Research Article

The Influence of Exchange Rate Fluctuation on Foreign Direct Investment in Nigeria (1986-2022)

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Abstract: Using yearly data series spanning 36 years, from 1986 to 2021, the research empirically evaluates the influence of exchange rate fluctuation on foreign direct investment in Nigeria. The study's objectives were focus on examining the extent of exchange rate volatility in Nigeria and ways by which exchange rate volatility impact on foreign direct investment in Nigeria. Secondary source of data was employed from world development indicator (WDI) and central bank of Nigeria (CBN). Autoregressive Distributed Lag (ARDL) were employed and the GARCH (1, 1) model was used in investigating the model built and were analyzed using multicollinearity with the use of Augmented Dickey-Fuller (ADF) test to verify that the variables are stationary in order to make sure the estimated results are not erroneous. Findings from the study shows that real exchange rate volatility (REERVOL) has a long-term and short-term detrimental impact on FDI and negative long- and short-term interest rate coefficients demonstrate that an unfavorable interest rate exacerbates the already diminishing foreign direct investment (FDI) flows to Nigeria as a result of REERVOL. Policy was recommended for the improving FDI through effective exchange rate management.

Keywords: exchange rate; exchange rate volatility; foreign direct investment

1. Introduction

The amount of foreign direct investment (FDI) flows that have been recorded as well as the body of academic research that aims to explain these flows in the context of both source and host nations have increased dramatically in recent years. Firms in source countries make decisions about where to invest their funds, and a variety of factors can influence their choice and either encourage or discourage them from investing in a specific host country. These decisions are what make FDI flows so important and significant. As a result, FDI has drawn the interest of numerous researchers for a considerable amount of time and is now being discussed and studied in several nations. The Organization for Economic Co-operation and Development (OECD) reports that FDI inflows reached USD 1,286 billion in 2022, with enterprises in developing nations receiving more than half of these inflows (OECD, 2023). This demonstrates how nations are paying more and more attention to FDI flows and how they are putting up efforts to give incentives to international investors to boost FDI flows.

FDI is an investment made with the intention of allowing an expatriate entity with headquarters to control ownership of a business enterprise in another nation. It has been widely acknowledged that FDI has a significant role in boosting productivity in the receiving country and is one of the main sources of capital inflows to developing nations from resource-rich countries as well as within developing nations themselves (Onyele et al., 2023). Resource-scarce economies (like Nigeria) need FDI because it increases domestic investment. Nigeria have benefited greatly from these inflows in terms of enhanced managerial abilities, employment creation, and technical spillovers. In addition to other macroeconomic considerations, the political and legal climate of the host nation, inflationary pressure, domestic savings, physical and social infrastructure, fiscal and monetary policies, and indigenous technology all have an impact on the movement of capital, goods, and services into and out of that nation. In addition to the aforementioned, international investors consider one more crucial aspect before permitting the flow of their goods into any nation;

the risks posed by exchange rate fluctuation (Ozigbo & Anuya, 2023; Aderemi, 2019.

The cost of one nation's currency in terms of another is known as the exchange rate. It is a crucial macroeconomic measure that is used to gauge how competitive a certain economy's currency is (Abbott et al., 2012). As one of the most significant prices in an open economy, exchange rate affects the flow of capital, products, and services across national borders and, as a result, exerts significant pressure on the macroeconomic variables of inflation, balance of payments, and other factors (Aidoo, 2017). Currency appreciation or depreciation may result from exchange rate fluctuations. An appreciation in exchange rates raises a nation's cost of manufacturing, which results in erratic and low FDI. The resultant massive imbalance in the local country's balance of trade and payments will be accompanied by poverty, high inequality, and underdevelopment.

Conversely, a decline in the value of the currency gives businesses a competitive edge in global trade. It raises the price of home goods, boosts demand for exports, and results in a rise in the demand for domestic goods abroad while lowering imports. This has a favorable effect on FDI into the home nation as foreign investors seeks to maximize returns. Decision-makers can be helped by an equilibrium foreign exchange to lessen the uncertainty that arises from exchange rate fluctuation and, consequently, promotes FDI inflows which is expected to foster economic growth and development. In light of this, stabilizing exchange rate is essential to any nation's economic management in this more interconnected globe if it hopes to deter risk-averse players from shifting their operations to other counties that have less risky markets. The stability of the exchange rate has a significant impact on why investors would choose to spend their resources in any given country. Effective foreign exchange rate management is critically needed for the Nigerian economy in order to promote FDI inflow and aid in economic diversification. But despite all of the government's efforts to stabilize the currency rate, there has not been much success in terms of FDI inflows. As a result, the goal of this research is to investigate the long- and short-term relationships between exchange rate volatility and FDIs into Nigeria. It also makes policy recommendations intended to manage the risk associated with unforeseen and unanticipated exchange rate volatility. The evidence offered has given the literature a new perspective and established a baseline against which subsequent research can be evaluated.

The results of this study have also added to the understanding of how much exchange-rate volatility influences FDI. This knowledge is crucial for designing FDI and exchange rate policy. The study's timeframe, which runs from 1986 to 2022, was selected based on the availability of data and the fact that Nigeria adopted the Structural Adjustment Programme (SAP) in 1986, which led to financial liberalization. The world's currencies were altered following the fall of the Bretton Woods Agreement, and the majority of nations implemented flexible exchange rate regimes, which led to exchange rate swings (Dal Bianco & To Loan, 2017). Foreign investors now face greater risk and uncertainty as a result of these movements. As a result, a lot of scholars started to pay attention to exchange rate volatility and look into how it impacts on FDI. Furthermore, researchers looked at a number of other factors in addition to the exchange rate to have a full picture of what draws more inward FDI to a nation because they were unable to determine how exchange rate volatility affected FDI.

2. Literature Review

2.1 Conceptual Framework

2.1.1 Exchange Rate

The nominal exchange rate, or the cost of one currency in terms of another, is a concept that most people are aware of. Typically, it is stated as the foreign currency's domestic price. What can be purchased with the foreign currency piques the curiosity of the investor or corporation purchasing it (IMF, 2014). The real exchange rate enters the picture at this point. It aims to determine how much a nation's goods are worth in relation to those of another nation, a group of nations, or the entire world, using the current nominal exchange rate (Itskhoki, 2020). Purchasing power parity (PPP), the concept that prices and exchange rates adjust to equalize the common-currency price of comparable bundles of products, is fundamental to international banking. In open economy macroeconomics, the real exchange rate is a crucial relative price that indicates how many bundles of domestic commodities must be sacrificed in order to acquire a single bundle of foreign goods. PPP can be defined as the situation in which one bundle of domestic goods is always exchanged for one bundle of foreign commodities. Put differently, PPP presupposes a steady real exchange rate (Gopinath, 2016).

