

Effect of Exchange and Interest Rates on Foreign Direct Investment in Nigeria 2006-2018

Benson Emmanuel¹, Eya Criscent Ike², Yunusa Alhasan³

^{1,3}Department of Accounting and Finance, University of Agriculture, Makurdi

²Smart Consult Research Unit, Makurdi Benue State, Nigeria.

Abstract:

This study examined the Effect of Exchange and Interest Rates on Foreign Direct Investment in Nigeria 2006-2018. Secondary data was used for the study and it was obtained from the financial statement of the Central Bank of Nigeria 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 cointegrating nature of the data while the longrun and the shortrun 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 exist 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 longrun co-integrating equation shows that a negative relationship exit between Interest Rate (INT) and Foreign Direct Investment (FDI) and the result is not 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 increase in Foreign Direct Investment by GDP by 23.37%. This relationship is statistically significant ($p < 0.05$) (as $t_{cal} = -12.5639$) is less than $t_{tab} = 2.101$ @ df 17) and in line with our a priori expectation. It was recommended among others that board composition effect on total voluntary disclosure can be increased when appointment is made sometimes of an outside director who is an official of a financial firm as it has been found to increase firm share value. 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.

Keywords: Exchange rate, investment, inflation, interest rate, Nigeria.

1.0 Introduction:

The common goal of all businesses is wealth maximization and businesses will seek all ways to remain profitable and increase shareholders' wealth. Muema (2013) defined FDIs as investments that are meant to be long lasting and those that are outside the economic or physical boundaries of the investor.

The beneficiary country of FDI is equipped with capital flow as well as technology flow that will aid in its development. When a country seeks to invest in another, the benefit it seeks to achieve must be higher than the risks it must deal with. UNCTAD (2002) describes three different types of FDI. These

are: reinvested earnings, equity capital and other capital which mainly consist of intercompany loans. FDI's create new job opportunities as upon setting of the business, recruitment and training of the locals in the host country is undertaken transferring skills and technological know-how as well as providing jobs. According to Kinuthia (2010), FDI usually represents long term commitment to the host country. It is a preferred form of investment because it has no obligations to the host country.

FDI is important in adopting new technologies, skills and managerial capabilities in the different sectors of the economy which are traditionally difficult to raise through use of domestic savings, and if not, there would be difficulty in importation of the technology from abroad. This would be compounded by the fact that transferring technology to firms with little experience is risky and they will find difficulty in the use of it and it comes at a great cost (Olson, 2008). FDI is responsible for many externalities that come in the form of benefits to the home country that are not responsible for generating incomes to the host country. FDI is important for developing countries as it avails resources necessary to optimize the level of economic development (Ismaila & Imoughele, 2010). The reason for this is that their economies face challenges such as low domestic savings, revenues, low levels of productivity and low foreign exchange earnings.

A country's appeal for FDI is affected by changes in restrictions that include removal of government barriers to trade as well as privatization of government agencies. Potential economic growth is also a factor that affects a country's appeal for FDI as countries that have greater potential for economic growth may enable the firms to be able to take advantage of that growth by setting up business there. Exchange rates and tax rates make up some factors that affect a country's appeal for FDI. Low tax rates on corporate profits are more likely to attract foreign direct investment while firms prefer to direct FDI to countries where the local currency is expected to appreciate against their own currency. A company that seeks to invest in another will always seek out a host country that has a local currency that will be expected to strengthen against

their own. Madura and Fox (2011) argue that a firm will invest funds in a country whose local currency is currently weak in order to earn from new operations which may regularly be converted back to the foreign firm's currency at a better exchange rate. Exchange rate movements affect FDI values because they tend to generally affect the expected amount of cash inflows received from their investments and the amount of cash outflows required to pay to continue operating these investments.

The inter-relationships between interest rate, exchange rate, foreign portfolio investment and in emerging economies like Nigeria is dynamic depending on the absorbing capacity of the country and her responsiveness to technology. According to the UNCTDA report of 2002, foreign direct investment can be defined as an investment involving a long term business interest and control by a foreign investor in another country different from that of the investor. The role played by foreign direct investment in actualizing economic development in a nation cannot be under estimate. As such, across the border transaction is celebrated mostly in the developing countries as it is seen as an avenue to promote and encourage inflows of technology, skill, materials and bridge the gap between savings, exchange rate and government spending.

