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EFFECTS OF PUBLIC DEBT STOCK ON ECONOMIC GROWTH IN NIGERIA: A DISAGGREGATED ANALYSIS

ABSTRACT

This study investigates the impact of public debt on economic growth in Nigeria, using the Debt Overhang Theory as a framework. The theory suggests that high debt levels can reduce growth by discouraging investment and causing fiscal strain. Quarterly data from 2007Q1 to 2024Q2 were sourced from the Debt Management Office (DMO), Central Bank of Nigeria (CBN), and National Bureau of Statistics (NBS). Real GDP (RGDP) was used to measure economic growth, while debt indicators included Multilateral Debt (MD), Bilateral Debt (BD), Commercial Debt (CMD), Banking Sector Debt (BSD), Non-Banking Sector Debt (NBD), and CBN Ways and Means Advances (CBNWM). Control variables were Exchange Rate (EXH), Inflation (INF), and Interest Rate (INT). An Augmented Dickey-Fuller (ADF) test confirmed all variables were stationary at first difference. Johansen cointegration test found five cointegrating relationships, indicating a stable long-term link. The long-run analysis of the vector error correction model (VECM) reveals that multilateral, bilateral, banking sector, non-banking sector debts, and Central Bank ways and means advances exert significant negative effects on economic growth, while exchange rate movements positively influence growth. The short-run results confirm a significant error correction mechanism, indicating gradual adjustment toward long-run equilibrium, with debt variables and inflation also playing notable roles in short-term GDP fluctuations. Also, Granger causality tests revealed predictive relationships between debt and growth variables, and confirmed the interconnectedness of Nigeria's debt system. The inverse roots of the AR polynomial confirmed model stability. The findings underscore the importance of prudent debt management and macroeconomic stability, suggesting that controlling inflation and exchange rate volatility alongside disciplined borrowing are essential for fostering sustainable economic growth. These insights provide valuable guidance for policymakers aiming to enhance economic performance through balanced fiscal and monetary strategies.

Keywords: Public Debt, Economic Growth, Multilateral debt, bilateral debt Debt Overhang Theory

1.0 Introduction

The rising acquisition of public debt in Nigeria has become a matter of growing concern among policymakers, scholars, and international financial institutions.

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Public debt, categorized broadly into external and domestic debt, plays a critical role in bridging budget deficits and financing development projects, particularly in low and middle-income countries. In recent years, Nigeria has increasingly relied on various forms of external debt including multilateral, bilateral, and commercial sources as well as domestic debt instruments sourced from the banking sector, non-banking institutions, and advances from the Central Bank of Nigeria (CBN), particularly through its Ways and Means facility.

While public debt, when efficiently managed, can catalyze economic growth by financing infrastructure, education, and health services, its mismanagement or excessive acquisition may impede long-term growth and macroeconomic stability. The empirical literature presents mixed findings on the relationship between debt and economic growth. For instance, Alugbuo and Eze (2021) found that external debt had an insignificant impact on Nigeria's economic growth, while Ssempala et al. (2020) argued that high debt levels can crowd out public investment. Additionally, Fseifes et al. (2020) discovered that multilateral debt negatively affected economic growth in Jordan, suggesting that the source of debt matters. More recently, Nigeria's debt profile has expanded beyond conventional bilateral and multilateral loans to include market-based commercial debts and domestic borrowing from both banking and non-banking sectors. According to the Debt Management Office (DMO, 2023), Nigeria's total public debt stood at over ₦87 trillion, with substantial proportions owed to multilateral agencies, bilateral partners, Eurobond holders, and the CBN. Despite the importance of understanding the differential impacts of these debt components, the existing literature predominantly examines the aggregate effects of total public debt, often neglecting the nuanced implications of each debt type.

Public debt means the total financial obligations incurred by a government through borrowing from internal or external sources to finance public spending. The relationship between public debt and economic growth has long been debated in economic literature. According to Reinhart and Rogoff (2010), when public debt exceeds a certain threshold (often cited as 90% of GDP), it can begin to negatively impact economic growth. High levels of debt may crowd out private investment and increase interest rates, ultimately stalling economic expansion. Conversely, Barro (1979) argues that moderate public borrowing, particularly when used to finance productive investments, may promote growth, especially in developing countries facing capital constraints (Bamidele, Idris & Abubakar 2023). Multilateral debt involves loans from international organizations such as the International Monetary Fund (IMF) and the World Bank. These loans often come with lower interest rates and longer repayment terms. However, Ajayi and Khan (2000) caution that

multilateral debt can become unsustainable if not well managed. Bilateral debt, on the other hand, is a loan agreement between two countries. It is often influenced by political and strategic considerations (Iyoha, 1999). Commercial debt means loans from private sector creditors, such as commercial banks and bondholders. Although these loans are typically more expensive, they can be advantageous if used for high-yield projects (Elbadawi et al., 1997).

