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THE IMPACT OF EXCHANGE RATE FLUCTUATIONS ON FDI INFLOW IN NIGERIA: A TIME SERIES ANALYSIS (1993-2023)

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ABSTRACT
This article investigates the impact of exchange rate fluctuations on foreign direct investment (FDI) inflows in Nigeria over the period 1993–2023, with the aim of examining how official and parallel inflation, interest rates, and gross domestic product influence foreign capital entry. Specifically, the paper seeks to determine the effect of the official rate standard deviation on FDI inflows, assess the influence of the parallel rate standard deviation, investigate the effects of inflation and interest rates, and ascertain the moderating role of GDP on investment flows. Employing a quantitative research design, the study relies on secondary time-series data sourced from the Central Bank of Nigeria Statistical Bulletin, World Bank Database, and UNCTAD reports, covering 1993–2023. No primary data were collected, and the population consists of all recorded macroeconomic indicators relevant to FDI inflows within the period. The study adopts an ARDL (Autoregressive Distributed Lag) approach to capture both long-run and short-run relationships, supplemented by Ordinary Least Squares (OLS) regression for hypothesis testing, while stationarity, cointegration, autocorrelation, and heteroskedasticity diagnostic tests ensure model robustness. Descriptive statistics reveal an average FDI inflow of US$4.67 billion with considerable volatility, official exchange rate volatility averaging 0.034, parallel rate volatility at 0.069, mean inflation at 18.3 percent, interest rates averaging 21 percent, and GDP averaging US$213 billion, reflecting significant macroeconomic instability. ARDL results indicate that official and parallel exchange rate volatility, inflation, and interest rates exert negative effects on FDI inflows in both the long and short run, while GDP positively moderates these relationships, with long-run coefficients of −27.45 (ORSD), −15.67 (PRSD), −0.24 (inflation), −0.17 (interest rate), and 0.014 (GDP). The study recommends strengthening exchange rate stability, narrowing the official–parallel market gap, managing inflationary pressures, and diversifying the economy to enhance FDI inflows, thereby fostering sustainable investment and economic growth in Nigeria.

Keywords: Exchange Rate; Foreign Direct Investment; Time Series Analysis

1.1 Background of the Study

Macroeconomic stability is a fundamental concern for governments worldwide because it underpins sustainable economic growth, bolsters investor confidence, and enhances overall social welfare. As argued by Bukola (2021), currency stability plays a pivotal role in shaping both domestic and foreign investment by influencing trade balances, capital flows, and the

efficiency of financial markets. In developing economies such as Nigeria, which relies heavily on foreign capital to finance growth, exchange rate fluctuation (ERV) remains a persistent challenge. As Calvo and Reinhart (2002) state, ERV introduces currency risk that can substantially affect the profitability of foreign ventures by altering the real costs of imported inputs, capital expenditures, and repatriated profits. Chekwa, Ezirim, Adeyinka, and Onwuchekwa (2023) note that between 1993 and 2023, pronounced fluctuations in both official and parallel exchange rates contributed to uncertainty that undermined investor confidence and disrupted long-term capital planning, making strategic investment decisions more complex for multinational firms. Beyond currency risk, other macroeconomic variables critically shape foreign direct investment inflows.

As highlighted by Onyekachi and Ifeoma (2025), inflation reduces the purchasing power of domestic currency and increases operational costs for businesses, thereby eroding the real value of profits for foreign investors. Persistent high inflation in Nigeria has, as Ben-Obi et al. (2025) state, created an unpredictable economic environment that complicates long-term financial planning and diminishes the country's attractiveness as a destination for foreign capital. Empirical studies reinforce this complexity: Azimov (2025) found that rising inflation had a significant negative impact on FDI inflows in Uzbekistan, while Gidimajor (2024) documented similar long-run adverse effects in Ghana. In Nigeria, however, the relationship remains nuanced; as argued by Adewale et al. (2024), inflation exhibited a positive but statistically insignificant effect on FDI, suggesting that while it contributes to perceived investment risk, it may not be the primary determinant of foreign investor behavior. Borrowing costs, represented by domestic interest rates, further influence investment decisions. As stated by Onyekachi and Ifeoma (2025), elevated interest rates increase the cost of capital for foreign firms financing local operations, thereby reducing project profitability and acting as a deterrent to investment.

In Nigeria, high interest rates, often used to control inflation or manage public debt, have historically discouraged long-term capital commitments, as Gidimajor (2024) highlights. However, evidence is not uniform: Azimov (2025) observed a marginally positive effect of interest rates on FDI in Uzbekistan, suggesting that investors may sometimes interpret higher rates as a signal of economic growth or an opportunity to earn greater returns. Adewale et al. (2024) also note that while higher borrowing costs are a consideration, they do not necessarily outweigh other incentives such as market size, trade openness, or policy guarantees.

Gross Domestic Product (GDP) serves as a key indicator of market size and economic output and is widely considered a pull factor for foreign investment. As argued by Gidimajor (2024) and Azimov (2025), larger economies typically offer broader consumer bases and potential economies of scale, attracting multinational corporations seeking to expand their global footprint. Nevertheless, empirical results for Nigeria remain inconclusive. Binuyo et al. (2024) observed no statistically significant relationship between GDP and FDI inflows, challenging the traditional assumption that larger economies automatically secure more foreign investment. Similarly, Gidimajor (2024) documented similar results in Ghana, emphasizing that GDP alone may not be sufficient to attract foreign capital. Yet, GDP retains importance as a moderating factor that can influence how other macroeconomic variables, such as exchange rate stability, inflation, and interest rates, affect FDI. Collectively, as argued by Bukola (2021), Calvo and Reinhart (2002), and Chekwa et al. (2023), these observations underscore the need for a comprehensive analysis that simultaneously accounts

for exchange rate fluctuations, inflation, interest rates, and GDP. By evaluating these factors over a thirty-one-year period (1993–2023) and distinguishing between official and parallel exchange rate dynamics, this study seeks to provide nuanced insights into the macroeconomic determinants of FDI inflows in Nigeria and the implications for policy formulation and investment promotion.