The actual exchange rate fluctuates over time and is observed to have a significant impact on FDI to the degree that PPP fails to hold in the short run.

2.1.2 Foreign Direct Investment

The World Bank (2022) states that FDI occurs when capital flows into a company in an economy other than the investor's in order to obtain a long-term managerial stake (10% or more of voting shares). According to the balance of payments, it is the total of equity capital, profits reinvestment, other long-term capital, and short-term capital. The International Monetary Fund (2009) and the United Nations Conference on Trade and Development (UNCTAD, 2019) both agree that a foreign direct investor must have at least 10% ownership in a business in order to be deemed an investor with a significant say in its management. A kind of international investment known as "foreign direct investment" occurs when a person or group based in one country has a long-term stake in and exerts substantial control over a business based in another one. A person or corporation from another nation makes a direct investment in a country's production or business when they purchase a company there or increase the output of an existing business there (Babasanya & Olabisi, 2018). In this research, FDI is defined as the process by which a domestic firm gains majority ownership in a foreign company. But the other country's day-to-day activities are heavily influenced by international corporations. This implies they are bringing more than just financial resources; they are also bringing expertise, experience, and new technologies.

2.1.3 Exchange Rate and FDI in Nigeria: Stylized Facts

Nigeria has implemented a number of macroeconomic strategies over time to increase FDI (Onyele et al., 2023). Nonetheless, these measures had a minor effect on attaining sustainable growth in this particular area of capital flow. According to a survey study from the World Development Indicators (WDI) studies, net FDI inflows to Nigeria decreased in 2015 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 noted that Nigeria was severely impacted by the decline in its oil prices in 2015 (UNCTAD, 2016). In addition, net FDI inflows to Nigeria decreased more in 2017 as anticipated because of the world's economies' brittleness, exchange rate changes, low aggregate demand, and acceleration in a few major economies. According to the WDI, FDI to Nigeria decreased to $2.41 billion in 2017 and then to $0.78 billion in 2018. More recently, the WDI reported that net FDI inflows into Nigeria increased to $3.31 billion in 2021 from $2.31 billion in 2019, but then dropped to a negative $0.19 billion in 2022, suggesting that Nigeria had more outflows than inflows. The UNCTAD attributed the decline in investment into the nation to the economic recession, which had exposed the nation to a number of macroeconomic instability, most notably exchange rate volatility. The National Bureau of Statistics (NBS) reports that since 2008, when the world economy collapsed, Nigeria has mostly seen a steady decrease in FDI. But before to the financial crisis, the nation's FDI growth followed a mixed pattern. Figure 1 shows the trend of net inflows of FDI in Nigeria from 1986-2022.
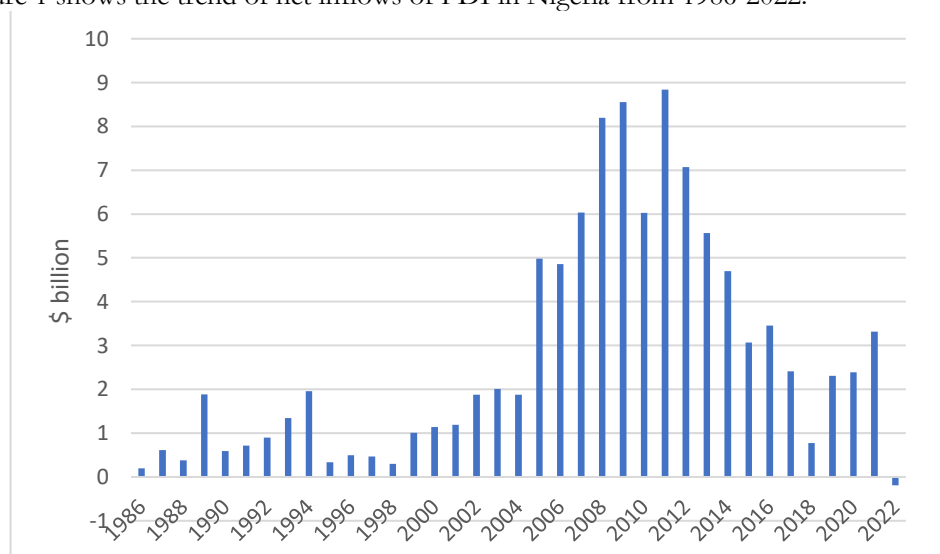
Figure 1. The trend of net inflows of FDI in Nigeria from 1986-2022.
Source: World development indicators (WDI)

The exchange rate is a crucial macroeconomic variable that is used to measure how

competitive a given economy's currency is. It continues to be one of the key determinants of a firm's decision to invest abroad and of a nation's effort to attract foreign direct investment. The movement of the exchange rate, as well as the kinds and amount of investment that a country attracts, are all influenced by the deliberate depreciation, appreciation, or manipulation of its currency in respect to another's. Exchange rate fluctuations can be linked to the various currency policies that the nation's central bank has implemented, claim Uzoma-Nwosu and Orekoya (2019). For example, the Structural Adjustment Programme (SAP) included a significant depreciation of the exchange rate, which was intended to dissuade imports and increase the return on investment for multinational corporations focused on exports. According to Obi (2017), SAP also noted significant fluctuations in currency rates when there was uncertainty about the inflation rate in the economy. A significant contributing element to the fluctuations in the exchange rate during this time period was external shocks brought on by the worldwide fluctuations in the pricing of oil and agricultural commodities, which are major sources of foreign exchange earnings and exports from Nigeria (Odionye et al., 2023). Nigeria is going through serious trade shocks in the current oil period due to the constant swings in the price of oil around the world. Figure 2 shows the real exchange rate of Nigeria from 1986-2022.
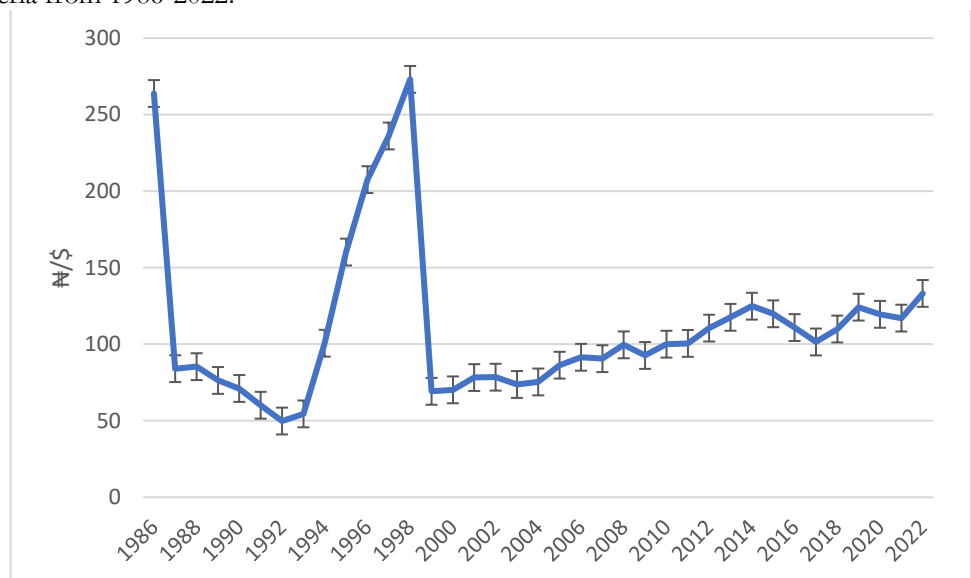

