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International Financing and Gross Fixed Capital Formation in Nigeria

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Abstract- ***This study examined the effect of international financing on gross fixed capital formation in Nigeria from 1983 to 2023. The study disaggregated international financing into external debt, foreign direct investment, official development assistance and remittances, while economic development was proxied by gross fixed capital formation. Annual time series data used were sourced from the World Development Indicators (WDI), the National Bureau of Statistics (NBS), and the Central Bank of Nigeria (CBN) annual Statistical Bulletin and utilized the Autoregressive Distributed Lag (ARDL) to estimate the short-run and long-run interactions among the variables. Empirical results revealed that external debt showed a positive but statistically insignificant impact on gross fixed capital formation in both the short run and long run, while foreign direct investment, official development assistance and remittances have significant positive effects on gross fixed capital formation in both the short run and long run. The study concluded that international financing plays a vital role in enhancing capital accumulation and economic development in Nigeria. It was recommended among others that government and policymakers should strengthen the institutional and governance frameworks guiding the utilisation of external debt to ensure that borrowed funds are channelled into productive, capital-enhancing projects rather than recurrent expenditure, while sustaining an enabling environment that allows foreign direct investment, official development assistance and remittances to be productively invested in physical capital formation.***

I. INTRODUCTION

In the face of persistent development challenges and limited domestic financial resources, many developing countries, including Nigeria, have increasingly turned to international financing to bridge savings-investment gaps and accelerate economic growth, with the ultimate aim of developing their economies. Economic development, broadly defined as sustained improvements in the economic, social, and institutional structures of a nation, transcends mere increases in national income, encompassing structural transformation, poverty reduction, employment creation, and equitable distribution of resources (Todaro & Smith, 2020). Achieving such development requires large volumes of financial resources to finance investments in infrastructure, human capital, industrialisation, and technological innovation. However, for most developing countries, including Nigeria, domestic savings and internally generated revenues remain inadequate to meet these requirements (World Bank, 2022). International financing has therefore emerged as a critical complement to domestic resources. It encompasses all forms of external capital inflows such as foreign direct investment (FDI), external debt, official development assistance (ODA), remittances and funding from bilateral and multilateral institutions (IMF, 2021). According to the Organisation for Economic Co-operation and Development (OECD) (2023), the channels of international financing into Nigeria have expanded beyond traditional official loans and grants to include private capital flows and remittances. External borrowing, both concessional and non-concessional, has funded infrastructure, education, and health services. For instance, official development assistance (ODA), mostly from multilateral agencies, averaged around $2 billion annually between 2005 and 2020, reaching approximately $3.5 billion in 2023 (OECD, 2024). FDI, primarily directed toward the oil, gas, and telecom sectors, has supported industrial development and job creation, albeit with limited linkages to the broader economy. Meanwhile, remittances from the Nigerian diaspora have grown steadily, rising from $2.5 billion in 2004 to over $20 billion in 2022, and now constitute one of the largest sources of foreign exchange after oil (CBN, 2023).

Gross fixed capital formation (GFCF), which refers to the net investment in fixed assets such as infrastructure, machinery, buildings, and equipment used in the production of goods and services for more than one year, is widely recognised as a critical driver of long-term economic growth and development, and is often used in development economics as a proxy for domestic investment (OECD, 2023; Todaro & Smith, 2015). Between 1983 and 2023, Nigeria's GFCF as a percentage of GDP has fluctuated considerably, with notable declines during periods of political instability, economic recession, and oil price volatility, while public sector investment, which dominates capital formation in Nigeria, has often been constrained by fiscal deficits and inefficiencies in project execution (World Bank, 2023; CBN, 2023). The importance of international financing in stimulating capital formation lies in its potential to fill resource gaps, supplement domestic savings, and facilitate access to technology and expertise needed for productive investment. The dual-gap theory, for example, posits that international finance is vital to closing the savings-investment and foreign exchange gaps that constrain investment and growth in developing economies (Chenery & Strout, 1966). However, the effectiveness of such financing in translating into actual capital accumulation depends on its composition, terms, governance mechanisms, and how well it is aligned with national development priorities.

Statement of the Problem

International financing is expected to provide the capital and support needed to drive investment, enhance infrastructure, promote industrialisation, and strengthen the private sector by supplementing the country's limited domestic resources, resulting in higher gross fixed capital formation and, ultimately, economic development. But Nigeria has consistently grappled with the challenge of achieving sustainable capital accumulation despite vast natural resources and decades of foreign capital inflows (Shobande, 2022). Since 1983, the country has relied heavily on various forms of international financing, including bilateral and multilateral loans, foreign direct investment (FDI), development aid and remittances to stimulate investment, fund infrastructure, and bridge its savings-investment gap. Yet, the persistent paradox of rising international inflows alongside weak and unstable capital formation, infrastructure decay, and low industrial capacity remains largely unresolved. Between 1983 and 2023, Nigeria's external debt stock rose from approximately $11.9 billion to $41.6 billion, reflecting an increasing reliance on external borrowing to finance budgetary and developmental shortfalls (World Bank, 2023). While debt can serve as a tool for capital accumulation, it becomes problematic when resources are poorly utilised or disproportionately spent on recurrent expenditures rather than productive fixed investment. Nigeria has experienced repeated cycles of debt relief (e.g., the 2005 Paris Club deal) followed by renewed accumulation, raising concerns about debt sustainability, fiscal discipline, and the risk of debt overhang crowding out productive investment (CBN, 2023).

