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Impact of Exchange Rate Volatility on Foreign Direct Investment in Nigeria

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Abstract: It is of both practical and theoretical importance to investigate the impact that exchange rate volatility exert on foreign direct investment (FDI) inflows. This endeavor aims to assist governmental entities in the formulation of targeted policies that facilitate sustainable FDI inflow and promote enduring economic growth. To this end, the influence of exchange rate volatility on FDI inflows was systematically analyzed for Nigeria, spanning the period from 1986 to 2022. The series of real exchange rate volatility was computed employing the generalized autoregressive conditional heteroscedasticity (GARCH) methodology. Following the execution of an initial unit root test on the series, the Autoregressive Distributed Lag (ARDL) approach was utilized to estimate the model pertinent to this study. The GARCH assessment of real exchange rate volatility revealed that the Nigerian real exchange rate underwent persistent fluctuations throughout the study period. The empirical findings indicated the presence of both long-term and short-term negative impacts of exchange rate fluctuations on FDI, which were statistically significant. In conclusion, the continuous depreciation of the naira (₦) in relation to the USD has served to deter FDIs in Nigeria. These findings engender policy recommendations aimed at enhancing FDI through adept management of exchange rate.

Keywords: Exchange rate, Volatility, FDI, GARCH, ARDL, Nigeria

1. Introduction

The flow of FDIs recorded, alongside the corpus of academic inquiry directed towards elucidating these flows in the context of both source and host nations, has exhibited a marked increase in recent years. Enterprises within source countries engage in decision-making processes regarding the allocation of their investment capital, and a myriad of factors can sway their determinations, either incentivizing or dissuading investment in a particular host nation. Such decision-making processes underscore the significance and relevance of FDI flows. Consequently, FDI has garnered the attention of a plethora of researchers over

an extended duration and is currently the subject of discourse and investigation across various nations. The Organisation for Economic Co-operation and Development (OECD) has reported that FDI inflows attained USD 1,286 billion in 2022, with entities in developing nations receiving in excess of half of these inflows (OECD, 2023). This observation illustrates the increasing focus nations are placing on FDI flows and their efforts to establish incentives for international investors to augment such inflows.

FDI refers to an investment undertaken with the objective of enabling an expatriate organization, headquartered in its country of origin, to exert control over the ownership of a business enterprise situated in a different nation. It is widely recognized that FDI plays a pivotal role in enhancing productivity within the host country and constitutes one of the principal sources of capital inflows to developing nations from resource-abundant countries, as well as inter-inflows among the developing nations themselves (Onyele et al., 2023). Economies deficient in resources (such as Nigeria) are in dire need of FDI as it serves to amplify domestic investment. Nigeria has reaped substantial benefits from such inflows, particularly in terms of improved managerial competencies, job creation, and technical spillovers. Various macroeconomic factors, including the political and legal environment of the host country, inflationary pressures, domestic savings, physical and social infrastructure, fiscal and monetary policies, as well as indigenous technological capabilities, significantly influence the movement of capital, goods, and services into and out of that nation. Furthermore, international investors take into account an additional critical factor prior to permitting the influx of their goods into any country: the risks associated with fluctuations in exchange rates (Ozigbo & Anuya, 2023).

The exchange rate is defined as the cost of one nation's currency in relation to another. It constitutes a vital macroeconomic indicator employed to assess the competitiveness of a particular economy's currency (Aderemi, 2019). As one of the most consequential prices within an open economy, the exchange rate impacts the movement of capital, goods, and services across national borders, thereby exerting substantial influence on macroeconomic variables such as inflation, balance of payments, and other related factors (Aidoo, 2017). Fluctuations in exchange rates can lead to currency appreciation or depreciation. An appreciation of the exchange rate escalates a nation's production costs, resulting in erratic and diminished FDI. This resultant significant imbalance in the local country's balance of trade and payments is likely to be accompanied by increased poverty, heightened inequality, and underdevelopment (Onyele et al., 2024a). Conversely, a depreciation in the value of the currency confers a

competitive advantage to businesses in the realm of international trade. It enhances the prices of domestic goods, stimulates demand for exports, and leads to an increase in the demand for domestic products abroad while concurrently reducing imports. A stable foreign exchange rate can assist decision-makers in mitigating the uncertainties arising from exchange rate fluctuations, thereby promoting FDI inflows, which are anticipated to stimulate economic growth and development. In this context, the stabilization of exchange rates is imperative for effective economic management in any nation in this increasingly interconnected global environment, particularly if it seeks to dissuade risk-averse entities from relocating their operations to countries characterized by lower-risk markets.

Persistent fluctuations in the exchange rate engender uncertainty within the global investment landscape, thereby complicating investors' ability to anticipate future rates across both short-term and long-term horizons. Should prospective investors elect to allocate their resources within Nigeria, they are confronted with the prospect of experiencing volatility in the exchange rate, given these apprehensions. Researches like Jannat (2020), Ehikioya (2019), Emmanuel et al. (2019), Eregha (2017) has substantiated that exchange rate volatility possesses a profound and extensive effect on the overall appeal of FDI. As noted in Onyele and Nwadike (2021), there have been recurrent fluctuations in the exchange rates of various countries since the dissolution of the Bretton Woods system in 1973. These fluctuations have engendered risks for investors, rendering them uncertain in their ability to interpret these changes.

Due to the inherent volatility of exchange rates, investors may opt to postpone their investments, leading to a decline or complete cessation of FDI inflows into Nigeria. This assertion is corroborated by studies conducted by Ozigbo and Anuya (2023), Akinlo and Onatunji (2021), and Adokwe et al. (2019), whereas Jacob and Kattookaran (2019), Emmanuel et al. (2019), Safini and Mansur (2017), and Ochieng and Anyango (2013) present a contradictory perspective, asserting that exchange rate volatility does not result in a reduction of FDIs. The uncertainty surrounding investors' reactions to fluctuations in exchange rates subsequently engenders a debate that highlights the imperative for further investigation. Therefore, it is essential to ascertain the impact of exchange rate volatility on FDI in Nigeria, in both the short and long term.

The stability of the exchange rate exerts a profound influence on the rationale behind investors' decisions to allocate their resources in any particular nation. The Nigerian economy necessitates adept management of foreign exchange rates to facilitate the inflow of FDI and to assist in the diversification of its economic

structure. However, notwithstanding the government's persistent endeavors to stabilize the currency rate, there has been limited success regarding the inflow of FDIs. Consequently, the objective of this research is to examine the long-term and short-term relationships between exchange rate volatility and the influx of FDIs into Nigeria. Additionally, it proffers policy recommendations aimed at mitigating the risks associated with unforeseen and unpredictable fluctuations in exchange rates. The evidence presented has contributed a novel perspective to the existing literature and established a benchmark against which future research may be assessed. The findings of this study have further enriched the understanding of the extent to which exchange rate volatility impacts FDI. This insight is vital for the formulation of policies concerning FDI and exchange rates. The temporal scope of the study, spanning from 1986 to 2022, was determined based on the availability of data and the pivotal moment in 1986 when Nigeria adopted the Structural Adjustment Programme (SAP), which instigated financial liberalization.

