

**UNIVERSITY OF PORT HARCOURT JOURNAL OF ACCOUNTING AND  
BUSINESS  
DEPARTMENT OF ACCOUNTING  
UNIVERSITY OF PORT HARCOURT, CHOBA  
PORT HARCOURT, RIVERS STATE  
NIGERIA  
VOL. 9 NO. 1 MARCH 2022**

**EXCHANGE RATE VOLATILITY AND FOREIGN DIRECT INVESTMENT NEXUS**

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**Abstract**

Motivated by the poor and dwindling level of foreign investments, the study examined the evaluated the impact of Exchange rate volatility on Foreign direct investment in Nigeria from 1986 to 2020, using secondary sourced data gotten from the Central bank of Nigeria Statistical Bulletin. The analytical techniques employed by the study include; stationarity test, Johansen cointegration test, Error correction model and the Pairwise Granger Causality test. The study uncovers that; the rate of exchange rate volatility directly mimics the increasing level of Foreign Investment in the agricultural sector. Foreign Investment in the service sector is identified to possess insignificant influence on the exchange rate fluctuation showing how furtive the foreign investment in the manufacturing/industrial sectors and foreign investment in the service sector investments have been towards the exchange rate fluctuation of the nation which may likely be due to misappropriation and leakages coupled with poor economic, social and political stability. The study recommends that the government should foster its appropriation of capital and recurrent expenditure on improving the productive dominance of the nation and eliminate room for insecurity and political turmoil. It was also recommended that the government should also endeavor to mop the leakages in accrued foreign investment in the service sector, to foster the influence of this resource on the nation and reverse its insignificant influence. Since Foreign Investment in the service sector fails to relate with exchange rate volatility, the nation should endeavor to create a transparent avenue to collect and expend received Foreign Investment in the service sector and policymakers and financial institution should strive to polish the foreign direct investment system as it greatly predicts the exchange rate volatility proper regulation of the foreign inflows and ensuring strict monitoring of illicit activities such as cybercrime.

**Introduction**

Exchange rate is an important macroeconomic variable used as a parameter for determining international competitiveness and it is being regarded as an indicator of the competitiveness of the currency of any economy and also an inverse relationship between this competitiveness exists (Thuy & Thuy, 2019). Exchange rate is the price of one country's currency expressed in terms of some other currency.

It determines the relative prices of domestic and foreign goods, as well as the strength of external sector participation in the foreign direct investment. Exchange rate regime and

interest rate remain important issues of discourse in international finance as well as in developing nations, with more economies embracing trade liberalization as a requisite for economic growth (Chen, Du, & Hu, 2020)

Simply put, Exchange rate volatility is defined as the risk associated with the unexpected movements in the interest rate and the balance of payments, which have become more volatile in the 1980s and early 1990s, by themselves, are sources of exchange rate volatility (Akinlo & Gbenga, 2021). The fluctuation of exchange rate can lead to currency appreciation or depreciation. The world's total external reserves grew to \$9.7 trillion in 2010, while Nigerians reserves peaked at \$64 billion in 2008 before the global financial crisis and dropped to \$31.7 billion in late 2011. The U.S Dollar increased to 165.80 Nigerian Naira in October from 163.85 in September of 2014. The Nigerian naira averaged 122.44 from 1960 until 2014, reaching an all-time high of 165.80 in October 2014 and a record low of 0.53 in September of 1980. This shows that the naira keeps fluctuating and this fluctuation makes it difficult for countries to trade internationally (Qamruzzaman, Mehta, Khalid, Serfraz, & Saleem, 2021).

Havi (2021) noted that despite various efforts by the government to maintain a stable exchange rate, the naira has depreciated throughout the 80's to date. This fluctuation in the exchange rate was due to the implementation of the Structural Adjustment Program (SAP) that required deregulation of foreign exchange market and this deregulation led to the devaluation of the Nigerian naira. The main object of SAP was to restructure the production base of the economy with a positive bias for the production of agricultural exports. The foreign exchange reform that facilitated a cumulative depreciation of the effective exchange rate was expected to increase the domestic prices of agricultural exports and therefore boost domestic production (Dada, 2020; Morina et al., 2020).

Several scholars have evaluated the direction of causal association between Nigeria's exchange rate movement and foreign direct investment in both theoretical and empirical terms since the beginning of the floating exchange rate system in the 1970s. One purpose of this article is to address this problem empirically (Dada, 2020). The impact of exchange rate fluctuations on external sector activities such as foreign direct investment is still controversial because there is no consensus on whether the impact is negative or positive as shown in the results of previous studies. However, most studies have indicated that there is a negative relationship between foreign direct investment and exchange rate fluctuations. However, this study is an attempt aimed at investigating the response of Foreign direct investment to shocks provided by the activities of the exchange rate.

### **Statement of the Problem**

Despite various studies on the effect of foreign direct investment on Nigeria's economic growth, sectoral foreign investment effect has been lacking in literature. In recognition of these problems, Dada (2020) observed that of all capital inflow, FDI is the most promising due to its potential of dealing with the problems of savings gap, shortage of technology and needed skills. Even though so many literatures have claimed positive impact of foreign investment inflow to host economies, the direction is not too clear as there are other proponents of foreign investment inflow to host economies that have strongly argued that there is a negative nexus particularly in developing economies. Experts such as Adigun (2015), Okafor et al (2016), favoured a positive impact of foreign direct investment while other financial experts like Uwubanmwen and Ogiemudia, (2016) and others have consistently found negative impact from regime to regime since the late 1980s. Ayadi (2010)

concluded that the link between FDI and economic growth in Nigeria is very weak. According to Omojefe (2018), the preponderance of conflicting results on foreign investment has left the scholars and practitioners at a crossroad. Therefore, this gives rise to the need to know the sector effect of this.

