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INTERPLAY BETWEEN ECONOMIC GROWTH, EXCHANGE RATE AND INSTITUTIONAL QUALITY ON PUBLIC DEBT IN NIGERIA (1986-2023)

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Abstract

This study aims to examine the tripartite interplay between economic growth, exchange rate fluctuations, and institutional quality on public debt accumulation in Nigeria over the period 1986-2023. The motivation stems from Nigeria's alarming public debt trajectory, which surged from NGN 12.6 trillion in 2015 to over NGN 97.3 trillion by 2023, despite periods of favorable economic growth. Using an annual time-series research design, this study employs the Auto-Regressive Distributed Lag (ARDL) bounds testing approach for cointegration and mediation analysis within an error correction framework. The preliminary conceptual framework suggests that economic growth exerts a negative effect on public debt, while exchange rate depreciation exhibits a positive and significant impact. Crucially, institutional quality is hypothesized to mediate both relationships: weak institutions amplify the debt-increasing effect of currency depreciation and undermine the debt-reducing potential of economic growth. The findings reveal that the interaction terms (Economic Growth × Institutional Quality and Exchange Rate × Institutional Quality) are statistically significant, indicating that institutional quality fundamentally conditions how macroeconomic fundamentals translate into debt outcomes. Policy recommendations emphasize integrated reforms combining exchange rate stabilization, growth diversification, and institutional strengthening particularly control of corruption and government effectiveness to achieve sustainable public debt management in Africa's largest economy.

Keywords: Public Debt, Economic Growth, Exchange Rate, Institutional Quality, ARDL, Nigeria.

1. INTRODUCTION

Public debt management has re-emerged as a central theme in global macroeconomic policy, particularly following the COVID-19 pandemic and subsequent geopolitical tensions. The International Monetary Fund (2023) reported that global public debt reached 93% of GDP in 2023, up from 84% in 2019, raising profound concerns about long-term fiscal sustainability. For developing economies like Nigeria, this challenge is acutely magnified by the complex interplay between sluggish economic growth, volatile exchange rate dynamics, and persistently weak institutional frameworks.

The Nigerian economy presents a quintessential case study of this harmful interplay. As the largest economy in Africa, Nigeria's public debt stock has grown alarmingly from NGN 12.6 trillion in 2015 to over NGN 97.3 trillion by the end of 2023 (Debt Management Office, 2024). This escalation has occurred despite periods of favorable economic growth, pointing to a fundamental disconnect. The Nigerian paradox is characterized by low fiscal revenues driven by a narrow tax base, oil dependency, and institutionalized leakages.

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Compounding this is a legacy of institutional weaknesses evidenced by perceptions of corruption and policy inconsistency which undermine the productivity of public investment (Okafor, 2022). The recent unification of the foreign exchange windows in 2023 led to a sharp depreciation of the Naira, which has exponentially increased the Naira burden of servicing external debt (Terrupse et al., 2023).

The critical gap this study addresses is the inadequacy of existing models that do not simultaneously account for the combined, exacerbating effects of economic growth, exchange rate volatility, and institutional quality on Nigeria's public debt sustainability. This research contends that it is the specific interplay where poor institutions undermine growth benefits and amplify exchange rate risks that fundamentally drives the country's precarious debt situation.

2. LITERATURE REVIEW

2.1 Theoretical Framework

This study is anchored on four complementary economic theories. First, the Keynesian Theory of Public Debt (Keynes, 1936) posits that public debt is a vital tool for counter-cyclical macroeconomic management, though its efficacy depends critically on the quality of public investment. Second, the Debt Overhang Theory (Krugman, 1988; Sachs, 1989) suggests that when debt exceeds repayment capacity, it creates disincentives for investment, trapping the economy in a low-growth, high-debt equilibrium.

Third, the Portfolio Balance Approach (Branson, 1975) explains how the composition of public debt between domestic and foreign currency influences investor portfolio choices and exchange rate dynamics. Fourth, Institutional Theory (North, 1990; Acemoglu & Robinson, 2012) provides the overarching framework, contending that institutions determine whether borrowed funds are channeled productively or dissipated through rent-seeking.

2.2 Empirical Review

Existing empirical literature reveals a predominant gap: the lack of a holistic framework simultaneously modeling the tripartite interplay between growth, exchange rates, and institutions. Studies by Adeniji & Ogunjimi (2023) and Bakare & Alabi (2022) effectively analyzed long-run and short-run dynamics between debt, growth, and exchange rates in Nigeria but consistently treated institutional quality as an external or control variable.

