



Umar Ahmed
Economics Department,
Modibbo Adama University, Yola,
Adamawa State, Nigeria.

umarmbilla@gmail.com

Sikiru Jimon Babalola
Economics Department,
Modibbo Adama University, Yola,
Adamawa State, Nigeria.

sjbabalola@mau.edu.ng

<https://orcid.org/0000-0002-4904-9900>

***Corresponding Author:**

Umar Ahmed
Economics Department,
Modibbo Adama University, Yola,
Adamawa State, Nigeria.

umarmbilla@gmail.com

IMPACT OF FOREIGN DIRECT INVESTMENT ON ECONOMIC GROWTH IN NIGERIA: ROLE of EXCHANGE RATE VOLATILITY

ABSTRACT

This study investigates the effect of Foreign Direct Investment (FDI) on economic growth in Nigeria, focusing on the moderating role of exchange rate volatility. Using annual data from 1992 to 2022 obtained from the World Development Indicators and Central Bank of Nigeria Statistical Bulletin, the study employed the ARDL approach, with exchange rate volatility estimated using the GARCH model. The findings show that FDI positively and significantly contributes to economic growth in the long run, while exchange rate volatility negatively affects growth, particularly in the short run. However, the positive and significant interaction between FDI and exchange rate volatility indicates that exchange rate conditions influence the growth-enhancing effect of FDI. Granger causality reveals a unidirectional relationship from economic growth to FDI, while the stability tests confirm that the model remains structurally stable. The study concludes that achieving greater exchange rate stability, strengthening foreign exchange reserves, diversifying exports, and improving the investment environment are essential for maximizing the contribution of FDI to sustainable economic growth in Nigeria.

Keywords: *Foreign Direct Investment; Economic Growth; Exchange Rate Volatility; ARDL; GARCH; Nigeria; Granger Causality.*

1. INTRODUCTION

Foreign direct investment (FDI) and exchange rate are vital variables that stimulate economic growth. The role of foreign direct investment on economic growth has been hotly debated in the literature. Some studies are of the view that foreign direct investment contributes positively to the growth of the economy (Adegbite et al, 2011), while some are of the view that FDI only contributes small and it is not significant (Akinlo, 2004). However, the attributes of FDI in any economy of the world cannot be over-emphasized. Foreign direct investment (FDI) refers to an investment made by an investor either corporate bodies or individuals in a country other than the domestic country of origin of the investor in creating business or buying an asset in the country. John (2016), opined that foreign direct investment is seen as a process of moving technology and capital from a nation either developed or developing countries to another nation.

Farrell (2008), opined that foreign direct investment refers to the package of technology, capital, management, and entrepreneurship that firm uses to operate and provide goods and services in a foreign market. In Africa, Nigeria is the third host economy for FDI, behind Egypt and Ethiopia. Some of the investing countries in Nigeria are the USA, United Kingdom, China, the Netherlands and France according to United Nations Conference on Trade and Development (UNCTAD, 2018). While Exchange rate is the price of one unit of the foreign currency in terms of the domestic currency. Exchange rate is one of the variables used in assessing performance of an economy. A very strong exchange rate is a reflection of a strong and viable economy, On the other hand, a very weak currency is a reflection of a very vulnerable and weak economy (Khalid, 2018). Exchange rate volatility on the other hand is associated with unpredictable movements in the relative price in the economy. It also refers to the swings or fluctuations in the exchange rate over a period of time or deviations from a benchmark or equilibrium exchange rate, Exchange rate volatility is an important contributor to risk in the financial world. During the period of excessive movements in exchange rates, foreign trade and investments could be affected negatively (Mordi, 2006).

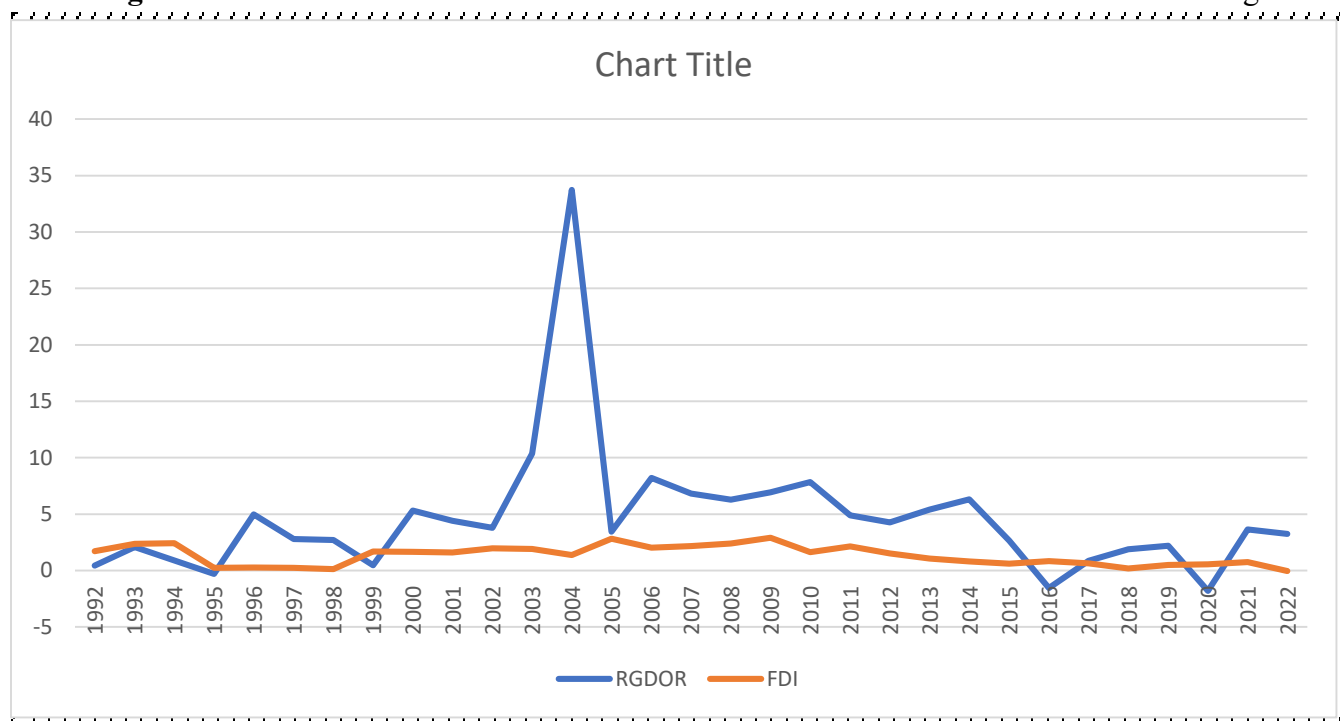
FDI (inflows) is vital to any economy, it augments domestic investment, Nigeria has been a major beneficiary of technological spill overs, job creation, improved managerial skills and other benefits from these inflows. This flow of goods, services, and capital in and out of a country is influenced by political and legal environment of the host country, inflationary pressure, domestic savings, physical and social infrastructure, fiscal and monetary policy, indigenous technology, among other macroeconomic factors. In addition to the above, two very important factors that foreign investors think about before allowing their goods to flow to any country are risks associated with exchange rate and its volatility (Jonh, 2016).

