

Effects of Exchange Rate Fluctuations on Foreign Direct Investment in Nigeria between 2001 And 2015

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Abstract: This study examined the effect of foreign exchange rate fluctuations on foreign direct investment in Nigeria from 2001 to 2015. The study adopted a quasi-experimental research design considering the fact that a time series data were analyzed. The secondary data for analysis were extracted from CBN publications. A regression model was formulated to provide empirical illustration of the causal relationship and effect of exchange rate fluctuations and inflation rate on foreign direct investment. The Augmented Dickey Fuller Stationary Test, the Johenson Co-Integration Test, The Vector Auto regression Wald Test and the Granger Causality test were all conducted using Eviews 7.0. The study reveals a unidirectional causality run from exchange rate fluctuation to foreign direct investment inflow into Nigeria, and no causality run between Inflation Rate (INFR) and Foreign Direct Investment (FDI). Based on the findings of the study, it was recommended that Government policies be geared towards currency appreciation, and, Business Cycles be monitored and trade balances pursued in order to reduce currency risk and create a stable currency quote in the naira.

Keywords: Exchange Rate, Foreign Direct Investment, Inflation Rate, Currency Risk, Currency Appreciation, Currency Quote.

Introduction

Inflationary pressure from exchange rate instability and fluctuations in Nigeria has caused a serious concern for economists, monetary theory authorities and policy analyst (Akpan, 2014). As major instruments for measuring economic performance, the adverse consequences of exchange rate and inflation rate has in recent times heightened the worries of the public as to the fate of the Nigerian economy in the nearest future.

An investigation into the causal relationship between Foreign Direct Investments (FDI) and exchange rate fluctuation is of great essence. Dixit and Pindyck (1994), in their irreversibility literature established the existence of a negative relationship between exchange rate volatility and FDI. Stream of profits accruing from investment become risky and uncertain in countries with high incidence of exchange rate volatility, and to the extent that this investment remains considerably non-reversible, there is need to ensure that adequate information is obtained regarding inflation rate vis-à-vis investment (Foad, 2005). In a situation where a certain number of potential direct investments is known, countries with a high rate of currency exposure and fluctuations will be suppressed by countries with more stable currencies in terms of FDI volume. Osinubi and Amaghionyeodiwe (2009), agreeing with Foad (2005) further added that Nigeria, despite having over 130 million population, endowed with both human and natural resources, with single largest indigenous market in Sub-

Saharan Africa which can induce both domestic and foreign investment, is one of the countries facing increased rate of currency exposure (Central Bank of Nigeria, 2004).

Babatunde, A. M., Adenikinju, O., and Adenikinju, A. (2010) assert that fluctuation of exchange rates account for economic instability in developing nations like Nigeria. Their position as presented in their work provoked monetary agencies of developing countries to come up with adhoc economic models that will help to sustain the equilibrium between exchange rates and other economic variables such as inflation. Unfortunately, exchange rate stability has not been achieved by the application of these intervention mechanisms thereby, leaving much to be desired.

Qi (2007) posited that Foreign Direct Investment enhances development by directly improving capital formation in the country it is received, and indirectly augment human capital development and employment, which facilitates healthy competition and transfer of technology amongst countries. This is the economic rationale whereby nations seek to attract foreign direct investment always. Yet, despite the efforts of the Nigerian policy makers to induce the optimum foreign direct investment needed to be at par with the developed nations, there still exist great difficulties in the trend of FDI inflows. This trend is worrisome, and gives very little or no chances of economic growth and development of the Nigerian economy.

Meanwhile, there has been a vast strand of literature buttressing the impact of, and relationship between exchange rate fluctuations and FDI, yet; the results obtained from the several studies conducted vary significantly.

The studies of Obiora and Igue, (2006); Udoh and Egwaikhide, (2008); and Kyereboah-Coleman and Agyire-Tettey, (2008) found a negative significant relationship between exchange rate fluctuations and FDI. Some others like that of Osinubi and Amaghiyoeodiwe, (2009) have suggested the existence of a positive significant relationship between these variables, and still others such as that of Omorokunwa and Ikponmwosa, (2014) found out that no relationship exist at all.

Therefore, this study is to expand the frontier of knowledge and shed light on future works by investigating the impact of fluctuations or uncertainties in exchange rate on FDI in Nigeria from 2001 to 2015.

Research Questions

To achieve this objective, the following questions were posed to;

- what extent does Exchange Rate Fluctuations affect FDI inflows in Nigeria?
- what extent does Inflation Rate affect FDI inflows in Nigeria?

Research Hypotheses

In answering these questions, two propositions were formulated.