Figure 2. The real exchange rate of Nigeria from 1986-2022
Source: World development indicators (WDI)

Since SAP was introduced, the real effective exchange rate trajectory in Nigeria, as depicted in Figure 2, has continued to be a burden on the country's economy. In actuality, this scenario illustrates what is referred to as "exchange rate instability," which denotes a lack of knowledge regarding the exchange rate at any given moment. The real exchange rate depreciated steadily starting in 1986 and continued until 1992. However, as seen in the graph above, there was a brief period of relative appreciation of the naira compared to the US dollar from 1993 to 1998. This period was documented during Gen. Sani Abacha's stringent currency rate regime and has little bearing on the general trajectory of the exchange rate in this study. The real exchange rate has been fluctuating steadily since 1999. Ceteris paribus, the following situation makes it clear that investor trust cannot be guaranteed due to exchange rate volatility. Given the aforementioned issues, it is crucial to reevaluate how exchange rate volatility affects FDI in Nigeria and offer solutions as necessary.

2.2 Theoretical Framework

Arguments based on the "Mundell-Fleming model," "risk aversion," and "production flexibility" have all been used to support theoretical claims about how volatility affects FDI. Interestingly, there are differences in viewpoints and expectations regarding how exchange rate volatility affects foreign direct investment in each of these arguments.

2.2.1 Mundell-Fleming model

The theoretical framework of this study is based on the Mundell-Fleming model. The Mundell–Fleming model of economics was initially proposed (independently) by Robert Mundell and Marcus Fleming. The Mundell-Fleming Model (MFM) describes how a small

economy that is open to international commerce in goods and financial assets functions and provides a framework for assessing monetary and fiscal policy. Essentially, the model elucidates the causes of the short-term fluctuations in overall income in an open market. This study is based on the Mundell-Fleming model (MFM), developed by (Mundell, 1961; Fleming, 1962). The traditional IS-LM model characterizes an open economy, while the MFM model characterizes a closed economy, or autarky. It explains the relationship between output, interest rate, and real exchange rate in an open economy with international trade. This study employs the Mundell-Fleming model since it is thought that Nigeria's economy is open. Perfect capital mobility is assumed because Nigeria has little effect on interest rates or trade prices worldwide. Therefore, the MFM can be used as a framework to determine how the exchange rate affects 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 Mundell-Fleming model's principal prediction is that an economy's conduct is largely determined by the exchange rate system it chooses to use, whether it has a fixed or variable exchange rate system. The IS Curve for Open Economy: The following equation represents the goods and services market in the Mundell-Fleming model.

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

When each term is used in its regular sense. The interest rate, r*, determines investment in this case since r = r*, and the exchange rate, e, determines net exports (NX), which is the cost of a foreign currency in terms of domestic currency.

2.2.2 Risk Aversion Theory

As per the risk aversion hypothesis, fluctuations in the currency rate might bring additional risk that can impact returns on investment. Consequently, investors may need to get compensation to mitigate the impact on their part. This is due to the fact that increased volatility in exchange rates reduces the degree of certainty associated with the predicted exchange rate. According to Goldberg and Kolstad (1995), a firm's expected profit function is influenced by the degree of certainty at which it makes investment decisions today with the hope of realizing returns in later periods. In this case, and in line with the risk aversion theory, foreign direct investment and returns are anticipated to decline in the event of a very volatile exchange rate. When the impact of short-term exchange rate volatility is taken into consideration, the risk aversion arguments become more compelling since firms are unlikely to modify the production components that are most likely to remain constant in the near future. The risk aversion theory was developed by Campa (1993) to account for risk-neutral enterprises and future expected returns. Campa (1993) contended that corporations would choose to postpone making investment decisions when exchange rate volatility rises because investors become more anxious about future expected returns. Given the high levels of exchange rate volatility, risk-neutral enterprises are projected to favor the local market over overseas ones in this scenario, which will result in a decline in foreign direct investment.

2.2.3 Production flexibility theory

The production flexibility theory runs counter to the risk aversion theory. This idea states that manufacturers must commit to investment capital and production costs to both the local and international capacity before making any judgments about foreign investments. Under this structure, capacity sunk costs, industry competitiveness, and total returns will now be the factors influencing the impact of exchange rate movement on foreign investment decisions. According to the production flexibility theory, enterprises may be able to modify how they use the factors of production, especially in the long run after profits are realised. As a result, increased exchange rate volatility is predicted to result in an increase in foreign direct investment in the ex-ante phase (Goldberg & Kolstad 1995). Conversely, as we approach the ex-post phase, the potential excess capacity and production increase with increasing volatility (Reinert et al., 2010; Chaudhary et al., 2012). Amidst the conflicting claims made by proponents of risk aversion and production flexibility, Goldberg and Kolstad (1995) contended that when making foreign investment decisions, one must distinguish between short-term exchange rate volatility and long-term misalignments of exchange rates. The production flexibility arguments seem more reasonable over the long term because enterprises can modify their usage of variable factors, even though risk aversion seems more acceptable in the near term because factors of production may be fixed.

2.3 Review of Empirical Literature

In addition to the theoretical justifications, a number of conflicting empirical studies make an effort – albeit without conclusive evidence – to explain how exchange rate volatility affects FDI.

In a recent study, Ozigbo and Anuya (2023) examined the real exchange rate volatility and FDI inflow into Nigeria from 1983 to 2022 in a recent study. The Error Correction Model (ECM) methodology and cointegration are compatible with the ordinary least squares (OLS) method that was applied. The cointegration test showed that the variables have an equilibrium connection over the long term. The study's findings demonstrated that there was a considerable real exchange rate fluctuation, which had an adverse effect on FDI inflows into Nigeria.