The subsequent sections of the paper are organized in the following manner: Section 2 delves into the mechanisms through which international trade may influence industrial value, as well as the analytical methodology employed. The theoretical framework is elaborated upon in Section 3. The analytical approach utilized in this paper is elucidated in Section 4. In Section 5, the results and discussions are articulated, while Section 6 concludes the paper with a discourse on the findings.

2. Literature Review

2.1. Stylized Facts

Nigeria has executed a series of macroeconomic strategies over time aimed at enhancing FDI. However, these initiatives have only yielded a modest impact on achieving sustainable growth within this specific domain of capital inflow. A survey conducted by the World Development Indicators (WDI) revealed that net FDI inflows to Nigeria diminished in 2015, declining from $4.69 billion in 2014 to $3.06 billion. The United Nations Conference on Trade and Development (UNCTAD) global investment trend monitoring report also indicated that Nigeria experienced significant repercussions from the downturn in oil prices during 2015. Furthermore, net FDI inflows to Nigeria decreased more markedly in 2017 as anticipated, due to the fragility of global economies, fluctuations in exchange rates, diminished aggregate demand, and acceleration in several principal economies. According to the WDI, FDI in Nigeria plummeted to $2.41 billion in 2017 and subsequently to $0.78 billion in 2018. More recently, the

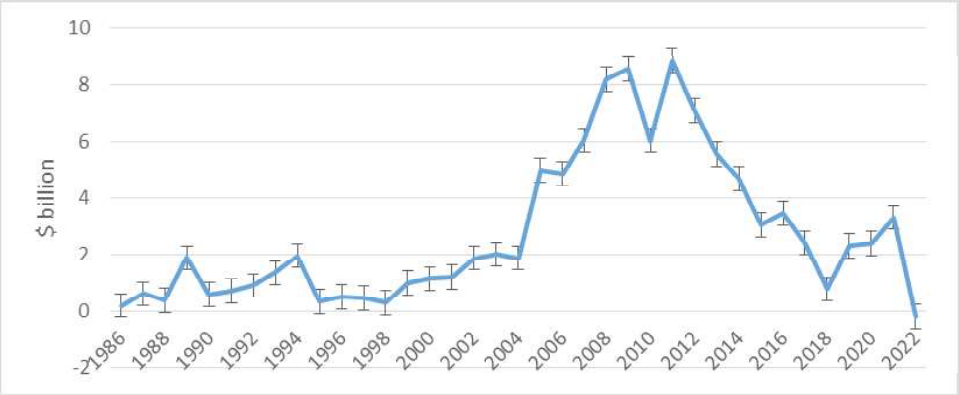

Figure 1: Trend of Net inflows of FDI in Nigeria

WDI has reported a resurgence in net FDI inflows into Nigeria, which rose to $3.31 billion in 2021 from $2.31 billion in 2019, only to fall to a negative $0.19 billion in 2022, indicating that Nigeria experienced greater outflows than inflows. The UNCTAD attributed this decline in investment into the nation to the economic recession, which had rendered the country susceptible to various macroeconomic instabilities, most notably volatility in exchange rates. The National Bureau of Statistics (NBS) has indicated that since 2008, following the collapse of the global economy, Nigeria has predominantly witnessed a consistent decline in FDI. Prior to the financial crisis, however, the growth trajectory of FDI in the nation exhibited a mixed pattern.

The exchange rate constitutes a vital macroeconomic variable utilized to assess the competitiveness of a particular economy's currency. It remains one of the principal determinants influencing a firm's decision to invest overseas as well as a nation's endeavors to attract FDI. The fluctuations in the exchange rate, alongside the types and volumes of investment a country garners, are all shaped by the intentional depreciation, appreciation, or manipulation of its currency in relation to others. Variations in exchange rates can be associated with the diverse currency policies implemented by the nation's central bank. For instance, the Structural Adjustment Programme (SAP) involved a substantial depreciation of the exchange rate, which was aimed at discouraging imports and enhancing the return on investment for multinational corporations focused on exportation (Onyele et al., 2025). According to SAP, significant fluctuations in currency rates were noted amidst uncertainties concerning the inflation rate within the economy. A major contributing factor to the volatility of the exchange rate during this period was external shocks induced by global fluctuations in the prices of oil and agricultural commodities, which serve as primary sources of foreign exchange

earnings and exports for Nigeria. Currently, Nigeria is experiencing severe trade shocks in the prevailing oil environment due to the persistent fluctuations in global oil prices.

The period from 1993 to 1998 exhibited fluctuations in the US dollar. This interval was characterized by Gen. Sani Abacha's stringent currency rate policies and bears minimal relevance to the overall trend of the exchange rate discussed in this study. Since 1999, the real exchange rate has demonstrated a consistent pattern of fluctuation. *Ceteris paribus,* the prevailing conditions elucidate that investor confidence cannot be assured in light of exchange rate volatility. In light of the aforementioned challenges, it is imperative to reassess the influence of exchange rate volatility on FDI in Nigeria and to propose solutions as warranted.

Since the implementation of the SAP, the trajectory of the real effective exchange rate in Nigeria, as illustrated in Figure 2, has persistently placed a significant strain on the nation's economy. This phenomenon exemplifies what is commonly referred to as "exchange rate instability," which signifies an absence of clarity regarding the exchange rate at any particular moment in time. The real exchange rate has exhibited a consistent depreciation.

2.2. Theoretical Framework

The theoretical foundation of this study is predicated upon the Mundell-Fleming model. The Mundell-Fleming model of economics was originally articulated (independently) by Robert Mundell and Marcus Fleming. The Mundell-Fleming Model (MFM) delineates the operational dynamics of a small economy that is open to international trade in goods and financial assets, thereby providing a

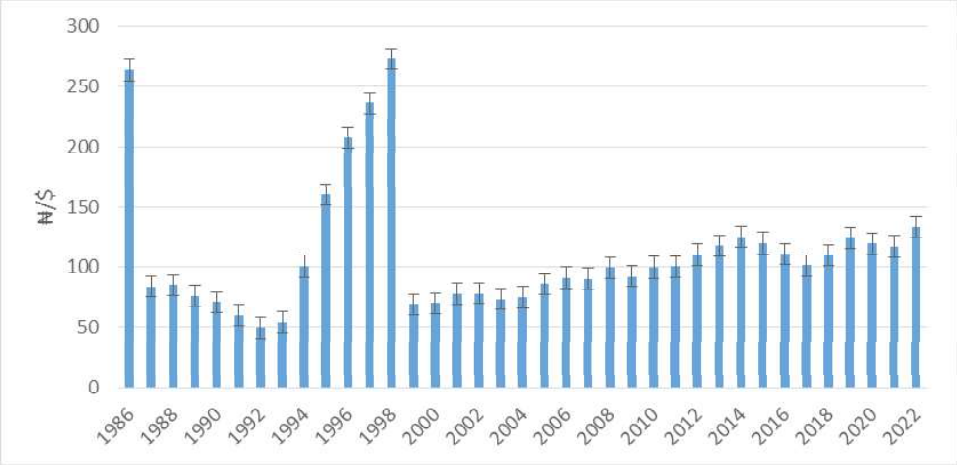

Figure 2: Real exchange rate

framework for evaluating monetary and fiscal policies. In essence, the model elucidates the underlying factors contributing to short-term fluctuations in aggregate income within an open market.

