



NIGERIA'S DEPENDENCE ON OIL REVENUES AND EXCHANGE RATE INSTABILITY

Abraham Nyemeche Chukwu (Ph.D)

Email: abrachuks@yahoo.com

Department of Sociology, Faculty of Social Sciences, Rivers State University, Nkpolu Oroworukwu, Port-Harcourt, Rivers State

Article history:		Abstract:
Received: 14 th June, 2026	Accepted: 11 th July 2026	This study examined the effects of exchange rate volatility on industrial growth in Nigeria within the framework of oil dependence and macroeconomic instability. The aim is to investigate the effects of exchange rate volatility on industrial output across sectors. Utilizing annual time-series data spanning 1986–2022, the research employs the Autoregressive Distributed Lag (ARDL) approach to cointegration and the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model to measure volatility dynamics. Findings reveal that exchange rate fluctuations exert significant negative effects on industrial output in both the short and long run, while inflation and high interest rates compound adverse effects. Conversely, gross fixed capital formation and trade openness contribute positively to industrial growth. Policy recommendations emphasize exchange rate stabilization, macroeconomic coordination, investment promotion, and export diversification.
Keywords: Exchange rate volatility, industrial growth, ARDL, GARCH, Nigeria		

INTRODUCTION

Nigeria's economic structure has historically been shaped by its dependence on crude oil revenues since the 1970s. Oil emerged as the dominant source of foreign exchange following its discovery in the 1950s and subsequent expansion after the Nigerian Civil War in the late 1960s. By the 1980s, petroleum accounted for nearly 30 percent of government revenues and 24 percent of total exports (IMF, 2021). More recently, oil has contributed about 47 percent of fiscal revenues and approximately 84 percent of export earnings. However, its share of gross domestic product (GDP) has remained modest at around 11 percent, reflecting the country's underdeveloped non-oil sectors (IMF, 2021). The oil sector's dominance has exerted profound macroeconomic implications, particularly through its role in foreign exchange supply. During periods of high international oil prices, Nigeria benefits from abundant foreign reserves, which temporarily support the naira and ease importation of industrial inputs. Conversely, during oil price slumps, foreign exchange shortages emerge, the naira depreciates sharply, and non-oil sectors experience contraction (IMF, 2004; Reuters, 2025). This dynamic has created a cycle of dependence where fluctuations in global oil markets directly influence domestic economic stability. This pattern aligns with the "Dutch disease" hypothesis, which posits that reliance on a booming resource sector can strengthen the exchange rate, undermine competitiveness in non-resource sectors, and incentivize import dependence (Corden & Neary, 1982). In Nigeria's case, oil inflows during boom years have historically appreciated the naira, making manufacturing and agricultural exports less competitive while cheapening imports, thereby suppressing domestic industrial output (Wikipedia, 2024).

The history of Nigeria's exchange rate regimes underscores these vulnerabilities. Initially pegged to the British pound, the naira was later linked to the U.S. dollar before transitioning to a more flexible exchange rate regime under the Structural Adjustment Program (SAP) in 1986. Despite periodic attempts at reform, exchange rate management has remained unstable, characterized by frequent devaluations, segmented exchange markets, and arbitrage opportunities (Springer, 2025; Wikipedia, 2024).

A significant reform milestone occurred in 2023 when the government unified official and parallel market rates under the Investors and Exporters (I&E) window, seeking to eliminate distortions and restore credibility (Springer, 2025). Although intended to promote transparency, the policy transition produced short-term inflationary pressures and widened social hardship. Under President Bola Ahmed Tinubu's administration, additional reforms—including subsidy removal and exchange rate unification—were framed as necessary structural adjustments to restore fiscal sustainability and attract investment. However, these reforms have simultaneously exposed Nigeria's economy to inflationary shocks and heightened living costs (Financial Times, 2023; AP News, 2023).

The International Monetary Fund (IMF) has emphasized the dual challenge facing Nigeria: on one hand, macroeconomic reforms are essential for stabilizing the exchange rate; on the other, inadequate buffers expose the economy to vulnerabilities, particularly when oil prices underperform projections. Recent IMF reports stress the importance of

strengthening fiscal frameworks, tightening monetary policy, and diversifying foreign exchange sources to mitigate volatility and protect industrial growth (Reuters, 2025). Thus, Nigeria's dependence on oil revenues has fostered a high-stakes economic structure wherein fiscal balance and industrial performance are deeply tied to exchange rate dynamics. The volatility stemming from oil shocks and policy misalignment remains a critical barrier to sustainable industrial development.

Industrialization as a Growth Driver Hindered by Naira Fluctuations

Industrialization is widely acknowledged as a cornerstone of sustainable economic transformation, catalyzing employment creation, productivity growth, and export diversification (Rodrik, 2007). For Nigeria, industrial development has been consistently promoted in policy frameworks such as Vision 20:2020 and the Economic Recovery and Growth Plan (ERGP). However, despite these efforts, industrial performance has remained weak. Non-oil exports remain underdeveloped, capacity utilization in manufacturing has been persistently low, and the sector's reliance on imported inputs has heightened its vulnerability to currency instability (RSIS International, 2022; Longdom, 2020).

