Impact of Exchange Rate Fluctuations on Export Performance in Nigeria

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Abstract: The paper examined the impact of exchange rate fluctuations on the performance of export trade in Nigeria, between 1960 and 2019. In achieving its objective the paper employs the use of Autoregressive Conditional Heteroscedasticity (ARCH), Generalized Autoregressive Conditional Heteroscedasticity (GARCH) and Autoregressive Distributed Lag (ARDL) model to estimate the influence of exchange rate volatility on export. The findings revealed that exchange rate fluctuations have positive and significant influence on export performance. GDP and real interest rate were found to have significant negative impact on export, while inflation has insignificant negative impact on the export performance. It is therefore recommended that the government in Nigeria should take measures to improve its export production by providing enabling environment for the private sector to flourish especially those involved in the production of export. It is also suggested that our natural resource endowments should be harnessed to encourage the production of exportable products.

Keywords: Foreign Exchange, Foreign Exchange Fluctuations, International Trade, Foreign Trade, Nigeria.

JEL Classification: F31, F40, F43.

INTRODUCTION

Macroeconomic stability is the goal that every nation aspires however; it is not possible for countries to maintain macroeconomic stability all-round all the times. So Fluctuations in the macroeconomic variables is a natural phenomenon, but it still remains a major issue of concern to policy makers and scholars alike. This is because fluctuation is a major constraint to the economic development

of a nation, making planning more challenging and investment climate becomes more risky. Exchange rate fluctuation, in particular, is an issue of concern to policy makers because of its role in determining international trade. It is therefore necessary for national policy makers to understand the behavior of exchange rate so that they can make plans that attract investment especially in the real sectors of the economy and achieve economic growth. Exchange rate stability can also enable the growth of a nation's export and also serve as a measure of countries competitiveness abroad. It is therefore argued that an erratic or unstable exchange rate regime bring a number of obstacles to the growth and development aspirations of a country.

Exchange rate is therefore, an important economic variable as its appreciation or depreciation affects the performance of other macroeconomic variables. As such policy makers struggle to stabilize their foreign exchange to avoid distortions in the market. When stability of foreign exchange prevails, various economic agents in the country would be able to plan ahead without incurring unnecessary costs or battling with instability in the prices of goods and services.

The exchange rate policy of any nation is aimed at preserving the external value of the domestic currency and maintaining a healthy balance of payments position. The problem of foreign exchange market, which Nigeria has been facing just like any other developing country, has much to do with the gap that exists between supply of foreign exchange and its demand. The failure of the economy to supply enough foreign exchange to meet the demand, forced governments to resort to rationing the available foreign exchange and this lead to speculative hoarding and the development of a parallel market, which ultimately leads to instability of the exchange rate.

In Nigeria however, exchange rate instability becomes more prominent from 1986 following the implementation of the Structural Adjustment Programme (SAP) which came along with the deregulation of the foreign exchange market. Since then different ways of managing exchange rate have been deployed with varying degree of successes. It is in view of this that, this paper is set to examine the effect of exchange rate fluctuations on the performance of export sector of Nigeria within the period under review. To achieve this objective the paper is divided into five sections including this introduction. Section two is the review of related literature, section three is the description of the research methodology section four is the presentation and discussion of results while section five concludes the paper with some suggestions.

2. LITERATURE REVIEW

This section presents an extensive review of relevant literature on the relationship between exchange rate volatility and export performance of both cross countries studies and country-specific studies.

Beginning with a study conducted in South-Africa by Chamunorwa and. Choga (2015) who regressed the relationship between exchange rate volatility and export performance using GARCH approach over the period of 2000 – 2011. The study found that exchange rate volatility had a significant negative impact on export performance in the country. In a similar study, Arize, Osang, and Slottje (2000) reported that increase in exchange rate volatility had an adverse effect on foreign trade, implying that higher exchange rate volatility leads to higher costs for risk and uncertainties. Boug and Fagereng (2007) on the other hand, used cointegrated VAR approach and GARCH model to examine the relationship between exchange rate volatility and export performance in Norwegian economy. The study found that exchange rate volatility had a significant impact on export performance. Similarly, Adubi, and Okunmadewa (1999) examined the relationship between exchange rate volatility and agricultural trade flows in Nigeria. The study found that if the exchange rate fluctuation is more volatile, it tends to increase the prices of export crops as a result of uncertainties, but generally leads to a decline in export production. However, exchange rate appreciation reduces imports, while its volatility has a positive effect.