This study is grounded in the Mundell-Fleming model (MFM), as developed by Mundell (1961) and Fleming (1962). This theoretical framework is derived from the conventional IS-LM model which characterizes an open economy. It elucidates the interconnections among output, interest rates, and real exchange rates within an open economy engaged in international trade. This study adopts the MFM on the premise that Nigeria's economy is open. It is presumed that there is perfect capital mobility, given Nigeria's minimal influence on global interest rates or trade prices. Therefore, the MFM serves as a framework to analyze the impact of exchange rate fluctuations on FDI flows.

The fundamental presumptions of the model are as follows:

a) The domestic rate of interest (r) is equal to the world rate of interest (r^*);

b) There is small open economy with perfect capital mobility;

c) It assumes fixed price level of domestic production.

The MFM fundamental prediction is that an economy's conduct is primarily controlled by the exchange rate system it chooses to adopt, whether it has a fixed or variable exchange rate system. The IS Curve for Open Economy: The Mundell-Fleming model's goods and services market is represented by the following equation:

$$Y = C(Y - T) + I(r^*) + G + NX(e) \quad (1)$$

In this scenario, investment is determined by the interest rate (r^*) because $r = r^*$, and net exports (NX), or the cost of a foreign currency in terms of domestic currency, are determined by the exchange rate (e).

2.3. Empirical Review

Onyele et al. (2024b) used the Autoregressive Distributed Lag (ARDL) model to examine factors influencing capital flows in Nigeria using data from 1980 to 2020. The results showed that the exchange rate significantly impacted FDI. Regarding the policy implications, governments should concentrate on implementing macroeconomic policies efficiently to strengthen the domestic macroeconomic environment and make it more resilient to global shocks during times of crisis. This will attract foreign capital for economic productivity.

Ozigbo and Anuya (2023) conducted an examination of the volatility of the real exchange rate and the inflow of FDI into Nigeria from 1983 to 2022 in a

recent scholarly inquiry. The methodology employed, namely the Error Correction Model (ECM), is congruent with the ordinary least squares (OLS) approach that was utilized. The results from the cointegration test indicated that the variables maintain an equilibrium relationship over the long term. The findings of the study revealed a significant fluctuation in the real exchange rate, which adversely impacted FDI inflows into Nigeria.

Odionye et al. (2023) investigated the influence of fluctuations in interest rates, exchange rates, and political stability on FDI into Nigeria during the period from 1981 to 2021. A discrete threshold regression model (DTRM) was applied in this analysis. It was determined that fluctuations in the exchange rate and political stability negatively affected the influx of capital into the country.

The interrelationship between FDI and the foreign currency exchange rate in Nigeria was analyzed by Oladeji and Musa (2022) covering the period from 1986 to 2018. Within the framework of an ECM, the study employed a range of quantitative analytical methodologies, including regression analysis, Granger causality tests, correlation matrices, and descriptive statistics. According to the estimations derived from the causality test, there was no causal relationship between FDI and the exchange rate during the research period. A significant long-term relationship was established between FDI and the exchange rate.

In Zhejiang province, China, Tan et al. (2021) assessed the mechanisms through which the exchange rate impacts FDI inflows within China. This assessment was conducted utilizing co-integration tests, vector error correction models, Granger causality tests, and impulse response tests. The empirical findings indicated a long-term, stable, and unidirectional causal relationship between the exchange rate and FDI inflows. The persistent appreciation of the RMB against the USD served to deter FDI.

Utilizing the data amassed from 42 source nations during the period from 2005 to 2019, Nadine et al. (2021) scrutinized the ramifications of various relative dimensions on inward FDI to Egypt from diverse source nations, as well as the effect of the real effective exchange rate on inbound FDI to Egypt, employing a Generalized Method of Moments (GMM) estimation technique. The volatility of the relative currency rate was identified as having an adverse impact on FDI directed towards Egypt.

With time series data extending from 1986 to 2017, Akinlo and Onatunji (2021) investigated the correlation between exchange rate volatility and FDI within a select group of ECOWAS nations. The effects of exchange rate volatility on FDI, along with causal relationships, were examined through the ARDL model and the Toda-Yamamoto methodology for assessing causality. According to the

empirical findings, the calculated coefficient for nominal exchange rate volatility was significant only in Ghana, Sierra Leone, and Nigeria, with negative values recorded for all selected nations. Conversely, the influence of actual exchange rate fluctuations was predictably substantial and negative in Nigeria, Togo, Sierra Leone, and Côte d'Ivoire. Nevertheless, in Ghana and The Gambia, the effects were positive but statistically insignificant.

In a comparative study, Jannat (2020) evaluated how currency rate volatility affected FDI inflows into Bangladesh, India, Pakistan, Nepal, and Sri Lanka. Panel data from the developing South Asian nations indicated above, covering the years 1980–2017, were used in the study. Since exchange rate volatility is not directly observable, data on volatility was produced using a GARCH (1,1) model. After that, the influence on FDI was examined using the exchange rate volatility variable in conjunction with additional control factors. Findings indicated that fluctuations in currency rates significantly hampered FDI inflows into South Asian nations, which desperately needed more FDI to boost their economies.

Similarly, Adokwe et al. (2019) employing monthly time series data concerning exchange rate volatility and FDI for the years 1986–2016, [14] evaluated the impact of exchange rate volatility on FDI in Nigeria utilizing the GARCH methodology. The model of the study was estimated using the 2-Stage Least Squares technique. The conclusions of the study was that exchange rate volatility exerted a significant and negative influence on Nigeria's FDI.

Likewise, utilizing data spanning from 1999 to 2016, Uzoma-Nwosu and Orekoya (2019) explored the relationship between exchange rate volatility and FDI in Nigeria. The GARCH(1,1) methodology was employed in the analysis to generate the volatility series, while the Vector Error Correction Model (VECM) was utilized for estimation purposes. The findings indicated that FDI's responsiveness to variations in exchange rates evolved over time. For instance, FDI exhibited a favorable reaction to exchange rate fluctuations in the long term, whereas it tended to respond adversely in the short term.

Similarly, Ehikioya (2019) examined the extent to which exchange rate volatility influences FDI directed towards Nigeria. The investigation analyzed time series data from 1970 to 2016, employing ECM, GARCH, and ARCH models. Cointegration tests were conducted, and the stationarity of the data series was ascertained. The conclusions drawn from the study indicated that exchange rate volatility persisted throughout the duration of the analysis.

In a separate investigation, Jacob and Kattookaran (2019) determined how fluctuations in exchange rates impacted FDI inflows into India from April 1995 to March 2018. ARDL estimation revealed that fluctuations in exchange rates

had a significantly detrimental effect on FDI flows into India, both in the short and long terms. Short-term surges in FDI into the host country were attributed to the devaluation of its currency.

