FOREIGN EXCHANGE RATE AND EXPORT IN NIGERIA: ARDL BOUND TEST APPROACH

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Abstract

Exchange rate is an important variable used as a parameter for determining international competitiveness and it is being regarded as an indicator of the competitiveness of the currency of any economy and an inverse relationship between this competitiveness exist. The study analysed impact of foreign exchange rate and export relation in Nigeria. In the model specified, export is the dependent while real exchange rate; inflation rate and real interest rate are the independent variables. Data were collected from CBN statistical Bulletin and national bureau of statistics (NBS) for the period 1980 –2017. The statistical techniques used for the analysis are the unit root test, cointegration test; ARDL bound test and post estimation techniques of heteroscedasticity, Serial Correlation Test, and stability test. The results of the empirical analysis for the unit root result were found to be mixed order of integration at level and first difference. The result of the ADRL model revealed that there are significant effects of the lag of the variables on the export during the. The ARDL suggests a significant effect of the current year of export exchange rate and inflation shows a significant effect of current year, second and third on exports. While interest rate also has a significant effect ate current year on export. ARDL bound test shows the there is no long run relationship among the variables given that the F-statistics lies below the lower bound of the critical value and finally the post estimation heteroscedasticity test series correlation and stability test indicate that the model is reliable. Therefore, the paper recommends exchange rate stabilization measures to encourage the through the fixed exchange rate regime to reduce the uncertainty in the value of naira in order to enhance the export volume of Nigeria.

Keywords: Foreign Exchange Rate, Export, Bound Test, Interest Rate, Inflation

Introduction

In Nigeria, the term foreign exchange has become a house hold expression due to the activities of the street hawkers of this very essential commodity. Foreign exchange is a financial asset usually denominated in foreign asset earned through exports of goods and services as well as inflows of foreign investments, external grants and loans. The quantum of foreign exchange available of any point in time constitutes foreign exchange resources. The volatility and continued depreciation of exchange rate of the Naira is principal caused by the expansionary liquidity and the resultant persistent excess liquefy in the banking system supply of inelastic of both domestic production and the foreign exchange market with its further

destabilizing speculative activities need to be managed ineffectively (Gbosi,2005).

Exchange rate plays an increasingly significant role in any economy as it directly affects domestic price level, profitability of traded goods and services, allocation of resources and investment decision. The stability of the exchange rate is today formidable bedrock of all economic activities. Since the adoption of the Structural Adjustment Programmed (SAP) in 1986, Nigeria has moved to various types of floating regimes of exchange rate from the fixed/pegged regimes between 1960s and the mid-1980s. Floating exchange rate has been shown to be preferable to the fixed arrangement because of the responsiveness of the rates to the foreign exchange market (Nwankwo, 1980).

Exchange rate is an important variable used as a parameter for determining international competitiveness and it is being regarded as an indicator of the competitiveness of the currency of any economy and an inverse relationship between this competitiveness exist. The impact of exchange rate on trade can lead to currency appreciation or depreciation. The world's total external reserves grew to $9.7 trillion in 2010, while Nigerians reserves peaked at $64 billion in 2008 before the global financial crisis and dropped to $31.7 billion in late 2011. The U.S Dollar increased to 165.80 Nigerian Naira in October from 163.85 in September of 2014. The Nigerian Naira averaged 122.44 from 1960 until 2014, reaching an all-time high of 165.80 in October 2014 and a record low of 0.53 in September of 1980. This shows that the Naira keeps fluctuating and this fluctuation makes it difficult for countries to trade. This fluctuation in the exchange rate was due to the implementation of the Structural Adjustment Program (SAP) that required deregulation of foreign exchange market and this deregulation led to the devaluation of the Nigerian Naira (Adeniran et al, 2014).

However, maintaining a realistic exchange rate for the Naira is very crucial for the sustainability of export growth in Nigeria. The objective of the paperis to investigate the impact of foreign exchange rate on trade in Nigeria. The paper is divided into five sections, section one is the background to the paper, section reviewed of related works in the area, section three method of empirical analysis and finally, section five is conclusion and policy implication

Literature Review
Floating exchange rate regime where the international value of a currency, at any point in time is determined by the interaction of the market forces of demand and supply of foreign exchange. The floating exchange rate system allows the market to manage the exchange rate by making

provision for a continuous adjustment of exchange rate to the changes in the demand and supply of foreign exchange. It therefore, eliminates the difficulties associated with having to determine exchange rate as in the case of fixed exchange rate regime. Flexible exchange rate regimes thus, offer countries the advantage of maintaining an independent monetary policy (CBN, 2009).