Kipkoech Antony, and Jagongo (2017) investigated the impact of exchange rate volatility on export performance of tea firms in Kenya. The study used a census approach where secondary average monthly data for the fifty-four (54) tea firms were utilized for the period of 5 years i.e. January 2008 to December 2012. The study discovered that exchange rate volatility and domestic tea prices significantly influenced export performance of tea firms in Kenya to the world markets. In addition, it showed that the tea substitute's prices did not influence the export performance of tea firms to the importing countries. It also realized interdependence between exchange rate stability, export performance and macroeconomic stability.

Khosa, Botha & Pretorius (2015a) juxtaposed the impact of exchange rate volatility on emerging market exports using a sample of nine (9) emerging economies from 1995 to 2010. The study used Generalized Autoregressive Conditional Heteroscedasticity (GARCH), conventional standard deviation and Pedroni residual cointegration approach in order to examine the nature of the association between exchange rate volatility and exports as well as to test for panel cointegration. The study established existence of a long-run relationship between the variables under

investigation. In addition, it discovered that exchange rate volatility had a significant negative impact on the export performance in the countries under study. Similarly, Khosa, Botha and Pretorius (2015b) examined the relationship between exchange rate volatility and foreign trade flows. Monthly time series data ranging from January 1993 to December 2006 was obtained to estimate the causality between the variables under investigation using EGARCH model. The study discovered that short run dynamics of exchange rate volatility is negatively related to both export and import. In a related study, Isitua and Neville (2006) analyzed the effect of exchange rate volatility on macroeconomic performance in Nigeria. The study revealed that exchange rate fluctuation has a negative and significant impact on exports. Another related study is the work of Ajinaja, Popoola and Ogunlade (2017) using OLS examined the impact of exchange rate volatility on export performance in Nigeria between the period of 1982 and 2015. The study discovered that gross domestic product, exchange rate volatility and foreign direct investment are positively related to export performance in Nigeria. Obinwata, Owuru and Farayibi (2017) on the other hand, studied the exchange rate trends and export performance in Nigeria over the period of 1970 to 2015 using a descriptive analysis. The study found that despite the policy pronouncement between 1970 and 2015, exchange rate volatility significantly influenced export performance in the country under study.

Applying bound testing approach of cointegration, Bahmani-Oskooee and Gelan (2017) analyzed real exchange rate volatility and foreign trade performance in 12 African countries. They found that exchange rate volatility affects foreign trade flows of many of the countries under study in the short run, while the effects, in the long-run, were restricted only to the exports of five countries and on the imports of only one country. In a study on Vietnam, Nguyen and Trinh (2019) analyzed the relationship between exchange rate volatility and exports using Autoregressive Distributed Lag (ARDL) model covering the first quarter of 2000 to the fourth quarter of 2014. The study found that exchange rate volatility and domestic currency depreciation are negatively related to the export volume in the long run and the short run, respectively while domestic currency depreciation is positively related to exports in the long run. They also found that an increase in the real income of a foreign country reduces the export volume.

Using Autoregressive Distributive Lag (ARDL) model and Error Correction Model (ECM), Fitriani (2017) examined the long-run and short-run effects of exchange rate volatility on export performance in Indonesia. Monthly time series data ranging from January, 1998 to October, 2015 was used to estimate the variables

under study. The study concentrated on the real exports from Indonesia's major trading partners, Japan and United States. The study revealed that rupiah volatility against the Japanese yen decreased Indonesia's real export to Japan in both the short and the long-run. On the other hand, the study further revealed that the intensity of rupiah volatility against the United States dollar accelerate Indonesia's export to the United States in the short run. However, the impact of commodity price shock is minor, except for the long-run export to Japan.