Exchange rate influences international flow of goods, services, and capital among countries, and therefore commands a strong pressure on balance of payments, inflation and other macroeconomic variables. The fluctuation of exchange rate can lead to currency depreciation or appreciation. When exchange rate appreciates, it causes the cost of production to rise in a country's economy, and this will lead to low and volatile FDI. Poverty, high inequality and underdevelopment also will ensue with the attendant huge deficit that will be recorded in the domestic country's balance of trade and of payment. On the other hand, depreciation in exchange rate creates competitive advantages in international trade. It makes domestic goods cheaper and increases the demand for export goods, it causes an increase in international demand for domestic goods while import decreases. This impacts positively on FDI inflow into the domestic country. An equilibrium foreign exchange can assist decision makers to reduce the air of uncertainty caused by volatility in exchange rate and hence growth and development. The volatility in exchange rate leads to uncertainty, which has a negative effect on trade flows.

Nigeria has also experienced significant fluctuations in its exchange rate in the past decade, due to various factors such as oil price shocks, political instability, security challenges, and policy reforms. These fluctuations have had mixed effects on the FDI inflows and outflows in Nigeria, which have also been influenced by the global and regional economic conditions, the business environment, and

the investment incentives and regulations in the country. An ideal expectation is for foreign direct investment to stimulate growth and development in the host countries. However, the graphical depiction of foreign direct investment as a percentage of gross domestic production growth rate (GDPR) and the corresponding GDP growth rates in Nigeria (see Figure 1) appears to indicate that high foreign direct investments are associated with low GDP growth rate in some years.

Figure:1 Real Gross Domestic Product Growth and FDI inflows to Nigeria



Source: E-views Results and Author's Computation 2026

Specifically, this appears to be the case in most of the periods covered in this study like 1992–1993; 1998–1999, and 1992–1993, 2001–2002, 2004–2005, 2006–2008, 2010–2011, 2015–2016 and 2019–2020. CBN (2022), the FDI inflows to Nigeria decreased from \$3.31 billion in 2021 to - \$0.19 billion in 2022, while the FDI outflows increased from \$2.41 billion in 2021 to \$3.45 billion in 2022. This implies a net FDI outflow of \$3.64 billion in 2022, compared to a net FDI inflow of \$0.9 billion in 2021. The negative FDI inflow in 2022 was mainly due to the sharp depreciation of the naira against the US dollar, which reached a record low of 570 naira per dollar in June 2022 (Ogundipe, 2022). The depreciation was caused by the persistent decline in oil prices, the COVID-19 pandemic, and the insecurity and social unrest in the country. The depreciation increased the cost of production and reduced the profitability of foreign investors, who decided to divest their assets and repatriate their capital. The depreciation also increased the inflation rate, which reached 18.2% in June 2022 (Ogundipe, 2022), eroding the purchasing power and the living standards of the population.

The exchange rate volatility is measured by the standard deviation of the quarterly returns of the Nigerian Exchange rate data from the CBN (Central Bank of Nigeria, 2022), it shows that the exchange rate increased from 307 naira per dollar in 2019 to 359 naira per dollar in 2020, also

increase to 401 naira per dollar in 2021 and 425 naira per dollar in 2022. The exchange rate fluctuations hurt the FDI inflows and outflows in Nigeria, as it increased the uncertainty and risk of investing in the country. The data from the CBN (Central Bank of Nigeria, 2022) show that the foreign portfolio investment (FPI), which is a component of FDI that involves the purchase of stocks, bonds, and other financial assets, decreased from \$3.06 billion in 2019 to \$2.39 billion in 2020, before increasing to \$3.31 billion in 2021 and \$3.45 billion in 2022. The FDI flows were mainly driven by the exchange rate expectations, interest rate differential and the market liquidity (Jonh, 2016).

