IMPACT OF TRADE OPENNESS AND EXCHANGE RATE VOLATILITY ON ECONOMIC GROWTH IN NIGERIA

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Abstract
This paper investigated the impact of trade openness and exchange rate volatility on economic growth in Nigeria for the period 1986-2019. The main objective of the study was to investigate the effect of trade openness and exchange rate volatility on economic growth in Nigeria. To achieve the objective, the generalized autoregressive conditional heteroskedasticity (GARCH) and autoregressive distributed lag (ARDL) model were employed for the analysis. The study used annual time series data sourced from CBN Statistical Bulletin and National Bureau of Statistics for the period under investigation. The variables employed for the study include GDP growth rate used as proxy for economic growth which served as the dependent variable while trade openness, real exchange rate, foreign direct investment and inflation rate were used as the independent variables. Results from ARDL model showed that trade openness had negative and significant relationship with Nigeria's economic growth both in the short-run and long-run. The results from the GARCH model indicated the presence of volatility in the real exchange rate of naira with its attendant implications on the Nigerian economy. Based on the findings, the study recommended that the Central Bank of Nigeria should stabilize the exchange rate of naira by controlling the high demand for foreign currency.

Key words: Trade Openness, Volatility, Exchange Rate, ARDL, GARCH

1.0 Introduction

One of the challenges facing most developing economies and particularly Nigeria is the maintenance of exchange rate stability, price stability and sustainable economic growth and development. In Nigeria, the Central Bank is the apex bank saddled with the responsibility of maintaining price and exchange stability in the economy and this is done by ensuring low inflationary pressure. However, for the past few decades, Nigeria has persistently witnessed volatility of her exchange rate. Yakub, Sani, Obiezue, and Aliyu (2019) posited that exchange rates is highly volatile and have fluctuated widely in Nigeria virtually in all the segments of the foreign exchange markets; official, bureau de change and parallel markets. During the Structural Adjustment Programme (SAP) in 1986, exchange rate stood at N2.02 per US dollar but in 1987,1990, 1991 and 1994 it depreciated to an average of N4.01, N8.04 N9.09 and N22.00 respectively. Again, the value of naira depreciated to N97.95 per US dollar in 1999, N125 between 2000 and 2006 and appreciated slightly to N117.97 per US dollar in 2007. Meanwhile, in 2009 the naira depreciated to N149.58 per US dollar as a result of the global financial crisis coupled with the decline in the international oil price. In 2012, it depreciated further to N158.55 in 2014 and then N189.49 in 2015 , N253.19 in 2016, N305.30 in 2017

and N350 in 2018 and N360.5 in 2019 respectively (Yakub, Sani, Obiezue & Aliyu, 2019). This decline in exchange rate has negative implications on the economy, by way of reducing average growth rate of GDP. The continuous depreciation of exchange rate has also affected the real income of most average Nigerians. The high cost of production resulting from exchange rate volatility affect the sales and profit margin of many businessmen. Generally speaking, the depreciation of exchange rate has also undermined international competitiveness of non-oil exports through trade openness which is inimical to the growth of the economy. The uncontrolled demand for foreign exchange as a result of import dependent nature of the Nigerian economy coupled with the dwindling prices of oil are some of the factors responsible for the fall in the value of naira (Dickson & Andrew, 2013).

Obadan and Okojie (2016) opined that international trade is an engine of economic growth and development**.** Trade openness affords Nigeria the opportunity to be integrated into the global market. In other words, through trade openness, Nigeria is able to interact with the global markets, exchange and consume variety of goods which other countries have produced, thus improving her standard of living. Some scholars like Armah, Brafo-Insaidoo and Akapare (2015) opined that, trade openness is detrimental to growth because it breeds international inequalities by restricting African countries to mere producers of primary products and consumers of manufactured products from industrialized countries.

Trade openness is the process of reducing or removing restrictions on international trade which may take the form of reduction or removal of tariffs, abolition of import quotas, and multiple exchange rates (Nwosa, Ogbuagu & Fasina, 2019). Through trade openness, developing countries would not only enjoy variety of products across the globe, but also, technological innovations which spurs growth.

