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TESTING LONG RUN RELATIONSHIP BETWEEN TRADE LIBERALIZATION AND EXCHANGE RATE IN NIGERIA: AN ARDL BOUND TEST APPROACH (1986-2023)

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Abstract

This study examined the existence of long run relationship between trade liberalization and exchange rate in Nigeria over a period of 1986 to 2023, using annual time series data drawn from publication of World Bank annual data on nominal effective exchange rate (NEER), trade openness (TOP), terms of trade (TOT) and inflation rate (INFR). The data were estimated using Autoregressive Distributed Lag Model (ARDL) bound test approach to cointegration. The result revealed that there is long run relationship between trade liberalization and exchange rate in Nigeria. The ECM found to be negative with coefficient of 68% and statistically significant at 5% significant level, which is also another evidence confirming the existence of long run relationship between among the variables of study. Therefore, the Federal Government of Nigeria should strive to increase the value of the Naira as this will reduce the rate at which the naira is exchanged for the Dollar.

Key words: ECM, Cointegration Test, Trade Liberalization, Exchange Rate.

1. Introduction

Exchange rate is the price of one currency in terms of another. It is an important price in an open economy that influences the flows of goods, services and capital in any given economy. Instability in exchange rate exerts strong pressure on the balance of payments, inflation and other macroeconomic variables. The most important themes that emerge in the discussion of exchange rates and their management in Nigeria include the high volatility, real exchange rate overvaluation albeit in the context of continuous nominal depreciation and the search for mechanism for market-determined rate where government is the dominant supplier of foreign exchange.

Exchange rate stability is one of the goals of monetary policy in Nigeria and over the years exchange rate policy has been driven mostly by an obsession to keep the nominal exchange rate 'stable'. For the general public, the health of the economy is gauged by the nominal exchange rate where a depreciating rate is synonymous with a weakening economy (Soludo, 2008). Another key feature of the exchange regime is the huge premium which indicates the extent of distortions in the market. This has been due to the fixed regime until the mid-1980s, the managed float of the Structural Adjustment Programme era, the refixing of the official rate from 1994 to 1998 and thus the large disparity between the official and the parallel (free) market rates. Given the huge demand for foreign exchange for imports and sundry reasons, and also the fact that forex at the official rate was rightly regulated with strict documentation requirements, the parallel market boomed (Obi, Oniore & Nnadi, 2016).

Nigeria has made varying degree of attempt at trade liberalization since independence in 1960. For most part of its colonial history, its trade was tied to apron of and virtually restricted to the British economy and for this reason its trade regime during this period could be described as restrictive. This colonial trade regime

remained in place in the immediate post independent years and trade restrictions were only heightened with the passage of exchange Control Act of 1962. Between 1976 and 1979, the military government further escalated Nigerian trade restrictions. Between 1980 and 1982, government after initially relaxing trade restrictions tightened the noose in 1982 (CBN, 2012). However, it was in 1986 that the first decisive attempt at changing the trade regime was made and this happened to a trade liberalization programme in Nigeria (Sani, 2006).

Based on the above, the following research questions were formulated for the study.

i. What is the trend of trade liberalization and exchange rate in Nigeria?
ii. Is there a long run relationship between trade liberalization and exchange rate in Nigeria?

Based on the above research questions, the aim of study is to examine the impact of trade liberalization on exchange rate in Nigeria from 1986 to 2023. The specific objectives are:

i. Assess the trend of trade liberalization and exchange rate in Nigeria.
ii. Examine if there exist a long run relationship between trade liberalization and exchange rate in Nigeria.