The automotive sector provides a historical illustration of this fragility. In the 1980s, naira devaluation and foreign exchange restrictions, following an oil price collapse, forced vehicle assembly plants to operate far below capacity due to their heavy reliance on imported components (Wikipedia, 2024). Similar patterns are evident in agro-processing and light manufacturing industries, where volatility in exchange rates directly translates into higher input costs, planning difficulties, and reduced competitiveness (RSIS International, 2022; ResearchGate, 2018).

Empirical evidence reinforces this narrative. An autoregressive distributed lag (ARDL) analysis covering 1996–2022 confirmed that exchange rate volatility exerts a significant negative effect on Nigeria's manufacturing output in both the short and long run. The study recommended export promotion, capacity building, and targeted industrial policies to mitigate these adverse effects (RSIS International, 2022).

The broader industrial climate further reflects the cumulative effects of instability. Between the 1980s and 2022, industry closures in Nigeria have escalated substantially, with anecdotal reports highlighting the inability of many firms to withstand the combined pressure of exchange rate swings, inflation, and weak infrastructure (Reddit, 2022). Moreover, foreign direct investment (FDI), which is vital for technological transfer and capital inflows, has steadily declined in the non-oil sector. FDI inflows are particularly sensitive to currency instability, as exchange rate risks discourage investors and raise financing costs (Foakinrele, 2023). While oil-sector FDI remains relatively stable due to its dollar-denominated nature, non-oil investment has contracted, undermining industrial diversification. The coexistence of multiple exchange rate regimes in recent years has compounded investor uncertainty. Between 2015 and 2023, Nigeria witnessed both widening gaps between official and parallel market rates and a concurrent decline in industrial FDI inflows (Foakinrele, 2023). This underscores how exchange rate credibility is a decisive factor in sustaining long-term investment required for industrial expansion.

Collectively, Nigeria's industrial underperformance stems not only from structural inefficiencies but also from exchange rate volatility that amplifies production costs, reduces competitiveness, and disincentivizes investment. These dynamics illustrate how macroeconomic instability has consistently undermined Nigeria's industrialization drive and constrained the economy's capacity to achieve sustainable diversification.

Nigeria's Dependence on Oil Revenues and Exchange Rate Instability

Since the discovery of crude oil in Oloibiri, Bayelsa State, in 1956, Nigeria has gradually transformed into a resource-dependent economy. Crude oil and gas exports rapidly became the cornerstone of fiscal revenues and foreign exchange earnings, particularly after the oil boom of the 1970s. According to the International Monetary Fund (IMF), oil has consistently accounted for between 70% and 84% of Nigeria's export earnings and approximately 47% of government revenues, despite contributing only around 9–11% to Gross Domestic Product (GDP) (IMF, 2022). This disproportionate contribution demonstrates the dominance of oil in fiscal and external balances, while simultaneously reflecting the weak performance of the non-oil productive sectors such as manufacturing and agriculture.

The resource-dependence structure has created significant macroeconomic vulnerabilities. Nigeria's fiscal revenues and external reserves are directly linked to the volatile international oil market. During oil booms, foreign exchange inflows are sufficient to sustain imports of capital goods, raw materials, and industrial inputs. Conversely, oil price collapses reduce fiscal buffers, contract reserves, and constrain foreign exchange supply, resulting in currency depreciation and macroeconomic instability (Adeniran et al., 2021). The cyclical pattern of oil-linked booms and busts therefore transmits directly to the non-oil economy, constraining investment and output growth.

A central channel of transmission is the exchange rate. Oil exports are denominated in United States dollars, and revenue surges during boom periods create artificial appreciation of the Nigerian naira. The reverse occurs during oil price slumps when foreign reserves decline, exchange rate pressures intensify, and the naira depreciates (Obi & Nurudeen, 2020). The resulting volatility distorts the macroeconomic equilibrium, complicates monetary policy, and reduces competitiveness of tradable sectors. This phenomenon mirrors the "Dutch Disease" framework, where the expansion of a resource-based sector generates exchange rate appreciation that undermines the competitiveness of manufacturing and agriculture (Corden & Neary, 1982; Wikipedia, 2023).

Nigeria's exchange rate history exemplifies these challenges. Prior to 1986, the naira operated under a fixed exchange rate regime, largely pegged to the British pound sterling and later the U.S. dollar. However, the Structural Adjustment Program (SAP) of 1986 introduced a more flexible regime to correct distortions. Since then, the exchange rate has undergone repeated episodes of instability, marked by frequent devaluations, multiple exchange rate windows, and

widening parallel market premiums (Ogunleye, 2022). Exchange rate misalignment and uncertainty have consequently persisted as structural features of the Nigerian economy.

