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Analysis of the Effect of Exchange Rate Depreciation on Export Performance in Nigeria

Nweke, Abraham Mbam[1*], Eze, Onyebuchi Michael[2*], and Atuma, Emeka[3*]
Department of Economics, Ebonyi State University, P.M.B. 053 Abakaliki, Ebonyi State, Nigeria

Abstract: *The study examined the impact of exchange rate depreciation on export performance of Nigeria for the period 1981-2018, by adopting the ex-post facto research design in the investigation. The study utilized the Auto-Regressive Distributed Lag model in the analysis. The variables analyzed in the research include oil exports, non-oil exports, total exports, exchange rate, gross domestic product, and interest rate. The results indicated that exchange rate had a positive and significant impact on oil export performance and total export performance in both the short-run and long-run, respectively. It also showed that exchange rate had a positive and insignificant effect on non-oil export performance in the short-run; while in the long-run, exchange rate had a negative and insignificant effect on non-oil export performance. Thus, the study recommended that the government should, as a matter of fact, rely holistically on exchange rate depreciation policy in stimulating export performance in the economy, as it promotes and accelerates oil export and total export performance in the economy.*

Keywords: *Exchange rate depreciation, Export performance, Autoregressive distributed lag model*

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I. Introduction

Nigeria, like any other country of the world, is well endowed with abundant natural resources, including human and material resources. Some of these resources include labour intensive, oil, and gas, zinc, coal, lead, palm oil, timber, cocoa, groundnut, among others. Unlike the developed countries, Nigeria exports are almost in their unprocessed state to its trading partners for further processing (Joseph, Oswald & Charles, 2014). As a result, the foreign exchange earned from the exports, mainly dependent on the export prices and export volume.

In contemporary, the volume of exports and foreign revenues earned by countries of the world are made possible through the world globalization. By globalization of the world, all countries are interdependent on one another for sustenance. In this sense, no nation of the world is an island of itself without requiring the assistance of other countries. Increasingly, globalization of trade renders the world borderless. As a result, the consumption choice bundles of citizens of various countries have widened, as more goods and services are made available in the countries' domain, through international trade. Therefore, trade, undoubtedly, is one of the essential sources of economic growth and development of any economy. In particular, the demand for a nation's exportable products in the world market is an injection into the economy as it brings about financial inflows into the domestic economy; and this, in turn; result in an improved level of the external reserve of the country (Obinwata, Owuru & Farayibi, 2016).

In foreign transactions, the role of exchange rate movements has over time been the major concern of policymakers, analysts and economists, knowing full well that exchange rate changes play a crucial role in export growth as well as the growth of any economy. Whether the exchange rate appreciated or depreciated, it has severe effects on export volume, import volume, domestic products, export, and import prices as well as economic development of nations. Exchange rates can either be appreciated or depreciated during a particular period of time. The exchange rate appreciation entails when a nation's exchange rate gained more value against a foreign currency while the depreciation of exchange rate occurs when the currency of a country lost its value relative to other countries of the world in the foreign exchange market. Therefore, if a country's currency appreciated due to foreign exchange rate depreciation, the export volume of the country decreases due to decreases in foreign demand for export products, occasioned by high prices of the export products in the country. In contrast, if the nation's currency depreciated as a result of foreign exchange rate appreciation, the export volume of the country increases as demand for the export products increases due to cheap prices of the export products in the domestic economy (Khaled, 2016).

Meanwhile, exchange rate according to Jhingan (1997) is defined as the rate at which a unit currency is exchanged for another. This indicates that exchange rate is a price of one currency in terms of another currency.

Thus, the exchange rate between the naira and the dollar refers to the amount of naira required to purchase a dollar. Similarly, Obaseki (2001), conceived that the exchange rate of a particular currency measures the value of a domestic economy in terms of another, as it measures the external value of a currency (Anoke, Odo & Ogbonna, 2016).