The effect of the instability of interest rate and exchange rate is very significant to foreign direct investment inflow to a developing nation like Nigeria experiencing transition and emerging markets. A rise in interest rate will cause an increase in current real exchange rate. Hence, the variation between exchange rate and interest rate consistently correlates to Foreign Direct Investment inflows and thus amplified economic development. Foreign Direct Investment inflows are essential for an emerging resource-based economy like Nigeria. The required prerequisite to attract adequate Foreign Direct Investment are classified into political, economic, legal and social factors. Higher profitability on investments, political stability, suitable investment climate, cheap labour and production cost, adequate and functional

infrastructure amenities and a stable regulatory environment also help to invite and retain Foreign Direct Investment in a nation.

Exchange rates as one of the determinants of FDI are one of the reasons that a foreign investor would seek to invest in Nigeria, mostly that the Naira should be weaker than the currency of the home of the foreign investor. What is in question is the price the country has to pay in order to attract these investments and whether the benefits outweigh the costs associated with them. If a currency is weaker, is it obvious that FDI will flow into that country. Once FDI has been attracted, it is expected to help the economy grow and with its growth, a stronger shilling is expected to be a characteristic of a country with FDI. This is far from what the country has experienced. Despite being home to a number of FDIs, the currency has not vastly improved. The exchange rates have been skewed to enabling FDIs to thrive which in reality has not been observed. Kinuthia (2010) finds that FDI is a key input in the reduction of poverty levels in developing countries. He further attests that those factors which are favorable to domestic investment are often likely to increase FDI. This would in effect mean that a weak currency, as a determinant of FDI should also encourage local investments. Currencies trading at the foreign exchange market determine the exchange rates to be used as the market is expected to determine which currency is demanded more than it is supplied. The advent of FDIs would mean that more shillings are required in order to buy.

Statement of Problem:

When a country's borders are opened and people with different ideas are welcomed into it, the host country is given a chance to learn new ways of doing things. Wealth is transferred not only through the exchange of goods and services but also through the exchange of ideas, exchange of technology and the exchange of manpower. FDI, which involves the investment of assets in a host country subjecting it to the laws of that land, seeks to provide a country such as Nigeria with its many advantages. The leading determinant of FDI is the exchange rate. Others are interest rate, size of the economic growth

represented by the country's GDP etc. A country whose currency is weaker compared to that of the foreign country will make it attractive as the costs of production are bound to be cheaper than in the FDI's home country.

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The required prerequisite to attract adequate Foreign Direct Investment is classified into political, economic, legal and social factors. Higher profitability on investments, political stability, suitable investment climate, cheap labour and production cost, adequate and functional infrastructure amenities and a stable regulatory environment also help to invite and retain Foreign Direct Investment in a nation. This study examines how these factors have positively or negatively affected interest rate within the period under review.

The main objective of this study therefore is to examine the effect of exchange and interest rate on the foreign portfolio investment in Nigeria. The specific objectives of the study therefore is to examine the effect of exchange rate on foreign portfolio investment in Nigeria, examine the effect interest rate on foreign portfolio investment in Nigeria and how the control variable - inflation influence the attraction of FDI into the country.

2.0 Literature Review:

Foreign Direct Investment:

Foreign Direct Investment (FDI) is a direct investment by a corporation in a commercial venture in another country. Mallampally and Sauvart (1999) define FDI as an investment by multinational corporations in foreign countries in order to control assets and manage production

activities in those countries. It plays an extraordinary and growing role in global business by providing a firm with new markets and marketing channels for their products. For a host country or the foreign firm which receives the investment, it provides a source of new technologies, capital, process, products, organizational technologies and modern management practices. All of these are presumed to contribute to economic growth and development in an economy. FDI is important not just for the developing countries but also for developed nations.

Over the last three decades, Foreign Direct Investment (FDI) has emerged as one of the most important sources of globalization and an important catalyst for economic growth, transferring technology and knowledge between participating countries. FDI also provides opportunities and financial challenges around the world. The theories related to the types of FDI suggest two types of FDI: horizontal (market-seeking) and vertical. The international market searching for the lowest cost of production is called vertical FDI, which is mainly export oriented (Shatz and Venables, 2000).

Horizontal FDI refers to the establishment of homogenous plants in foreign locations as a means of supplying certain goods in a foreign country. This type of FDI replaces exports from the home country to the host country.

Exchange Rate:

An exchange rate is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in relation to another currency. For example, an interbank exchange rate of 114 Japanese yen to the United States dollar means that ¥114 will be exchanged for each US\$1 or that US\$1 will be exchanged for each ¥114. In this case it is said that the price of a dollar in relation to yen is ¥114, or equivalently that the price of a yen in relation to dollars is \$1/114. Exchange rates are determined in the foreign exchange market, which is open to a wide range of different types of buyers and sellers, and where currency trading is continuous: 24 hours a day except weekends, i.e. trading from 20:15 GMT on

Sunday until 22:00 GMT Friday. The spot exchange rate refers to the current exchange rate. The forward exchange rate refers to an exchange rate that is quoted and traded today but for delivery and payment on a specific future date.