In addition, Nigeria has historically been a major recipient of foreign direct investment in Africa, but its translation into broad-based fixed capital formation across sectors beyond oil, gas, and telecoms remains questionable (UNCTAD, 2023). Additionally, Nigeria receives billions in foreign aid and official development assistance (ODA), averaging around $2 billion per year, yet its contribution to infrastructure and capital-intensive development projects remains uneven (OECD, 2023). Also, remittance inflows, which reached $20.1 billion in 2022, have become an important source of foreign exchange and household income, but the extent to which they are channelled into productive investment, as opposed to consumption, seems underexplored (World Bank, 2023). Despite these inflows, the country continues to face challenges such as debt overhang, low industrial capacity, and sluggish capital accumulation. Nigeria therefore seems to be faced with a paradox of financial inflows without commensurate improvements in physical capital stock and productive investment capacity. These developments raise key concerns on why Nigeria has not achieved significant capital accumulation and structural transformation, despite massive external capital inflows, and the extent to which international financing has genuinely contributed to gross fixed capital formation in Nigeria. Hence, this study examined the effect

international financing has on gross fixed capital formation in Nigeria. The specific objectives of the study are to assess the impact of external debt on gross fixed capital formation in Nigeria; to examine the relationship between foreign direct investment (FDI) and gross fixed capital formation in Nigeria; to analyse the effect of official development assistance (ODA) on gross fixed capital formation in Nigeria; and to evaluate the role remittances play in influencing gross fixed capital formation in Nigeria.

II. LITERATURE REVIEW

Theoretical Framework

i. The Dual-Gap Theory

The Dual-Gap Theory, developed by economists Chenery and Strout (1966), serves as a foundational framework in understanding the need for international financing in the process of capital formation and economic development, especially in developing countries like Nigeria. This theory posits that the major constraint to economic growth in developing economies is the existence of two critical "gaps": the savings-investment gap and the foreign exchange gap. The Savings-Investment Gap arises when domestic savings are insufficient to finance the level of investment required for sustainable economic growth. Since investment, proxied by gross fixed capital formation, is a key driver of economic development, this shortfall in domestic resources necessitates international financial inflows such as foreign direct investment (FDI), external debt, official development assistance (ODA), and remittances to fill the savings gap and boost capital formation. Even when domestic savings are adequate, countries often lack the foreign exchange needed to import essential capital goods, technology, and raw materials required for production and infrastructure development. The foreign exchange gap thus represents the shortfall between a country's foreign exchange earnings and the foreign exchange needed to finance the importation of capital goods for development. To bridge this gap, countries rely on international financing sources to supplement export earnings and finance the importation of critical capital equipment. Over the years, Nigeria has experienced persistent fiscal and current account deficits, limited domestic savings, and inadequate foreign exchange earnings due to fluctuating oil prices (IMF, 2020; World Bank, 2021), and has therefore relied heavily on external sources of finance to bridge the two gaps and stimulate capital accumulation (CBN, 2022; UNCTAD, 2021). The Dual-Gap Theory underpins the argument that international financing, if efficiently managed, can fill critical resource and foreign exchange shortages, enhance Gross Fixed Capital Formation (GFCF), and thereby accelerate broader economic development (Chenery & Strout, 1966; Todaro & Smith, 2015).

ii. Debt Overhang Theory

The Debt Overhang Theory is a critical framework in development economics that explains the adverse effects of excessive external debt on investment and economic growth in developing countries. Originally articulated by Krugman (1988), the theory posits that when a country's external debt is perceived to be unsustainable or unpayable, it discourages both domestic and foreign investment, since a large portion of future national income is expected to be used for debt servicing, thereby acting as a tax on future output and reducing the returns to new investment. According to Krugman (1988), when debt levels surpass a certain threshold, additional borrowing or external inflows no longer contribute to growth because they are absorbed by interest payments rather than productive activities; investors may consequently delay or cancel capital investment decisions due to uncertainty and diminished confidence in the economy. In the context of Nigeria, the Debt Overhang Theory is particularly relevant, as the country has historically experienced episodes of excessive external borrowing, notably in the 1980s and early 2000s, culminating in the 2005 debt relief deal with the Paris Club, and has once again increased its reliance on external debt in recent years to finance budget deficits and infrastructure projects. If these funds are not used efficiently to generate returns, they could result in a debt overhang that impairs the accumulation of fixed capital and the economy's long-term prospects. The application of the Debt Overhang Theory to this study helps to frame the risks associated with Nigeria's growing dependence on external debt as a source of international financing, underscoring the importance of sustainable debt management and the need to

ensure that external borrowings are channelled into productive sectors that enhance gross fixed capital formation rather than crowding out investment.