Since 1986, Nigeria has introduced a number of trade policy reforms aimed at stabilizing the economy. Some of this policy include; the Structural Adjustment Programme (SAP) which was launched in 1985, the reduction or removal of tariffs, abolition of import quotas, import prohibition, duty exemptions and concessions, import-substitution strategy and export promotion strategy. These policy reforms were meant to revamp the external sector of the Nigerian economy and to increase competition in both domestic and international markets and to restructure and diversify the productive base of the economy (Mohammed & Olabisi, 2016). Despite these measures, Nigeria is still faced with the challenges of exchange rate volatility and poor performance of the economy. It is against this background that this study was undertaken. The main objective of this paper is to examine the effect of trade openness and exchange rate volatility on economic growth in Nigeria for the period 1986-2019.

Following this introduction, the rest of the paper is structured as follows. Section two deals with literature review. Section three focuses on methodology and specification of the model to be empirically tested while section four deals with results and discussion. The last section deals with conclusion and recommendations.

2.0 Literature Review

2.1 Conceptual Issues

Trade openness is defined as the removal of restrictions or barriers to trade such as tariffs, quotas, subsidies and non-tariff barriers to trade. It refers to the integration of the economies into the world market through the increasing volume and variety of cross border transactions in goods and services and international capital flows. Armah, Brafo-Insaidoo and Akapare (2015) defined trade openness as the removal of trade-distorting policies which may include free access to market, free access to market information, reduction of monopoly or oligopoly power, free movement of capital and labour between and across different countries. Trade openness could take the form of free trade zones, free trade areas, and regional trade blocs and bilateral and multilateral free trade agreements. Trade openness is measured as the ratio of exports and imports to the country's gross domestic product (GDP).

Exchange rate volatility refers to the erratic fluctuations in exchange rates. According to Yakub, Sani, Obiezue, and Aliyu (2019), exchange rate volatility refers to appreciation or depreciation of domestic currency over a period of time. Exchange rate is the rate at which a country's currency is exchanged with another country's currency.

Economic growth is defined as the increase in per capita income or gross domestic product (GDP) over a period of time. Basically, it is defined as the increase in a country's total output of goods and services. According to Jhingan, (2010), economic growth is a sustained increase in a country's national income. It refers to a quantitative and sustained increase in the country's per capita income accompanied by expansion in its labour force, consumption, capital and volume of trade (Dwivedi, 2009). It is measured as the percentage rate of increase in real Gross Domestic Product or GDP growth rate.

2.2 Theoretical Framework

The Heckscher-Ohlin's theory of factor endowment provide the theoretical basis for this study**.** This theory was developed by two Swedish economists, Heckscher and Ohlin. According to this theory, trade is necessitated because of differences in factor endowments. The theory assumed that factor inputs; labour and capital are homogeneous and the production function exhibits constant returns to scale. This theory posited that through trade openness, countries are allowed to trade with each other. The country with abundant capital should produce relatively more of capital-intensive goods, while the country with abundant labour should produce relatively more of the labour intensive goods. Based on this international specialization, trade brings about economic growth.

2.3 Empirical Literature

Nwosa, Ogbuagu and Fasina (2019) investigated the relationship between trade openness and country size for two African countries, Nigeria and Benin Republic for the period 1970-2018. The variables employed include trade openness, foreign direct investment, country size and official exchange rate. The study employed Autoregressive Distributed Lag model (ARDL) for the analysis. Results revealed that

trade openness had negative and significant relationship with country size in Nigeria while it was negative and insignificant in Benin Republic.

Achouak, Ousama and Mourad (2018) examined the impact of exchange rate volatility on economic growth on a sample of 45 developing and emerging countries over the period of 1985~2015. The study employed generalized autoregressive conditional heteroskedasticity (GARCH) model for the analysis. Findings revealed that nominal and real exchange rate volatilities had negative and significant impact on economic growth.

Armah, Brafo-Insaidoo and Akapare(2015) investigated the relationship between trade openness and economic growth in Ghana using annual time series data covering the period 1970- 2014. The variables employed include trade openness, foreign direct investment, country size and official exchange rate. The study employed co-integration and error correction model and the Granger causality test for the analysis. Findings from the study revealed that trade liberalization had positive and significant relationship with imports both in the long-run and short-run. Results also revealed a unidirectional causality running from trade liberalisation to economic growth.

Serenis and Tsounis (2014) investigated the effect of exchange rate volatility on two small countries, Croatia and Cyprus on aggregate exports using annual time series data for the period 1990 to 2012. Autoregressive distributed lag (ARDL) model was employed for the analysis and results revealed a positive and significant effect of exchange rate volatility on exports of Croatia and Cyprus.