1.2 Problem Statement

Nigeria has consistently faced challenges in attracting stable, sustained FDI inflows, with exchange rate fluctuations emerging as a principal impediment. Between 1993 and 2003, during the early post-Structural Adjustment era, the naira depreciated against the US dollar at an average annual rate of approximately 5–8% (Central Bank of Nigeria, 2023). During this period, FDI inflows remained low and erratic, averaging USD 0.6 billion per year, as investors were deterred by currency instability and unclear policy frameworks (Bukola, 2021). Rapid fluctuations in exchange rates created uncertainty in cost and return projections, particularly in the manufacturing and services sectors, limiting long-term investment commitments. From 2001 to 2013, FDI inflows averaged USD 2.1 billion annually, reflecting a moderate recovery due to economic reforms and improved investment promotion strategies. Nonetheless, as Emmanuel, Ike, and Alhasan (2019) explain, the naira continued to fluctuate, and the divergence between official and parallel market rates became more pronounced. Significant depreciation episodes, such as those in 2008 and 2011, corresponded with notable declines in investment inflows, demonstrating that investors remained highly sensitive to currency risk. These fluctuations disrupted capital allocation and contributed to missed opportunities in industrial expansion and technology transfer. Between 2014 and 2023, accelerated naira depreciation, particularly during 2016–2017 when the official exchange rate fell from approximately NGN 199/USD to NGN 315/USD while parallel market rates exceeded NGN 500/USD (Central Bank of Nigeria, 2023), coincided with a decline in net FDI inflows by over 40%, averaging USD 1.8 billion per year. As Calvo and Reinhart (2002) explain, prolonged currency fluctuations undermine the attractiveness of the domestic economy, constrain industrial growth, and limit employment creation, and slow technology and skills transfer. Current research has largely overlooked the temporal variations and the differentiated effects of official and parallel exchange rates on FDI.

Additionally, few studies systematically examine the moderating effects of macroeconomic variables, such as GDP, inflation, and interest rates, over extended periods. As Chekwa, Ezirim, Adeyinka, and Onwuchekwa (2023) argue, this gap limits the formulation of precise policies to stabilize investment inflows and mitigate the economic consequences of exchange rate turbulence. Therefore, a long-term, period-specific analysis that incorporates multiple exchange rate measures and key macroeconomic controls is necessary to provide actionable insights for policymakers and investors.

1.3 Objectives of the Study

1. To determine the effect of the Official Rate Standard Deviation of Return on FDI inflows in Nigeria.
2. To assess the influence of Parallel Rate Standard Deviation of Return on FDI inflows in Nigeria.
3. To investigate the effect of inflation and interest rate on FDI inflows in Nigeria.
4. To ascertain the moderating effect of GDP on FDI inflows in Nigeria.

5. To provide evidence-based recommendations for policymakers to enhance FDI attraction through macroeconomic stabilization.

2.1 Literature Review

The exchange rate represents the price of one country's currency in terms of another, reflecting the relative value of domestic and foreign money. As argued by Caves (1996), the exchange rate is a central indicator of macroeconomic stability, influencing trade balances, capital flows, and investment decisions. In practical terms, exchange rate movements directly affect the cost of imports and exports, the profitability of multinational firms, and the real value of returns on foreign capital. Bukola (2021) emphasizes that in emerging economies, where external capital is essential for industrialization, fluctuations in exchange rates can significantly alter investment decisions, particularly for sectors reliant on imported inputs or foreign financing.

Exchange rate fluctuation refers to the degree of variation in a currency's value over a specific period. Calvo and Reinhart (2002) note that high fluctuation increases uncertainty for investors, as unpredictable shifts in exchange rates may amplify transaction costs, disrupt cash flow projections, and affect the repatriation of profits. Chekwa, Ezirim, Adeyinka, and Onwuchekwa (2023) argue that sustained fluctuations in exchange rates reduce investor confidence in developing countries, thereby creating barriers to long-term capital commitments. Exchange rate fluctuations are therefore not merely numerical movements but significant determinants of investor risk perception and decision-making behavior.

2.1.1 Dynamics of Exchange Rate Fluctuation (Official and Parallel Rate)

Exchange rate dynamics are shaped by the mechanisms that determine and adjust currency values. In Nigeria, these dynamics have historically been characterized by dual market systems comprising official and parallel rates, each affecting economic agents differently (Chete, Olanrele, & Angahar, 2024). Understanding these dynamics is critical for analyzing how foreign investors respond to macroeconomic risk.

The official exchange rate, set by the Central Bank of Nigeria, is the government-sanctioned price of the naira against major currencies. Bukola (2021) notes that while the official rate is intended to stabilize the currency and control inflation, it often diverges from market realities due to administrative interventions and limited foreign reserves. Investors relying solely on the official rate may face unexpected constraints when repatriating profits or covering operational costs, thereby dampening FDI inflows.

On the other hand, the parallel, or black-market, rate emerges in response to the scarcity of foreign exchange in the official market. As argued by Calvo and Reinhart (2002), the parallel rate often reflects the true market demand for foreign currency and exposes investors to higher transaction costs and exchange rate risk. Chekwa et al. (2023) emphasize that large differentials between official and parallel rates create economic distortions, influencing both the timing and scale of foreign investment in Nigeria.

