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Exchange Rate Volatility and Foreign Capital Inflows in Nigeria (1990-2016) Cointegration, DOLS and Granger Causality Approach

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ABSTRACT:
The aim of this study is to examine the nexus between exchange rate volatility and foreign capital inflows in Nigeria. The results from the past empirical studies about this subject matter have been controversial, which has created a gap in the literature. The study extracted data from CBN Statistical Bulletin and UNCTAD investment report from 1990-2016. Consequently, the findings that emerged in this work shows that cointegration test confirms the existence of long run equilibrium relationship among the selected variables. Foreign direct investment has a significant negative relationship with exchange rate in Nigeria. Ditto for external debt, though not significant. However, remittances and exchange rate volatility have a non -significant positive relationship with each other in the country. In addition, due to the important findings that originated from this work, the study makes the following recommendations for the policy makers, investors, future researchers and the general public. The significant negative impact of foreign direct investment on exchange rate volatility calls for the attention of the appropriate authorities in the Central Bank of Nigeria to develop a sound policy with adequate capacity to stabilize the exchange rate so that value of the country`s currency could be competitive in the global economy.

Keywords: *Exchange rate volatility, FDI, External debt and remittances*

INTRODUCTION

Foreign capital inflows is one of the most reliable means of bridging the deficiencies created by saving-investment gap in the domestic economy (Ellahi, 2011). Some of important components of foreign capital are foreign direct investment, foreign portfolio investment, overseas development assistance, external debt and remittances. Majority of developing countries have largely relied heavily on one or more of these components for their investment projects in the last few decades. In Nigeria, the inflows of foreign capital in 1960s and 70s, was more of overseas development assistance (ODA). A decade later, foreign capital inflows took another dimension which was in the form of foreign direct investment (FDI) and foreign portfolio investment (FPI). Meanwhile, debt crisis is one of the prominent problems confronting some African countries in which Nigeria is not insulated either. Continuous passage of deficit budgets in Nigeria has propelled the country to resort to external funds from various international lenders like London Club and Paris Club. It has been established that foreign capital in the form of external debt from 1999 to 2017, has increased sporadically from 2.577 trillion to over #15 trillion in the country (NBS, 2017). However, it has been recognized

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in the literature that the effect of massive capital inflows could adversely affect the exchange rate of the domestic country's currency which could bring about less competitiveness of its trade and worsen the current account balance in the long run (Ghosh, 2010, De Paula et al., 2012). Conversely, exchange rate volatility is the unusual movements of the exchange rate in an economy. A country`s exchange rate is one of the critical economic indicators that shows how its currency competes with the rest of the world. This is the reason why foreign investors and private individual usually factor in this variable in their daily investment decision and planning. Consequently, the implementation of the Structural Adjustment Program, in 1986, marked the genesis of exchange rate volatility in the country. Since then, it has been a serious challenge for policy makers in charge of monetary policies to come up with a vital policy measure to stabilize this variable in the country. The paradox of exchange rate control through monetary policy tightening is that this policy may cause additional inflow of foreign capital into the domestic economy because of higher returns on investment, this consequently exacerbates the level of current exchange rate.

In the recent time, Nigeria`s currency has been very volatile in foreign exchange market, and this has made naira to be continuously depreciated and unstable in the economy. The instability of Nigerian currency has generated the issue of concern among scholars in the literature. Similarly, an attempt to examine how exchange rate volatility affects foreign capital inflows has further sparked off debates among researchers and policy makers in the country. See (Ogunleye, 2008 Caruana, 2011; Osinubi and Amaghionyeodiwe, 2009; Udoh and Egwaikhide, 2008). However, the debate about the subject is still ongoing due to the inconclusive nature of the literature. Therefore, this study will move the frontiers of knowledge in this regard by examining the nexus between exchange rate volatility and foreign capital inflows in the country.