To the best of our knowledge, few studies such as (Asteriou et al., 2016; Basirat et al., 2014; Kenny, 2019; Ojo & Alege, 2014; Osinubi et al., 2009) exist. Studies such as (Uzoma-Nwosu & Orekoya, 2019; Ojo & Alege, 2014) concentrated on exchange rate fluctuations on economic growth. Others such as (Khalighi & Fadaei, 2017 and Kenny, 2019) studied the effects of the exchange rate and foreign direct investment on specific sectors, such as the impact of export on the economy. In terms of foreign direct investment, although a growing literature on economic growth, exchange rate and foreign direct investment has been uncovered, relatively little is known about Nigeria. Given the importance of exchange and FDI to the Nigerian economy, this study aims to analyze how the exchange rate volatilities affect FDI inflows to Nigeria, which is important for the country's economic growth and development and to examines the relationship between exchange rate volatility, foreign direct investment and Nigeria's economic growth. This paper is organized as follows: Section One is an introduction; Section Two explains the literature review; Section Three describes the methodology; Section Four reports the results and discussion of findings; and Section Five draws' conclusions and policy recommendations.

2. Literature Review

This section presents the theoretical and empirical literatures on impact of foreign direct investment on economic growth. The theoretical literature deals with concepts and methods that have been advanced to explain the link between foreign direct investment and economic growth. It also enables the selection of models which best suit the study. The empirical literature provides evidence from past studies that are related to the subject, to enable the identification of gaps needed to be filled.

2.1 Theoretical Framework

The theory that underpins the current study is exogenous growth theory of neo-classical. The Solow-Swan neo-classical growth model, which is independent of saving rates, bases its explanation of the long-run growth rate of output on two exogenous variables: the rate of population expansion and the pace of technical advancement. The neo-classical theory has limited policy implications because the long-run growth rate depended on exogenous causes. As pointed out by Romer,

$$Y_t = A_t F(K_t L_t H_t) \quad (2.1)$$

Where ‘ H ’ represents the aggregate stock of knowledge; ‘ K ’ stands for capital; and ‘ L ’ for Labour, A represents the level of technology and the subscripts t represent time period. Following Romer (1986), equation (2.1) suggests that investment in knowledge leads to a natural externality, thus the production of knowledge by one firm is assumed to have positive external effects on other firms. Now relating the production function in equation (2.1) to aggregate production function that relates Gross Domestic Product (GDP) at time t to factors of production leads to equation (2.2).

$$Y_t = A_t K_t^\omega L_t^\tau H_t^\rho \quad (2.2)$$

The model starts from general production function given by Solow which is explicitly given as:

$$Y = f(K, L, A) \quad (2.3)$$

Where $Y = GDP$, $K =$ Capital input, $L =$ Labor input, $A =$ the level of technological knowledge.

2.3 Empirical Literature

This section reviews the empirical literature on how foreign direct investment affect economic growth in Nigeria and other countries. The literature shows mixed results, depending on the methods, data and countries used. A recent study by Ogu (2020) examined the effect of exchange rate fluctuation, interest rate, inflation, gross fixed capital formation and gross domestic product on foreign direct investment in Nigeria. The results indicated that exchange rate fluctuation has a positive relationship with foreign direct investment. The result also shows that interest rate and inflation contributed positively to the inflow of foreign direct investment in Nigeria. Simultaneously, variables such as gross fixed capital formation and gross domestic product negatively affect the inflow of foreign direct investment in Nigeria.

The empirical studies reviewed revealed mixed findings on the relationship between foreign direct investment (FDI) and economic growth across different countries. In Nigeria, Kolade (2019), Ehimare (2011), and Saibu and Keke (2014) reported evidence of a positive relationship between FDI or foreign private investment and economic growth, although the significance and magnitude of the effects varied. Conversely, Akinlo (2004) found that private capital and lagged foreign capital had statistically insignificant effects on economic growth, suggesting that the contribution of FDI may depend on the sector receiving the investment and the prevailing economic conditions. Similarly, studies conducted outside Nigeria provided evidence of heterogeneous effects. Sunde (2017) established that FDI and exports contributed positively to South Africa’s economic growth, while Karimi and Zulkornain (2009) found a long-run relationship between FDI and economic growth in Malaysia without strong evidence of bidirectional causality. Türkcan, Duman and Yetkiner (2008) identified a reciprocal relationship between FDI and economic growth across 23 OECD countries, whereas Chakraborty and Nunnenkamp (2008) demonstrated that the growth effects of FDI in India varied across economic sectors. Furthermore, Mokuolu (2018), Ehimare (2011), and Eravwoke and Imide (2013) highlighted the relevance of exchange rates, inflation and corruption in understanding FDI dynamics and macroeconomic performance. Collectively, these findings suggest that the relationship between FDI and economic growth is not uniform but depends on country-specific conditions, institutional quality, sectoral composition and macroeconomic stability.

Despite the contributions of the reviewed studies, a methodological and empirical gap remains regarding the role of exchange rate volatility in the relationship between FDI and economic growth in Nigeria. Previous studies largely examined the direct effect of FDI on economic growth (Kolade, 2019; Akinlo, 2004; Saibu & Keke, 2014), the influence of exchange rates and other macroeconomic variables on FDI (Mokuolu, 2018; Ehimare, 2011), or the causal relationship between FDI and economic growth (Karimi & Zulkornain, 2009; Türkcan et al., 2008). Although Eravwoke and Imide (2013) investigated corruption, FDI and exchange rate movements, limited attention has been devoted to examining whether exchange rate volatility moderates the effect of FDI on economic growth through an interaction term between the two variables. This omission is important because exchange rate volatility may influence investment costs, expected returns, investor confidence and the capacity of foreign investment to stimulate domestic production. Consequently, the present study addresses this gap by incorporating an interaction term between FDI and exchange rate volatility into the economic growth model, alongside the constituent variables, to establish both the direct and moderating effects. This approach is consistent with the methodological concerns regarding the specification and interpretation of interaction effects discussed by Babalola and Shittu (2020). Furthermore, the use of more recent data is expected to provide updated empirical evidence and relevant policy implications for attracting foreign investment, managing exchange rate instability and promoting sustainable economic growth in Nigeria.

