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Exchange Rate and Foreign Direct Investment in Nigeria 1981-2018

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Abstract

The prevalent issue of volatility of exchange rate and dearth of foreign direct investment among businesses necessitated this study. Thus, this research study extensively investigated exchange rate on foreign direct investment in Nigeria 1981-2018. The study adopted secondary time series data obtained, from Central Bank of Nigeria and federal office of statistics. Diagnostic test was conducted to ensure that the models are in line with basic econometric assumptions. Unit Root Test, stationarity test, multi-collinearity, Co-integration Relationship, Error Correction Model (ECM) were applied to avoid spurious result. The granger causality test was applied to examine the effect of the independent variable on the dependent variable. The findings revealed that both real exchange rate and nominal exchange rate are positively related with foreign direct investment. The study recommends that the CBN should ensure adequate flow of forex in the foreign exchange market and ensure a sustained/stable exchange rate level which will serve as attraction of foreign investors for increased inflow of foreign direct investment.

Keywords: Exchange Rate, Volatility, Foreign Direct Investment.

Introduction

It is a well known position that one of the major catalysts required for rapid economic development, especially in developing countries like Nigeria, is the influx of capital in the form of investment. These capital investments could be technological, financial, human, material or technical as the case may be. Such capital investments which offers the foreign investor controlling interest of enterprise in the host nation is usually referred to as Foreign Direct Investment (FDI). With national economies becoming more integrated and interconnected, foreign direct investments have come to be considered the primary motor of globalization (Asmae, and Ahmed, 2019; Sokang, 2018; Alba, Park and Wang, 2009). FDI is increasingly recognized as an important instrument for resource to flow across national borders to improve economic performance, industrial and international competitiveness, and exports (Lily, Kogid, Mulok, Sang, and Asid 2014; Benson, Eya and Yunusa, 2019; Shauna and Ahmadi-Esfahani, 2008).

Owing to the fact that these investments are made between different sovereign states or countries; meaning that transfer of capital is converted from foreign to domestic currencies;

such transfer of capital and the flow of returns is liable to be affected by the exchange rate movements. Variations and unpredictability in the peripheral worth of an exchange upsets the actual price of asset both at the period of deal and at the time of conveying returns. This shows that external funds are affected by exchange rate movements and unpredictability (Morrissey and Udomkerdmongkol, 2014; Eregha, 2017). The effect of exchange rate on FDI is still a subject of debate even after several studies have attempted to unravel the mysteries surrounding the subject matter. For instance, some proponents of a positive effect of exchange rate (depreciation) on FDI posit that, depreciation in the currency value of a nation will afford foreigners an advantage in purchasing the country's investment. However, proponents of a negative effect (that is, depreciation discourages FDI) opine that exchange rate is a measure of a nation's economic performance compared to the rest of the world and thus foreign investors would likely shy away from countries experiencing steady exchange rate depreciation. Ismaila (2016) provides a clarification for this two positions when he stated that the exchange rate in whatever conceptualization, is not only an important relative price, which connects domestic and world markets for goods and assets, but it also signals the competitiveness of a country's exchange power vis-à vis the rest of the world in a pure market (Ali, Mohamed, and Zahir, 2017; Eregha, 2017 and Kunofiwa, 2015).

Foreign Direct Investment in Nigeria has not been adequate to spur dynamic growth in some areas, and several policy measures have been put in place to remedy the situation. One of the areas of policy adjustment to that effect is in the area of exchange rate. Several exchange rate policies have been adopted in Nigeria over the years; ranging from fixed exchange rate regime and flexible exchange rate regime to a unified exchange rate policy and so on. However, FDI remains inadequate for rapid infrastructural and economic development. This issue prompts the researcher to investigate the macroeconomic effect of exchange rate on foreign direct investment in Nigeria.

The objective of the study is to examine the effect of real exchange rate and nominal exchange rate on foreign direct investment in Nigeria. The justification of this study is hinged on the effort to breach the gap among studies on exchange rate and FDI since there has been inconclusive evidence on their relationship. These opposing views have their foundation in theoretical literature. For instance, the Mudell-Fleming Model asserts that exchange rate depreciation would serve to encourage capital inflows and exports encourage investment by lowering currency premium from interest rates thereby leading to economic development. On the other hand, contrary views posit that constant depreciation of currency may scare off international investors because depreciation of exchange rate reduces the real value of their holdings and this could trigger capital flight (Tejvan, 2019). The existing literature has conflicting issues, with some studies supporting the significant relationship whilst others reject it (Jaratin, Mori, Dullah, Lim, and Rozilee, 2014). Shauna and Ahmadi-Esfahani (2008) corroborated this by insisting that indeed the sign on the predicted relationship between exchange rates and FDI varies across theoretical models and some models predict ambiguous outcomes. Exchange rate and FDI nexus are crucial for effective policies as Omankhanlen (2011) asserted that given the Nigerian economy resource base, the country's foreign investment policy should move towards attracting and encouraging more inflow of foreign capital. There have been other studies with similar time series characteristics set of data but this study differs in decomposing exchange rate into real and nominal in finding out the different separate relationship of both on FDI.

