

IMPACT OF EXTERNAL DEBT AND CAPITAL FORMATION ON ECONOMIC GROWTH IN NIGERIA (1980-2025)

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Abstract: The study investigated the impacted of external debt and capital formation on economic growth in Nigeria (1980-2025). The Autoregressive Distributed Lag (ARDL) modelling approach was used because ARDL is an appropriate modelling approach for variables that are integrated of mixed orders, I(0) and I(1). The Augmented Dickey-Fuller (ADF) unit root test and the ARDL Bounds test for cointegration were performed as preliminary analyses. The ARDL Bounds test confirms the existence of a long run relationship between the variables since the value of F-statistic (8.543949) is above both the lower and upper bounds at all the levels of significance (1%, 2.5%, 5% and 10%). The short-run error correction model suggested that the error correction term is negative and statistically significant (-0.318810, $p < 0.01$) which means that about 31.9% of short-run disequilibrium is corrected toward LR equilibrium per year. The results also indicated that the external debt had a negative effect on economic growth while the capital formation had a positive effect on the long-run economic growth. While inflation had both positive and negative short-run effects, the short-run effects of exchange rate and government expenditure were not statistically significant. The post-estimation diagnostic tests showed the absence of any serial correlation, heteroscedasticity and normal distribution of the residuals, thus the estimated ARDL model was robust and reliable. The study comes to the conclusion that while external borrowing is still a vital source of development financing, its impact is limited if it is not being used in a productive way or the debt management is unsustainable, whereas the quest to build more capital is still a key ingredient to a sustained economic growth in Nigeria. The study suggests that the government should implement prudent debt management of its external debt by investing the borrowed money in productive sectors with high return to the economy and improving its debt sustainability assessment.

Keywords: External Debt, Capital Formation, Economic Growth, ARDL, Nigeria.

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Introduction

Economic growth remains a central objective of macroeconomic policy across the globe. It signifies the expansion of a nation's productive capacity and is often associated with rising income levels, improved living standards, and sustainable development. According to the World Bank (2023), sustained growth is largely driven by the accumulation of physical and human capital, technological innovation, and sound macroeconomic management. However, financing the investments necessary for such growth often exceeds the capacity of domestic resources, compelling many countries especially developing ones to rely on external borrowing (El-Yaqub, Akomolafe, and Owunnah, 2025).

In the African context, external borrowing has long been a significant component of development financing. Limited domestic savings, weak financial systems, and volatile export earnings have compelled many African nations to seek external funds to support investment and consumption needs (Were, 2011; El-Yaqub, Ismail & Ibrahim, 2025)). Despite these efforts, Africa continues to experience relatively low growth rates, high poverty levels, and persistent structural weaknesses. The United Nations Conference on Trade and Development (UNCTAD, 2022) reports that Africa's

external debt stock has risen substantially over the last decade, with debt servicing consuming a growing share of government revenues. Although external resources are often intended to enhance capital formation and stimulate growth, the continent's experience suggests that the benefits of borrowing have been undermined by mismanagement, corruption, and inefficient allocation of funds.

Within West Africa, debt accumulation and low capital formation continue to constrain macroeconomic performance. The Economic Community of West African States (ECOWAS, 2020) highlights that many countries in the region, including Ghana, Nigeria, and Côte d'Ivoire, rely on external debt to finance fiscal deficits and development projects. However, despite several debt relief initiatives such as the Heavily Indebted Poor Countries (HIPC) program most countries have re-accumulated significant debt burdens due to weak fiscal discipline and limited diversification of export bases (Ajayi & Oke, 2012). Additionally, the region's low rate of capital formation has hindered its ability to transform debt-financed investments into sustained economic growth. The persistent gap between borrowing and productive investment underscores the need to reassess how external debt



influences capital accumulation and long-term development in West Africa.

Nigeria's experience mirrors these regional dynamics but with unique national dimensions. As Africa's largest economy, Nigeria has historically relied on external borrowing to fund infrastructural development, stabilize the balance of payments, and support economic recovery. According to the Debt Management Office (DMO, 2024), Nigeria's total external debt has increased significantly in recent years, raising concerns about its sustainability and implications for growth. Although capital formation is recognized as a driver of economic progress, Nigeria continues to experience inadequate investment in productive sectors, weak infrastructure, and limited technological advancement (Onyele & Nwokocha, 2016, Akomolafe, and Agunbiade, 2018)). The mismatch between external borrowing and productive capital accumulation has led to debates over whether debt has supported or hindered Nigeria's economic growth trajectory.

Despite Nigeria's abundant endowment of natural resources, large population, and revenue potential, the country continues to experience slow and unstable economic growth (El-Yaqub, Usman, Musa & Ismail, 2024). Over the past decades, successive governments have increasingly resorted to external borrowing to finance budget deficits and stimulate economic development. However, economic outcomes remain unimpressive. According to the Debt Management Office (DMO, 2024), Nigeria's total public debt stock stood at ₦97.34 trillion, of which ₦33.25 trillion represents external debt. This marks a sharp increase from ₦12.1 trillion in 2015, revealing a heavy reliance on foreign loans. Yet, Nigeria's Gross Domestic Product (GDP) growth remains weak, averaging below 3% between 2015 and 2023, which is inadequate for reducing poverty and unemployment (El-Yaqub, Musa & Ismail, 2024). This raises concerns as to whether external debt is being effectively utilized to stimulate productive activities and long-term economic growth (Musa, *et al.*, 2025).

Another critical challenge confronting Nigeria is low capital formation, which has hindered industrialization, infrastructure development, and economic diversification. Gross Fixed Capital Formation (GFCF) as a percentage of GDP averaged only 22.3% between 2010 and 2023 (World Bank, 2024), far below the 30–35% benchmark recommended for developing economies to achieve sustainable growth. Poor capital accumulation reduces the productive capacity of the economy and limits domestic investment. Empirical evidence suggests that external debt may worsen capital formation when inefficiently managed. For instance, Kocha *et al.* (2021) found that external debt exerts a significant negative influence on capital formation in Sub-Saharan Africa, while Yousaf and Mukhtar (2022) observed that high levels of foreign borrowing crowd out domestic investment and hinder capital accumulation. In Nigeria, rising debt servicing and weak investment reflect this disturbing trend.