Vieira, Holland, Gomes, and Bottecchia (2013) analysed the impact of exchange rate volatility on economic growth on a sample of 82 developed and emerging countries over the period of 1970~2009. The study employed generalized autoregressive conditional heteroskedasticity (GARCH) model for the analysis. Findings revealed that nominal and real exchange rate volatilities had negative and significant impact on economic growth in the sampled countries.

In addition, Michael (2013) examined the impact of trade openness on economic growth in Ghana for the period 1986–2010. The variables employed include; GDP, trade openness, foreign direct investment (FDI), capital stock, inflation and population. The study employed Autoregressive Distributed Lag approach for the analysis. Results revealed that trade liberalization proxy by trade openness had a positive and significant effect on economic growth in Ghana. The results also revealed that capital stock and population had positive and significant impact on real GDP growth in both the long-run and short run while Foreign Direct Investment (FDI) was found to have a negative impact on real GDP growth. Inflation though showed a positive relationship with real GDP growth, it was insignificant.

In another study, Manni and Ibn- Afzal (2012) examined the effect of trade openness on economic performance of Bangladesh from 1980- 2010. The variables employed include GDP, trade openness, exchange rate and inflation. The study employed

ordinary least squares for the analysis and the result revealed that trade liberalization had a positive and significant effect on GDP growth rate.

Mori, Rozilee, Jaratin, Dullah and Nanthakumar (2012) investigated the effects of the exchange rates volatility on economic growth in Malaysia during the period 1971 to 2009. The variables employed include; GDP, real exchange rate and nominal exchange rate. The study employed Autoregressive Distributed Lag approach for the analysis. Results revealed that both nominal and real exchange rates had a positive and significant effect on economic growth in Malaysia.

In Nigeria, Yakub, Sani, Obiezue and Aliyu (2019) investigated the impact of exchange rate volatility on trade flows in Nigeria using monthly data for the period 1997 – 2016. A GARCH model was used to generate the nominal exchange rate volatility series. The variables employed include growth rate of real GDP, import, exports and real exchange rate. To detect the long-run relationship among variables, the ARDL bounds test approach was employed. Also, the Granger causality test was applied to ascertain the direction of causality among the variables. The study found that exchange rate volatility affected Nigeria's trade flows negatively in the short-run but does not in the long-run.

Alwell, Mansi and Vincent (2017) investigated the effect of trade openness on economic growth in Nigeria. The study used annual time series data from 1980-2015. The variables employed include growth rate of real GDP, oil import, non-oil imports, oil export, non-oil export and exchange rate. The study employed the Autoregressive Distributed Lag model (ARDL) for the analysis. Findings from the study revealed that oil export and non-oil import had positive and significant impact on economic growth both in the short and long run.

Mohammed and Olabisi (2016) examined the impact of trade openness on economic growth of Nigeria from 1961- 2014. The study employed vector autoregressive (VAR) methodology for the analysis. The result revealed that shocks emanating from trade openness had a positive and significant effect on output growth in Nigeria for the period under investigation.

Nelson, Nathaniel and Fredrick (2016) explored the relationship between trade openness and exchange rate fluctuations in Nigeria, using annual time series data covering from 1984 to 2013. The variables employed include; real GDP, trade openness, real exchange rate, inflation rate, real interest rate and foreign interest rate. The study employed the ordinary least squares (OLS) method and the results revealed that trade openness had positive and significant impact on exchange rate volatility in Nigeria.

Olowe and Ibraheem (2015) examined the effect of trade openness on economic growth in Nigeria, using annual time series data from 1980- 2013. The study employed ordinary least squares for the analysis. The result revealed that trade openness had a negative and significant effect on economic growth in Nigeria.

In addition, Ajao and Igbekoyi (2013) investigated the determinants of real exchange rate volatility in Nigeria using annual time series data from 1981 to 2008. Using Generalized Auto-regression Condition Heteroskedasticity (GARCH) techniques and the Error Correction Model (ECM), the result revealed that trade openness, government expenditures, interest rate and the lagged exchange rate had positive and significant effect on real exchange rate volatility during the period under investigation.

Dickson and Andrew (2013) analysed the impact exchange rate fluctuations on trade variations in Nigeria for the period 1970 to 2010. The study employed error correction and GARCH model for the analysis and results of the study showed that exchange rate volatility is not significant in explaining variations in import, but was found to be positive and significant in accounting for variations in export.