Exchange rate system is classified into flexible and fixed exchange system. Under the flexible exchange system, the exchange rate is determined by the interaction of the forces of demand and supply, implying that increase in imports leading to increase in demand for the foreign currency, while an increase in exports leads to a rise in the supply of the domestic currency. A rise in the general price level in the domestic economy would stimulate demand for imports, which now become relatively cheaper. This increases demand for foreign currency without corresponding increase in supply of the domestic currency, thereby causing the home currency to depreciate (Anoke, Odo & Ogbonna, 2016). On the other hand, a fixed exchange rate system entails the pegging of the exchange rate of the domestic currency to other currencies. However, the major drawback of the fixed regimes is that it implies the loss of monetary policy discretion, whereas the flexible exchange rate regime, allows the forces of demand and supply to determine the exchange rate.

In Nigeria, exchange rate is an important relative price that affects the external competitiveness of the country's domestic goods. Hence, following the naira exchange rate depreciation, which accompanied the 1986 Structural Adjustment Programme (SAP), the issue of persistent exchange rate depreciation has over the years become a matter of great concern in Nigeria. The essence of this, for obvious reason, is that the macroeconomic objective of achieving exchange rate stability has not been attained in the economy (Celina, Eze & Atuma, 2018). This could be because; the prominent traditional export commodities of nation revolve around oil and non-oil exports (Nwachukwu, 2014 cited in Lawrence & Mohammed, 2015). In this vein, the government of Nigeria in an attempt to promote international trade of the country, often design and implement trade and exchange rate policies, mainly to benefit from the gain accrued to foreign trade (Lawrence & Mohammed, 2015).

In spite of these efforts on the part of the government, the naira exchange rates against foreign currencies, US dollar in particular have persistently depreciated without any significant effect of such depreciation translated into the export performance, as well as the economic development of the nation. For instance, the naira exchange rate depreciated from ₦0.6702 per US dollar in 1982 to ₦19.6609 per US dollar in 1992; and in 2002, the exchange rate depreciated further to ₦120.9793 per USD. By 2012 and 2018, the naira exchange rate against the US dollar further depreciated to ₦155.9402 and ₦306.7095, respectively.

On the other hand, the export performance recorded a negative growth rate of 25% in 1982; and by 1992, the growth rate of export performance increased to 69.2%. In 2002, the export performance growth rate again recorded a negative growth rate of 6.6%. Furthermore, the export performance of Nigeria also had a negative growth rate of 0.64% in 2012, and however, recorded a positive growth rate of 37.8% in 2018.

The facts above suggest that exchange rate depreciation in Nigeria appears to have deviated from economic postulation, which opined that depreciation in exchange rate a country brings about improved export performance by increasing foreign aggregate demand for export products, export volume, export revenue, stimulates investment in the export sector, generate employment, ensure balance of payments and above all improve the economic growth of the nation. However, despite the persistent exchange rate depreciation in Nigeria, it appears that these developments are yet to translate into a consequential export performance as the economy still records low foreign aggregate demand for export products, low export volume and export revenue, low employment, balance of payments deficits, and low economic growth, among others. It is on this note, that this research investigates the influence of exchange rate depreciation on export performance in Nigeria.

II. Literature Review

2.1 Theoretical Review

There are several theories in literature explaining the relationship between exchange rate depreciation and export performance in an economy. The prominent among them include the standard theory of international trade, exchange rate devaluation/depreciation and trade balance theory such as absorption approach, elasticity approach, and monetary approach. Recall that depreciation or devaluation of currency increases the volume of exports and reduces the volume of imports, both of which have a favourable effect on the balance of trade. The approaches as aforementioned are discussed below.

2.1.1 Standard Theory of International Trade and Exports

The Heckscher – Ohlin Trade Theory

The Heckscher-Ohlin trade theory of endowment otherwise referred to as the theory of factor proportion was initially hatched in 1919 by Eli Heckscher and developed and published in 1933 by Bertin Ohlin in his book titled, "Interregional and International Trade". The theory explained the countrys' trade in terms of

its factor endowments. It indicates that the relative factor abundance of nations' resources endowments is relatively better suited to the production of the good, which uses relatively large amounts of the abundant factor. Thus, a commodity that requires more intensive use of the more abundant factors will always be cheaper than the other.

Therefore, the theory postulated that foreign trade emerged due to differences in factor proportion or factor endowments among countries of the world. Some nations are intensively endowed with capital, while others are intensively endowed with labour. Therefore, countries endowed with much labour intensive should engage in the production and exports of labour intensive commodities, while the countries endowed with much capital intensive should engage in the production and exports of capital intensive commodities.