Furthermore, the increasing debt servicing burden has implications for economic stability. In 2023, Nigeria spent ₦8.24 trillion on debt servicing, representing 45% of total government revenue Central Bank of Nigeria (CBN, 2024). This situation poses a potential debt overhang problem, where the burden of debt repayment discourages private investment and limits government expenditure on growth-enhancing sectors such as infrastructure,

education, and health.. Similarly, Sadaf *et al.* (2023) and Ale, Islam, and Tun-Nessa (2023) found that excessive dependence on external borrowing undermines economic growth and fiscal sustainability.

However, the literature reveals mixed findings, creating a theoretical and empirical gap. Some studies argue that external debt can promote growth when borrowed funds are efficiently invested in productive sectors (Junejo *et al.*, 2024; Tarawalie & Mbayoh, 2024). Others report a negative impact due to mismanagement, corruption, and macroeconomic instability (Syzydykova, 2024; Yusuf & Mohd, 2021; El-Yaqub & Ismail, 2025)). In Nigeria, little attention has been given to understanding how capital formation interacts with external debt to influence economic growth. Most previous studies examined external debt and growth, neglecting the crucial role of capital formation as a mediating variable. Therefore, this study seeks to fill this research gap by empirically investigating the impact of external debt and capital formation on economic growth in Nigeria, covering recent data and accounting for macroeconomic controls. The study divided into five sections; section one is the introduction, section contains literature review while section three is the methodology. Finally, section four is the analysis and section five is the conclusion and recommendations.

Literature Review

External debt is that portion of a country's debt that is acquired from foreign sources such as foreign corporations, government or financial institutions (El-Yaqub, *et al.*, 2025). It is the borrowing from foreign creditors primarily to finance their own excess expenditures, build additional infrastructure, finance recovery from natural disasters, and even to repay its previous external debt. This may, however, lead to a debt cycle of continuous borrowing, accumulating payment burden, and eventual default (Arnone, Bandiera & Presbiterio, 2005). External debt as that portion of a country's debt that is acquired from foreign sources such as foreign corporations, government or financial institutions (El-Yaqub, Ismail & Bappayo, 2024). It is that part of the total debt of a country that is owed to creditors outside the country. The debtors can be the government, corporations or private households (Abula *et al.*, 2016). According to Muhammad & Fayyaz (2015), external debts affect the economy in different ways, explaining that where efficient use of external debts can bring economic prosperity to a nation, their inefficient use can cause severe damages as well. In essence, what matters most is not the amount of the foreign loans but the ways the loans are used in developmental process in the economy. However, if these loans are used for current consumption, they will have less impact on future economic growth, but if invested rationally in productive sectors of the economy, they will contribute positively to real growth and enhance the productive capacity of the economy (El-Yaqub, Musa & Ismail, 2024).

According to Jhingan (2016), capital formation is the process of increasing the capital stock of a country through investment in productive assets, which enhances the capacity of an economy to produce more output. It is an essential component of economic growth, as it helps in expanding the productive base, generating employment, and improving living standards. The process typically involves three stages: savings, mobilization of savings into investments, and the actual investment in capital goods.

Furthermore, capital formation plays a pivotal role in driving economic development, especially in developing countries where the scarcity of capital often constrains growth. Todaro and Smith (2015) emphasize that capital formation not only raises productivity but also facilitates technological advancement and structural transformation of the economy. It enables economies to shift from subsistence-oriented activities to more diversified and industrialized production. Consequently, the rate of capital formation is often regarded as an indicator of a nation's potential for economic expansion and long-term growth.

According to Balami (2016) Economic growth which is always proxied by GDP often conceptualized as increase in output of an economy's capacity to produce goods and services essential to improve the welfare of the country's citizens. Growth is seen as a steady process which involves raising the level of output of goods and services in the economy. Growth is meaningful when the rate of growth is much higher than population growth because it has to lead to improve human welfare. Economic growth is related to the quantitative and sustained increase in the countries per capita output or income accompanied by expansion in its labor force, consumption level, capital and volume of trade (Ijirshar, Joseph & Godoo, 2016). Economic growth signifies the escalation in an economy's production output, often indicating a rise in income levels. The measure of a country's economic growth lies in its productivity, trade volume, and investments in both human and physical capital. Ochejele (2007) characterizes economic growth as "the sustained and quantitative increase in a nation's per capita output or income, coupled with expansions in labor force, consumption, capital, and trade volume.

Empirical Review

Tarawalie and Mbayoh (2024) examined the impact of external debt on economic growth in Sierra Leone and sought to determine the threshold level of external debt that is conducive to growth. Using annual time series data from 1980 to 2022, the study applied the Ordinary Least Squares (OLS) estimation technique within a non-linear quadratic framework to capture possible threshold effects. The empirical results revealed that lagged GDP, external debt, external debt squared, and investment are key determinants of economic growth in Sierra Leone. Specifically, external debt, investment, and lagged GDP were found to have a positive impact on growth, while the squared term of external debt exhibited a negative and significant effect, confirming the existence of a non-linear relationship between external debt and growth. The analysis identified an optimal threshold level of external debt at 115% of GDP, indicating that debt accumulation below this level enhances growth, whereas debt beyond this point becomes detrimental. The study concluded that effective debt management and transparency in borrowing and contract negotiations are essential for maintaining sustainable debt levels and ensuring that external borrowing contributes positively to Sierra Leone's long-term economic development.

Junejo, Hamadou, and Haidari (2024) investigated the relationship between external debt and economic growth in Indonesia using the Solow Growth Model framework with annual time-series data covering the period 1970–2022. Employing the Autoregressive Distributed Lag (ARDL) method, the study analyzed Gross Domestic Product (GDP) as the dependent variable and Debt Service, External Debt, Exports, Imports, Gross Capital Formation, and Population Growth as the explanatory variables.