Similarly, Odionye et al. (2023) examined how changes in interest rates, exchange rate fluctuations, and political stability affected foreign capital inflows into Nigeria between 1981 and 2021. A discrete threshold regression model (DTRM) was employed in the investigation. An interest rate differential high and above the predetermined threshold encourages a favorable and significant inflow of foreign capital into the country, as demonstrated by the study's discovery of an interest rate differential threshold value of 3.68 percent. Exchange rate swings and political stability also had a detrimental impact on the nation's capital influx.

The relationship between FDI and the foreign currency rate in Nigeria was studied by Oladeji and Musa (2022) from 1986 to 2018. Within an ECM framework, the study employed a variety of quantitative analytical tools, such as regression analysis, Granger causality test, correlation matrix, and descriptive statistics. FDI and exchange rate did not exhibit a causal link over the research period, as per the estimations of the causality test. Second, there was a significant, long-term relationship between FDI and the exchange rate. The conclusion indicated above suggested that there was a short- and long-term relationship between FDI and the exchange rate in Nigeria. It also suggested that FDI was strongly depreciated as a result of the significant impact of capital inflows and the currency rate in particular.

In Zhejiang province, China, Tan, Xu, and Gashaw (2021) evaluated the mechanisms by which the exchange rate influences FDI inflows. They did this by using co-integration tests, vector error correction models, Granger causality tests, and impulse response tests. The exchange rate and FDI inflows have a long-term, stable, and unidirectional causal relationship, according to empirical findings. FDI inflow was deterred by the RMB's ongoing appreciation versus the USD. Rather than the cost or demand effects, the wealth effect was the mechanism responsible for the long-term association. However, in the near term, FDI inflows was not significantly impacted by the exchange rate or any of the three influencing mechanisms.

Using the data gathered for 42 source nations between 2005 and 2019, Nadine, Ashraf, and Nagia (2021) used both the enhanced and basic FDI gravity models in Egypt. This study examined the effects of several relative dimensions on inward FDI to Egypt from different source nations, as well as the influence of the real effective exchange rate on inbound FDI to Egypt, using a Generalised Method of Moments (GMM) estimating approach. The relative currency rate volatility was found to have a detrimental effect on foreign direct investment (FDI) into Egypt. Research has also shown that inward FDI was significantly positively impacted by the market sizes of both the host and home countries.

With time series data spanning from 1986 to 2017, Akinlo and Onatunji (2021) examined the relationship between exchange rate volatility and foreign direct investment (FDI) in a subset of ECOWAS nations. The impacts of exchange rate volatility on FDI and causal links were investigated using the Autoregressive Distributed Lag (ARDL) model and Toda-Yamamoto approach to causality. Only in Ghana, Sierra Leone, and Nigeria was the calculated coefficient of nominal exchange rate volatility significant, according to the empirical data, which were negative for all the nations chosen. In Nigeria, Togo, Sierra Leone, and Cote d'Ivore, on the other hand, the impact of actual exchange rate fluctuation was, as predicted, negatively substantial. Nonetheless, in Ghana and the Gambia, the effect was favourable but statistically negligible. Furthermore, in all of the countries that were chosen—aside from Ghana—the findings of the causality test demonstrated a unidirectional causal relationship between FDI and exchange rate volatility when the nominal exchange rate was used. However, only in Nigeria and Sierra Leone was there evidence of bidirectional causality between the two variables when real currency rate volatility was taken into account.

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. The investigation continues by estimating fixed-effect models across the panel of nations. Findings indicated that fluctuations in currency rates significantly hampered FDI inflows into South Asian nations, which desperately needed more FDI to boost their economies.

Once more, using monthly time series data on exchange rate volatility, foreign direct investment, external reserves, domestic interest rate, RGDP growth rate, and trade openness for the years 1986–2016, Adokwe, Agu, and Maduka (2019) examined the impact of exchange rate volatility on FDI in Nigeria. Using the generalised autoregressive conditional heteroscedasticity (GARCH) method, the exchange rate volatility series was estimated. The study's model was estimated using the 2-Stage Least Squares approach following the results of a preliminary unit root test on the series. The study's conclusions showed that exchange rate volatility significantly and negatively impacted Nigeria's foreign direct investment.

Likewise, using data from 1999 to 2016, Uzoma-Nwosu and Orekoya (2019) examined the connection between exchange rate volatility and FDI in Nigeria. The GARCH(1,1) method was employed in the study to produce the volatility series, and the VECM methodology was employed for the estimate. The results demonstrated that FDI's reactions to fluctuations in exchange rates changed over time. For example, FDI reacted favourably to exchange rate fluctuation over the long term, but tended to react negatively in the short term.

Likewise, Ehikioya (2019) investigated how foreign direct investment (FDI) to Nigeria is impacted by exchange rate volatility. The study analysed time series data from 1970 to 2016 using the EC, GARCH, and ARCH models. The cointegration tests were performed and the stationarity of the data series was confirmed. The study's conclusion showed that exchange rate volatility tended to continue for the duration of the investigation.

In a different study, Jacob and Kattookaran (2019) ascertained how exchange rate fluctuations affected FDI inflows into India between April 1995 and March 2018. To calculate the effect of exchange rate volatility on FDI flows into India, the Autoregressive Distributed Lag (ARDL) model was utilised. Studies showed that exchange rate fluctuations significantly harmed FDI flow into India over the short and long terms. Short-term increases in FDI into the host nation are caused by the devaluation of its currency.

Likewise, Emmanuel, Ike, and Alhassan (2019) looked at how interest rates and currency rates affected FDI in Nigeria between 2006 and 2018. The study made use of secondary data that was taken from the Central Bank of Nigeria's 2000–2018 financial statements. Using the Augmented Dickey Fuller Test, the unit root property of the data was examined, and it was found that all of the variables were stationary at first difference. The cointegrating character of the data was further tested using the statistics from the Johansen co-integration test, and the error correction model was utilised to look at the long- and short-term relationships between the study's variables. The study's statistically significant conclusion showed a robust and positive association between FDI and exchange rates.

Similarly, the impact of exchange rate volatility on FDI and international trade in developing nations along the "One Belt and One Road" was examined by Latief & Lefen (2018). Seven developing nations—Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka—were chosen for this project between 1995 and 2016. The exchange rate volatility was measured using the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) (1,1) and Threshold-Generalized Autoregressive Conditional Heteroscedasticity (TGARCH) (1,1) models. In addition, the study used a fixed effect model to examine how exchange rate volatility affects FDI and trade. The study's findings, which support the economic theory contending that exchange rate volatility may harm FDI and international trade, showed that in OBOR-related nations, exchange rate volatility had a substantial but unfavorable impact on both.