Ho₁: Exchange Rate Fluctuation does not have a significant effect on Foreign Direct Investment inflows into Nigeria

Ho₂: Inflation Rate does not have a significant effect on Foreign Direct Investment inflows into Nigeria

Literature Review

FDI could be seen as the transfer of capital resources that involve both ownership and control between countries. It serves as key stimulus for international economy and globalization. To both the host and home countries, FDI is essential and a major driver of economic developments. In developing economies, FDI is also considered as a booster of economic growth. This is as a result of the fact that it influences economic growth by strengthening domestic investment, enhancing capital formation as well as, ensuring transfer of technology among countries (Falki, 2009).

Khan (2007) claims that despite the fact that developing countries share in the global distribution of FDI, their FDI portion has remained insignificant or even decreasing. Falki (2009), highlighted employment increase, augmented productivity, improved exports and high rate of technology transfer as major effects of FDI on the host economy. He further claimed that the possible benefits that the host economy could derive from FDI include the facilitation of the exploitation and use of local natural resources, introduction of current tools of organization and

advertising, creation of easy access to modern skills, provision of external inflows that can be used for funding current account deficits, and the provision of a platform for increasing the stock of human capital via on-the-job training.

Exchange rates can be defined as the domestic currency price of a foreign currency. He maintains that exchange rates alongside their levels and fluctuations significantly influence FDI activity (Odili, 2014). The total amount involved in foreign direct investment per time, and the apportionment of the investment expenditure through a number of countries, can be significantly influenced by exchange rate (Goldberg, 2006). In a situation where currency declines in value in relation to the value of another country's currency, i.e. currency depreciation, FDI tends to suffer two implications as a result of the exchange rate fluctuation. Firstly, the country's earnings and production expenditure reduce in relation to her foreign counterparts. Secondly, if every factor remains unchanged, the country whose currency depreciates has enhanced "locational advantage" or advantage as a location for attracting productive capacity investment. Depreciation in exchange rate leads to an improvement in the overall rate of return, through "relative wage" channel to foreigners who are considering foreign investments in this country (Goldberg, 2006).

The theoretical arguments linking exchange rate volatility or fluctuations to FDI have been spearheaded by two strands of arguments: production flexibility arguments and risk aversion arguments. According to production flexibility arguments, exchange rate volatility increases foreign investment because firms can adjust the use of one of their variable factors following the realization of nominal or real shocks. This argument relies on the assumption that firms can adjust variable factors, for the argument would not hold if factors were fixed. According to the risk aversion theory, FDI decreases as exchange rate volatility increases. This is because higher volatility in the exchange rate lowers the certainty equivalent expected of exchange rate. Certainty equivalent levels are used in the expected profit functions of firms that make investment decisions today in order to realize profits in future periods (Campa, 1993). Goldberg and Kolstad, (1995) extend this claim to include risk-neutral firms by using the argument of future expected profits. He hypothesizes that as investors are concerned with future expected profits, firms will postpone their decision to enter as the exchange rate becomes more volatile. Risk neutral firms will thus be deterred from entering foreign markets in the presence of high levels of exchange rate uncertainty. The theoretical result is confirmed empirically for inward investment to the US in the wholesale industries, particularly in cases where the sunk costs of entry are high. Goldberg and Kolstad (1995) note that when evaluating risk-aversion approaches versus production flexibility

approaches it is important to distinguish between short-term exchange rate volatility and long-term misalignments.

Risk-aversion arguments are more convincing under short-term volatility because firms are unlikely to be capable of adjusting factors in the short-run. In the short-run, factors of production are usually fixed, and as a result firms will only be risk-averse to volatility in their future profits. However, the production flexibility argument appears convincing under the long-term misalignments because firms are now able to adjust their use of variable factors (Jayaratnam 2003).

Nazima (2011) empirically studied the impact of exchange rate volatility on foreign direct investment in the Pakistan economy. He adopted data on time series from secondary sources between the period 1980 and 2010. In finding both short and long run estimates of his study, the Auto regressive distributed lag (ARDL) was employed, and in finding the direction of causality existing between exchange rate fluctuation and FDI, the multivariate vector error correction method (VECM) causality test was conducted. The results of his study revealed that FDI inflow is impacted negatively on a short run, and positively on a long run by exchange rate volatility.

Yousaf, S., Shahzadi, I., Kanwal, B. and Hassan, M. (2013) examines the extent to which exchange rate volatility impacts on FDI in Pakistan within the period 1980 and 2011. The OLS regression model and volatility analysis was adopted in this study. Their findings revealed that while exchange rate has a significant positive relationship with FDI, exchange rate volatility and inflation alter FDI volume.