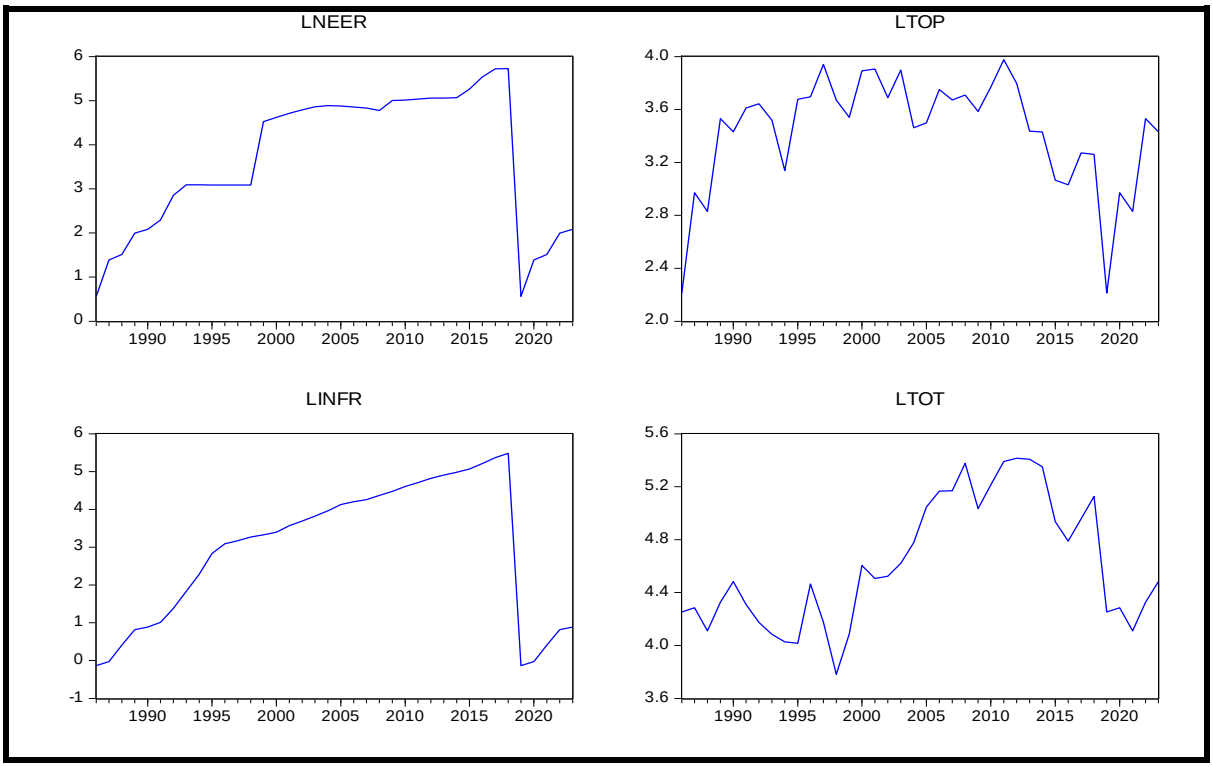
To achieve the foregoing objectives, this study is divided into five sections including this introduction. Section two contains review of related literature, section three discusses the methodology, while section four and five comprises results and interpretation and conclusion and recommendations respectively.

The trend of trade openness in relation to exchange rate in Nigeria from 1986 to 2023

The trend of trade openness, exchange rate (NEER), terms of trade (TOT) and inflation rate (INFR) based on the data sourced from World Development Indicators (WDI) data base.

Trend of trade liberalization in relation to exchange rate in Nigeria from 1986 to 2023

Figure 1



Source: ***computed by the researcher using E-views 9***

Figure 1 shows the trend of trade openness (TOP), nominal effective exchange rate (NEER), and terms of trade (TOT) and inflation rate (INFR) over the study period 1986 to 2023. This was done to enable the study to provide answer to the first research question. The result shows that trade openness and exchange rate (NEER) has fluctuated over different periods of the investigation. The trends have both upward and downward movement. When the trend of trade openness has been rising and falling, exhibiting clustering volatility, the exchange rate (NEER) exhibits an upwards trend in an unstable nature throughout the study period. The trade openness trended upward from 1986 to 1988 indicating that trade protection is at minimum level and falls slightly into 1989. This fluctuation continues until around 2012 when it falls sharply in 2017. This indicates that, as the economy keep introducing different trade policies, it trade with other nations largely depends on the policies that were favourable. However, the exchange rate (NEER) has upward and unstable trending throughout the period, indicating that exchange rate keep on depreciating, while the value of naira has been falling consistently with trade liberalization. The trend of exchange rate (NEER) became steeper from 1998 to 1999 due to depreciation of exchange rate. Therefore, the movement of exchange rate (NEER) connotes currency depreciation and consistently falling in the value of naira due to trade liberalization. This phenomenon can be identified as an important feature of trade liberalization.

The trend of Nigeria terms of trade (TOT) as shown in figure 1 has been unstable as the trade liberalization became pronounced. The trend follows a rise and fall pattern which is an indication that with openness of the economy, the net barter terms of trade has not been stable. But from 2002 the trend keep rising to 2014, where it falls down to 2016 before it start rising. By implication, the price of imports is high than that of exports. This shows that importation is higher than exportation in the economy. Also, Nigeria is vulnerable to terms of trade shocks because of it exportation of primary products. The trend of inflation rate (INFR) is a clear departure from other trends. The trend indicates a stable rising trend. The rising trend became more conspicuous with increase in trade liberalization. This is due to rise in importation of goods and services. This indicates that with trade openness, more of goods and services are imported in the economy, which also contributes to the rise in the inflationary rate. By the year 2020, the trends of all the variables exhibit a downward movement showing that during the period openness to trade is down, due to lockdown and boarder closure. Afterward, they keep moving upward considering the measures taking by government.