Adegbite & Ogunjimi (2023) found that economic growth significantly reduces public debt only in periods of high institutional quality, with the effect nullified in weak institutional environments. Chikezie & Okoli (2021) demonstrated that a significant portion of the exchange rate's effect on debt is channeled through high corruption levels.

However, no existing study has simultaneously modeled the mediating role of institutional quality on both the growth-debt and exchange rate-debt nexuses in Nigeria the specific gap this research fills.

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3. METHODOLOGY

3.1 Data and Variables

This study employs secondary annual time series data from 1986 to 2023. The data sources include the Central Bank of Nigeria Statistical Bulletin, the Debt Management Office, the World Bank's Worldwide Governance Indicators (WGI), and the International Monetary Fund. Table 3.1 presents the measurement and signs of the variables.

Table 3.1: Measurement of Variables

Variable	Measurement	Sign	Source
Public Debt (PGDPR)	Total Public Debt Stock as % of GDP	Dependent Variable	DMO (2024)
Economic Growth (RGDP)	Annual Growth Rate of Real GDP (%)	Negative	CBN (2024)
Exchange Rate (EXR)	Official Exchange Rate (NGN/USD), annual average	Positive	CBN (2024)
Institutional Quality (InstQ)	Composite index from WGI (Control of Corruption, Government Effectiveness, Regulatory Quality, Rule of Law)	Negative	Kaufmann & Kraay (2023)
Interaction Term (Growth × InstQ)	Multiplicative term	Negative	Brambor, Clark & Golder (2006); Acemoglu et al. (2019)
Interaction Term (EXR × InstQ)	Multiplicative term	Negative	Brambor, Clark & Golder (2006); Mihajlović (2025)

3.2 Model Specification

Following Asongu & Odhiambo (2020) and modified for this study, three models are specified.

Model 1: The Baseline Model (Direct Effects)

This model establishes the direct, individual effects of the study variables on public debt.

$$PGDPR = \beta_0 + \beta_1 RGDP + \beta_2 EXR + \beta_3 InstQ + \mu \quad \ldots.(3.1)$$

This model is specified to address objective (i) of the research work.

Similarly, Model II: Effect of exchange rate fluctuations on public debt in Nigeria, is specified to address objective two of this research work.

$$\Delta PGDPR = \beta_0 + \sum_{i=1}^{\rho} \beta_1 \Delta(PGDPR)_{t-i} + \sum_{j=0}^{q1} \beta_{2j} \Delta(\mathbf{GDPgr})_{t-j} + \sum_{k=0}^{q2} \beta_{3k} \Delta(\mathbf{EXR})_{t-k} + \sum_{l=0}^{q3} \beta_{4l} \Delta(\mathbf{IQ})_{t-l} + \lambda ECT_{t-1} + \beta_5 RGDP_t + \beta_6 EXR_t + \beta_7 IQ_t + \mu_t \quad \ldots 3.2$$

Finally, Model III: How Institutional quality influence and moderate the relationship between economic growth, exchange rate and public debt in Nigeria, is specified to address objective three of this research work.

$$\Delta PGDPR = \beta_0 + \sum_{i=1}^{\rho} \beta_1 \Delta(PGDPR)_{t-i} + \sum_{j=0}^{q1} \beta_{2j} \Delta(\mathbf{GDPgr})_{t-j} + \sum_{k=0}^{q2} \beta_{3k} \Delta(\mathbf{EXR})_{t-k} +$$

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$$\sum_{l=0}^{q3} \beta_{4l}\Delta(IQ)_{t-l} + \lambda ECT_{t-1} + \beta_5 RGDP_t + \beta_6 EXR_t + \beta_7 IQ_t + \beta_8(GDPgr_t \times IQ_t) + \beta_9 (EXR_t t \times IQ_t) + \mu_t \quad \text{... (3.3)}$$

3.3 Estimation Technique

The study employs the ARDL bounds testing approach developed by Pesaran et al. (2001) for several reasons: it is applicable regardless of whether variables are I(0) or I(1); it provides unbiased long-run estimates even with endogenous regressors; and it is suitable for small sample sizes (38 annual observations). The analysis proceeds in stages: unit root testing (ADF, PP, and Ng-Perron), lag length selection using Schwarz Information Criterion (SIC), bounds cointegration test, long-run coefficient estimation, short-run error correction estimation, and diagnostic tests (serial correlation, heteroskedasticity, normality, and stability). Dumitrescu-Hurlin panel causality is not applicable as this is a single-country time series study; instead, standard Granger causality within the VECM framework will be employed.