From the foregoing review of empirical literatures, it is clear that there are quite a number of studies on exchange rate volatility and export performance in Nigeria. However, there is yet no consensus with regards to their findings. This therefore means there is room for carrying out further study in order to re-confirm the nature of the causality between exchange rate volatility and export performance as well as the intensity of exchange rate volatility's impact on the export performance in Nigeria. This study also introduces a new variable in study that is, quality of life.

3. METHODOLOGY

3.1. Source of Data

This study uses secondary data which was obtained from the World Bank database. In analyzing the data, the study employs Autoregressive Conditional Heteroscedasticity (ARCH), Generalized Autoregressive Conditional Heteroscedasticity (GARCH) and Autoregressive Distributed Lag (ARDL) model to estimate the influence of exchange rate volatility on the export performance in Nigeria. Three explanatory variables were added which include; GDP, real interest and inflation. The study has tested for stationarity using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. However, it also tested for presence of autocorrelation and arch effect using Correlogram of Standardized Residuals Squared and Langrage Multiplier (LM) for Autoregressive Conditional Heteroskedasticity (ARCH), respectively. The data covers a period of sixty years i.e. 1960 to 2019 the choice of the period was based on the availability of data.

3.2. Model Specification

The model used in analyzing the data is specified below:

$$\Delta EXPP_t = \beta_0 + \Sigma_{i-1}^m \beta_1 EXPP_{t-1} + \Sigma_{i-1}^m \beta_2 EXCH_{t-1} + \Sigma_{i-1}^m \beta_3 GDP_{t-1} + \Sigma_{i-1}^m \beta_4 RIR_{t-1} + \Sigma_{i-1}^m \beta_5 IFL_{t-1} + \mu_t$$

Where:

β_0 = Constant parameter

$\beta_1 - \beta_5$ = Coefficient of independent variables

EXPP = Export Performance

EXCH = Exchange Rate Volatility

GDP = Gross Domestic Product

RIR = Real Interest Rate

IFL = Inflation rate

$_{t-1}$ = Lag Value

4. RESULTS AND DISCUSSIONS

This section presents the results of inferential statistics that has been carried out in form of time series regression analyses, Autoregressive Conditional Heteroscedasticity (ARCH), Generalised Autoregressive Conditional Heteroscedasticity (GARCH) and/or Autoregressive Distributed Lag (ARDL) model employed in estimating the influence of regressors (exchange rate volatility, quality of life, real interest rate, and inflation rate) on the regressand (export performance). It also presents the diagnostic tests including the normality test, serial correlation test, and heteroscedasticity test

In conducting this kind of analysis it is important to explore the descriptive statistic of the datasets used in the estimation as well as to determine the distribution of the variables with a view to have an insight on the relationship between the variables under investigation. Data for this study is on 5 variables for the period

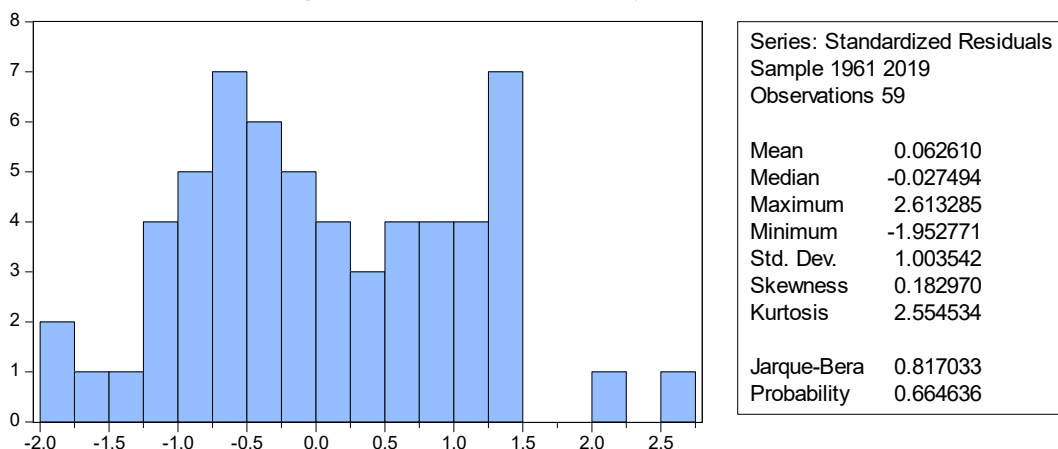| Series: Standardized Residuals	
Sample 1961 2019	
Observations 59	
Mean	0.062610
Median	-0.027494
Maximum	2.613285
Minimum	-1.952771
Std. Dev.	1.003542
Skewness	0.182970
Kurtosis	2.554534
Jarque-Bera	0.817033
Probability	0.664636