Empirical Review

Ekiran (2024) provided a comprehensive empirical analysis of the impact of Nigeria's external debt crisis on gross fixed capital formation and overall economic growth, covering the period from 1981 to 2022 and employing a Vector Error Correction Model (VECM) framework, with gross fixed capital formation and GDP growth as dependent variables, and external debt stock and debt servicing obligations as the main independent variables. The findings indicated that external debt has a long-run negative effect on capital formation and economic growth, suggesting that rising debt burdens limit the government's capacity to finance infrastructure and productive investments, with debt servicing found to significantly crowd out public investment. The study recommended that external debt be directed toward productivity-enhancing sectors, accompanied by reforms in public investment management.

Michael (2023) conducted an empirical investigation into the impact of public debt on capital formation in Nigeria using time series data spanning from 1981 to 2021 and the Autoregressive Distributed Lag (ARDL) bounds testing approach. The results indicated that public debt had a significant negative impact on capital formation in both the short run and long run, highlighting the burden of rising debt servicing costs and inefficient allocation of borrowed resources, and the study concluded that unless debt is managed sustainably and directed toward growth-enhancing sectors, public debt would continue to undermine capital accumulation in Nigeria.

Kocha, Iwedi, and Sarakiri (2021) investigated the dynamic effect of public external debt on capital formation in Sub-Saharan Africa using annual panel data, specifying gross capital formation as the dependent variable and public external debt, domestic savings, inflation, and economic growth as the key explanatory variables, employing the Pooled Mean Group (PMG) estimator within an ARDL framework. Their empirical results showed that public external debt had a negative and significant long-run impact on capital formation, supporting the debt-overhang and crowding-out hypotheses, while domestic savings and economic growth contributed positively to capital formation in the long run.

Kayani (2024) examined the relationship between foreign direct investment (FDI) and economic growth in Romania, employing gross domestic product (GDP) as the dependent variable and FDI, Gross Capital Formation and Employment as explanatory variables, for the period spanning from 1993 to 2022, using a vector error correction model (VECM). The results indicated a statistically significant and positive long-run relationship between FDI and economic growth, and FDI was also found to uni-directionally cause Gross Capital Formation, reinforcing the theoretical expectation that FDI contributes to capital accumulation, technology transfer, and productivity improvements in host countries.

Etukafia, Enang, and Ele (2024) employed an Autoregressive Distributed Lag (ARDL) framework to assess how Foreign Direct Investment (FDI) inflows influence Gross Fixed Capital Formation (GFCF) in Nigeria from 1981 to 2022, with GFCF as the dependent variable and FDI inflows, alongside government capital expenditure, total savings, trade openness, GDP, and exchange rates, as explanatory variables. The long-run results revealed a negative and statistically significant relationship between contemporaneous FDI and GFCF, suggesting current FDI inflows may hinder capital formation if not strategically allocated, whereas lagged FDI exerted a positive and supportive impact, underscoring the importance of timing and institutional frameworks in extracting capital formation benefits from FDI.

Olowe (2022) investigated the relationship between foreign direct investment (FDI) and capital formation in Nigeria from 1981 to 2020, employing an Autoregressive Distributed Lag (ARDL) approach, with capital formation, proxied by gross capital formation data, as the dependent variable and FDI inflows, alongside government expenditure, GDP, interest rate, exchange rate, and inflation, as explanatory variables. The study confirmed a long-run cointegration relationship between FDI and

capital formation, with FDI inflows exerting a positive and statistically significant long-run impact, suggesting that sustained foreign investment bolsters productive asset accumulation in Nigeria.

Amighini, McMillan, and Sanfilippo (2017) conducted an empirical investigation into the relationship between foreign direct investment (FDI) and capital formation in developing economies, using a novel dataset constructed at the industry level, with capital formation as the dependent variable and industry-level FDI inflows as the key independent variable. Employing fixed-effects regression models, the study found that FDI positively influences capital formation, particularly in manufacturing sectors with higher technological intensity, although the impact varies across industries and countries depending on absorptive capacity and local policy environments.

Dash, Gupta, and Khandelwal (2024) offered a comprehensive panel study analysing the effects of foreign aid on capital formation across six South Asian countries between 1990 and 2019, employing second-generation panel unit root and cointegration tests alongside dynamic estimators such as Pooled Mean Group (PMG) and Common Correlated Effects PMG (CCE-PMG). Their long-run results revealed that foreign aid appears to directly crowd out domestic investment, but, through indirect channels, especially via complementarities with trade integration, human capital development, financial deepening, and FDI inflows, its broader developmental environment can unlock complementary capital formation gains.

Moloi (2024) conducted an empirical investigation into the causal relationships between Official Development Assistance (ODA), Foreign Direct Investment (FDI), and economic growth across selected African countries over the period 1980 to 2018, employing the Dumitrescu-Hurlin panel causality test and a threshold regression analysis. The study found that while FDI had a positive and statistically significant impact on economic growth, ODA exhibited a negative and significant coefficient at higher levels, indicating that foreign aid may, in some contexts, hinder rather than promote productive economic outcomes, highlighting the importance of absorptive capacity and institutional quality.