Literature Review

Theoretical Literature Review

One of the relevant theoretical thoughts for this is work is conceptualized in International Monetary theory (IMA) which was championed by Emerson. This theory posits if monetary union brings exchange rate stability in an economy, improvement in trade and investment should be the result. However, it was observed that volatility in exchange rate could bring adverse effect on FDI [Emerson, et al 1992]. In an attempt to test this theory empirically, Morsink and Molle (1992) found out that exchange rate volatility constituted an impediment to FDI flows between two economies. However, the rate of return theory on FDI submits that international differences in rates of returns on capital relative to the required rate of return is the motivating factor behind the inflows of cross border investment among the world economies. Based on this, it is expedient for capital to flow from economies with low rate of returns to the economies that possess higher rate of returns naturally. In another perspective, the Portfolio theory put forward by Tobin and Markowitz emphasizes that despite the fact that investors are normally driven by profit maximization, they can also minimize their risks through spreading of investment in different countries [Tobin 1958**,** Markowitz, 1959].

In addition, remittances of citizens in diaspora cannot be undermined whenever the issue of foreign capital inflow is raised in the literature. This suggests the inclusion of the theory of workers remittance in this work. Lucas and Stark (1985) opined in the implicit family agreement theory that family could sometimes agree to sponsor one of its members abroad with sole expectation of remittance in the form of both principal and interest when the fellow gains a lucrative employment in the foreign country. Meanwhile, Kaasschieter (2014) raised a contrary opinion by advancing motives behind workers remittances as the concern for the welfare of their family members and associates left behind in his or her home country. It is worth of note that these first two remittance theories are driven by consumption motive. However, investment driven motive behind remittance is the only factor that has the capability to advance economic growth. As a result of this the portfolio management decision theory of workers remittance surfaced in the literature. This theory considers a country`s macroeconomic indicators like interest exchange rate, rate, inflation rate and prevalent economic policies of both home and foreign countries as

the critical factors in which the migrant workers look before taking decision to remit fund home for the purpose of investment.

Empirical Literature

This section of the study presents a series of past empirical works relevant to exchange rate and foreign capital in developed, emerging and developing economies in general and Nigeria in particular.

In the work of Mireille (2007), the impact of the real exchange rate on manufacturing exports in Nigeria and Benin was examined. It was discovered that the overvaluation of exchange rates constituted a major restriction to the process of economy recovery of both Nigeria and Benin Republic. As it was suggested in the study the appropriate policy measures alongside with the devaluation of currency and upward adjustment in the domestic prices of tradable products could be an avenue to bring exchange rate to equilibrium and consequently boost the performance of the both economies selected for that study. In another study, Edwards and Levy-Yeyati (2003) embarked on a comparative analysis of countries that utilized flexible exchange rate vis-à-vis countries with fixed exchange. The author concluded that countries with more of flexible exchange rate have a faster growth pace than those that fixed their exchange rate. This connotes that a significant direct correlation exists between real exchange rate depreciation and faster economic growth. Similarly, Rogoffs and Reinhart (2003) juxtaposed that developing countries become relatively better off when embarking flexible exchange rate regimes. Aliyu et al (2009) adopted a vector Error Correction Model in examining exchange rate pass-through in Nigeria from 1986 to 2007. The paper posited that that exchange rate pass-through was low and decreasing in the country. This study partly contradicts the conventional proposition of the literature which states that exchange rate pass-through in developing countries is always significantly higher than those of developed ones. But, if the appropriate policy measure is put in place exchange rate pass through has the propensity to increase in the long run in the country. Consequently, Harris (2002) utilized the Generalized Least Square model to establish if real exchange rate is properly managed it could spur productivity and economic growth in both short and long run concurrently. This finding was in line with the competitiveness hypothesis, which argues productivity and growth could come from exchange rate depreciation in the short run. While investigating the link between exchange rate, inflation and output in Nigeria, Odusola and Akinlo (2001) employed a structural VAR model to corroborate that a negative impact of the parallel exchange rate is felt on output in the short alone. The results from the estimated model showed that the strategic sources of perturbations in the official exchange rate prices are parallel exchange rate and lending rate. Meanwhile, the prominent causes of inflation dynamics in the economy are output and parallel exchange rate. Hence, the study advocated for more serious policy measures by the Central Bank of Nigeria with a view to halting the parallel exchange rate behavior and facilitating the growth of income in the country.