Ogunleye (2008) in his study on FDI and exchange rate nexus in Sub Saharan Africa, examined the region, by employing time series and panel model estimation techniques to test data in nine countries within the region. The results of his study found that FDI inflows are daunted by exchange rate volatility. In the same vein, Ogunleye (2009) used a two stage least square methodology in testing the correlation existing between the exchange rate and (FDI) inflows in sub-Saharan African countries using Nigeria and South Africa as case study. The study revealed that Foreign Direct Investment (FDI) inflow is granger caused by exchange rate volatility, and FDI inflows granger causes exchange rate volatility in Nigeria. When these results were compared with South Africa, it was discovered that the relationship is however weak.

Alaba (2003) in his attempt to investigate the effects of exchange rate volatility on FDI in Sub Sahara African (SSA) countries, adopted both GARCH measure of volatility and the error correction methodology. Findings of his study officially revealed that in both agricultural and manufacturing sectors, market exchange rate volatility does not significantly influence FDI inflows.

Omorokunwa and Ikponmwoosa (2014), after a plethora of initial investigations which include the Engle and Granger two-step co-integration procedure, and the

Augmented Dickey Fuller (ADF) test for stationarity, later applied the Error Correction Model (ECM), to test the association between exchange rate instability and foreign direct investment in Nigeria between 1980 and 2011. The result revealed that Foreign Direct Investment (FDI) is not significantly affected by exchange rate instability in the short run, but very significantly in a long run.

Aliyu (2009), on the basis of quarterly observations, adopted standard deviation degree of exchange rate instability in assessing the extent to which non-oil flows in Nigeria has been affected by exchange rate volatility between 1986-2006. The statistical results of the study showed that non-oil exports is reduced by exchange rate instability in Nigeria.

Osinubi and Amaghioyodiwe (2009) empirically tested how exchange rate fluctuations influence Foreign Direct Investment (FDI) in Nigeria. Applying the error correction technique and OLS model on time series data obtained from secondary sources from 1970 to 2004, the results revealed that investors' decision is not significantly influenced by exchange rate fluctuations. The study also revealed that a significant positive association exist between real inward FDI and exchange rate.

Obiora and Igue (2006) examined the possible impact of exchange rate fluctuations on foreign direct investment in Nigeria. The findings of their investigation showed that Nigeria's export to the US has been significantly influenced by exchange rate instability.

Udoh and Egwaikhide (2008) employed the GARCH model to empirically measure the impact of exchange rate fluctuations on FDI in Nigeria from 1970 to 2005. Their study revealed that inflation fluctuations and exchange rate volatility negatively affect FDI in Nigeria.

Research Methodology

This study adopts a quasi-experimental research design. This research design is useful considering the fact that the researcher intends to analyze a time series data spanning from 2001 to 2015. This design, however, relates to the setting up of a specific kind of test where there is no absolute control over the distribution or treatments of factors that are being investigated. Also, another special component usually included in this investigation method is the use of time series examination. Finally, in longitudinal researches involving stretched time periods, this design is useful.

The data set for this study constitute the annual data spanning from 2001 through 2015 from various sources such as the CBN Statistical Bulletin, CBN Financial and Banking Indicators, World Bank Development Report. Other relevant materials were gotten from the reviewed literatures of studies done by scholars in this area of study.

An empirical investigation of the impact of exchange rate fluctuation on Foreign Direct Investment inflows has often been accomplished using regression analysis. The regression analysis is hinged on the

assumption that this model is a good fit and the nature of causality relationship is determined in the model. This study therefore employed the Vector Auto-Regression Estimate (VAR) and Granger Causality to test the causal relationship between exchange rate fluctuation, inflation rate and FDI in Nigeria between 2001 and 2015

The functional form in which the model based is stated thus:

$$FDI = f (EXRF, INFR) \text{ -----(1)}$$

Equation 1 can be stated explicitly as:

$$FDI = \beta_0 + \beta_1 EXRF. + \beta_2 INFR. + U \text{(2)}$$

Where:

FDI = Foreign Direct Investment

EXRF = Exchange Rate Fluctuations

INFR = Inflation Rate

β_0 is constant, β_1 and β_2 are coefficients, while U is the Stochastic Error Term.