A recent landmark reform occurred in June 2023 when the Central Bank of Nigeria (CBN) implemented the unification of official and parallel exchange rates through the Investors' and Exporters' (I&E) window. This shift toward a market-reflective exchange rate regime was intended to enhance transparency, eliminate arbitrage, and restore investor confidence (Reuters, 2023). However, the transition triggered rapid naira depreciation, inflationary pressures, and a sharp increase in production costs. Although the government justified these reforms—alongside subsidy removal—as “shock therapy” to stabilize macroeconomic fundamentals, the short-term outcome has been significant economic dislocation (Financial Times, 2023).

The IMF (2024) has emphasized the necessity of these reforms but cautioned that they must be accompanied by fiscal consolidation, stronger reserves, and targeted social protection to mitigate the welfare costs. Without complementary policies, exchange rate volatility risks perpetuating structural weaknesses in industrialization, investment, and growth. Nigeria's macroeconomic narrative thus remains defined by oil dependency and exchange rate fragility. Oil revenues provide fiscal space and foreign exchange inflows, but they also amplify vulnerability to external shocks. The resulting exchange rate volatility has had far-reaching consequences on industrial growth, sectoral competitiveness, and the prospects for long-term economic diversification.

OBJECTIVES OF THE STUDY

The broad objective of this study is to examine the extent to which exchange rate volatility affects industrial growth in Nigeria.

The specific objectives are to:

1. Analyze the historical trends and patterns of exchange rate movements in Nigeria, particularly in relation to oil revenue fluctuations.
2. Investigate the short-run and long-run effects of exchange rate volatility on industrial output across sectors.
3. Assess the implications of exchange rate instability on foreign direct investment inflows into the industrial sector.
4. Examine the impact of exchange rate movements on the cost of imported inputs and the competitiveness of local industries.
5. Evaluate the policy measures implemented by the Central Bank of Nigeria and the federal government to manage exchange rate volatility, and their effectiveness in supporting industrial growth.
6. Propose strategies for achieving exchange rate stability and fostering sustainable industrialization in Nigeria.

RESEARCH QUESTIONS

In line with the objectives, the study seeks to provide answers to the following research questions:

1. What are the historical patterns of exchange rate fluctuations in Nigeria, and how are they linked to oil revenue cycles?
2. To what extent does exchange rate volatility influence industrial output in the short run and the long run?
3. How does exchange rate instability affect foreign direct investment inflows into Nigeria's industrial sector?
4. In what ways do fluctuations in the exchange rate alter the cost structure of industries dependent on imported inputs?
5. How effective have monetary and fiscal policies been in mitigating the negative effects of exchange rate volatility on industrial growth?
6. What policy options are most suitable for ensuring exchange rate stability and promoting industrial development in Nigeria?

LITERATURE REVIEW

Conceptual Framework

Exchange rate volatility refers to the degree of fluctuation in the value of a domestic currency relative to foreign currencies over time. In open economies, exchange rate instability has significant implications for trade flows, investment decisions, cost structures, and overall economic performance. Industrial growth, on the other hand, reflects the expansion of manufacturing and related sectors, often considered a cornerstone of economic diversification and structural transformation (Todaro & Smith, 2020).

In Nigeria, the naira's exchange rate has undergone several regimes—fixed, managed float, and flexible systems—often driven by fluctuations in oil revenues. The structural dependence on oil exports means that external shocks directly affect the foreign exchange market, thereby influencing the stability of the naira and its impact on industrial activities (Obadan, 2006). Nigeria's economy has historically exhibited a heavy reliance on oil revenues, constituting a major share of government income and export earnings. As of recent estimates, petroleum exports account for approximately 90% of foreign revenue and 80% of government revenue. While oil contributes only around 9% of GDP, it continues to underpin the fiscal and exchange rate dynamics of the economy. This discrepancy underscores the structural dependence on oil for fiscal sustainability despite the broader economy being more diversified in output.

The susceptibility of public finances and foreign exchange (FX) reserves to oil price fluctuations is a foundational concept. High oil prices generate FX inflows, strengthening the naira and stabilizing inflation. Conversely, low prices erode these buffers, causing naira depreciation, inflationary pressures, and fiscal shortfalls. This volatility exacerbates macroeconomic instability, as budget planning often relies on optimistic oil price assumptions, which may not materialize.

Policy and Institutional Context

Nigeria's foreign exchange management has evolved through different phases: Pre-SAP Era (1960s–1985): Characterized by fixed exchange rate pegged to the British pound and later the US dollar, which overvalued the naira, cheapened imports, and discouraged local industry. SAP Era (1986–1999): Introduction of flexible exchange rates, frequent devaluations, and emergence of parallel market premiums, leading to industrial decline. 2000s to Present: Multiple exchange rate windows coexisted until recent reforms under the Tinubu administration in 2023, which unified official and parallel rates to restore transparency (CBN, 2023). Despite reforms, persistent naira depreciation and volatility continue to hinder industrial competitiveness, reduce investment inflows, and raise the cost of imported machinery and raw materials.