The empirical results revealed that External Debt, Debt Service, Exports, Imports, and Gross Capital Formation have a significant positive relationship with GDP, implying that increased external borrowing can contribute to economic expansion when effectively utilized. The findings suggest that external debt, if directed toward productive investments and trade-related activities, can serve as a catalyst for economic development rather than a constraint. Therefore, the authors recommend that Indonesian policymakers focus on strengthening foreign investment channels, promoting exports and imports, and ensuring efficient debt management to transform external borrowing from a debt trap into a source of economic prosperity.

Syzdykova (2024) analyzed the relationship between external debt and economic growth in Central Asian countries using annual data from 1995 to 2022. The study aimed to provide region-specific insights into how external borrowing influences growth dynamics, considering the unique economic histories of these countries, which began the post-independence period with no debt in 1991 but have since accumulated substantial external liabilities. Employing the Westerlund (2007) cointegration test to examine the long-run relationship and the Panel Fully Modified Ordinary Least Squares (FMOLS) method to estimate long-term coefficients, the results revealed a statistically significant negative relationship between external debt and economic growth in the region. Specifically, the long-run coefficient of -0.1493 indicates that a 1% increase in external debt stock leads to a 0.15% decline in economic growth. Country-level analysis showed that the debt-growth relationship was negative in Kazakhstan, Kyrgyzstan, and Tajikistan, positive in Uzbekistan, and statistically insignificant in Turkmenistan. The study concluded that excessive reliance on external borrowing tends to hinder long-term growth in most Central Asian countries, emphasizing the need for prudent debt management strategies and effective utilization of borrowed funds to ensure sustainable economic development across the region.

Ewurum and Okafor (2024) evaluated the nexus between public health expenditure, health status, and economic development in Nigeria, and how these dynamics influence global health security. Using annual data from 1981 to 2021, the study applied a simultaneous equation model with the three-stage least squares estimation technique. A composite Economic Development Index (EDI) was constructed using Seers' Three-Pillars Model of Development which integrates poverty, inequality, and unemployment—through principal component analysis (PCA). Similarly, a health status index was developed using indicators such as infant mortality, under-five mortality, maternal mortality, and crude death rate. The findings revealed a bidirectional causal relationship between public health expenditure and health status, and a unidirectional causal relationship from health status to economic development. However, no direct causal link was found between public health expenditure and economic development, indicating that the influence of public health spending on economic development operates indirectly through improvements in health status.

Sadaf, Anwer, Iqbal, Rouf, Younas, and Zahid (2023) investigated the impact of external debt on economic growth in Pakistan over the period 1972–2021. The study employed Autoregressive Distributed Lag (ARDL) model to analyze both the short-run and long-run relationships between economic growth (GDP), external debt (ED), debt servicing (DS), imports (M), inflation (INF), and exports (X). The findings revealed that

economic growth, external debt, and debt servicing were stationary at first difference, while imports, inflation, and exports were stationary at level. The empirical results indicated that external debt had a significant negative effect on Pakistan's economic growth in both the short and long run, suggesting that rising debt burdens and high debt servicing obligations constrain productive investment and hinder sustainable economic performance. The study concluded that excessive reliance on external borrowing poses a challenge to macroeconomic stability.

Opadeji, Olaniyi, Adekanmbi, and Olubitan (2023) investigated the impact of gross capital formation and infrastructure on economic development in Nigeria from 1991 to 2021 using the Vector Error Correction Model (VECM). The study found evidence of a long-run relationship among the variables, indicating that both capital formation and infrastructure are integral to Nigeria's development process. However, the VECM results revealed that gross capital formation did not have a statistically significant impact on economic development during the study period, while infrastructure showed a significant positive effect on economic growth and development. The findings suggest that while capital accumulation alone may not drive development, improved infrastructure plays a crucial role in enhancing economic productivity and growth.

Yousaf and Mukhtar (2022) empirically examined the relationship between external debt and capital accumulation in Pakistan from 1972 to 2016 using the Autoregressive Distributed Lag (ARDL) bound testing approach. The findings revealed a negative relationship between external debt and capital accumulation, supporting the debt overhang hypothesis, which posits that excessive debt accumulation discourages investment and reduces the stock of capital in the economy. Specifically, higher levels of external debt and debt servicing obligations were found to significantly hinder capital accumulation in Pakistan. The study concluded that efficient and productive utilization of external debt, particularly in public sector development projects, is crucial for promoting capital formation and sustaining long-term economic growth in Pakistan.

Yusuf and Mohd (2021) analyzed the impact of government debt on Nigeria's economic growth using annual data from 1980 to 2018 within the framework of the Autoregressive Distributed Lag (ARDL) model. The results revealed that external debt negatively affects long-term economic growth, reflecting a debt overhang effect, while it enhances growth in the short term. Conversely, domestic debt was found to have a significant positive impact on long-term growth but a negative effect in the short run. Additionally, debt service payments were shown to hinder growth in both the short and long run, emphasizing the burden of high repayment obligations on economic performance.

Theoretical Framework

The study is anchored primarily on the Debt Overhang Theory, which provides a critical lens for analyzing the complex relationship between external debt and economic growth. The theory, initially advanced by Krugman (1988) and Sachs (1989), posits that when a country accumulates debt beyond its repayment capacity, it creates a situation where future debt servicing obligations discourage both domestic and foreign investment. Potential investors anticipate that future profits may be taxed or that resources will be diverted to meet debt obligations, leading to a reduction in capital formation and productivity. This scenario can

ultimately slow economic growth and, in extreme cases, cause stagnation, thereby illustrating why debt management is a pivotal concern for policymakers in developing economies such as Nigeria.