2.3.1 Empirical Literature

Based on the empirical literature mentioned above, it can be said that a large number of academic scholars have been attempting to predict the impact of exchange rate volatility on FDI for a while now. To determine the impact of exchange rate volatility on FDI and the nature of the link between the two, they have conducted a number of empirical and descriptive studies. Using the methods and approaches at their disposal, they have come to differing results, which calls for additional research into the impact of currency rate volatility on FDI in Nigeria. The studies that were analyzed did not include the most recent dataset in terms of the time periods that these investigations covered. Hence, this study used annual

time series data spanning from 1986 to 2022 to cover current realities as it concerns the impact of exchange rate volatility on FDI in Nigeria.

2.3.2 Research Design

This study examined currency rate volatility and its impact on foreign direct investment inflows into Nigeria using yearly data from the World Development Indicators (WDI) and the Central Bank of Nigeria (CBN). The World Bank's World Development Indicators database provided the data used to support the FDI figures. For the factors under consideration, sample data was available from 1986 to 2022. The study used data on exchange rates between US dollars and Nigerian naira to examine volatility across the research period. The study period is mostly determined by the accessibility of data for both SAP and pertinent variables. To improve data integration and analysis, time periods with full data availability should be taken into account. Nigeria underwent economic liberalization during the period under review, which paved the way for the implementation of a flexible/floating exchange rate system as the nation began to see consistent changes in the foreign exchange rate

3. Materials and Methods

3.1 Method of Data Analysis

3.1.1 Measurement of Exchange rate Volatility on FDI

The standard deviation of monthly exchange rate fluctuations has been used in previous research to gauge exchange rate volatility (Furceri & Borelli, 2008). Nevertheless, the time-varying and clustering characteristics of assets are not taken into account by the standard deviation as a method of calculating volatility. The full strength of volatility in a system cannot be taken into account by the standard deviation technique. Given this difficulty, the study decides to quantify exchange rate volatility using the Bollerslev (1986)-developed Generalized Autoregressive Conditional Heteroscedasticity (GARCH), which has been supported by a few recent studies (Bala & Asemota, 2013). The Autoregressive Conditional Heteroscedasticity (ARCH) model, which was introduced by Engle in 1982 and uses a time series' variance, was improved upon in the GARCH model. The GARCH model permits the error term's variance to have a time-varying variance that is dependent on the series' historical behaviour and hence reflects perceived actual volatilities. Furthermore, since a GARCH (1, 1) specification with its own lag effectively captures the issue of autocorrelation in time series data, it is important to generate exchange rate volatility. The following describes the GARCH (1, 1) model used in this investigation:

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

Equation (1) can be expressed further as:

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

In the model, α_0 represents the mean, ε_{t-1}^2 is the ARCH term and σ_{t-1}^2 is the GARCH term. According to Bollerslev (1986), the necessary condition to ensure stationarity of the model is when $\sum_{t=1}^{p} \omega_1 + \sum_{i=1}^{q} \beta_j < 1$. In order to investigate the effect of real effective exchange rate volatility on FDIs to Nigeria, the study adapted the model by Ehikioya (2019) with the inclusion of interest rate, real GDP growth rate and population growth rate as moderating variables. The inclusion of these variables is expected to control for other macroeconomic variables that can affect or explain the FDIs to Nigeria.

3.1.2 Multicollinearity Test

Analysing the model's multicollinearity problems is the next stage. To attain the more effectively explainable independent variables for the model, tolerance measures and the Variance Inflation Factor (VIF) are utilized. The coefficient of determination (R^2) is the foundation of the variance inflation factor (VIF), which measures the degree of multicollinearity between a single independent variable and the model. When the VIF of an independent variable rises beyond 10, it indicates that there are problems with multicollinearity in the model, since it indicates a strong correlation between the variable and

at least one of the explanatory factors.

3.1.3 Test for Stationarity

The research used the Augmented Dickey-Fuller (ADF) test to verify that the variables are stationary in order to make sure the estimated results are not erroneous. The ADF test's capacity to automatically control for higher order connections and modify the test approach gives it a significant edge over other series procedures for stationarity testing. However, because the Philips-Perron (PP) test can moderate error terms without adding lag difference terms, it was used in this investigation to corroborate the findings from the ADF test. To determine whether there is a long-term link between the variables, the study used the Johansen co-integration estimation technique. The study used the Akaike Information Criterion (AIC), as defined by Akaike (1974), to determine the ideal lag length.

3. 1.4 Autoregressive Distributed Lag (ARDL)

After explaining the stationarity tests, the ARDL model was chosen because it can conduct cointegration tests without requiring the same order of stationary variables. This implies that the model can be applied even if the variables are stationary in different orders (Pesaran, Shin & Smith, 2001). The behavior of the dependent variable in relation to the independent variables can be explained by the ARDL model using lag values. The ARDL model represents the cointegration of variables without requiring them to be all stationary in I (1), hence avoiding the issue of variables in stationarity tests having mixed outcomes in their ordering.

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 capital inflows, such as foreign direct investments. This study used the Uzoma-Nwosu and Orekoya (2019) model for a longer time span (1986 to 2022) based on this theoretical perspective. Equation 3 illustrates the empirical function for this investigation as follows:

$$FDI = f(REERVOL, INTR, RGDP, POPU) \tag{3}$$

Following Pesaran et al. (2001), the ARDL bounds test for cointegration is expressed, thus:

$$\Delta FDI_t = \delta_0 + \sum_{i=1}^{p} \delta_1 \Delta FDI_{t-i} + \sum_{i=1}^{p} \delta_2 \Delta REERVOL_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta INTR_{t-i} + \sum_{i=0}^{p} \delta_4 \Delta RGDP_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta POPU_{t-i} + \beta_1 FDI_{t-1} + \beta_2 REERVOL_{t-1} + \beta_3 INTR_{t-1} + \beta_4 RGDP_{t-1} + \beta_5 POPU_{t-1} + \mu_t \tag{4}$$

Once cointegration is established, the long-run relationship was estimated using the conditional ARDL model as follows:

$$\Delta FDI_t = \delta_0 + \beta_1 FDI_{t-1} + \beta_2 REERVOL_{t-1} + \beta_3 INTR_{t-1} + \beta_4 RGDP_{t-1} + \beta_5 POPU_{t-1} + \mu_t \tag{5}$$

The short-run dynamic relationship is estimated using error correction mechanism (ECM) as specified in equation 6:

$$\Delta FDI_t = \delta_0 + \sum_{i=1}^{p} \delta_1 \Delta FDI_{t-i} + \sum_{i=0}^{p} \delta_2 \Delta REERVOL_{t-i} + \sum_{i=0}^{p} \delta_3 \Delta INTR_{t-i} + \sum_{i=0}^{p} \delta_4 \Delta RGDP_{t-i} + \sum_{i=0}^{p} \delta_5 \Delta POPU_{t-i} + \theta ecm_{t-i} \tag{6}$$

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

Where,

The dependent variable is FDI, which is measured as the total yearly FDI intake into Nigeria from all sources. It is the internal rate of inflation at current prices expressed as a percentage of GDP (GDP). One useful measure of an economy's relative appeal to foreign investment is the size of this variable. Additionally, it serves as a catalyst for developing nations' economies to expand.