Exchange rate volatility according to the literature has to do with the unusual movements of the exchange rate. The increase in exchange rate volatility leads to uncertainty, which has a negative effect on trade flows. This fluctuation in the exchange rate has created severe macroeconomic disequilibrium, which has led to balance of payment deficit. The Nigerian economy has been trying to resolve the problem of external and internal balance which is caused by the disequilibrium in our balance of payment and causing the economy balance of payment deficit but the many aim of this currency devaluation was to encourage export thereby improving the economy, however this objective of increasing export through devaluation of the naira has not been achieved, instead despite the various effort of the government to stabilize the exchange rate, the naira has continued to depreciate and making the naira worthless in terms of other country's currency (Danladi, et al. 2015).

The current predicament of Capital Flight, which Cooper and Hardt (2000) explained as the flow of financial assets resulting from the holder's perception that capital is subjected to inordinate level of risk due to devaluation, hyperinflation, political turmoil or expropriation of retained earnings at home in domestic currencies. Which not only aggravates the shortage of resources for development; but also indirectly leads to a decline in growth (Kolapo and Ojo, 2012).

Although a lot of articles were written on the topic of exchange rate volatility, different economists still have different ideas about the effect of exchange rate variability on foreign direct investment and most of the results of empirical studies are inconclusive. Since the exchange rates during the last decades have been highly volatile which caused a lot of changes in capital markets, this question is still very relevant. Moreover, the development of forward markets makes us look at this problem from different point of view now. As the exchange rate variability has a great influence on the welfare of the nation as it directly affects its trade, it is very important to research this problem to find ways to avoid the negative consequences of it (Rodriguez, & Rodrik, 2000).

One lesson from the above is that, literatures have given diverse results. The diversity of results may not be unconnected with the fact that different methods of measuring exchange rate volatility have been adopted by different researchers over time. There are no general ways of measuring volatility according to existing theories. This is because there is no consensus on the model of firm behaviour facing risk arising from fluctuations in exchange rates; Different statistical measures of exchange rate volatility have been proposed in the literature (Oloba and Abogan, 2013).

The paper therefore aims at using a different approach to the measure of volatility in exchange rate, which is parametric in nature and then analyse the trend which the exchange rate volatility has followed and discuss the possible causes of such trend on foreign direct investment in Nigeria. As a result of these dilemma and controversy this study seeks to put in proper perspective what the exact position is in the present time and to expand the frontier of foreign investment flows by undertaking a thorough examination of foreign investment inflow on a sectoral basis. There is therefore need for further studies to be carried out on how foreign direct investment is impacted by exchange rate volatility.

## **THEORETICAL FRAMEWORK**

### **Purchasing Power Parity Theory**

The starting point of exchange rate theory is purchasing power parity (PPP), which is also called the inflation theory of exchange rates. PPP can be traced back to sixteen-century Spain and early seventeen century England, but Swedish economist Cassel (1918) was the first to name the theory PPP. Cassel once argued that without it, there would be no meaningful way to discuss over-or-under valuation of a currency (Sugiharti et al., 2020).

Under this model, let  $P_i$  and  $P_i^*$  denote, respectively, the price level of good  $i$  in the home currency and foreign currency. Letter “ $S$ ” denotes the nominal exchange rate that expresses the price in foreign currency in terms of the domestic currency. According to the “law of one price,” the price of one good should be equal at home and abroad, say,  $P_i^* = S P_i$ . If the prices of each good are equalized between the two countries and if the goods baskets and their weights in the two countries are the same, then, then absolute PPP holds (Akinlo & Gbenga, 2021).

Absolute PPP theory was first presented to deal with the price relationship of goods with the value of different currencies. The theory requires very strong preconditions. Generally, Absolute PPP holds in an integrated, competitive product market with the implicit assumption of a risk-neutral world, in which the goods can be traded freely without transportation costs, tariffs, export quotas, and so on. However, it is unrealistic in a real society to assume that no costs are needed to transport goods from one place to another. In the real world, each economy produces and consumes tens of thousands of commodities and services, many of which have different prices from country to country because of transport costs, tariffs, and other trade barriers (Hniya et al., 2021; Dada, 2020).

### **Keynesian Theory of Investment**

In Keynesian terminology, investment refers to real investment which adds to capital equipment. It leads to increase in level of income and production by increasing the production and purchase of capital goods. Investment thus includes new plant and equipment, construction of public works like roads, dams, buildings, e.t.c In the words of John Robinson, “By investment, is meant an addition to capital, such as addition to capital, such as occurs when a new house is being built or a new factory is built. Investment means making an addition to the stock of goods in existence.

**Eclectic Theory:** Eclectic theory is one of the vital theories as regards to foreign Direct Investment and its determinant such as the volatility of exchange rate. Dunning (1988), in his eclectic theory on international production includes three variables as the major determinants FDI; ownership-specific, location-specific and currency rate (Dada, 2020). The theory sometimes called “OLI framework”, stands at the intersection of a macroeconomic theory of international trade and microeconomic theory of the firm. It is an exercise in resource allocation and organizational economics. The key assertion is that all three factors (OLI) are important in determining the extent and pattern of FDI. Ownership-specific variables include tangible assets such as natural endowments, manpower, and capital but also intangible assets such as technology and information, managerial, marketing, and entrepreneurial skills, and organizational systems. Location-specific (or country-specific) variables refer to factor endowments introduced in the preceding chapter as well as market structure, government legislation and policies, and the political, legal, and cultural environments in which FDI is undertaken. Finally, internalization refers to the firm’s inherent flexibility and capacity to produce and market through its own internal subsidiaries (Sugiharti, Esquivias, & Setyorani, 2020).

### Empirical Review

Akinlo and Gbenga (2021) empirically investigated the exchange rate volatility-FDI nexus in selected Economic Community of West African States (ECOWAS) countries using time series data from 1986-2017. Using Autoregressive Distributed Lag (ARDL) model and Toda-Yamamoto (1995) causality techniques, the effects of exchange rate volatility on FDI and causality relationship between the two are examined. The empirical results show that the estimated coefficient of nominal exchange rate volatility is negative in all the selected countries but significant only in Ghana, Sierra Leone, and Nigeria. Conversely, the effect of real exchange rate volatility is negatively significant as expected, in Nigeria, Togo, Sierra Leone, and Cote d'Ivoire. However, the effect is positive but statistically insignificant in Ghana and Gambia. Furthermore, the causality test results show unidirectional causality from exchange rate volatility to FDI in all selected countries except in Ghana when the nominal exchange rate is employed. On the other hand, when real exchange rate volatility is employed, there is evidence of bidirectional causality between the two variables only in Nigeria and Sierra Leone.

