

Foreign Direct Investment and Exchange Rate on Macroeconomic Performance in Nigeria

¹Oparandu, C. S., ²Njoku, K. C., & ³Ozuzu, S. C.

Department of Economics,
^{1,2,3,&4}Rivers State University, Port Harcourt,
Rivers State, Nigeria.

oparandu.silverline@rsu.edu.ng

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Abstract

This study examined the influence of foreign direct investment (FDI) and exchange rates on Nigeria's macroeconomic performance from 1990 to 2024. The study employed foreign direct investment net inflows as a percentage of GDP, real effective exchange rate, trade openness, and gross fixed capital formation as explanatory variables, while real GDP growth rate served as indicators of macroeconomic performance. Time series data were sourced from the World Bank's World Development Indicators and the Central Bank of Nigeria Statistical Bulletin. The study utilized descriptive statistics, Augmented Dickey-Fuller (ADF) unit root tests, ARDL bounds cointegration tests, ARDL estimation technique, and post estimation tests for empirical analysis. The findings reveal that trade openness has a negative but statistically insignificant long-run effect on real GDP growth. The real effective exchange rate exerts significant positive effects in the short run but a significant negative effect in the long run. Gross fixed capital formation has a significant positive long-run effect, indicating that productive investment contributes substantially to economic growth. Conversely, foreign direct investment has a significant negative effect on real GDP growth in both the short and long run. The error correction term is negative and statistically significant, confirming the existence of a long-run equilibrium relationship among the variables. The study concludes that Nigeria should strengthen productive investment, promote exchange-rate stability, improve the quality of FDI inflows, and adopt trade policies that enhance domestic production and export competitiveness.

Keywords: Real GDP Growth, Trade Openness, Real Effective Exchange Rate, Gross Fixed Capital Formation, Foreign Direct Investment, ARDL, Nigeria.

1. Introduction

Nigeria's macroeconomic evolution from 1990 to 2024 reflects a complex interaction between external sector dynamics and domestic structural constraints. Following the Structural Adjustment Programme and the deregulation of the foreign exchange market, Nigeria shifted from a fixed to a market-determined exchange rate regime, thereby exposing the economy to sustained nominal exchange rate volatility. According to the Central Bank of Nigeria (CBN) Statistical Bulletin, the official exchange rate depreciated from ₦8.04/US\$ in 1990 to ₦98.20 in 1999, ₦149.58 in 2009, ₦305.00 in 2016, ₦460.00 in 2022, and beyond ₦1,500 per US dollar in 2024 after exchange rate unification (CBN, 2024). These episodes of depreciation were closely associated with oil price shocks, capital flow reversals, and monetary policy adjustments. The exchange rate pass-through mechanism has been significant.

Real GDP growth has similarly exhibited volatility. World Bank data indicate that growth averaged approximately 4.1% between 1990 and 2024, peaking above 10% during the oil-driven expansion of 2002, but contracting during the 2016 recession (−1.6%) and the COVID-19-induced downturn in 2020 (−6.4%) (World Bank, 2024b). Despite rebasing GDP in 2014 which temporarily elevated Nigeria to Africa's largest economy, the structural drivers of growth remained concentrated in oil exports and low-productivity services. This structural composition raises critical questions about the sustainability of growth and the role of foreign capital and trade integration in enhancing productive capacity.

Foreign direct investment (FDI) has been a pivotal component of Nigeria's integration into the global economy. Foreign direct investment FDI net inflows rose significantly during the oil boom era, reaching approximately US\$8.84 billion in 2011 (about 2.1% of GDP), but declined sharply after 2015 to less than US\$3 billion annually in several post-2017 years (World Bank, 2024c). The decline coincided with foreign exchange restrictions, exchange rate misalignment, and investor uncertainty. Empirical studies demonstrate that FDI positively influences real GDP in the long run through capital deepening and technological spillovers (Jibir and Abodu, 2017; Orji *et al.*, 2021; Nwanosike, 2025). However, exchange rate volatility significantly moderates this effect, as depreciation and currency instability discourage foreign investors (Adebisi, Odesola & Aromona, 2025). This suggests that macroeconomic stability is a prerequisite for translating FDI inflows into sustained growth.