Moreover, Due and Sen (2006) adopted a cointegration and granger causality techniques to examine a relationship between capital flows, real exchange rate, fiscal and monetary policy indicators and the current account surplus in India with a quarterly data from 1993:2 to 2004:1. It was concluded from the study that there exists a long run relationship between the selected variables of the study. Also, there was a unidirectional feedback from all of the studied variables to the real exchange rate in the country. In another study, Abdul (2009) verified the nexus between real effective exchange rate volatilities and capital inflows with the aid of granger causality test in Pakistan between 1991 and 2007. It was pinpointed from the study that a significant feedback relationship existed between foreign capital inflows and exchange rate volatility in the country. In another perspective, Chonnikara (2010) analyzed the how exchange rate volatility and foreign direct investment and portfolio flows to Thailand are related within the period of 2005 and 2009 with the application of a panel data. The author submitted that there was an existence of a negative relationship between exchange rate risk and foreign portfolio investment. This implies that each firm –specific foreign portfolio flow to Thailand is lowered due to high exchange rate risk. Meanwhile, Teddy (2015) estimated the link between exchange rate volatility and private

capital inflows in Zambia with the aid of GARCH model, Johansen cointegration test and error correction model. The result from that paper established that the nominal exchange rate volatility has a significant negative relationship with foreign portfolio investment flow in Zambia.

However, Nwosa and Amassona (2014) adopted both granger causality and error correction model to examine a relationship between capital inflows and exchange rate in Nigeria between 1986 and 2011. It was discovered that foreign portfolio inflows and exchange rate had an insignificant relationship with each other in the country. Guglielmo, Faek, and Nicola (2013) utilized GARCH-BEKK model to estimate the nexus between exchange rate uncertainty and different components of portfolio flows Australia, Japan, Uk, Canada and Sweden between 1988 and 2011. The results from the study indicated that exchange rate volatility and portfolio investment are inverse in some countries and direct in other countries. In the same vein, Odusola and Akinlo (2003) concluded that in the medium and long term, an expansionary output could emanate from exchange rate depreciation but in the short run reverse could be the case. While investigating the link between exchange rate fluctuation and economic growth in Nigeria from 1980 to 2010, Asher (2012) posited that real exchange rate and economic growth had a positive relationship with each other in the country.

In addition, Udoh and Egwaikhide (2008) employed GARCH model to evaluate the link between exchange rate volatility, inflation uncertainty and foreign direct investment in Nigeria between 1970 and 2005. The estimated result established that the influence of exchange rate volatility and inflation uncertainty was significantly negative on foreign direct investment. Also, it was recognized in the study that prominent determinants of FDI inflow in Nigeria are appropriate size of the government sector, infrastructural development and international competitiveness. While investigating the nexus between FDI and real exchange rate in some selected Sub-Saharan African (SSA) nations, Ogun, Egwaikkhide and Ogunleye (2012) utilized Granger causality and simultaneous techniques to assert that FDI flows are real exchange rate movements sensitive in the continent. Also, there was an existence of statistically significant nexus between the two variables.

Consequently, from the above reviewed studies, one could pinpoint that literature on exchange rate volatility and foreign capital is ongoing in Nigeria, and their results are still inconclusive in the country. Therefore, the relevance of this work.

RESEARCH METHOD

This study makes use of secondary data from 1990 to 2016. Data on external debt, remittances and exchange rate were sourced from CBN Statistical Bulletin Meanwhile, data on FDI was extracted from UNCTAD database published by World Bank.