Olaifa, Subair and Biala (2013) examined the effect of trade openness on economic growth in Nigeria, using annual time series data from 1970- 2012. The variables employed include; GDP, trade openness and exchange rate. The study employed structural VAR for the analysis and the result revealed that trade openness had a positive and significant effect on economic growth.

Nwosa, Saibu and Fakunle (2012) analysed the effect of trade openness on trade tax revenue in Nigeria, using annual time series data from 1970- 2009. The variables employed include GDP, trade openness, exchange rate and tax revenue. The study employed ordinary least squares for the analysis. The result revealed that trade openness had a positive and significant effect on tax revenue in Nigeria.

Joseph (2011) investigated the impact of real exchange rate volatility on economic growth in Nigeria from 1970-2009. The study used the GARCH model for the analysis. Results indicated that a negative and insignificant transmission existed between exchange rate volatility and economic growth.

Aliyu (2010) analysed the impact of exchange rate volatility on Nigeria's non-oil exports using quarterly data from 1986 to 2006. Using vector error correction and the VAR model, results revealed a long-run stable and negative relationship between Naira exchange rate and non-oil exports in Nigeria.

However, from the literature reviewed, it is obvious that studies that examined the effect of trade openness and exchange rate volatility on economic growth.in Nigeria are few. Most of the previous studies tend to dwell much on the impact of trade openness or exchange rate volatility in isolation without considering the effect of trade openness and exchange rate volatility simultaneously. In addition, some of the previous studies employed ordinary least squares technique for their analysis without subjecting the variables to diagnostic test which may invariably be prone to spurious results. Thus this present study is different from previous ones in terms of methodology employed, variables used and scope. This study is an attempt to bridge the gap by employing the GARCH modelling technique combined with the ARDL bounds test approach. Above all, the variables were subjected to some diagnostic

measures to avoid spurious regression results, a major gap that this study intends to fill.

3.0 Methodology

The study employed the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model proposed by Bollerslev (1986) and Autoregressive Distributed Lag (ARDL) approach developed by Pesaran, Shin and Smith (2001) to examine the effect of trade openness and exchange rate volatility on economic growth in Nigeria.

The study used annual time series data on variables such as GDP growth rate proxy for economic growth which served as the dependent variable while the independent variables include; trade openness, real exchange rate, foreign direct investment and inflation rate. The data were sourced from Central Bank of Nigeria Statistical Bulletin (2019) and National Bureau of Statistics (2019).

3.1 Model specification

This study employed the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) model and Autoregressive Distributed Lag (ARDL) model to examine the effect of trade openness and exchange rate volatility on economic growth in Nigeria. This study adopted the empirical works of Yakub, Sani, Obiezue and Aliyu (2019) and Nwosa, Ogbuagu and Fasina (2019) with some modifications in the terms of variables used. Previous scholars in this area used only three variables in their model which include GDP, import, exports and real exchange rate. This present study incorporated key variables such as trade openness (TOP), foreign direct investment (FDI), inflation (INFL), and real exchange rate (EXR) in order to make the results robust for policy implementation.
Thus, the modified form of the model is specified mathematically as in Equation [1]

GDP= f (TOP, EXR, FDI, INFL)..... (1)
The econometric form of the model is specified as in Equation [2]

$$\ln GDP=\alpha_0+\alpha_1 \ln TOP_{t-1}+ \alpha_2 \ln EXR_{t-1}+ \alpha_3 \ln FDI_{t-1}+\alpha_4 \ln INFL_{t-1}+\mu_i \quad \ldots\ldots\ldots\ldots (2)$$

Where: GDP represents growth rate of real gross domestic product (a proxy for economic growth), TOP represents trade openness (measured by imports plus exports/GDP), EXR is real exchange rate, FDI is foreign direct investment and INFL denotes inflation rate. α_0 is intercept term, α_1 - α_4 are the parameters to be estimated.
The general form of ARDL model is specified in Equation [3]

$$y_t = \beta_0 + \sum \beta_I \, y_{t-1} + \delta \, x_{t-1} + \mu t \quad \ldots\ldots\ldots\ldots [3]$$

Where y_t is the dependent variable, which is a function of its lagged values as well as the lagged values of the independent variables, δ denotes the coefficients of the short run dynamics, μ_t is the error term.

A priori expectations:
On a priori ground, we expect the value of $\alpha_1, \alpha_2, \alpha_3 > 0$ but $\alpha_4 < 0$

4.0 Results and Discussion

4.1 Test for Volatility

The test for volatility of real exchange rate was conducted by using the GARCH model. The results of volatility test are presented in table 1.