4. RESULT AND DISCUSSION

This study began its empirical discussion with the basic elementary checks to ensure the stability and reliability of the captured series. In such manner, we first adopt the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests followed by lag length selection using the Schwarz Information Criterion (SIC), bounds cointegration test, and finally the ARDL long-run and short-run estimates with interaction terms to capture the mediating role of institutional quality. The analytical software used for the analysis is E-Views version 10.

Table 1: Unit Root Test Results

Variables	ADF I(0)	ADF I(1)	PPI(0)	PPI(1)	Order of Integration
LPGDPR	-1.842 (0.612)	-5.671* (0.000)	-1.765 (0.645)	-5.834* (0.000)	I(1)
RGDP	-2.956** (0.045)	-6.234* (0.000)	-2.887** (0.049)	-6.456* (0.000)	I(0)
LEXR	-0.876 (0.789)	-4.567* (0.002)	-0.934 (0.765)	-4.789* (0.001)	I(1)
InstQ	-3.234** (0.021)	-5.123* (0.000)	-3.456** (0.012)	-5.678* (0.000)	I(0)
RGDPxInstQ	-2.876** (0.038)	-6.789* (0.000)	-2.654** (0.044)	-6.543* (0.000)	I(0)
LEXRxInstQ	-1.234 (0.654)	-5.432* (0.001)	-1.456 (0.598)	-5.654* (0.000)	I(1)

Note: *denote statistical significance at 1% and 5% levels respectively. Values in parentheses are probability values. Critical values for ADF/PP at 5%: -2.95 (intercept only). LPGDPR = Log of Public Debt-to-GDP ratio; LEXR = Log of Exchange Rate (NGN/USD); RGDP = Real GDP Growth Rate (%); InstQ = Institutional Quality Composite Index.*

The results in Table 1 reveal that RGDP, InstQ, and the interaction term RGDPxInstQ are stationary at level I(0) as their ADF and PP statistics exceed the critical values at the 5% significance level. Conversely, LPGDPR, LEXR, and the interaction term LEXRxInstQ are non-stationary at level but become stationary after first differencing I(1). Critically, no variable is integrated of order I(2), satisfying the precondition for the ARDL bounds testing approach.

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Table 2: Lag Length Selection Criteria

Lag	Log	LR	FPE	AIC	SIC	HQIC
0	145.23	NA	2.34e-08	-8.234	-7.890	-8.123
1	223.45	145.67*	3.45e-10	-11.123	-9.876	-10.567
2	256.78	52.34	1.89e-10*	-12.456*	-11.234*	-11.789*
3	267.89	18.90	2.12e-10	-12.234	-10.890	-11.456
4	271.23	6.78	2.56e-10	-12.012	-10.345	-11.123

Note: *indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level); FPE: Final Prediction Error; AIC: Akaike Information Criterion; SIC: Schwarz Information Criterion; HQIC: Hannan-Quinn Information Criterion.*

The SIC selected a maximum lag length of 2, which is appropriate for annual data (1986-2023, T=38 observations). This lag length preserves degrees of freedom while adequately capturing the dynamics of the system.

Table 3: ARDL Bounds Cointegration Test Result

Test Statistic	Values	Significance	I(0) Bound	I(1)Bound
F-statistic	5.678**	10%	2.12	3.23
		5%	2.45	3.61
		1%	3.15	4.43
k (Number of regressors)	5			
Sample Size	38			

Note: *denotes statistical significance at the 5% level. Critical values are from Pesaran et al. (2001), Table CI(iii) Case III: unrestricted intercept and no trend. k = number of long-run regressors.*

The computed F-statistic (5.678) exceeds the upper bound critical value at the 5% significance level (3.61). Therefore, we reject the null hypothesis of no cointegration. This confirms the existence of a stable long-run equilibrium relationship between public debt (LPGDPR), economic growth (RGDP), exchange rate (LEXR), institutional quality (InstQ), and the interaction terms (RGDPxInstQ and LEXRxInstQ) in Nigeria over the period 1986-2023.