Igbinovia, Odengha, and Umoru (2024) investigated the relationship between foreign aid, gross fixed capital formation (GFCF), and economic growth in Nigeria using ARDL bounds testing and error-correction modelling. Their empirical results indicated that foreign aid exhibited a statistically significant relationship with capital formation, although the effect depends on macroeconomic instability, notably exchange-rate volatility, and limited absorptive capacity can reduce the positive impact of aid on GFCF in the short run, while long-run estimates showed more persistent positive linkages between external transfers, capital accumulation, and growth.

Amutabi (2023) examined the role of international remittances in influencing gross fixed capital formation (GFCF) in Kenya, applying the Autoregressive Distributed Lag (ARDL) modelling framework to annual time series data, controlling for GDP growth, foreign direct investment, and inflation. Empirical results revealed a statistically significant and positive long-run relationship between international remittances and GFCF, suggesting that remittances serve not only as a source of household consumption financing but also as a channel for productive investment in physical capital, although the short-run effect was weaker and occasionally insignificant, indicating that remittance-financed investment projects may have longer gestation periods before contributing to measurable capital stock increases.

III. METHODOLOGY

Research Design

The ex-post facto research design was utilized in this study. Ex-post facto research design is a non-experimental research design in which the researcher investigates the possible cause-and-effect relationships among variables after the events have already occurred, without manipulating the independent variables. The term ex post facto is derived from Latin, meaning "after the fact."

Data Collection Method and Sources

Annual time series data which ranged from 1983 to 2023 were used in this study and these data were obtained from World Development Indicators (WDI), the National Bureau of Statistics (NBS), and the Central Bank of Nigeria (CBN) annual Statistical Bulletin spanning from.

Model Specification

In order to assess how international financing affects gross fixed capital formation in Nigeria, and consistent with the study's objectives, the Auto Regressive Distributed Lag (ARDL) model was adopted as the analytical technique. The theoretical foundation for the study is the Dual Gap Theory, developed by Chenery and Strout (1966), which posits that developing economies typically confront two major barriers to growth: a gap between savings and investment, and a gap in foreign exchange availability. The model applied here draws on the empirical framework used by Ekwunife and Ikeora (2019) in their examination of the link between external financing and economic growth in Nigeria over the 1986–2017 period. With slight modifications, the model is specified as follows:

Functional Model Specification

$$GFCF = f(EXDT, FDI, ODA, REMIT) \quad (3.1)$$

Mathematical Model Specification

$$GFCF_t = c_0 + c_1EXDT_t + c_2FDI_t + c_3ODA_t + c_4REMIT_t \quad (3.2)$$

Econometrical Model Specification

$$GFCF_t = c_0 + c_1EXDT_t + c_2FDI_t + c_3ODA_t + c_4REMIT_t + U_{it} \quad (3.3)$$

GFCF = Gross Fixed Capital Formation, EXDT = External Debt, FDI = Foreign Direct Investment, ODA = Official Development Assistance, REMIT = Remittance, c0 = Intercept of the model, c_1 - c_4 = Slopes of the model, U = Error term, f = Functional Notation.

A Priori Expectation

The a priori expectations for each of the independent variables are presented based on economic theory and insights from previous empirical literature.

From theoretical considerations, the coefficient of EXDT, c_1, is expected to have an ambiguous sign. On the one hand, when debt is prudently contracted and channeled into productive investment, it can augment capital formation and stimulate growth. On the other hand, excessive accumulation of debt may generate a debt-overhang effect, discourage private investment, and divert scarce resources toward debt servicing, thereby exerting a negative influence on gross fixed capital formation (GFCF). In this model, c1 is expected to be negative. The coefficient of FDI, c_2, is anticipated to have a positive impact on GFCF. This is because FDI represents a critical source of external capital that supplements domestic savings, facilitates technology transfer, and improves managerial capacity. These effects are expected to expand the stock of productive assets and enhance gross fixed capital formation. Similarly, c3, the coefficient of ODA, is expected to exert a positive influence on GFCF, since ODA is often directed toward infrastructure, social services, and capacity-building projects, thereby strengthening the capital formation process. The coefficient of REMIT, c4, is also expected to positively affect GFCF, as remittances supplement household incomes, relax credit constraints, and can be channeled into small-scale investments, housing, and other productive ventures that contribute to fixed capital formation. Mathematically, the a priori expectations regarding the parameters are expressed as follows: $c1 < 0$; $c2, c3, c4 > 0$.

Method of Data Analysis

The data analysis technique employed in this study was Autoregressive Distributed Lag (ARDL). This is because the result of the unit root test generated mixed stationarity, that is, I(0) and I(1).

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IV. DATA ANALYSIS AND DISCUSSION OF FINDINGS

The descriptive statistics for the study variables are summarized in Table 4.1:

Descriptive Analysis

Table 4.1: Descriptive Statistics for the Research Variables

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
GFCF	11260.25	3846.230	70901.33	125.8800	17790.50	2.196157	6.918613	59.19025
EXDT	3700.056	716.8700	38219.85	10.58000	6995.950	3.431730	16.07677	372.6029
FDI	1592.788	248.2200	6591.530	0.340000	2026.579	1.010597	2.767703	7.071111
ODA	1502.427	299.5500	11431.96	42.99000	2198.858	2.632689	11.53595	171.8357
REMIT	663.1671	263.5100	2289.190	87.49000	659.9828	1.051058	2.698156	7.704592