Fixed exchange rate regime connotes an era during which the exchange rate of the country was fixed and controlled by the monetary authority without room for the market forces of demand and supply. This era lasted between 1959 (when the CBN started operation) and June 1986 (when the Structural Adjustment Programmed, SAP, was introduced). From 1959-1967, the country adopted ad hoc or administrative measures in determining the exchange rate of the Nigerian pound, which was fixed at par with the British pound sterling until the devaluation of the British pound sterling by 10.0 per cent in November, 1967. From this period, the Nigerian government opted to operate its own separate exchange rate system independent of the pound sterling (CBN, 2016).

In between the floating exchange rate and the fixed exchange rate regime is the hybrid exchange rate regime. This is an exchange regime that is a hybrid between the fixed (hard peg) and floating exchange rate regimes. The soft peg allows the central bank limited flexibility over its domestic monetary policy. In this system, currencies are maintained at a stable value relative to an anchor- currency or a basket of currencies. This is achieved by allowing the exchange rate to oscillate around a central rate (nominal anchor) within a narrow band of less than ±1 per cent or a wide band of up to ±30 per cent or adjusted up or down periodically in line with some quantitative economic indicators including inflation differentials across anchor countries (Akpan, 2012).

Empirical Literature Review
Morley (1992) analyzed the effect of real exchange rates on output for twenty eight developing countries that have devalued their currencies using a regression framework. After the introduction of controls for factors that could simultaneously induce devaluation and reduce output including terms of trade, import growth, the money supply, and the fiscal balance, he discovered that depreciation of the level of the real exchange rate reduced the output.

Ojo (1978) In Nigeria, a study carried out by on the effect of exchange rate on the country's trade balance suggested that exchange rate changes do not play any significant role in the explanation of Nigerian import-export balance. Rano-Aliyu (2010) quantitatively assessed the impact of exchange rate

volatility on non-oil export flows in Nigeria, employing fundamental analysis where the flow of non-oil exports from the Nigerian economy is assumed to be predicated on fundamental variables: the naira exchange rate volatility, the US dollar volatility, Nigeria's Terms of Trade and Index of Openness. The co-integration results revealed that non-oil exports and the fundamental variables had a stable long-run equilibrium relationship.

Obadan (2006) summarized the factors that led to the misalignment of the real exchange rate in Nigeria to include weak production base, import dependent production structure, fragile export base and weak non-oil export earnings, expansionary monetary and fiscal policies, inadequate foreign capital inflow, excess demand for foreign exchange relative to supply, fluctuations in crude oil earnings, unguided trade liberalization policy, speculative activities and sharp practices (round tripping) of authorized dealers.

Thapa (2002) using co integration and error correction models analyzed the impact of real effective exchange rate on economic activities in Nepal to determine which of the transmission channels (aggregate demand channel and aggregate supply channel) the effect of variation in real exchange. The traditional view has it that the real exchange rate operates through the aggregate demand channel. By this, means that the depreciation of real exchange rate, enhances the international competitiveness of domestic goods, boosts net exports and eventually enlarges GDP.

Shehu and Aliyu (2006), asserted that appreciation of exchange rate results in increased imports and reduced export while depreciation would expand export and discourage import. Also, depreciation of exchange rate tends to cause a shift from foreign goods to domestic goods. Hence, it leads to diversion of income from importing countries to countries exporting through a shift in terms of trade, and this tends to have impact on the exporting and importing countries' economic growth.

Oyinlola *et al* (2010) examined the long-run and short-run impacts of exchange rate and price changes on trade flows in Nigeria using exports and imports functions. The bounds testing (Auto regressive distributive lag model) approach. It was also revealed from the result that in the long-run, devaluation is more effective than relative prices in altering imports demand at both baseline and augmented models. In exports demand however, the reverse is the case.