Figure I: Descriptive Statistics and Normality Test

of 60 years i.e. from 1960 to 2019, which gives us a total of sixty (60) observations. Figure 1 shows the descriptive statistics and nature of the distribution among the variables as obtained from E-views version 9.0.

To ensure the normality distribution of the residuals in the model, normality test was conducted along with descriptive statistics using histogram – normality test and the result is presented in Figure I. The residuals are said to be not normally distributed going by p-value of Jarque-Bera (0.1974) which is insignificant even at 5 per cent level of significance.

Table 1, shows the results of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests and none of the series goes beyond I(1) order of integration. Thus, all variables are stationary at level or first differenced as depicted in the table.

Table 1: Unit Root tests [Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP)]

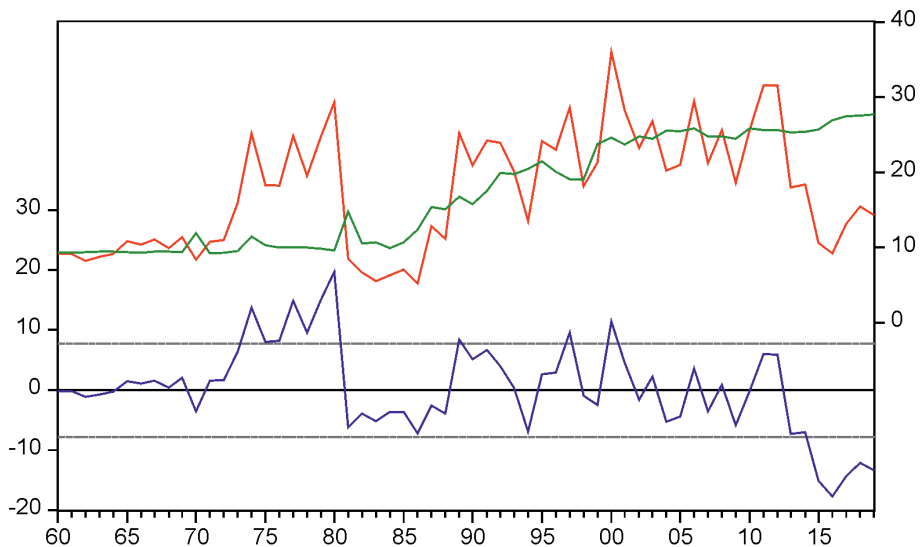| Variables	ADF		PP	
	Level	First Diff.	Level	First Diff.
Export Performance	-3.2596**			-3.3213**
Exchange Rate Volatility		-5.9819***		-5.9900***
GDP Per Capita		-6.4239***	-1.3238	
Real Interest Rate	-5.7828***			
Inflation rate	-3.5798***		-3.4552**	
Note: ***, **, and * indicating level of significance at 1%, 5% and 10% respectively.				
Source: Authors computation using Eviews Version 9.0				

Figure II: Exchange rate fluctuations from 1960 – 2019

The study applied Heteroskedasticity Test: ARCH to find out exchange rate fluctuations over the period of the study. Figure II presents exchange rate fluctuations over the period of 60 years i.e. 1960 – 2019.We observe from the figure that there exists prolonged periods of low volatility from 1960 to 1970, from 1980 to 1987, and from 2001 to 2009. However, it shows that periods of low volatility is followed by periods of low volatility for long periods of time. Implying that long periods of low volatility causes another long periods of low volatility. Similarly, it shows that periods of high volatility is followed by another periods of high volatility for long periods of time, for examples, from 1970 to 1980, from 1988 to 2001, and from 2009 to 2019. Implying that long periods of high volatility causes another long periods of high volatility and vice versa. In other words, periods of low volatility are followed by periods of low volatility and periods of high volatility tend to be followed by periods of high volatility. Hence, this suggests that residuals or error tem is conditionally heteroskedastic and it can be represented by ARCH and GARCH model.