Table 1: Results of Volatility Test

	Coefficient	Std. Error	z-Statistic	Prob.
C	1.05E+08	70338721	1.486582	0.1371
ARCH(1)	1.417694	1.255259	1.129404	0.2587
GARCH(1)	-0.599096	0.220280	-2.719700	0.0065

Source: Author's computation (2020)

The result of the Wald-test presented in table 3 indicates that the coefficients of the GARCH (1) (-0.599) is significant at 5% critical level. This implies that real exchange rate volatility measured using the GARCH model has negative and significant effect on economic growth in Nigeria as shown by the z-statistic. The implication arising from this finding is that the more the exchange rate fluctuates or depreciates, the lower (in real terms) the prices of goods and services produced in the domestic economy.

4.2 Test for Stationarity

The Augmented Dickey Fuller (ADF) unit root test was performed to ascertain the order of integration. The results of stationarity test are presented in table 2.

Table 2: Results of Stationarity Test

	At levels		At 1st difference			
Variables	ADF statistics	Critical value at 5%	ADF statistics	critical value at 5%	order of integration	Decision
LnGDP	-3.311	-2.981	-----	-----	1(0)	Stationary
LnTOP	-3.386	-2.952	------	-----	1(0)	Stationary
LnEXR	-2.467	-2.954	-5.151	-2.957	1(1)	Stationary
LnFDI	-2.230	-2.967	-5.282	-2.967	1(1)	Stationary
LnINFL	-2.739	-2.954	-4.380	-2.967	1(1)	Stationary

Source: Author's computation (2020)

The results of stationarity test in table 2 indicate that exchange rate (EXR), foreign direct investment (FD) and inflation rate (INFL) are integrated of order 1 (that is 1(1)) while growth rate of GDP and trade openness (TOP) are stationary at level 1(0). These results indicate that the variables have mixed order of integration, thereby lending support to the use of autoregressive distributed lag (ADRL) model for the analysis.

4.3 Bounds Test for Co-integration

To test whether there is a long run relationship among the variables, the study employed bounds test. The results of the ARDL bounds test are presented in table 3.

Table 3. Results of the ARDL Bounds Test for Co-integration

Critical Bounds	**5% level of Significance**
Upper Bound	3.49
Lower Bound	2.56
F-Statistic	19.620
F-Value	0.000
Decision:	**Co-integration exists**

Note: Unrestricted intercept and no trend. Bound test critical values are obtained from Pesaran, Shin and Smith (2001).
Source: Author's computation (2020)

The analysis on table 3 indicates that the calculated F-statistic is 19.620. The F-statistic is higher than the upper critical value (3.49) ,suggesting that there is a long run relationship among the variables. Having ascertained the long-run relationship among the variables, the next step was to estimate the ARDL long-run results.

Table 4: ARDL Long-run Estimation Results
Dependent variable LOG(GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LnTOP	-6677.589	2679.325	-2.492266	0.0200
LnFDI	3.326674	1.568389	2.121077	0.0444
LnEXR	47.04918	11.09141	4.241948	0.0003
LnINFL	-21.40170	11.05512	-1.935908	0.0647
C	273.3451	977.4197	0.279660	0.7821
R-squared	0.891525	F-statistic		
Adjusted R-squared	0.876028	Prob(F-statistic)		0.000000
Durbin-Watson stat	2.083519			

Source: Author's computation (2020)

The results in table 4 indicate that trade openness has an inverse and significant relationship with economic growth in Nigeria. The coefficient of trade openness is -6677 with a probability value of 0.0200. This regression coefficient is negative and significant as shown by the probability value. This result implies that there is a negative and significant relationship between trade openness and economic growth. This result is in line with studies conducted by Olaifa, Subair and Biala (2013) and

Olowe and Ibraheem (2015) who discovered an inverse relationship between trade openness and economic growth in Nigeria.

The result also indicates that foreign direct investment has positive and significant relationship with economic growth. The coefficient of FDI is 3.326674 with a probability value of 0.0444. This regression coefficient is positive and significant as shown by the probability value. This result implies that for every one- unit increase in FDI, GDP will increase by about 3.32 unit. This is in line with a priori expectations.