Gross Fixed Capital Formation has a mean value of N11,260.25, reflecting average investment levels in physical capital over the study period. The wide gap between the minimum value of N125.88 and the maximum value of N70,901.33 highlights substantial fluctuations in capital accumulation, while the large standard deviation of N17,790.50 confirms high volatility. The strong positive skewness (2.196157) and high kurtosis (6.918613) suggest a heavily right-skewed and leptokurtic distribution, reflecting episodic surges in investment, and the high Jarque-Bera statistic confirms non-normality. External debt shows a mean value of N3,700.056, indicating substantial reliance on external borrowing, with the minimum value of N10.58 contrasting strongly with the maximum value of N38,219.85, highlighting dramatic debt accumulation, while the large standard deviation of N6,995.95 confirms high volatility. Foreign direct investment records a mean value of N1,592.788, suggesting modest average inflows, with the minimum value of N0.34 showing periods of near absence of foreign investment, while the maximum value of N6,591.53 reflects episodes of increased investor confidence. Official development assistance has a mean value of N1,502.427, reflecting the average scale of foreign aid received, with the minimum value of N42.99 contrasting with the maximum value of N11,431.96, indicating episodic surges in assistance. Lastly, remittance has a mean value of N663.1671, reflecting the growing importance of diaspora inflows to the economy, with the minimum value of N87.49 contrasting with the maximum value of N2,289.19, highlighting strong growth in recent years.

Unit Root Test

The results of the unit root test are presented in Table 4.2 below:

Table 4.2: Augmented Dickey-Fuller (ADF) Test Results

Variables	Level	Critical Value @ 5%	1st Difference	Critical Value @ 5%	I(d)	Stationary @
LOG(GFCF)	-0.108008	-2.936942	-4.525242	-2.938987	I(1)	1st Difference
LOG(EXDT)	-1.481817	-2.936942	-4.170548	-2.938987	I(1)	1st Difference
LOG(FDI)	-2.176899	-2.936942	-7.254021	-2.938987	I(1)	1st Difference
LOG(ODA)	-1.019004	-2.941145	-6.037195	-2.941145	I(1)	1st Difference
LOG(REMIT)	-4.810113	-2.936942	-	-	I(0)	Level

The unit root test results showed that remittances (REMIT) attained stability at level. This is because the test statistic value of remittances (REMIT) is greater than the Mackinnon critical value at 5% level of significance at level. This further indicates that remittances (REMIT) is stationary at order zero [i.e., I(0)]. On the other hand, gross fixed capital formation (GFCF), external debt (EXDT), foreign direct investment (FDI) and official development assistance (ODA) attained stability after first differencing. This is because their test statistic values are greater than the Mackinnon critical value at 5% level of significance at first difference. This further indicates that gross fixed capital formation (GFCF), external debt (EXDT), foreign direct investment (FDI) and

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official development assistance (ODA) are integrated at order one [i.e., I(1)].

Correlation Analysis

The results of the correlation are presented in Table 4.3:

Table 4.3: Correlation Matrix

	LOG(GFCF)	LOG(EXDT)	LOG(FDI)	LOG(ODA)
LOG(GFCF)	1			
LOG(EXDT)	0.350701	1		
LOG(FDI)	0.273456	0.112681	1	
LOG(ODA)	0.075886	0.338474	0.496673	1
LOG(REMIT)	0.128636	0.232239	0.348865	0.536449

The pairwise correlations between gross fixed capital formation and its explanatory variables are generally weak to moderate, with external debt recording the strongest association with GFCF (0.350701), followed by foreign direct investment (0.273456), while official development assistance (0.075886) and remittances (0.128636) record weaker associations. Among the explanatory variables themselves, the correlation coefficients are generally low to moderate, with the highest observed between official development assistance and remittances (0.536449), while external debt and foreign direct investment record a very weak correlation of 0.112681. Since none of the correlations among the independent variables exceeds the conventional threshold of 0.80, the result indicates the absence of multicollinearity in the model, thereby justifying the simultaneous inclusion of external debt, foreign direct investment, official development assistance, and remittances in the estimation of the gross fixed capital formation model and supporting the reliability of the estimated coefficients.

Bound Cointegration Test

Table 4.4: ARDL Bounds Cointegration Test

		Critical Value Bound	F-Statistics
FGFCF(EXDTt/EXDTt, FDIt, ODAt, REMITt)			26.82834***
K = 4			
Significance	I(0) Bound	I(1) Bound	
10%	2.2	3.09	
5%	2.56	3.49	
2.5%	2.88	3.87	
1%	3.29	4.37	

Note: Null hypothesis: No level relationship; K = number of regressors; *, ** and *** denote significance at 10%, 5% and 1% level, respectively.

In order to determine if there is cointegration among gross fixed capital formation (GFCF), external debt (EXDT), foreign direct investment (FDI), official development assistance (ODA) and remittances (REMIT), a bounds test was conducted. The result of the ARDL Bounds cointegration test in Table 4.4 showed that the bound test indicates the presence of a long-run relationship among gross fixed capital formation (GFCF), external debt (EXDT), foreign direct investment (FDI), official development assistance (ODA) and remittances (REMIT), given that the F-statistic value of 26.82834 is higher than the 5% upper bound critical value of 3.49. By this, the null hypothesis is rejected, which leads to the study concluding that there is a cointegrating relationship among the variables. The confirmation of long-run dynamics among the variables further necessitated the estimation of the extent of the relationship between the dependent and independent variables through estimation of the Autoregressive Distributed Lag (ARDL) model.