In 1986, the Structural Adjustment Programme (SAP) brought about the foreign exchange market deregulation. The deregulation process introduced market determined and managed floating rate regime. Prior to the implementation of this program, Nigeria operated a fixed exchange rate regime, sustained by exchange control regulations that created major economic problems till date. Most of the industries in Nigeria depend solely on importation of natural resources, basic materials and finished goods from foreign countries, the CBN usually interfere in the foreign exchange market through its monetary policies and operations in the money market to tilt the exchange rate variability in the desired path such that it raises the competitiveness of the domestic economy. Today exchange rate in Nigeria is determined through the instrument of efficient resource allocation between any interacting economies by the means of import and export (BOP) which invariably affect the demand of the country's currency. Nigerian as an import dependent country was seriously affected by the deregulation exercise. The value of naira depreciates as a result of high degree of currency risk; recurrent changes in exchange rate and inflation.

Nexus between FDI, exchange and Interest Rate:

The exchange rate is a crucial factor of FDI flows and some studies on FDI determinants have integrated the exchange rate (Schmidt and Broll, 2009; Russ, 2007; Waldkirch, 2003). Previous studies (Barrel and Pain 1998) suggest that a depreciation of the host country's currency attracts FDI. In the meantime, other research (Waldkirch, 2003; Campa; Schmidt and Broll, 2009; Amuedo-Dorantes and Pozo, 2001) argues that the appreciation of the host currency attracts FDI. The literature related to the interrelationship between the exchange rate, exchange rate volatility, and exchange rate expectations with FDI is mixed.

There is no clear statement as to how exchange rates affect FDI. There are several channels through which the level of the exchange rate affects FDI. Given an imperfect capital market, real exchange rate depreciation of the host country currency stimulates FDI (Froot and Stein, 1991). In this situation, we expect a negative relationship of the exchange rate (home per host currency) and FDI. The strong negative impact of the exchange rate depreciation of the host currency was also reported by Barrell and Pain (1998).

Currencies appreciate and depreciate according to prevailing market conditions. Firms that have operations in other countries other than their mother countries must understand the forces that cause exchange rates to change over time in order to gauge how currencies may be affected by these forces and in so doing be in a position to mitigate these losses.

Generally, higher interest rates increase the value of a country's currency. Higher interest rates tend to attract foreign investment, increasing the demand for and value of the home country's currency. One of the primary complicating factors is the relationship that exists between higher interest rates and inflation. A weak exchange rate in the host country can attract more FDI because it will be cheaper for the multinational to purchase assets. However, exchange rate volatility could discourage investment.

Theoretical Framework:

The Purchasing Power Parity Theory:

The purchasing power parity theory enunciates the determination of the rate of exchange between two inconvertible paper currencies. Although this theory can be traced back to Wheatley and Ricardo, yet the credit for developing it in a systematic way has gone to the Swedish economist Gustav Cassel. This theory states that the equilibrium rate of exchange is determined by the equality of the purchasing power of two inconvertible paper currencies. It implies that the rate of exchange between two inconvertible paper currencies is determined by the internal price levels in two countries. There are two versions of the purchasing power parity theory:

- (i) The Absolute Version and
- (ii) The Relative Version.

The Absolute Version:

According to the absolute version of the purchasing power parity theory, the rate of exchange should normally reflect the relation between the internal purchasing power of the different national currency units. In other words, the rate of exchange equals the ratio of outlay required to buy a particular set of goods at home as compared with what it would buy in a foreign country.

The absolute version of the purchasing power parity theory is, no doubt, quite simple and elegant, yet it has certain shortcomings. Firstly, this version of determining exchange rate is of little use as it attempts to measure the value of money (or purchasing power) in absolute terms. In fact, the purchasing power is measured in relative terms. Secondly, there are differences in the kinds and qualities of products in the two countries. These diversities create serious problem in the equalization of product prices in different countries. Thirdly, apart from the differences in quality and kind of goods there are also differences in the pattern of demand, technology, transport costs, tariff structures, tax policies, extent of state intervention and control and several other factors. These differences prohibit the measurement of exchange rate in two or more currencies in strict absolute terms.

(ii) The Relative Version:

The relative version of Cassel's purchasing power parity theory attempts to explain the changes in the equilibrium rate of exchange between two currencies. It relates the changes in the equilibrium rate of exchange to changes in the purchasing power parities of currencies.