Literature Review

Okonkwo (2019); Dabwor, Ezie and Tukur (2019) stated that the exchange rate measures the external value of a currency and provides a direct relationship between the domestic and foreign prices of goods and services. Foreign currency is required for making payments to the countries concerned for goods, services, interest payments on loans for investment there. Thus Nigeria's demand for US dollars, British sterling, French francs and Japanese Yen is largely derived from Nigeria's demand for American, British, French and Japanese goods respectively. Nigeria's supply of these currencies is earned by its exports to those countries. Exchange rate policy in Nigeria has undergone a good number of changes (Obi, Oniore & Nnadi, 2016). It has developed from a fixed parity to a flexible system where market forces of demand and supply determine price of exchange rate. Under the flexible exchange system, the exchange rate is determined by the interplay of the forces of demand and supply, increase in imports leading to increase in demand for the foreign currency of the exporting country while an increase in exports leads to increase in the supply of that foreign currency. Under this regime, increase and decrease in the value of the country's currency are referred to as exchange rate appreciation and depreciation respectively.

Exchange rate is allowed to fluctuate freely in that manner; gold is no longer required for settlement of indebtedness arising from a deficit balance of payment. The exchange rate itself therefore, brings the balance of payment into balance. In other words, the balance of payments corrects itself. It is claimed for a freely fluctuating exchange rate that it enables a country to adopt whatever internal monetary policy it pleases. Since it is never compelled to pay other nations in gold, the Central Bank is relieved of its pre-occupation with the protection of the country's gold reserves, and thus it need never embark upon a policy of deflation. On flexible exchange rates a country can adopt whatever internal monetary policy it wishes without worrying about its gold reserves, but that does not mean that it will have nothing to worry about. It cannot afford to ignore the effects of its internal policy on the foreign exchange rate of its currency. The extent to which a country must pay attention to the value of its currency in terms of others will determine the extent of its freedom of action with regard to its internal monetary policy. A country with a large volume of internal transactions will probably be more interested in the internal value of its currency than one which is more nearly self-supporting.

On the other hand, a fixed exchange rate system is one in which the exchange rate is fixed by the discretion monetary and fiscal authorities of the country. In other words the policy makers fix the unit of domestic currency that can be traded for a particular country's currency and this measure is used when exchanging domestic currency with other country's currency. In this case, increase and decrease in the value of the country's currency are referred to as exchange rate revaluation and devaluation respectively.

There are three main quotations of exchange rate namely; the nominal exchange rate, the real exchange rate and the real effective exchange rate. The nominal exchange rate refers to the stated price of one country's currency in terms of another's while the real exchange rate represents the nominal exchange rate treated for inflation or deflated by the index of relative inflation rates (Lawal and Ijirshar, 2013). Real effective exchange rate is the nominal effective exchange rate divided by a price deflator index costs. Nigeria's Real Effective Exchange Rate (REER: 2005=100: Month Avg: Nigeria) was 152.7 in Feb 2020, compared with the number of 149.4 in the previous month. Nigeria's Real Effective Exchange Rate data is updated monthly and averaged 701.7 from Dec 1979 to Feb 2020. The data reached an all-time high of 701.7 in Sep 1984 and a record low of 51.2 in Mar 1992. CEIC generates Real Effective Exchange Rate

Index with base 2005=100. Consumer Price Index (CPI) is used as a deflator. An increase in REER indicates reduced competitiveness for the reporting economy. The cash rate (Policy Rate: Month End) was set at 13.5 % p.a. in Feb 2020. Nigeria's Exchange Rate against USD averaged 306.5 (NGN/USD) in Feb 2020. The level of real exchange rate is important on economic growth as it determines the value of imports and exports of a country (Sibanda, Ncwadi & Mlambo, 2013).

The need for foreign direct investment (FDI) is born out of the underdeveloped nature of a country's economy that essentially hindered the pace of her economic development. Although exchange rate can be a major factor influencing FDI, the final determination of a country's FDI is the result of a number of interrelated elements that reflect the overall economic condition of a country in respect to other nations (Cambazoğlu and Güneş, 2016; Kenny, 2019; Sharifi-Renani and Mirfatah, 2012). Economic and political stability and the demand for a country's goods and services are also prime factors. Foreign Direct Investment in Nigeria increased by 1150.51 USD Million in the first quarter of 2019. It averaged 1240.22 USD Million from 2007 until 2019, reaching an all-time high of 3084.90 USD Million in the fourth quarter of 2012 and a record low of 314.44 USD Million in the fourth quarter of 2018.

Empirical Review

Robinson (2007) found a strong evidence of weak economies' currency increasing foreign direct investment. This is within an imperfect capital market model as depreciation (downward change in exchange rate) makes a host country less expensive than export destination countries. Thapa (2002) argued that exchange rate depreciation in host economies tend to increase foreign direct investment inflows; adding that a strong real exchange rate strengthens the incentives of foreign companies to produce at home for export instead of investing in a host country for export. Scholars like Adeniran, Yusuf and Ademeyi (2014) indicate that the exchange rate system has not sustained an effective policy that will attract foreign exchange inflows and foreign investment. The complementary roles by the informal foreign exchange market have succeeded in destabilizing the economy. Unfortunately, in Nigeria foreign exchange has witnessed inelasticity of supply both in the domestic and foreign exchange market with its further destabilizing speculative activities when compared with her counterparts in Asia and America which Nigeria was ranked ahead in the 70s in terms of exchange rate stability. Mahmood, Ehsanullah & Ahmed (2011) stated that volatility in exchange rate of a country can affect the investment in that country adversely, creating an uncertain environment for investment in that country and requires that resources in that country should be reallocated among various sectors of the economy of that country.