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Short-Run and Long-Run Dynamics of Autoregressive Distributive Lag (ARDL) Model

The short-run and long-run dynamic effect of external debt, foreign direct investment, official development assistance and remittances on gross fixed capital formation in Nigeria was estimated using the Autoregressive Distributive Lag (ARDL) approach. The results of the estimation are presented in Table 4.5:

Table 4.5: Estimated Long-Run and Short-Run Coefficients of ARDL of GFCF Model

Dependent Variable = DLOG(GFCF)				
Short-Run Results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DLOG(EXDT)	0.045726	0.024578	1.860441	0.0723
DLOG(FDI)	0.064555	0.028936	2.230957	0.0331
DLOG(ODA)	0.559841	0.194977	2.871315	0.0141
DLOG(REMIT)	0.146767	0.054007	2.717568	0.0107
CointEq(-1)*	-0.103161	0.007545	-13.67234	0.0000
R^2 = 0.608794				
Adjusted R^2 = 0.569674				
Durbin-Watson stat = 2.105405				
Long-Run Results				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(EXDT)	0.032206	0.251849	0.127877	0.8991
LOG(FDI)	0.018590	0.004766	3.900364	0.0021
LOG(ODA)	0.013567	0.001957	6.933025	0.0000
LOG(REMIT)	0.766132	0.180382	4.247266	0.0011
C	1.519530	1.937062	0.784451	0.4387
*EC = LOG(GFCF) - (0.0322*LOG(EXDT) + 0.0186*LOG(FDI) + 0.0136*LOG(ODA) + 0.7661*LOG(REMIT) + 1.5195)*				

Interpretation of Short-Run and Long-Run Autoregressive Distributive Lag (ARDL) Model Estimation Results

The ARDL results for the gross fixed capital formation model provide insight into how external debt, foreign direct investment, official development assistance, and remittances influence investment levels in Nigeria over both the short and long run.

External Debt (EXDT) and Gross Fixed Capital Formation (GFCF)

In the short run, external debt has a coefficient of 0.045726 with a p-value of 0.0723, indicating a positive but statistically insignificant effect on gross fixed capital formation. This suggests that changes in external debt have a limited immediate impact on domestic investment, possibly due to delays in the disbursement or utilization of borrowed funds for productive investment projects. In the long run, the coefficient for external debt is 0.032206 with a p-value of 0.8991, which is also positive and statistically insignificant, implying that over time, external debt does not substantially influence the accumulation of fixed capital in Nigeria. This may reflect inefficiencies in debt allocation or a lack of investment in sectors that directly contribute to capital formation.

Foreign Direct Investment (FDI) and Gross Fixed Capital Formation (GFCF)

Foreign direct investment exhibits a short-run coefficient of 0.064555 with a p-value of 0.0331, demonstrating a positive and statistically significant effect on gross fixed capital formation. This indicates that immediate inflows of foreign capital stimulate domestic investment by providing funds for new

projects, technology transfer, and employment generation. In the long run, the effect remains positive with a coefficient of 0.018590 and a p-value of 0.0021, confirming that sustained foreign investment continues to foster fixed capital accumulation, though at a lower magnitude than in the short run. This emphasizes the importance of maintaining investor-friendly policies to ensure that foreign investment consistently contributes to Nigeria's long-term capital formation.

Official Development Assistance (ODA) and Gross Fixed Capital Formation (GFCF)

Official development assistance shows a substantial short-run effect on gross fixed capital formation, with a coefficient of 0.559841 and a p-value of 0.0141, indicating that aid inflows significantly encourage immediate investment in infrastructure, social projects, and capital-intensive sectors. In the long run, the coefficient declines to 0.013567 but remains statistically significant with a p-value of 0.0000, implying that the sustained impact of development assistance on investment is more modest yet persistent. This highlights the role of consistent aid flows in supporting investment projects that gradually enhance the country's capital stock.

Remittances (REMIT) and Gross Fixed Capital Formation (GFCF)

Remittances in the short run have a coefficient of 0.146767 with a p-value of 0.0107, showing a statistically significant positive effect on gross fixed capital formation, reflecting that diaspora inflows provide households and entrepreneurs with liquidity that can be channeled into investment activities. In the long run, the effect of remittances is much stronger, with a coefficient of 0.766132 and a p-value of 0.0011, indicating that sustained remittance inflows significantly contribute to capital formation over time. This suggests that remittances are a critical source of long-term financing for investment projects, infrastructure development, and business expansion in Nigeria.

Interpretation of CointEq(-1) Result

The error correction term, CointEq(-1), has a short-run coefficient of -0.103161 with a p-value of 0.0000, indicating that deviations from the long-run equilibrium in gross fixed capital formation are corrected at a rate of approximately 10% per period. This moderate adjustment speed implies that any short-run shocks to investment levels, such as sudden changes in foreign inflows or government borrowing, are gradually corrected as the economy returns to its long-term capital formation trend.