The real effective exchange rate volatility is denoted by REERVOL. The GARCH approach is employed to construct this volatility variable. Two phases of estimation were completed. Initially, the pertinent lags of the relevant variables were used to estimate the GARCH model. The residuals were acquired, second. It is the residuals' variance that captures volatility. GARCH outperforms standard deviation measures because it can differentiate between predictable and unpredictable elements in the real exchange rate formation process. Standard deviation measures overlook the stochastic process of generating exchange rates, which leads to an underestimation of the impact of volatility on decision-making. FDI is anticipated to suffer as a result of REERVOL.

The interest rate is INTR. It gauges the nation's cost of capital as a draw for foreign direct investment (FDI) looking for resources. One anticipates a negatively signed INTR.

The size of the domestic economy is gauged by the growth rate of the GDP (RGDP), which is included to regulate the flow of foreign direct investment. It represents the purchasing power of individual consumers and is used as a gauge of a nation's productivity. Consistently growing markets also draw global profit-maximizing businesses. Long-term advantages are possible with FDI for both the home and host nations. Profit-maximizing businesses therefore want countries with sizable marketplaces that experience steady expansion over time. Annual RGDP growth expressed as a percentage is used to gauge this growth. The RGDP is expected to be positive a priori.

The population growth rate (POPU) gauges the size of the market and the potential of its population. A higher population is thought to pique the attention of foreign investors in that economy, which is predicted to have a beneficial impact on FDIs.

4. Analysis and Discussion of Results

4.1 Summary Statistic

The statistical characteristics of the variables, such as their measures of dispersion, such as the maximum, minimum, and standard deviation, and their measures of central tendency, such as the mean and median, are examined using descriptive statistics. In order to determine whether or not the variables were normally distributed, the descriptive statistics also show the pattern of distribution of the variables. Table 1 analyses descriptive statistic of variables.

Table 1. Descriptive statistic of variables

	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 Software, Version 10 (2023)

According to the given descriptive statistics, there are exactly 37 observations for each variable. The statistical characteristics of the variables, such as mean, median, maximum, minimum, etc., as well as the distribution pattern of the variables, are also indicated by the results. With reference to the Jarque-Bera estimates and probability value, it was possible to observe the distribution of the above descriptive statistic and determine that, while the variables (INTR, RGDP, and POPU) were normally distributed with probability values of $0.064803 > 0.05$, $0.374535 > 0.05$, and $0.554331 > 0.05$, respectively, the other variables (FDI and REER) are not, as indicated by their probability values of the Jarque-Bera statistic given as $0.000001 < 0.05$, $0.000000 < 0.05$.

4.2 Generalized Autoregressive conditionally heteroscedastic (GARCH)

Using the GARCH model, the data analysis process starts with testing and extracting the real effective exchange rate volatility.

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	Mean dependent var		107.0269
Adjusted R-squared	0.682081	S.D. dependent var		47.32524
S.E. of regression	42.80041	Akaike info criterion		8.929942
Sum squared resid	62283.76	Schwarz criterion		9.149875
Log likelihood	-155.7389	Hannan-Quinn criterion		9.006704
Durbin-Watson stat	1.930986			

Source: Author's computation using EViews Software, Version 10 (2023)

Table 2 demonstrated the existence of the GARCH effect in the variance equation since all of the GARCH parameters are significant. Additionally, the GARCH parameter in the mean equation is significant, as indicated by the probability value of 0.0022, which is less than 0.01 (1% threshold of significance). This demonstrates that from 1986 to 2022, there was volatility in the real effective exchange rate (REER). Thus, from the variance equations, real effective exchange rate volatility (REERVOL) was obtained.

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

From Table 2, the GARCH(1,1), it was concluded that the extent of exchange rate volatility in Nigeria was high and persistent over the period of study.

Hypothesis 1 (Ho1): The extent of exchange rate volatility in Nigeria is not significant.

The result as reported in Table 2 reveals that the parameters exchange rate volatility had probability values that were less than 0.05. The result suggests that the extent of volatility persistent was statistically significant.

4.3 Multicollinearity Test

The multicollinearity test using VIF was summarized in Table 3:

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, Version 10 (2023)

Since none of the variables have multicollinearity problems and all have tolerances below 1 and VIFs between 1 and 10, it is possible to validate each variable using the multicollinearity tests as well. This is shown in Table 3. As a result, none of the variables need to be removed from the model.

4.4 Test for Stationarity

After determining the volatility of the real effective exchange rate, the following computation is needed to determine the stationarity features of the variables being studied (Table 4):

Table 4. Unit Root Test Results for Stationarity of Data

Variable	ADF Test		PP Test	
	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 Software, Version 10 (2023)

Note: Lags were automatically selected by the Akaike Information Criterion (AIC). *** and ** denote statistical significance at 5% and 1% levels respectively

The variables (FDI, REERVOL, and RGDP) were stationary in their levels, according to the unit roots test result, indicating that they are order zero 1 (0). However, a second test of the variables in their first difference shows that they have stationarity at first difference I(1). In contrast, the variables (INTR and POPU) failed the stationarity test at levels. As a result, the null hypothesis is accepted for the variables (FDI, REERVOL, and RGDP), and it is possible to draw the conclusion that there is no unit root. It is necessary to draw the conclusion that the variables (INTR and POPU) do not have a unit root at first difference. Therefore, the study moved on to the next model in order to estimate the ARDL model, implying that the variables are integrated of both order zero I(0) and order one 1(1).