Viewing the effect of these fluctuations first from its impact on foreign direct investment (FDI), Senhadji (1998) noted that low exchange rate favour production, foreign direct investment and export in periods of high foreign exchange rate. Sokang (2018) studied the impact of foreign direct investment on the economic growth in Cambodia. The study aims to investigate the impact of FDI on the economic growth of Cambodia by utilizing the time series data throughout 2006-2016. The correlation matrix and multiple regression analysis techniques were used to analyze the collected data. The results of the study reveal that FDI has a positive impact on the economic growth of Cambodia. The study recommends that government should bring reforms in the domestic market to attract more FDI in Cambodia. Sharifi-Renani and Mirfatah (2012) studied the determinants of inward FDI particularly volatility of exchange rate in Iran by using the Johansen and Juselius's cointegration system

approach model covering the period 1980Q2-2006Q3. The findings of the study reveal that gross domestic product, openness and exchange rate to have positive relationship with foreign direct investment but, world crude oil prices and volatility of exchange rate have negative relationship with foreign direct investment. The recommended to implement exchange rate policies that promote stability of exchange rate, which could help reduce exchange rate volatility in order to attract more FDI.

In a related study Benson, Eya and Yunusa (2019) examined the effect of exchange and interest rates on foreign direct investment in Nigeria 2006-2018. Secondary data was used for the study for the period 2000-2018. The unit root property of the data was analyzed using the Augmented Dickey Fuller Test and the variables were all stationary at first difference. Also, Johansen Co-integration test statistics was used to test the co-integrating nature of the data while the long-run and the short-run relationship between the variables of the study were examined using the error correction model. The data was tested for normality using the Jarque-Bera test statistics. The result of the study indicates that a positive relationship exists between Exchange Rate and Foreign Direct Investment (FDI). The relationship is statistically significant as t_{cal} (7.25891) is greater than t_{tab} (2.101, df = 17) and in line with a priori expectation. The long-run co-integrating equation shows that a negative relationship exists between Interest Rate (INT) and Foreign Direct Investment (FDI) and the result is statistically significant as t_{cal} (12.5639) is greater than t_{tab} (2.101, df = 17). Inflation (INF) was negatively related to Foreign Direct Investment (FDI) in the long-run. A unit increase in Inflation (INF) will lead to a corresponding decrease in Foreign Direct Investment by GDP by 23.37%. This relationship is statistically significant ($p<0.05$) as tcal = -12.5639 is less than ttab = 2.101@ df 17 and in line with a priori expectation. It was concluded that FDI is an important avenue for investment in agricultural, manufacturing and transfer of technology to an economy. It was recommended among others that the government should seek to stabilize exchange rates, through adoption of sound fiscal and monetary policies.

Eregha (2017) investigated the effect of exchange rate policies and inflationary expectation on foreign direct investment flow to the West African Monetary Zone (WAMZ). The Study employed the Arellano Panel Correction for Serial Correlation and Heteroscedaticity option of the Within Estimator for five of the WAMZ countries selected based on data availability for the period 1980-2014. Results showed that exchange rate uncertainty hampered FDI flow while inflation expectation had an insignificant effect on FDI flow to WAMZ. The fixed exchange rate policy regime was found to hamper FDI flow in the zone while intermediate policy regime had a significantly positive effect in facilitating FDI flow with periods of current account imbalances and changes in foreign exchange reserves as the channels since most of these countries use their reserves from the restricted export earnings to intervene in the foreign exchange market to maintain the official rate. The magnitude and significance of the negative effect of fixed policy regime on FDI increased indicating that fixed regime is not a good policy in period of current account imbalance and depleting foreign exchange reserve. It is therefore recommended that monetary authorities in these countries especially in periods of depleting foreign reserve and current account imbalances allow the market to determine the exchange rate or reduce their intervention so as to eliminate unnecessary uncertainties that hinders FDI flow to the zone.

Morrissey and Udomkerdmongkol (2014) examined the impact of exchange rates on US foreign direct investment (FDI) inflows to a sample of 16 emerging market countries using panel data for the period 1990-2002. Three variables are utilized to capture separate exchange rate effects. The bilateral exchange rate to the US$ captures the value of local currency (a higher value implies a cheaper currency and attracts FDI). Changes in real effective exchange rate index (REER) proxy for expected changes in the exchange rate: an increasing (decreasing) REER is interpreted as devaluation (appreciation) being expected, so that FDI is postponed (encouraged). The transitory component of bilateral exchange rates is a proxy for volatility of local currency, which discourages FDI. The results support the 'Chakrabarti and Scholnick' hypothesis that, *ceteris paribus*, there is a negative relationship between the expectation of local currency depreciation and FDI inflows. Cheaper local currency (devaluation) attracts FDI as volatile exchange rates discourage FDI.