2. Literature Review

2.1 Empirical Review

Ayodeji and Mustapha (2020) examined the impact of trade liberalization on exchange rate in Nigeria from 1986 to 2018, using Autoregressive Distributed Lag Model (ARDL) approach to cointegration. The result of estimated ARDL model showed that trade liberalization and terms of trade have negative impacts on exchange rate, while inflation rate have positive impact on exchange rate.

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 to 2016. A GARCH model was used to generate the nominal exchange rate volatility series. To detect the long-run relationship among variables, the ARDL bounds testing approach was employed. The result showed that there exists a long run relationship between exchange and trade flows in Nigeria.

Egbulonu*et al.* (2018) examined empirically the relationship between trade openness and economic growth in Nigeria. The study covered the period 1990 to 2015, using ARDL approach to cointegration. The ARDL result confirmed the existence of a long-run relationship between Economic Growth, Trade

Openness, Foreign Direct Investment and Gross Capital Formation.

Hlalefang, Nwabisa and Clement (2017) determined the long run relationship between trade openness and economic growth in Ghana and Nigeria covering the period between 1980 and 2016. The Autoregressive distributed lag (ARDL) model was employed to examine the long run relationship between the variables. The findings suggested existence of a long run relationship among the variables for both countries.

Dickson and Ukavwe (2013) applied the error correction and GARCH model to investigate the impact of exchange rate fluctuations on trade variations in Nigeria using annual time series data from 1970 to 2010. The results of the study showed that exchange rate volatility is not significant in explaining variations in import, but was found to be statistically significant and positive in accounting for variations in export.

Lee and Chee-Hong (2013) investigated the impact of trade openness on Malaysian exchange rate from 2005 to 2009, using the ARDL model. The findings showed that most of the variables are statistically significant and carried the expected signs. As predicted by the theory, the rise of the income level and stock market index in Malaysia will lead to the appreciation of domestic currency. The result showed that increase in trade openness can lead to depreciation of Malaysian Ringgit.

Madueme (2011) tried to ascertain the trend in trade openness from 1990 to 2008. Data was collected through Central Bank Statistical Bulletin and analyzed using descriptive and inferential statistics. The Results showed that significant differences existed in trade openness in the Nigerian economy pre and post year 2000. This prompted the trend analysis to captured recent relationship among the variables.

Based on the previous empirical studies, Madueme (2011) established trend of trade openness not in relationship to exchange rate, Dickson and Ukavwe (2013) used GARCH model on some selected foreign countries, Yakub, Sani, Obiezue and Aliyu (2019) examine long run relationship but on trade flow, and there is need to extend the period of study. This study assess the trend and test if there exist a long run relationship between trade openness, terms of trade, inflation rate and exchange rate in Nigeria from 1986 to 2023.

2.2 Theoretical Framework

Marshall- Lerner Condition

Marshall-Lerner condition is supportive to this study because the approach states that depreciation would lead to expansion in output if the sum of price elasticity of demand for export and the price elasticity of demand for imports is greater than unity. The mechanism behind these positive effects is that devaluation switches demand from imports to domestically produced goods by increasing the relative prices of imports and making export industries more competitive in international markets thus stimulating domestic production of tradable goods and inducing domestic industries to use more domestic inputs.

3. Methodology

3.1 Model Specification

This section presents the model to estimate the long-run equation and the model to estimate the speed of adjustments (ECM) in accordance with the objective of the study.

Based on the objectives of this study, the above equation is modified mathematically as:

$NEER = f\ (TOP, TOT, INFR)$ (1)

The econometric model specification is specified in equation (2) below:

$NEER_t = \beta_0 + \beta_1 TOP_t + \beta_2 TOT_t + \beta_3 INFR_t + \mu_t$ (2)

Where:

NEEX = nominal effective exchange rate

TOP = trade openness

TOT= terms of trade

INFR = inflation rate,

β_0 - β_3 = Constants term

μt= Stochastic error term.