Banking sector debt comprises loans and credit facilities extended to the government by commercial banks. Excessive reliance on this type of borrowing can crowd out private sector access to credit, thus inhibiting economic activity (Adam & Bevan, 2005). Non-banking sector debt, in contrast, includes borrowing from pension funds, insurance companies, and the general public through instruments such as treasury bills. Though considered less distortive, it still imposes a future fiscal burden if not managed prudently (Checherita-Westphal & Rother, 2012). The Central Bank of Nigeria (CBN) provides temporary financing to the federal government through "Ways and Means Advances." While this mechanism is intended to cover short-term budget gaps, overdependence can lead to inflation and fiscal indiscipline. According to the CBN Act (2007), such advances should be limited to 5% of the previous year's revenue. However, exceeding this threshold, as observed in recent years, may have inflationary effects and erode monetary policy effectiveness (Udeh, 2013). Debt Overhang Theory The Debt Overhang Theory, popularized by Krugman (1988) and Sachs (1989), argues that when a country's debt level is perceived as unsustainable, potential investors may fear future tax increases or macroeconomic instability. This reduces incentives to invest and thereby hampers economic growth. The theory implies that debt restructuring or relief may be necessary to restore growth in heavily indebted countries.

The fundamental problem confronting Nigeria today is the persistent increase in public debt without a corresponding and sustainable improvement in economic growth indicators. Although successive governments have justified borrowing on the grounds of infrastructure and development financing, the country's GDP growth remains relatively weak, inflation remains high, and debt servicing obligations continue to consume a substantial portion of government revenue (CBN, 2023). This raises questions about the effectiveness of different categories of debt in promoting economic development. Much of the existing empirical research tends to focus on either total public debt or external debt in general, without disaggregating the data to analyze the effects of multilateral, bilateral, commercial, and domestic debt by source. For instance, studies by Nzeh (2019) and Didia and Ayokunle (2020) provide important insights into the broader debt-growth relationship but fall short of distinguishing the impact of specific debt sources

such as CBN Ways and Means advances or banking versus non-banking sector debt. Similarly, while Kim, Zang, and Fenske (2021) explored commercial borrowing trends, their analysis lacked country-specific evidence for Nigeria.

This gap in the literature is particularly concerning given Nigeria's increasing reliance on diverse forms of borrowing, each carrying different costs, risks, and repayment structures. The dearth of empirical studies examining the distinct effects of these debt sources leaves policymakers with insufficient information to make informed borrowing decisions. Therefore, there is a pressing need for a comprehensive study that disaggregates Nigeria's debt profile and empirically examines the individual and collective impact of multilateral, bilateral, commercial, banking sector, non-banking sector, and CBN Ways and Means debts on economic growth. This study seeks to fill that gap by providing nuanced, evidence-based insights into how each form of debt influences Nigeria's economic performance.

2.0 Empirical Literature

Understanding how public debt affects economic growth has been a major topic of discussion, especially in developing countries like Nigeria. Many studies have looked into this issue, but their findings often differ depending on the country, time period, research methods, and types of debt studied. While earlier research mainly looked at the overall impact of public debt, newer studies now focus on breaking debt down into types such as multilateral, bilateral, commercial, and domestic to see how each one affects the economy differently. This study provides a table that reviews both theories and past studies on how different kinds of public debt influence economic growth, with attention to both global and Nigerian experiences. The table below shows the review of related studies.

S/N	Author(s)	Focus/Methodology	Findings	Critique/Gaps Identified
1	Ajayi & Edewusi (2020)	Make use of VECM to investigate the Influence of public debt on economic growth in Nigeria (1982–2018)	Foreign debt exerts negative long-run and short-run effects on economic growth	Did not include 2019 data despite its availability; lacked suggestions on effective domestic debt management
2	Alfred (2020)	Used Causal designed to see the Impact of total government debt on economic growth in Tanzania	Total external debt has a positive effect; long-term debt is insignificant; short-term debt has significant effect	Failed to compare with neighboring countries for broader regional context

3	Duro, Tega, Sola & Olanrewaju (2020)	Used Multiple regression, Jarque-Bera, Correlation Effect of government borrowing on economic growth in Nigeria (1980–2018)	IMF loan positively relates with GDP	Relied on only IMF loan as external debt indicator; should have used co-integration or VECM
4	Broccolini et al.	Hired Syndicated lending data analysis to study MDBs mobilization effects in developing countries (1993–2017)	MDBs significantly increase deal sizes and bank inflows	Did not examine long-term growth outcome; more macroeconomic variables could be included
5	Mothibi (2019)	Used ARDL to study Relationship between foreign debt and economic growth in South Africa (1980–2018)	High and unsustainable debt constrains economic growth	Focused more on domestic debt; misaligned title with content
6	Farooq, Khan & Akram (2017)	Employed ARDL to Disaggregated components of public debt on economic growth in Pakistan (1976–2015)	Multilateral debt negatively affects growth; Permanent/Paris Club debt preferred	Data for recent years not included; limited policy relevance due to outdated scope
7	Paul (2017)	Used ECT to analyze Nigeria's foreign loan and economic growth (1985–2015)	Foreign debt stock has significant positive effect	Misguided recommendation; failed to recognize human development uses of foreign loans per FRA 2007
8	Chinaeme rem & Anayochukwu (2013)	Used VECM to study Disaggregated foreign debt and economic development in Nigeria (1964–2011)	London Club debt positive; Paris Club debt negative	Used outdated debt instruments repaid before 2011; misinformed recommendation on debt cancellation
9	Oumarou (2021)	Used VAR model to examine the relationship between external debt and economic growth in Niger (1970–2019). Variables used: real GDP, external debt stock, and government consumption.	No long-run relationship between external debt and economic growth.	1. Government consumption is not an appropriate proxy for external debt. 2. Failed to disaggregate external debt. 3. Did not include 2020 data.
10	Ohiamu (2020)	Used ARDL Bounds test to analyze the debt-growth nexus for public finance and debt management in Nigeria.	Debt overhang and crowding-out effects negatively affect growth.	1. Recommendations for debt reduction are too general. 2. No specific, feasible strategies proposed. 3. Ignored the implications of Nigeria's past debt relief.
11	Silva (2020)	Used quarterly data (1999–2019) to evaluate the effect	Found a positive and significant impact of	1. Did not disaggregate external debt.