Interpretation of Adjusted R-Squared (Adj. R^2) Value

The adjusted R-squared of 0.569674 indicates that approximately 57% of the short-run variation in gross fixed capital formation is explained by external debt, foreign direct investment, official development assistance, and remittances, while the remaining 43% is explained by other variables or factors outside the model. This signifies that these financial inflows are major determinants of investment activity in Nigeria, although other factors, such as domestic policy, political stability, and private sector dynamics, also play a significant role.

Post-Estimation Tests of Gross Fixed Capital Formation (GFCF) Model

The results of the diagnostic tests are presented and discussed below:

Table 4.6: Post-Estimation Test Results

Test	Null Hypothesis	X^2 Value	X^2 Prob	Remark
Jarque-Bera	Normal distribution exists	3.794443	0.149985	Normal residuals
Breusch-Godfrey LM	Serial correlation does not exist	0.583080	0.5646	Serial independence
Breusch-Pagan-Godfrey	Homoscedasticity exists	0.436487	0.8898	Constant Variance
Ramsey RESET	Model is stable	6.022905	0.0727	correctly specified model

Table 4.6 reports the post-estimation diagnostic test results conducted to assess the validity and robustness of the estimated econometric model. The Jarque-Bera test statistic of 3.794443 with a probability value of 0.149985 indicates that the null hypothesis of normal distribution of the residuals

cannot be rejected, confirming that the error terms are normally distributed and suitable for reliable statistical inference. The Breusch-Godfrey Lagrange Multiplier test for serial correlation yields a chi-square value of 0.583080 with a probability of 0.5646, implying that serial correlation does not exist in the residuals and that the assumption of serial independence is satisfied. Furthermore, the Breusch-Pagan-Godfrey test for heteroscedasticity produces a chi-square value of 0.436487 with a high probability value of 0.8898, clearly indicating homoscedastic residuals and constant variance of the error term. Lastly, the Ramsey RESET test produces a chi-square value of 6.022905 with a probability value of 0.0727, which, though closer to the 5% threshold than the other diagnostics, is still above the conventional 0.05 significance level, implying that the model does not suffer from major functional form misspecification or omitted variable problems. Overall, the post-estimation diagnostic results confirm that the estimated ARDL model is statistically sound, stable, and reliable for policy analysis and inference.

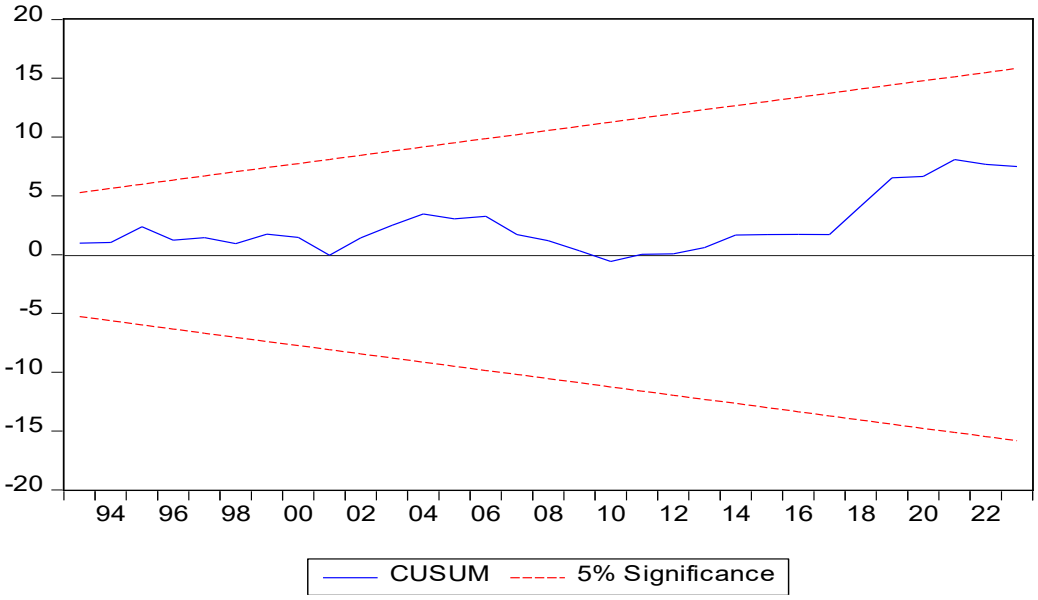

Figure 4.1: Stability Cusum Test

The cumulative sum (CUSUM) indicates that the CUSUM line stayed within the 5 percent critical bound while neither did CUSUM plot crosses the 5 percent critical lines. The implication of this is that there is stability of the long-run coefficients of the study variables.

Discussion of Findings

This study has empirically analyzed the time series data sourced to determine the effect of international financing on gross fixed capital formation in Nigeria from 1983 to 2023 using the Autoregressive Distributive Lag (ARDL) estimation technique and the E-Views 12 statistical package to run the analysis.