Gross capital formation (at 2010 Constant Purchasers' Prices), representing total domestic investment, has averaged between ₦7.331.16 billion and 11.766.42% of GDP from 1990 to 2024, well below benchmark associated with rapid industrialization in emerging economies (CBN, 2024; Dauda, 2022). The Central Bank of Nigeria Statistical Bulletin show that gross capital formation peaked near ₦11.445.86 billion of GDP current price in the 2019 but declined subsequently amid fiscal constraints and capital importation slowdowns (CBN, 2024).

Trade openness, measured as the ratio of exports and imports to GDP, increased from approximately ₦64.168.200 million in 1990 to above ₦5 billion in 2013 before fluctuating with oil price cycles (CBN, 2024). While openness theoretically fosters efficiency and technology diffusion, Nigeria's export base remains oil-dominant, exposing the economy to external volatility.

Notwithstanding decades of economic liberalization, Nigeria continues to grapple with moderate growth, declining FDI inflows, and recurrent exchange rate instability. Given recent exchange rate unification reforms, global supply chain disruptions, and post-pandemic adjustments, earlier findings may not fully capture current structural realities. Therefore, a critical gap persists in providing an updated and integrated empirical assessment of how foreign direct investment, real effective exchange rate dynamics, gross capital formation, and trade openness jointly influence Nigeria's macroeconomic performance, as measured by real GDP growth from 1990 to 2024. Addressing this gap was essential for designing coherent exchange rate, investment, and trade policies aimed at promoting sustainable growth in Nigeria's evolving open-economy environment.

2. Literature Review

Mundell-Fleming Model

The Mundell–Fleming model, also known as the IS–LM–BP framework or the open economy IS–LM model, was independently developed by Robert Mundell in 1963 and Marcus Fleming in 1962. The model extends the traditional Keynesian IS–LM framework to an open economy context by incorporating international trade and capital mobility into macroeconomic analysis (Mundell, 1963; Fleming, 1962). The theory was developed to explain the interaction between exchange rates, capital flows, monetary policy, and fiscal policy in economies that are integrated into the global financial system. The Mundell–Fleming framework remains one of

the most influential theoretical foundations for analyzing macroeconomic performance in developing and emerging economies such as Nigeria, particularly in studies involving foreign direct investment (FDI), exchange rate dynamics, inflation, and economic growth.

The central proposition of the Mundell–Fleming model is that macroeconomic outcomes in an open economy depend significantly on the exchange rate regime, the degree of capital mobility, and the interaction between domestic and external sectors. The model demonstrates that under conditions of high capital mobility, monetary and fiscal policies have different levels of effectiveness depending on whether the exchange rate system is fixed or flexible. In a flexible exchange rate regime, monetary policy becomes highly effective because changes in interest rates influence capital flows and exchange rate adjustments, thereby affecting aggregate demand and output. Conversely, fiscal policy tends to be less effective under flexible exchange rates because expansionary fiscal measures may appreciate the domestic currency and crowd out net exports. Under a fixed exchange rate system, however, fiscal policy becomes more potent while monetary policy loses much of its effectiveness due to the need to maintain exchange rate parity (Mundell, 1963).

The relevance of the Mundell–Fleming model to the Nigerian economy is substantial because Nigeria is a highly open developing economy characterized by dependence on external trade, oil export revenues, foreign capital inflows, and exchange rate volatility. The model provides a theoretical explanation for how fluctuations in the real effective exchange rate can influence economic growth through transmission mechanisms involving import prices, export competitiveness, and aggregate demand. Exchange rate depreciation, for instance, may stimulate export competitiveness and encourage domestic production; however, in import-dependent economies like Nigeria, persistent depreciation can also increase imported inflation and reduce macroeconomic stability. This dual effect aligns with the predictions of the Mundell–Fleming framework regarding the complex relationship between exchange rates and macroeconomic performance.

Solow-Swan Growth Model

The Solow–Swan Growth Model was independently developed by Robert M. Solow and Trevor W. Swan in 1956 as a neoclassical framework for explaining long-run economic growth. The theory emerged as a response to the limitations of the Harrod–Domar growth model, particularly its inability to explain stable equilibrium growth. Solow (1956) and Swan (1956) introduced technological progress, capital accumulation, labor force growth, and diminishing returns into growth analysis to explain differences in national output and long-run economic performance across countries. The model remains one of the foundational theories in modern macroeconomics and development economics because it provides a theoretical basis for understanding how investment, savings, labor expansion, and technological advancement influence economic growth over time.