3. Methodology

Prior to estimating the ARDL model, the study tested the stationarity of the data obtained for each variable to ascertain whether or not a unit root existed by the using Augmented Dickey-Fuller (ADF) test, which Dickey and Fuller first suggested in 1979. The co-integration was examined using the bounds testing approach. To confirm the existence and direction of a causality between exchange rate volatility and economic development, a pair-wise granger causality test was performed. Lastly, the stability of ARDL long run model parameters were examined using the cumulative sum of the recursive residuals (CUSUM) and the cumulative sum of the squares of recursive residuals (CUSUMSQ) tests proposed by Brown *et al.* (1975). The model on which the economic phenomenon will be investigated and empirically evaluated in order to investigate the relationship between variables and express this relationship in mathematical form (Gujarati, 2009). Two equations were used in this work to address this issue. In order to fulfill objective 1, equation 1 recorded the relationship between foreign direct investment and economic growth, whereas equation 2 captured causality between the variables. To achieve those objectives, the theoretical underpinning this work is based on the general approach to exogenous growth model of neo-classical that rely on firm production function of the form;

$$Y_t = A_t F(K_t L_t H) \quad (3.1)$$

Where ‘*H*’ represents the aggregate stock of knowledge; ‘*K*’ stands for capital; and ‘*L*’ for Labour, *A* represents the level of technology and the subscripts *t* represent time period. Following Romer (1986), equation (3.1) suggests that investment in knowledge leads to a natural externality, thus the production of knowledge by one firm is assumed to have positive external effects on other firms. Now relating the production function in equation (3.1) to aggregate production function that relates Gross Domestic Product (GDP) at time *t* to factors of production leads to equation (3.2).

$$Y_t = A_t K_t^\omega L_t^\tau H_t^\rho \quad (3.2)$$

This study adopted and modified a model developed by Onabote, Adama, Obasaju, Bright, Eluyela and Popoola (2022). The model starts from general production function given by Solow which is explicitly given as: $Y = f(K, L, A)$ (3.3)

Where $Y = GDP$, $K =$ Capital input, $L =$ Labor input, $A =$ the level of technological knowledge.

$$\text{then: } RGDP = f(GCF, LB, FDI, EXR, INF, INT) \quad (3.4)$$

where: GCF = Gross capital formation, LB = Labor, FDI = Foreign direct investment, EXR = Exchange Rate, INF = Inflation rate, INT = Interest Rate, If we proxy EXR by Exchange rate volatility ($EVOL$) into the model to analyzed the effect of $EVOL$ and proxy BL by School Enrollment Rate ($SCER$).

Equation 1: Economic growth equation

The first objective is captured by this equation. It is denoted mathematically as:

$$RGDP = f(GCF, SCER, FDI, EVOL, INF, INT) \quad (3.5)$$

From the implicit model above, we therefore proceed to build our explicit model thus:

$$RGDP = \alpha_0 + \alpha_1 GCF + \alpha_2 FDI + \alpha_3 SCER + \alpha_4 EVOL + \alpha_5 INF + \alpha_6 INT + \mu_t \quad (3.6)$$

If we convert equation (3.5) to log form, we get the following

$$LRGDP = \alpha_0 + \alpha_1 LGCF + \alpha_2 LFDI + \alpha_3 LSCER + \alpha_4 LEVOL + \alpha_5 INF + \alpha_6 INT + \mu_t \quad (3.7)$$

To examine the interactive effect of foreign direct investment (FDI) and Exchange rate volatility ($EVOL$) we extend equation 3.7 to obtain:

$$LRGDP = \alpha_0 + \alpha_1 LGCF + \alpha_2 LFDI + \alpha_3 LSCER + \alpha_4 LEVOL + \alpha_5 INF + \alpha_6 LINT + \alpha_7 (LFDI * LEVOL) + \mu_t \quad (3.8)$$

We expect the coefficient of the variables to have the following signs: $\alpha_1 > 0$, $\alpha_2 > 0$, $\alpha_3 > 0$, $\alpha_4 < 0$, $\alpha_5 < 0$, $\alpha_6 > 0$, $\alpha_7 > 0$.

The estimating processes involved figuring out how the exogenous and endogenous variables included in the economic growth equation related to one another. Additionally, the causal relationship between economic growth and foreign direct investment was examined. The Pesaran, Smith, and Shin (2001) ARDL technique was specifically used to estimate the economic growth equation. However, due to the nature of the time series data used in this study and the possibility of spurious regression results, the time series data were tested for stationarity to ensure that no variables of order I were integrated (2). The reason for this is that the estimated f-statistics provided by Pesaran et al. (2001) can only be used when variables are integrated of order I(0) and I(1) before they were used to estimate the ARDL model. To find the long-run equilibrium relationship between the exogenous variables (GCF , FDI , $SCER$, $EVOL$, INF , INT) and the endogenous variable ($RGDPR$) for the first equation passing the Wald test, co-integration testing was done using the

ARDL limits testing approach. By including a period-lagged error term variable in the estimated model, an error correction mechanism was created.