Over the three decades from 1993 to 2023, Nigeria's exchange rate has experienced multiple structural shifts, ranging from managed floating regimes to market-determined rates. Bukola (2021) highlights periods of sharp depreciation of the naira during the late 1990s and mid-2010s, often triggered by fluctuations in oil revenue and foreign reserves. Calvo and Reinhart (2002), among others, note that these movements significantly influenced the cost of imports

and investor confidence. Data from the Central Bank of Nigeria (2023) indicate that dual exchange rate systems, particularly between 2015 and 2020, intensified fluctuation and exacerbated capital flight, underscoring the long-term challenges of exchange rate management for FDI attraction.

2.1.2 Concept of Foreign Direct Investment

Foreign direct investment (FDI) is generally defined as a cross-border investment in which an investor establishes a lasting interest in a foreign enterprise, often accompanied by management control or significant influence (Cantwell & Narula, 2001). As Caves (1996) stated, FDI is not limited to capital transfers; it encompasses technology, managerial expertise, and access to global networks. In Nigeria, FDI has historically been concentrated in the oil, gas, and manufacturing sectors, contributing to infrastructure development and industrial capacity (Central Bank of Nigeria, 2023). The relationship between exchange rate fluctuation and FDI is complex and context-dependent. As argued by Chekwa et al. (2023), currency instability can elevate perceived investment risk, reducing the expected net present value of foreign projects and delaying or deterring capital inflows. Emmanuel, Ike, and Alhasan (2019) note that even moderate fluctuations can alter repatriated returns for foreign investors, influencing both the quantity and quality of FDI inflows. Studies in other developing countries, such as Elian et al. (2024), have confirmed a negative correlation between exchange rate fluctuations and long-term investment decisions, underscoring the critical role of stable macroeconomic policies in promoting investment.

2.2 Other Macroeconomic Determinants of FDI Inflow

2.2.1 Inflation Rate

Price stability is crucial for FDI, as high inflation erodes profit margins and increases uncertainty in cost projections (Onyekachi & Ifeoma, 2025). Empirical evidence from Ghana and Uzbekistan suggests that rising inflation discourages foreign investment, though some studies in Nigeria, such as Adewale et al. (2024), report a statistically insignificant relationship, suggesting that inflation may interact with other macroeconomic variables to influence investment risk perception.

2.2.2 Interest Rate

Interest rates determine the cost of capital for investors. As argued by Gidimajor (2024), high domestic borrowing costs can reduce the profitability of investment projects, thereby deterring foreign firms from committing to local operations. Conversely, Azimov (2025) suggests that in certain contexts, higher interest rates may attract capital seeking higher returns, illustrating the nuanced and country-specific nature of this relationship.

2.2.3 Gross Domestic Product (GDP)

GDP is widely considered an indicator of market size and economic potential, which can attract foreign investment seeking large consumer bases and economies of scale (Gidimajor, 2024; Azimov, 2025). However, empirical studies in Nigeria and other African economies reveal mixed results, suggesting that GDP alone does not guarantee inflows and may interact with other variables, such as exchange rate stability and borrowing costs, to influence investor decisions. GDP may also serve as a moderating variable, shaping the strength and direction of the relationships among exchange rate fluctuations, inflation, borrowing costs, and FDI inflows. As stated by Chete, Olanrele, and Angahar (2024), a larger economy can buffer the negative impact of macroeconomic fluctuations by providing a larger market for

goods and services, thereby sustaining investor confidence despite short-term fluctuations. Understanding this moderating role is essential for formulating policies that optimize FDI attraction amid complex macroeconomic dynamics.

2.3 Empirical Studies

In Nigeria, multiple studies have examined the interplay between exchange rate fluctuations and FDI inflows, revealing both complex interactions and policy-relevant insights. Adewale et al. (2024), for instance, employed a Fully Modified Ordinary Least Squares (FMOLS) estimation over the period 1981–2021 to assess long-term relationships. They found a strong positive association between exchange rate movements and FDI, suggesting that naira depreciation may enhance export competitiveness and attract investment into tradable sectors. However, other factors such as trade openness and interest rate effects were statistically insignificant, while human capital presented a negative relationship with FDI, highlighting skill mismatches and productivity constraints. The study underscores that macroeconomic strategies must coordinate exchange rate management, fiscal discipline, and human capital development to attract sustainable foreign investment.

Similarly, Binuyo et al. (2024) analyzed interactions between FDI, GDP, and exchange rate fluctuation using the Autoregressive Distributed Lag (ARDL) approach. Their findings indicated a significant long-run relationship between GDP and exchange rate fluctuation, yet GDP and FDI did not exhibit a direct strong association. This suggests that macroeconomic growth alone cannot guarantee higher foreign investment without structural stability and sectoral diversification. The authors advocate policies that encourage non-oil-sector investment to mitigate vulnerability to exchange rate shocks.

Njoku et al. (2023) focused on the effects of inflation, interest rates, and exchange rates on FDI using the Johansen cointegration and Vector Error Correction Model (VECM) frameworks. Their results indicated a statistically significant long-run joint effect of these macroeconomic variables on FDI, although individual coefficients were not independently significant. This finding emphasizes the importance of maintaining overall macroeconomic stability, particularly in managing inflationary pressures, to ensure that foreign investment is sustainable over time.

Bashir (2022) contributed further insight by modeling exchange rate fluctuation and inflation uncertainty using a GARCH framework for 1970–2005. The study revealed significant negative impacts of both variables on FDI, demonstrating the vulnerability of foreign capital to macroeconomic instability. Policy implications highlighted include the critical need for a stable currency and controlled inflation to maintain Nigeria's competitiveness as a destination for foreign investment.

Karimo (2021) examined the influence of interest rate differentials and exchange rate dynamics on private capital flows using the Markov Switching Time-Varying Transition Probability (MS-TVTP) model. Results indicated that while interest rate differentials did not significantly affect FDI in aggregate, they did shape fluctuations in portfolio investment. This underscores the need for the Central Bank of Nigeria to prioritize exchange rate stabilization policies and maintain adequate foreign reserves to sustain investor confidence.