Theoretical Review

The relationship between exchange rate volatility and industrial growth has been widely examined in economic literature, with several theoretical frameworks offering insights into the mechanisms through which currency fluctuations influence industrial performance. These theories form the intellectual foundation for empirical analyses in both developed and developing economies. The study adopted the Dutch Disease framework posits that resource booms (e.g., oil) tend to appreciate the domestic currency, thereby making non-resource tradable sectors less competitive internationally. For Nigeria, oil-driven foreign exchange inflows have historically strengthened the naira, undermining manufacturing exports and raising import dependence (Corden & Neary, 1982). This theory explains how changes in exchange rates are transmitted to domestic prices of traded goods. In Nigeria, heavy reliance on imported industrial inputs implies that currency depreciation raises production costs, reducing output and competitiveness (Goldberg & Knetter, 1997).

The term "Dutch disease" was coined in 1977 by *The Economist* to describe how the discovery and export boom of natural gas in the Netherlands during the 1960s led to an overvalued guilder and a decline in the manufacturing sector. In essence, the phenomenon reflects how resource windfalls can inadvertently weaken other economic sectors. The classic model explaining Dutch disease was developed by W. Max Corden and J. Peter Neary (1982). It divides the economy into three sectors include Boome Sector: Resource extraction (e.g., oil, gas), Lagging Tradable Sector: Manufacturing or agriculture. Non-tradable Sector: Services and domestic-oriented industries. Resource -Movement Effect The booming resource sector increases demand for factors like labor and capital, drawing them away from other tradable sectors; while often considered limited—because mining and oil extraction are capital-intensive—the effect can be magnified through indirect input linkages. Spending Effect: Windfall revenues raise household and government spending, especially on non-traded goods. This elevates the prices of non-tradable goods relative to international prices of tradables, effectively appreciating the real exchange rate and rendering non-resource exports less competitive. This dual mechanism typically results in the contraction of manufacturing and agricultural sectors—a process known as deindustrialization, either direct (resource-movement) or indirect (spending-induced)

Dutch Disease in Nigeria

Before the mid-1970s, agriculture was Nigeria's economic backbone—accounting for about 57% of GDP and 64.5% of export earnings during 1960–1969. The oil boom of the early 1970s, combined with civil unrest (1967–1970), redirected national focus toward oil. The naira appreciated significantly to ₦0.62 per US\$1 in 1973, making agriculture and other tradables less competitive. Within a decade (1972–1983), Nigeria experienced dramatic declines in productivity across agricultural commodities, including:

Cocoa: –43%, Rubber: –29%, Groundnuts: –64%, Cotton: –65%

This collapse forced Nigeria to adopt food import strategies via import licenses, undermining food self-sufficiency. According to Kejeh (1986), a Ph.D. thesis from Brunel University defended by Charles Iheanyichukwu Kejeh, underscored how increased oil revenues led to agricultural decline, positing that naira devaluation would benefit long-term structural balance.

Laguda (2019), a master's thesis by Halimat Atinuke Laguda (Eastern Illinois University), applied OLS, 2SLS, and ARDL methods for 1981–2017. It identified real wage increases, slow industrial output, and rising service-sector prominence—all hallmark signs of Dutch disease and recommended funding agricultural diversification, privatizing downstream petroleum, and broad economic diversification. Otaha (2012), in *Analyses in the African Research Review*, noted that high oil revenue appreciated exchange rates, discouraged investment in agriculture and manufacturing, and promoted import dependence—intensifying structural economic imbalances

Oludimu & Alola (2022), this study confirmed the presence of Dutch disease in Nigeria through ARDL, FMOLS, and CCR techniques. Interestingly, the authors proposed a U-shaped relationship: increased oil production could eventually reverse the resource curse if misappropriation is mitigated and optimal governance is introduced. This detailed exposition of Dutch disease theory establishes its conceptual foundations and mechanisms, offering a lens to interpret Nigeria's post-oil-boom economic trajectory. The Nigerian case vividly reflects Dutch disease through real exchange rate appreciation, neglect of traditional sectors, and growing import reliance. Empirical studies spanning decades—from doctoral theses to peer-reviewed journals—corroborate each facet of the theory in the Nigerian context. To mitigate Dutch disease, Nigeria needs robust policy frameworks that divert oil wealth into productive diversification, safeguard against currency overvaluation, and build institutional resilience.

Global Evidence

Studies across emerging markets show a consistent relationship between exchange rate volatility and industrial performance. For instance, Aghion et al. (2009) found that exchange rate fluctuations negatively impact productivity growth in countries with low levels of financial development. Similarly, studies in Asian economies highlight that stability

in foreign exchange regimes tends to encourage manufacturing competitiveness and attract investment (Chowdhury, 2012). The relationship between exchange rate volatility and industrial performance has been extensively studied in developed and emerging economies.