3.1 Autoregressive distributed lag (ARDL) model

This technique was developed by Pesaran and Shin in 1999 and improved by Pesaran, Shin and Smith in 2001. The model is based on estimating an unrestricted error correction model (UECM) which has several merits above other co-integration techniques. This technique can be applying on same sample size study, thus, conducting bounds test is appropriate for this study, it estimates short and long run coefficients of the model concurrently thereby eliminating troubles of omitting variables and serial correlation and when appropriate lags have been selected, long run relationship can be estimate.

Considering the above listed merits, ARDL-UECM specification base on equation (3.8) is expressed as follows:

$$\begin{aligned} \Delta LRGDPR_t = & \alpha_0 + \alpha_1 LRGDPR_t + \alpha_2 LGCF_t + \alpha_3 LFDI_t + \alpha_4 LSCER_t + \alpha_5 LEVOL_t + \alpha_6 INF_t + \\ & \alpha_7 LINT_t + \alpha_8 (LFDI_t + LEVOL_t) + \\ & + \sum_{i=0}^k \alpha_{9i} \Delta LRGDPR_{t-1} + \sum_{i=0}^k \alpha_{10i} LGCF_{t-1} + \sum_{i=0}^k \alpha_{11i} \Delta LFDI_{t-1} + \sum_{i=0}^k \alpha_{12i} \Delta LSCER_{t-1} + \\ & \sum_{i=0}^k \alpha_{13i} \Delta LEVOL_{t-1} + \sum_{i=0}^k \alpha_{14i} \Delta INF_{t-1} + \sum_{i=0}^k \alpha_{15i} \Delta LINT_{t-1} + \\ & \sum_{i=0}^k \alpha_{16i} (\Delta LFDI_{t-1} * \Delta LEVOL_{t-1}) + \varepsilon_t \end{aligned} \quad (3.9)$$

The chaw test confirmed the existence of structural break in exchange rate in the first quarter of 1992, 1999, 2009 and 2015 respectively. The years are detected from the graph of exchange rate volatility in Figure 1 (conditional variance (GARCH 1, 1)). This led to the introduction of dummy variables i.e DUM01, DUM02, DUM03 and DUM04.

$$\begin{aligned} \Delta LRGDPR_t = & \alpha_0 + \alpha_1 LRGDPR_t + \alpha_2 LGCF_t + \alpha_3 LFDI_t + \alpha_4 LSCER_t + \alpha_5 LEVOL_t + \alpha_6 INF_t + \\ & \alpha_7 LINT_t + \alpha_8 (LFDI_t + LEVOL_t) + \\ & + \sum_{i=0}^k \alpha_{9i} \Delta LRGDPR_{t-1} + \sum_{i=0}^k \alpha_{10i} LGCF_{t-1} + \sum_{i=0}^k \alpha_{11i} \Delta LFDI_{t-1} + \sum_{i=0}^k \alpha_{12i} \Delta LSCER_{t-1} + \\ & \sum_{i=0}^k \alpha_{13i} \Delta LEVOL_{t-1} + \sum_{i=0}^k \alpha_{14i} \Delta INF_{t-1} + \sum_{i=0}^k \alpha_{15i} \Delta LINT_{t-1} + \\ & \sum_{i=0}^k \alpha_{16i} (\Delta LFDI_{t-1} * \Delta LEVOL_{t-1}) + DUM01 + DUM02 + DUM03 + DUM04 + \sum_{i=0}^k \alpha_{17} \varepsilon_t \dots \end{aligned} \quad (3.10)$$

Finally, short run dynamic parameters related with long estimate are obtained by estimating ECM model base on equation (3.10) is expressed as follows:

$$\begin{aligned} \Delta LRGDPR_t = & \alpha_0 + \sum_{i=1}^k \alpha_1 \Delta LRGDPR_{t-1} + \sum_{i=0}^k \alpha_2 \Delta LGCF_{1t-1} + \sum_{i=0}^k \alpha_3 \Delta LFDI_{t-1} + \\ & \sum_{i=0}^k \alpha_4 \Delta LSCER_{1t-1} + \sum_{i=0}^k \alpha_5 \Delta LEVOL_{t-1} + \sum_{i=0}^k \alpha_6 \Delta INF_{t-1} + \sum_{i=0}^k \alpha_7 \Delta LINT_{t-1} + \\ & \sum_{i=0}^k \alpha_8 (\Delta LFDI_{t-1} * \Delta LEVOL_{t-1}) + \varphi ECM_{t-i} + \varepsilon_t \end{aligned} \quad (3.10)$$

