Impact of Exchange Rate Volatility on Non-Oil Export Performance in Nigeria

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ABSTRACT

*This study empirically investigated the impact of exchange volatility on non oil export performance in
Nigeria. The objectives of the study are to determine the impact of exchange rate (naira/dollar) volatility to
Nigeria non oil export performance and the speed of adjustment using error correction method (ECM). The
study used annual data from 1981 to 2017. The Augmented Dickey Fuller test was used to check for the
presence of a unit root in the variables, and the cointegration was used to check if long-run relationship
exists among the variables in the model and was carried out using the Johansen technique. The Arch test
was used to test for the Arch effect (volatility) in the exchange rate. The ECM was used to determine the
speed of adjustment. From the results, it was found that exchange rate has an ARCH effect on non oil
export performance in Nigeria and more so, significantly and negatively on it. It was recommended that the
managers of the economy should apply policies that can stabilize the exchange rate as the sector has the
capability to generate jobs and reduce extreme poverty in the land.*

Keywords: *exchange rate, volatility, economy, export, performance*

INTRODUCTION

Nigerian economy before independence and
after independence depended largely on non oil
for her growth and development. Since the
discovery and export of crude oil in commercial
quantity in the late 60s to date, the economy has
been a mono-culture economy relying heavily
on oil as its major source of foreign exchange
earnings without any structural transformation
leading to the thought "if oil is a blessing or a
curse to Nigeria". The economy lives on the
mercy of crude oil earnings and crisis in oil
producing economies.

The implication of this dynamics is that the
economy is at the whims of the price of oil and
crisis in oil producing economies, which the
most part, has been volatiled and determining
Nigeria boom and recess (Enoma and Mustafa,
2011). The main issue on this mono-culture oil
economy is that the oil sector that produces
about 90% of export earnings are in the hands of
less than one percent of the Nigerian population
and dominated by expatriates and members of
the political class who control production and
the proceeds respectively. Worse still, the sector
is disconnected from other tiers and sectors of

the economy and thus offers little or no link and
multiplier effect to the economy as a whole. It
neither generates jobs nor reduces poverty in
real scene. (Onodugo, 2013) So the earlier the
managers of the economy get to know this fact
and fashion out good policies to grow the non-
oil export sector as it was immediately before
and after independence the better the economy
would have been. This period has been
adjudged as the best time in Nigeria history of
growth and development.

In order to cure this gross consequence of
dependence on mono cultured crude oil
economy, is the need and urgency to look
inward and find a possible way to diversify
Nigerian economy away from oil lead export
towards the direction of non-oil lead export
trade.

Advocates of this hypothesis believe that the
non-oil lead export trade has great potentials to
propel Nigerian economy to the desired growth
and development. Onwualu (2012) maintained
that the value chain approach to non oil export
has the potentials to open up the economy and
generates various activities which are capable of
creating jobs, stabilizing the exchange rate and

enhancing industrialization and thus makes the non-oil sector to hold the aces for the immediate Nigerian sustainable economic growth and development as it was in the early 60s. These potential gains can not if the exchange rate of the domestic economy is highly volatiled. Thus, the stabilization of exchange rate is vital in determining the performance of non oil export in Nigeria.

Exchange rate is the price of one currency in relation to another. It expresses a national currency's quotation with respect to foreign ones. From the literature, one of the key determinants of the volume and cost of imports and export is the exchange rate.

Exchange rate stability is a major macroeconomic objective of countries in the global economy. Its critical role in the attainment of macroeconomic stability in both the developed and developing economies hinges greatly on its importance as a price that not only affects the price of imports, exports, and by extension, the balance of payments, but also the general price level.

Consequently, governments and relevant authorities all over the world employ the exchange rate as a policy tool to manage the volume of imports and exports as well as the general price level in a country.

The impact of the exchange rate volatility on exports flows especially in developing countries like Nigeria has been described as one of the main sources of economic instability and uncertainty. The unexpected swing in the exchange rate of the naira has been enormously identified as volatile.

It is observed that quantitative analysis of the role of exchange rate fluctuations on non-oil export performance in Nigeria has received relatively less attention from researchers. Admittedly, a series of recent academic papers have touched on sustainability of exchange rate in relation to general export (oil and non-oil) forgetting the fact that the quantity and price of oil export is not determined by domestic countries.

This fundamental issue of determining the how argument rate fluctuation impact of non-oil performance is the problem of this study.