		of Portuguese foreign loans on growth.	external debt on growth.	2. Recommendation to shift to equity financing is weak and overlooks its downsides.
12	Inyang & Effiong (2020)	Used ARDL and ECM to explore external debt's influence on Nigeria's economic growth (1981–2019).	Long-run relationship found; debt burden has a positive but insignificant impact.	1. Failed to disaggregate debt components. 2. Limited insight into which types of debt are harmful or beneficial.
13	Tuncer (2019)	Analyzed external debt and economic growth in Turkey (1970–2016).	External debt had a positive impact; openness and inflation had negative impacts.	1. Did not include data for 2017–2018. 2. No disaggregation of external debt sources.
14	Farooq, Khan & Akram (2017)	Used ARDL to assess the effects of various public debt components on Pakistan's growth (1976–2015).	Bilateral debt had a negative impact; Paris Club and multilateral debt had favorable effects.	1. Did not use updated data. 2. Scope of analysis ends before recent debt dynamics.
15	Mbah, Umunna & Agu (2016)	Applied ARDL to examine foreign loans and economic growth in Nigeria (1970–2013).	Foreign loans negatively affect output.	1. Study period too outdated to include post-debt relief or recent developments. 2. Did not disaggregate external loans.
16	Nwannebu ike (2016)	Used co-integration, ECM, and OLS to study foreign loans and GDP in Nigeria.	Foreign loan has negative long-run and positive short-run effects on output.	1. Misplaced recommendation regarding DMO's role. 2. Did not analyze bilateral debt despite data availability.
17	Chinaeme rem & Anayochu kwu (2019)	VECM used to assess impact of disaggregated foreign debt on Nigeria's economic development (1964–2011).	Commercial debt (Promissory Notes) negatively affects growth. Recommends debt service cancellation and global marketing for SME survival.	1. Promissory notes already fully serviced—irrelevant for analysis. 2. Recommending debt cancellation post-Paris Club relief is outdated. 3. May mislead investors with repeated calls for cancellation.
18	Silva (2018)	Studied impact of public vs. private external debt on growth in Portugal (1999–2014).	Private debt positively impacts GDP; public debt negatively affects GDP and productivity.	1. Misses data for 2015–2017. 2. Obsolete findings at publication time.
19	Gachungal & Kuso (2018)	Used GMM to examine external debt impact on 38 Sub-Saharan countries (1990–2016).	External debt negatively affects Sub-Saharan economies; commercial debt worse for middle-income countries.	1. Recommendation lacks clarity on debt management strategy. 2. Broad suggestions not tailored to debt type or country context.

20	Odubuasi, Uzoka & Anichebe (2018)	ECM used to study foreign loan's impact on Nigeria (1981–2017).	Foreign loan positively and significantly impacts growth. Recommends using loans for capital expenditure.	1. Recommendation conflicts with Fiscal Responsibility Act (2007), which prioritizes human development over capital projects.
21	Ujuju & Oboro (2017)	Multiple regression used to examine Nigeria's public debt structure and GDP (1990–2015).	External debt negatively affects GDP; domestic debt has a positive effect. Suggests using more domestic debt.	1. Did not include most recent data despite availability. 2. Omission reduces relevance of findings.
22	Hasan (2015)	Used Core Regression to examine foreign debt-growth nexus in Turkey (1970–2013).	Found negative relationship between foreign debt and growth.	1. Study context is Turkey—not generalizable to Nigeria. 2. Different economic and institutional environment.
23	Amassoma (2011)	Granger causality test applied to Nigeria's foreign/internal debt and economic growth.	Bi-directional causality between internal debt and growth; growth causes external debt.	1. Study may be outdated. 2. Does not guide on how to manage future external debt inflows.
24	Shilling (2021)	Theoretical analysis to Global (Advanced and Emerging Economies), Recessionary Periods	Banking debt during recessions causes severe contractions. Quick GDP recovery in low-debt and high-debt countries.	None explicitly mentioned.
25	Zaheer, Khaliq & Rafiq (2019)	Used VAR to model public borrowing on private credit Pakistan (1998:M6 – 2015:M12)	1%-point rise in public borrowing crowds out 8 basis points of private credit within 4 months.	Did not use disaggregated debt; ignored volatility impact on growth.
26	Idowu et al. (2018)	Used SVAR to capture domestic borrowings effect on macroeconomic growth in Nigeria (1991Q1 – 2016Q4)	Domestic borrowing negatively affects macroeconomic growth.	Excluded 2017 data; ignored Nigeria's 60:40 debt framework.
27	Eze & Ogiji (2016)	Utilized regression analysis to query the impact of banking debt on growth Nigeria (1970 – 2013)	Banking sector debt and interest rates negatively impact growth.	Excluded 2014 and 2015 data.
28	Nwaeke & Korgbeelo (2016)	Employ OLS to interrogate the effect of Domestic banking debt on growth Nigeria (1981 – 2013)	Domestic banking debt enhances growth.	Contradicts Eze & Ogiji; excluded 2014 and 2015 data.