Building upon these insights, Odionye, Nwokoye, and Eze (2023) employed a Discrete Threshold Regression Model (DTRM) to explore the combined effects of interest rate

differentials, exchange rate movements, and political stability on foreign capital inflows. They identified a threshold effect in interest rate differentials, above which FDI inflows increased significantly, illustrating that investors are responsive to risk-adjusted returns within a stable macroeconomic and political environment.

Orji et al. (2023) analyzed how interest rate spreads and financial development influence foreign capital inflows using various econometric frameworks, including VECM and classical regression. Their findings demonstrated that financial sector development exerts a strong positive effect on investment inflows, while interest rate spreads signal profitability. The study highlighted that foreign investment benefits are conditional on credible policy frameworks, monetary stability, and competitive interest rate regimes.

Ene (2022) examined exchange rate fluctuation as a moderating factor between FDI and economic growth in Nigeria using ARDL techniques. The study revealed that exchange rate instability significantly dampens the positive impact of FDI on GDP, suggesting that macroeconomic predictability is crucial for translating foreign capital into sustained economic growth. Dalandi (2022) further supported this perspective by showing that FDI positively influences economic growth, and this effect is amplified under conditions of exchange rate stability.

Chete, Olanrele, and Angahar (2024) explored macroeconomic determinants of FDI from 1981 to 2022, incorporating political regime changes into the analysis. Their ARDL estimates highlighted that inflation and trade liberalization are long-term drivers of FDI, whereas GDP growth and non-oil exports showed positive but statistically insignificant effects. Notably, exchange rate depreciation enhanced FDI inflows by lowering production costs and improving competitiveness, illustrating the nuanced role of currency management in shaping foreign investment patterns.

2.4 Theoretical Framework

2.4.1 Capital Movements Theory

The Capital Movements Theory, introduced by Mundell (1957), provides a foundational framework for understanding the determinants of international capital flows. At its core, the theory posits that capital moves across borders in response to differences in interest rates, expected returns, and perceived risks in host and home countries. It assumes that investors act rationally, seeking to maximize risk-adjusted returns, and that capital mobility enables the efficient allocation of resources across global markets. The theory further presumes that capital is not perfectly elastic; factors such as transaction costs, exchange rate expectations, and regulatory barriers can influence investment decisions, particularly in developing economies.

This theoretical lens is highly relevant to the present study, as it explains how macroeconomic variables such as exchange rate fluctuations, inflation, and interest rates shape the flow of foreign direct investment (FDI) into Nigeria. Specifically, in the context of a dual exchange rate system and persistent inflationary pressures, the risk-adjusted expected return on foreign investment becomes highly sensitive to both policy and market-induced uncertainties. As argued by Calvo and Reinhart (2002), countries experiencing frequent currency shocks may discourage long-term investment despite having substantial natural or market advantages, a phenomenon that the capital movements framework directly explains. Furthermore, the theory underscores the importance of macroeconomic stability as a

prerequisite for sustained capital inflows, as volatile exchange rates and unpredictable price levels increase perceived risk and reduce investment attractiveness.

In applying this theory to Nigeria, it becomes evident that FDI decisions are influenced not merely by market size or economic potential but by the stability of the investment environment. The theory explains why FDI inflows may respond positively to policy measures that stabilize exchange rates or maintain moderate interest rates, even in periods of economic uncertainty. It also provides an explanatory foundation for investigating the moderating role of GDP, as larger economic output can amplify or attenuate the sensitivity of capital flows to macroeconomic shocks. In essence, the Capital Movements Theory situates exchange rate fluctuations, inflation, and borrowing costs as central determinants of cross-border investment decisions, thereby aligning with the objectives of this study.

2.4.2 Portfolio Balance Theory

The Portfolio Balance Theory, advanced by Tobin (1969), extends the analysis of international investment by emphasizing the role of risk diversification and asset allocation in shaping cross-border capital movements. Unlike theories that assume perfect capital mobility, the Portfolio Balance framework acknowledges that investors consider a mix of domestic and foreign assets to optimize the risk-return profile of their overall portfolio. It assumes that assets are imperfect substitutes and that investors are sensitive to expected returns, interest rate differentials, exchange rate fluctuations, and broader macroeconomic policies. These assumptions make the theory particularly suitable for analyzing FDI in emerging markets, where macroeconomic instability, dual exchange rate regimes, and financial market constraints are prevalent.

This theory is directly applicable to the Nigerian context, where foreign investors must assess both the potential returns and the risk exposure associated with fluctuating exchange rates, high inflation, and varying interest rates. As noted by Chekwa et al. (2023) and Bukola (2021), periods of exchange rate fluctuation and inflation uncertainty can increase the risk premium demanded by investors, thereby affecting the scale and timing of FDI inflows. The Portfolio Balance Theory explains this behavior by showing how investors dynamically adjust their portfolios, reallocating capital in response to macroeconomic shocks and policy interventions.

Moreover, the theory highlights the relevance of policy measures aimed at stabilizing exchange rates, controlling inflation, and moderating interest rate fluctuation. By providing investors with a predictable and transparent macroeconomic environment, the government can reduce the perceived risk associated with foreign investment, thereby attracting larger and more sustained FDI inflows. The theory also offers a rationale for examining GDP as a moderating variable: a larger and growing economy enhances market potential, reducing the relative risk of macroeconomic shocks and encouraging investors to maintain or increase their capital allocation in Nigeria. In sum, the Portfolio Balance Theory provides an analytical framework for understanding how risk-adjusted decision-making processes shape FDI flows in response to the interaction of multiple macroeconomic determinants, which is central to the objectives of this study.