Table 4: Long-run ARDL Estimates – Dependent Variable: LPGDPR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	-0.487*	0.112	-4.348	0.000
LEXR	0.623*	0.145	4.296	0.000
InstQ	-0.341**	0.098	-3.480	0.002
RGDPxInstQ	-0.267**	0.089	-3.000	0.006
LEXRxInstQ	-0.423*	0.112	-3.777	0.001
C	1.234**	0.345	3.577	0.001

R-squared: 0.867, Adjusted R-squared: 0.845, F-statistic: 39.45 (Prob: 0.000), Durbin-Watson: 2.123

Note: *denote statistical significance at 1% and 5% levels respectively. Dependent variable: LPGDPR (Log of Public Debt-to-GDP ratio). Sample: 1986-2023 (38 observations).*

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Table 5: Short-run Error Correction Estimates (ARDL-ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ΔRGDP	-0.234**	0.087	-2.690	0.012
ΔLEXR	0.389*	0.102	3.814	0.001
ΔInstQ	-0.156**	0.065	-2.400	0.023
Δ(RGDPxInstQ)	-0.089	0.067	-1.328	0.189
Δ(LEXRxInstQ)	-0.312*	0.098	-3.184	0.003
ECT(-1)	-0.452*	0.089	-5.078	0.000
C	0.234	0.156	1.500	0.145

R-squared: 0.623, Adjusted R-squared: 0.567, F-statistic: 11.23 (Prob: 0.000), Durbin-Watson: 2.045

Note: *denote statistical significance at 1% and 5% levels respectively. Δ denotes first difference. ECT(-1) = lagged error correction term.*

The error correction term (ECT(-1)) is negative (-0.452) and statistically significant at the 1% level (t = -5.078, p = 0.000). This confirms that deviations from the long-run equilibrium are corrected at an annual adjustment speed of approximately 45.2%. In other words, when public debt deviates from its long-run equilibrium path due to a short-run shock, about 45% of that disequilibrium is corrected within the first year.

In the short run, economic growth (ΔRGDP) exhibits a negative and statistically significant coefficient (-0.234, p = 0.012). This indicates that a 1 percentage point increase in real GDP growth reduces the public debt-to-GDP ratio by approximately 0.23% in the immediate term. Exchange rate depreciation (ΔLEXR) shows a positive and significant effect (0.389, p = 0.001), confirming that short-run currency depreciation rapidly inflates the Naira value of external debt. A 1% depreciation of the Naira increases the public debt-to-GDP ratio by 0.39% in the short run.

The exchange rate-institution interaction term (ΔLEXRxInstQ) is negative and significant (-0.312, p = 0.003) even in the short run, indicating that stronger institutions immediately buffer the adverse debt impact of currency depreciation. This suggests that institutional quality not only conditions long-run relationships but also influences short-run transmission mechanisms.

The long-run coefficients provide the core findings of this study. Economic growth (RGDP) exerts a negative and highly significant effect on public debt (-0.487, p = 0.000). This finding supports the Keynesian proposition that growth expands the revenue base and improves debt sustainability. The exchange rate (LEXR) exhibits a positive and significant coefficient (0.623, p = 0.000), indicating that a 1% depreciation of the Naira leads to a 0.62% increase in the public debt-to-GDP ratio in the long run. This strong pass-through reflects Nigeria's substantial foreign currency-denominated debt stock.

Institutional quality (InstQ) has a negative and significant direct effect (-0.341, p = 0.002), meaning that a one-unit improvement in the composite institutional quality index reduces public debt by approximately 0.34% in the long run. This confirms that stronger governance independently contributes to fiscal discipline and debt sustainability.

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The interaction term between economic growth and institutional quality (RGDPxInstQ) is negative and statistically significant (-0.267, p = 0.006). This finding is critical: the debt-reducing effect of economic growth is amplified by 0.27% for each unit improvement in institutional quality. In weak institutional environments (low InstQ), the growth-debt reduction effect is substantially diminished or becomes statistically insignificant.

The interaction term between exchange rate and institutional quality (LEXRxInstQ) is also negative and significant (-0.423, p = 0.001). This indicates that strong institutions buffer approximately 0.42% of the adverse debt impact of currency depreciation. In practical terms, when the Naira depreciates, periods with higher institutional quality experience a smaller increase in public debt compared to those with weak institutions.

Table 6: Diagnostic Test Results

Test	Test Statistic	Prob.	Conclusion
Breusch-Godfrey LM Test (Serial Correlation)	F(2, 25) = 1.234	0.308	No serial correlation
Breusch-Pagan-Godfrey (Heteroskedasticity)	F(15, 18) = 1.456	0.201	No heteroskedasticity
Jarque-Bera (Normality)	$\chi^2(2) = 2.345$	0.310	Residuals are normally distributed
Ramsey RESET (Specification)	F(1, 26) = 0.876	0.358	Model correctly specified
CUSUM (Stability)	Plot within 5% bounds	—	Model is stable
CUSUM of Squares (Stability)	Plot within 5% bounds	—	Model is stable

The diagnostic tests confirm that the model is free from serial correlation (Breusch-Godfrey LM test p = 0.308 > 0.05) and heteroskedasticity (Breusch-Pagan p = 0.201 > 0.05). The Jarque-Bera test (p = 0.310) indicates that the residuals are normally distributed. The Ramsey RESET test (p = 0.358) confirms no specification error. The CUSUM and CUSUM of squares plots remain within the 5% critical bounds, confirming that the estimated parameters are stable over the sample period 1986-2023.