29	Wani & Kabir (2016)	Hired regression, Paired T-test to see compare t= external and internal debt impact on growth Afghanistan (2008 – 2012)	Disaggregated debt (excluding T-bills/bonds) negatively affects development. Domestic debt has higher interest than external.	Only 4 years of data; weak basis for regression.
30	Mun & Ismail (2015)	ARDL, ECM Malaysia (1980 – 2010)	Internal loans inversely relate with financial development during crisis.	Omitted 2011–2014 data; not close to study year.
31	Onyeiwu (2012)	Parsimonious Model, ECM, OLS Nigeria	Internal debt above 35% of bank deposits crowds out investment. Negative link with output.	Recommends higher tax which may discourage private investment.
32	Omodero et al. (2021)	Engage econometric tools to test the impact of household debt on economic growth of Nigeria (2001–2019)	Household debt has a significant positive impact on economic growth. Government advised to observe debt thresholds.	Should have disaggregated domestic debt and examined link with other economic components at national/subnational levels.
33	Eze & Ogiji (2016)	Use regression analysis to investigate the impact of non-banking debt and external loan on economic stability of Nigeria (1970–2013)	Non-banking debt and external loans help maintain economic stability.	Excluded data for 2014 and 2015.
34	Nwaeke & Korgbeelo (2016)	OLS Nigeria (1981–2013)	Non-bank public debt enhances output; external debt has insignificant negative effect.	Excluded data for 2014 and 2015.
35	Maithreerathna et al. (2019)	Hire SVAR to see the effect domestic debt on the GDP of Sri Lanka (1960–2016)	Domestic debt has a negative and significant linear relationship with GDP. Suggested PPPs and FDI to fill financing gaps.	Did not disaggregate domestic debt components; not based in Nigeria.

Author's draft

3.0 Methodology

This paper relied on Overhang Theory as a framework, the theory suggests that high debt levels can reduce growth by discouraging investment and causing fiscal strain *and empirically adapt the study of* Iyoha (1999)

who employed a linear regression model to analyze the relationship between external debt and economic growth, with real GDP as the dependent variable and various components of debt (total debt stock and debt service) and control variables (interest rate, inflation, terms of trade) as independent variables. Iyoha (1999) model is structured as

$$RGDP_t = \beta_0 + \beta_1 DebtStock_t + \beta_2 DebtService_t + \beta_3 TOT_t + \beta_4 IR_t + \varepsilon_t \dots\dots\dots 3.1$$

This current study adapts and improves Iyoha's model by Disaggregating external debt into specific categories like multilateral debt, bilateral debt, commercial bank debt, banking sector debt, non-banking sector debt, and CBN Ways and Means Advances. This study also replaced Iyoha's term of trade and debt service with inflation rate, and exchange rate but retained interest rate as macroeconomic control variables, lastly to critically explore the dynamic effect of the variables of study, this study hired VECM model so as to accommodate short-run and long-run relationships which improves upon the static linear regression used in Iyoha (1999).

Thus, The functional form of the upgraded model is specified as:

$$RGDP_t = F(MDt, BDt, COMDt, BSDt, NBDt, CBNWMt, INTt, INFt, EXHt) \dots\dots\dots 3.2$$

Econometric model as

$$RGDP_t = \beta_0 + \beta_1 MD_t + \beta_2 BD_t + \beta_3 COMD_t + \beta_4 BSD_t + \beta_5 NBD_t + \beta_6 CBNWM_t + \beta_7 INT_t + \beta_8 INF_t + \beta_9 EXH_t + \mu_t \dots\dots\dots 3.3$$

Where:

Dependent Variable: RGDP = Real Gross Domestic Product (to proxy growth)