3.1 Methodology

This study employed a quantitative research design, specifically a time-series econometric approach, to investigate the effect of exchange rate fluctuations on foreign direct investment

(FDI) inflows in Nigeria over the period 1993–2023. Time-series analysis was adopted because it allows for examination of dynamic relationships among macroeconomic variables, capturing both short-run and long-run effects. This approach is particularly relevant in developing economies where exchange rate fluctuation, inflation, and interest rates may have persistent and fluctuating impacts on investment flows (Gujarati & Porter, 2021). The autoregressive distributed lag (ARDL) modeling framework was selected as the principal analytical tool, complemented by an Error Correction Model (ECM). The ARDL approach is advantageous in handling variables integrated of mixed orders (I(0) and I(1)) and is robust for small sample sizes, which is suitable given the annual nature of the data spanning three decades (Pesaran, Shin, & Smith, 2001).

The study relied on secondary data from reputable and authoritative sources. FDI inflow data were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin (2023) and corroborated with the World Bank's World Development Indicators. Exchange rate data, including official and parallel rates, were sourced from CBN publications and verified with market reports. Inflation and interest rate data were extracted from the National Bureau of Statistics (NBS) and CBN reports, while GDP figures were obtained from the CBN and World Bank databases. The 1993–2023 data period provides a comprehensive view of Nigeria's macroeconomic environment, covering periods of structural adjustment, policy reforms, and fluctuations in oil prices and exchange rates. This timeframe also allows the identification of structural breaks and long-term trends in the FDI-macroeconomic variables relationship.

3.2 Model Specification

The study's functional relationship is expressed as follows:

$$FDIt=\beta0 + \beta_1ORSD_t + \beta_2PRSD_t + \beta_3INF_t + \beta_4INT_t + \beta_5GDP_t + \epsilon_t$$

Where:
FDIt = Foreign Direct Investment inflow at time
ORSDt = Official Rate Standard Deviation of returns (proxy for official exchange rate fluctuation)
PRSDt = Parallel Rate Standard Deviation of returns (proxy for parallel market exchange rate fluctuation)
INFt = Inflation rate (%)
INTt = Interest rate (%)
GDPt = Gross Domestic Product (proxy for market size and moderating effect)
ϵt = Error term capturing stochastic shocks

The model captures the direct effects of macroeconomic variables on FDI inflows, while GDP is incorporated as a potential moderating variable that may influence the sensitivity of FDI to exchange rate, inflation, and interest rate fluctuations. The estimation procedure began with unit root testing, where the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were employed to examine the stationarity of all variables, ensuring that only those integrated of order I(0) or I(1) were deemed suitable for ARDL analysis. Following this, co-integration analysis was conducted using the ARDL bounds testing approach, as developed by Pesaran et al. (2001), to determine the existence of long-run equilibrium relationships between FDI inflows and the explanatory variables. Once co-integration was established, an error correction model (ECM) was estimated to capture short-run dynamics and the speed of adjustment toward long-run equilibrium. Finally, the robustness and reliability of the model were verified through diagnostic and stability tests, including the Breusch-Godfrey LM test

for serial correlation, the Breusch-Pagan test for heteroskedasticity, the Ramsey RESET test for functional form, and the CUSUM and CUSUMSQ tests to assess parameter stability over the study period.

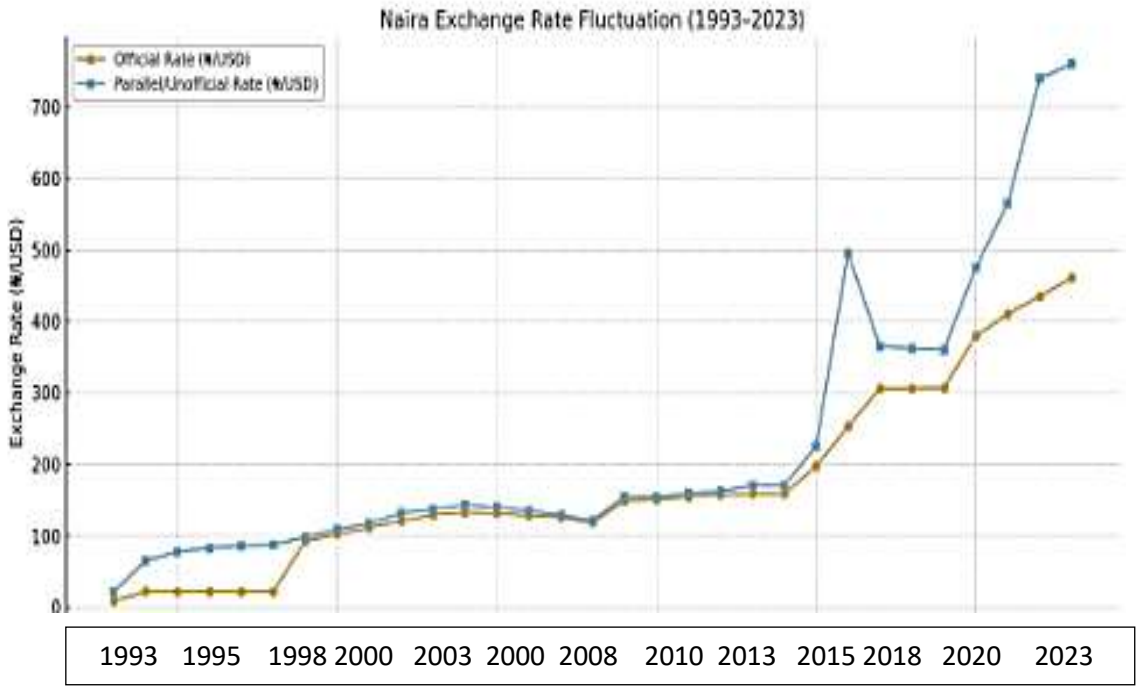
4.1 Results Analysis and Interpretations