Qamruzzaman, Mehta, Khalid, Serfraz, and Saleem (2021) explores the nexus between foreign direct investment (FDI), financial innovation, and exchange rate volatility in selected South Asian countries for 1980 to 2017. The study applies the unit root test, Autoregressive Distributed Lagged, nonlinear ARDL, and causality test following Toda-Yamamoto. Unit root tests ascertain that variables are integrated in a mixed order; few variables are stationary at a level and few after the first difference. Empirical model estimation with ARDL, Long-run cointegration revealed with the tests of FPSS, WPSS, and by rejecting the null hypothesis of "no cointegration." This finding suggests that, in the long-run financial innovation, FDI inflows, and exchange rate volatility move together.

Moreover, study findings established adverse effects running from FDI inflows and financial innovation to exchange rate volatility in the long run. These findings suggest that continual FDI inflows and innovativeness in the financial system assist in lessening the volatility in the foreign exchange market. Furthermore, nonlinear ARDL confirms the presence of asymmetric cointegration in the model. The standard Wald test established asymmetric effects running from FDI inflows and financial innovation to exchange rate volatility, both in the long and short run. Directional causality unveils feedback hypothesis holds for explaining causality between FDI, financial innovation, and exchange rate volatility.

Chen, Du, and Hu (2020) explored the investment impact of COVID-19 and the relevant government response policies on exchange rate volatility in 20 countries during the period of January 13, 2020 to July 21, 2020 by using system GMM estimation.

The empirical results indicate that an increase in confirmed cases does significantly raise exchange rate volatility. The various policies adopted by governments in response to the pandemic, such as closing schools, restrictions on internal movements, and public information campaigns also inhibit exchange rate volatility. Furthermore, the economic response policies implemented by governments during the pandemic, including income support, fiscal measures, and international aid, have a restraining effect on exchange rate volatility. Their findings herein provide valuable information and implications for policymakers and financial investors around the world.

Thuy and Thuy (2019) investigated the impact of exchange rate volatility on exports in Vietnam using quarterly data from the first quarter of 2000 to the fourth quarter of 2014. The paper applies the autoregressive distributed lag (ARDL) bounds testing approach to the analysis of level relationships between effective exchange rate volatility and exports. Using

the demand function of exports, the paper also considers the effect of depreciation and foreign income on exports of Vietnam. The results show that exchange rate volatility negatively affects the export volume in the long run, as expected. A depreciation of the domestic currency affects exports negatively in the short run, but positively in the long run, consistent with the J curve effect. Surprisingly, an increase in the real income of a foreign country actually decreases Vietnamese export volume. These findings suggest some policy implications in managing the exchange rate system and promoting exports of Vietnam

Muzurura, Sikwila, and Nesongano (2019) examined the impact of foreign direct investment on export growth in Zimbabwe for the period 1980 to 2011. Using the Ordinary Least Squares method, the results showed that current period FDI, one year lagged FDI, trade openness and one year lagged exports were significant and had a positive impact on export growth. However, gross domestic product was insignificant. The study recommends that Zimbabwe creates a clement investment climate that fosters export oriented FDI inflows. Policies that enhance trade openness and export competitiveness are a prerequisite for growth of a sustainable export base.

Mukhtarov, Alalawneh, Ibadov, and Huseynli (2019) investigated the impact of foreign direct investment (FDI) on exports in the case of Jordan, employing Autoregressive Distributed Lag Bounds Testing (ARDL BT) cointegration approach to the data ranging from 1980 to 2018. The results indicate that there is a long-run relationship among the variables. Also, we find that there is a positive and statistically significant impact of FDI on export in the long-run. The estimation results indicate that a 1% increase in FDI increases exports by 0.13%.

Mukhtarov et al., (2018) which examined the long-run and short-run relationship between foreign direct investment (FDI) inflows, exports, and economic growth in Sri Lanka over the period of 1980–2016. The study implies Autoregressive Distributed Lag (ARDL) bounds testing approach to reveal the relationship between the variables. The study indicates that FDI inflows have a positive and significant relationship with economic growth in the long-run and short run. If FDI inflows increase, GDP growth will increase. But for exports, it has a negative and significant relationship with economic growth in the long-run.

Sunde (2017) empirically investigated economic growth as a function of foreign direct investment and exports in South Africa. The article applied the autoregressive distributed lag model, known as the ARDL bounds testing approach to cointegration for the long run relationship between economic growth, foreign direct investment and exports. The error correction model was used to examine the short run dynamics; and the VECM Granger causality approach was used to investigate the direction of causality.

The article confirmed cointegration between economic growth, foreign direct investment and exports. The article indicates that both foreign direct investment and exports spur economic growth contrary to some studies, which found that FDI does not cause economic growth. The VECM Granger causality analysis found unidirectional causality between economic growth and foreign direct investment running from foreign direct investment to economic growth, unidirectional causality between foreign direct investment and exports running from foreign direct investment to exports and bidirectional causality between economic growth and exports.

The article confirms the FDI-led growth hypothesis for South Africa. On the policy front, the government could stimulate foreign direct investment through incentives to investors, creation of a good macroeconomic environment and a careful utilisation of loose monetary policy to grow the economy.

Selimi, Reçi, and Sadiku (2016) analyzed empirically the foreign direct investments and exports performance during the period of 1996-2013 in Western Balkan countries. The paper also investigates for the fixed effects and individual heterogeneity across countries and years. Based on the panel regression techniques and Least Square Dummy Variable (LSDV) regression method, FDI positively affect export performance in the sample countries in various model specifications.