Table 2 Heteroskedasticity Test: ARCH

F-statistic	0.728563	Prob. F(1,57)	0.3969
Observations R-squared	0.744609	Prob. Chi-Square(1)	0.3882
Akaike info criterion	3.429046	Hannan-Quinn criterion	3.456537
Schwarz criterion	3.499471	Durbin-Watson stat	1.963850

Table 2 presents the result of heteroskedasticity test using Langrage Multiplier (LM) because it is important to examine the residuals for the evidence of heteroskedasticity. The presence of conditional heteroskedasticity if not accounted for, it leads to misleading results. In order to test the presence of heteroskedasticity in the residuals of exchange rate fluctuations and establish whether there is arch effect in the residuals or otherwise, Langrage Multiplier (LM) for Autoregressive Conditional Heteroskedasticity (ARCH) is applied. The result indicates that there is no arch effect going by the p-value of F-statistic (0.3969) and observations' R-squared (0.3882) which are statistically insignificant because the p-value are more than 10 per cent level of significance. Since, there is no arch effect in the residuals of the model, therefore there is need to go further to apply ARCH and GARCH model so as to estimate the influence of exchange rate fluctuations on export performance.

Since the result of Heteroskedasticity test indicates that there is no arch effect in the residuals, therefore the need to know the result of Autoregressive Conditional Heteroskedasticity (ARCH) in order to determine the influence of exchange rate fluctuations on export performance is fundamental. However, the result of ARCH

Table 3: ML ARCH

Dependent Variable: Export Performance				
Variables	Coefficients	Std. Error	t-Statistics	Prob.
Constant	18.65233	0.001051	17743.19	0.0000
Exchange rate fluctuations	7.681985	0.189741	40.48665	0.0000
GDP	-3.210391	0.046900	-68.45117	0.0000
Inflation rate	-0.017194	0.018836	-0.912826	0.3613
Real Interest rate	-0.057816	0.019293	-2.996798	0.0027
Variance Equation				
C(6)	2.621482	0.598653	4.378967	0.0000
C(7)	2.150607	0.516571	4.163240	0.0000
C(8)	0.540671	0.281777	1.918789	0.0550
C(9)	-0.317382	0.133582	-2.375931	0.0175
R2	0.085782	Akaike info Criterion (AIC)		6.547143
Adj. R²	0.018062	Schwarz Criterion		6.864055
Durbin-Watson stat	0.689952	Hannan-Quinn Criterion		6.670853
Source: Authors Computation Using E-views Version 9.0				

model is clearly presented in Table 3. The result shows that exchange rate fluctuations has positive significant influence on export performance over a long period of time going by its respective probability value which is statistically significant at one per cent level of significance, thus, implies that a one percentage increase in exchange rate fluctuations will lead to about 7.68% increase in export performance and vice-versa. This is in conformity with the works of Ajinaja, Popoola and Ogunlade (2017); Obinwata, Owuru and Farayibi (2017); Kipkoech Antony, and Jagongo (2017); Boug and Fagereng (2007); and Adubi, and Okunmadewa (1999). In another development, real interest rate and GDP per capita have negative impact on export performance at one per cent level of significance throughout the study period. This implies that a one per cent increase in real interest rate and GDP per capita will dampen down export performance by 0.05% and 3.21% over a long period of time, vice versa. This is in conformity with the work of Kipkoech, Antony, and Jagongo (2017). However, it is pivotal to test for serial correlation in the residuals of the parameters.