The relevance of the Debt Overhang Theory to Nigeria is particularly pronounced given the country's historical patterns of external borrowing and debt accumulation. Empirical studies have consistently highlighted the potential negative impact of excessive debt on investment and growth. For instance, Abubakar, Warioba, & Kapunda (2025) analyzed selected Less Developed Countries (LDCs) and found that foreign debt exerts a negative and statistically significant effect on economic growth. Their findings align with the central premise of the Debt Overhang Theory, demonstrating that high debt levels create uncertainty that discourages private investment. Similarly, Sadaf *et al.* (2023) and Ale, Islam, & Tun-Nessa (2023) reported significant long-term adverse effects of external borrowing on economic growth across Pakistan and South Asian economies, reinforcing the theory's applicability across diverse developing contexts.

Moreover, while some studies, such as Tarawalie and Mbayoh (2024) and Junejo, Hamadou, & Haidari (2024), suggest that external debt can enhance growth under certain conditions, these findings highlight the non-linear and conditional nature of debt's impact. The Debt Overhang Theory accommodates this nuance by emphasizing that external debt can be growth-enhancing only when it remains within sustainable thresholds and is channeled toward productive investments that generate returns sufficient to service the debt. In Nigeria, where capital formation is often constrained by limited domestic savings, external borrowing could potentially stimulate growth if carefully managed. However, mismanagement or excessive accumulation can trigger the debt overhang effect, undermining investment incentives and slowing growth.

The empirical literature further supports the suitability of the Debt Overhang Theory for this study. Studies focusing on Nigeria, such as Yusuf & Mohd (2021), Godfrey (2021), Faizulayev, Bakitjanovna, & Wada (2020), & Shah *et al.* (2023), consistently demonstrate a negative relationship between external debt and economic growth, highlighting the crowding-out effects on capital formation and productive investment. These findings underscore the theory's explanatory power in the Nigerian context, where external borrowing without corresponding productivity gains can lead to prolonged debt servicing burdens, higher fiscal deficits, and reduced economic expansion. They also align with observations from other regions, including Sub-Saharan Africa (Kocha, Marshal, & Sarakiri, 2021) and Central Asia (Syzydykova, 2024), further confirming its broad relevance. The Debt Overhang Theory provides a robust theoretical framework for this study due to its ability to explain both the potential benefits and pitfalls of external debt in shaping economic growth. Its central argument that excessive borrowing can dampen investment and productivity resonates with empirical findings across Nigeria and other developing economies, highlighting the importance of prudent debt management. By anchoring the study on this theory, the research can critically assess how external debt influences capital formation and economic performance, providing a conceptual basis for evaluating strategies that maximize growth benefits while minimizing the risks of debt overhang.

Methodology

Research Design

The research design for this study is ex-post facto, meaning the study will analyze historical data to draw conclusions about causal relationships among External Debt, Capital Formation and economic growth in Nigeria. Ex-post facto research is appropriate as it allows for the exploration of data collected over time, without any manipulation of variables. This design will facilitate an examination of how external debt, capital formation and economic growth have interacted in the past and to what extent these factors have influenced each other in the Nigerian economy. To analyze this impact effectively, the study utilized the Autoregressive Distributed Lag (ARDL) model as its estimation technique. The ARDL model is particularly advantageous because it can accommodate variables with different integration orders, including $I(0)$ and $I(1)$, which is crucial for time series analysis where variables often exhibit varying levels of integration. This model allows for a detailed examination of both short-term and long-term effects of external debt and capital formation on economic growth, providing a comprehensive view of their impacts across different time horizons.

Model Specification

This study is based on single model that address the research objectives. The Objectives adapt the approach of Iteh and Oyeau (2021), who examined the Impact of external debt on economic growth in Nigeria, with modifications to align with the focus of the current study incorporating slight modifications, to better reflect the socio-economic factors influencing Economic growth. The adapted model is written as:

$$GDPGR = F(EXDS, DSV, EXR, INT) \quad (3.1)$$

Where:

GDPGR = GDP growth rate, EXDS = External debt stock (% of GDP), EXD = External debt services (% of GDP), EXR = Real effective exchange rate, and INT = Real interest rate

The above model (3.1) is therefore modified as:

$$\ln RGDP_t = \beta_0 + \beta_1 \ln EXD_t + \beta_2 \ln CPF_t + \beta_3 \ln EXCR_t + \beta_4 \ln INFR_t + \beta_5 \ln GOVE_t + U_t$$

Where:

RGDP=Real Gross Domestic Product (Proxy for economic growth), EXD = External Debt, CPF = Capital Formation (Proxy as Gross Fixed Capital Formation), EXCR = Exchange Rate, INFR = Inflation Rate, GOVE = Government Expenditure, and U_t = Error Term

A-Priori Expectations and variables measurement

It is expected that economic growth will be negatively affected by external debt and inflation, and positively affected by capital formation and government expenditure. The impact of the exchange rate is likely to be uncertain, as it can either stimulate or hinder growth in the present economic climate. Economic growth is calculated on the basis of Real Gross Domestic Product (RGDP) while external debt, capital formation, exchange rate, inflation and government spending are measured as per normal macroeconomic indicators.

Nature and Sources of Data

This study uses secondary data to investigate the impact of external debt and capital formation on economic growth in Nigeria over a period of forty-five years (1980-2025). Data collection technique for this study is time series, and were sourced mainly from the World Development Indicator (WDI, 2026) and Central Bank of Nigeria statistical Bulletin (CBN, 2026). The data collected are annual data on the variables stated in the model above. Figures on External Debt, Capital Formation, Exchange Rate, Inflation Rate, Government Expenditure and Economics Growth were obtained for a period of forty-five years in Nigeria.

Estimation Techniques

Pre-estimation procedures were conducted to ensure the suitability and reliability of the data for econometric analysis. The Augmented Dickey-Fuller (ADF) unit root test was applied to assess the stationarity of the time series data and determine their order of integration, thereby preventing spurious regression results. The null hypothesis of a unit root (non-stationarity) was rejected when the absolute test statistic exceeded the corresponding critical value, ARDL bound Test was conducted for cointegration while post estimation techniques including, serial correlation, heteroscedasticity, normality, and stability test with CUSUM and CUSUMSQ.