Moreover, Emmanuel et al. (2019) investigated the influence of interest rates and currency exchange rates on FDI in Nigeria during the period from 2006 to 2018. The cointegration characteristics of the data were further examined using statistics derived from the Johansen cointegration test, and the ECM was applied to analyze both the long- and short-term relationships among the variables of the study. The statistically significant results indicated a strong and positive correlation between FDI and exchange rates.

In a similar vein, the influence of exchange rate volatility on FDI and international trade within developing countries along the "One Belt and One Road (OBOR)" initiative was scrutinized by Latief and Lefen (2018). A selection of seven developing nations—namely Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka—was made for this analysis, encompassing the period from 1995 to 2016. The measurement of exchange rate volatility was conducted utilizing the GARCH (1,1) and threshold-GARCH methodology. The findings of the investigation, which corroborate the economic theory postulating that exchange rate volatility may adversely affect FDI and international trade, indicated that in the nations associated with OBOR, exchange rate volatility exerted a significant yet detrimental influence on both aspects.

The correlation between currency rate volatility and FDI inflows into South Africa was analyzed by Hanusch et al. (2018), utilizing a panel of 80 developing and developed countries for the timeframe spanning 1990 to 2015. The results revealed a negative correlation between FDI and exchange rate volatility. *Ceteris paribus,* a 10% reduction in exchange rate volatility over the course of a year could potentially augment FDI inflows by an estimated 0.48 percentage points of GDP, whereas a comparable reduction over the preceding five years could lead to an increase in FDI inflows by 0.27 percentage points over an extended duration.

Employing traditional time series methodologies, Safini and Mansur (2017) probed whether exchange rate volatility impacts FDI inflow into Thailand. The study incorporated the VECM approach, long-run structural modeling, and variance decompositions, in addition to Johansen's cointegration methodology, to evaluate the theoretical interrelations among the variables. The results demonstrated a significant and positive association between FDI and exchange rate volatility.

The short- and long-term effects of currency rate fluctuations on FDI in Kenya were investigated by Malot et al. (2017). The research utilized annual

secondary data sets encompassing the years from 1980 to 2014. While multiple regression was employed to assess the long-term implications of exchange rate volatility on FDI, the ECM estimation was utilized to ascertain the short-term impacts. The findings indicated a noteworthy decline in FDI attributable to exchange rate volatility.

Aidoo (2017) examined the manner in which fluctuations in exchange rates influenced FDI and domestic investment (DI) in South Africa during the period from 1980 to 2015. Following the measurement of exchange rate volatility using the GARCH model, the study employed the Granger causality test and the VECM approach to achieve its primary objective. The short-term analysis unveiled a connection between South Africa's DI, FDI, and currency rate volatility. The long-term outcome of the model revealed that FDI and exchange rate volatility were positively correlated.

The influence of inflationary expectations and exchange rate regulations on the flow of FDI to the West Africa was examined by Eregha (2017). Utilizing data available for the period from 1980 to 2014, the research employed the Arellano Panel Correction for Serial Correlation and Heteroscedasticity option of the Within Estimator across five West African member states. The findings indicated that, although inflation expectations exerted a minimal influence on FDI, uncertainty surrounding exchange rates obstructed the flow of FDI. While episodes of current account deficits and variations in foreign exchange reserves acted as conduits for FDI flow, the fixed exchange rate policy regime was identified as a deterrent to such inflows within the zone.

2.3.1. Summary of review and gap

In light of the aforementioned empirical literature, it may be asserted that a considerable number of academic researchers have been endeavoring to forecast the effects of exchange rate volatility on FDI for an extended period. In order to ascertain the influence of exchange rate volatility on FDI and the nature of the interrelationship between the two, these scholars have undertaken a series of empirical and descriptive investigations. Employing the methodologies and strategies at their disposal, they have arrived at varied conclusions, thereby necessitating further inquiry into the repercussions of currency rate volatility on FDI. The studies reviewed did not incorporate the most recent datasets concerning the time frames encompassed by these analyses. Consequently, this study utilized annual time series data extending from 1986 to 2022 to address contemporary realities regarding the impact of exchange rate volatility on FDI in Nigeria.

3. Methodology

3.1. Sources of Data

This research investigated the fluctuations of exchange rates and their influence on the inflows of foreign direct investment into Nigeria, utilizing annual data sourced from the World Development Indicators (WDI) and the Central Bank of Nigeria (CBN) statistical bulletin. The data employed to substantiate the foreign direct investment figures was derived from the WDI database. For the variables under analysis, sample data spanning from 1986 to 2022 was accessible. The examination focused on the exchange rates between United States dollars and Nigerian naira to assess volatility throughout the duration of the study. The temporal scope of the study is predominantly dictated by the availability of data pertaining to both Structural Adjustment Programs (SAP) and relevant variables. In order to enhance the integration and analysis of data, time frames characterized by comprehensive data availability should be prioritized. During the period under consideration, Nigeria experienced economic liberalization, which facilitated the adoption of a flexible or floating exchange rate system, as the nation began to witness consistent fluctuations in the foreign exchange rate.

3.2. Model Specification

In general, the macroeconomic theory underlying the Mundell-Fleming framework maintains that interest rates and exchange rate volatility have an impact on FDI. This study used the Uzoma-Nwosu and Orekoya (2019) model for a longer time span (1986 to 2022) based on this theoretical perspective. Equation 2 illustrates the empirical function for this investigation as shown in equation (2):

$$FDI = f\,(REERVOL,\ INTR,\ RGDP,\ POPU) \tag{2}$$

Equation (3) expresses the ARDL limits test for cointegration in accordance with [30] as follows:

$$\Delta FDI_t = \delta_o + \Sigma_{i=1}^{p}\delta\Delta FDI_{t-i} + \Sigma_{i=1}^{p}\delta_2\Delta REERVOL_{t-i} + \Sigma_{i=0}^{p}\delta_3\Delta INTR_{t-i} + \Sigma_{i=0}^{p}\delta_4\Delta RGDP_{t-i} + \Sigma_{i=0}^{p}\delta_5\Delta POPU_{t-i} + \beta_1 FDI_{t-1} + \beta_2 REERVOL_{t-1} + \beta_3 INTR_{t-1} + \beta_4 RGDP_{t-1} + \beta_5 POPU_{t-1} + \mu_t$$

Equation 4 shows that ECM is used to estimate the short-run dynamic connection.

$$\Delta FDI_t = \delta_o + \Sigma_{i=1}^{p}\delta_1\Delta FDI_{t-i} + \Sigma_{i=0}^{p}\delta_2\Delta REERVOL_{t-i} + \Sigma_{i=0}^{p}\delta_3\Delta INTR_{t-i} + \Sigma_{i=0}^{p}\delta_4\Delta RGDP_{t-i} + \Sigma_{i=0}^{p}\delta_5\Delta POPU_{t-i} + \theta ecm_{t-i} \tag{4}$$

Where,

δ_0 = constant

δ_1 - δ_5 = short-run elasticities (coefficients of the first-differenced explanatory variables)

β_1 - β_5 = long-run elasticity (coefficients of the explanatory variables)

θ = speed of adjustment

ecm_{t-i} = error correction term lagged for one period

Δ = first difference operator

p = lag length

3.3. Description of Model Variables

The dependent variable under consideration is FDI which is quantified as the aggregate annual FDI inflow into Nigeria from all available sources. This variable is also indicative of the internal rate of inflation at current prices, articulated as a percentage of GDP. An instrumental measure of an economy's relative attractiveness for FDI is the magnitude of this variable. Furthermore, it acts as a significant catalyst for the expansion of economies in developing nations.