Jaratin, Mori, Dullah, Lim, and Rozilee (2014) investigated the exchange rate movements and foreign direct investment (FDI) relationship using annual data on ASEAN economies, that is, Malaysia, the Philippines, Thailand, and Singapore. By employing ARDL bounds test approach, the empirical results show the existence of significant long-run cointegration between exchange rate and FDI for the case of Singapore, Malaysia, and the Philippines with all countries recording negative coefficient implying that the appreciation of Singapore dollar, Malaysian ringgit, and the Philippine peso has a positive impact on FDI inflows. Using the ECM based ARDL approach for causality test, both Singapore and the Philippines show long-run bidirectional causality between exchange rate and FDI whereas long-run unidirectional causality running from the exchange rate to FDI in Malaysia. Furthermore, this study also found that short-run unidirectional causality running from the exchange rate to FDI exists in Singapore.

Cambazoğlu and Güneş (2016) study tested the hypothesis that there exists a reciprocal relationship between FDI inflows in Turkey and the real exchange rate level. Time series data for the period from January, 2007 to January, 2015 were used to investigate the effect of real exchange rate on foreign direct investment in Turkey in a long run. For this purpose, we employed a bound test co-integration approach that is based on the Autoregressive Distributed Lag Model (ARDL). The results obtained from a long-term static analysis of estimated ARDL model revealed that there is a co-integration relationship between the exchange rate level and FDI inflows in Turkey. Kenny (2019) study examined the influence of foreign direct investment and exchange rate on economic growth in Nigeria from 1971 to 2013. The study employed trend lines and percentage to analysis the influence of both FDI and exchange rate on the economic growth of the country. From the analysis, this study found that exchange rate exerts most influence on economic growth than FDI in Nigeria. A study by Shauna and Ahmadi-Esfahani (2008) on exchange rates and foreign direct investment: theoretical models and empirical evidence discovered that growth in foreign direct investment (FDI) has stimulated significant attempts at developing theories. One line of this research explores the relationship between exchange rates and FDI. There is no consensus about the nature of this relationship in either the theoretical or empirical work.

Methodological Dimension
The macroeconomic effect of exchange rate on foreign direct investment in Nigeria was examined using the hypothetico-deductive research design adopted for a time period of

thirty-eight (38) years from 1981 to 2018. A hypothetico-deductive research design allows the researcher validate or refute the postulation/assumptions of a theory through hypotheses formulated. Furthermore, the researcher cannot manipulate the data as they are available for public consumption by established government agencies. This study used secondary time series data obtained from publications of the Central Bank of Nigeria and federal office of statistics.

Model Specification
In the realization of the objective of this study, an estimation of a modified linear regression model was followed. A model similar to the one used in the study of Morrissey and Udomkerdmongkol (2014) was adopted in this study. While they expressed FDI as a function of bilateral exchange rate and real effective exchange rate, this study expresses FDI as a function of Nominal Exchange Rate (NEXR) and Real Exchange Rate (REXR). The functional model is stated in equation 1.

FDI = f(REXR, NEXR)   eq1

Accounting for econometric properties in the model, enables extensive interpretation of the result for a clear understanding of the econometric relationships. To express the econometric model we assume that some portion of the value FDI is independent of the regressors. This portion is usually referred to as the constant term (α_0). The other portions of the value of FDI which accounts for the relationship between FDI and the regressors are the regression coefficients (α_1 and α_2) and the standard error of the regression ε_t. Based on these parameters, the model of the study is therefore expressed econometrically thus;

$FDI_t = \alpha_0 + \alpha_1 REXR_t + \alpha_2 NEXR_t + \varepsilon_t$ eq2

For effect, cause or impact to be established, one event must precede the other. The preceding event must be significant in predicting the dependent event. The researcher therefore hypothesizes that, changes in nominal and real exchange rate at a previous time ($\Delta NEXR_{t-i}$ and $\Delta REXR_{t-i}$) led to the present change in the value of FDI (ΔFDI_t). Therefore a time lag (t-i) is accounted for in the model. i is the optimal number of lags which is determined by the Akaike Information Criterion (AIC) of the VAR lag length test; Δ is the differencing operator. The causal model also accounts for White noise disturbance term, U_t.

The model testing for effect of exchange rate on FDI is therefore specified as;

$\Delta FDI_t = \alpha_0 + \sum_{f=i}^{n} \alpha_1 \; \Delta NEXR_{t-i} + \sum_{f=i}^{n} \alpha_2 \; \Delta REXR_{t-i} + U_t$ eq3

Diagnostics tests were conducted to ensure that the data meets the basic econometric assumptions of the selected model. These assumptions include; stationarity, homoscedasticity, absence of multi-collinearity, normality etc. The pre-estimation tests include the ADF, PP and KPSS Unit Root Test, Correlation Matrix Test for Multi-correlation, and the Jarque-Bera Normality Test. Estimates were done using the Autoregressive Distributive Lags regression and the Grander Causality tests. Post-estimation tests were split into coefficient diagnostics, residual diagnostics and stability diagnostics of the Model. Coefficient diagnostics were done using the Bounds Test and Variance Decomposition; the residual diagnostics were conducted using the Harvey Heteroskedasticity Test and the Serial Correlation LM Test; while the stability diagnostics was conducted using Ramsey RESET test.

Data Presentation and Analysis
This trend shows the flunctuation in FDI and exchange rate both real and nominal as it relates to FDI. The trend diagrammatically explains that if exchange rate is stable to an extent there will be more inflow of FDI in the country.