OBJECTIVES OF THE STUDY

The main objective of this study is to determine the impact of exchange rate (naira/dollar)

volatility to Nigeria non oil export performance. The other specific objectives are to:

Determine to speed of adjustment using error correction method (ECM)

THEORETICAL FRAMEWORK

There are several theories on the subject of exchange rate and imports/ exports. However, the theory that is relevant in developing countries like Nigeria is the Marshall Lerner condition (MLC). The Marshall-Lerner condition seeks to answer the following questions: when does a real devaluation (in fixed exchange rates) or a real depreciation (in floating exchange rates) of the currency improves the current account balance of a country? For simplicity, assume that trade in services, investment-income flows, and unilateral transfers are equal to zero, so that the trade account is equal to the current account. In its simplest version, the MLR condition states that a real devaluation (or a real depreciation) of the currency will improve the trade balance if the sum of the elasticities (in absolute values) of the demand for imports and exports with respect to the real exchange rate is greater than one, $(\varepsilon + \varepsilon^* > 1)$.

This theory is very applicable to the Nigerian economy being that the Nigerian economy is import dominated and this has registered its effect on the country's currency. Sometime in the past, the Nigerian effort had put up effort to promote exports and also discourage import by devaluing the country's currency. But, has this strategy really been effective for the purpose which it was being carried out? This is the same view presented in the Marshall-Lerner condition.

EMPIRICAL LITERATURE REVIEW

Uduakobong and Williams (2018) analyzed the relationship between exchange rate volatility and non-oil exports in Nigeria using annual data covering the period of 1970 to 2015. The study employed the Johansen test of Cointegration, Error Correction Model (ECM), and the Granger Causality test to achieve the objectives. The results indicate that there exists a long run relationship between exchange rate and non-oil exports in Nigeria. This result also shows that it will take non-oil exports four years to return back to its equilibrium value when displaced by the volatility in exchange rate. The Granger Causality test revealed that there exists uni-directional causality between exchange rate and non-oil exports in Nigeria with the direction of

causality running from Exchange rate to Non-oil Exports. Ajinaja, Popoola and Ogunlade (2017) investigated empirically the impact of variables such as gross domestic product (GDP), exchange rate fluctuation (EXCt) and foreign direct investment on export performance (Xt) in Nigeria . All data used were secondary data obtained from the Statistical Bulletin of Central Bank of Nigeria from 1982 -2015. Ordinary Least Square method was used to analyze the data and it was deduced that gross domestic product (GDP), exchange rate fluctuation (EXCt) and foreign direct investment have positive relationship to export performance (Xt) in Nigeria.

Uduakobong and Williams (2017) analyzed the relationship between exchange rate volatility and non-oil imports in Nigeria using annual data covering the period of 1970 to 2015. Specifically, it seeks to: investigate the existence of a long run relationship between exchange rate volatility and non-oil imports in Nigeria; and determine the nature of the causal relationship between exchange rate volatility and non-oil imports in Nigeria. The study employed the Johansen test of Co integration Error Correction Model and the Granger Causality test to achieve the objectives. The study found that there exists a long run relationship between exchange rate volatility and non-oil import,; exchange rate does not granger cause the movements in non-oil imports.

Aro-Gordon (2017) investigated the causal relationship between currency exchange rate (EXR) and export growth (EXP) in Nigeria. The study used econometric tools for the analysis based on statutory annual data over the period 1970s-2014. It is shown that EXR and EXP are not co-integrated and, hence, a long-run equilibrium relationship may not exist between them. The Granger causality test shows significant absence of short-run nexus between EXR and EXP, but there is a unidirectional causality running from EXR to EXP with no feedback. It is inferred that while the EXR may have significant impact on EXP, EXP in a single commodity (crude oil)-dependent economy like Nigeria, may have very little impact on EXR. Thus, the long-held thesis which is of the notion that devaluing the currency will lead to increase in export is not empirically supported in the Nigerian experience.

Akanbi, Alagbeb, Yusuf and Oluwaseyi (2017) examined exchange rate volatility with ARCH

model and its various extensions (GARCH, TGARCH, and EGARCH) using quarterly exchange rate series from 1986-Q1 to 2014-Q4.The impact of exchange rate volatility on non-oil exports was also examined using Error Correction Model (ECM) with two different measures of volatility. The results obtained confirm the existence of exchange rate volatility and also found a significant negative effect on non-oil export performance in Nigeria.

Adaramola (2016) examined the effect of real exchange rate volatility on export volumes in Nigeria. The study employed the time series quarterly data for the period of 1970Q1-2014Q4. The analytical method employed was econometric techniques of Johansen Multivariate approach to co-integration as well as the Error Correction Mechanism (ECM). The study also employed the ARCH and GARCH model to determine the presence of volatility in the real exchange rate series.