ARDL Bound Test

The ARDL bound test of co-integration by Pesaran (2001) is used since no variable is stationary. When the variables have distinct orders of integration, such as $I(0)$ and $I(1)$, the ARDL approach to co-integration is advised (1)

$$RGDP_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} RGDP_{t-i} + \sum_{i=1}^n \alpha_{2i} EXD_{t-i} + \sum_{i=1}^n \alpha_{3i} CPF_{t-i} + \sum_{i=1}^n \alpha_{4i} EXCR_{t-i} + \sum_{i=1}^n \alpha_{5i} INFR_{t-i} + \sum_{i=1}^n \alpha_{6i} GOVE_{t-i} + \alpha_7 EXD_{t-1} + \alpha_8 CPF_{t-1} + \alpha_9 EXCR_{t-1} + \alpha_{10} INFR_{t-1} + \alpha_{11} GOVE_{t-1} + u_{1i} \quad (3.3)$$

The ARDL procedure involves two stages. In the first stage, the null hypothesis of no co-integration ($H_0: \alpha_1 = \alpha_2 = \alpha_3 = \dots \alpha_{14} = 0$; $H_0: \beta_1 = \beta_2 = \beta_3 = \dots \beta_{14} = 0$; $H_0: \gamma_1 = \gamma_2 = \gamma_3 = \dots \gamma_{14} = 0$;) is tested against the alternative hypothesis of co-integration ($H_1: \alpha_1 \neq 0, \alpha_2 \neq 0, \alpha_3 \neq 0, \alpha_4 \neq 0, \alpha_5 \neq 0$). Testing co-integration relationship is based on the F-statistics. Since the asymptotic distribution of this F-statistic is non-standard irrespective of whether the variables are $I(0)$ or $I(1)$, Narayan (2005) tabulated two sets of critical values

which are appropriate for the studies with small sample size ranging from 30 to 80 observations. In this sense, one set assumes that all variables are $I(0)$ and other sets assume that all variables are $I(1)$. This provides a bound covering all possible classifications of the variables. If the calculated F-statistic lies above the upper level of the bound, the H_0 is rejected, supporting co-integration relationship. If the calculated F-statistics lies below the lower level of the bound, then the H_0 cannot be rejected, indicating lack of co-

integration. Since co-integration among variables does not ensure the stability of the parameters, one should provide that the co-

integration parameters are stable over the time.

Short Run Analysis: Error Correction Model

The ECM of interest can be formulated as follows:

$$\Delta \text{RGDP}_t = \gamma_0 + \sum_{j=1}^n \gamma_1 \Delta \text{RGDP}_{t-j} + \sum_{j=1}^o \gamma_2 \Delta \log \text{EXD}_{t-j} + \sum_{j=1}^p \gamma_3 \Delta \log \text{CPF}_{t-j} + \sum_{j=1}^q \gamma_4 \Delta \log \text{EXCR}_{t-j} + \sum_{j=1}^r \gamma_5 \Delta \log \text{INFR}_{t-j} + \sum_{i=1}^n \alpha_{6i} \Delta \text{GOVE}_{t-i} + \theta \text{ECT} + \mu_t \quad (3.13)$$

Where: Δ is the first difference operator; θ is the error correction coefficient and the remaining variables are as defined above. If θ shows the ECM, it is expected to be negative and significant to show the speed of adjustment.

Data Presentation, Analysis and Discussion of Results

The data for this study, which examines the impact of external debt and capital formation on economic growth in Nigeria (1980-2025), is presented in the appendix. The variables under analysis are LOGRGDP (log of real GDP), LOGCPF (log of capital formation), LOGEXCR (log of exchange rate), LOGEXD

(log of external debt), LOGOVE (log of government expenditure), and INF (inflation rate) are displayed in time-series format to showcase their trends over the study period. Descriptive statistics was be presented to summarize the central tendencies and variations of the variables, followed by the results from econometric analyses, including ARDL models.

Descriptive Statistics

Table 1: Descriptive Statistic Results

Statistic	CAF	EXCR	EXD	GOVE	INFR	RGDP
Mean	36.02042	150.9032	24,001.87	3,498.226	19.89184	40,838.17
Median	32.55634	113.0000	689.8375	1,018.178	14.31000	28,957.71
Maximum	89.38105	767.5000	173,823.6	15,445.92	76.75000	145,515.4
Minimum	14.90391	0.610000	2.331200	9.636500	0.223000	13,779.26
Std. Deviation	17.51794	190.1522	54,781.35	4,613.859	16.96210	28,749.35
Skewness	1.248216	1.728809	2.065703	1.343457	1.734762	1.405900
Kurtosis	4.609630	5.788468	5.493690	3.606055	5.362355	5.294475
Jarque-Bera	16.54328	36.99501	43.66315	14.22526	33.03435	24.69531
Probability	0.000256	0.000000	0.000000	0.000815	0.000000	0.000004
Sum	1,620.919	6,790.646	1,080,084.0	157,420.2	895.1330	1,837,718.0
Sum Sq. Dev.	13,502.64	1,590,945.0	1.32E+11	9.37E+08	12,659.36	3.64E+10
Observations	45	45	45	45	45	45

Source: Author's computation from E-Views 9, (2026)

Descriptive statistics provide a detailed summary of the characteristics of each variable in the data set, offering insights into their central tendencies, variability, and distributional properties.

Starting with the mean values, which represent the average for each variable, Real Gross Domestic Product (RGDP) has the highest mean value of 40,838.17, indicating a generally strong level of economic output over the observed period. External debt

(EXD) has a mean of 24,001.87, showing Nigeria's substantial reliance on foreign borrowing. Government expenditure (GOVE) and capital formation (CAF) have average values of 3,498.23 and 36.02, respectively, suggesting that public spending and investment contribute moderately to economic activities. The exchange rate (EXCR) has a mean of 150.90, reflecting continuous depreciation of the naira against the U.S. dollar, while the inflation rate (INFR) averages 19.89, signifying persistent inflationary pressure within the economy during the period under review.