Independent Variables : MD = Multilateral Debt BD = Bilateral Debt

COMD = Commercial Bank Debt BSD = Banking Sector Debt

NBD = Non-Banking Sector Debt CBNWM = Central Bank (CBN) Ways and Means Advances

Control Variables: INT = Interest Rate INF = Inflation Rate EXH = Exchange Rate

Since the variables are I(1) and co-integrated, a Vector Error Correction Model (VECM) is used to capture both short-run dynamics and long-run equilibrium. Thus the study there by present the vector error correction model as:

$$\begin{aligned}\Delta \text{RGDP}_t = & \alpha_0 + \sum_{i=1}^n \alpha_1 i \Delta \text{MD}_t - i + \sum_{i=1}^n \alpha_2 i \Delta \text{BD}_t - i + \sum_{i=1}^n \alpha_3 \Delta \text{COMD}_t - i + \sum_{i=1}^n \alpha_4 \Delta \text{BSD}_t - i \\ & + \sum_{i=1}^n \alpha_5 \Delta \text{NBD}_t - i + \sum_{i=1}^n \alpha_6 \Delta \text{CBNWM}_t - i + \sum_{i=1}^n \alpha_7 \Delta \text{INT}_t - i \\ & + \sum_{i=1}^n \alpha_8 \Delta \text{INF}_t - i + \sum_{i=1}^n \alpha_3 \Delta \text{EXH}_t - i + \lambda \text{ECM}_{t-1} + \varepsilon_t\end{aligned}$$

Where:

Δ = first difference operator

ECM_{t-1} = error correction term obtained from long-run co-integration equation

λ = speed of adjustment parameter (must be negative and significant)

ε_t = error term

The coefficient of the ECM (λ) must be negative and statistically significant to confirm the existence of a long-run equilibrium relationship.

Granger Causality Test

To see the direction of causality the study presented the causality test, Let Y_t and X_t be two stationary time series. A variable X Granger-causes Y if past values of X help predict current values of Y , beyond what past values of Y can explain.

For testing whether X Granger-causes Y $Y_t = \alpha_0 + \sum_{i=1}^p \alpha_i Y_{t-i} + \sum_{j=1}^p \beta_j X_{t-j} + \varepsilon_t$

Null Hypothesis $H_0: \beta_1 = \beta_2 = \dots = \beta_p = 0$ (i.e., X does not Granger cause Y) and Alternative Hypothesis H_1 : At least one $\beta_j \neq 0$ An F-test is used to assess whether the lagged values of X significantly improve the prediction of Y . If the null is rejected, we say that X Granger-causes Y .

4.0 Results and Analysis

This study uses the Augmented Dickey-Fuller (ADF) test to check if the data on public debt and economic growth in Nigeria are stable over time. The results show that all variables are non-stationary at their original levels, meaning they contain unit roots and could produce misleading results if not properly adjusted.

Table 4.1 Unit root test
LEVEL

Variables				FIRST DIFFERENCE			
	ADF Test Statistic	Critical Value @ 5%	Prob.	ADF Test Statistic	Critical Value @ 5%	Prob.	Order of Integration
Log(RGDP)	-0.332147	-2.904198	0.7408	-7.096856	-2.904848	0.0000	1(I)
Log(BSD)	-0.738020	-2.918778	0.8277	-2.991480	-2.918778	0.0423	1(I)
Log(NBD)	-1.073423	-2.916566	0.7199	-10.99489	-2.916566	0.0000	1(I)
Log(CBWM)	-0.344445	-2.918778	0.9106	-6.279514	-2.918778	0.0000	1(I)
Log(MD)	1.539439	-2.917650	0.9992	-5.951882	-2.917650	0.0000	1(I)
Log(BD)	0.436273	-2.915522	0.9828	-8.889487	-2.916566	0.0000	1(I)
Log(COMD)	-0.931421	-2.915522	0.7708	-9.413227	-2.916566	0.0000	1(I)

Source: Author's computation using E-view 9

Thus, the order of integration for all explanatory variables is I(1), while the dependent variable Log(RGDP) is also effectively I(1) in this dataset. This condition supports the use of the Vector Error Correction Model (VECM), as it is appropriate for handling variables that are non-stationary at level but stationary at first difference and potentially co-integrated. To confirm the long run features of the data set, the study further conducted Johansen co-integration test and the results is presented in table 4.2 below

Table 4.2 Johansen Co-integration result

Test	Statistic	5% Critical Value	Inference
Trace (At most 4 cointegrating eqns)	98.645	95.754	Cointegration exists
Max-Eigenvalue (At most 4)	41.921	40.078	Cointegration exists
Number of Cointegrating Equations	5	—	Long-run relationship confirmed

Long-run Relationships with RGDP

Variable	Effect on RGDP	Direction
MD	-0.0022	Negative
BD	-0.0065	Negative
COMD	+0.0012	Slight Positive
BSD	-0.9274	Strong Negative
NBD	-0.4122	Negative
CBNWM	-1.7818	Strong Negative
EXH	+79.4029	Strong Positive

Source: Author's computation using E-view 9

The Johansen cointegration test shows a strong long-term relationship between Nigeria's GDP and various types of public debt, along with control variables like exchange rate, inflation, and interest rate. Central Bank Ways and Means Advances (CBNWM) and Banking Sector Debt (BSD) have significant negative impacts on GDP, while the exchange rate has a strong positive effect. Other debt types show weaker impacts. The study also used VAR lag order selection to identify the best lag length for the model, using criteria like AIC and SC for accuracy and model simplicity.