The Solow–Swan model is built on several important assumptions. First, the economy operates under conditions of perfect competition, where firms maximize profits and factors of production are paid according to their marginal productivity. Second, production is characterized by a neoclassical production function exhibiting constant returns to scale, usually represented through the Cobb–Douglas production function. Third, the model assumes diminishing marginal returns to individual factors of production, particularly capital. Fourth, labor and technology grow exogenously, meaning they are determined outside the model. Fifth, the savings rate is assumed to be constant, and all savings are transformed into investment. Finally, the model assumes closed economy conditions in its original form, although subsequent extensions incorporated trade and capital mobility to suit open economies (Solow, 1956; Swan, 1956).

The central proposition of the Solow–Swan model is that economic growth is driven by the accumulation of capital, expansion of labor, and technological progress. In the short run, increases in capital stock through investment raise output and income levels. However, because of diminishing marginal productivity of capital, additional units of capital generate progressively smaller increases in output. Consequently, economies eventually converge toward a steady-state equilibrium where capital accumulation alone can no longer sustain long-run growth. At this steady state, output per worker grows only through technological advancement. Thus, technological progress becomes the ultimate source of sustained economic growth in the long run (Solow, 1956).

In the context of this study, the Solow–Swan growth model provides a suitable theoretical foundation for examining how foreign direct investment inflows, exchange rate movements, trade openness, and gross fixed capital formation affect Nigeria’s macroeconomic performance, particularly real GDP growth. The theory supports the argument that increased investment and efficient allocation of resources can stimulate productive capacity and long-run economic growth, while macroeconomic instability may constrain growth outcomes.

Empirical Review

Loretta (2021) examined the effects of exchange rate fluctuations and foreign reserves on macroeconomic performance in Nigeria over the period 1980–2019. The study included external debt, foreign reserves, exchange rate, external debt servicing, and government expenditure as key variables. The results revealed a unidirectional causality between exchange rate and foreign reserves, with exchange rate Granger causing foreign reserves, while foreign reserves did not Granger cause exchange rate. This finding implied that exchange rate movements, whether depreciation or appreciation, significantly influenced Nigeria’s foreign reserves. Lawal-Arogundade (2022) investigated the nexus between exchange rate regimes and macroeconomic performance in Nigeria using annual time-series data from 1970 to 2020. The study employed a nonlinear ARDL model, which captured the partial sums of positive exchange rate movements (depreciations) and negative movements (appreciations). The findings indicated that exchange rate regimes influenced inflationary pressure depending on whether the regime responded to depreciation or appreciation. However, irrespective of exchange rate movements, exchange rate regimes exhibited little or no significant impact on output growth. The study further revealed that an intermediate exchange rate regime driven by depreciation promoted trade surpluses, whereas one driven by appreciation contributed to trade deficits. The magnitude of the nonlinear effect on trade balance was found to be stronger during periods of exchange rate appreciation.

Shaheen and Rozina (2024) examined the impact of foreign direct investment (FDI) on economic growth in G20 countries using annual panel data from 19 countries covering the period 2001–2022. The results consistently showed that FDI exerted a positive and statistically significant impact on economic growth in G20 countries. Exchange rate appreciation and gross fixed capital formation also positively influenced economic growth, whereas inflation and trade openness negatively affected growth. Government effectiveness was found to be statistically insignificant. Songur (2023) examined the causal relationship among internet penetration, foreign direct investment, foreign trade, and economic growth in the BRICS-T countries over the period 1993–2019. The Dumitrescu and Hurlin panel causality test was applied. The findings revealed strong causal relationships among the variables. The results indicated that economic growth and international trade were causally linked, while foreign direct investment served as a source of economic expansion.

Rito, Mbulaheni, and Azwifarwi (2024) investigated the impact of foreign direct investment on economic growth in South Africa using annual time-series data from 1985 to 2019. The ARDL approach was employed to examine both short-run and long-run relationships. The results

indicated a negative long-run relationship between FDI and economic growth. In contrast, saving rates were positively associated with economic growth. Inflation and real interest rates exhibited negative long-run relationships with economic growth.