The real export volumes, real exchange rate as well as real exchange rate volatility and all other orthodox determinants of export such as relative price and real foreign income series were non-stationary. They were indeed I (1) series. The estimated result indicated that there was a long run relationship between real exchange rate and its volatility and export volumes in Nigeria.

The ARCH and GARCH model showed that the exchange rate was volatile. The results concluded that real exchange rate uncertainty had significantly and positively impacted on the volume of trade in the Nigerian economy.

Omotola (2016) examined the effect of exchange rate fluctuations on manufacturing sector output in Nigeria from 1986 to 2014, a period of 28 years. Data sourced from Central Bank of Nigeria (CBN) statistical Bulletin and World Development Indicators (WDI) on manufacturing output, Consumer Price Index (CPI), Government Capital Expenditure (GCE) and Real Effective Exchange Rate (EXC) were analyzed through the multiple regression analysis using Autoregressive Distribution Lag (ARDL) to examine the effect of exchange rate fluctuations on manufacturing sector.

Using ARDL it was discovered that exchange rate fluctuation has long run and short run relationship with manufacturing sector output. The results showed that exchange rate has a positive relationship with manufacturing sector output but not significant. However, from the empirical analysis it was discovered that

exchange rate is positively related to manufacturing sector output.

Imoughele and Ismaila (2015) examined the impact of exchange rate on non-oil export. Time series data obtained from CBN for a period of 27 years that is 1986 to 2013 was used. Augmented Dickey-Fuller (ADF) test was used for the unit root test and Johansen's co-integration test was also conducted to establish short and long run relationships between non-oil exports and independent variables. The results showed that three co-integrating equations which establish the existence of long run relationship among the variables. Ordinary Least Square statistical technique was used to assess the determinants of non-oil export in Nigeria. The results show that effective exchange rate, money supply, credit to the private sector and economic performance have a significant impact on the growth of non-oil export in the Nigerian economy and appreciation of exchange rate has negative effect on non-oil export which is consistent with the economic theory

Oriavwote and Eshenake (2015) empirically evaluated the impact of the Real Effective Exchange Rate on non oil exports in Nigeria. The study covered the period between 1980 to 2014. The cointegration technique was applied to estimate the data. The results of the ADF unit root test indicate that all the variables were I(1). The results of the Johansen cointegration test suggests a long run relationship among the variables. The parsimonious ECM result indicates that the Real Effective Exchange Rate and the degree of openness have positive and significant impact on non-oil exports in Nigeria. The ARCH/GARCH results indicate that the volatility of the REER has influenced the level of non-oil exports in Nigeria.

Akinlo and Adejumo (2014) investigate the impact of exchange rate volatility on non-oil exports in Nigeria, 1986(1)–2008(4). The paper confirms the existence of statistically significant relationship between real exports and exchange rate volatility. The results show that exchange rate, exchange rate volatility and foreign income have significant positive effects on non-oil exports in the long run. Imports, on the other hand, have a statistically negative effect on exports in the long run. The ECM results show that lagged foreign income has significant positive effect on non-oil exports. The coefficient of imports is positive supporting the import compression hypothesis in the short run.

The results show that short run impact of the exchange rate volatility is statistically insignificant. The positive coefficient of the exchange rate variable (though not significant) suggests that an appreciable depreciation of the exchange rate could lead to increase in non-oil exports in Nigeria.

Mohagheghzadeh, Nasiri, Mohagheghzadeh, and Mahdizadeh (2014) studied the impact of official exchange rate on non-oil exports of OPEC countries between 1975 and 2010. The statistical population of the investigation consists of oil countries including Iran, Saudi Arabia, United Arab Emirates, Kuwait, Qatar, Venezuela, Nigeria, Libya, and Ecuador. The time series statistics are collected from Central Bank of the Islamic Republic of Iran and the World Bank. Data .Necessary tests for studying durability of under-study variables, panel data, and needed tests for studying the model with fixed or random effects are carried out using Hausman statistics, and required tests for recognition of co-linearity have been also done. The study showed that there is a positive and significant relationship between non-oil exports and official rate of exchange. Indeed, non-oil exports increase with an increase in exchange rate and vice versa. Because with increased official rate of exchange, the actual value of domestic currency decreases and domestic goods will be cheaper for foreigners and exports will increase. Also, considering the model estimation it is seen that in OPEC countries there is a positive significant relationship between domestic production, domestic price, trading, and prior period non-oil exports with non-oil exports.