Rafat (2018) evaluated the causal relationship between foreign direct investment (FDI), exports and economic growth in two panels of developing countries (eight European developing countries and eight Asian developing countries). Panel-VECM causality is employed for investigating a tri-variate model of FDI, exports and GDP. Causality results in the European developing panel indicate bidirectional causality between GDP and FDI, and unidirectional causality from GDP and FDI to exports in the short-run. The empirical results of the Asian developing panel indicate bidirectional causality between exports and economic growth in the short-run. Moreover, there is evidence of long-run causality from export and FDI to economic growth, and long-run causality from economic growth and export to FDI for both of the aforementioned panels.

Mukhtarov et al., (2019) examined and analyzed empirically the foreign direct investment and export performance during the period of 1996-2013 in Western Balkan countries. The paper also investigated for the fixed effects and individual heterogeneity across countries and years. Based on the panel regression techniques and least squares dummy variables (LSDV) regression method, FDI positively affect export performance in the sample countries in various model specifications.

Past studies have evaluated how foreign investment with other variables but this study seeks to predict FDI with exchange rate fluctuations and also declassify FDI by sectors. This study corrects the anomalies of the aforementioned studies by disaggregating and comparing various classified sector based foreign investment in Nigeria and observing their relationship with. exchange rate changes. The study similarly seeks to employ long run estimation tools and techniques using updated data.

### **Methodology**

The study employs the 'Ex-post facto design.' The population of this study entails all foreign direct investment activities in various classified sectors in Nigeria and exchange rate volatility related activities, while the sample includes the selected variables which are foreign direct investment to the agricultural, industrial/manufacturing, and service sectors and exchange rate over the time period of 1981 to 2020.

The study employs purposive random sampling. The study in this light selected all three classified sectors. The sample period of study is 1981 to 2020 based on data availability. The study utilized secondary time-series data. These data were sourced to ensure the reliability and replicability of the underlying study. These data were gotten from the various report of employed institutions. These sources are; The Central Bank of Nigeria Statistical Bulletin and the World Bank Report.

### **Operational Measures of Variables:**

#### **Dependent Variable (Criterion).**

**Exchange rate change (EXC):** is measured as the annual rate of change in the values of exchange rate in Nigeria over the study period.

#### **Explanatory or Independent Variable**

**Foreign Direct Investment (FDA) in agricultural sector:**This is rate of change in annual values of foreign direct investment mobilized to the agricultural sector annually. It is measured in rate have a positive relationship with exchange rate change/exchange rate volatility.

**Foreign Direct Investment (FDM) in industrial/manufacturing sector:**This is rate of change in annual values of foreign direct investment mobilized to the industrial/manufacturing sector annually. It is measured in rate.

**Foreign Direct Investment (FDS) in service sector:**This is rate of change in annual values of foreign direct investment mobilized to the service sector annually. It is measured in rate and expected to have a positive relationship with exchange rate change/exchange rate volatility.

**Model Specifications:**

Due to the bidirectional relationship in literature, the study employs the vector autoregressive modelling;

$$V = (EXC_t) (FDA_t, FDM_t, FDS_t) \tag{i}$$

**Where:**

- EXC = Exchange rate changes
- FDA = Foreign direct investment in the agricultural sector
- FDM = Foreign direct investment in the manufacturing sector
- FDS = Foreign direct investment in the service sector

This can be mathematically written as:

In statistics, the above equation 1 is not sufficient in specification due to the absence of the Constant Parameter and error term. Therefore, we introduce the Constant Parameter and error terms as follows;

$$V = (EXC_t) (\beta_1 FDA_t + \beta_2 FDM_t + \beta_3 FDS_t + \mu_i) \tag{2}$$

**Where:**

- EXC = Exchange rate changes
- FDA = Foreign direct investment in the agricultural sector
- FDM = Foreign direct investment in the manufacturing sector
- FDS = Foreign direct investment in the service sector
- $\beta_0$  = Constant Parameter
- $\beta_1, \beta_2, \& \beta_3$  = Estimation parameters
- $\mu$  = Error terms

**Apriori Expectation**

On apriori  $\beta_1 > 0, \beta_2 > 0, \& \beta_3 > 0$

The theoretical expectation of is positive for all sectoral distribution of foreign direct investment in relation to exchange rate volatility as captured by the exchange rate change.

**Results and Discussions**

**Data Analysis**

**Unit Root Test (Augmented Dickey Fuller)**

Due to the underlying shocks inherent in time series variables, and also shocks that could be found in the error terms (other variables not captured by the model), we therefore intend to capture the stationarity of the employed variables, since a stationary variables is useful in forecasting and predicting and has a great possibility of the effect of shock to die out gradually, while non-stationary data are not suitable for long run test.



**Table 1: Results of Stationarity (Unit Root) test:**

Variable	ADF T-statistics		Probability Level	Order of Integration
	At Level	1st diff		
EXC	-0.260579	-4.578579***	0.0006	I(1)
FDA	-0.895315	-7.354184***	0.0000	I(1)
FDM	-0.929257	-4.614372***	0.0004	I(1)
FDS	-2.110527	-5.738673***	0.0001	I(1)

Source: Extracted from *Eviews-12*.

Going by the respective test critical values of level, it can be identified that all variables are stationary at the first difference I(1) showing a great level of integration amongst variables. Table 2 also goes to show that employed data possess trends capable of being used for analysis as their values rotate around their respective mean. Since the prerequisite of co-integration is the integration of all variables at same level, this parameter therefore leads to the co-integration of employed variables.

### Co-integration Test

The researcher proceeds to test the long run relationship between financial investment inflow dimensions and Exchange rate fluctuation.

**Table 2: Co-integration Test (Johansen Co-integration)**

Date: 12/28/21 Time: 11:36

Sample (adjusted): 1981 2020

Included observations: 30 after adjustments

Trend assumption: Linear deterministic trend

Series: EXC FDA FDM FDS

Lags interval (in first differences): 1 to 1

#### Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.950611	161.6995	69.81889	0.0000
At most 1 *	0.716139	71.45854	47.85613	0.0001
At most 2 *	0.513646	33.68037	29.79707	0.0170
At most 3	0.241627	12.05580	15.49471	0.1543

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

#### Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.950611	90.24095	33.87687	0.0000
At most 1 *	0.716139	37.77817	27.58434	0.0018
At most 2 *	0.513646	21.62457	21.13162	0.0426
At most 3	0.241627	8.297410	14.26460	0.3493

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

\* denotes rejection of the hypothesis at the 0.05 level

\*\*MacKinnon-Haug-Michelis (1999) p-values

Source: *Eviews-12 output*.