Ngerebo-A et al. (2014) investigated the causal relationship among exchange rate, balance of payments, external debt, external reserves, gross domestic product growth rate, and inflation rate in Nigeria during the post-Structural Adjustment Programme period (1987–2011). The results indicated the existence of a long-run equilibrium relationship among the variables. Granger causality tests revealed a unidirectional causality from exchange rate to balance of payments, external reserves, and gross domestic product growth rate. Additionally, a unidirectional causality was found from gross domestic product growth rate to external reserves. Emeka (2024) analysed the relationship between foreign direct investment (FDI) and economic growth in Nigeria using a desk research methodology based on secondary data. The study reviewed published reports and academic literature sourced from online journals and libraries. The findings indicated that FDI positively influenced Nigeria's economic growth through capital formation and technology transfer. However, this relationship was moderated by institutional quality and governance effectiveness. Infrastructure deficits and policy instability were identified as constraints that limited the full benefits of FDI.

Din et al. (2024) examined the relationships among exchange rate fluctuations, inflation, and economic growth in South Asian countries, including Pakistan, India, Bangladesh, Sri Lanka, and Nepal, over the period 1990–2021. The results revealed that exchange rate volatility significantly and negatively affected economic growth. Inflation exhibited a negative but statistically insignificant effect. The study recommended policies aimed at stabilising exchange rates to promote sustained economic growth.

Kutu (2025) examined the effectiveness of economic openness and FDI inflows in promoting economic growth in Nigeria using annual data from 1986 to 2022. The study applied the dynamic ARDL model. The findings revealed that economic openness did not significantly promote economic growth, thereby supporting protectionist arguments. The results further showed that FDI inflows exerted a detrimental effect on economic growth, consistent with dependency theory. The study concluded that economic integration posed challenges to Nigeria's economy and recommended the adoption of import substitution industrialisation policies to strengthen domestic production.

Aninwagu et al. (2026) applied the ARDL bounds testing approach of Pesaran, Shin, and Smith (2001) to analyse the determinants of Nigeria's economic growth from 1990 to 2023. Using real GDP *per capita* as the dependent variable, the model incorporates total trade, foreign direct investment (net inflows), gross fixed capital formation, and government recurrent spending on education. Results showed that trade and education spending exert negative short-run effects, while FDI has a negative short-run but significant positive long-run impact. Gross fixed capital formation has a positive and significant effect on growth in the short run, but not in the long run. The error correction term confirms a stable long-run equilibrium, with 62% adjustment annually. The model explains 91.5% of growth variations, indicating strong explanatory power. Adebisi et al. (2025) investigated the long-run effect of exchange rate volatility on stock market performance (SMP) and the interactive effect of exchange rate volatility and SMP on foreign direct investment in Nigeria. The study adopted an explanatory time-series design using secondary data from the World Bank database. The ARDL model, Granger causality tests, and multiple regression analysis were employed. The results revealed a significant long-run inverse relationship between lagged and current FDI, indicating an adjustment process toward equilibrium. Exchange rates exerted a positive and significant long-run effect on FDI, whereas short-run dynamics of exchange rate movements and stock market performance were insignificant. Exchange rate volatility was found to reduce FDI inflows, reflecting the adverse impact of exchange rate uncertainty on foreign investment.

Kolawole and Seyingbo (2025) assessed the impact of foreign direct investment, inflation, and exchange rate fluctuations on economic growth in Nigeria using annual data from 1990 to 2024. The findings indicated that past GDP significantly influenced present growth, suggesting path dependence. Inflation and exchange rate fluctuations exhibited inconsistent and short-lived effects. FDI was insignificant in the short run, implying that foreign capital inflows did not immediately translate into productivity gains due to institutional weaknesses and profit repatriation. In the long run, FDI exerted a weak but positive effect, significant only at the 10% level, while inflation and exchange rates were insignificant.

Okere et al. (2022) examined the relationship between trade openness, FDI inflows, and economic growth in Nigeria from 1982 to 2018, accounting for the global financial crisis of 2007–2008 and the commodity crisis of 2016. The results indicated that the global economic crisis significantly dampened economic growth. The interaction effects of total trade and FDI with the global crisis weakened both trade-led and FDI-led growth relationships. The negative interaction between FDI inflows and the global crisis was more pronounced in the long run than in the short run.