The findings obtained from the analysis are discussed as follows:

The findings of the analysis of this study indicate that external debt exerts a positive but statistically insignificant effect on gross fixed capital formation in Nigeria in both the short run and long run, suggesting that borrowed funds have not been decisively translated into measurable increases in the country's physical capital stock. This finding relates to the findings of Ekiran (2024) and Michael (2023), who found that external debt exerts a significant negative effect on capital formation in Nigeria, reflecting the crowding-out and debt-servicing burdens associated with the debt-overhang hypothesis. Similarly, Kocha, Iwedi, and Sarakiri (2021) found that public external debt has a significant negative long-run effect on

capital formation across Sub-Saharan Africa. While the present study's finding of statistical insignificance, rather than a significant negative effect, offers a somewhat less pessimistic picture, it nonetheless aligns with the broader implication of these studies that external debt in Nigeria has not been efficiently or productively channelled into fixed capital investment, likely due to weak debt management, corruption, and inadequate returns on borrowed funds. The implication is that while external debt can potentially finance capital formation, without effective management and proper sectoral targeting, it may fail to meaningfully improve gross fixed capital formation.

Also, foreign direct investment (FDI) demonstrates a positive and statistically significant effect on gross fixed capital formation in Nigeria in both the short run and long run, given its role in supplying external capital, facilitating technology transfer, and improving managerial capacity. This finding aligns with Olowe (2022), who found that FDI inflows exert a positive and statistically significant long-run impact on capital formation in Nigeria, and with Kayani (2024), who found that FDI significantly and positively drives Gross Capital Formation in Romania. It is also broadly consistent with Amighini, McMillan, and Sanfilippo (2017), who found that FDI positively influences capital formation across developing economies, particularly in technologically intensive sectors. However, this finding contrasts with Etukafia, Enang, and Ele (2024), who found that contemporaneous FDI exerts a negative long-run effect on GFCF in Nigeria, although their lagged FDI values were positive, suggesting that the timing and institutional handling of FDI inflows can shape whether their effect on capital formation is positive or negative. The implication is that Nigeria's investment climate over the study period has been sufficiently favourable for FDI inflows to translate into fixed capital accumulation, although sustained efforts to maintain investor confidence remain essential.

Moreover, official development assistance (ODA) exerts a positive and statistically significant effect on gross fixed capital formation in Nigeria in both the short run and long run. This finding is consistent with Igbinovia, Odengha, and Umoru (2024), who found that foreign aid has a statistically significant positive long-run relationship with capital formation in Nigeria, and it also resonates with the indirect complementary channels identified by Dash, Gupta, and Khandelwal (2024), who found that foreign aid can support capital formation in South Asian economies through complementarities with trade integration, financial deepening, and FDI. However, the finding differs somewhat from Moloi (2024), who found that ODA exerted a negative and significant effect on economic growth at higher levels across selected African countries, underscoring that the developmental benefits of aid are conditional on absorptive capacity and institutional quality. The implication is that Nigeria has, over the period under review, been reasonably able to convert development assistance into capital formation, but continued institutional strengthening is required to sustain and deepen this effect.

Lastly, remittances are found to have a positive and statistically significant impact on gross fixed capital formation in both the short run and long run, with the long-run effect considerably stronger than the short-run effect. This finding agrees strongly with Amutabi (2023), who found a statistically significant and positive long-run relationship between international remittances and gross fixed capital formation in Kenya, while similarly reporting a weaker short-run effect, a pattern that mirrors the results obtained in this study. The implication is that remittances constitute a critical and increasingly important source of long-term financing for capital formation in Nigeria, as diaspora inflows are gradually channelled from household consumption into productive investment, housing, and business expansion, although policies promoting financial inclusion and productive investment are essential to maximise this potential.

V. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study empirically examined the effect of international financing on gross fixed capital formation in Nigeria. The findings of the study

indicated that external debt has a positive but statistically insignificant effect on gross fixed capital formation, while foreign direct investment, official development assistance, and remittances have significant positive effects on gross fixed capital formation in Nigeria, in both the short run and long run. Premised on the findings, the study concluded that international financing plays a vital role in enhancing capital accumulation and, by extension, economic development in Nigeria, although the effectiveness of external debt in this regard remains limited relative to the other financing channels examined.

Recommendations

The following recommendations are proffered based on the findings of this study:

i. Government and policymakers should strengthen debt management institutions and fiscal discipline to ensure that external borrowing is channelled into productive, capital-enhancing infrastructure and industrial projects rather than recurrent expenditure, so that external debt can begin to translate into a statistically meaningful contribution to gross fixed capital formation.
ii. Policymakers should sustain and deepen an enabling investment climate, including regulatory certainty, ease of doing business reforms, and security improvements, to ensure that foreign direct investment inflows continue to be productively absorbed into Nigeria's physical capital stock over both the short and long run.
iii. Development partners and government agencies responsible for coordinating official development assistance should ensure that aid inflows are strategically targeted at infrastructure, capacity-building, and other capital-intensive sectors, with strong monitoring frameworks to sustain the positive contribution of ODA to capital formation.
iv. The Central Bank of Nigeria and relevant financial institutions should promote financial inclusion and the development of formal investment channels, such as diaspora bonds and remittance-linked investment products, to encourage the increasing channelling of remittance inflows into productive fixed capital investment rather than consumption alone.

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