The co-integration test seeks to empirically define the Long-run association/relationship between a given set of variables i.e. identifying the stochastic drift between financial investment inflow dimensions and exchange rate fluctuation (to know if the variables move together). Carried out using the Johansen cointegration test. Assuming all study variables as endogenous using the trace and Eigenvalue test.

From the trace and Eigenvalue test output in Table 3, it can be seen that there exists three (3) co-integrating equation, which were all signed respectively. Judging by the signed rank, there exist a long run association and movement amongst employed variables. It can therefore be established that there exists evidence of long run relationship amongst employed variables; the study therefore proceeds to the error correction model.

**Error Correction Model**

In light of the presence and identification of a long-run stochastic trend/cointegration in the study model, the study carries out the Vector Error correction Model. This enables restrictions to be placed on employed variables that are seen to have attained stationarity only at the first difference. This helps retain the relevant information in the data (which would otherwise get missed on differencing of the same). The foremost advantage of VECM is that it has nice interpretation with long term and short-term equations.

**Table 3: Vector Error Correction Model Output**

Vector Error Correction Estimates

Date: 01/20/22 Time: 07:19

Sample (adjusted): 1982 2020

Included observations: 39 after adjustments

Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1				
EXC(-1)	1.000000				
FDA(-1)	11.66774 (6.89610) [ 2.38307]				
FDM(-1)	-58.21936 (4.13499) [-14.0797]				
FDS(-1)	-21.72053 (9.65523) [ -2.24961]				
C	-14019.22				
Error Correction:	D(EXC)	D(FDA)	D(FDM)	D(FDS)	D(RMT)
<b>CointEq1</b>	<b>-0.010745</b> <b>(0.00432)</b> <b>[-2.48727]</b>	<b>0.007107</b> <b>(0.00107)</b> <b>[ 6.66828]</b>	<b>0.004677</b> <b>(0.00394)</b> <b>[ 1.18561]</b>	<b>0.001768</b> <b>(0.00201)</b> <b>[ 0.87890]</b>	<b>-0.002026</b> <b>(0.00513)</b> <b>[-0.39466]</b>
D(EXC(-1))	0.422589 (0.20810) [ 2.03066]	0.005658 (0.02380) [ 0.23771]	0.006801 (0.08809) [ 0.07720]	0.017583 (0.04492) [ 0.39146]	-0.054072 (0.11465) [-0.47163]

D(EXC(-2))	0.275606 (0.23164) [ 1.18978]	-0.011864 (0.02649) [-0.44779]	0.041816 (0.09806) [ 0.42644]	0.016763 (0.05000) [ 0.33528]	0.067279 (0.12762) [ 0.52719]
D(FDA(-1))	4.309217 (1.49584) [ 2.88080]	-1.472119 (0.17109) [-8.60441]	1.643192 (0.63322) [ 2.59497]	-0.412791 (0.32286) [-1.27855]	-0.106656 (0.82409) [-0.12942]
D(FDA(-2))	6.696340 (2.10410) [ 3.18251]	-0.985441 (0.24066) [-4.09474]	-2.456507 (0.89071) [-2.75791]	-0.581069 (0.45414) [-1.27948]	-0.515234 (1.15920) [-0.44447]
D(FDM(-1))	-1.221221 (0.37896) [-2.79867]	0.302940 (0.07766) [ 3.90102]	0.830871 (0.28742) [ 2.89082]	0.219502 (0.14654) [ 1.49786]	-0.147724 (0.37405) [-0.39493]
D(FDM(-2))	1.345943 (0.48201) [ 2.79233]	0.018121 (0.05513) [ 0.32868]	-0.406789 (0.20405) [-1.99360]	0.004157 (0.10404) [ 0.03996]	-0.325716 (0.26555) [-1.22656]
D(FDS(-1))	-0.041792 (0.69945) [-0.05975]	-0.414487 (0.08000) [-5.18108]	0.217672 (0.29609) [ 0.73515]	-0.098027 (0.15097) [-0.64933]	-0.180570 (0.38534) [-0.46860]
D(FDS(-2))	-0.376231 (0.74268) [-0.50658]	-0.481971 (0.08495) [-5.67389]	-0.091860 (0.31439) [-0.29218]	-0.200883 (0.16030) [-1.25318]	-0.408433 (0.40916) [-0.99822]
C	435.5484 (259.908) [ 1.67578]	4.417895 (29.7273) [ 0.14861]	-55.06883 (110.024) [-0.50051]	-3.954921 (56.0978) [-0.07050]	90.62617 (143.189) [ 0.63291]
R-squared	0.826179	0.867415	0.813131	0.806448	0.435738
Adj. R-squared	0.713706	0.781625	0.692215	0.681208	0.070627
Sum sq. resids	10844651	141869.4	1943371.	505206.9	3291518.
S.E. equation	798.6993	91.35240	338.1064	172.3892	440.0213
F-statistic	7.345591	10.11089	6.724785	6.439227	1.193440
Log likelihood	-227.2116	-164.3320	-202.2825	-182.7479	-209.9229
Akaike AIC	16.49735	12.16083	14.77810	13.43089	15.30503
Schwarz SC	17.06313	12.72661	15.34388	13.99667	15.87080
Mean dependent	1802.607	36.81720	89.71435	32.79690	226.6738
S.D. dependent	1492.716	195.4873	609.4384	305.3207	456.4347
Determinant resid covariance (dof adj.)		7.06E+22			
Determinant resid covariance		4.89E+21			
Log likelihood		-929.8840			
Akaike information criterion		68.61269			
Schwarz criterion		71.67732			
Number of coefficients		65			

Source: Eviews-12 output. Note: Standard errors in ( ) & t-statistics in [ ]

Table 4 shows the coefficient value of the error correction term (CointEq1) to be -0.010746 which denotes that the speed and rate of adjustment/convergence to the long-run equilibrium is approximately 1.07%. The independent variables (foreign direct investment) and their respective lagged values jointly account for up to 82.62 percent of variation in the exchange rate variability i.e. exchange rate fluctuation. All employed variables which the

exception of the foreign direct investment in the service sector (FDS) and second lagged value of exchange rate changes (EXC) were seen to be significant judging by their various t-statistics value which are seen to be greater than  $\pm 1.98$ . Although, foreign direct investment in the manufacturing/industrial sector (FDM) and Foreign direct investment in the service sector (FDS) show negative coefficient as against the apriori thereby showing that increases in these variables are capable of decreasing the exchange rate variability and vice versa.