Model Specification

The model for this study can be specified in the general form as follows:

EXR = F (FDI, REMT, ExtDEBT,)………… (1)

Model (I) can be linearized to form model as follows.

$EXRt = \beta_1 + \beta_2$ LnFDIt $+ \beta_3$ LnREMTt $+ \beta_4$ LnExtDEBTt $+ \mu_i$ ………………………….. (2)

It is expected that coefficient of the variables to have the following signs: $\beta_{2<0}, \beta 3_{>0}, \beta_{4>0}$

Where

EXR denotes exchange rate volatility.
FDI means Foreign Direct Investment.
ExtDEBT stands for external debt.
REMT means remittances from overseas.
ui is error term and t =1990-2015.

The Direction of Causality between Capital Flow and Exchange Rate Volatility in Nigeria

Furthermore, in analyzing the feedback effect among all the selected variables, this study made use of pairwise granger causality by estimating the VAR model in equation (c-f) which states thus;

$$EXR_t = \alpha_0 + \sum_{i=0}^{p} \alpha_1 FDI_{t-1} + \sum_{i=0}^{p} \alpha_2 ExtDEBT_{t-1} + \sum_{i=0}^{p} \alpha_3 REMT_{t-1} + \sum_{i=0}^{p} \alpha_4 EXR_{t-1} + \varepsilon_{1t} \ldots\ldots (3)$$

$$FDI_t =+ \beta_0 + \sum_{i=0}^{p} \beta_1 FDI_{t-1} + \sum_{i=0}^{p} \beta_2 EXR_{t-1} + \sum_{i=0}^{p} \beta_3 ExtDEBT_{t-1} + \sum_{i=0}^{p} \beta_4 REMT_{t-1} + \varepsilon_{2t} \ldots\ldots\ldots\ldots\ldots\ldots \quad (4)$$

$$REMT_t = \gamma_0 + \sum_{i=0}^{p} \gamma_1 FDI_{t-1} + \sum_{i=0}^{p} \gamma_2 REMT_{t-1} + \sum_{i=0}^{p} \gamma_1 ExtDEBTI_{t-1} + \sum_{i=0}^{p} \gamma_3 EXR_{t-1} + \varepsilon_{3t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$$ExtDEBT_t = \gamma_0 + \sum_{i=0}^{p} \gamma_1 ExtDEBT_{t-1} + \sum_{i=0}^{p} \gamma_2 FDI_{t-1} + \sum_{i=0}^{p} \gamma_3 REMT_{t-1} + \sum_{i=0}^{p} \gamma_4 EXR_{t-1} + \varepsilon_{4t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

RESULTS AND DISCUSSION

Table 1 shows the descriptive statistics of the dataset employed for this work. This provides useful information about the mean, median, minimum and maximum values; and how the sample is distributed measured through the values of skewness, kurtosis and Jaque-Bera statistics. As indicated in table 1, the values of mean and median of FDI, external debt and remittances are very close. This shows that the distribution of the data is symmetrical to large extent. This is further justified by the argument of Karmel and Polasek (1980), who asserted that the values of mean, median and mode of dataset must be identical for such a set of data to possess a symmetrical distribution.

Table 1: Descriptive statistics of annual data series (1990-2016)

Descriptive Statistics	EXR	LFDI	LExtDEBT	LRMT
Mean	101.3211	1.816300	23.84834	1.936482
Median	120.9702	1.118452	24.09157	1.408133
Maximum	253.4923	22.21595	24.40959	24.27861
Minimum	8.037808	-0.442086	21.51535	-3.426120
Std. Deviation	66.66267	4.122966	0.597753	4.656975
Skewness	0.022722	4.726509	-2.405381	4.231533
Kurtosis	2.213479	23.94586	9.631635	21.25543
Jargue-Bera	0.698266	594.0994	75.51226	455.4947
Probability	0.705299	0.000000	0.000000	0.000000
Sum	2735.669	49.04011	643.9050	52.28500
Sum. Sq. Deviation	115541.7	441.9701	9.290012	563.8729
Observation	27	27	27	27