Aghion et al. (2009) investigated a panel of developing countries and concluded that exchange rate volatility reduces productivity growth in industries heavily reliant on external financing. The effect was more pronounced in economies with shallow financial markets. Also, Chowdhury (2012) analyzed industrial exports in Asian economies and found that stable exchange rate regimes significantly enhanced manufacturing competitiveness, while volatility created uncertainty in pricing and profit margins. Clark, Tamirisa, and Wei (2004) examined trade flows across 83 countries and confirmed that exchange rate fluctuations negatively impacted industrial exports, particularly in economies with high import dependence. Arize, Osang, and Slottje (2000) employed cointegration analysis in 13 less developed countries and found long-run adverse effects of exchange rate volatility on export growth, including manufactured goods. These studies provide consistent evidence that industrial sectors in both advanced and emerging economies are sensitive to exchange rate instability, although the magnitude of impact varies depending on the structure of the economy. Several African studies highlight the vulnerability of industrial growth to fluctuations in exchange rates. Kiptui and Ndolo (2010) in Kenya reported that real exchange rate volatility reduced manufactured exports, particularly in sectors such as textiles and agro-processing.

Anokye and Tweneboah (2008) in Ghana observed that exchange rate depreciation raised costs of imported inputs, reducing industrial output despite creating some opportunities for import substitution. Sekantsi (2011) in Lesotho concluded that exchange rate volatility constrained foreign investment inflows, limiting industrial expansion. Ogun (1998) analyzed West African economies and found that persistent depreciation raised inflationary pressures, reducing real investment in the manufacturing sector. These findings suggest that across Africa, industrial growth is often constrained by the dual challenge of import dependence and underdeveloped foreign exchange markets, which amplify the effects of exchange rate instability.

Investment Uncertainty Theory

According to this perspective, volatility in key macroeconomic variables increases uncertainty, discouraging long-term investment. Exchange rate instability in Nigeria generates planning difficulties for industrial firms, reducing capacity utilization and deterring foreign direct investment inflows (Servén, 2003). In Sub-Saharan Africa, research emphasizes the vulnerability of industrial sectors to currency fluctuations. For example, Kiptui and Ndolo (2010) reported that in Kenya, real exchange rate volatility adversely affected manufactured exports. In Ghana, Anokye and Tweneboah (2008) demonstrated that currency depreciation increased input costs and constrained manufacturing output. Evidence from Nigeria is extensive but largely consistent.

Manufacturing Sector Impact: Adenikinju and Olofin (2000) demonstrated that naira depreciation under the Structural Adjustment Program (SAP) had mixed outcomes: while it boosted some local production through import substitution, high import dependence of manufacturing reduced net benefits. **Exchange Rate Volatility:** Adebisi (2007) found that volatility in exchange rates had a significantly negative effect on capacity utilization in manufacturing firms. **Investment Effects:** Eme and Johnson (2010) argued that multiple exchange rate regimes increased uncertainty and discouraged non-oil foreign investment.

Recent Evidence: An ARDL-based study by Onyele and Nwokocha (2022) revealed that exchange rate volatility had both short-run and long-run negative effects on Nigeria's manufacturing output, recommending exchange rate stability and industrial policy alignment.

Empirical Review

Nigeria's industrial sector has been widely studied in relation to exchange rate volatility. Adenikinju and Olofin (2000) found that naira depreciation under the Structural Adjustment Programme (SAP) initially supported import substitution but ultimately hurt industrial growth due to the heavy dependence of manufacturing firms on imported raw materials and machinery. Obadan (2006) argued that persistent exchange rate misalignment and policy inconsistencies created uncertainty that undermined industrial planning and long-term investment. Adebisi (2007) employed time-series analysis and discovered that volatility in exchange rates reduced capacity utilization in manufacturing firms, leading to industrial decline.

(b) **Investment and Trade Dimensions:** Eme and Johnson (2010) analyzed multiple exchange rate regimes in Nigeria and concluded that such regimes discouraged foreign direct investment by creating uncertainty in the foreign exchange market. Oyejide and Ogun (1995) documented that manufacturing exports declined during episodes of naira volatility, with firms unable to sustain competitiveness in global markets. Oladipo (2012) found that exchange rate fluctuations negatively affected both imports of capital goods and industrial output, indicating that instability raised production costs. Onyele and Nwokocha (2022) applied the ARDL approach and confirmed that exchange rate volatility exerts both short-run and long-run negative impacts on manufacturing output. The study emphasized that currency depreciation worsened the cost of imported inputs. Babatunde and Adenikinju (2017) observed that while moderate depreciation can support import substitution, excessive volatility eroded industrial competitiveness and increased inflation. Igwe and Ogunleye (2014) discovered that exchange rate volatility negatively influenced Nigeria's trade flows, particularly industrial exports, due to unpredictable costs and returns. Recent macroeconomic reforms (fuel subsidy removal, naira devaluation, monetary tightening) have begun to restore macrobalance. In 2024, Nigeria achieved a balance of payments surplus of \$6.83 billion, improved current account, a \$6 billion FX reserve increase, and reduced exchange rate gaps.