The volatility of the real effective exchange rate is represented by the acronym REERVOL. The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) methodology is utilized to derive this volatility metric. The estimation process was conducted in two distinct phases. Initially, the relevant lags of the pertinent variables were employed to estimate the GARCH model. Subsequently, the residuals were obtained. The variance of the residuals serves to encapsulate volatility. The GARCH methodology surpasses standard deviation measures as it is capable of distinguishing between predictable and unpredictable components in the formation process of the real exchange rate. Conversely, standard deviation measures neglect the stochastic processes involved in the generation of exchange rates, resulting in an underestimation of the volatility's influence on decision-making. It is anticipated that FDI will be adversely affected by REERVOL.

The interest rate is denoted by the acronym INTR. It serves to evaluate the nation's cost of capital as an enticement for FDI in search of resources. A negatively signed INTR is to be expected.

The growth rate of RGDP is employed to assess the magnitude of the domestic economy and is incorporated to regulate the influx of foreign direct investment. This metric signifies the purchasing power of individual consumers and serves as an indicator of a nation's productivity. Markets that demonstrate consistent growth are also attractive to global profit-maximizing enterprises.

This growth is quantified as annual RGDP growth expressed in percentage terms which is expected to yield a positive outcome *a priori.*

The population growth rate (POPU) serves to evaluate the market size and the potential of its populace. An elevated population is perceived to capture the interest of foreign investors in that economy, which is expected to exert a favorable influence on FDIs.

3.4. Estimation Technique

The standard deviation of exchange rate has been employed in prior research endeavors to assess exchange rate volatility (Bala and Asemota, 2013). However, the calculation of volatility through standard deviation does not account for the time-varying and clustering characteristics. The full extent of volatility within a system is not adequately captured by the standard deviation. In light of this challenge, the present study has opted to quantify exchange rate volatility utilizing the GARCH model developed by Bollerslev (1986), which has garnered support from numerous contemporary studies. The Autoregressive Conditional Heteroscedasticity (ARCH) model, introduced by Engle in 1982, utilizes the variance of a time series and has been further enhanced in the GARCH model (Onyele & Nwadike, 2021). GARCH allows for the variance of the error term to exhibit a time-varying nature that relies on the historical behavior of the series, thereby reflecting perceived actual volatilities. Moreover, given that a GARCH (1,1) specification with its own lag effectively addresses the issue of autocorrelation in time series data, it is imperative for the generation of exchange rate volatility. The subsequent section elucidates the GARCH (1,1) model employed in this analysis:

$$\sigma_t^2 = \alpha_0 + \omega_t \varepsilon_{t-1}^2 + \beta_j \sigma_{t-1}^2 \tag{5}$$

Equation (5) can be expressed further as;

$$\sigma_t^2 = \alpha_0 + \sum_{t=1}^{p} \omega_1 \varepsilon_{t-1}^2 + \sum_{i=1}^{q} \beta_j \sigma_{t-1}^2 \tag{6}$$

α_0 represents the mean, ε_{t-1}^2 is denoted as the ARCH term, and σ_{t-1}^2 is identified as the GARCH term. According to [32], the requisite condition to ensure the stationarity of the model is when $\Sigma_{t=1}^{p}\omega_1 + \Sigma_{i=1}^{q}\beta_j < 1$. To investigate the impact of real effective exchange rate volatility on FDI, the study has adapted the model proposed by Ehikioya (2019), incorporating interest rate, RGDP growth rate,

and population growth rate as moderating variables. The inclusion of these variables is anticipated to control for other macroeconomic factors that may influence or elucidate the FDI.

The subsequent phase involves analyzing the multicollinearity challenges associated with the model. To achieve a more effectively explicable set of independent variables for the model, tolerance measures alongside the Variance Inflation Factor (VIF) are employed. The coefficient of determination (R^2) serves as the foundation for the VIF, which assesses the degree of multicollinearity between a singular independent variable and the model. When the VIF of an independent variable exceeds 10, it signifies potential multicollinearity issues within the model, as it indicates a substantial correlation between the variable and at least one of the explanatory factors.

The research employed the Augmented Dickey-Fuller (ADF) test to ascertain the stationarity of the variables, ensuring that the estimated results are not erroneous. The ADF test's capability to automatically account for higher-order connections and adjust the testing approach provides it with a significant advantage over other procedures for testing stationarity in series. Nevertheless, given that the Philips-Perron (PP) test can moderate error terms without the incorporation of lag difference terms, it was utilized in this investigation to corroborate the findings derived from the ADF test. To ascertain whether a long-term relationship exists, the study employed the Johansen co-integration estimation technique. The Akaike Information Criterion (AIC) was utilized to determine the optimal lag length.

After elucidating the stationarity tests, the ARDL model was selected due to its capability to perform cointegration tests without necessitating the uniform order of stationary variables. This indicates that the model is applicable even when the variables exhibit stationarity at varying orders (Pesaran et al., 2001). The dynamics of the dependent variable in relation to the independent variables can be articulated by the ARDL model through the utilization of lagged values. The ARDL model characterizes the cointegration of variables without the prerequisite that all variables be stationary in I(1), thereby circumventing the complications associated with mixed outcomes in the ordering of variables during stationarity tests.

4. Empirical Findings

4.1. Descriptive Statistic

Descriptive statistics represent a summary measure that quantitatively delineates characteristics derived from a dataset, whereas the term descriptive statistics

refers to the methodology employed in the utilization and analysis of these statistics (Onyele & Nwadike, 2020). The statistical attributes of the variables, encompassing their measures of dispersion—such as maximum, minimum, and standard deviation—as well as their measures of central tendency, including mean and median, are scrutinized through descriptive statistics. Furthermore, in order to ascertain the normality of distribution of the variables, the descriptive statistics also elucidate the distributional patterns exhibited by the said variables.