Source: Authors` Computation (2018), (UNCTAD, 2018, CBN, 2017)

Table 2: Unit Root Test

Variables	ADF Test			PP Test		
	Level	1st Difference	Remarks	Level	1st Difference	Remarks
EXTR	-2.981038**	-2.986225**	I (1)	-2.981038**	-2.986225**	I (1)
LFDI	2.9886201**	2.991831**	I (1)	2.976200**	2.991917**	I (1)
LExtDEBT	-2.981038**	-2.986225**	I (1)	-2.981038**	2.991823**	I (1)
LREMT	2.986215**	2.991803**	I(1)	2.986211**	2.991803**	I(1)

Source: Authors` Computation (2018) (UNCTAD, 2018, CBN, 2017) ** %5 level of significance

The data for this work were subjected to a unit root test through the standard Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The estimated results reported in table 2 clearly proved that the data employed are stationary after first differencing. This implies that the data used to capture the variables of interest are said to possess a unit root.

TABLE 3: Johansen Cointegration Test (Trace Statistics)

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.441390	38.05584	47.85613	0.2996
At most 1	0.389042	23.49825	29.79707	0.2224
At most 2	0.252723	11.18008	15.49471	0.2007
At most 3 *	0.144342	3.897100	3.841466	0.0484

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.441390	14.55759	27.58434	0.7823
At most 1	0.389042	12.31817	21.13162	0.5166
At most 2	0.252723	7.282984	14.26460	0.4562
At most 3 *	0.144342	3.897100	3.841466	0.0484

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LEXTDEBT	LFDI	LRMT	EXTR
2.382896	-0.621818	1.153867	0.003065
-0.244511	-3.167476	0.625960	-0.028352
2.756641	0.464806	-0.488047	0.012624
-0.938372	0.028468	-0.746708	0.019120

Unrestricted Adjustment Coefficients (alpha):

Source; Authors` computation (2018), (UNCTAD, 2018, CBN, 2017)

The diagnostic testing of the dataset shows that all the variables in the study are non-stationary variables. Though these variables might show some level of deviations in the short run, yet there is high tendency they possess some level of relationship in the long run. In order to investigate this long run equilibrium relationship, this paper utilized Johansen and Juselius (1990) cointegration approach whose Trace statistics and Maximum eigenvalue statistics can be estimated from the eigenvalues of the coefficient matrix. However, the results of the multivariate cointegration analysis as reported in the above table show the existence of at most two cointegrating vectors in the systems from the trace statistics and the maximal eigenvalue statistics model at a lag interval of 1 to 1. The implication of table 3, is that these variables of interest have a long run equilibrium relationship with one another which may likely show some adjustment to short run disequilibrium through one channel. As a result of this, dynamic ordinary least square would be estimated to examine the nature of long run relationship that exists among these variables.

The estimated results of the model is presented in table 4. It could be established that foreign direct investment and exchange rate have a significant negative relationship in the country. In another words, FDI has a significant negative impact on exchange rate in Nigeria. A unit change in FDI leads to a reduction in the value of naira by 0.8% on annual basis. This implies that volatility in exchange rates increases the level of uncertainty and risk factors which could serve as discouraging elements for the foreign investors to be actively involved in economic activities in the country. This finding is supported by Udoh and Egwaikhide (2008), similar result was also discovered by Ogunleye (2008), Nwosa and Amassoma (2014) although not statistically significant.

Similarly, exchange rate volatility and external debt have negative relationship in the country, though not statistically significant at 5% level of significance. As external debt changes by a unit in the country, it leads to 0.55% reduction in the value of the country`s currency. The implication of this is that exchange rate volatility increases the burden of external debt in the country. However, exchange rate volatility has a positive relationship with remittances in the country. Though this result is not significant at 5% level of significance. As remittance changes by a unit, exchange rate increases by 0.083%. In addition, the value of R-squared shows that 89% of the systematic variations in the dependent variable is jointly explained by the set of regressors in the model, leaving 11% unexplained due to random chance. The implication of this is that the model is good for the analysis of this work. However, the adjustment for the loss in the degree of freedom reduces the explanatory power to 77%.