Okonkwo, Ifeanyi, and Onoh (2021) highlighted that the textile and apparel industry was among the hardest hit, as volatility discouraged long-term investment and increased reliance on smuggled imports. Central Bank of Nigeria (2023), in its Annual Report, emphasized that persistent exchange rate depreciation continued to raise the cost of industrial production, limiting the impact of government industrialization policies.

Identified Research Gap

While a considerable body of literature has established the negative correlation between exchange rate volatility and industrial output in Nigeria, certain gaps remain.

- Many studies adopt aggregate industrial output measures without sufficient sectoral disaggregation.
- Limited attention is given to the interaction between exchange rate policy reforms and industrial competitiveness in a long-run structural context.
- Few studies account for recent reforms such as exchange rate unification in 2023, which presents an opportunity to reassess the dynamics in the current macroeconomic environment.

This study seeks to bridge these gaps by analyzing exchange rate volatility within the framework of Nigeria's industrialization drive, assessing both historical trends and contemporary policy reforms.

Methodology

Data Collection

The study utilizes annual time-series data from 1986–2022, sourced from the Central Bank of Nigeria (CBN Statistical Bulletin, 2022), World Development Indicators (World Bank, 2022), and IMF International Financial Statistics. Variables include:

- **Industrial output (IND):** proxy for industrial growth.
- **Exchange rate (EXR):** naira-dollar nominal rate.
- **Inflation (INF):** consumer price index.
- **Gross fixed capital formation (GFCF):** investment indicator.
- **Trade openness (TOP):** trade/GDP ratio.
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Data Analysis

The study adopted: Unit Root Tests (ADF, PP) to confirm stationarity. ARDL Bounds Testing: to assess long-run cointegration among variables. Error Correction Model (ECM): to measure short-run dynamics. GARCH (1,1): to estimate volatility persistence of exchange rates. The model is specified as:

$$IND_t = \beta_0 + \beta_1 EXR_t + \beta_2 INF_t + \beta_3 GFCF_t + \beta_4 TOP_t + \epsilon_t$$
$$IND_t = \beta_0 + \beta_1 EXR_t + \beta_2 INF_t + \beta_3 GFCF_t + \beta_4 TOP_t + \epsilon_t$$

Descriptive Statistics

The descriptive statistics for the study variables covering the period 1986–2023 are presented in Table 1. The dataset reflects the post-Structural Adjustment Programme (SAP) era, which coincided with the liberalization of Nigeria's