Results and Discussion

Data collected for this study are presented in the table below:

Table 1

YEAR	FDI (N)	EXR (N)	INFR (%)
2001	4,937.00	111.93	18.87
2002	8,988.50	121	12.88
2003	13,531.20	129.3	14.03
2004	20,064.40	133.5	15
2005	26,083.70	131.66	17.86
2006	41,734.00	128.65	8.22
2007	4,324.86	134.05	5.42
2008	4,659.16	132.37	11.58
2009	3,810.25	132.6	12.54
2010	3,810.25	148.68	13.72
2011	5,304.11	146.2	10.8
2012	3,199.89	150.2	12.2
2013	6,740.00	156	10.67
2014	4,700.00	188.45	8.5
2015	3,400.00	258.3	8.3

Table 2. Summarized Results of Augmented Dickey Fuller (ADF) Test

VARIABLES	LEVEL		FIRST DIFF		Order of Integration	Conclusion
	ADF Test	Critical Value (5%)	ADF Test	Critical Value (5%)		
FDI	-2.085479	-3098896	-4.267371	-3.119910	1	1(1)
EXRF	-2.830036	--3098896	-3.646143	-3.144920	1	1(1)
INFR	3.978173	-3098896	1.171226	-3.144920	1	1(0)

Source: Author’s Computation, 2016

The result of the ADF test presented in table 1 reveals that the time series data of INFR was stationary or has no unit root at level. The null hypothesis of the unit root property of INFR was rejected at level since the Absolute ADF test value > Absolute critical value at 5%. The time series data

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In 2002,EXR increased by 8% from N111.93 in 2001 while INFR reduced by approximately 32% from 18.87 in the same year. There was a steady increase in the EXR from 2001 to 2005 before it fell from N131.66 to N128.65 in 2006 and quickly increased by 4% in 2007. EXR became relatively stable between the period 2008 and 2010 before witnessing a steady and astronomical increase from N146.2 in 2011 to N258.3. In the same vein, INFR reduced initially by 32% in 2002, increased to 14.03 by 9% approximately in 2003, increased steadily to 17.86 in 2005 and then fell sharply by 54% to 8.22 in 2006. This fall in INFR continued up to 2007 before sharply increasing by 114% to 11.58 in 2008 and from then to 2010, there was a steady increase until 2012 when it became constantly decreasing to 8.3 in 2015.

FDI increased by 82% from N4.9 billion in 2001 to N8.9 billion in 2002, and steadily increased to N41.7 billion in 2006. There was however, a sharp fall by approximately 90% to N4.3 billion in 2007. This fall remained steady until 2013 when it briefly increased by 109% to N6.7 billion from N3.2 billion in 2012. From 2013 to 2015, FDI reduced steadily from N6.7 billion to N3.4 billion respectively.

From the foregoing, we have observed that both FDI, EXR and INFR fluctuate throughout the period, 2001 to 2015 and this paper seeks therefore, to explore the extent to which the EXR and INFR fluctuations significantly account for FDI fluctuations.

The Augmented Dickey Fuller (ADF) Test was employed to first examine the stationarity in the serial data of variables, before proceeding to test for co-integration, VAR and Granger Causality. This unit root testing was applied at level and at first difference to ascertain the order of integration of the time series data. The tests were performed using Eviews 7.0 to automatically select the number of lagged variables with a view to remove autocorrelation. The result is presented below:

of FDI and EXRF were stationary a first difference, where the Absolute ADF test values exceeded their Absolute critical values @ 5%.

Two statistical tests were carried out to test the existence of long-run equilibrium between the series in the model.

Table 3. Johenson Co-Integration Test result (Trace)

Hypothesized	Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.923247	45.10200	29.79707	0.0004
At most 1	0.466727	11.72886	15.49471	0.1704
At most 2*	0.239287	3.555488	3.841466	0.0493

Trace test indicates 2 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

Source: Eviews 7.0

Table 4. Johenson Co-Integration Test result (Maximum Eigenvalue)

Hypothesized	Max-Eigen	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.923247	33.37314	21.13162	0.0006
At most 1	0.466727	8.173375	14.26460	0.3613
At most 2*	0.239287	3.555488	3.841466	0.0493

Max-eigenvalue test indicates 2 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

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

Source: E-views 7.0

From the tables above, the trace test gave 2 co-integrating equations and the maximum eigen value also gave 2. This means that at the 5% level of significance, there are co-integration vectors in the model, implying that there is a long term correlation between the variables. That is, a long term relationship exist between FDI and all the variables. By implication, this means that the dependent variable can be successfully projected applying a particular independent variable in a long run.

The Wald Test was performed from the Vector Autoregression (VAR) Estimates. It was used to show the impact of a lagged independent variable on a dependent variable. By implication, the Wald Test was used to restrict unrestricted VAR coefficients, in order to identify whether the independent variables under study granger cause the dependent variable. In this study, e-views considered the coefficients on the 2-lagged values of EXRF and INFR.