4.5 ARDL Estimation

4.5.1 VAR model, values of information criteria by lag

The optimal lag length used for the estimation was determined as follows:

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

As demonstrated in Table 5 by the FPE and AIC criteria, the ARDL model requires three delays in order to be practical, as indicated by the VAR model. The software determines the ideal number of delays for each variable later in the short-term calculations, assuming a maximum of 3 (in accordance with the VAR model).

Although three lags on annual data, with a 38-year observation period and seven variables, are thought to be the maximum number of lags that can be used to estimate the ARDL model (more than three lags cannot be used to run the model in the software), this could be interpreted as overly pushing the lag length in the model. It should be noted, nevertheless, that in this study, with either one or two lags, cointegration between the variables would not occur, and autocorrelation between the variables would be detected in the diagnostic tests of the ARDL model.

4.5.3 Bound test

The long-run estimates are displayed in Table 7:

Table 7. Long-term estimations of FDI inflows

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Remark
REERVOL	-0.017655	0.003354	-5.263342	0.0001***	Significant
INTR	-0.148135	0.047735	-3.103293	0.0068***	Significant
RGDP	-0.201376	0.049020	-4.108061	0.0008***	Significant
POPU	6.514058	1.406800	4.630407	0.0003***	Significant

Source: Author's computation using EViews Software, Version 10 (2023)

Note: *** stands for significance at 1% level

With regard to the long-term estimates, Table 7 shows that the variables real effective exchange rate (REERVOL), interest rate (INTR), growth rate of real GDP (RGDP), and population growth (POPU) statistically significantly (at the 1% significance level) by rejecting the null hypothesis with p-values of 0.01.

The results indicate that, with the exception of POPU, all of the statistically significant variables have a negative impact on FDI inflows into Nigeria. REERVOL, INTR, and POPU all show the expected effect on FDI inflows into Nigeria, while RGDP does not show the expected signs.

Therefore, based on the coefficients, an increase of 1% in REERVOL, INTR, and RGDP, respectively, results in a long-term decline in FDI inflows into Nigeria of roughly 0.018%, 0.148%, and 0.201%. Given that Nigeria's economy has performed in an entirely unpredictable manner over the past 38 years, it is reasonable to draw conclusions about the detrimental effects these variables have on FDI inflows and to make the case that this unstable and irregular economy has changed some expected values, making them misleading over the long term. However, POPU showed a positive correlation, in keeping with a priori expectations. This indicates that a percentage rise in the population growth rate translated into a 6.514% increase in FDIs into Nigeria

4.5.4 Error correction mechanism (ECM) and short-term estimations of FDI inflows

The outcome of the ECM is contained in Table 8:

Table 8. ECM and short-term estimations of the FDI inflows

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
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 Software, Version 10 (2023)

Note: ***, ** and * stands for significance at 1%, 5% and 10% level respectively

First, the coefficient of ECM provides validation for whether or not the model is viable in the short run, which is important for a deeper examination of the short-run estimations. This model is used in the short term because it calculates the efficiency in the brief moment when an independent variable varies and the dependent variable returns instantly to its initial equilibrium. For the entire sample, the estimated error term of the model's lag, or the coefficient of the error correction mechanism (ECM), is determined to be -0.893263, and at 1%, it is statistically significant. This finding implies the importance of endogenous variables in explaining foreign direct investment in Nigeria. Furthermore, it suggested that FDI and the endogenous variables influencing its short-term movements have a long-term link, suggesting that such disequilibrium can be corrected and repaired over time. This supports the preliminary analysis's findings on potential cointegration of the study's variables.

Regarding the short-term estimations denoted as D(REERVOL), D(INTR), D(RGDP) and D(POPU) in Table 8 is possible to observe that, the variables REERVOL, INTR, RGDP growth and POPU reject the null hypothesis through the p-values < 0.05, which means they are statistically significant. In relation to the sign that each statistical significant variable has, it is seen that D(REERVOL), D(INTR) and D(POPU) have the expected effect on FDI inflows into Nigeria, however, D(RGDP) did not have the expected sign, stating that RGDP have a positive influence on FDI inflows into Nigeria.

However, the variable of interest, REERVOL, is statistically significant in lags 1 and 2, indicating that, over a two-year timeframe, international investors are likely to pay attention and have REERVOL affect their investment decisions. Once more, the significance of INTR at its first difference suggests that foreign investors seem to be aware of the impact of interest rates, which can affect their investments in less than a year. Additionally, the RGDP growth rate is not statistically significant in one lag, indicating that foreign investors often pay attention to and are influenced by RGDP growth during a three-year timeframe when making investment decisions. The fact that POPU was insignificant in the beginning suggests that foreign investors are aware of the population growth rate and that it will have an impact on their investments in less than a year.

The explanatory factors may account for almost 87% of the variation in the explained variable, the FDI, according to the R-squared result (0.870345). Put otherwise, it denotes the portion of the FDI variance that can be explained by REERVOL, INTR, RGDP, and POPU taken as a whole. About 79% of the study model appears to be a good fit for explaining the

variability of the data from its mean location, according to the results of the Adjusted R-squared (0.786069). The study's variables show no signs of autocorrelation, as indicated by the Durbin-Watson statistic of 2.226378 over the sample period. In light of the three samples' F-statistic of 10.32733 and p-value of 0.000003, it is safe to draw conclusions about the model's overall relevance for this investigation. Additionally, this result suggests that FDIs to Nigeria are significantly impacted by all of the explanatory variables together.

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

From Tables 7 and 8, it was found that real exchange rate volatility has a negative impact on FDI flows to Nigeria in the long-run and short-run, indicating that the higher the level of REERVOL, the lower the FDI flows to Nigeria.

Hypothesis 2 (Ho2): Exchange rate volatility does not have a significant impact on foreign direct investment in Nigeria.

The probability value of real exchange rate volatility (REERVOL) in the long-run (0.0001) and short-run (0.0033) was less than 0.01. This indicates the impact of REERVOL on FDI flows to Nigeria was statistically significant at 1% level. Therefore, hypothesis 1 (Ho1) is rejected as the study holds that exchange rate volatility has a significant impact on FDI flows to Nigeria.