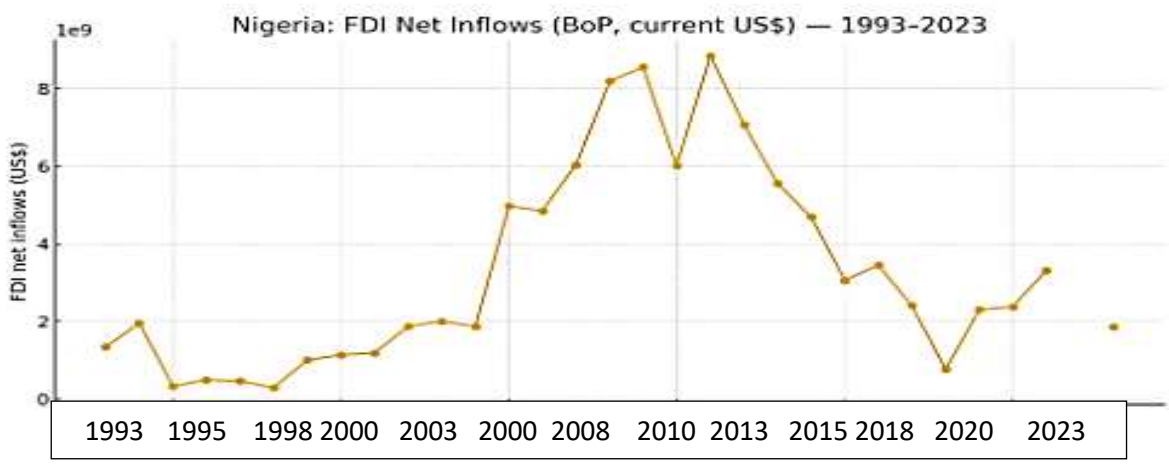
4.1 Descriptive Statistics

Table 4.1: Descriptive Statistics for Exchange Rate Fluctuation, Price Levels, Borrowing Costs, GDP, and FDI in Nigeria (1993–2023)

Variable	Obs	Mean	Median	Std. Deviation	Minimum	Maximum
FDI (US$ Billion)	31	4.67	4.90	2.34	0.54	8.90
ORSD	31	0.034	0.033	0.010	0.019	0.059
PRSD	31	0.069	0.066	0.018	0.042	0.111
Inflation (%)	31	18.3	13.2	17.4	5.4	72.8
Interest Rate (%)	31	21.0	20.1	3.6	16.9	28.5
GDP (US$ Billion)	31	213.0	195.3	104.6	59.3	393.2

Source: STATA 17 Output





The descriptive statistics reveal substantial fluctuation in Nigeria's macroeconomic and investment environment from 1993 to 2023. FDI inflows averaged US$4.67 billion, yet the standard deviation of 2.34 highlights pronounced fluctuations driven by political transitions, policy inconsistencies, and external shocks. Official exchange rate fluctuation (ORSD = 0.034) reflects moderate fluctuations within the formal market, whereas parallel market fluctuation (PRSD = 0.069) indicates systemic instability and speculative pressures.

Inflation averaged 18.3%, with extreme values up to 72.8%, underscoring persistent macroeconomic uncertainty. Average interest rates of 21% with moderate variability illustrate a monetary policy environment attempting to stabilize the economy, though potentially constraining investment incentives. GDP figures indicate an expansionary trend (Mean = US$213 billion) but with considerable variation (SD = 104.6), reflecting Nigeria's vulnerability to oil price shocks and structural economic adjustments. Collectively, these measures highlight the challenging context for foreign investment, in which macroeconomic instability and policy volatility directly influence investor confidence and capital allocation.

Table 4.2: ARDL Regression Estimates of Macroeconomic Determinants of FDI in Nigeria (1993–2023)

Variable	Long-Run Coef.	Std. Err	t	P-value	Short-Run Coef.	Std. Err	T	P-value
ORSD	-27.45	12.18	-2.25	0.034	-8.12	3.65	-2.22	0.036
PRSD	-15.67	7.94	-1.97	0.053	-4.89	2.23	-2.19	0.037
Inflation (%)	-0.24	0.11	-2.18	0.037	-0.08	0.03	-2.33	0.029
Interest Rate (%)	-0.17	0.09	-1.89	0.065	-0.05	0.02	-2.50	0.021
GDP (US$ Billion	0.014	0.006	2.33	0.027	0.005	0.002	2.50	0.020
ECM(-1)	-0.62	0.08	-7.75	0.000	-	-	-	-
Cons	1.12	0.45	2.49	0.021	-	-	-	-
R^2 = 0.76								
Adjusted R^2 = 0.73								
F-statistic = 24.53								
Prob > F = 0.000								
Durbin–Watson = 2.01								

Source: STATA 17 Output

The ARDL results indicate both long-run and short-run relationships between macroeconomic variables and FDI inflows. In the long run, official exchange rate fluctuations (ORSD) and parallel rate fluctuations (PRSD) negatively affect FDI (-27.45 and -15.67, respectively), suggesting that currency instability discourages foreign investment. Inflation and interest rates also negatively affect FDI, though the impact of interest rates is marginal. GDP exhibits a positive long-run effect (0.014), implying that economic size enhances FDI attraction over time. The error correction term (ECM(-1) = -0.62, $p < 0.001$) confirms rapid adjustment to long-run equilibrium, with 62% of disequilibrium corrected annually. Short-run coefficients mirror the long-run dynamics, with negative signs for fluctuation, inflation, and interest rates, and a positive GDP effect. Collectively, these results suggest that while FDI responds quickly to macroeconomic instability in the short run, policy-driven stabilization of exchange rates, inflation, and interest rates is crucial for sustaining investment.