In other words, the relative changes in the price levels in two countries between some base period and current period have vital bearing upon the exchange rates of currencies in the two periods. According to this version, the equilibrium rate of exchange in the current period (R1) is determined by the equilibrium rate of exchange in the base

period (R1) and the ratio of price indices of current and base period in one country to the ratio of price indices of current and base periods in the other country.

Microeconomic Theory of Foreign Direct Investment:

Hymer's theory states that the main intentions for internationalization of companies are: variables connected to the company's ownership of specific assets and dimension; and variables caused by existence of market inefficiencies. Hymer stated that "foreign direct investment is beneficial when firm-specific advantages across nations allow overcoming additional costs of doing business abroad". Moreover he opined that it is economical for international companies with specific advantage to operate successfully outside their own country. Hymer further asserts that foreign direct investment brings about technological advancement, helps the inflow of new features of production; also the acquisition of additional skill and expertise helps to enhance and advance other production processes. These advantages are inextricably linked from one department of a company to another irrespective of their location in one nation or more.

Empirical Review:

Mbanasor and Obioma (2017) examined exchange rate fluctuations and foreign private investments in Nigeria. In the methodology of research, the design adopted was the ex-post facto research design. The data utilized were secondary in nature obtained from the Central of Nigeria Statistical Bulletin for the relevant periods. The model for the regression was specified in detail with the roles of the variables explained. The hypotheses stated will be tested using the two-stage least square (2LS). The statistical properties of the 2LS are contained in the popular Gauss- Markov theorem which sees the least squares estimators as unbiased linear estimator, having minimum variance. The model examines the relationship between a dependent variable and two or more regressor (independent variables). This suit the research since the intention of the researcher is to examine the impact of exchanges rate on these macro-economic variables

on a variable by variable basis. The Granger Causality will also be employed to test the causal relationship between exchange rate and major macro-economic variables. The exchange rate fluctuations has negative and non-significant impact on Nigeria's foreign private investment (coefficient of EXR = -0.015, t-value = -0.267). This indicates that a one percent increase in foreign private investment into Nigeria may be due to 0.015 percent decrease in exchange rate fluctuations. The probability value of 0.792 > 0.05 confirms the non-significance of the result. The coefficient of determination which measures the goodness fit of the model as revealed by R-square (R2) indicates that 83.6% of the variations observed in the dependent variable were explained by variations in the dependent variable. This is quite high could be attributed to the inclusion of control variables such export rate (EXPR) and import rate (IMPR). The test of goodness of fit as indicated by R2 was properly adjusted by the Adjusted R-Square to 81.2%. The result of this study that exchange rate fluctuations has negative and non-significant impact on Nigeria's foreign private investment supports the above argument implying that FDI investment in Nigeria is not determine by exchange rate but on other motives such as technology, entrepreneurial skills, source of capital an overall motive to make profit irrespective of the exchange rate. Recommendations of study include examining the transmission mechanism of exchange rate on major macro-economic variables in Nigeria. The channels through which exchange rate impact on these major macroeconomic variables will determine the appropriateness of policies. Secondly, another recommendation is for the inclusion of the parallel exchange rate market on major macroeconomic variables in Nigeria and also recommends an inclusion of the parallel exchange rate market on major macro-economic variables in Nigeria.

Momodu and Monogbe (2018) amplified the determinant of industrialization and economic development in Nigeria using series of econometrics estimating tools. Study reveals that of the five explanatory variables under investigation, three of those variables were established to be an adequate

drivers of industrialization. On that premises, the study concluded that foreign direct investment, exchange rate, net export and aggregate bank lending are significant drivers of industrialization in the Nigeria context. Hence, the study recommends that more effort be put in place to resuscitate the dormant industrial firms in the country as they appear to be a key contributor to sustainable economic development.

Monogbe (2017) amplified the behavioural effect of multination operations and its performance on the Nigeria economy between the periods 1986 to 2014. Study employed error correction model and impulse response method among others. Report shows that the operation of the multinational firm has significantly contribute to the growth of the Nigerian economy thought the contributive quadrant is minuet and as such the mangers of the Nigerian economy should put in place strategies that will attract foreign investors to ensure more inflows of foreign capital in the country

Alaba (2003) examined exchange rate volatility and foreign direct investment in Sub Sahara Africa economies between 1982 and 1998. He adopted GARCH model and error correction technique. His result revealed that exchange rate volatility was not significant for foreign direct investment inflows in both agricultural and manufacturing segment of Nigeria.

Ogunleye (2008) investigated exchange rate volatility and foreign direct investment in Sub Sahara Africa (SSA), they investigated nine countries in the region, Country-specific time series data and panel model estimation techniques were employed. He establish “that exchange rate instability generally limits foreign direct investment inflows to SSA.