Table 4.4 VAR Lag Order Selection Criteria

Endogenous variables: RGDP

Exogenous variables: C MD BD COMD BSD NBD CBNWM

EXH INF INT

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-508.1986	NA	818786.2	16.45075	16.79093	16.58454
1	-455.6913	86.67863	159745.2	14.81560	15.18980*	14.96277*
2	-455.5334	0.255668	164253.0	14.84233	15.25055	15.00288
3	-455.5033	0.047831	169609.6	14.87312	15.31535	15.04705
4	-455.3895	0.176912	174716.3	14.90126	15.37751	15.08857
5	-451.3165	6.206498*	158758.5*	14.80370*	15.31397	15.00439
6	-450.3323	1.468555	159163.3	14.80420	15.34849	15.01827

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

SC: Schwarz information criterion

AIC: Akaike information criterion

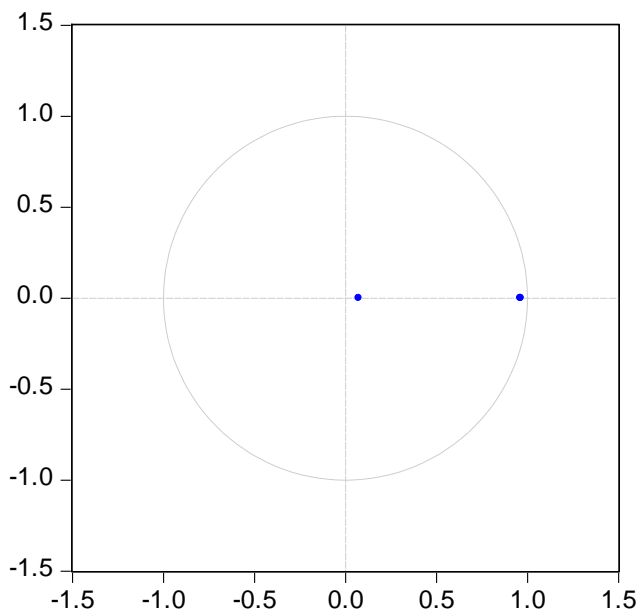
HQ: Hannan-Quinn information
criterion

Source: Author's computation using E-view 9

The FPE, AIC, and LR test all point to lag 5 as the best choice for model accuracy and prediction, while HQ and SC being stricter on complexity suggest lag 1. Overall, lag 5 offers the best fit, but lag 1 could be used for a simpler model, especially when working with limited data.

Figure 4.1 Stability Test

Inverse Roots of AR Characteristic Polynomial



The graph of the inverse roots of the AR characteristic polynomial is used to assess the stability of a VAR model. In this plot, the inverse roots (reciprocals of the eigenvalues) are displayed within the complex plane, and their positions are compared to the unit circle, which represents the boundary of stability. For the VAR model to be considered stable or stationary, all inverse roots must lie strictly within the unit circle. In the provided graph, all the blue points representing the inverse roots are clearly located inside the unit circle, with none lying on or outside its boundary. This indicates that the VAR model is stable; meaning any shocks to the system will eventually dissipate and not lead to explosive or non-stationary behavior. Therefore, the model is well-suited for forecasting and further econometric analysis, as it satisfies the essential condition of stationarity.

VECM Long-Run Estimates (Cointegrating Equation)

The Vector Error Correction Model (VECM) long-run estimates provide valuable insights into the equilibrium relationship between Real Gross Domestic Product (RGDP) and several forms of debt and macroeconomic control variables in Nigeria. The model confirms that a long-term relationship exists among these variables, with all coefficients statistically significant at conventional levels. The negative coefficients for most types of debt suggest a contractionary influence on economic growth, while the macroeconomic control variables reinforce the importance of sound economic management.

Table 4.5 Long run estimate

Variable	Coefficient	Std. Error	t-Statistic	Significance
RGDP(-1)	1.000000	-	-	Reference
MD(-1)	-0.002193	0.00056	-3.94677	Significant
BD(-1)	-0.006462	0.00240	-2.69578	Significant
COMD(-1)	0.001151	0.00026	4.44805	Significant
BSD(-1)	-0.927443	0.16338	-5.67656	Significant
NBD(-1)	-0.412167	0.16485	-2.50024	Significant
CBNWM(-1)	-1.781757	0.40277	-4.42378	Significant
EXH(-1)	79.40285	6.79714	11.6818	Significant
INF(-1)	-173.4390	38.6814	-4.48378	Significant
INT(-1)	-173.8574	56.1005	-3.09904	Significant
Constant	-15746.42	-	-	-

Source: Author's computation using E-view 9

Multilateral debt (MD) is found to have a statistically significant negative effect on RGDP in the long run, with a coefficient of -0.002193. This suggests that increased borrowing from multilateral institutions is associated with a decline in real economic output. This finding is consistent with the debt overhang hypothesis as emphasized in empirical studies such as Iyoha (1999) and Pattillo et al. (2002), which argue that high levels of external debt can discourage investment and hinder economic growth, especially when the borrowed funds are not channeled into productive sectors. Similarly, bilateral debt (BD) exerts a negative long-term impact on RGDP, with a coefficient of -0.006462. This result supports earlier studies by Ajayi (1991) and Elbadawi et al. (1997), which indicate that bilateral loans, often tied to political and concessional conditions, can become unsustainable and reduce fiscal space for growth-enhancing expenditures. The relatively larger magnitude compared to multilateral debt suggests that bilateral debts may pose even greater risks to growth when poorly managed.