Foreign Direct Investment Graph Trend from 1981 to 2018
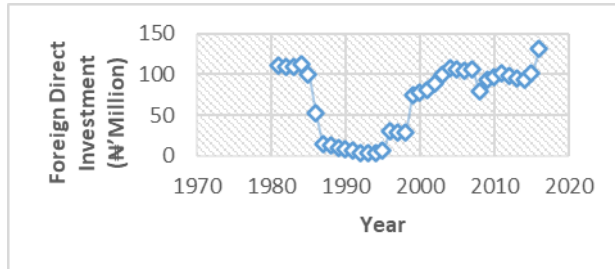
Source: Central Bank of Nigeria statistical bulletin

Foreign direct investment was valued at ₦334.7 million in 1981, but rose by over 100% by the end of 2009 to settle at ₦1, 273, 800 million. In 2010, foreign direct investments deteriorated by 40.64% to peck at 905, 700 million. Despite the marginal rise of 33.42% in 2011, foreign direct investments continued to depreciate by 22.16%, 27.24% and 18.55% respectively in 2012, 2013 and 2014. It degenerated further by 22.62% to close at ₦602, 000 million in 2015 but surprising appreciated by 6.44% in 2016 to record ₦1, 124,100 million.

Real Exchange Rate
As can be seen there is clear evidence that the real exchange rate of Naira against one US dollar has so much depreciated from 0.6100 in 1981 to 253.4923 2016 based on official exchange rate of the Central Bank of Nigeria which is lesser than the parallel or black market rate. In 2009, the exchange rate declined by 20.36% from 118.5669 in 2008 to 148.8802 in 2009. Despite the various intervention programme of CBN to increase supply of forex, the value of Naira against the US Dollar is still very weak.

Real Exchange Rate Graph Trend from 1981 to 2018
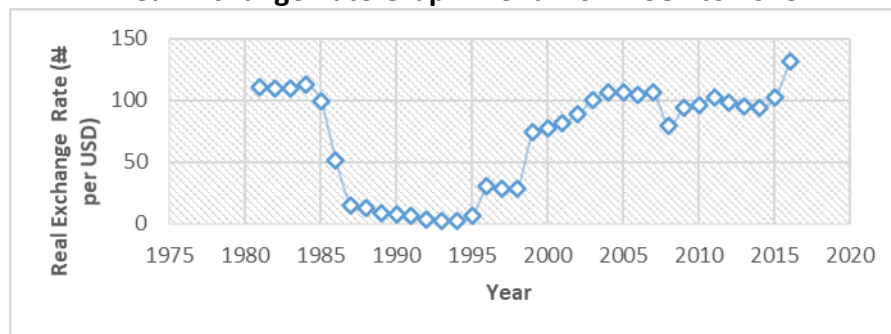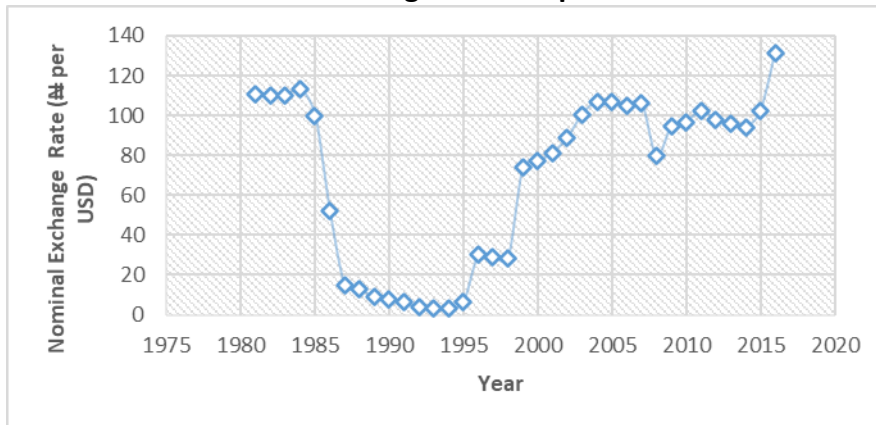
Source: Central Bank of Nigeria statistical bulletin

Nominal Exchange Rate
The nominal exchange rate as at 1981 was valued at ₦110.39 per US Dollar but has risen to ₦96.74 in 2010. There was further appreciation in 2011 as it was put at ₦102.30 but went down in 2012 to amount ₦98.08. Nevertheless, in 2016, nominal exchange rate increased to ₦131.30 as shown in Table 3, Fig. 15 and 16.

Nominal Exchange Rate Graph Trend from 1981 to 2018

Source: Central Bank of Nigeria statistical bulletin

Descriptive Statistics of Data

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	P-value	Obs
FDI	348669.3	110900.	1360300.	264.300 00	437174.8	0.980167	2.490572	6.153640	0.046 10	36
REXR	76.59332	57.3722	253.4923	0.610000	72.03735	0.423761	1.985578	7.621017	0.049 68	36
NEXR	69.18389	91.5000	131.3000 0	2.960000	42.84541	-0.504870	1.598253	7.476704	0.006 63	36

Source: E-views 10.0

Standard deviation of the data is 437174.8for foreign direct investment, 72.04 for real exchange rate and 42.85 for nominal exchange rate. The data were positively skewed towards normality except nominal exchange rate. From the Kurtosis statistics, variables were not leptokurtic in nature. The p-value of the Jarque-Bera which is significant at 5% significance level indicates that the data were normally distributed and free from any outlier that may impede on the model estimated output.