Udoh and Egwaikhide (2008) investigate “the impact of exchange rate volatility and inflation certainty on Foreign Direct Investment in Nigeria, between the periods of 1970 to 2005. Adopting the Generalized Autoregressive Conditional Heteroskedastic (GARCH) estimation model. They concluded that exchange rate uncertainty have a negative impact on foreign direct investment

inflows in Nigeria. Yousaf, Shahzadi, Kanwal and Hassan, [15] examined the “influence of exchange rate movement on Foreign Direct Investment in Pakistan.” between the periods of 1980 to 2011. Their study used ordinary least square regression (OLS) model along with diagnostic analysis. They established that “exchange rate shocks and inflation rate averts Foreign Direct Investment while a positive correlation exist between exchange rate and FDI”.

Ellahi (2011) investigated the impact of exchange rate volatility on FDI inflow in Pakistan between 1980 to 2010. Employing Autoregressive distribution lag (ARDL) model. The result clearly showed that the volatility of exchange rate has a negative impact on FDI inflow on the short run and positive impact in the long run in Pakistan economy.

Method of Data Analysis:

Statistical Analysis

This study adopted was the ex-post facto research design using secondary data from the Nigeria Bureau of Statistics for the period of 2000 to 2018. The unit root property of the data was examined using Augmented Dickey Fuller test. The relationship between the variables as they move from one year to the other was examined using Johansen cointegration test. The study examined the longrun and the shortrun relationship using error correction model. This is the analyzing using pooled E-views 10.0. For analysis of data, the probability value of the estimate is used to test all the hypotheses. The formula for pooled regression analysis is stated as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_i \dots \dots \dots \beta_i Y_{it} + U.$$

Where Y_{it} = dependent variable (financial performance measure)

β_0 = the intercept term

X_{it} = independent variable

$\beta_1, \beta_2, \beta_3,$ = Regression coefficients

U= error term

t= time unit (t = 1, 2... 18 years)

The functional relationship is represented in a model form as follows:

$$FDI = f(EXR, INT, INF)$$

The model is written in explicit form and it reflects the dependent variable and the independent variables for the study with the error term.

$$FDI_{it} = \beta_0 + \beta_1 EXR_{it} + \beta_2 INT_{it} + \beta_3 INF_{it} + \mu_{it} \dots$$

equation 2

Where:

β_0 =the intercept term

$\beta_1 - \beta_3$ = Regression coefficients

FDI = Foreign Direct Investment in period t

EXR = Exchange Rate in period t

INT = Interest Rate in period t

INF = Inflation in period t'

μ_{it} = Stochastic error terms

t =the time unit (t= 1, 2 . . . 18 years)

4.0 Results and Discussions

Table 1: Summary Statistics

	FDI	EXR	INT	INF
Mean	1050.281	7.463750	8.540625	6.566250
Median	333.9500	8.040000	9.055000	7.040000
Maximum	3218.800	10.11000	17.20000	9.110000
Minimum	21.70000	2.170000	1.110000	2.810000
Std. Dev.	1245.537	2.185744	5.425280	1.946281
Skewness	0.701602	-0.871275	0.125203	-0.467465
Kurtosis	1.794295	3.042827	1.679353	1.915282
Jarque-Bera	2.281803	2.025544	1.204541	1.367138
Probability	0.319531	0.363211	0.547567	0.504812
Sum	16804.50	119.4200	136.6500	105.0600
Sum Sq. Dev.	23270443	71.66218	441.5049	56.82017
Observations	16	16	16	16

The above Table 1 shows the descriptive statistics for this study. The Mean score, Median Maximum, Minimum, Standard deviation, Skewness and Kurtosis etc are shown above. Foreign Direct Investment FDI has a 1050.281 a standard deviation of 1245.537 and a positive skewness of 0.794295. Exchange Rate (EXR) has a Mean of 7.463750, a standard deviation to the right of the Mean of 2.170000. Interest Rate (INT) has a Mean of 8.540625 with a positive standard deviation of 5.425280. Inflation (INF) has a Mean of 6.566250,

a standard deviation to the right side of the Mean of 1.946281. The main statistics of interest, the Jarque-Bera statistics which is used to establish the normality or otherwise of a time series data indicate that the Jarque–Bera test probability values are greater than 0.05 i.e ($p > 0.05$) for all the variables of the study, implying that the data is normally distributed. The descriptive statistics gives an indication of the spread of the data collected. The Mean, the standard deviation and other test statistics indicates a good spread of the data collected.