Methodology

This section describes the methodology of the research work. The data were obtained from Central bank of Nigeria annual reviews (CBN), National Bureau of Statistics (NBS), Journals of Economics, Nigeria Stock Exchange (NSE), Security and Exchange Commission. The method of data analysis employed in this study is the unit root test (adf), Cointegration Test, ARDL, and bound test. The model specified fundamental relationships between the dependent variable and independent variables in a linear form:

$$\Delta lnEXPT_{t=}\alpha_0 + \emptyset_1 lnEXPT_{t-1} + \emptyset_2 lnEXPT_{t-1} + \emptyset_3 lnFEXR_{t-1} + \emptyset_4 lnINFR_{t-1} + \emptyset_5 lnINTR_{t-1}$$

$$+ \sum_{i=1}^{k1} \sigma_{1i}\Delta ln\,EXPT_{t-1} \quad + \sum_{i=0}^{k2} \gamma_{2i}\Delta ln\,EXPT_{1t-i} \sum_{i=0}^{k3} \varepsilon_{3i}\Delta ln\,FEXR_{2t-i} + \sum_{i=0}^{k4} \emptyset\Delta lnINFR_{3t-i}$$

$$+ \sum_{i=0}^{k5} \vartheta_5 \Delta ln\,INTR_{4t-i} + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where, EXP stands for exports, EXR for Foreign Exchange Rate, INF for Inflation Rates and INR for Interest Rates. α_0 denotes Constant, $\emptyset_1$ and $\emptyset_2$ are the Co-efficient of Export Rate (EXPT) $\emptyset_2$ is the coefficient of Foreign Exchange Rate (FEXR), $\emptyset_3$ isthe Co-efficient of Inflation Rates (INFR), $\emptyset_3$ is the Co-efficient of Interest Rates (INTR) and μ_t is the error term.

Data Presentation and Analysis
Test for Stationarity (Unit root test)
A stationary time series is one whose statistical properties such as mean, variance, are all constant over time (Dickey and Fuller, 1981),. The Augmented Dickey Fuller test is used to test for stationary

Table 1: Augmented Dickey Fuller Test

Variables	Critical Values at 1%	Critical Values at 5%	Critical Values at 10%	Lags	Other of Difference	t-Statistics	Probability	Decision
EXPT	-3.626784	-2.945842	-2.611531	9	I(1)	-6.15784	0.0000	Stationary
EXGR	-2.630762	-1.950394	-1.611202	9	I(0)	-2.167010	0.0415	Stationary
INTR	-3.621023	-2.943427	-2.610263	9	I(0)	-5.929399	0.0000	Stationary
INFR	-3.62123	-2.943427	-2.610263	9	I(0)	-2.948145	0.0495	Stationary

Source: Author's Computation Using E-views 9

This study stated by examining the time series properties of each variable employed in the model using the Augmented Dickey Fuller (ADF). Here, export is shown to be stationary at first difference I(1), while other variables such as exchange rate, interest rate and inflation rate are stationary at level I(0). This indicates that the model is appropriate for the estimation of ARDL model**.**

Autoregressive Distributed-Lag Models (ARDL): Bound Test

Table 2: Autoregressive Distributed-Lag Models (ARDL)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LEXP01(-1)	0.821772	0.106654	7.705016	0.0000
EXR	0.000934	0.001176	0.794523	0.4344
INFR	-0.014204	0.005448	-2.607391	0.0152
INFR(-1)	0.005795	0.006851	0.845878	0.4056
INFR(-2)	-0.001361	0.006992	-0.194626	0.8473
INFR(-3)	-0.013612	0.006491	-2.097226	0.0463
INFR(-4)	0.011025	0.005455	2.020935	0.0541
INTR	-0.005563	0.004496	-1.237380	0.2274
C	4.430574	2.554361	1.734514	0.0951
R-squared	0.906694	Akaike info criterion		1.095830
Adjusted R-squared	0.876837	Schwarz criterion		1.499866
F-statistic	30.36711	Hannan-Quinn criter.		1.233618
Prob(F-statistic)	0.000000	Durbin-Watson stat		1.708684

Source: Extracted from E-View 9.0 estimated output, 2019.

The result of the ADRL model revealed that there are significant effects of the lag of the variables on the export during the period covered. The result suggests the significant effect of the current year of export exchange rate, whereas inflation shows a significant effects of current year, second and third year respectively all having significant effect on exports. Finally, current year of interest rate also have a significant effect on export.

However, one percent increase in exchange rate will affect export by 0.000934, inflation rate in the current year, second year and third year will negative affect export by -0.014204, -0.0013612 and -0.013612 units respectively. A one percent increase in interest rate in the current year will decrease export by -0.005563 units. Similarly, all the variables confirmed the apriory signs. This indicates that appreciation of exchange rate at the current year will increase export by the said value, while inflation having a negative sign will have an adverse effect on export in the current year, second year and third year respectively. Likewise, interest rate have a negative sign affects export negatively by the said among in the table.