Table 1: Descriptive Statistic

	FDI	*REER*	*INTR*	*RGDP*	*POPU*
Mean	1.582739	111.2637	18.16865	4.162427	2.597588
Median	1.380374	100.0000	17.59000	4.195924	2.586844
Maximum	5.790847	273.0092	29.80000	15.32916	2.764062
Minimum	-0.039128	49.77628	10.50000	-2.035119	2.380007
Std. Dev.	1.257269	53.30672	3.999617	3.854065	0.100791
Skewness	1.655711	1.801745	0.737173	0.515553	-0.184600
Kurtosis	5.799086	5.690173	4.173130	3.459191	2.206849
Jarque-Bera	28.98395	31.17584	5.472808	1.964139	1.179988
Probability	0.000001	0.000000	0.064803	0.374535	0.554331
Observations	37	37	37	37	37

Source: Author's computation using EViews 10.0

From Table 1, there exist precisely 37 observations for each variable. The statistical attributes of the variables, including mean, median, maximum, minimum, among others, along with the distributional patterns of the variables, are also elucidated by the results. With regard to the Jarque-Bera estimates and their corresponding probability values, it was discerned that while the variables (INTR, RGDP, and POPU) exhibited normal distributions with probability values of 0.064803 > 0.05, 0.374535 > 0.05, and 0.554331 > 0.05, respectively, the remaining variables (FDI and REER) did not conform to normality, as evidenced by their Jarque-Bera statistical probability values of 0.000001 < 0.05 and 0.000000 < 0.05.

4.2. Generalized Autoregressive Conditionally Heteroscedastic (GARCH)

Employing the GARCH model, the data analysis commences with the assessment and extraction of the volatility of the real effective exchange rate. Table 2 substantiated the presence of the GARCH effect within the variance equation, as all GARCH parameters were found to be statistically significant. Additionally, the GARCH parameter within the mean equation was significant, as demonstrated by the probability value of 0.0022, which is below the 0.01

significance threshold. This indicates that from 1986 to 2022, volatility was observed in the real effective exchange rate (REER). Consequently, the volatility of the real effective exchange rate (REERVOL) was derived from the variance equations.

Table 2: GARCH(1,1) Estimates

Variable	*Coefficient*	*Std. Error*	*z-Statistic*	*Prob.*
REER(-1)	0.706734	0.076741	9.209352	0.0000
C	30.93342	6.772923	4.567219	0.0000
	Variance Equation			
C	57.83094	24.54210	2.356397	0.0185
RESID(-1)^2	6.788185	2.117631	3.205556	0.0013
GARCH(-1)	1.298591	0.266336	4.875762	0.0022
R-squared	0.705450			
Adjusted R-squared	0.682081			
Durbin-Watson stat	1.930986			

Source: Author's computation using EViews Software

Research Question 1: What is the extent of exchange rate volatility in Nigeria?

From Table 2, the GARCH(1,1) model led to the conclusion that the level of exchange rate volatility in Nigeria was both high and persistent throughout the study period.

Hypothesis 1 (Ho_1): The extent of exchange rate volatility in Nigeria is not significant.

The findings as presented in Table 2 indicate that the parameters associated with exchange rate volatility possessed probability values that were below 0.05. This outcome suggests that the degree of persistent volatility was statistically significant.

4.3. Multicollinearity Test

The assessment of multicollinearity through the Variance Inflation Factor (VIF) has been succinctly presented in Table 3. Given that none of the variables exhibit

Table 3: Variance Inflation Factor (VIF)

Variable	*Tolerance*	*VIF*
REERVOL	0.652188	1.225684
INTR	0.002967	6.216312
RGDP	0.002977	2.434557
POPU	0.155154	2.624084

Source: Author's computation using EViews Software

issues pertaining to multicollinearity, with all tolerances being below 1 and VIF values ranging between 1 and 10, it is plausible to affirm the validation of each variable utilizing the multicollinearity assessments as well.

4.4. Test for Stationarity

Subsequent to ascertaining the volatility of the REER, the ensuing computation is requisite to elucidate the stationarity characteristics of the variables under examination. The variables (FDI, REERVOL, and RGDP) demonstrated stationarity at their levels, as per the outcomes of the unit roots test, signifying that they are of order zero, denoted as 1(0). However, a subsequent evaluation of the variables in their first differences reveals that they exhibit stationarity at first difference, classified as I(1). Conversely, the variables (INTR and POPU) did not satisfy the stationarity criteria at their levels. Consequently, the null hypothesis is accepted for the variables (FDI, REERVOL, and RGDP), leading to the conclusion that there is an absence of a unit root. It is imperative to conclude that the variables (INTR and POPU) likewise do not possess a unit root at first difference. Hence, the study proceeded to the subsequent model to estimate the Autoregressive Distributed Lag (ARDL) model, indicating that the variables are integrated of both order zero, denoted as I(0), and order one, represented as I(1).

Table 4: Unit Root Test Results for Stationarity of Data

	ADF Test		*PP Test*	
Variable	*Level*	*First difference*	*Level*	*First difference*
FDI	-4.447770***	-	-4.336846***	-
REERVOL	-5.404684***	-	-5.396870***	-
INTR	-3.491707	-5.993907***	-5.724544***	-
RGDP	-3.986068**	-	-3.892720**	-
POPU	-1.130319	-4.231677**	-0.346986	-3.671069**

Source: Author's computation using EViews 10.0

4.5. ARDL Estimation

As evidenced in Table 5 by the Final Prediction Error (FPE) and Akaike Information Criterion (AIC) criteria, the ARDL model necessitates the inclusion of three lags to ensure practical application, as indicated by the Vector Autoregression (VAR) model. The software subsequently determines the optimal number of lags for each variable in the short-term calculations, adhering to a maximum of three lags (in accordance with the VAR model).

Although the employment of three (3) lags based on annual data, encompassing a 37-year observation period with five (5) variables, is deemed to

be the upper limit for the estimation of the ARDL model (exceeding three lags is not permissible within the software), this could be construed as an excessive extension of the lag length within the model. It is noteworthy, however, that in this analysis, the implementation of either one or two lags would result in the absence of cointegration among the variables, and autocorrelation would be identified within the diagnostic assessments of the ARDL model.

Table 5: VAR Lag Selection Criteria

Lag	*LogL*	*LR*	*FPE*	*AIC*	*SC*	*HQ*
0	-1114.080	NA	3.79e+14	59.10949	59.49734	59.24749
1	-910.2011	300.4537	6.60e+11	52.64216	56.52066	54.02210
2	-780.1275	130.0736	1.08e+11	50.05934	57.42848	52.68122
3	-574.8164	108.0585*	2.65e+09*	43.51665*	54.37643*	47.38048*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

4.6. Bounds Test

As illustrated in Table 6, the bounds test reveals that the calculated F-statistic exceeds the upper critical bound values (surpassing both the 95% and 90% upper bounds). This finding implies that the model rejects the null hypothesis positing the absence of level effects, thereby indicating cointegration among the variables and establishing a long-term trajectory in the relationship between the model variables.

Table 6: Bounds Test

Test Statistic	*Value*	*Signif.*	*I(0)*	*I(1)*
F-statistic	7.462947	10%	3.03	4.06
k	4	5%	3.47	4.57
		1%	4.4	5.72

Source: Author's computation using EViews 10.0

4.7. Long-run Estimates

In terms of the long-term estimates, Table 7 illustrates that the variables, namely the REERVOL, INTR, RGDP, and POPU are statistically significant (at the 1% significance level) by rejecting the null hypothesis with p-values of 0.01.