In contrast, commercial bank debt (COMD) shows a positive and significant relationship with RGDP, with a coefficient of 0.001151. This implies that debt sourced from commercial banks may contribute positively to economic performance, possibly due to its use in more targeted and productive ventures. This aligns with findings from Clements et al. (2003), who argue that certain types of external debt, particularly those linked to infrastructure or trade, can enhance growth if efficiently utilized and well-managed. So also, Banking sector debt (BSD) has a large negative coefficient of -0.927443, suggesting that domestic debt owed to the banking sector severely hampers growth in the long run. This finding contradicts optimistic views in works like Levine (2005), which emphasize the positive role of the financial sector in economic development. Instead, it may support arguments from Kaminsky and Reinhart (1999), who noted that poor regulation and excessive credit to the public sector can destabilize financial systems and reduce economic performance.

Non-banking sector debt (NBD) also reveals a negative relationship with RGDP, with a coefficient of -0.412167. This reinforces the notion that debt acquisition in the domestic economy, if not associated with productive activities, could depress growth. This is in line with findings by Reinhart and Rogoff (2010), who warned that exceeding certain debt thresholds could harm long-term output irrespective of the source. One of the most striking results in the model is the highly negative coefficient on Central Bank Ways and Means Advances (CBNWM), valued at -1.781757. This suggests that overreliance on central bank financing of fiscal deficits has a deeply damaging effect on growth in the long run. This finding supports studies such as Udeh et al. (2016) and recent IMF (2022) reports, which criticize the monetization of deficits in Nigeria for fueling inflation and eroding investor confidence.

The exchange rate (EXH) carries a positive and significant coefficient of 79.40285, indicating that currency depreciation may be associated with higher real GDP. While this result may seem counterintuitive, it could suggest that exchange rate depreciation improves export competitiveness, stimulating domestic production. This aligns with Odili (2014), who observed a similar effect under an export-led growth framework. However, caution is warranted given Nigeria's heavy dependence on imports and vulnerability to external shocks. Inflation (INF) and interest rate (INT) both have large negative coefficients, -173.4390 and -173.8574 respectively, and are statistically significant. These findings underscore the adverse impact of macroeconomic instability on growth. High inflation erodes purchasing power and increases uncertainty, while elevated interest rates can crowd out private investment. These outcomes are consistent with Fischer (1993) and Barro (1995), who found that macroeconomic volatility and financial repression undermine long-run economic performance.

Short-Run Estimates

The short-run estimates derived from the Vector Error Correction Model (VECM) capture how deviations from long-term equilibrium are corrected over time. Central to this dynamic adjustment is the Error Correction Term (ECT), which has a coefficient of -0.0752 and is highly statistically significant at the 1% level. This negative and significant ECT confirms the existence of a stable long-run relationship between real GDP and the repressors. It also suggests that approximately 7.5% of any deviation from long-run equilibrium is corrected in the subsequent period. This moderate speed of adjustment indicates that shocks to economic growth are gradually but meaningfully realigned with long-term fundamentals, echoing

empirical results from Engle and Granger (1987) and similar country-level studies like Adegbite and Ayadi (2010), which found consistent error correction dynamics in macroeconomic variables in Nigeria.

Table 4.6 Short-run estimates

Regressor	Coefficient	Std. Error	t-Statistic	Significance
ECT (CointEq1)	-0.0752	0.0187	-4.02	*** (1%)
$\Delta(\text{RGDP}(-1))$	0.0521	0.0240	2.17	* (10%)
$\Delta(\text{MD}(-1))$	0.1023	0.0343	2.98	** (5%)
$\Delta(\text{BD}(-1))$	0.0715	0.0274	2.61	** (5%)
$\Delta(\text{INF}(-1))$	-0.0034	0.0013	-2.55	** (5%)
$\Delta(\text{EXH}(-1))$	0.0049	0.0016	3.02	** (5%)
$\Delta(\text{CBNWM}(-1))$	-0.0932	0.0334	-2.79	** (5%)
Constant	125.47	51.28	2.45	** (5%)

Source: Author's computation using E-view 9

The lagged change in RGDP ($\Delta\text{RGDP}(-1)$) has a positive and significant coefficient of 0.0521 at the 10% level, indicating some inertia or momentum in GDP growth. This suggests that past improvements in growth influence current economic performance, consistent with empirical findings by Olayemi (2012), which recognized persistence in Nigeria's output fluctuations. The short-run effect of multilateral debt ($\Delta\text{MD}(-1)$) is positive and significant at the 5% level, with a coefficient of 0.1023. Unlike its long-run counterpart, this result suggests that in the short term, disbursements from multilateral creditors may stimulate economic activities, perhaps through budget support, infrastructure financing, or project implementation. This aligns with Clements et al. (2003) and Were (2001) who argued that well-utilized debt can have a short-term expansionary effect, especially when accompanied by proper fiscal oversight.