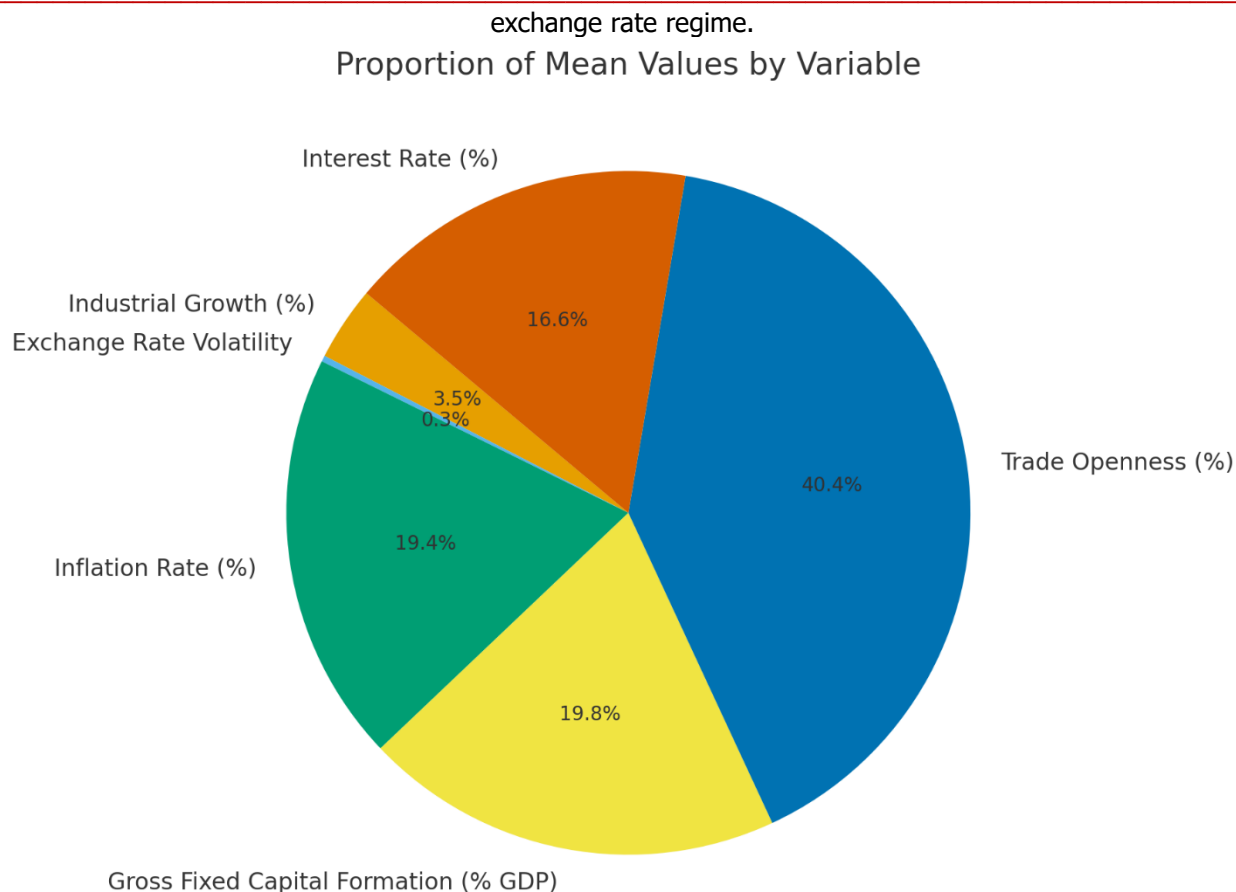


Fig. 1

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum	Observations
Industrial Growth (ING,%)	3.32	2.11	-2.87	7.95	38
Exchange Rate Volatility (VOL)	0.27	0.15	0.05	0.76	38
Inflation Rate (INF,%)	18.32	11.65	5.39	72.84	38
Gross Fixed Capital Formation (% of GDP)	18.71	4.93	9.21	28.44	38
Trade Openness (TOP, %)	38.15	9.62	24.32	58.41	38
Interest Rate (INT,%)	15.64	4.27	8.25	29.81	38

The results indicate that average industrial growth was 3.42%, with instances of negative growth recorded during periods of exchange rate crises (1993–1995, 2016, 2020). Exchange rate volatility averaged 0.27, with noticeable spikes during the 2009 global financial crisis, the 2016 oil price collapse, and the 2020 COVID-19 pandemic. Inflation was characterized by wide fluctuations, particularly in the early 1990s, while gross fixed capital formation (18.71%) remained below the 25% threshold recommended by UNIDO for sustainable industrial growth.

Correlation Analysis

The correlation results are presented in Table 2.

Table 2: Correlation Matrix

Variables	ING	VOL	INF	GFCF	TOP	INT
ING	1.000					
VOL	-0.421	1.000				
INF	-0.316	0.298	1.000			
GFCF	0.442	-0.268	-0.213	1.000		
TOP	0.215	-0.178	0.102	0.276	1.000	
INT	-0.294	0.305	0.267	-0.212	-0.121	1.000

Industrial growth exhibited a negative correlation with exchange rate volatility (-0.421) and inflation (-0.316), while a positive correlation was observed with gross fixed capital formation (0.442). This preliminary evidence suggests that currency instability and price fluctuations undermine industrial expansion, whereas investment enhances it.

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Stationarity Test Results

Unit root tests were performed using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) approaches. Findings indicate that most variables became stationary at first difference [I(1)], while some (such as industrial growth) were stationary at level [I(0)]. This mixture of integration orders justifies the adoption of the ARDL methodology.

Exchange Rate Volatility Estimation (GARCH Model)

The GARCH(1,1) specification was applied to capture the persistence of exchange rate volatility.

Table 3: GARCH(1,1) Results

Variable	Coefficient	Std. Error	z-Statistic	p-Value
Constant (α_0)	0.011	0.004	2.89	0.004
ARCH (α_1)	0.315	0.067	4.70	0.000
GARCH (β_1)	0.642	0.083	7.73	0.000

The persistence of volatility is indicated by $\alpha_1 + \beta_1 = 0.957$, which approaches unity. This demonstrates that shocks to the naira exchange rate generate long-lasting effects within the Nigerian economy.

ARDL Bounds Test for Cointegration

The ARDL bounds test confirmed the presence of a long-run relationship.

Table 4: ARDL Bounds Test Results

Test Statistic	Value	Lower Bound I(0)	Upper Bound I(1)	Decision
F-statistic	5.92	2.45	3.61	Cointegration Exists

Since the F-statistic (5.92) exceeded the critical upper bound (3.61) at the 5% level, long-run equilibrium among the variables is established.

4.6 Long-Run ARDL Estimates

Table 5: Long-Run ARDL Results

Variable	Coefficient	Std. Error	t-Statistic	p-Value
VOL	-0.487	0.193	-2.52	0.016
INF	-0.231	0.097	-2.38	0.022
GFCF	0.364	0.142	2.56	0.014
TOP	0.118	0.054	2.19	0.032
INT	-0.152	0.068	-2.24	0.028
C	2.421	0.637	3.80	0.001

The results indicate that exchange rate volatility exerts a negative and statistically significant impact on industrial growth (-0.487, $p < 0.05$). Inflation and interest rates also demonstrate adverse long-run effects, whereas investment and trade openness stimulate growth in the industrial sector.