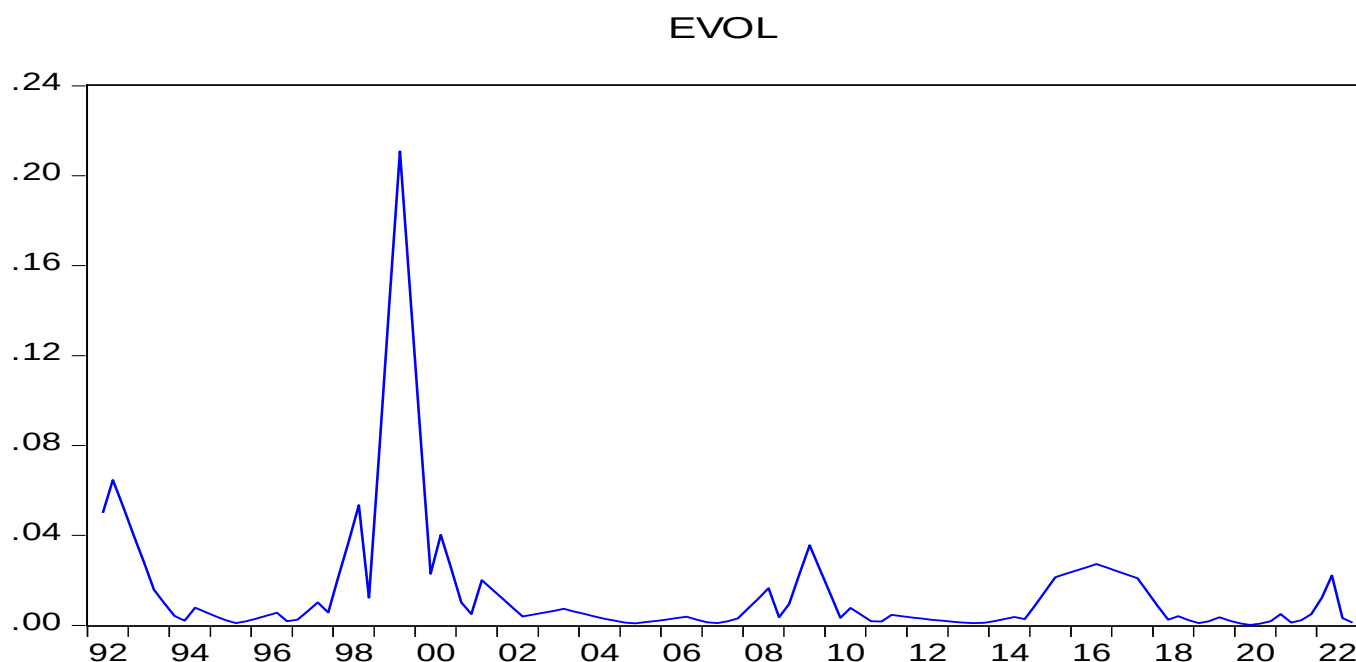
Where:

α_1 to α_8 = short run dynamic coefficients of the model,

φ = speed of adjustment mechanism.

There are different methods of capturing the exchange rate volatility, these includes: an absolute percentage change within a given period of time, Autoregressive Integrated Moving Average (ARIMA) residual models, non-parametric techniques and Autoregressive Conditional Heteroskedasticity (ARCH) model. This study employed the generalized variant of the ARCH (GARCH) measurement of exchange rate volatility. Figure 2 plots the conditional variance for equation 3.9 and shows the volatility data exchange rate from 1992 to 2022.

Figure 2 (conditional variance (GARCH 1, 1))



Source: Author's Computation, 2024.

All data on variables to be used were sourced from the World Development Indicator (WDI). Exchange rate volatility was computed by the author by applying standard deviation on the exchange rate data collected from CBN Statistical Bulletin. Moreover, the data obtained are from 1992 to 2022.

4. Data Analysis and Presentations

This section is structured to encompass analysis on descriptive statistics, unit root testing, ARDL bound test for cointegration, long run result, short run error correction model (ECM), and CUSUM test and CUSUM square, Finally the var granger causality checks is considered in this study.

Table 4.1 Descriptive Statistics of the variables considered in the study.

Variables	RGDPR	FDI	FDI_EVOL	EVOL	GCF	INF	INR	SCER
Mean	4.6227	1.3301	3.06544	-3.48E-06	27.00	18.594	10.822	36.007
Median	3.6471	1.5237	21.0049	23.41619	27.117	12.876	10.108	34.997
Maximum	33.735	2.9002	83.537	270.4160	44.488	72.835	23.241	56.205
Minimum	-1.7942	-0.0395	-180.73	138.2648	14.903	5.3880	4.2068	23.551
Skewness	3.5582	0.0706	-1.6468	0.821496	0.3264	2.1059	0.8236	0.0739
Kurtosis	17.832	1.7843	4.7379	2.911618	1.8580	6.3717	4.0239	1.6679
Jarque-Bera	1398.3	7.7386	71.657	13.98737	8.9400	150.39	19.434	9.2804
Probability	0.0000	0.0208	0.0000	0.000918	0.0114	0.0000	0.0001	0.0096
Sum	573.22	164.93	0.00038	0.000432	3348.8	2305.6	1342.0	4464.8
Sum Sq. Dev.	4489.6	91.000	551081.3	1579538.	11037.0	32616.	2041.37	11904.7
Observations	124	124	124	124	124	124	124	124

Source: E-views Results and Author's Computation 2024

The descriptive statistics reported in Table 4.1 indicates that foreign direct investment (FDI) and Real Gross Domestic Product Growth Rate (RGDPR) has mean values of 1.33% and 4.66% respectively. Also, the mean values for Gross Capital Formation (GCF), Interest rate (INR), Inflation Rate (INF), School Enrolment Ratio (SCER) are 26.9%, 10.8%, 18.4% and 36.1% respectively during the period under investigation. Foreign Direct Investment (FDI) and Real Gross Domestic Product Growth Rate (RGDPR) has maximum rates of and 2.9% and 33.7% respectively.