METHODOLOGY

In determining the impact of exchange rate volatility on non oil export performance in Nigeria for the period of 1981-2017, the study uses serial annual and secondary data gotten from the Central Bank of Nigeria, statistical bulletin, annual reports, and the various publications of the debt management office. To avoid spurious regression due to the problem of non-stationarity of data, the Augmented Dickey Fuller test was used to check for the presence of a unit root in the variables, next, was to test for cointegration.

This test was used to check for the existence of long-run relationship among the variables in the model and was carried out using the Johansen technique. The Arch test was used to test for the Arch effect (volatility) in the exchange rate. The

ECM was used to determine the speed of adjustment of the dependent variable to the independent variable(s)

MODEL SPECIFICATION

The study adapts the postulations of the Marshall Lerner condition as specified in the theoretical framework with some structural modifications being that other variables that are considered by theory and other empirical works that can impact on a country's non oil export have been added to the original model. Specifically, the study specifies a model in which non-oil exports is expressed as a function of exchange rate changes)

$NEXP = \square (EXR_{vol})$

$nexp = \alpha_0 + \alpha_1 exr_{vol} + u_t$ ----------------- (i)

However, in order that the model is not underspecified, other variables that have been identified from the literature as having influences on non-oil exports performance are included in the model

$NEXP = \square (EXR_{vol}, INTR, FDI, TGE)$

$$NEXP = \alpha_0 + \alpha_1 EXR + \alpha_2 INT + \alpha_3 FDI + \alpha_4 TGE + u_t \text{------------------------} \quad (ii)$$

In order to avoid the presence of heterosce dasticity, equation is logged, thus

$$Log\ NEXP = \alpha_0 + \alpha_1 logEXR_{vol} + \alpha_2 logINT + \alpha_3 log\ FDI + \alpha_4 logTGE + u_t \text{---------} \quad (iii)$$

Empirically, most high volume trade in foreign transactions use forward market in order to hedge risk associated with exchange rate changes, thus,

$$Log\ NEXP = \alpha_0 + \alpha_1 logEXR_{vol-1} + \alpha_2 logINT + \alpha_3 log\ FDI + \alpha_4 logTGE + u_t \text{---------} \quad (iv)$$

$$(-) \qquad (+/-) \qquad (+) \qquad (+)$$

In order to determine the speed of adjustment of the dependent variable to the independent variable (s), the Error correction method is introduced given as

$$Log\ NEXP = \alpha_0 + \alpha_1 logEXR_{vol-1} + \alpha_2 logINT + \alpha_{3log}\ FDI + \alpha_{4log}TGE + u_t + \alpha_5 ECM + v_t - (v)$$

where:

NEXP= non oil export

EXR_{vol} = exchange rate volatility (naira and dollar)

INT = interest rate (lending)

FDI = foreign direct investment

TGE = total government expenditure

ECM = error correction method

Log = log to base 10

V_t, u_t = disturbance term

Equations (iv) and (v) are the models for the study.

Empirical Analysis

Pre-Estimation Test

Table1. *Unit-Root Test Result by Augmented Dickey Fuller Method*

Variables	5% critical level	First Difference	Order of Integration
Log NEXP	-2.9499	-3.814003	I(1)
Log EXRvol	-2.9499	-3.795981	I(1)
Log FDI	-2.9499	-4.019188	I(1)
Log TGE	-2.9499	-4.014539	I(I)
Log INT	-2.9499	-4.411898	I(I)

The study tested the variables for unit root problem using Augmented Dickey Fuller Test. The result of the stationary test showed that all the variables were stationary at first difference using five percent significant level as shown in table – 1 - above,. Having established the stationarity of the variables, the researcher tested whether the said variables have long run

co-movement using Johansen co integration test.

Result of table -2- shows that there exist four (4) co-integrating equations at 5% level of significance. This is because the trace test

statistic is greater than the critical value at 5%. This shows that there is long run relationship between among the variables.

Table 2. *Johansen Cointegration Result*

Trace test	5 Percent Critical Value	Hypothesized No. of CE(s)
69.96636	68.52	None *
48.71951	47.21	At most 1 *
30.57970	29.68	At most 2 *
19.89747	15.41	At most 3 *
2.301457	3.76	At most 4

(**) denotes rejection of the hypothesis at 5% (1%) significance level

L.R. test indicates 4 cointegrating equation(s) at 5% significance level

Table 3. *ARCH Test*

F-statistic	503.2944	Probability	0.000000
Obs*R-squared	33.72192	Probability	0.000000

Since the result of table 1 showed that the exchange rate is stationary, therefore, ARCH effect is tested for volatility in exchange rate. From the result of table 3, there is an ARCH effect, because the p-value of Observed *R-

squared is less than 0.05 (0.0000). This means that naira exchange to dollar is volatility. Therefore , the study runs the OLS to determine how this volatility affect the non oil export performance in Nigeria .