The findings suggest that, with the sole exception of POPU, all other variables exert a deleterious influence on FDI inflows into Nigeria. Specifically, REERVOL

and INTR demonstrated adverse effects on FDI inflows, whereas POPU manifested a beneficial effect on FDI inflows within the Nigerian context. Additionally, RGDP exhibited a negative effect on FDI inflows into Nigeria.

Consequently, based on the coefficients derived from the analysis, an increment of 1% in REERVOL, INTR, and RGDP, respectively, results in a persistent decline in FDI inflows into Nigeria of approximately 0.018%, 0.148%, and 0.201%. Considering that the Nigerian economy has exhibited an entirely erratic performance over the preceding 38 years, it is prudent to draw inferences regarding the adverse ramifications these variables impose on FDI inflows and to assert that this unstable and irregular economic environment has altered certain anticipated values, rendering them misleading over an extended duration. Nevertheless, POPU displayed a positive correlation, consistent with prior expectations. This suggests that a percentage increase in the population growth rate corresponds to a 6.514% escalation in FDI inflows into Nigeria.

4.8. Error Correction Mechanism (ECM)

The results of the ECM are presented in Table 8. Initially, the coefficient of the ECM serves to substantiate whether the model is robust in the short term, which is crucial for a more comprehensive analysis of the short-term estimations. This model is employed in the short term because it assesses the efficiency during the brief period when an independent variable fluctuates and the dependent variable promptly reverts to its original equilibrium. For the entire sample, the estimated error term of the model's lag, or the coefficient representing the ECM, is ascertained to be -0.893263, which is statistically significant at the 1% level. This outcome underscores the significance of endogenous variables in elucidating foreign direct investment in Nigeria. Moreover, it indicates that FDI and the endogenous variables influencing its short-term fluctuations possess a long-term interconnection, suggesting that such disequilibrium can be rectified and restored over time. This corroborates the preliminary analysis's findings on the potential cointegration of the study's variables.

With regard to the short-term estimations denoted as D(REERVOL), D(INTR), D(RGDP), and D(POPU) in Table 8, it is observable that the variables REERVOL, INTR, RGDP growth, and POPU reject the null hypothesis as evidenced by p-values < 0.05, signifying their statistical significance. Concerning the signs associated with each statistically significant variable, it is apparent that D(REERVOL), D(INTR), and D(POPU) exert the anticipated effect on FDI inflows into Nigeria; however, D(RGDP) did not conform to the expected sign, indicating that RGDP has a positive influence on FDI inflows into Nigeria.

However, the variable of interest, REERVOL, exhibits statistical significance in lags 1 and 2, thereby indicating that, within a two-year horizon, international investors are likely to be cognizant of REERVOL and allow it to influence their investment decisions. Furthermore, the significance of INTR at its first difference implies that foreign investors appear to recognize the ramifications of interest rates, which may impact their investments in a timeframe of less than one year. Additionally, the RGDP growth rate does not demonstrate statistical significance in one lag, suggesting that foreign investors frequently consider and are influenced by RGDP growth over a three-year period when determining their investment choices. The initial insignificance of POPU indicates that foreign investors are aware of the population growth rate and acknowledge its potential effect on their investments within a duration of less than one year.

The explanatory variables may account for nearly 87% of the variation observed in the explained variable, FDI, as indicated by the R-squared value (0.870345). In other terms, it signifies the portion of the variance in FDI that can be elucidated by REERVOL, INTR, RGDP, and POPU collectively. Approximately 79% of the study model appears to effectively elucidate the variability of the data from its mean location, as evidenced by the results of the Adjusted R-squared (0.786069). The variables of the study exhibit no indications of autocorrelation, as demonstrated by the Durbin-Watson statistic of 2.226378 across the sample period. Considering the F-statistic of 10.32733 and p-value of 0.000003 from the three samples, it is reasonable to infer the model's overall relevance to this investigation. Moreover, this finding suggests that foreign direct investments in Nigeria are significantly influenced by the collective impact of all explanatory variables.

Table 8: ECM

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*	*Remark*
C	-17.08662	2.520275	-6.779667	0.0000***	Significant
@TREND	-0.166808	0.027553	-6.054014	0.0000***	Significant
D(FDI(-1))	0.719498	0.204385	3.520313	0.0028***	Significant
D(FDI(-2))	0.304713	0.149548	2.037561	0.0585*	Non-significant
D(REERVOL)	-0.011630	0.003371	-3.450346	0.0033***	Significant
D(REERVOL(-1))	0.019240	0.004857	3.961021	0.0011***	Significant
D(REERVOL(-2))	0.016526	0.004479	3.689412	0.0020***	Significant
D(INTR)	-0.101662	0.045468	-2.235883	0.0400**	Significant
D(RGDP)	-0.164873	0.038943	-4.233699	0.0006***	Significant
D(RGDP(-1))	0.213406	0.059164	3.607044	0.0024***	Significant

contd.

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*	*Remark*
D(RGDP(-2))	0.087749	0.042772	2.051538	0.0570*	Non-significant
D(POPU)	0.217109	0.052130	4.164729	0.0007***	Significant
D(POPU(-1))	-8.852606	5.804218	-1.525202	0.1467	Non-significant
ECM(-1)	-0.893263	0.206499	-4.325749	0.0003***	Significant
R-squared	0.870345				
Adjusted R-squared	0.786069				
F-statistic	10.32733				
Prob(F-statistic)	0.000003***				
Durbin-Watson stat	2.226378				

Source: Author's computation using EViews 10.0
Note: ***, ** and * stands for significance at 1%, 5% and 10% level respectively

Research Question 2: In what way does exchange rate volatility impact on FDI in Nigeria?

Hypothesis 2 (Ho_2): Exchange rate volatility does not have a significant impact on FDI in Nigeria.

From Tables 7 and 8, it has been determined that real exchange rate volatility exerts a negative influence on FDI flows to Nigeria in both the long run and short run, indicating that an increase in the level of REERVOL corresponds with a decrease in FDI.

The probability value of real exchange rate volatility (REERVOL) in the long run (0.0001) and short run (0.0033) was found to be less than 0.01. This observation indicates that the effect of REERVOL on FDI flows to Nigeria is statistically significant at the 1% level. Consequently, hypothesis 1 (Ho1) is rejected, as the study asserts that exchange rate volatility significantly influences FDI.

4.9. Diagnostic Tests

The quartet of diagnostic assessments pertinent to ARDL estimations is enumerated in Table 9. With a p-value ranging from 0.1892 to 2.05 in the F-statistics, the serial correlation test is incapable of rejecting the null hypothesis, thereby suggesting the absence of significant serial correlation among the variables and indicating that the error terms of each independent variable remain uncorrelated. Concerning the normality assessments, it can be ascertained from both statistical metrics that the null hypothesis positing that the residuals are normally distributed cannot be refuted. This model successfully fulfills all diagnostic evaluations, thereby facilitating the examination of the impacts of

independent variables on the dependent variable across both long-term and short-term horizons. In the concluding assessment, the heteroscedasticity test reveals that both p-values do not permit the rejection of the homoscedasticity null hypothesis. Given that the F-statistics constitute the focal point of this inquiry, it may be posited that the functional form is adeptly applied within this model.