Table 4.2: Correlation Analysis of the Variables

Variables	RGDPR	FDI	FDI_EVOL	EVOL	GCF	INF	INR	SCER
RGDPR	1							
FDI	0.19646	1						
FDI_EVOL	0.1975	-2.3072	1					
EVOL	-0.1027	-0.3739	9.1855	1				
GCF	-0.12909	0.04890	-0.4009	-0.58512	1			
INF	-0.2245	0.04515	-0.4967	-0.3839	0.5655	1		
INR	0.1149	0.4292	-0.3901	-0.6321	0.5782	0.5327	1	
SCER	0.0293	-0.2105	0.2248	0.7684	-0.8600	-0.4465	-0.6775	1

Source: E-views Results and Author's Computation 2024

Result shows that there is a positive relationship between Foreign Direct Investment (FDI) and economic growth (RGDPR) in Nigeria ($r = 0.19$) this is expected because an increase in the Foreign Direct Investment (FDI) leads to an increase in economic growth and vice versa.

Table 4.3: Stationary Test

Variable	Test	Constant and Trend		Order of Integration
		Levels	First Diff.	
RGDPR	ADF	-2.6838 (0.0798)	-8.67161** (0.0000)	I (0)
	PP	-3.3908 (0.0130)	-17.9505** (0.0000)	
FDI	ADF	-2.0089 (0.2838)	-10.9734** (0.0000)	I (1)
	PP	--1.9509** (0.3082)	-11.3034** (0.0000)	
EXR	ADF	0.828904 (0.9942)	-3.6950*** (0.0053)	I (1)
	PP	1.4787 (0.9992)	-11.8091*** (0.0000)	
GCF	ADF	-1.6540 (0.4521)	-11.1290*** (0.0000)	I (1)
	PP	-1.6682 (0.4448)	-11.1761*** (0.0000)	

EVOL	ADF	-3.37328 (0.0600)	-6.01724 (0.0000)	I (0)
	PP	-3.54192 (0.0394)	-1.6682 (0.0000)	
EVOL_FDI	ADF	-3.3462 (0.0150)	-6.4561 (0.0000)	I (0)
	PP	-3.07194 (0.0314)	-7.3296 (0.0000)	
SCER	ADF	-0.9306 (0.7756)	-11.1092 (0.0000)	I (1)
	PP	-0.87194 (0.7942)	-11.1554 (0.0000)	
INR	ADF	-2.3689 (0.1527)	-10.999*** (0.0000)	I (1)
	PP	-2.2361 (0.1948)	-11.4895*** (0.0000)	
INF	ADF	-2.1252 (0.2353)	-10.973*** (0.0000)	I (1)
	PP	-2.160749 (0.2218)	-10.973*** (0.0000)	

Source: Author's Computation 2024, using E-Views

Note: ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

Table 4.3. depicts the ADF and PP Test results. It evidently shows that only Real Gross Domestic Product Growth Rate (RGDPR) and Exchange Rate Volatility (EVOL) are stationary at level while the remaining variables were all stationary at first deference. This is because their ADF and PP Test values are less than the critical value at 5%. the series reveals the presence of different order of integration (I(0) and I(1)),

Table 4.4 Optimal Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1560.405	NA	25.05390	25.92404	26.10889	25.99912
1	-528.7047	1909.924*	2.84e-06*	9.929003*	11.59261*	10.60466*
2	-516.5799	20.84254	6.78e-06	10.78645	13.92882	12.06268
3	-496.0290	32.60978	1.44e-05	11.50461	16.12575	13.38143

* Indicates lag order selected by the criterion

Source: Authors computation using E-views 10

The optimal lag length of this model has to be determined before proceeding to the bound test. Table 4.4 shows the optimal lag length of (1) out of maximum lag lengths of 4 lag as selected by the 2 different criteria because 2 lags have the lowest values. After establishing the number of lags to be used in the models. Hence, the study proceeds to estimate the ARDL bounds test for co-integration.

Table 4.5 ARDL Bound Test for exchange Rate (EXR) Model

Test Statistic	Value	K
F-statistic	8.8794	7
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Source: Authors computation using E-views 10

The result from table 4.5 indicates that the value of F-statistics (8.879) is less than the I(1) critical bounds at 10%, 5%, 2.5% and 1%. This suggests the acceptance null hypothesis of no co-integration.

4.2 Long Run Coefficient

Table 4.6: ARDL Long Run Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI_EVOL	0.011353	0.002249	5.047777	0.0000
EVOL	-0.004054	0.000498	-8.133127	0.0000
LFDI	0.373210	0.101333	3.682987	0.0005
LGCF	2.318261	0.304183	7.621272	0.0000
LSCER	4.613602	0.395332	11.670184	0.0000
LINR	2.058291	0.203704	10.104304	0.0000
INF	-0.074223	0.164780	0.450434	0.6539

Source: Authors Computation using E-views 9.0

In this model, the data sample period is 31 years after the adjustment which account for the maximum lag length used. Generally, it can be observed from the result that foreign direct investment (FDI) is positively (0.53) related to economic growth (RGDPR) and statistically significant. Thus, at 1 percent increase in foreign direct investment would significantly increases GDP growth rate earnings by 0.53 percent in the long run. This result is consistent with (Jonh, 2016) who found a positive relationship between foreign direct investment and economic growth. We estimate the interaction effect of foreign direct investment and exchange rate volatility (FDI*EVOL) on the economic growth (RGDPR) of Nigeria. Thus, at 1 unit increase in in the interacting variable

will lead to 0.01% increase in economic growth in Nigeria, also Gross Capital Formation (GCF) is positive and insignificant.