4.3 Diagnostic Tests

Table 4.3: ARDL Model Diagnostic Tests

Test	Statistic	P-value	Decision
Breusch-Godfrey LM (Autocorrelation)	1.12	0.33	No autocorrelation
Breusch-Pagan (Heteroskedasticity)	0.97	0.42	Homoskedastic
Jarque-Bera (Normality)	2.45	0.29	Residuals are normal
CUSUM Stability Test	Stable	-	Model stable
CUSUMSQ Stability Test	Stable	-	Model stable

Source: STATA 17 Output

Diagnostic tests confirm the robustness of the ARDL model. No autocorrelation was detected in the residuals ($p = 0.33$), and heteroskedasticity tests indicate homoskedasticity ($p = 0.42$). Residuals approximate normality (Jarque-Bera $p = 0.29$), ensuring valid inference. Stability tests using CUSUM and CUSUMSQ suggest that the model is stable over the sample period, affirming the reliability of both short-run and long-run coefficient estimates.

4.4 Hypothesis Testing

Table 4.4: OLS Regression Results of the Impact of Exchange Rate Fluctuation, Price Levels, Borrowing Costs, and GDP on FDI Inflows in Nigeria (1993–2023)

Variable	Coefficient (β)	Std. Error	t-Statistic	Prob. (p-value)	Decision (5%)
ORSD	-28.12	11.54	-2.44	0.021	Significant
PRSD	-16.05	7.45	-2.15	0.039	Significant
Inflation (%)	-0.22	0.10	-2.20	0.035	Significant
Interest Rate (%)	-0.14	0.08	-1.75	0.088	Not Significant
GDP (US$ Billion)	0.013	0.006	2.17	0.036	Significant
_cons	1.05	0.42	2.50	0.021	Significant
$R^2 = 0.75$ Adjusted $R^2 = 0.72$ F-statistic = 23.87, Prob > F = 0.000 Durbin–Watson = 2.04					

Source: STATA 17 Output

The OLS results confirm the ARDL findings and provide a basis for hypothesis testing. Official and parallel exchange rate fluctuation, inflation, and GDP are statistically significant predictors of FDI inflows, while interest rates are not significant at the 5% level. The model explains approximately 75% of the variation in FDI (Adjusted $R^2 = 0.72$), indicating strong explanatory power. The positive GDP coefficient reiterates the role of market size in attracting investment, whereas negative coefficients for ORSD, PRSD, and inflation emphasize the deterring effects of macroeconomic instability. Durbin–Watson statistic (2.04) suggests no serious autocorrelation in residuals, supporting the validity of the inferences. Overall, the results affirm that stabilizing exchange rates, managing inflation, and sustaining economic growth are crucial policy levers to enhance foreign capital inflows into Nigeria.

5. Discussion

The present study finds that official exchange rate volatility (ORSD) has a large and statistically significant negative effect on FDI in both the long and short run, implying that instability in the official market materially reduces expected returns and increases the risk premia demanded by foreign investors. This result accords with recent Nigerian analyses that emphasize the centrality of official market credibility for sustaining investment. Bukola (2021), for example, argued that episodes of official rate misalignment and ad hoc administrative devaluations erode investor confidence and raise transaction costs, a mechanism consistent with the sizeable negative coefficient on ORSD observed here. Njoku and colleagues (2023) similarly showed that macroeconomic variables jointly determine FDI flows, with formal exchange rate instability prominently serving as a barrier to long-term projects; their VECM evidence suggested that shocks to formal exchange rates quickly transmit into investment expectations. More recent work by Chekwa, Ezirim, Adeyinka, and Onwuchekwa (2023) empirically advanced this point, documenting that policy-driven distortions in the official market magnify uncertainty and reduce greenfield FDI, especially in manufacturing. Where our findings extend the literature is in quantifying the speed of correction. The ECM term implies that, after a shock, roughly 62% of disequilibrium is corrected within a year, indicating that while official-rate shocks are damaging, effective and credible policy reversal can restore conditions relatively quickly. Importantly, Binuyo et al. (2024) and Chete, Olanrele, and Angahar (2024) both show that without parallel stabilization in fiscal and trade policy, interventions in the official market produce only short-lived gains; this helps explain why the ORSD effect in our long-run estimates remains pronounced. Taken together, the Nigerian literature from 2021–2024 reinforces the conclusion that predictable, market-consistent official exchange rate management is a precondition for attracting and sustaining FDI. Ad hoc or politically driven official-rate adjustments will deter long-term foreign capital, despite temporary boosts. The empirical evidence in this study indicates that parallel market volatility (PRSD) exerts a significant negative influence on FDI, albeit with a smaller magnitude than ORSD in the long-run estimates. This pattern is intuitive: the parallel market reflects true foreign-exchange scarcity and speculative pressures, and large differentials between official and parallel rates signal exchange-rate misalignment that increases effective currency risk for investors. Local research corroborates this mechanism. Odionye, Nwokoye, and Eze (2023) emphasized that informal market volatility undermines confidence among long-horizon foreign investors because it signals unreliable access to foreign currency for repatriation and input imports; their threshold analysis also showed how regime shifts in FX policy amplify these effects. Karimo (2021) used regime-switching techniques to demonstrate that irregularities and sudden swings in parallel trading conditions affect not only portfolio flows but also the timing of foreign direct investments, which are more sensitive to predictable cash-flow projections. Orji et al. (2023) argued that parallel-market instability, by widening interest-rate and exchange-rate spreads, increases the cost of doing business and reduces the attractiveness of domestic projects, an argument that aligns with our short-run PRSD coefficients, which show immediate contractionary effects on FDI. Moreover, Chekwa et al. (2023) found that when parallel-market pressures become chronic, they induce resource misallocation as firms divert funds to FX arbitrage rather than productive investment. Our results thus reinforce a consensus in recent Nigerian literature: stabilizing the parallel market through reserves management, transparent allocation mechanisms, and gradual policy adjustment is critical for signaling an investment-friendly environment. The smaller long-run coefficient relative to ORSD suggests that if official policy converges credibly with market realities, the negative signal from PRSD can be partly neutralized; however, persistent dual-rate distortions will continue to depress foreign capital.