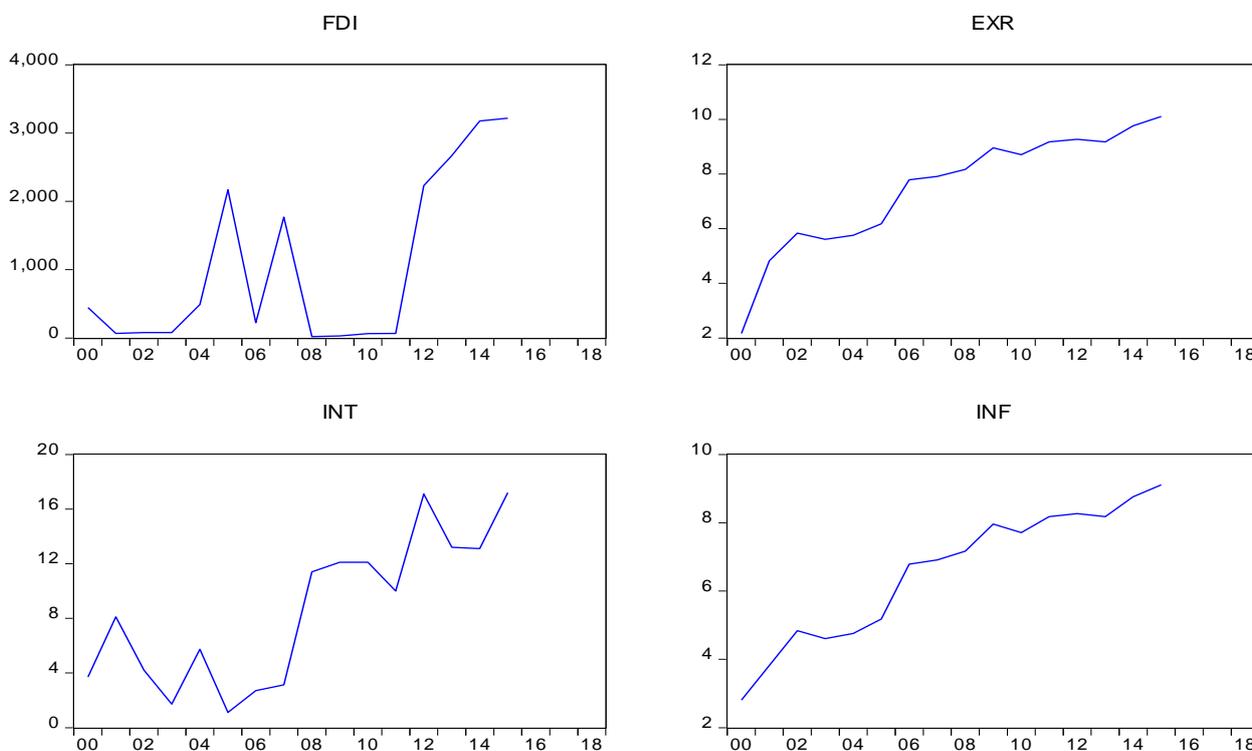


Figure 1: Trend analysis

The above graph shows trend analysis of the variables as they move from one year to the other during the study period. The graph of the Foreign Direct Investment (FDI) against year shows that the FDI rose from 2002 to a considerable height and dropped steadily from the start point in 2005 and rose gradually in 2011 to its highest in 2014. This oscillation in the level of the FDI can be linked to the changes in factors that affects FDI such as those examined in this study.

Exchange rate rose from 2000 as shown by the trend in the graph to its peak in 2018. This fluctuation in movement of the variables over time indicates the kinds of decision made by management on the capital structure of the company. From the graph, the company was not faring well in the utilization of their capital structure as several factors influenced

the downward spiral movement of the various variables of the capital structure under study.

This rise could also have been occasioned by government policies outside the control of management such as exchange rate, interest on loan, inflation and change of government that comes with variations in prevailing economic changes.

Testing for Unit Root (ADF-Test):

The unit root test is motivated by theory; it will be one test in combination with other tests to establish the stationarity properties of the data and to satisfy the basic assumption for the test statistics adopted for this study. Testing for the order of integration is standard in applied econometric work at different levels of integration.

Table 3: Augmented Dickey-Fuller Test (ADF) at Level

Variables	ADF	5% Critical Value	Integration Order
FDI	-2.458356	-3.144920	I (0)
EXR	-3.236193	-3.081002	I (1)
INT	-1.122403	-3.081002	I (0)
INF	-1.743792	-3.081002	I (0)

Source: E-views 9.0 result computation, 2019.

The unit root test using Augmented Dickey Fuller test (ADF) shows that Foreign Direct Investment (FDI) Interest Rate (INT) and Inflation (INF) were all stationary at levels and are integrated of order [I

(0)]. This implies that the null hypothesis of non-stationary for all the variables at levels is rejected for Inflation (INF).