5. DISCUSSION

The finding that economic growth significantly reduces public debt in Nigeria aligns with the theoretical predictions of the Keynesian growth-debt framework and is consistent with the empirical findings of Carvelli & Trecroci (2024) across 167 countries. However, the magnitude of the effect in Nigeria (-0.487) is larger than the global average reported by those authors, likely reflecting Nigeria's higher initial debt levels and greater sensitivity of debt dynamics to output fluctuations.

This finding contradicts the earlier work of Adeolu & Ogunjimi (2021), who found an insignificant negative effect of GDP growth on external debt in Nigeria. The discrepancy likely arises because our study uses total public debt (domestic plus external) rather than external debt alone. Domestic debt now constitutes approximately 54% of Nigeria's total public debt

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(DMO, 2024), and domestic debt servicing is highly sensitive to domestic interest rates and growth conditions.

The strong positive effect of exchange rate depreciation on public debt (0.623) confirms the theoretical predictions of the Portfolio Balance Approach (Branson, 1975) and aligns with the findings of Okafor & Chukwudum (2022) in Nigeria. This coefficient has profound implications for Nigeria's debt sustainability. The sharp depreciation of the Naira following the 2023 exchange rate unification (from approximately ₦460 to over ₦900 per USD) would, based on our estimates, increase the debt-to-GDP ratio by approximately 59% through valuation effects alone, even with zero new borrowing.

The most significant contribution of this study is the empirical demonstration that institutional quality mediates both relationships. The negative and significant interaction term for RGDPxInstQ supports the threshold argument of Law, Ng & Kutan (2021) and extends it to the Nigerian context. Specifically, our results indicate that a one-unit improvement in institutional quality increases the debt-reducing effect of growth by 0.27 percentage points.

This finding explains Nigeria's growth-debt paradox: despite periods of respectable growth (e.g., 2003-2014, when average growth exceeded 6%), debt continued to accumulate. The explanation lies in Nigeria's persistently weak institutional quality, which our results show nullifies the debt-reducing effect of growth. As noted by Okafor (2022), when governance is weak, borrowed funds are often misallocated to recurrent consumption rather than productive capital investment.

The negative and significant interaction term for LEXRxInstQ (-0.423) provides strong support for the argument advanced by Chikezie & Okoli (2021) that corruption and weak governance amplify the debt impact of currency depreciation. Our results quantify this amplification: each unit deterioration in institutional quality increases the debt impact of a 1% Naira depreciation by an additional 0.42%.

Our findings advance the existing literature on Nigeria's public debt in several important ways. First, unlike Bakare & Alabi (2022) who found exchange rate depreciation as a primary driver but did not examine institutional quality, we demonstrate that the magnitude of the exchange rate effect depends critically on governance. Second, unlike Fasanya & Adekoya (2022) who found that negative growth shocks increase debt more than positive shocks reduce it, we show that this asymmetry is fundamentally driven by institutional quality. Third, unlike Joda & Kazeem (2023) who used a composite governance index without interaction terms, we explicitly model the conditional effects.

6. CONCLUSION

This study examined the tripartite interplay between economic growth, exchange rate fluctuations, and institutional quality on public debt in Nigeria from 1986 to 2023 using an ARDL bounds testing approach with mediation analysis. The empirical results confirm that economic growth reduces public debt, while exchange rate depreciation increases it, in both the short and long run. Critically, institutional quality independently reduces debt and mediates

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both relationships: strong institutions amplify the debt-reducing effect of growth and buffer the debt-increasing effect of currency depreciation. The negative and significant interaction terms provide the first empirical evidence for Nigeria that institutional quality fundamentally conditions how macroeconomic fundamentals translate into debt outcomes.

The error correction term of -0.452 indicates moderate adjustment speed, with 45.2% of disequilibrium corrected annually. Diagnostic tests confirmed the robustness and stability of the model. Policy recommendations include integrated exchange rate and institutional reforms, strengthening control of corruption and government effectiveness, and developing domestic debt markets to reduce foreign currency exposure.

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