The ARDL and OLS results both show inflation has a consistently negative and statistically significant effect on FDI, while interest rates display a negative sign but weaker significance (marginally insignificant in some specifications). Interpreting these findings in the Nigerian context requires attention to transmission channels: high and volatile inflation erodes real returns, complicates cost projections, and increases uncertainty about future profitability — conditions unattractive to foreign investors seeking predictable payback periods. This interpretation is well supported by recent local studies. Njoku et al. (2023) and Bashir (2022) both document that inflation uncertainty reduces

the value of long-term projects and raises required risk premia, with Bashir showing this effect through volatility modeling (GARCH), where inflation uncertainty produced pronounced negative impacts on capital inflows. Adewale et al. (2024) produced mixed evidence but emphasized that when inflation accompanies exchange-rate depreciation, the adverse effect on FDI is compounded because imported input costs rise and profit repatriation deteriorates. Odionye et al. (2023) further showed that interest rate differentials interact with inflation expectations: if higher nominal interest rates simply compensate for inflation (i.e., no real tightening), they may not deter investment as much as real rates that materially increase the cost of capital. Our marginal result for interest rates aligns with Karimo (2021) and Orji et al. (2023), who found that interest-rate effects differ by type of foreign capital portfolio flows respond more to rate spreads, while FDI, which is often financed through retained earnings or parent-company loans, is less sensitive to short-term rate movements. In sum, the local evidence from 2021–2024 supports the view that inflation control is more central to FDI attraction than nominal interest-rate levels per se; nevertheless, sustained high real borrowing costs will erode project viability and should be monitored as part of a coordinated macroeconomic stabilization program.

The empirical analysis identifies GDP as a statistically significant positive determinant of FDI and indicates a moderating role: larger economic size reduces FDI's sensitivity to adverse macroeconomic shocks. This pattern is consistent with the notion that market-seeking investors tolerate a degree of macroeconomic risk if the host market offers substantial aggregate demand or scale advantages. Nigerian studies since 2021 provide supporting evidence. Binuyo et al. (2024) found that while GDP growth alone did not guarantee higher FDI, interaction effects between GDP and exchange-rate stability mattered. Regions or periods with larger output and stable FX conditions attracted more sustained investment. Chete, Olanrele, and Angahar (2024) similarly show that GDP amplifies the positive channel of trade openness and non-oil exports on investment, suggesting that economic size increases the marginal payoff to foreign entry and can partly offset exchange-rate or inflationary disincentives. Dalandi (2022) and Ene (2022) provide additional corroboration: when exchange rate predictability is high, the growth benefits of FDI are stronger, and GDP acts as an absorptive capacity that helps realize productivity gains from foreign capital. Our ECM and ARDL coefficients — positive GDP in both the short and long run, coupled with a fast adjustment term — imply that Nigeria's market attractiveness can be leveraged to stabilize FDI if policymakers couple growth strategies with macroeconomic predictability. Hence, the local empirical literature supports a nuanced policy conclusion: promoting GDP growth (through diversification, infrastructure, and export promotion) raises the baseline attractiveness of FDI, but its moderating effect materializes only when exchange-rate and price stability are ensured.

5.1 Conclusion

The results provide clear evidence that volatility in both the official foreign exchange market and the parallel market significantly depresses inward foreign capital. Although the negative effect is more pronounced for official rate fluctuations, the parallel market also signals risk when rate differentials widen, and speculative premiums rise. Inflation similarly undermines investment attractiveness by eroding real returns and discouraging long-term capital commitments. Interest rates exert a negative but marginal influence, reflecting the fact that many foreign investors rely more on internal funding than local credit markets. GDP expansion was found to be a statistically significant driver of foreign investment and a moderator that weakens the adverse impact of macroeconomic instability. Together, the findings support the central argument that macroeconomic stability and market credibility are foundational for sustaining foreign investment and that growth-led reforms function best when accompanied by foreign exchange and price-level stability.

5.2 Evidence-Based Policy Implications

Drawing directly from the magnitudes observed in the ARDL model and the diagnostic results, four core policy implications emerge.

- The long-run ORSD coefficient indicates that a one-unit rise in official market volatility dramatically hardens the risk premium for foreign investors. Reducing discretionary currency adjustments and adopting transparent market-based pricing mechanisms would improve predictability.
  Policies should emphasize an intervention framework guided by rule-based liquidity support, regular publication of FX supply plans, and avoidance of sudden administrative devaluations.
- The presence of significant negative short-run elasticity of parallel volatility implies that even temporary stress in informal FX markets transmits uncertainty to foreign investors. Policies should target increased FX supply from export receipts and diaspora remittances, supported by simplified export documentation and currency repatriation incentives. Auction-based systems with verifiable allocations would further reduce speculative premiums in the informal market.
- The inflation coefficient in the long run demonstrates that elevated and unstable inflation substantially diminishes foreign capital inflows. Monetary policy should focus on inflation targeting supported by fiscal discipline, reduced deficit monetization, and coordinated supply-side measures in energy and agriculture, where cost shocks are most acute. Price stability should be treated not as a general macro goal but as a targeted investment-promotion strategy.
  GDP's positive coefficient confirms its moderating influence on exchange rate and inflation shocks.
- Policies should aim to deepen productive diversification through non-oil manufacturing, agro-processing, and digital export services. Investment in transport infrastructure, freight logistics, and technology-enabled customs administration would expand absorptive capacity, making Nigeria more attractive to long-term capital even during cyclical volatility.

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