Table 4 presents serial correlation test using Correlogram of Standardized Residuals Squared. The result reveals that there is no serial correlation in the residuals of the parameters going by the fact that all the probability values are statistically insignificant because they are above 10 percent level of significance. Therefore, the residuals of the parameters are free from serial correlation problem.

Table 4: Serial Correlation Test

Date: 12/18/20 Time: 16:06
Sample: 1960 2019
Included observations: 59

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. |** |	. |** |	1	0.228	0.228	3.2189	0.073
.*| . |	.*| . |	2	-0.137	-0.200	4.4093	0.110
. | . |	. |*. |	3	0.046	0.141	4.5435	0.208
. | . |	. | . |	4	0.037	-0.047	4.6311	0.327
. | . |	. | . |	5	-0.008	0.027	4.6357	0.462
. | . |	. | . |	6	0.011	0.002	4.6441	0.590
.*| . |	.*| . |	7	-0.093	-0.111	5.2449	0.630
.*| . |	. | . |	8	-0.111	-0.053	6.1207	0.634
.*| . |	.*| . |	9	-0.151	-0.165	7.7699	0.557
.*| . |	.*| . |	10	-0.137	-0.077	9.1559	0.517
. | . |	. |*. |	11	0.047	0.074	9.3224	0.592
. | . |	.*| . |	12	-0.011	-0.076	9.3310	0.674
. | . |	. | . |	13	-0.035	0.048	9.4251	0.740
.*| . |	.*| . |	14	-0.077	-0.132	9.8972	0.770
. | . |	. |*. |	15	0.019	0.080	9.9269	0.824
. | . |	.*| . |	16	0.012	-0.089	9.9383	0.870
. | . |	. | . |	17	-0.003	-0.005	9.9392	0.906
. | . |	. | . |	18	0.023	-0.004	9.9849	0.932
.*| . |	.*| . |	19	-0.073	-0.147	10.468	0.940
. | . |	. |*. |	20	-0.018	0.077	10.499	0.958
. | . |	.*| . |	21	0.012	-0.087	10.513	0.971
.*| . |	. | . |	22	-0.066	-0.057	10.935	0.976
.*| . |	.*| . |	23	-0.080	-0.072	11.581	0.976
. | . |	. | . |	24	0.021	-0.012	11.628	0.984

Source: *Authors Computation Using E-views Version 9.0*

Arising from the foregoing, it was found that exchange rate fluctuation has a significant positive impact on the export performance of Nigeria during the study period. It was also found that GDP and real interest rate have significant negative impact on the export, while inflation has insignificant negative impact on the export.

5. CONCLUSION AND RECOMMENDATIONS

The study empirically examined the impact of exchange rate fluctuations on the export performance in Nigeria. This is against the backdrop of the fact that exchange rate fluctuations is an essential variable in the life of an economy while export performance

is expected to be the driving force in the movement towards industrialization. It is notably observed that Nigeria is greatly dependent on the foreign economy for the supply of industrial inputs, semi-finished goods and finished goods this has made the impact of exchange rate fluctuation worse most especially in production of manufactured goods, this is because capacity to import was constrained by the depreciating currency leading to a corresponding decline in output.

It is therefore important to note that the fluctuation of exchange rate in relation to factors such as technology and human skills are required for a country to be well established in the export market which are inadequate in the case of Nigeria, like other developing countries in Africa. The country should therefore, embark on improving its physical infrastructural facilities such as stable power supply, good means of transportation system, health care system and safe drinking water.

In addition, there is the need for sourcing of raw materials and other inputs locally especially from mining and agricultural sectors, since Nigeria is endowed with huge quantities of natural resources. Therefore, these resources should be explored to satisfy Nigeria's industrial demands. However, a technological policy aimed at boosting the country's export base is seriously needed. The policy should be geared towards utilizing our resource endowments for the production of exportable products to reduce our reliance on imported products. This could lead to accumulation of more external reserves build-up and reduce the incidence of unfavorable balance of payment. Export performance could also be promoted by government via the provision of incentives and subsidies to indigenous entrepreneurs and also by improving the technological and infrastructural facilities so as to increase the contribution of the sector to Gross Domestic Product and employment generation within the country.

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