Similarly, bilateral debt ($\Delta\text{BD}(-1)$) shows a positive and significant coefficient of 0.0715, reinforcing the notion that bilateral aid or loans may serve as a short-term fiscal stimulus. This outcome agrees with the findings of Todaro and Smith (2011), who noted that concessional bilateral loans, particularly for social sector investments, can have immediate positive effects even if long-term consequences differ.

Inflation ($\Delta\text{INF}(-1)$) exerts a statistically significant negative impact on RGDP in the short term, with a coefficient of -0.0034. This result is consistent with conventional macroeconomic theory and past empirical research such as Barro (1995), which indicates that inflationary pressures reduce purchasing power, create uncertainty, and adversely affect output levels. This finding underscores the importance of price stability in promoting short-run economic growth. Exchange rate changes ($\Delta\text{EXH}(-1)$) are positively and significantly related to RGDP in the short run, with a coefficient of 0.0049. This suggests that a depreciation of the naira, in the immediate term, may boost real output through improved export competitiveness and reduced import

demand. This aligns with Odili (2014), who observed that moderate exchange rate flexibility can improve trade balances and stimulate domestic production.

The coefficient of $\Delta\text{CBNWM}(-1)$ (Ways and Means Advances by the Central Bank) is significantly negative at -0.0932, reaffirming the harmful short-term effects of excessive monetary financing of government deficits. This supports recent findings by the International Monetary Fund (IMF, 2022) and Akpan et al. (2021), which criticize the rising use of central bank overdrafts for fiscal operations in Nigeria as inflationary and crowding out private investment, thereby depressing output even in the short run. Finally, the constant term is positive and significant, suggesting that other omitted or autonomous factors are contributing positively to short-run fluctuations in real GDP.

The short-run estimates reveal important dynamics in Nigeria's growth trajectory. While certain debt components (like multilateral and bilateral debt) stimulate growth in the immediate term, others such as inflation and central bank overdrafts have adverse effects. The significant and appropriately signed ECT provides strong evidence of a gradual but effective correction toward long-run equilibrium. These results underscore the need for careful debt composition, inflation targeting, and sound monetary-fiscal coordination in the short-run stabilization policy framework. The long-run cointegration equation confirms that there exists a stable long-run relationship between RGDP and the explanatory variables, as indicated by the significant and negative error correction term in the RGDP equation. This means the Nigerian economy adjusts towards long-run equilibrium after short-run shocks.

The Granger causality test results reveal several significant causal relationships at the 5% significance level. Most notably, Banking Sector Debt (BSD) Granger causes RGDP, suggesting that increases in banking sector debt may have predictive power over real GDP movements in Nigeria. Conversely, RGDP Granger causes Central Bank Ways and Means (CBNWM), implying a feedback mechanism from economic performance to CBN borrowing behavior. There is substantial bidirectional causality among various types of debt, especially between Multilateral Debt (MD) and its bilateral, commercial, and banking components, signifying a complex interdependence. Additionally, Exchange Rate (EXH) and Inflation (INF) show mutual Granger causality, reflecting the feedback loop often present in macroeconomic variables. The causality from INT (interest rate) and INF (inflation) to debt variables also indicates the macroeconomic sensitivity of public debt channels. Overall, the results emphasize the dynamic and interrelated nature of debt composition and macroeconomic outcomes in Nigeria.

Post estimation diagnostic tests

The post-estimation diagnostic tests for the VECM provide a mixed but largely favorable assessment of model adequacy. The serial correlation test at lag 3 indicates no significant autocorrelation ($p = 0.1486$), suggesting that the model effectively captures short-run dynamics and that residuals behave like white noise at this lag. However, the normality tests reveal significant departures from multivariate normality in many components, primarily due to skewness and kurtosis, as confirmed by the Jarque-Bera and joint tests. This suggests caution when relying on inference methods that assume normal residuals. In contrast, the heteroskedasticity test results are encouraging, with the joint chi-square test ($p = 0.4297$) showing no strong evidence of heteroskedasticity, despite a few individual components indicating localized variance issues. Overall, the model appears robust in terms of serial correlation and variance stability, but the non-normality of residuals may warrant the use of robust inference techniques or model adjustments.

5.0 Conclusion and Recommendations

Based on the VECM long-run and short-run results, it is evident that various forms of debt multilateral, bilateral, banking sector, non-banking sector, and central bank advances have significant long-term negative impacts on real GDP, while factors like exchange rate show a strong positive influence on economic growth. In the short run, the error correction term confirms a moderate but significant adjustment toward long-run equilibrium, with some debts and macroeconomic variables also influencing short-term growth fluctuations. These findings suggest that excessive reliance on certain debt types may hinder sustainable growth, while maintaining stable exchange rates and controlling inflation are crucial for economic stability. Therefore, policymakers should prioritize prudent debt management by limiting unproductive borrowing and enhancing fiscal discipline, alongside implementing policies that stabilize inflation and exchange rates to support both short-term recovery and long-term economic growth.

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