The model has an R2 value of 0.91 implying that about bout 91% of the variable in the export is explained by the variables in the model. The probability of the F-statistics 0.0000 suggests that the variables are jointly significant in influencing export. Durbin Watson statistics of 1.71 suggest the present of slightly serial correlation among the variables in the model

Table 3: Bound Test Result

Test Statistic	Value	K
F-statistic	0.876767	3

Perasan Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Source: Extracted from E-View 9.0 estimated output, 2019.

To conclude on the long run relationship Perasan (2001), maintain that that the F-statistics must lay outside the upper bounds of the critical values for a long run relationship to exist otherwise no long run relationship in the model. However, if the F-statistics lies between the lower and upper bound the test is inconclusive.

The ARDL bound shows the export as the dependent variable, the calculated F-statistics of 0.876767 which falls below the lower bound of the critical value at 10%, 5%, 2.5% and 1% level of significance. This implies that there exist no cointergration among the variables and no long run relationship among the variables

Going by the Pesaran interpretation, the major order of integration is I(0), therefore, the lower bound value is consider. The result indicate that the F-statistics is 0.876767 falls below the lower bound value for all the level of significant, we conclude that there is no long run relationship among the series in the model.

Heteroscedasticity Test

Table 4: The Breusch-Pagan-Godfrey and White Heteroscedasticity.

F-statistic	0.677740	Prob. F(16,17)	0.7790
Obs*R-squared	13.24137	Prob. Chi-Square(16)	0.6550
Scaled explained SS	2.641010	Prob. Chi-Square(16)	0.9999

Source: *Extracted from E-View 9.0 estimated output, 2019.*

From the Breusch-Pagan-Godfrey test result above, we have a P-value of 0.6550, giving room for the acceptance of the null hypothesis and rejection of the alternate hypothesis. There is the presence of homoskedasticity.

Serial Correlation Test

Table 5: Breusch-Godfrey Serial Correlation Test:

F-statistic	0.340763	Prob. F(3,15)	0.7962
Obs*R-squared	2.167957	Prob. Chi-Square(3)	0.5383

Source: *Extracted from E-View 9.0 estimated output, 2019.*
Since the P-value for the observed R-square is 0.5383 which is greater than 5% level of significant then the null hypothesis of no serial correlation is accepted. The model has no serial correlation.
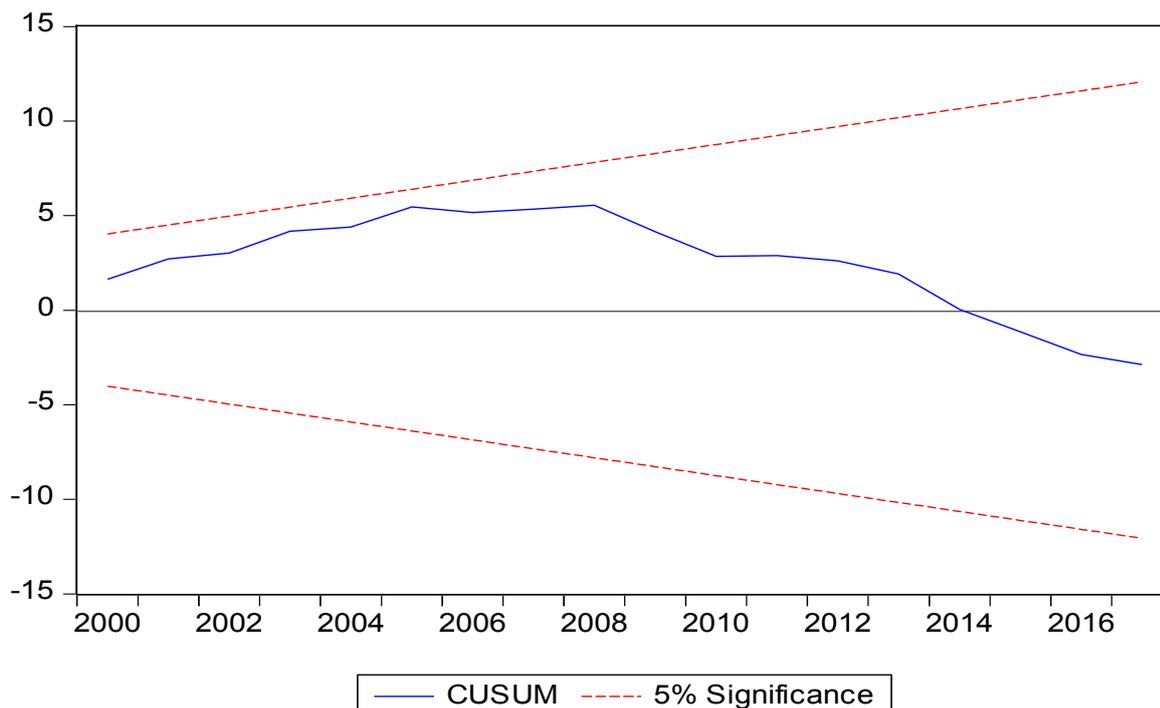
Cusum Test of Stability

Fig. 1: Cusum Test of Stability

Source: *Extracted from E-View 9.0 estimated output, 2019.*

The model stability is checked using the cusum test and shows to be stable because the cusum line is within the two red lines at 5% level of significant. Therefore, it is conclude that the model is stable.