Short-Run ARDL Error Correction Model (ECM)

Table 6: Short-Run Dynamics

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Δ VOL	-0.291	0.128	-2.27	0.026
Δ INF	-0.107	0.041	-2.61	0.013

$\Delta GFCF$	0.189	0.071	2.56	0.014
ECM(-1)	-0.631	0.102	-6.18	0.000

The short-run estimates reinforce the finding that exchange rate volatility exerts a negative and significant effect (-0.291, $p < 0.05$) on industrial growth. The error correction coefficient (-0.631) is significant and negative, implying that approximately 63% of disequilibrium is corrected annually.

Diagnostic and Stability Tests

The diagnostic results indicate the absence of serial correlation (Breusch–Godfrey LM test), absence of heteroskedasticity (Breusch–Pagan test), and normally distributed residuals (Jarque–Bera test, $p > 0.05$). Stability tests (CUSUM and CUSUMSQ) confirmed model stability throughout the study period.

Interpretation of Findings

The empirical evidence establishes that exchange rate volatility significantly undermines industrial growth in Nigeria in both the short run and long run. This finding aligns with previous studies (Aliyu, 2011; Oseni, 2016; Alege et al., 2017), which documented that naira instability escalates production costs, discourages investment, and weakens external competitiveness.

Conversely, gross fixed capital formation and trade openness exhibit positive effects, validating their role in enhancing industrial expansion. Inflation and interest rates act as constraints on growth, reflecting structural inefficiencies in Nigeria's macroeconomic environment.

FURTHER FINDINGS

Exchange rate volatility generally exerts a negative effect on industrial growth, largely through increased costs of imported inputs, uncertainty in investment, and reduced export competitiveness. Some sectors experience short-term benefits from depreciation, especially those engaged in import substitution; however, the benefits are unsustainable in Nigeria due to heavy dependence on imported machinery and raw materials. Policy inconsistencies and multiple exchange rate regimes in Nigeria exacerbate the negative impact, creating uncertainty and deterring foreign direct investment. The persistence of volatility in Nigeria suggests that the industrial sector remains vulnerable to external shocks, particularly oil price fluctuations and global economic cycles.

CONCLUSION

The empirical investigation confirms the significant and adverse role of exchange rate volatility in constraining industrial growth in Nigeria. Using the ARDL framework, the study establishes both short-run and long-run negative effects of exchange rate instability on industrial output performance. Evidence from the GARCH model further validates the persistence of volatility, implying that shocks to the naira exchange rate are not transitory but exert prolonged macroeconomic disruptions.

Complementary findings reveal that inflation and high interest rates contribute additional constraints, while gross fixed capital formation and trade openness exert positive influences on industrial expansion. The results align with prior literature (Aliyu, 2011; Oseni, 2016; Alege et al., 2017) and reinforce theoretical predictions of exchange rate pass-through effects on production costs, investment decisions, and competitiveness.

Therefore, the study concludes that exchange rate volatility remains a critical macroeconomic challenge undermining Nigeria's industrialization agenda. Unless addressed, the volatility-growth nexus will continue to limit the attainment of structural transformation objectives embedded in Nigeria's industrial and economic development plans.

RECOMMENDATIONS

1. **Exchange Rate Management:** Authorities should prioritize a stable and transparent exchange rate framework by reducing multiple exchange windows and strengthening market-determined mechanisms. This will mitigate speculative pressures and enhance investor confidence.
2. **Inflation and Interest Rate Stabilization:** Monetary authorities should adopt balanced policies aimed at reducing inflationary tendencies and maintaining moderate interest rates to lower industrial financing costs. Coordinated monetary-fiscal alignment is necessary to sustain price stability.
3. **Promotion of Domestic Investment:** Policies to increase gross fixed capital formation should be strengthened through tax incentives, credit support schemes, and targeted financing for manufacturing and industrial enterprises. Achieving the UNIDO benchmark of 25% of GDP investment is necessary for sustainable growth.
4. **Trade and Export Diversification:** Expanding trade openness through diversification of exports beyond crude oil will improve foreign exchange earnings and cushion exchange rate shocks. Support for agro-industrial and manufacturing exports should be prioritized.
5. **Macroeconomic Policy Coordination:** Stronger coordination between fiscal, monetary, and trade policies is essential for reducing exchange rate misalignments. Structural reforms in infrastructure, power, and logistics will further complement exchange rate stability measures.
6. **Long-Term Industrial Strategy:** Industrial policy should be integrated with exchange rate policy to ensure competitiveness. Sector-specific interventions targeting manufacturing, agro-processing, and technology-driven industries will strengthen resilience against external shocks.

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