**Granger Causality Test**

**Table 4: Pairwise Granger Causality Test**

Pairwise Granger Causality Tests

Date: 01/20/22 Time: 16:57

Sample: 1982 2020

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
FDA does not Granger Cause EXC	39	11.1745	0.0003
EXC does not Granger Cause FDA		1.33988	0.2800
FDM does not Granger Cause EXC	39	1.05114	0.3645
EXC does not Granger Cause FDM		13.5798	0.0001
FDS does not Granger Cause EXC	39	0.12392	0.8840
EXC does not Granger Cause FDS		3.50414	0.0455
RMT does not Granger Cause EXC	39	2.74860	0.0834
EXC does not Granger Cause RMT		3.81503	0.0358

Source: *Eviews-12 output.*

The above pairwise granger causality test shows that unidirectional causality is observed unilaterally amongst employed variables; it can be seen to be flowing in the following directions:

From the Foreign direct investment in the agricultural sector (FDA) to Exchange rate fluctuation (EXC). This shows that changes in the Foreign direct investment in the agricultural sector (FDA) account for changes in the level/quantum of Exchange rate fluctuation (EXC) or exchange rate variability in the country. I.e. foreign direct investment therefore stimulates the level of exchange rate variability in Nigeria.

Similarly, unidirectional causality can be seen to be flowing from Exchange rate changes to foreign direct investment in the manufacturing/industrial sector, foreign direct investment in the service sector. This shows that as the nation’s output changes, it causes changes in the level of inflows as regards the foreign direct investment in the manufacturing/industrial sector, foreign direct investment in the service sector. This goes to show that the economy’s output largely stimulates and influences the level of inflows in terms of foreign direct investment in the manufacturing/industrial sectors in her stock market, foreign direct investment in the service sector. This shows these types of foreign inflows to be demand following.

- Based on the Error Correction Model output, and the presence of a significant long-run relationship and the parsimonious error correction model for Foreign direct investment in the agricultural sector t-statistics shows a value of 2.88080 which is greater than the tabulated value of  $\pm 1.98/2$  and at a probability level of 0.0104 which is less than the 0.05 significance level, the study therefore rejects the null hypothesis and accept its alternate

form. It is therefore, concluded that there is a significant relationship between foreign direct investment in the agricultural sector and the exchange rate fluctuation in Nigeria.

- The Foreign direct investment in the manufacturing/industrial sector t-statistic shows a value of -2.79867 is greater than the tabulated value of  $\pm 1.98/2$  and at a probability level of 0.0298 which is less than the 0.05 (5%) significance level. The study therefore rejects the null hypothesis and accepts the alternate hypothesis. It can be therefore, concluded that there is a significant relationship between Foreign direct investment in the manufacturing/industrial sector and Exchange rate fluctuation in Nigeria.
- The Foreign direct investment in the service sector t-statistic shows a value of -0.041792 which is less than the tabulated value of  $\pm 1.98/2$  and at a probability level of 0.9531 that is greater than the 0.05 (5%) significance level. The study therefore retains the null hypothesis and rejects its alternate hypothesis. It can be therefore, concluded that there is no significant relationship between Foreign direct investment in the service sector and Exchange rate fluctuation in Nigeria.

### Discussion of Findings

The study found empirically the following:

As to the behaviour of the study variables, based on descriptive evidence, it has been observed that foreign direct investment in the nation have progressively grown which has left the country with a larger financial investment inflow growing relatively at a slower pace than the exchange rate volatility of the nation, this goes a long way to show the low level of openness and misappropriation of financial investment inflow funds to productive means. The stationarity test shows to a large extent that all employed variables were only integrated at the first differencing (i.e. I(1)) and all failed the stationarity test at level which led to the employment of the cointegration test.

The Johansen co-integration output goes a long way to show that in the presence of macro-economic changes, the nation's foreign direct investment is suitable in curtailing the movement of the exchange rate volatility of the nation.

The causality test shows that there is a lot of causal influences of foreign direct investment on exchange rate volatility in Nigeria over the study period. These causal influences were both supply and demand leading in nature. These findings find credence in the works of researchers like Najabat and Hamid (2017); Agrawal (2015), Akinpelu and Ogunbi (2013) and Akinbobola, Ibraim and Ibrahim (2017) who similarly forms of unidirectional causal relationship between foreign direct investment and exchange rate changes while contrasting studies by researchers like Rachdi and Saidi (2011); Charles (2016) and Gitaru (2015).

While in the long run as observed from the parsimonious error correction model, the study identifies a positive and significance relationship between foreign direct investment in the agricultural sector (FDA) and exchange rate fluctuation (EXC), showing that exchange rate volatility is directly stimulated by the increasing level of direct investment.

Foreign direct investment in the manufacturing/industrial sector and Foreign direct investment in the service sector are identified to possess negative but insignificant relationship with the exchange rate fluctuation showing how furtive the Foreign direct investment in the manufacturing/industrial sectors and Foreign direct investment in the service sector received fund has been towards the exchange rate fluctuation of the nation which may likely be due to misappropriation and leakages coupled with poor economic, social and political stability, Foreign direct investment in the service sector is seen to possess a positive and insignificant influence on exchange rate changes, showing how that this variable

is still yet to stimulate output which could indicate misappropriate and siphoning of Foreign direct investment in the service sector received by administrators and custodian.