Discussion of Findings
The ARDL coefficient for the variables test shows that exchange rate exhibited a positive relationship with export and it is statistically significant; therefore a 1% increase in exchange rate will increase export by 0.278673. Since the probability value (0.0002) is less than 0.05 percent level of significance; it is concluded that there is a significant relationship between exchange rate and export. This was apriorily expected. Inflation rate exhibited a negative relationship with export and it is statistically significant. Therefore, a 1% increase in inflation rate will reduce export by 0.454947. Since the probability value (0.0355) is less than 0.05 percent level of significance; it is concluded that there is a significant relationship between inflation rate and export. This was also apriorly expected.

Interest rate exhibited a negative relationship with export and the result is not statistically significant. A 1% increase in interest rate will reduce export by 0.002404. Since the probability value (0.7947) is greater than 0.05 percent level of significance; it is concluded that there is no significant relationship between interest rate and export.

The result of the ADRL model revealed that there are significant effects of the lag of the variables on the export during the period covered. The result suggests the significant effect of the current year of export exchange rate, whereas inflation shows a significant effects of current year, second and third year respectively all having significant effect on exports. Finally, current year of interest rate also have a significant effect on export.

The result of the bound test indicate that the F-statistics is 0.876767 falls below the lower bound value for all the level of significant, we conclude that there is no long run relationship among the series in the model.

Conclusion and Recommendations
This study employed quantitative research design to evaluate the impact Foreign exchange on Trade in Nigeria. The result of the unit root indicates a mixture of I(0) and I(1), The ARDL bound shows the export as the dependent variable, the calculated F-statistics of 0.876767 which falls below lower bound of the critical value at 10%, 5%, 2.5% and 1% level of significance. This implies that there exist no cointegration among the variables and no long run relationship among the variables. All the post estimation result proves that the model

is fit as indicated by the absence of serial correlation and presence of stability.

Base on the finding exchange rate proved to be an important determinant of export volume in Nigeria.

The paper recommends exchange rate stabilization measures to encourage the through the fixed exchange rate regime to reduce the uncertainty in the value of naira in order to enhance the export volume of Nigeria.

References

CBN Bullion, Vol.15, No.4, October December, 1991. CBN, Lagos.

Central Bank of Nigeria (2009) 50 Years of Central Banking in Nigeria 1958-2008

Dickey, D.A. and Fuller W. A. (1981*), Likelihood Ratio Statistics for Autoregressive Time Series with a unit Root.* Econometrical.

Morley, S. A. (1992). ―*On the Effect of Devaluation during Stabilization Programs in LDCs*. Review of Economics and Statistics 74, no. 1: 21–27.

Obadan, M. I. (2006), "Overview of Exchange Rate Management in Nigeria from 1986 to Date", In the Dynamics of Exchange Rate in Nigeria, Central Bank of Nigeria Bullion. 30 (3): 1- 9.

Ojo, M.O. (1998). *"Exchange Rates Developments in Nigeria: A Historical   Perspective".* Being Text of a paper delivered at a Seminar on "Exchange   Rate Determination and Arithmetic" by Unilag Consult.

Oyinlola, M. A., Adeniyi, O. and Omisakin, O. (2010).Responsiveness of trade flows to changes in exchange rate

Rano-Aliyu S.U. (2009*), "Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth.*

Sanusi J.O (2004*) Exchange Rate Mechanism:* The Current Nigerian Experience, APaper Presented At The Nigerian British Chamber Of Commerce.

Shehu, A. and Aliyu M. (2006).*"Naira Exchange Rate and Policy Management"* Unpublished Thesis submitted to the department of Economics, University of Benin.

Thapa, N. B. (2002*). "An Econometric Analysis of the Impact of Real Effective Exchange Rate on Domestic Activities in Nepal".* Research Department, Nepal Rastra Bank, Baluwatar, Kathmadu, Nepal.