4.5.5 Diagnostic tests

Table 9 shows Diagnostic Test for ARDL Estimate

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 Software, Version 10 (2023)

The four diagnostic tests for ARDL estimations are listed in Table 9. With a p-value of 0.1892-2.05 in F-statistics, the serial correlation test is unable to rule out the null hypothesis, indicating that there is no meaningful serial correlation between the variables and that the error terms of each independent variable are uncorrelated.
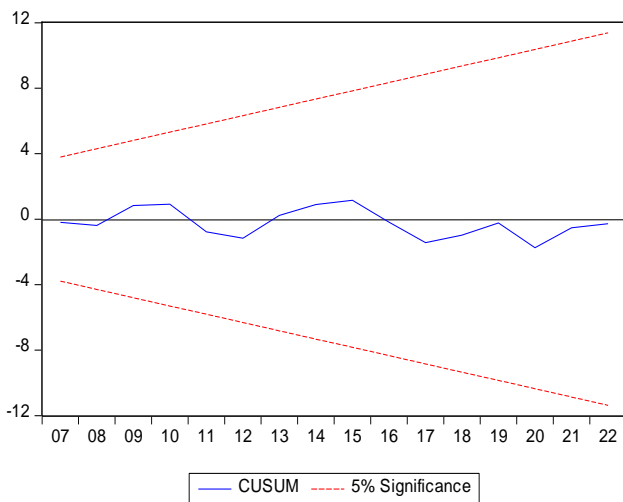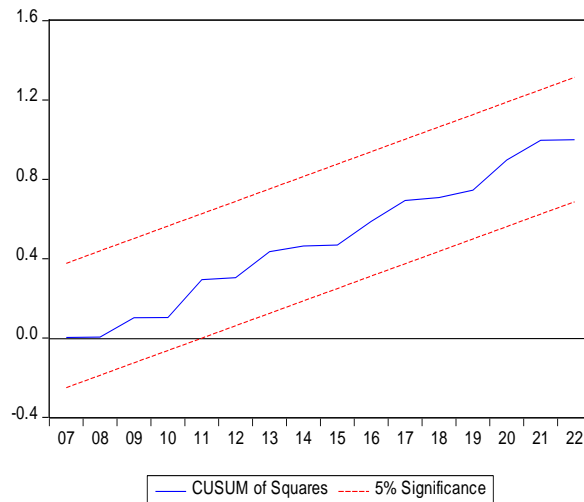

Figure 3. CUSUM

Figure 4. CUSUM

Regarding the normality tests, it is possible to determine from both test statistics that the null hypothesis, which states that the residuals are normally distributed, cannot be disproved. This model passes all diagnostic tests, making it possible to evaluate the effects of independent variables on the dependent variable over the long and short terms. In the final test, the heteroscedasticity test, both p-values are unable to reject the homocedasticity null hypothesis. Given that the F-statistics are the focus of this study, it can be said that the functional form is effectively used in this model.

As regards to the CUSUM and CUSUMQ tests, it is observable in their respective Figures 3 and 4, that there are no structural breaks and therefore, there is stability of the coefficients during the observation period, in the model. Thus, with all the tests complete, it

is confirmed that the model is feasible.

5. Discussion

The findings shown in Tables 7 and 8 demonstrate that real exchange rate volatility (REERVOL) has a long-term and short-term detrimental impact on FDI. Furthermore, the statistical significance of this REERVOL in the long-run estimations supports the idea that foreign investors are impacted by both short- and long-term fluctuations in REERVOL. This result is in direct accordance with earlier empirical research conducted by Adokwe et al. (2019), Odionye et al. (2023); and Akinlo and Onatunji (2021). This finding suggests that Nigeria's level of REERVOL deters FDI.

Additionally, the negative long- and short-term interest rate coefficients demonstrate that an unfavorable interest rate exacerbates the already diminishing foreign direct investment (FDI) flows to Nigeria as a result of REERVOL. Investors may be reluctant to directly fund local firms at a rate that is marginally below market value but higher than their parent company's borrowing rate if the interest rate is unfavorable. For local enterprises, on the other hand, who might not be able to borrow from the foreign lender at a rate that is less than the going rate, this situation might potentially cause still another set of issues. This is in consonance with the findings of Oladeji and Musa (2022) and Jennat (2020) who averred those changes in the interest rate aggravates the effect of exchange rate volatility on FDIs.

The study also looked at how the RGDP growth rate behaves in relation to FDI. The outcome demonstrates that FDI was negatively and statistically significantly impacted by the pace of RGDP growth both over the long and short terms. The findings imply that prospective investors in Nigeria would want to know or assess how the country's level of domestic productivity will affect the return on their capital. It implies that FDI is less during times of slower RGDP growth, which could potentially cause economic shocks. In this case, Nadine et al. (2021); Uzoma-Nwosu and Orekoya (2019) and Malot et al. (2017) lends credence to this study with the finding that low economic productivity could discourage FDIs during periods of extreme volatility in exchange rate.

The positive and statistically significant population growth rate (POPU) indicates that, even in the middle of REERVOL, Nigeria's expanding population may draw in foreign capital. Uzoma-Nwosu and Orekoya (2019), who presented the scenario to show that many foreign investors are drawn to nations with growing populations because of the availability of cheap labor and the potential population of the host economy's market size, backed this point of view.

6. Conclusions and Recommendations

6.1 Conclusion

This study looked at how exchange rate volatility affected foreign direct investments in Nigeria. Following a thorough examination of the literature, the study took into account a few FDI drivers that were found in the literature and included as control variables. According to the results of the ARDL estimation, real exchange rate volatility significantly and diminishingly affected net FDIs into Nigeria. The results from the long-run and short-run functions are consistent with this conclusion. The study recommended that policy makers take a more comprehensive approach to encouraging investment because there are other factors that influence FDI influx. Market players ought to consider reallocating resources and implementing additional macroeconomic factors that will stimulate FDI into the nation. To assess if Nigerian policies are acceptable, it is also critical to reexamine the currency rate to FDI transfer mechanism and vice versa. The analysis came to the conclusion that FDI flows to Nigeria are not influenced by either real exchange rate volatility.

6.2 Recommendations

In line with the findings from the data analysis, the following findings were made:

a)   Policies that guarantee exchange rate stability should be developed and/or upheld in order to draw FDI into the economy. Based on the aforementioned research, it is recommended that these policies combine monetary and fiscal measures aimed at achieving exchange rate stability, interest rate declines, and lower inflationary pressure.

b)   It is also suggested that when controlling FDIs, the monetary authorities should consider interest rate management in addition to exchange rate stabilization. The link between the exchange rate and foreign direct investment inflows into Nigeria appears to be

significantly moderated by interest rate control.

c) In order to achieve quick growth in the non-oil sector and increase domestic production, it is also advised that the economy be diversified. This will allow the country to export primary commodities, where it has a competitive advantage, and manage exchange rates more effectively.

d) Given that it has been shown to have a favorable effect on FDI in Nigeria over the study period, Nigeria's average population growth rate should be preserved. Therefore, it is crucial to direct the working population towards domestic production in order to create foreign exchange, which will aid in lowering the ongoing volatility of the exchange rate and promote FDI in Nigeria

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