Table 4: The impact of exchange rate volatility on foreign capital in Nigeria

Dependent Variable: EXR

Variable	Coefficient	t-statistics	P-value
LFDI	-80.02216	4.8	0.0006
LExtDEBT	-55.95768	1.7	0.1221
LRMT	8.344850	0.5	0.6523
C	1530.911	1.9	0.0872
R-Squared	0.891060		
Adjusted R-Squared	0.772216		

Source: Authors` computation (2018) (UNCTAD, 2018, CBN, 2017)

Table 5: Pairwise Granger Causality Test

Pairwise Granger Causality Tests
Date: 12/23/18 Time: 11:25
Sample: 1990 2016
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LFDI does not Granger Cause LEXTDEBT	25	2.99175	0.0530
LEXTDEBT does not Granger Cause LFDI		0.23154	0.7954
LRMT does not Granger Cause LEXTDEBT	25	0.71596	0.5008
LEXTDEBT does not Granger Cause LRMT		0.23685	0.7913
EXTR does not Granger Cause LEXTDEBT	25	2.97383	0.0540
LEXTDEBT does not Granger Cause EXTR		0.55397	0.5832
LRMT does not Granger Cause LFDI	25	0.13645	0.8733
LFDI does not Granger Cause LRMT		3.71383	0.0425
EXTR does not Granger Cause LFDI	25	0.93113	0.4105
LFDI does not Granger Cause EXTR		2.79571	0.0550
EXTR does not Granger Cause LRMT	25	2.57712	0.1010
LRMT does not Granger Cause EXTR		0.14270	0.8679

Source: Authors` Computation (2018), (UNCTAD, 2018, CBN, 2017)

In an attempt to examine the feedback relationship among exchange rate volatility, foreign direct investment, external debt and remittance, this study utilized a Pairwise Granger Causality Test. The estimated results reported in table 5 show among others that a unidirectional causality runs from foreign direct investment to external debt in Nigeria. In the same vein, exchange rate volatility granger causes external debt in the country. Also, there is a unidirectional feedback which runs from FDI to remittance and FDI granger causes exchange rate as well. However, no granger causal relationship between exchange rate volatility and remittance in Nigeria.

CONCLUSION

In this work, an attempt has been made in this paper to empirically investigate the relationship between exchange rate volatility and foreign capital in Nigeria over the period of 1990 to 2015. The summary of the findings that emerged in this work could be presented as follows: the results from the cointegration test confirmed that there is an existence of long run equilibrium relationship among the selected variables in this paper. Consequently, exchange rate volatility has a significant negative relationship with foreign direct investment and external debt in Nigeria, though not significant with external debt. However, remittances and exchange rate volatility have a non -significant positive relationship with each other in the country. Also, there is a unidirectional causality running from foreign direct investment to external debt. Exchange rate volatility granger causes external debt. Also, there is a unidirectional feedback which runs from FDI to remittance and FDI granger causes exchange rate as well, but there is no existence of causal relationship between exchange rate volatility and remittance in Nigeria.

RECOMMENDATIONS

However, due to the important findings that originated from this work, it is expedient for this study to make the following recommendations for the policy makers, investors, future researchers and the general public. Volatility in the exchange rate increases uncertainty and risk factors confronting foreign investors and thus, the inflows of cross border investment is adversely affected in the country. Therefore, the significant negative impact of exchange rate volatility on foreign direct investment calls for the attention of the appropriate authorities in the Central Bank of Nigeria to develop a sound policy with adequate capacity to stabilize the exchange rate so that value of the country`s currency could be competitive in the global economy.

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