The above output downplays the benefit of the foreign capital investments theory which promises significant influence of financial inflows on exchange rate volatility. A situation found doubtful especially in light of portfolio investment and Foreign direct investment in the service sector which could be linked to poor absorptive capability, the underdeveloped stock market and improper fund management.

### **Conclusion, And Recommendations**

This study has been peculiar in evaluating the influence of foreign direct investment on output stimulation in Nigeria over the period of 1981 to 2020 utilizing key variables such as Foreign direct investment in the agricultural sector (FDA), Foreign direct investment in the manufacturing/industrial sector (FDM), and Foreign direct investment in the service sector (FDS) and encoding exchange rate volatility with the Exchange rate fluctuation (EXC).

### **Conclusions**

Conclusively, it can be ascertained that financial investment inflow is only partially responsible for the exchange rate volatility in Nigeria. As some dimensions of foreign direct investment still fail miserably towards positively simulative exchange rate volatility in Nigeria. This could be linked to the unconducive business environment. Underdeveloped capital market and improper management of foreign funds disbursed into the Nigerian economy. This invariably shows that efforts towards opening the nation to foreign inflows are inconsequential and complacent in nature which gives strong evidence of poor management of accrued capital. In furtherance of this, since all employed variable shows great causal relevance, it can be finally estimated that if the right steps are taken, the nation could plunge itself into fostered performance by taking the right foreign direct investment measures.

Overall, it is clear that Nigerian economy has not fully gained from sectoral foreign direct investments and could have foreign direct investment in the service sector affect her exchange rate volatility. This therefore shows poor productive influx of foreign direct investment and the needs major foreign and private sector investment in almost all aspect of exchange rate volatility that can industrialize the whole economy. Therefore, Nigeria's foreign direct investment policy should gear towards attracting and encouraging inflows of foreign capital investment through stable economic programmes.

Also, government should embarked on development of indigenous technology and entrepreneurial capabilities because foreign direct investment cannot contribute much to the economic development of Nigeria if it is directed primarily to capital supply than to investment projects FDI can only be effective if it is directed toward improving and expanding managerial and labour skills. Finally, the most effective strategy for attracting foreign direct investment is to make the Nigerian economy very attractive to home investors at the beginning through the currency.

### **Recommendations**

The study therefore makes the following recommendations to policy makers and government for attracting foreign investors in other to give their contribution for the Nigerian growth and development.

- Due to the influence of foreign direct investment in the agricultural sector, the government should foster its appropriation of capital and recurrent expenditure on

improving the productive dominance of the nation, and eliminate room for insecurity and political turmoil.

- The government should endeavor to mop the leakages in accrued foreign direct investment in the service sector, to foster the influence of this resource on the nation and reverse its insignificant influence.
- Since Foreign direct investment in the service sector fails to relate with exchange rate volatility, the nation should endeavor to create a transparent avenue to collect and expend received foreign direct investment in the service sector.
- Policy makers and financial institution should strive to polish the foreign direct investment system as it greatly predicts the exchange rate volatility proper regulation of the foreign inflows and ensuring strict monitoring of illicit activities in the form of cybercrime.
- Due to the insignificance of the various sector foreign direct investment, the Nigerian government should ensure the transparency of the operations of foreign investors within exchange rate volatility by government of Nigeria and to encourage in-flows of FDI.
- Government should simplify and improved the screening process of FDI e.g. any foreign direct investment that brings about significant contribution to national income can be given priority.
- Friendly economic policies and business environment need to be put in place in order to attract FDI into all sectors of the economy.
- Good and stable infrastructural facilities such as electricity, roads, water etc. are highly needed to attract FDI in Nigerian.
- Nigerian government should carry out full liberalization of all sectors of exchange rate volatility for foreign investors to be attracted.
- Issues of security and corruption should permanently address for any foreign direct investment to come to Nigeria.

### References

- Akinlo, A. E., & Gbenga Onatunji, O. (2021). Exchange Rate Volatility and Foreign Direct Investment in Selected West African Countries. *The International Journal of Business and Finance Research*, 15(1), 77-88.
- Bahmani-Oskooee, M., & Nouira, R. (2020). On the impact of exchange rate volatility on Tunisia's trade with 16 partners: an asymmetry analysis. *Economic Change and Restructuring*, 53(3), 357-378.
- Chen, L., Du, Z., & Hu, Z. (2020). Impact of economic policy uncertainty on exchange rate volatility of China. *Finance Research Letters*, 32, 101266.
- Dada, J. T. (2020). Asymmetric effect of exchange rate volatility on trade in sub-Saharan African countries. *Journal of Economic and Administrative Sciences*.
- Havi, E. D. K. (2021). The impact of exchange rate volatility on foreign direct investment inflows in Ghana. *African Journal of Economic Review*, 9(4), 183-199.
- Hniya, S., Boubker, A., Mrad, F., & Nafti, S. (2021). The Impact of Real Exchange Rate Volatility on Foreign Direct Investment Inflows in Tunisia. *International Journal of Economics and Financial Issues*, 11(5), 52.
- Moraghen, W., Seetana, B., & Sookia, N. (2021). Impact of exchange rate and exchange rate volatility on foreign direct investment inflow for Mauritius: A dynamic time series approach. *African Development Review*.