Table 2: Augmented Dickey-Fuller Test (ADF) at First Level

Variables	ADF	5% Critical Value	Integration Order
FDI	-5.731072	-3.098896	I (1)
EXR	-5.030261	-3.098896	I (1)
INT	-5.223546	-3.098896	I (1)
INF	-4.122540	-3.098896	I (1)

Source: E-views 9.0 Result Output, 2019.

The unit root test using the Augmented Dickey Fuller (ADF) test statistics shows that all the variables FDI, EXR, INT, INF were all stationary at first difference and integrated of order [I (1)]. This implies that the null hypothesis of non-stationarity for all the variables at first difference is rejected. Hence we can proceed to investigate the longrun relationship of the variables of our study using the test statistics proposed by Kao Cointegration.

Johansen co-integration test

Once variables have been classified as integrated of order I (0), I (1), I (2) and so on it is possible to set up models that lead to stationary relations among the

variables, and where standard inference is possible. Testing for co-integration is a necessary step to modeling meaningful empirical relationships. If variables have different trends processes, they cannot stay in fixed long-run relation to each other, implying that you cannot model the long-run, and there is usually no valid basis for inference based on standard distributions. If co-integration does not exist at levels, it is necessary to continue to work with variables in differences instead.

The method used in this study is known as Kao cointegration test is presented in the following tables:

Table 3: Unrestricted Co-integration Rank Test (Trace)

Date: 06/24/19 Time: 04:09					
Series: FDI EXR INT INF					
Sample (adjusted): 2000 2015					
Dependent	tau-statistic	Prob.*	z-statistic	Prob.*	
FDI	-2.293339	0.7774	-8.872804	0.0290	
EXR	-7.095302	0.0022	-17.01798	0.0988	
INT	-3.019947	0.466	-12.14336	0.4310	
INF	-5.479048	0.0222	-16.48420	0.1222	
*MacKinnon (1996) p-values.					
Intermediate Results:					
		FDI	EXR	INT	INF
Rho - 1		-0.591520	-1.134532	-0.809557	-1.098947
Rho S.E.		0.257930	0.159899	0.268070	0.200573
Residual variance		1027231.	0.042902	12.11768	0.046202
Long-run residual variance		1027231.	0.042902	12.11768	0.046202
Number of lags		0	0	0	0
Number of observations		15	15	15	15
Number of stochastic trends**		4	4	4	4
**Number of stochastic trends in asymptotic distribution					

The result of the Kao cointegration shows that there is two co-integrating equation in the systems respectively. This is indicated by two co-integrating equation found in the systems of equation. This is because the probability value of the estimate is less than 0.05. This implies that the null hypothesis is of no co-integration is rejected. Testing for co-

integration is a necessary step to modeling meaningful empirical relationships. In the presence of co-integration, the long run relationship between the dependent and the independent variables of the study can be obtained from the shortrun equation of the vector error correction estimates as it contains both the longrun and shortrun equations.

Table 5: Vector Error Correction Estimates

Vector Error Correction Estimates	
Date: 06/24/19 Time: 04:20	
Sample (adjusted): 2000 2018	
Included observations: 16 after adjustments	
Standard errors in () & t-statistics in []	
Cointegrating Eq:	CointEq1
FDI(-1)	1.000000
EXR(-1)	-.2466728
	(1.89954)
	[12.9859]
INT(-1)	.4742175
	(6.53291)
	[7.25891]
INF(-1)	.2337553
	(1.86053)
	[-12.5639]
C	2.775377

Source: E-views 9.0 Result Output, 2019

A) Exchange Rate (EXR):

$$FDI_{t-1} = 2.77539 + 0.2466728EXR - 0.4742175INT - 0.2337553INF$$

As shown by the result of the long-run relationship between the dependent variable and the independent variables, there is a positive relationship exist 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. It means that a unit increase in Interest Rate (EXR) by one unit will lead to a corresponding increase in Foreign Direct Investment (FDI) by 47.42%.

Using the t test criteria of the longrun equation for model (that is $t_{cal} = 12.9859$) is greater than $t_{tab} = 2.101$ @ df 17), we reject the null hypothesis. That is, we accept that the estimate b_1 is statistically significant at the 5% level of significance. This implies that Interest Rate has a significant effect on the Foreign Direct Investment in Nigeria.

b) Interest Rate (INT):

$$FDI_{t-1} = 2.77539 + 0.2466728EXR - 0.4742175INT - 0.2337553INF$$

The longrun co-integrating equation shows that a negative relationship exist between Interest Rate (INT) and Foreign Direct Investment (FDI) and the result is not statistically significant (as $t_{cal} = -12.5639$ is greater than $t_{tab} = 2.101$ @ df 17). This is in line with our economic and theoretical *a priori* expectation. The result shows that in the long run, a unit increase in Interest Rate (INT) will result in a corresponding increase in Foreign Direct Investment (FDI) by a significant value of 47.22%. This means that in the long run, higher Interest Rate (INT) will lead to a very significant increase in the FDI. This result is an indication of the role of Interest rate on foreign direct investment in Nigeria.