4.3 Error Correction Model (ECM)

Table 4.7: ARDL Cointegrating / Short-run Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRGDPR)	0.846771	0.111314	7.607086	0.0000
D(FDI_EVOL)	0.001981	0.001311	1.510701	0.1356
D(EVOL)	-0.023741	0.002974	-7.983511	0.0000
D(LFDI)	0.552253	0.226266	2.440718	0.0173
D(LGCF)	0.371128	0.501934	0.739395	0.4623
D(LSCER)	4.296774	0.807182	5.323178	0.0000
D(LINR)	2.619442	0.263661	9.934885	0.0000
D(LINF)	-0.184496	0.162622	-1.134508	0.2607
C	-39.132415	4.202827	-9.310974	0.0000
CointEq(-1)	-0.040291	0.151007	-9.306142	0.0000

Source: Author's Computation 2024,

From the estimated ARDL (8, 8, 5, 0, 4, 8, 8, 1) model, the short-run effect of foreign direct investment and the control variables on Economic Growth is presented in Table 4.7. The short run results associated with the Error Correction term, ECM(-1), in the model explain the speed of adjustment to restore equilibrium in the dynamic model. The ECM(-1) explains how quickly variables converge to equilibrium. According to Bannerjee et al (1998), a highly significant error correction term further confirms the existence of a stable long-run relationship. The coefficient of the lagged error correction term, -1.41 is negative and significant at 1 percent, confirming the existence of a long run relationship among the variables. It implies that the FDI is corrected by 141% in the model by the coming year (In 4 quarters period). This result corroborates that of (Jonh, 2016) who found a positive relationship between foreign direct investment and economic growth in Nigeria.

4.4 Granger Causality

Table 4.8 Pairwise Granger Causality Tests

FDI does not Granger Cause RGDP	122	1.40946	0.2484
RGDP does not Granger Cause FDI		3.39153	0.0370
INF does not Granger Cause FDI_EVOL	122	0.19150	0.8260
FDI_EVOL does not Granger Cause INF		8.37988	0.0004
GCF does not Granger Cause FDI	122	0.18220	0.8337
FDI does not Granger Cause GCF		2.21246	0.1140
INR does not Granger Cause SCER	122	0.02515	0.9752
SCER does not Granger Cause INR		2.16763	0.1190

Source: Author's Computation 2024,

4.5 Discussion of findings

Equation 1: Economic Growth Equation

It can be observed from the result that foreign direct investment (FDI) is positively (0.54) related to economic growth (RGDP) and statistically significant. Thus, a 1 percent increase in FDI would significantly increase GDP growth rate (economic growth) earnings by 0.54 percent in the long run. This finding is consistent with (Jonh, 2016) who found a positive relationship between FDI and economic growth in Nigeria. Also, when interact FDI and EVOL it has positive relation with RGDP (0.01). Thus, a 1 unit increase FDI*EVOL would increase RGDP by 0.01%. The coefficient of the lagged error correction term, -1.40 is negative and significant, confirming the existence of a long run relationship among the variables. It implies that FDI is corrected by 140% in the model by the coming year. This means that more than 140 percent of the disequilibrium in the previous year is corrected in the current year. In other words, if a shock (example if decrease in FDI) occurs, the speed of adjustment for correction is 140 percent.

Base on Pairwise Granger Causality Tests' FDI has no causal relationship with Real gross domestic product (RGDP) and the interaction of FDI and exchange rate volatility (FDI*EVOL) has no causal relationship with Real gross domestic product (RGDP).

More so, the coefficient of multiple determinant which is also known as goodness of fit (R^2) value is 0.940184 and adjusted R^2 is 0.895777. This implies that the independent variables have above 94% variation in the dependent variable (economic growth rate). The F-statistic value is 21.17144 and its p-value is 0.0000000 indicating that all the independent variables (LFDI*EVOL, EVOL, LFDI, LGCF, INF, INTR and SCER) can jointly influence the dependent variable during the study period.

5. Conclusion

The empirical findings indicated that, both in the long and short terms, foreign direct investment when moderated with exchange rate volatility has a positive impact on Economic Growth rate but

this impact is only substantial in the long run. This suggests that, in the long run, Economic Growth has a considerable impact on foreign direct investment, this contradicts the finding of (Awe, 2013) who found a negative relationship. It also showed that in both the long and short ranges, the FDI in Nigeria is significantly influenced by the country's gross capital formation, inflation rate, and lending interest rate.

5.1 Recommendations

Based on conclusion above, the following recommendations were put in place:

- i. The positive effects of foreign direct investment on economic growth need a swift shift in Nigeria's export strategy from crude oil to non-oil products, including agricultural products and other solid minerals. This will bust the available of raw materials in the country which will directly encourage foreign investors.
- ii. Since Exchange Rate volatility give a negative impact on Economic Growth more in the short run, it is expected for Nigeria to make prompt effort to increasing her foreign reserves in the short run since it serves as a shock absorber against Exchange Rate volatility. Thus, Nigeria should consciously work to raise her reserve in the short term by carefully managing her foreign exchange policy and encouraging export through incentives.
- iii. This also study recommended that the government and the policy makers should create more avenues to attract foreign investors which will enhance technology transfer, and more job opportunities, and increase productivity into the economy. It is also recommended that the domestic investors need not to be ignored in formulating policy that could attract and motivate existing and potential domestic investors in Nigeria.
- iv. As we obtain a positive link between foreign direct investment and economic growth when the exchange rate volatility is incorporated into the analysis. This interaction effect posits that improvements in stability of exchange rate volatility increase the positive effect of foreign direct investment on economic growth. An important policy recommendation is, that as the Nigerian government looking forward to improve foreign direct investment, the policies to stabilize exchange rate should be accorded utmost priority. This would increase investors' confidence in the countries' economies and more private capitals would be attracted, instead of persistent reliance on foreign direct investment, to stimulate the growth of the Nigerian economy.

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