- Morina, F., Hysa, E., Ergün, U., Panait, M., & Voica, M. C. (2020). The effect of exchange rate volatility on exchange rate volatility: Case of the CEE countries. *Journal of Risk and Financial Management*, 13(8), 177.
- Qamruzzaman, M., Mehta, A. M., Khalid, R., Serfraz, A., & Saleem, H. (2021). Symmetric and asymmetric effects of financial innovation and FDI on exchange rate volatility: Evidence from South Asian Countries. *The Journal of Asian Finance, Economics, and Business*, 8(1), 23-36.
- Sugiharti, L., Esquivias, M. A., & Setyorani, B. (2020). The impact of exchange rate volatility on Indonesia's top exports to the five main export markets. *Heliyon*, 6(1), e03141.
- Thuy, V. N. T., & Thuy, D. T. T. (2019). The impact of exchange rate volatility on exports in Vietnam: A bounds testing approach. *Journal of Risk and Financial Management*, 12(1), 6.
- Zhou, Z., Fu, Z., Jiang, Y., Zeng, X., & Lin, L. (2020). Can economic policy uncertainty predict exchange rate volatility? New evidence from the GARCH-MIDAS model. *Finance Research Letters*, 34, 101258.
- Mukhtarov, S., Alalawneh, M. M., Ibadov, E., & Huseynli, A. (2019). The impact of foreign direct investment on exports in Jordan: An empirical analysis. *Journal of International Studies*, 12(3).
- Sunde, T. (2017). Foreign direct investment, exports and exchange rate volatility: ADRL and causality analysis for South Africa. *Research in International Business and Finance*, 41, 434-444.
- Selimi, N., Reçi, K., & Sadiku, L. (2016). The Impact of Foreign Direct Investment on the Export Performance: Empirical Evidence for Western Balkan Countries. *ILIRIA International Review*, 6(1), 45-49.
- Rafat, M. (2018). The interactive relationship between exchange rate volatility and foreign direct investments (FDI): A VAR analysis in Iran. *Iranian Economic Review*, 22(1), 163-185.
- Mukhtarov, S., Alalawneh, M. M., Ibadov, E., & Huseynli, A. (2019). The impact of foreign direct investment on exports in Jordan: An empirical analysis. *Journal of International Studies*, 12(3).
- Onu, A. J. C. (2012). Impact of Foreign Direct Investment on Exchange rate volatility in Nigeria, Inter disciplinary *Journal of Contemporary Research in Business* 4(5), 64-79.
- Onu, A.J.C (2012), Impact of Foreign Direct Investment on Exchange rate volatility in Nigeria, Inter disciplinary *Journal of Contemporary Research in Business* 4(5).
- Osinubi T.S & Amaghionyeodiwe L.A (2010). Foreign Private Investment and Exchange rate volatility in Nigeria. *Review of Economics and Business Studies*, 3(1), 105-127.
- Otepolo, A. (2002). FDI As A Factor of Exchange rate volatility In Nigeria, Dakar, Senegal, *African Institute for Economic Development and Planning (IDEP)*, (May).
- Oyatoye, E. O., Arogundade, K. K, Adebisi, S. O & Oluwakayode, E. F (2011). Foreign Direct Investment, Export and Exchange rate volatility in Nigeria. *European Journal of Humanities and Social Sciences*.2(1), 67-86



- Oyatoye, E. O., Arogundade, K. K, Adebisi, S. O. & Oluwakayode, E. F. (2011). Foreign Direct Investment, Export and Exchange rate volatility in Nigeria, *European Journal of Humanities and Social Sciences*. 2(1), 67-86.
- Oyejide, T. A. (2005). Capital Flows and Economic Transformation: A Conceptual Framework, *Proceedings of Central Bank of Nigeria, 5th Annual Monetary Policy Conference with the Theme Capital Flows and Economic Transformation in Nigeria, Held at the CBN Conference Hall, Abuja, (November)*.
- Pill H and Pradham M. (1997) Financial liberalization in Africa and Asia. *Finance and Development* 34(2) (June)
- Saibu O. M, Wosa, P. & Agbeluyi, A. M. (2011). Financial Development, Foreign Direct Investment and Exchange rate volatility in Nigeria, *Journal of Emerging Trends in Economics and Management Sciences*, 2(2), 146-154.
- Saqib N, Masnoon M & Rafique N (2013). Impact of Foreign Direct Investment on Exchange rate volatility of Pakistan. *Advances in Management & Applied Economics*, 3(1), 35-45,
- Saqib, N., Masnoon, M. & Rafique, N. (2013). Impact of Foreign Direct Investment on Exchange rate volatility of Pakistan, *Advances in Management & Applied Economics*, 3(1), 35-45.
- Saunders, M. Lewis, P. and Thornhill, A. (1997): *Research methods for Business Students*, Pittman, London.
- Shaibu A. Etal (1997) *Nigeria: National Agricultural Research Strategic Plan* (1996- (2010) Published by the federal Ministry of Agriculture and Natural Resources, Abuja.
- Timsina, N. (2014). Impact of Bank Credit on Exchange rate volatility In Nepal, *Research Department, Nepal Rastra Bank*, Research paper No 22/2014, 1-23.
- Todaro M.P (1999) *Economic Development*. Addison wasley, USA. Central Bank of Nigeria (2001) *Annual Report and Statement of Account*. 63-64.
- Umeora .C.E (2014), Effects of Foreign Direct Investment (Fdi) On Exchange rate volatility in Nigeria.
- Wai-Mun H, Kai-Lin, and Kar-Mun (2008), FDI and Exchange rate volatility Relationship: An Empirical Study of Malaysia, *International Business Research* 1(2), 11-18, SSRN.
- Walfur O.G and Abu N. (2010), Determinants of FDI in Nigeria, An Empirical Analysis, *Global Journal of Human Social Sciences* 10(1), 26-34.
- Yaqub J.O, Adam S. L.& Ayodele J (2013). Foreign Direct Investment and Exchange rate volatility in Nigeria: An Empirical Analysis. *American Academic & Scholarly Research Journal* ,5(1), 74- 82.
- Yaqub, J.O., Adam, S. L. & Ayodele, J. (2013). Foreign Direct Investment and Exchange rate volatility in Nigeria: An Empirical Analysis, *American Academic & Scholarly Research Journal*, 5(1), 74- 82.
- Yesufu F.M (1996) *The Nigerian Economy: Growth without Development*. Benin Social Science Series for Africa (BSSSA) Benin city.

Zhang, K. H. (2001). Does Foreign Direct Investment Promote Exchange rate volatility? Evidence from East Asia and Latin America. *Contemporary Economic Policy*, 19(2), 175–185.