Table 5. Wald Test showing whether the lagged values of EXRF Granger cause FDI

Test Statistic	Value	Df	Probability
Chi-square	79.09657	2	0.0000

Null Hypothesis: $D(EXRF(-1)) = D(EXRF(-2)) = 0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
D(EXR.F(-1))	-3874.102	436.1433
D(EXRF(-2))	-307.3656	454.7235

Restrictions are linear in coefficients.

Source: E-views 7.0

Table 6. Wald Test showing whether the lagged values of INFR Granger cause FDI

Test Statistic	Value	Df	Probability
Chi-square	1.298977	2	0.5223
Null Hypothesis: INFR (-1) = INFR (-2) = 0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)	Value	Std. Err.	
INFR(-1)	0.000136	0.000335	
INFR(-2)	0.000247	0.000317	

Restrictions are linear in coefficients.

Source: E-views 7.0

In table 5 above, a chi-square value of 79.09657 and probability value of $0.0000 < 0.05$ alpha level provides enough evidence to reject the null hypothesis. The results of the coefficients of the lagged EXRF variable in the model show a negative relationship with FDI inflows. Thus, the Wald Test result shows that lagged EXRF negatively influences FDI significantly.

In Table 6 above, a chi-square value of 1.298977 and probability value of $0.5223 > 0.05$ alpha level provides enough evidence not to reject the null hypothesis. The

results of the coefficients of the lagged INFR variable in the model show a positive relationship with FDI inflows. Thus, the Wald Test result shows that lagged INFR does not cause FDI.

To further validate the Wald Test, the pairwise granger causality test was used to test the existence of a bilateral directional relationship between all variables. Since the series of INFR were stationery at level, and that of FDI and EXRF were stationery at first difference, the granger causality was employed.

Table 7. Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
D(FDI) does not Granger Cause D(EXRF)	12	1.29388	0.3325
D(EXRF) does not Granger Cause D(FDI)		29.3678	0.0004
INFR does not Granger Cause D(EXRF)	12	0.02897	0.9716
D(EXRF) does not Granger Cause INFR		0.48082	0.6373
INFR does not Granger Cause D(FDI)	12	0.08961	0.9153
D(FDI) does not Granger Cause INFR		0.16352	0.8523

Source: E-views 7.0

Results in table 7, revealed that a unidirectional causality runs from EXRF to FDI, with no directional causality running from INFR to FDI, or from FDI to INFR. EXRF granger causes FDI and this is to say that Exchange Rate Instabilities have a significant negative impact on FDI inflows negatively. When fluctuations are high, there will be less flow of foreign direct investments into Nigeria. In the last three years, the Exchange rate of Dollar to Naira has risen from ₦156.00 in 2013, to ₦188.45 in 2014 and then ₦258.30 in 2015, while FDI value has persistently fallen from ₦6.7billion in 2013 to ₦4.7billion in 2014 and then to ₦3.4billion in 2015. Thus foreign exchange rate fluctuations explains the reason for the dwindling level of FDI in Nigeria.

The findings of our research prove that changes in the past values of EXRF can be used to explain changes in the present value of FDI in Nigeria. This result conforms to the empirical results of Obiora and Igue (2006), Udoh and Egwaikhide (2008), in the case of Nigeria; and Kyereboah-Coleman and Agyire-Tettey (2008), in the case of Ghana; and well as the claims of Benassy-Quere et al (2001) and Hubert and Pain (1999).

Conclusion

The study examined the impact of exchange rate fluctuation or change on FDI in Nigeria employing a time series data between 2001 and 2015. The Dickey Fuller test was applied in testing for the presence of stationarity in the series data

obtained from CBN. Having found the data stationary, the Johansen co-integration trace and Maximum Eigen value tests were employed to test for the existence of long-run relationship of the variables in the model. This was followed by the Vector Auto regression Estimate Wald Test to determine the relationship and impact of EXRF and INFR on FDI. The Granger Causality test was finally conducted to ascertain the directional causality of variables. The granger causality revealed a unidirectional causality run from EXRF to FDI, and no causality run between INFR and FDI. Thus it is concluded that while Foreign Exchange rate fluctuations cause and predict future flow of Foreign Direct Investment, Inflation Rate does not affect the inflow of foreign Direct Investment.

Recommendations

The following recommendations were made based on the research findings:

- i. The policies of government should be geared towards currency appreciation which will reduce the yearly fluctuations in foreign exchange rates
- ii. Business Cycles should be monitored and trade balances pursued in order to reduce currency risk and create a stable currency quote in the naira

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