Table 9: Diagnostic Tests for ARDL Estimations

Test	*t-statistics*	*Prob.*	*Remark*
Breusch-Godfrey Serial Correlation LM test:	1.879485	0.1892	No serial correlation
Heteroskedasticity test: Breusch-Pagan-Godfrey	1.090859	0.4330	No heteroskedasticity
Jarque-Bera	0.271646	0.8729	Normal distribution

Source: Author's computation using EViews 10.0

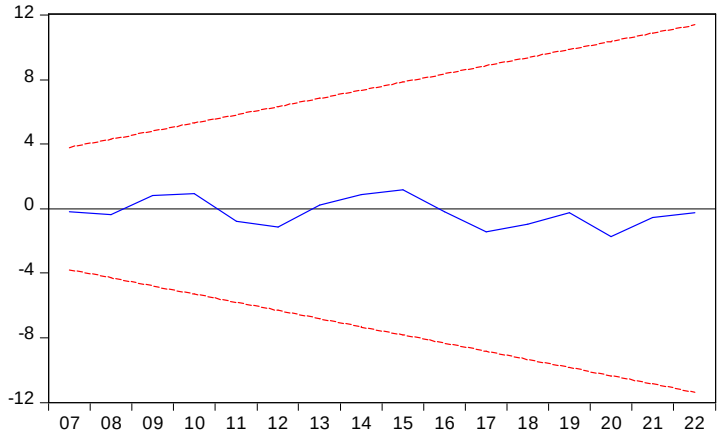

Figure 3: CUSUM Test

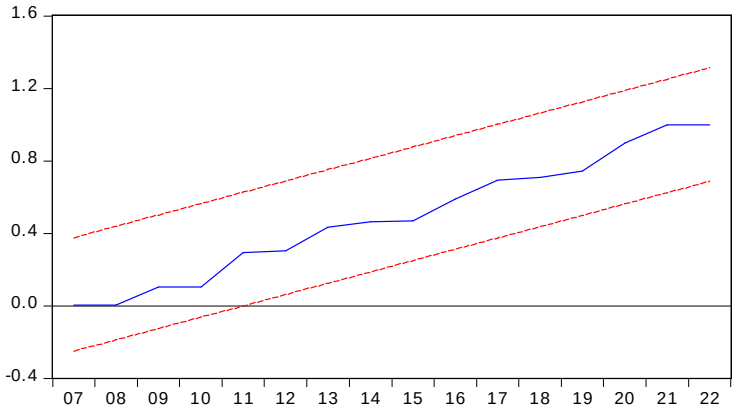

Figure 4: CUSUMSQ Test

With regard to the CUSUM and CUSUMQ tests, it is evident from their respective Figures 3 and 4 that there are no structural breaks; therefore, the coefficients remain stable throughout the observation period within the model. Thus, upon the completion of all tests, it is affirmed that the model is viable.

4.10. Discussion of Findings

The results presented in Tables 7 and 8 elucidate that REERVOL exerts both long-term and short-term adverse effects on FDI. Furthermore, the statistical significance of this REERVOL in the long-run estimations substantiates the notion that foreign investors are influenced by both short- and long-term fluctuations in REERVOL. This outcome aligns directly with prior empirical investigations conducted by Akinlo & Onatunji (2021), Adokwe et al. (2019). This observation indicates that the current level of REERVOL in Nigeria serves as a deterrent to FDI.

Moreover, the negative coefficients for both long- and short-term interest rates illustrate that an unfavorable interest rate exacerbates the decline of FDI inflows to Nigeria as a consequence of REERVOL. Investors may exhibit reluctance to directly invest in local enterprises at a rate that is marginally below market value yet exceeds their parent company's borrowing rate when confronted with an unfavorable interest rate environment. Conversely, for local enterprises that may be unable to secure borrowing from foreign lenders at a rate below the prevailing market rate, this scenario could potentially give rise to an additional set of challenges. This is congruent with the findings of Jannat (2020), Oladeji and Musa (2022), who asserted that fluctuations in the interest rate intensify the impact of exchange rate volatility on FDI in Nigeria.

The study further investigated the behavioral relationship of the RGDP growth rate in relation to FDI. The results indicate that FDI was negatively and statistically significantly influenced by the rate of RGDP growth in both long-term and short-term contexts. The findings suggest that prospective investors in Nigeria would be inclined to ascertain or evaluate how the nation's level of domestic productivity might affect the returns on their capital. It indicates that FDI diminishes during periods of sluggish RGDP growth, which could potentially precipitate economic shocks. In this context, Uzoma-Nwosu and Orekoya (2019), Oladeji and Musa (2022), Malot et al. (2017) reinforce this study by asserting that low economic productivity may deter FDIs during episodes of pronounced volatility in exchange rates.

The positive and statistically significant POPU suggests that, even amidst REERVOL, Nigeria's burgeoning population has the potential to attract FDI.

This perspective is supported by Uzoma-Nwosu and Orekoya (2019), who illustrated that numerous foreign investors are inclined to favor nations with increasing populations due to the availability of affordable labor and the considerable market size of the host economy.

5. Conclusion

This study examined the influence of exchange rate volatility on foreign direct investment in Nigeria. Following an exhaustive review of the existing literature, the study considered several determinants of FDI identified in the literature, which were incorporated as control variables. The findings from the ARDL estimation revealed that real exchange rate volatility significantly curtailed FDI inflows into Nigeria. Consistent with this conclusion, the results derived from both long-run and short-run functions indicated that real exchange rate volatility was associated with negative and significant coefficients. Furthermore, the study demonstrated that interest rate and RGDP growth exerted a negative interference on the effect of exchange rate volatility concerning FDI flows to Nigeria. Conversely, the population growth rate positively influenced the impact of exchange rate volatility on FDI flows to Nigeria. The implication of this discovery suggests that policymakers ought to adopt a more holistic strategy to promote FDI, given the presence of additional factors that affect FDI influx. The analysis concluded that FDI flows to Nigeria are strongly affected by real exchange rate volatility.

Thus, it is imperative that policies ensure exchange rate stability should be formulated and/or maintained to attract FDI into the economy. Based on the aforementioned research, it is advisable that these policies integrate monetary and fiscal measures aimed at achieving exchange rate stability, reducing interest rates, and alleviating inflationary pressures. As such, monetary authorities consider interest rate management in conjunction with exchange rate stabilization when regulating FDIs. The relationship between the exchange rate and foreign direct investment inflows into Nigeria appears to be significantly moderated by interest rate control. To enhance FDI inflows in Nigeria, it is further suggested that the economy be diversified. This diversification will enable the nation to export primary commodities, where it possesses a competitive advantage, and manage exchange rates more effectively. Given that Nigeria's average population growth rate has been demonstrated to exert a favorable effect on FDI throughout the study period, it is imperative to direct the workforce towards domestic production to generate foreign exchange, which will assist in mitigating the ongoing volatility of the exchange rate and fostering FDI in Nigeria.

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