Examining the median values, which represent the middle point of each distribution, it is observed that for most variables, the median is lower than the mean such as for EXD (689.84 vs. 24,001.87) and EXCR (113.00 vs. 150.90) indicating positive skewness caused by the presence of extreme high values or outliers. This pattern suggests that certain years experienced unusually high levels of external debt accumulation and exchange rate depreciation, which raised the overall averages. Similarly, the median inflation rate of 14.31 compared to its mean of 19.89 implies occasional inflation spikes within the study period. The difference between the mean and median values across variables points to uneven economic performance characterized by volatility in macroeconomic indicators such as inflation and exchange rate movements.

Table 2: ADF Unit Root Test Results

Variables	Augmented Dickey Fuller Test		
	t-statistic	Prob	Decision
LogCPF	-5.313334	0.0001	First Difference I(1)
Log EXCR	-5.741916	0.0000	First Difference I(1)
LogEXD	-5.531636	0.0000	First Difference I(1)
LogGOVE	-8.231771	0.0000	First Difference I(1)
INFR	-5.638303	0.0000	Level I(0)
LogRGDP	-8.971894	0.0000	First Difference I(1)

Source: Author's computation from E-Views 9, (2026)

The results of the Augmented Dickey-Fuller (ADF) unit root test presented in Table 2 indicate that all variables, except for INFR, are non-stationary at their levels and become stationary after first differencing (I(1)). Specifically, LogCPF, LogEXD, LogEXCR, LogGOVE and LogRGDP all have t-statistics significantly less than the critical value at a 5% significance level and corresponding p-values less than 0.05, implying that these variables are non-stationary at their levels but stationary after differencing once. In contrast, INFR is stationary at its level (I(0)) since its p-value (0.0000) is below the 5% threshold, suggesting that no differencing is needed for this variable.

The presence of both I(0) and I(1) variables in the dataset indicates a mix of stationary and non-stationary variables, which requires careful attention when selecting an appropriate model.

ARDL Bound Test Result

Table 4: ARDL Bounds Test Result

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	8.543949	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound

The standard deviations reveal the degree of variability among the variables. EXD (54,781.35) and EXCR (190.15) have the highest standard deviations, reflecting significant fluctuations in external debt levels and exchange rate movements. This high volatility implies economic instability and exposure to external shocks. Meanwhile, RGDP (28,749.35) and GOVE (4,613.86) also show notable dispersion, suggesting variations in economic growth and government spending patterns across years. On the other hand, INFR (16.96) and CAF (17.52) exhibit moderate variability, indicating somewhat steadier but still fluctuating trends in inflation and capital formation.

The skewness and kurtosis statistics further explain the shape of each distribution. All variables exhibit positive skewness, confirming that the distributions are right-skewed meaning a few large values pull the mean upward. The kurtosis values exceed 3 for all variables, implying leptokurtic distributions with heavy tails and the presence of outliers. For instance, EXD (5.49) and EXCR (5.79) indicate that extreme values occur more frequently than would be expected in a normal distribution. This is supported by the Jarque-Bera test, where all variables have p-values below 0.05, leading to a rejection of the null hypothesis of normality.

10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Author's computation from E-Views 9, (2026)

Table 3 indicates that the F-statistic of 8.543949 exceeds the critical value bounds for both I(0) lower bound and I(1) upper bound at all significance levels of (10%, 5%, 2.5%, and 1%). Specifically, at the 1% significance level, the critical values for I(0) and I(1) are 3.41 and 4.68, respectively, while the calculated F-statistic is well above these values. This result leads to the rejection of the null hypothesis that no long-run relationships exist, indicating that there is a significant long-term relationship between the variables under study. The test suggests that the variables are cointegrated and share a stable, long-run equilibrium relationship, which is essential for further analysis of their long-term dynamics.

Short Run Dynamics and Error Correction of ARDL Cointegration

Table 4: Short Run Dynamics and Error Correction

Representation of ARDL (1, 0, 1, 2, 0, 2) Selected based on Akaike info criterion (AIC)				
Dependent variable is RGDP				
Regressor	Coefficient	Std. Error	t-Statistic	Prob.*
D(LOGEXDBT)	-0.004442	0.014810	-0.299917	0.7662
D(LOGEXR)	0.015973	0.052187	0.306080	0.7616
D(LOGGEX)	0.060811	0.070035	0.868286	0.3919
D(LOGGEX(-1))	-0.112264	0.082749	-1.356681	0.1847
D(LOGGFCF)	-0.070463	0.073794	-0.954866	0.3470
D(LOGINF)	0.021015	0.012392	1.695866	0.0999
D(LOGINF(-1))	-0.029626	0.013280	-2.230878	0.0331
CointEq(-1)	-0.318810	0.060156	-5.299723	0.0000

Source: Author's computation from E-Views 9, (2026)

The ARDL results for the analysis of the relationship between external debt (LOGEXDBT), exchange rate (LOGEXR), government expenditure (LOGGEX), capital formation (LOGGFCF), inflation (LOGINF), and real gross domestic product (LOGRGDP) in Nigeria from 1980 to 2024 provide insights into both short-run and long-run dynamics.