Table 4. *Regression Estimation*

Variable	Coefficient	S. E	t-Stat	P-value
C	4.512058	3.055488	1.476706	0.1592
Log EXR$_{VOL}$	-0.740927	0.279038	-2.655289	0.0173
Log FDI	-0.248872	0.088658	-2.807116	0.0127
Log INTR	-0.496914	0.515378	-0.964173	0.3493
Log TGE	0.899179	0.426034	2.110580	0.0509
R-squared	0.972281	Mean dependent var		5.265157
Adjusted R-squared	0.963619	S.D. dependent var		0.642383
S.E. of regression	0.122527	Akaike info criterion		-1.133964
Sum squared resid	0.240207	Schwarz criterion		-0.836407
Log likelihood	18.47360	F-statistic		112.2441
Durbin-Watson stat	1.820530	Prob(F-statistic)		0.000000

Analysis

The result of table-4- indicates that approximately 97% (R-square) of the systematic variation in the dependent variable (NEXP) is explained or accounted for by the independent variables (EXRvol, FDI, INTR, and TGE).This is endorsed by the R-bar square which is approximately 96% .

The result also showed that at least or all the independent variables are significant with the probability of the f-statistic (0.000) less than 0.05.

The result of the DW statistic (1.82) approximately "2" indicates the absence of serial autocorrelation in the model. All the

independent variables agreed to apriori expectation except FDI which is negative. Outside the independent variables, the NEXP will operate at 4.512058 units.

The result of the EXRvol shows that volatility in exchange rate will negatively affect NEXP by 0.740927 units and has a significant impact on the NEXP because the *p-value* (0.0173) is less than 0.05. For FDI, the result shows that a one unit increase in FDI inflow will retard NEXP by -0.248 units and has an significant impact on the NEXP because the *p-value* (0.0127) is less than 0.05.

For INTR, the result shows that a one unit increase in INT will negatively affect NEXP by 0.496914 units and has an insignificant impact

on the NEXP because the *p-value* (0.3493) is greater than 0.05, and lastly for TGE, a one unit increase in TGE will positively affect NEXP by 0.899179 units and has an insignificant impact on the NEXP because the *p-value* (00.0509) is greater than 0.05.

Table 5. *ECM result*

Variable	Coefficient	S. E	t-Stat	P.value.
C	0.503748	1.730240	0.291143	0.7755
Log EXR$_{VOL}$	-0.738700	0.188579	-3.917200	0.0018
Log FDI	-0.131493	0.052898	-2.485778	0.0273
Log INTR	0.266461	0.327552	0.813490	0.4306
Log TGE	1.251756	0.238150	5.256162	0.0002
ECM	-0.639078	0.086607	-7.379026	0.0000
R-squared	0.990255	Mean dependent var		5.350038
Adjusted R-squared	0.985757	S.D. dependent var		0.610265
S.E. of regression	0.072832	Akaike info criterion		-2.132107
Sum squared resid	0.068958	Schwarz criterion		-1.783600
Log likelihood	28.32107	F-statistic		220.1622
Durbin-Watson stat	1.918526	Prob(F-statistic)		0.000000

Analysis

The ECM is no spurious regression model as indicated by the R-squared and DW statistics. It is also negative and significant (p-value 0.000) as desired. With the negative sign and significant values of the ECM , it validates the long run equilibrium relationship existing among variables in the model. With the ECM value of 63.91 percent, it means that the speed of adjustment from pervious disequilibrium is 63.91%. It shows that the system corrects its previous period disequilibrium at a speed of 63.91% annually.

CONCLUSION AND RECOMMENDATIONS

This study empirically investigated the impact exchange rate volatility on non oil export performance in Nigeria.

From the study, it is clear that volatility in exchange rate (naira- dollar) of Nigeria negatively impact on it export performance for the period under review. An economy like Nigeria cannot afford to be depending only on crude oil as its price instability has shown to be negatively affecting the economy.

The period between 2016 to 2017 was a clear eye opener of the negative effect of over relying on one product as a source of revenue.

The managers of the economy should diversify from oil export to non-export and also stabilize the exchange rate to enable non-oil exporters not to fall to the negative effect of exchange fluctuation on their trade.

Also, special exchange rate window should be opened to non-oil exporters, as it is for some imported items into the country, as the sector has the capability to generate jobs and reduces extreme poverty in the land.

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