3. Methodology

This study adopts ex-facto research design. This study relies exclusively on secondary data collected from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Development Indicators (WDI) from 1990-2024. The model was theoretically anchored on the Mundell–Fleming Open Economy Model (Mundell, 1963; Fleming, 1962). The study specifies the following models:

$$RGDPG = f(FDI, LOGREEXC, LOGGFCF, LOGTRADE)$$

$$RGDPG_t = \beta_0 + \beta_1 FDI_t + \beta_2 LOGREEXC_t + \beta_3 LOGGFCF_t + \beta_4 LOGTRADE_t + \mu_t$$

Where:

RGDPG = Real GDP growth rate

FDI = Logarithm of foreign direct investment
LOGREEXR = Logarithm of real effective exchange rate

LOGGFCF = Logarithm of gross fixed capital formation

LOGTADE = logarithm of trade openness

μ_t = stochastic error terms or error terms

β_0 = constant parameter to be estimated

A priori Expectations

Based on theoretical reasoning and empirical literature, the expected signs of the coefficients are as follows: $RGDPG = \beta_1 > 0, \beta_2 < 0, \beta_3 > 0, \beta_4 > 0$

4. Data Analysis

Table 4.1: Summary of Descriptive Statistics for the Variables

	FDI	LOGGFCF	LOGREEX	LOGTRAD	RGDPG
Mean	1.252000	8.666071	4.608422	15.22354	4.081714
Median	1.200000	8.927350	4.610158	15.93294	4.230000
Maximum	2.900000	11.36450	5.609472	18.17035	15.33000
Minimum	-0.030000	5.571279	3.907412	11.60720	-6.370000
Std. Dev.	0.859589	1.586329	0.378801	1.728585	4.152309
Skewness	0.222146	-0.192781	0.634821	-0.658627	0.106334
Kurtosis	1.823627	2.318227	3.597414	2.453295	3.822304
Jarque-Bera	2.305988	0.894649	2.871302	2.966318	1.052059

Probability	0.315690	0.639336	0.237960	0.226920	0.590947
Sum	43.82000	303.3125	161.2948	532.8241	142.8600
Sum Sq. Dev.	25.12236	85.55900	4.878669	101.5922	586.2169
Observations	35	35	35	35	35

Source: *Researcher's computation using E-views 12.*

Table 4.1 summarizes the distributional characteristics of the study variables from 1990 to 2024. The average values for foreign direct investment (FDI) net inflows as a percentage of GDP is 1.250, ranging from -0.030 to 2.900. The average of the logarithm of gross fixed capital formation (LOGGFCF) is 8.666, and the average for the logarithm of the real effective exchange rate (LOGREEXC) is 4.608. LOGGFCF varies from 5.571 to 11.364, and LOGREEXC ranges from 3.907 to 5.609. The mean values for the logarithm of trade openness (LOGTRADE) and the real GDP growth rate (RGDPG) are 15.223 and 4.081, respectively. LOGTRADE spans from 11.607 to 18.170, whereas RGDPG ranges between -3.670 and 15.330. The analysis indicates that the standard deviations reflect a certain level of dispersion around the mean values for all variables, except for the real GDP growth rate. The Jarque–Bera statistics and corresponding p-values suggest that the null hypothesis of normality is accepted at the 5% significance level for all variables. In summary, all series are approximately normally distributed at the standard 5% significance level.

Table 4.2: ADF unit test results

Variables	ADF at Level	Critical value 5%	ADF at 1 st Diff.	Critical value 5%	Order of Integration
FDI	-2.267781	-2.951125	-7.009617	-2.954021	I(1)
LOGGFCF	-1.304184	-2.951125	-4.241238	-2.954021	I(1)
LOGREEXC	-3.285158	-2.954021	NA	NA	I(0)
LOGTRADE	-1.282146	-2.951125	-5.174689	-2.954021	I(1)
RGDPG	-3.794899	-2.951125	NA	NA	I(0)

Source: *Researcher's computation from Eviews 12.*

The results of the Augmented Dickey-Fuller (ADF) unit root test presented in Table 4.2 indicate that only the real GDP growth rate (RGDPG) and the logarithm of the real effective exchange rate (LOGREEXC) demonstrate stationarity in their level forms, as their ADF values exceed the critical thresholds of -3.285158 and -3.794899 at the 5% level of significance. This finding allows the study to reject the null hypothesis of a unit root for both the real GDP growth and the logarithm of the real effective exchange rate. Conversely, the remaining variables analyzed show stationarity only in their first difference forms, as their ADF values also surpass the 5% significance level. This indicates that these variables are integrated of order 1 (I(1)), meaning they require differencing to achieve stationarity. Consequently, the series examined in this study comprises a mix of integrated order 0 (I(0)) and integrated order 1 (I(1)) variables, as shown in the table. This information is crucial for understanding the characteristics of the variables and for conducting subsequent analysis and modeling.