Pre-estimation Tests
Test for Stationarity of Data
In compliance to ascertaining the stationarity properties of the variables, the data were subjected to stationarity test through Augmented Dickey-Fuller (ADF), Phillips Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS). The ADF results for the variables at three set estimations: constant, trend and constant.

Augmented Dickey-Fuller (ADF)
The ADF stationarity test result reveal that all the variables were not stationary at level form despite estimated at constant, trend and constant; and none.

ADF Test Result at Level

Variables	Constant	Trend and Constant	None	Remark
FDI	-0.654012 (0.84)	-2.433646 (0.35)	3.191872 (0.99)	Not Stationary
REXR	1.311125 (0.99)	-1.385767 (0.84)	2.809754 (0.99)	Not Stationary
NEXR	-0.822136 (0.80)	-1.804179 (0.68)	-0.245166 (0.59)	Not Stationary

Source: E-views 10.0

Note: The optimal lag for ADF test is selected based on the Akaike Info Criteria (AIC), p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

ADF Test Result at First Difference

Variables	Constant	Trend and Constant	None	Remark
FDI	-7.086338 (0.00)*	-3.796404 (0.03)**	-6.907289 (0.00)*	Stationary
REXR	-3.669242 (0.00)*	-3.995108 (0.02)**	-3.041231 (0.00)*	Stationary
NEXR	-3.740379 (0.00)*	-4.137158 (0.01)*	-3.799041 (0.00)*	Stationary

Source: E-views10.0

Note: The optimal lag for ADF test is selected based on the Akaike Info Criteria (AIC), p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

PP Test Result at Level

Variables	Constant	Trend and Constant	None	Remark
FDI	-0.654012 (0.84)	-2.368320 (0.38)	0.139159 (0.72)	Not Stationary
REXR	1.142402 (0.99)	-1.616624 (0.77)	2.564295 (0.99)	Not Stationary
NEXR	-1.208048 (0.65)	-1.853334 (0.65)	-0.481616 (0.49)	Not Stationary

Source: E-views 10.0

Note: In determining the truncation lag for PP test, the spectral estimation method selected is Bartlett kernel and Newey-West method for Bandwidth, p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

PP Test Result at First Difference

Variables	Constant	Trend and Constant	None	Remark
FDI	-7.067563 (0.00)*	-7.009157 (0.00)*	-6.892836 (0.00)*	Stationary
REXR	-3.669723 (0.00)*	-3.979343 (0.02)**	-2.994521 (0.00)*	Stationary
NEXR	-3.709636 (0.00)*	-4.137158 (0.00)*	-3.769289 (0.00)*	Stationary

Source: E-views 10.0

Note: In determining the truncation lag for PP test, the spectral estimation method selected is Bartlett kernel and Newey-West method for Bandwidth, p-values are in parentheses where (*) and (**) denote significance at 1% and 5% respectively.

Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test

Using another unit root test of KPSS which is different from ADF and PP, it shows that all the data were stationary at level form performed at constant, trend and constant estimates. In Table 10, first difference estimation did not satisfy the stationarity of all the variables. Invariably, from the output of the KPSS, all the variables are free stationarity defects that characterized virtually all time series financial data.

KPSS Test Result at Level

Variables	Constant	Trend and Constant	Remark
FDI	0.574684 (0.00)*	0.142580 (0.00)*	Stationary
REXR	0.687698 (0.00)*	0.120301 (0.00)*	Stationary
NEXR	0.271935 (0.00)*	0.138577 (0.02)**	Stationary

Source: E-views 10.0

Note: The spectral estimation method selected for KPSS test is Bartlett kernel and Newey-West method for Bandwidth, p-values are in parentheses where (*) and (**) denotes significance at 1% and 5% respectively.

KPSS Test Result at First Difference

Variables	Constant	Trend and Constant	Remark
FDI	0.131025 (0.29)	0.054285 (0.47)	Not Stationary
REXR	0.343652 0.00)*	0.068785 (0.06)	Stationary
NEXR	0.310071 (0.82)	0.111312 (0.05)**	Stationary

Source: E-views10.0

Note: The spectral estimation method selected for KPSS test is Bartlett kernel and Newey-West method for Bandwidth, p-values are in parentheses where (*) and (**) denotes significance at 1% and 5% respectively.

Multicollinearity Test

To avoid the issue of multi-collinearity in the models, the correlation matrix was conducted to ensure that there is spurious result. The correlation between two independent variables: real exchange rate and nominal exchange rate is 0.62. This is an indication that the correlation between the independent variables are within the acceptable range that suggests that multi-collinearity problem does not exist between the explanatory variables in the models.

Consequently, regression estimates would be devoid of element of multi-collinearity as no independent variable vehemently explain the other.

