	0.0493
Δ(INF)	0.015157**	0.007511	2.018092	0.0493
ECM(-1)	-0.407108***	0.063909	-6.370112	0.0000
R-squared	0.483752			

*Note: *** Statistical significance at the 1 per cent levels**Statistical significance at the 5 per cent levels. *Statistical significance at the 10 per cent levels,*
***Source**: Computed by the author using E-views 10. Version 10 (2023)*

Gross capital formation (ΔLGCF) has a strong positive short-run impact (0.462, p<0.01), showing that investment activity drives immediate growth responses. This supports findings by Kolawole (2024) and Okekwu & Adejoh (2024) that emphasize productive investment as the primary channel through which debt can foster growth. On the other hand, the exchange rate (ΔEXR) negatively affects growth (-0.032, p=0.036). Depreciation erodes short-term output by raising the cost of servicing dollar-denominated debt and fueling import-driven inflation. This is consistent with Ohiomu (2020) and Okonta & Ishioro (2023), who highlighted the deflationary and destabilizing role of currency fluctuations. Interestingly, inflation (ΔINF) shows a negligible but positive short-run effect (0.015, p=0.049). This indicates that moderate inflation, often associated with expansionary monetary conditions, can stimulate output in the short run, echoing Onifade et al. (2020), but contrasts with the long-run negative inflation effect found in this study and in Efayena & Olele (2021).

Lastly, the error correction term (ECM) is negative and significant (-0.407, p<0.01), confirming the existence of a stable long-run equilibrium. About 40.7% of short-run disequilibria are corrected within a single quarter, suggesting relatively fast convergence to the long-run path.

4.8 Diagnostic Tests

The diagnostic results confirm that the ARDL model is statistically reliable and well-specified. The Jarque-Bera test (p=0.311) indicates that the residuals are normally distributed, satisfying the assumption of normality. The Breusch-Godfrey LM test for serial correlation (p=0.389) suggests no evidence of autocorrelation in the residuals, while the ARCH test (p=0.313) confirms the absence of heteroskedasticity, indicating that the model's variance is stable over time. Finally, the Ramsey RESET test (p=0.294) shows no evidence of model misspecification, implying that the functional form of the ARDL model is correctly specified. Collectively, these results validate the robustness of the estimated model and ensure that the subsequent inferences drawn from the ARDL analysis are reliable.

Table 4.81 Diagnostics Analysis

Diagnostic test	Null Hypothesis	Statistic	P-value
Normality test	Normality	Jarque-Bera (2.3332)	0.311
Serial Correlation LM	No Serial Correlation	F-Statistic (0.9648)	0.3888
Heteroskedasticity ARCH	Homoskedasticity	F-Statistic (1.0381)	0.3126
Ramsey RESET tests	No specification error	t-statistics (1.1719)	0.2940
		F-statistic (1.37353)	0.2941

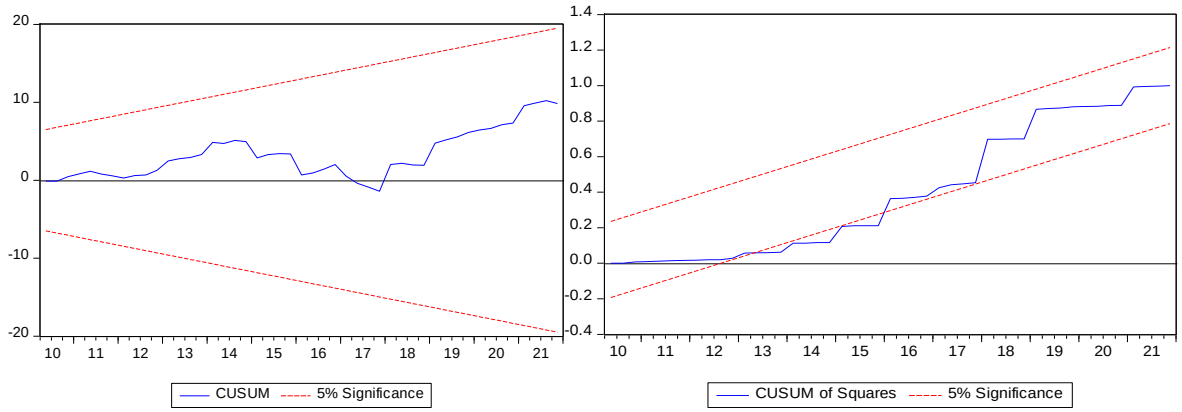
***Source**: Computed by the author using E-views 10. Version 10 (2025)*

4.9 Stability Test

The CUSUM and CUSUM of Squares plots assess the stability of the ARDL model parameters over time. In the first chart (CUSUM), the blue line remains within the 5% significance bounds (red dashed lines) throughout the sample period, indicating that the model's coefficients are stable and there are no structural breaks in the estimated parameters. Similarly, the CUSUM of Squares plot shows that the blue line does not cross the 5% critical boundaries, confirming the absence of instability or sudden variance shifts in the residuals. Together, these results validate that the ARDL model is dynamically stable and suitable for reliable inference regarding the relationship between bilateral debt and Nigeria's economic growth.

Figure 4.2: CUSUM Test

Figure 4.5 CUSUM of Square Test



Source: plotted by the author using E-views. Version 10 (2023)

5.0 Conclusion and Policy Recommendation

5.1 Conclusion

This study investigated the impact of bilateral debt on Nigeria's economic growth from 2007Q1 to 2024Q2, using the ARDL bounds testing approach. The findings reveal that bilateral debt and debt servicing exert significant negative effects on economic growth in both the short and long run, confirming the Debt Overhang Hypothesis. These effects are compounded by exchange rate depreciation, which raises the real burden of external obligations and suppresses output. Conversely, gross capital formation emerges as the most critical driver of growth, with positive and significant contributions across both time horizons, demonstrating that debt can only foster growth when channeled into productive investments. While inflation exhibits a modest positive effect in the short run, its long-run impact is contractionary, reflecting how persistent price instability undermines growth. The model diagnostics and stability tests (CUSUM and CUSUM of Squares) confirm that the ARDL model is statistically sound, free of serial correlation, heteroskedasticity, and misspecification, with stable parameters throughout the study period. These results highlight the delicate balance Nigeria must maintain in managing bilateral debt while fostering conditions for sustainable economic expansion.

5.2 Policy Recommendations

Base on the findings, the study recommends the following

i) Prudent Bilateral Debt Management: Nigeria must limit bilateral borrowing to concessional loans tied to revenue-generating projects. Loans should be linked explicitly to infrastructure, industrial diversification, and technological development to offset the growth-retarding debt overhang effects.

ii) Strengthen Debt Oversight and Transparency: The legislature should implement stronger oversight over bilateral agreements, ensuring clear reporting of loans terms, including interest rates and debt service obligations. Transparent debt tracking can reduce fiscal leakages and corruption.

iii) Mitigate Exchange Rate Volatility: Since naira depreciation exacerbates debt burdens, Nigeria should diversify its export base, accumulate foreign reserves, and implement coordinated fiscal and monetary policies to stabilize the exchange rate.

iv) Optimize Debt Servicing Strategy: While servicing debt improves credibility in the short run, excessive repayments strain fiscal capacity. Nigeria should renegotiate costly bilateral debts, extend maturities, and consider public-private partnerships (PPPs) to reduce reliance on external loans.

v) Promote Capital Formation: To convert bilateral borrowing into growth, Nigeria must prioritize capital expenditure in sectors that yield long-term returns, such as power, manufacturing, and digital infrastructure. This aligns debt accumulation with sustainable development goals.

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