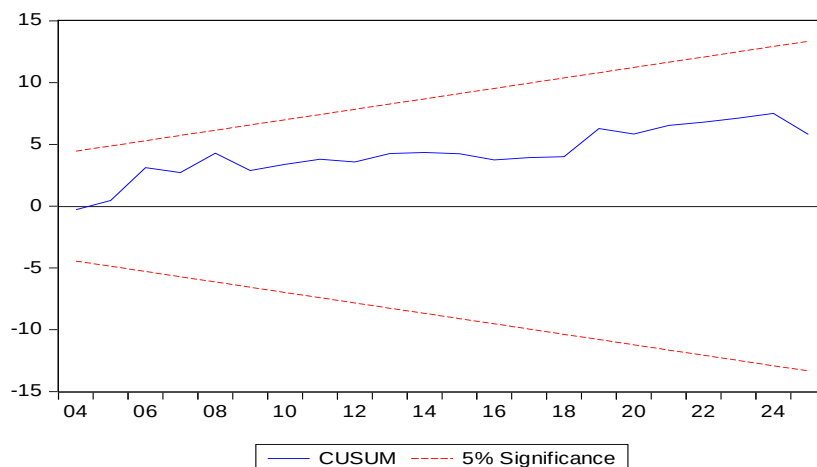
In the cointegrating form, the short-run coefficients reveal that most explanatory variables do not exert significant immediate effects on economic growth. Specifically, the coefficient of D(LOGEXDBT) (-0.004442) is negative but statistically insignificant ($p = 0.7662$), suggesting that short-term changes in external debt have a weak and negligible impact on real GDP. Similarly, the exchange rate (D(LOGEXR)) and government expenditure (D(LOGGEX)) show positive but insignificant short-run effects on economic growth, indicating that fluctuations in these variables do not produce immediate output responses within the period. The lagged value of government expenditure, D(LOGGEX(-1)) (-0.112264), is also insignificant, implying delayed fiscal responses. Capital formation (D(LOGGFCF)) has a

negative but insignificant coefficient (-0.070463), suggesting that short-term changes in investment do not immediately stimulate growth, possibly due to inefficiencies in the utilization of capital resources. Inflation (D(LOGINF)) shows a positive but weakly significant relationship with real GDP ($p = 0.0999$), while its lagged value, D(LOGINF(-1)), is negative and significant ($p = 0.0331$), indicating that inflationary pressures initially support growth but tend to have a contractionary effect in subsequent periods.

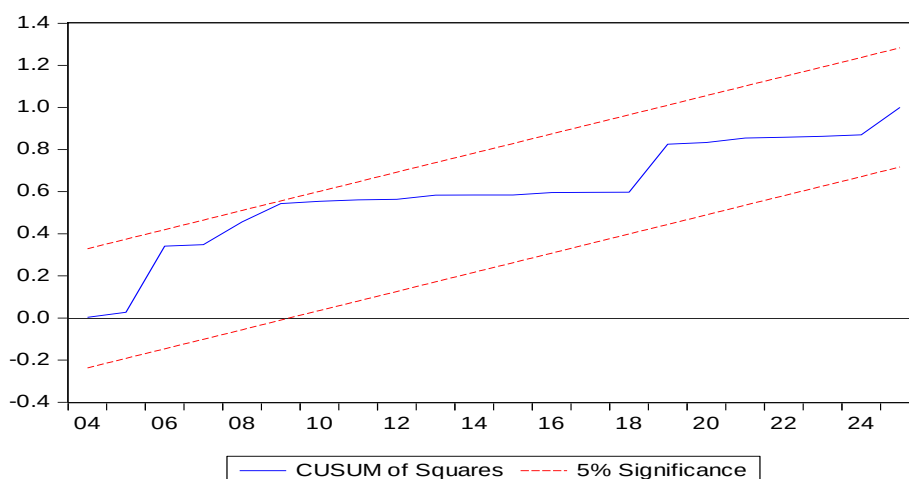
The coefficient of the error correction term, CointEq(-1), is -0.318810 and statistically significant at the 1% level ($p = 0.0000$). This negative and significant coefficient confirms the presence of a long-run equilibrium relationship among the variables, with an adjustment speed of approximately 31.88% per year. This means that any short-run deviation from the long-run equilibrium between economic growth, external debt, exchange rate, government expenditure, capital formation, and inflation is corrected over time at this rate.

Post Estimation Tests

Stability Test



The graph above shows recursive coefficients estimates where estimated values of parameter for regress and variables i:e real gross domestic product and explanatory variables. The graph shows the stability analysis from the year 1980 to 2025. During the intervals, the data looks stable because it falls with 0.05%. These tests were conducted to determine the efficiency of the models.



The graph above shows recursive coefficients estimates where estimated values of parameter for regress and variables i:e real gross domestic product and explanatory variables such as external debt and capital formation. The graph shows the stability analysis from the year 2002 to 2023. During the intervals, the data looks stable because it falls within the 5% significance boundaries (0.05%). These tests were conducted to determine the efficiency of the models and ensure that the relationship between external debt, capital formation, and Nigeria's economic growth is consistent and reliable for policy formulation.

Test for Residual Auto-Correlation

Table 5: Breusch-Godfrey Correlation LM Test

Observation Included: 44, Dependent Variable RESID^2 H ₀ : No serial correlation		
F-statistic	2.259156	Prob. F(2,32) 0.1367
Obs*R-squared	6.826471	Prob. Chi-Square(2) 0.0329

Source: Author's computation from E-Views 9, (2026)

The test results indicate that the null hypothesis (H₀), which asserts no serial correlation, is evaluated using two different statistics. The F-statistic of 2.259156, with a corresponding p-value of 0.1367, suggests that there is insufficient evidence to reject the null hypothesis at conventional significance levels (e.g., 0.05), implying that serial correlation is not present.