Correlation Matrix

	FDI	REXR	NEXR
FDI	1.000000	0.836072	0.537812
REXR	0.836072	1.000000	0.623593
NEXR	0.537812	0.623593	1.000000

Source: E-views 10.0

Estimation

Test
Autoregressive Distributive Lags

Regression

As depicted in the table below, real exchange rate has positive significant relationship with foreign direct investment. Similarly, nominal exchange rate relates positively but insignificantly with foreign direct investment. Keeping real exchange rate and nominal exchange rate constant, foreign direct investment would be down by a value of ₦27,017 million. Foreign direct investment would rise by a magnitude of ₦1,779.97 million and ₦221.88 million following a unit appreciation in real exchange rate and nominal exchange rate respectively. With respect to the adjusted R-squared, exchange rate mechanism through real exchange rate and nominal exchange rate explained 86.44% changes in foreign direct investment, and this is statistically significant as unveiled by the p-value (0.00) and f-statistic (73.24). The Durbin Watson value of 2.20 absolves the variables in the model of autocorrelation problem.

ARDL Regression: Foreign Direct Investment and Exchange Rate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI(-1)	0.705485	0.104277	6.765483	0.0000
REXR	1779.978	706.2094	2.520468	0.0171
NEXR	221.8846	875.6459	0.253395	0.8016
C	-27017.43	51949.89	-0.520067	0.6067
R-squared	0.876361	Mean dependent var		358621.7
Adjusted R-squared	0.864396	S.D. dependent var		439400.0
S.E. of regression	161806.8	Akaike info criterion		26.93340
Sum squared resid	8.12E+11	Schwarz criterion		27.11116
Log likelihood	-467.3346	Hannan-Quinn criter.		26.99476
F-statistic	73.24316	Durbin-Watson stat		2.201253
Prob (F-statistic)	0.000000			

Source: E-views 10.0

Granger Causality Analysis
To determine the effect of real exchange rate and nominal exchange rate on foreign direct investment, the granger causality analysis was performed. The choice of granger causality analysis is on the fact that it shows a variable that can predict or cause changes in another which is obviously lacking in the use of OLS which only ascertains the nature of relationship between variables. Two variables may relate but that does not mean that one can affect another. Based on the AIC, the optimal lag length is 3; therefore, the Grander Causality Test was conducted using 3 lags. The result of the granger causality test in unveils that there is a unidirectional causal relationship between FDI and real exchange rate running from real exchange rate to FDI at 5% level of significance on one hand. This implies that real exchange rate has significant effect on FDI in Nigeria.

Granger Causality Result for Exchange Rate and Foreign Direct Investment

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
REXR does not Granger Cause FDI	35	7.88074	0.0084	Causality No
FDI does not Granger Cause REXR		0.88592	0.3536	Causality No
NEXR does not Granger Cause FDI	35	1.13142	0.2954	Causality No
FDI does not Granger Cause NEXR		1.11956	0.2979	Causality

Source: E-views 10.0

The causality result depicts that causality flows from real exchange rate to foreign direct investment at 5% level of significance. By implication, real exchange rate has significant effect on foreign direct investment. In this regard, the null hypothesis that real exchange rate has no significant effect on foreign direct investment is rejected, while the alternate hypothesis accepted. On the contrary, the p-value for nominal exchange rate is insignificant at 5% level of significance, an indication that nominal exchange rate has no significant effect on foreign direct investment thus necessitating the acceptance of the null hypothesis and rejection of the alternate hypothesis.

Diagnostic Tests
Coefficient Diagnostics

Bound Test for Foreign Direct Investment and Exchange Rate

T-Test	5% Critical Value Bound		Remark
F-Statistic	Lower Bound	Upper Bound	
2.721947	3.79	4.85	Null Hypothesis Accepted

Source: E-views 10.0

Variance Decomposition
With the determination of the nature of both short and long run relationship in exchange rate disaggregated into real exchange rate/nominal exchange rate and foreign direct investment to determine if exchange rate influences FDI was therefore imperative. This was achieved

through the application of the variance decomposition mechanism. The table below shows that real exchange rate was stronger in determining the inflows of foreign direct investment relative to nominal exchange rate

Variance Decomposition of FDI

Period	S.E.	FDI	REXR	NEXR
1	167952.4	100.0000	0.000000	0.000000
2	186488.5	99.01537	0.006044	0.978583
3	207283.5	94.74528	4.067249	1.187469
4	226014.7	85.87328	12.69517	1.431554
5	249777.0	73.64789	24.71969	1.632420
6	278201.2	60.94647	37.13873	1.914807
7	311048.7	49.53906	48.16891	2.292029
8	347375.6	40.11101	57.12791	2.761086
9	386386.4	32.62575	64.08480	3.289448
10	427429.1	26.77523	69.38285	3.841916

Source: E-views 10.0

Residual Diagnostics
Serial Correlation LM Test
Prior to estimating the models, residuals of the variables were ascertained to check for the presence of serial correlation. This was done using the serial correlation LM test. The serial correlation LM test in Table 11 details that there is no element of serial correlation in the models owing to the fact that the p-values of the f-statistics are insignificant at 5% level of significance.

Serial Correlation LM Test

Regression Estimates	F-statistic	P-value
FDI →REXR + NEXR	0.841359	0.4414

Source: E-views 10.0

Heteroskedasticity Test
The situation in which the variability of a variable is unequal across the range of values of a second variable that predicts it leads to problem of heteroskedasticity. To ensure that there is homoscedasticity in the model estimation, the heteroskedasticity test via the Harvey selection criteria was performed. With the result there is no problem of heteroskedasticity in the models as the p-values of the f-statistics are insignificant at 5% significance level.