Table 4.3: Bounds Cointegration Test Result

Real GDP growth rate (RGDPG)

F-Bounds Test		Null Hypothesis: No relationship	No levels	
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	26.71182	10%	3.03	4.06
K	4	5%	3.47	4.57
		2.5%	3.89	5.07
		1%	4.4	5.72

Source: Authors' computations using Eviews 12

Note: K denotes the number of independent variables

This study employed the ARDL bounds cointegration test to examine the long-term relationship between I(1) and I(0) series, as outlined in Table 4.3. As indicated in Table 4.4, the F-statistics for this model 26.71182 for the real GDP growth rate, both of which exceed the critical values for the lower and upper bounds at a 5% significance level. This finding demonstrates a significant long-term correlation between the dependent and independent variables in each model.

Model Results and Discussion

Table 4.5: ARDL Short and Long Run Results

Dependent Variable: Real GDP growth rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-87.16957	6.280126	-13.88023	0.0000
@TREND	-5.083983	0.363584	-13.98298	0.0000
D(RGDPG(-1))	-0.249348	0.058702	-4.247716	0.0021
D(RGDPG(-2))	-0.232676	0.066222	-3.513563	0.0066
D(RGDPG(-3))	-0.211036	0.062748	-3.363246	0.0083
D(LOGTRADE)	-0.580815	0.800084	-0.725942	0.4863
D(LOGTRADE(-1))	-4.203889	0.876485	-4.796305	0.0010
D(LOGREEXC)	2.688428	1.027929	2.615383	0.0280
D(LOGREEXC(-1))	7.598586	1.453882	5.226411	0.0005
D(LOGREEXC(-2))	4.136421	1.099759	3.761205	0.0045
D(LOGGFCF)	10.04634	2.139304	4.696077	0.0011
D(LOGGFCF(-1))	-25.32934	2.469849	-10.25542	0.0000
D(LOGGFCF(-2))	-36.91356	3.075092	-12.00405	0.0000
D(LOGGFCF(-3))	-18.23934	2.906296	-6.275802	0.0001
D(FDI)	-3.078434	0.484626	-6.352191	0.0001
D(FDI(-1))	-2.574503	0.589307	-4.368693	0.0018
D(FDI(-2))	-2.357341	0.512527	-4.599444	0.0013
CointEq(-1)*	-1.201950	0.086536	-13.88952	0.0000

Long run results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGTRADE	-0.772672	1.741274	-0.443739	0.6677

LOGREEXC	-13.25738	2.868152	-4.622272	0.0013
LOGGFCF	27.92710	6.100525	4.577820	0.0013
FDI	-4.987893	1.446983	-3.447099	0.0073

$$R^2 = 0.965860; \text{Adj. } R^2 = 0.921216$$

Source: Researcher's computation using Eviews 12.

Table 4.5 displays the ARDL short- and long-term results, demonstrating the correlations among foreign direct investment, exchange rate fluctuations, and real GDP growth rate in Nigeria. The short-run analysis indicates that the coefficient of the logarithm of trade openness at the current year and lag 1 period indicates a negative correlation but is only statistically significant at the lag 1 period for the real GDP growth rate in Nigeria. The long-run coefficient indicates a negative yet not statistically significant effect on Nigeria's real GDP growth rate, suggesting that a 1% change in the logarithm of trade openness results in a decrease of 0.772 units in the real GDP growth rate. These findings are inconsistent with the study's a priori expectations.

The ARDL short- and long-run estimated coefficients reveal that the logarithm of the real effective exchange rate for the current year and its first and second lags exert statistically significant effects on the real GDP growth rate. Specifically, a 1% change in the logarithm of the real effective exchange rate increases real GDP growth in Nigeria by 2.688, 7.598, and 4.136 units, respectively, in the short run. In contrast, the long-run estimated coefficient reveals a statistically significant negative impact on Nigeria's real GDP growth rate, suggesting that a 1% change results in a decrease of 13.257 units in real GDP growth over the long term. These findings contradict the study's initial hypothesis and the empirical results of Shingil and Panshak (2017), who identified a positive long-term impact.