Using the t test criteria of the longrun equation for Interest rate (that is $t_{cal} = 7.25891$) is greater than $t_{tab} = 2.101$ @ df 17), we therefore reject the null

hypothesis. That is, we accept that the estimate b_2 is statistically significant at the 5% level of significance. This implies that Interest rate has a significant effect on the Foreign Direct Investment.

c) Inflation (INF):

$$FDI_{t-1} = 2.77539 + 0.2466728EXR - 0.4742175INT - 0.2337553INF$$

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 increase in Foreign Direct Investment by GDP by 23.37%. This relationship is statistically significant ($p < 0.05$) (as $t_{cal} = -12.5639$) is less than $t_{tab} = 2.101 @ df 17$) and in line with our *a priori* expectation. This means that a unit increases in the Inflation will decrease Foreign Direct Investment (FDI) by 23.37%.

Using the t test criteria of the longrun equation for External Debt (that is $t_{cal} = -12.5639$) is less than $t_{tab} = 2.101 @ df 17$), we therefore accept the null

hypothesis. That is, we accept that the estimate b_3 is not statistically significant at the 5% level of significance. This implies that Inflation has no significant effect on the Nigerian economic growth.

Vector Error Correction Model:

Vector Error Correction Models (VECM) directly estimates the speed at which a dependent variable returns to equilibrium after a change in an independent variable. The error-correction parameters in our study E_{t-1} has the expected negatives sign.

The linkage between co-integration and error correction models stems from the Granger representation theorem and it states that two or more integrated time series that are co-integrated have an error correction representation, and two or more time series that are error correcting are co-integrated as represented by the equation below:

$$Y_t = \rho Y_{t-1} + \varepsilon_{t-1}$$

Table 6: Vector error correction model estimates

Variable	Coefficient	Std. Error	t-statistic
ε_{t-1}	-0.723494	0.02317	-1.01414
D(EXR-1)	-0.480029	3.46834	-1.38419
D(INT-1)	3.581738	8.37507	0.42767
P (INF-1)	0.4626298	0.334898	1.38140
C	0.2951570	0.350440	0.84225

Source: E-View 9.0 Output, 2019

Table 6 shows the results of estimating the Error Correction modeling (ECM) of our research model. The short run coefficient of Exchange rate (EXR) is negatively signed while Interest Rate and Inflation are all positively signed and not statistically significant (as t_{cal} is less than $t_{tab} = 2.101 @ df 17$). This indicates that even though there are positive relationships between the variables of the study (INT & INF), these positive relationship were not statistically significant in the shortrun. Hence,

policy geared toward improving the above variables will have a negative effect on Foreign Direct Investment (FDI) but will not be statistically significant in the shortrun. The negative sign of (-0.723494) of the error term indicates that a long-run equilibrium characterized the relationship among the variables FDI, EXR, INT & INF. The coefficient for error term (ε_{t-1}) - 0.7294 implies that the system corrected its previous disequilibrium period due to

positive or negative shocks in one period at an adjustment speed of 72.35 percent annually.

Conclusion:

An effective foreign exchange rate management together with interest rate and inflation is expected to break the dominance of the oil sector, and give more opportunities to other sectors of the economy such as the manufacturing, agriculture, solid mineral mining etc and ultimately improve its balance of payment. FDI is an important avenue for investment in agricultural, manufacturing and transfer of technology to an economy. Though this study found that exchange rate fluctuation have a positive impact on foreign direct investment in Nigeria, however, a stable foreign exchange management is recommended in Nigeria so as to gain the benefit attached to the foreign direct investment. This can assist foreign investors to reduce their risks in investment.

It is recommended that the Central Bank of Nigeria should ensure that the domestic interest rates are favorable to foreign investors. With favorable interest rates, foreign investors will be willing to make more investment in the domestic market and hence lead to increase in FDI inflows to Nigeria. Also, the Central Bank of Nigeria should strive to maintain desirable exchange rates. The government should seek to stabilize exchange rates, through adoption of sound fiscal and monetary policies. This will also stimulate wider participation by private sector in economic growth and increase in FDI.

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Corresponding Author: Benson Emmanuel

Email ID: krisik25@gmail.com

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