Furthermore, the coefficient of exchange rate (EXR) is 47.04918 with a probability value of 0.0003. This regression coefficient is positive and significant as shown by the probability value. This result implies that for every one- unit increase in EXR, GDP will increase by about 47.0 unit. This is also in line with a priori expectations.

The results also indicate that the coefficient of inflation rate is -21.40170 with a probability value of 0.0647. This regression coefficient is negative and significant as shown by the probability value. This result implies that for every one- unit increase in inflation, the, GDP growth rate will reduce by about 21 unit. This is in line with a priori expectations. This is because inflation creates business risk and uncertainty and affect investment decision and economic growth.

The coefficient of determination (R-square) shows that about 0.89% of the total variation in the dependent variable is explained by changes in the explanatory variables. Thus, the regression is a good fit.

The F-statistic (57.5) indicates that all the variables are jointly statistically significant at 5 per cent level as shown by the low probability value of 0.0000. The Durbin-Watson statistic of 2.08 indicates absence of autocorrelation, thus it is robust and satisfactory for policy analysis.
The next step was to analyse the short-run dynamic impact of the independent variables on the dependent variable. The results of the short-run dynamics are presented in table 5.

Table 5: Dynamic Short-run Results
Dependent variable is LOG (GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3865.149	3358.698	-1.150788	0.2607
D(GDP(-1))	9.017138	0.643250	14.01810	0.0000
D(TOP(-1))	-73595.86	26273.84	-2.801108	0.0097
D(FDI(-1))	10.29780	15.78144	0.652526	0.5200
D(EXR(-1))	517.7704	110.1394	4.701047	0.0001
D(INFL(-1))	-0.046283	1.381061	-0.033513	0.9735
ECM(-1)	-0.627682	0.214488	-2.926425	0.0072
R-squared	0.914950	F-statistic		53.78871

Adjusted R-squared	0.897940	Prob(F-statistic)	0.000000
Durbin-Watson stat	1.964797		

Source: Author's computation (2020)

Table 5 presents the result of the short-run model. The results indicate that the lagged value of GDPGR and EXR are positive and significant. The lagged value of trade openness exerts negative and significant effect on economic growth in Nigeria.

The lagged error correction term (ECM) included in the model to capture the speed of adjustment towards the long-run equilibrium is negative and significant. The result indicates that about 62 % of the disequilibrium from the previous year's shock will be corrected in the current year.

4.3 Post estimation test

4.3.1 Results of Serial Correlation Test

Test for autocorrelation was done using Breusch-Godfrey Serial Correlation LM test. The results are presented in table 6.

Table 6: Breusch-Godfrey Serial Correlation LM Test:

F-statistic	7.700764	Probability	0.0024
Obs*R-squared	12.27613	Probability	0.0022

Source: Author's computation (2020)

The Serial Correlation LM test results indicate that the value of F-statistic is 7.700 and observed R^2 is 12.276 with probability values of 0.0024 and 0.0022 respectively. This probability values are greater than 0.05. This results imply that there is absence of serial correlation in the estimates.

4.3.2 Results of Normality Test

The Jarque-Bera normality test was carried out to ascertain the distribution of the residuals in the model using histogram-normality test. The results of the normality test are presented in figure 1.

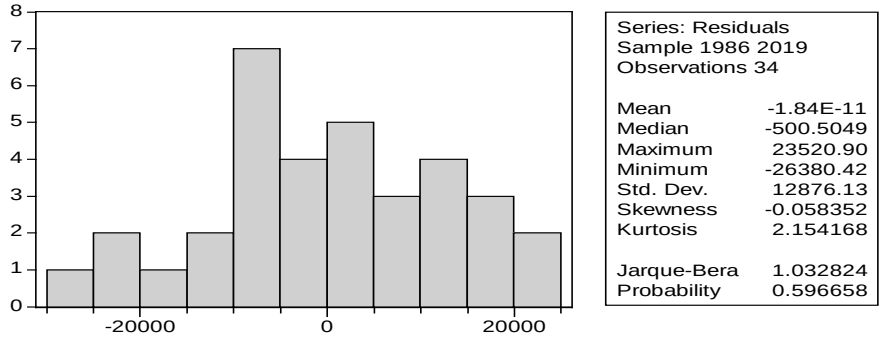

Figure 1**:** Results of Jacrque -Bera Normality Test

The result of the normality test indicates that the residuals are normally distributed. The probability value of Jarque-Bera is 0.596658 which is greater than 5% level. This result shows that the residuals are normally distributed.