Harvey Heteroskedasticity test

Regression Estimates	F-statistic	P-value
FDI →REXR + NEXR	0.185988	0.0608

Source: E-views 10.0

Stability Diagnostics

Ramsey RESET Test

To ensure that the models were well specified, the Ramsey Reset specification test was performed and the result presented. From the Ramsey Reset specification result, it was obvious that the models were well-specified. The p-values of the f-statistics for all the models are insignificant at 5% significance level.

Ramsey Reset Specification

Estimates	t-statistic	Df	P-value
FDI →REXR + NEXR	1.229799	30	0.2283

Source: E-views 10.0

As depicted in Table below, real exchange rate has positive significant relationship with foreign direct investment. Similarly, nominal exchange rate relates positively but insignificantly with foreign direct investment. Keeping real exchange rate and nominal exchange rate constant, foreign direct investment would be down by a value of ₦27,017 million. Foreign direct investment would rise by a magnitude of ₦1,779.97 million and ₦221.88 million following a unit appreciation in real exchange rate and nominal exchange rate respectively. With respect to the adjusted R-squared, exchange rate mechanism through real exchange rate and nominal exchange rate explained 86.44% changes in foreign direct investment, and this is statistically significant as unveiled by the p-value (0.00) and f-statistic (73.24). The Durbin Watson value of 2.20 absolves the variables in the model of autocorrelation problem.

Estimated Model	f-statistic	P-value	Decision
FDI → REXR + NEXR			
REXR	7.88074	0.0084	RejectH_0 and Accept H_1
NEXR	1.13142	0.2954	AcceptH_0 and Reject H_1

Source: Eviews 10.0

Discussion of Findings

Real exchange rate has significant positive relationship with foreign direct investment. In other words, exchange rate stability is a great determinant of the inflow of foreign direct investment in the host country. The granger causality result revealed that exchange rate was found to have significant effect on foreign direct investment inflow in Nigeria owing to the evidence of unidirectional causal relationship between foreign direct investment and real exchange rate running from real exchange rate to foreign direct investment at 5% significance level. This affirms the work of Osinubi and Amaghionyeodiwe (2009). This result also agrees with the studies of Omankhanlen (2011) and Zakari (2017) in Nigeria, Jin and Zang (2013) in China, Renani and Mirfatah (2012) in Iran, Mariel and Pankova (2010) in Central European economies. However, the result of a similar study by Lily, Kogid, Mulok, Sang and Asid (2014) in Asian economies was negated by the finding of this study.

This is on the idea that a direct investment in a country with a high degree of exchange rate volatility will have a riskier stream of profits and risk is directly proportional to returns. The establishment of a strong causal relationship between real exchange rate and FDI in Nigeria

is an indication that poor FDI values can be traceable to inefficiency in the previous exchange rate policies.

With a population of about 160 million people, vast mineral resources, and favourable climatic and vegetation features, Nigeria has the largest domestic market in Sub-Saharan Africa. The domestic market is large and potentially attractive to domestic and foreign investment. Investment income, however, has not been encouraging, which was a reflection of the sub-optimal operating environment largely resulting from inappropriate policy initiatives, particularly exchange rate. The exchange rate of Nigeria was only attractive and stable years before the introduction of the Structural Adjustment Programme (SAP) in 1986. However, owing to over-dependence on oil revenues, the huge decline in the Global price of oil meant that pressure was mounted on the naira and policymakers sought to stabilize the value of the naira without dealing with some underlying economic issues. This meant that at some point (especially between 1993 and 1995 during the reign of General Sani Abacha) the naira was overvalued and this meant that foreign investors were discouraged from investing in Nigeria.

Conclusion and Recommendation

Since real exchange rate has significant positive relationship with foreign direct investment, it implies that monetary policy adjustment by the Central Bank of Nigeria (CBN) with regard to exchange rate has affected inflow of FDI and further adjustments to these policies would likely result into changes in the value of FDI in Nigeria. In other words, exchange rate stability is a great determinant of the inflow of foreign direct investment in the host country. As exchange rate was found to have significant effect on foreign direct investment inflow in Nigeria, the study concludes that stability in exchange rate will attract more FDI since both real and nominal rate have significant positive relationship. The Nigerian currency has a lesser value compared to the US Dollar, Euros, Pounds ets. While this has caused foreign investors to see Nigeria as a promising investment outlet, due caution should be taken by the monetary policymakers to ensure that the exchange rate does not continue to depreciate as this could ultimately turnout to discourage foreign investors.

The study recommends for consideration and possible implementation by policymakers: that the Central Bank of Nigeria should ensure adequate flow of foreign exchange in the foreign exchange market and ensure a sustained/stable exchange rate level which will serve as attraction of foreign investors for increased inflow of foreign direct investment. This study has shown that the real exchange rate is more influential in attracting FDIs into Nigeria. Therefore, subsequent exchange rate policy measures should center on addressing Nigeria's real exchange rate and not just the nominal exchange rate as the case has been in time past. Attempts to strengthen the value of the naira should be addressed focusing on the interplay of demand and supply rather than using measures that would only overstate the value of the naira. In other words, rather than blindly defending the overstated nominal value of the naira, certain macroeconomic issues like import-dependence, low production and non-oil exports should be addressed. This way, demand for the naira would increase, and the exchange rate would reflect the true value of the country's economic performance and foreign investors would be encouraged to invest in Nigeria.

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