Model to Estimate the Long-run Equation

Based on the bounds-testing approach proposed by Pesaran and Smith (1998), Pesaran*et al.* (2001) and Narayan (2005) any long-run relationship may be given by the equation as follows:

$$\Delta NEER_t = \beta_0 + \sum_{1=0}^{n} \beta_{1i} \Delta \ln TOP_{t-1} + \sum_{1=0}^{n} \beta_{2i} \Delta \ln TOT_{t-1} + \sum_{1=0}^{n} \beta_{3i} \Delta INFR_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

Where *n* represents the optimal lag length, *t* is time and Δ refers to the first difference of variables.

Model to Estimate the Speed of Adjustments

By using the coefficient of this error correction model (ECM), the speed of the adjustment was calculated. This explained how much time the system will take to return to the long term equilibrium after a random shock and the expected sign will be negative to ensure the convergence. The error correction model (unrestricted) for the ARDL model is specified in as

$$\Delta NEER_t = \pi_0 + \sum_{1=0}^{n} \pi_{1i} \Delta \ln TOP_{t-1} + \sum_{1=0}^{n} \pi_{2i} \Delta \ln TOT_{t-1} + \sum_{1=0}^{n} \pi_{3i} \Delta INFR_{t-1} + \gamma ECM + u_t \ldots\ldots\ldots(4)$$

Where the speed of adjustment will be and ECM is the residuals which will be obtained through the application of the cointegration model. The residual term (ECM) indicates the changes independent variable. These changes are not only due to the two levels of disequilibrium in the cointegration association but also in the other explanatory variables which points to the convergence of the dependent variable from short to long run equilibrium. In such a situation, the error correction terms causes the dependent variable to converge to the long run of time for stable equilibrium cause by the variations in the independent variables.

4. Results and Discussions.

4.1Unit Root Test Results

Table 1: Unit Root Test of Stationary. H_0: the series has a unit root

Augmented Dickey Fuller (ADF) test				**Phillips Perron (PP) test**		
Variables	Level	1st Difference	Order	Level	1st Difference	Order
NEER	-1.840494	-6.850242	I (1)	-1.725207	-10.72083	I (1)
LTOP	-4.203706	-9.033987	I (0)	-4.220251	-10.39687	I (0)
LTOT	-1.646616	-6.098356	I (1)	-1.579764	-6.260501	I (1)
INFR	-1.337881	-6.129658	I (1)	-1.239136	-7.841030	I (1)
Critical Values (5%)**	-3.536601	-3.540328		-3.536601	-3.540328	

*** indicates significant at 5%*

Source: ***computed by the researcher using E-views 9***

Table 1 shows both the Augmented Dickey Fuller (ADF) and Phillips Perron PP unit root test. The decision rule for the stationarity is when the Mackinnon

values are greater than the critical values regardless of their signs. By applying ADF and PP Stationary tests, NEER, TOT and INFR are stationary at first difference I(1) while TOP is stationary at level I(0).

4.2 Lag length selection

Table 2: Lag length selection for F-Bound Cointegration Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-102.8951	NA	0.005284	6.108290	6.286044	6.169650
1	-34.57456	117.1209*	0.000268*	3.118546*	4.007317*	3.425350*
2	-21.45606	19.49035	0.000328	3.283203	4.882990	3.835449
3	-7.421260	17.64375	0.000407	3.395501	5.706303	4.193189

** indicates lag order selected by the criterion,*
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error;
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Source: ***computed by the researcher using E-views 9***

Before testing for cointegration, it is very important to choose the lag length to be used when performing the test. Considering the five lag selection criteria reported in Table 2 above, all the lag selection criteria suggest that a lag length of one is optimal for the F-bound cointegration test. Thus, one lag was chosen for this study.

4.3 ARDL Bounds Cointegration Test

Table 3: ARDL Bounds Cointegration Test

Test Statistic	Value	K
F-statistic	4.358066	3
Critical Value Bounds		
Significance	*Lower Bound*	*Upper Bound*
10%	2.72	3.77
5%	3.23	4.11
2.5%	3.69	4.89
1%	4.29	5.61
ECM	-0.681464 (0.0006)	
R-squared	0.966152	
F-statistic	38.73848	
D-W stat	2.449303	
LM Test	0.1505	
Heteroskedasticity Test	0.3347	
Normality Test (JB)	0.3469	

*** Level of significance at 5%*

Source: ***computed by the researcher using E-views 9***

Figure 2:

CUSUM Plot of Stability Test

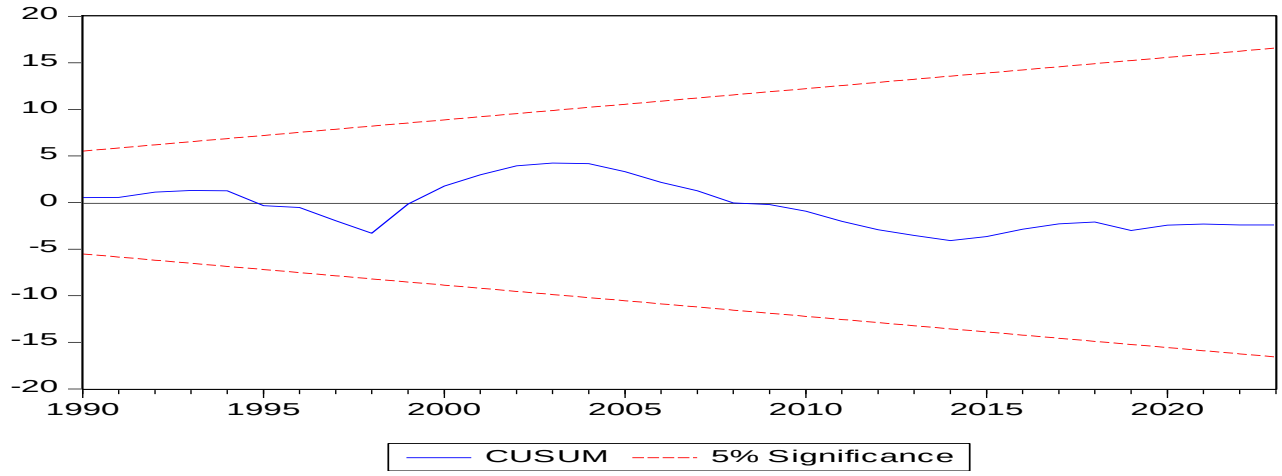


Table 3 presented the result of cointegration test based on the ARDL bound testing approach. Cointegration is tested on the model using exchange rate (NEER) as the dependent variable. The results show that F-statistic is greater than the lower and upper bounds critical values at 5% significant level. The significance of the bounds test implies rejection of null hypothesis that no long run relationship exist between the dependent and explanatory variables. Hence, there exist long run cointegration relationships between trade liberalization (TOP), terms of trade (TOT), inflation rate (INFR) and exchange rate (NEER) in Nigeria. The coefficient of the ECM variable is found to be negative and statistically significant at 32% level confirming the existence of long run relationship among variables. It also shows a high speed of adjustment back to equilibrium position, with about 68% of disequilibrium in the previous year returning to the long run equilibrium in the current year. The R-squared of the model shows that about 96% of the variation in exchange rate (NEER) is explained by the combined effects of all the determinants of exchange rate (NEER) used in the study, suggesting that about 4% variation in exchange rate (NEER) is accounted for by the other factors not included in the model. The F-statistic is high, which implies that the parameters are significant. Since the Durbin –Watson is more than 2, there is evidence of negative autocorrelation in the data set. The result of diagnostic test on serial correlation revealed that the model does not have serial correlation. On heteroskedasticity test, the series is not suffering the problem of heteroskedasticity. Also, on stability test the result showed that estimated parameters for the study are stable for the period under study and are useful for policy decision. Furthermore, the result passed the normality test. This means that the data are normally distributed.

5. Conclusion and Recommendations

This study examined if there exist long run relationship between trade liberalization and exchange rate in Nigeria from 1986 to 2023. The trends showed that the value of naira has been falling consistently with trade liberalization because the rise in exchange rate (NEER) connotes currency depreciation. The result of cointegration test based on bounds testing approach revealed that there exists long run cointegration relationship between trade liberalization, terms of trade, inflation rate and exchange rate in Nigeria over the period of study.

The result clearly revealed that there exist a long run relationship between trade liberalization and exchange rate in Nigeria; therefore Federal Government of Nigeria should strive to increase the value of Naira through trade. In order to achieved it, since the increase in the rate of dollar is as a result of increase in demand for it, which is because of high imports and low exports. To increase the level exportation, government

need to produce more exportable products through establishment of more local industries and encouragement of their production so as to increase the level and quality of local products. Also, to reduce the percentage of importation, there is need for government to increase the cost of importable products; as this will lead to increase in their selling price, which might hurts their sales. Eventually, importation would be reduced and there would be more local products for domestic consumption and exports. Thus, naira would gain it value and Nigeria can take benefit from trade.

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