4.3.3 Results of Stability Test

To determine the stability of the short run model, CUSUM and CUSUM of squares were used. The estimated model is stable if its recursive residuals lie within the two critical bounds. On the other hand, the model is unstable if residuals lie outside the two critical lines.

The results of stability test are presented in figure 2a and 2b

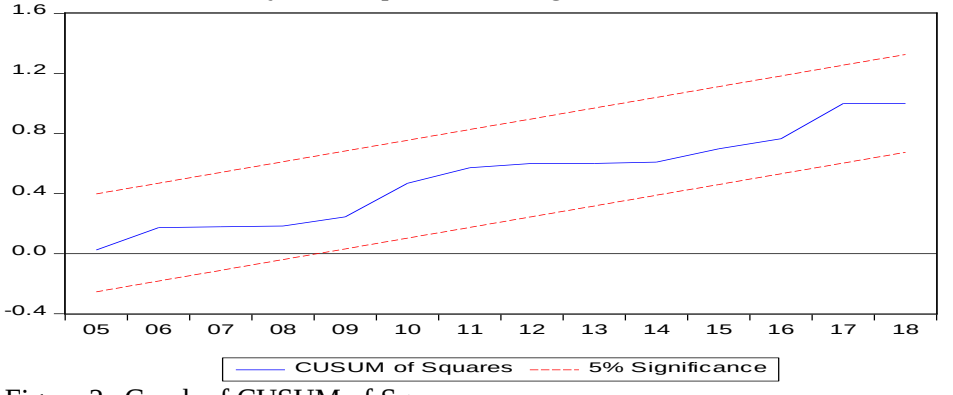

Figure 2a.Graph of CUSUM of Squares

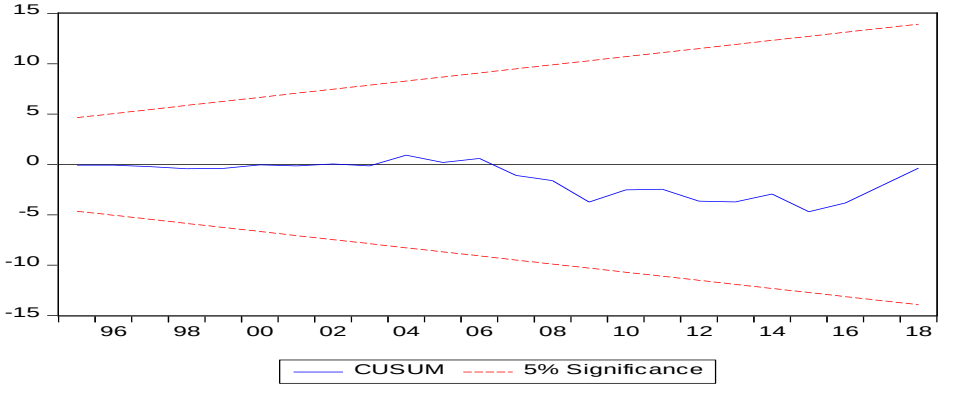

Figure 2b.Graph of CUSUM

From the analysis, both the graph of CUSUM and CUSUM of squares are stable because the recursive residuals fall within the two critical bounds.

5.0 Conclusion and Recommendations

This paper examined the effect of trade openness and exchange rate volatility on economic growth in Nigeria, using annual time series data for the period 1986-2019. The study employed the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) and Autoregressive Distributed Lag (ARDL) models for the analysis. The results from the GARCH model indicated that real exchange rate volatility had negative and significant relationship with economic growth in Nigeria. The

implication arising from this finding is that the more the exchange rate depreciates, the lower (in real terms) the prices of goods and services produced in Nigeria vis-à-vis its trading partners and this could retard economic growth of Nigeria. In addition, results from ARDL model showed that trade openness had negative and significant relationship with Nigeria's economic growth both in the short-run and long-run. Based on the findings, the following recommendations were put forward.

1. The Central Bank of Nigeria should stabilize the exchange rate of naira by controlling the high demand for foreign currency.
2. Government should put in place policies that will restrict importation of some goods and services coming into the country. This is on account of the negative relationship between trade openness and economic growth as shown from the empirical studies.
3. There is need to encourage foreign direct investment into the Nigerian economy. This is on account of the positive and significant relationship between FDI and economic growth. This can be achieved through the provision of functional and adequate supply of electricity, portable water, granting of subsidies, tax exemption and other incentives.

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