The ARDL short-run estimates indicate that the logarithm of gross fixed capital formation for the current year significantly impacts the real GDP growth rate in Nigeria, demonstrating that a 1% variation in this logarithm increases the real GDP growth rate by 10.04 units in the short term. The lags of one, two, and three periods exhibit a statistically significant adverse effect on the real GDP growth rate in Nigeria. The long-run coefficient estimates demonstrate a statistically significant positive impact of the logarithm of gross fixed capital formation on the real GDP growth rate in Nigeria, suggesting that a 1% variation in the logarithm of gross fixed capital formation results in an increase of 27.927 units in the real GDP growth rate in the long term. These findings align with the study's a priori expectations and the empirical results of Ghulam (2021) and Islam & Biswas (2023), which indicate that gross fixed capital formation is positively correlated with real GDP growth.

Furthermore, the short-run analysis indicates that in the current year, lags 1 and 2, the coefficients of foreign direct investment demonstrate a statistically significant negative effect on Nigeria's real GDP growth rate. The long-run estimated coefficient indicates a statistically significant negative impact of foreign direct investment on Nigeria's real GDP growth rate, suggesting that a unit increase in FDI reduces the real GDP growth rate by 4.987 units in the long term. The results contradict the study's a priori hypothesis of the study.

The error correction term, CointEq(-1), which signifies the rate of return to equilibrium, is statistically significant (-1.201950, Prob. = 0.0000). This result indicates that 120% of deviations from the long-term equilibrium are corrected annually, signifying an exceptionally rapid adjustment process to short-term fluctuations. The R-squared value of 0.965860 signifies a strong model fit for the data, confirming the explanatory power of the variables analysed regarding their impact on Nigeria's industrial employment. The adjusted R-squared value of 0.921216, which accounts for degrees of freedom, indicates the model's fit after considering the number of predictors.

Table 4.5: Post-Estimation Tests Results

Test	Null Hypothesis	F-Statistic	Probability	Decision
Serial Correlation LM Test	H₀ : No serial correlation	0.074129	0.9288	Retain H ₀
Heteroskedasticity Test	H₀ : Homoscedasticity	0.873393	0.5627	Retain H ₀
Normality Test	H₀ : Normally distributed	0.622353	0.732585	Retain H ₀

Source: *Researcher's Computation using Eviews 12, 2026.*

The post-estimation diagnostic results presented in Table 4.5 indicate that the estimated ARDL model does not exhibit evidence of the major residual problems examined. The Breusch–Godfrey LM test reports a probability value of 0.9288, which is greater than the 5% significance level. Therefore, the null hypothesis of no serial correlation cannot be rejected, suggesting that the residuals do not exhibit statistically significant serial correlation.

Similarly, the Breusch–Pagan–Godfrey heteroskedasticity test produces a probability value of 0.5627, which exceeds 0.05. Thus, the null hypothesis of homoskedasticity cannot be rejected, indicating no statistically significant evidence of heteroskedasticity in the residuals.

The Jarque–Bera test reports a statistic of 0.622353 with a probability value of 0.732585. Since the probability value exceeds 0.05, the null hypothesis of normally distributed residuals cannot be rejected. Hence, there is no statistically significant evidence that the residuals depart from normality.

5. Conclusion and Recommendations

Conclusion

The study concludes that Nigeria's real GDP growth is significantly influenced by exchange-rate movements, gross fixed capital formation, foreign direct investment, and trade openness. Gross fixed capital formation has a positive and significant long-run effect, highlighting the importance of productive investment for sustained economic growth. In contrast, FDI and the real effective exchange rate exhibit significant negative long-run effects, while trade openness has a negative but statistically insignificant effect. Overall, the findings suggest that Nigeria should focus on productive investment, exchange-rate stability, quality-oriented FDI, and strategic trade policies to achieve sustainable real GDP growth.

Recommendations

Based on the findings and conclusion drawn from this study, the following recommendations are made:

1. The Nigerian government should expand infrastructure and private-sector investment, given the strong positive long-run effect of gross fixed capital formation on real GDP growth.
2. Reduce excessive exchange-rate volatility and maintain a competitive, predictable real exchange rate, given its significant negative long-run effect on GDP growth.
3. Shift from attracting FDI by volume to targeting investments that generate technology transfer, local employment, domestic linkages, and productive capacity.
4. Complement trade liberalization with export diversification, improved infrastructure, and support for domestic firms to ensure openness contributes more effectively to economic growth.

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