Heteroscedasticity Test

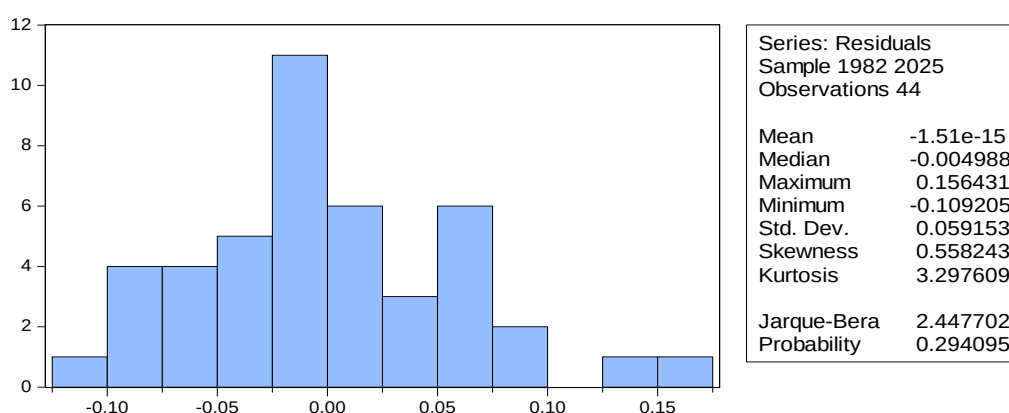
Table 6: Heteroscedasticity Test for Model Two

Observation Included: 43, Dependent Variable RESID^2 H ₀ : No serial correlation			
F-statistic	0.754565	Prob. F(11,31)	0.6859
Obs*R-squared	10.37518	Prob. Chi-Square(12)	0.5831

Source: Author's computation from E-Views 9, (2026)

The heteroscedasticity test results suggest that there is no evidence of heteroscedasticity in the model. The F-statistic of 0.754565 with a p-value of 0.6859 is greater than the conventional significance level (e.g., 0.05), meaning that we fail to reject the null hypothesis of no heteroscedasticity. This implies that the variance of the residuals is constant across observations. Additionally, the Obs*R-squared statistic of 10.37518 with a p-value of 0.5831, which is also greater than 0.05, further supports the conclusion that there is no significant heteroscedasticity present in the model. Therefore, both test statistics suggest that the residuals do not exhibit non-constant variance.

Jarque-Bera Normality Test



The Jarque-Bera normality test was used to determine whether the residuals follow a normal distribution. The result showed a Jarque-Bera statistic of 2.447702 with a probability value of 0.294095, which is greater than 0.05. This implies a failure to reject the null hypothesis of normality. Therefore, the residuals are normally distributed, as confirmed by the moderate skewness (-0.558243) and a kurtosis value (3.297609) that is very close to the expected value of 3 for a normal distribution, indicating the absence of significant asymmetry or extreme fat tails. This validates the reliability of the ARDL results and confirms that the model's error terms meet the classical assumption of normality required for robust statistical inference in time series applications.

Discussion of Results

The regression results indicate that external debt (EXD) has a negative and statistically insignificant impact on Nigeria's economic growth over the 1980–2025 period. This suggests that increased external borrowing has not significantly contributed to economic expansion. The finding aligns with recent studies such as Ideh & Uzonwanne (2020) and Ojekwu & Ojonugwa (2024), which report that high levels of external debt in Nigeria have often been associated with a debt overhang effect, whereby resources that could support productive investment are diverted to debt servicing, thereby limiting the positive impact on growth.

Conversely, capital formation (CPF) shows a positive and significant effect on economic growth in the same period, reflecting the crucial role of investment in physical and

infrastructural capital in driving long-term economic performance. This result is consistent with Onwiodiokit & Otolurin (2019), who found that capital formation significantly influences growth in Nigeria. Similarly, Nadabo *et al.* (2024) highlight that investment in productive sectors, rather than excessive debt accumulation, is a more effective strategy for stimulating growth. This underlines the importance of domestic and private sector investment as key drivers of sustainable development (El-Yaqub, Ismail & Usman, 2025).

The interaction between external debt and capital formation in the results suggests that while investment promotes growth, excessive or misallocated external debt can undermine the effectiveness of such investment. This is consistent with Nadabo *et al.* (2024) findings that external debt may adversely affect capital formation in Nigeria. In practice, this indicates that debt-financed projects must be carefully targeted towards high-return investments to avoid crowding out productive capital and diminishing growth outcomes.

Conclusion

The study provides strong evidence of a long-term relationship between external debt, capital formation, and economic growth in Nigeria. The ARDL and Cointegration results reveal that while capital formation exerts a positive and significant influence on economic growth, external debt has a negative long-run impact, indicating that excessive borrowing without efficient utilization can constrain growth. In the short run, the effect of external debt remains weak, suggesting that borrowed funds may

take time to translate into tangible growth outcomes. Conversely, capital formation continues to play a crucial role in driving both short-term and long-term economic performance. These findings emphasize that sustainable economic growth in Nigeria largely depends on how effectively the country manages its debt portfolio and mobilizes productive investment.

Moreover, the study highlights the need for policies that promote responsible debt management, efficient investment allocation, and macroeconomic stability. Specifically, channeling external borrowings into growth-enhancing sectors such as infrastructure, manufacturing, and human capital development will ensure that debt contributes positively to national output. Encouraging domestic investment and improving the ease of doing business will also strengthen capital formation and complement external resources. Ultimately, the study concludes that maintaining a balance between debt sustainability and productive investment is essential for achieving sustained economic growth and long-term development in Nigeria.

Recommendations

Based on the specific findings of this study, the following recommendations are proposed to improve the management of external debt, enhance capital formation, and promote sustainable economic growth in Nigeria:

- The study found that external debt has a negative long-run impact on economic growth, primarily due to inefficiencies in debt utilization and rising debt-servicing burdens. Therefore, the government should adopt a prudent debt management strategy that prioritizes borrowing for productive and self-sustaining projects. External loans should be channeled into sectors that yield high economic returns such as infrastructure, manufacturing, and agriculture. In addition, the Debt Management Office (DMO) should regularly assess debt sustainability to ensure that borrowing remains within manageable limits and contributes directly to national development objectives.
- The findings also reveal that capital formation plays a significant role in promoting economic growth. To strengthen capital formation, the Nigerian government should encourage domestic savings and investment through effective fiscal policies, such as tax incentives for investors, reduction in bureaucratic bottlenecks, and improving access to credit for small and medium-sized enterprises (SMEs). Establishing public-private partnerships (PPPs) and developing capital markets can also serve as effective mechanisms for mobilizing long-term investment funds.

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