The trade theory of Heckscher-Ohlin originated from Eli-Heckscher in 1919 with the idea that international trade evolves from differences in factor endowment among nations. This idea was published in 1933 by Bertin Ohlin with the propagation that foreign trade based on relative factor proportion or factor endowments brings about equalization in factor price, which in turn, raise returns to labour in the developing nations up to the levels of the developed countries. By implication, this indicates that international trade in all facets is a critical factor, which mitigates income inequalities and wealth distribution between and within countries.

The Theory of Reciprocal Demand

The reciprocal demand trade theory, also referred to as the theory of international value was propounded by John Stuart Mill in 1844. The theory accepted the theory of labour value of David Ricardo and clearly re-echoed the theory of comparative cost advantage. It, therefore, formulated his theory in terms of comparative effectiveness of labour or comparative cost advantage as a contrast to David Ricardo's comparative labour cost to tackle the issue of international value or the ratios whereby goods can exchange for one another in the global markets. Thus, theory instead of conceiving that a certain output level is given in each of the two nations with different labour costs, inversely postulated the same amount of labour is given for each of the two nations with the different output levels. By implication, the reciprocal demand theory of trade opined that international trade among countries emerged as a result of relative strength and demand elasticity of the two trading nations for each other's product (Anowor & Agbarakwe, 2015).

Therefore, Mill through the theory of reciprocal demand contributed to foreign trade theory and political economy, which were in twofold. In his explanations on the price-specie flow mechanism, the theory treated money as intermediate goods by equating precious metals and money, which made it easier to model foreign trade in the form of trade by barter. The other contribution of the reciprocal demand to trade theory on the concept of division of gains from trade, and the manner by which the reciprocal demand for countries' products are determined.

2.1.2 Exchange Rate Depreciation/Devaluation and Trade Balance Theory

The Elasticity Approach, Marshall-Lerner Condition Theory

The elasticity approach was promulgated by Robinson (1947) and Metzler (1948) and popularized by Kreuger (1983). In elasticities approach, trade balance adjustment path was viewed on the basis of elasticities of demand for imports and exports. The elasticity of demand is defined as the responsiveness of quantity demanded of goods or services to changes in price (Howitt, Watson & Adams, 1980). Although the Elasticity Approach is commonly known as Bickerdike-Robinson-Metzler (BRM) condition (Hooy & Chan, 2008), Bickerdike (1920) was actually the one who originally developed and laid the foundations of this approach by modeling nominal import and export prices as functions of import and export quantities. The Bickerdike-Robinson-Metzler Condition implies that the change in the foreign currency value of the trade balance depends upon the import and export supply and demand elasticities and the initial volume of trade. As can be seen, all discussions in the elasticities approach revolve around the questions of volume and value responses to changes in real exchange rate.

The approach postulated that transactions under contract completed during the exchange rate depreciation period negatively affect trade balance in the short-run. This is because, the quantities of exports and imports adjust thereby giving rise to elasticities of exports and imports to increase and quantities to adjust. In this view, the foreign price of the devaluing country's export is reduced, and the price of imported goods increase, which directly reduces the demand for imports at the long run, and hence, improves the trade balance (Anoke, Odo & Ogbonna, 2016).

The theory opined that the effect of exchange rate depreciation is dependent on the elasticity of exports and imports. This approach to exchange rate change is commonly known as the BRM model which was derived from its proponents, namely: Bickerdike (1920); Robinson (1947); and Metzler (1948). The BRM model has been recognized in the literature as providing a sufficient condition for the improvement of trade balance, which is possible under the exchange rate depreciation period. Therefore, the hypothesis that exchange rate

depreciation improves trade balance is rooted in a particular solution of the BRM condition, known as the Marshall-Lerner condition due to Marshall (1923), and Lerner (1944). This condition opines that for a positive effect of exchange rate depreciation on the trade balance, and implicitly for a stable exchange market, the absolute values of the sum of the demand elasticities for exports and imports must exceed unity. Empirical evidence for developed and developing nations revealed that exchange rate depreciation might cause a negative effect on the trade balance in the short run, but an improvement in the long run; that is, the trade balance followed a J-cure.

The Monetary Approach

The Monetary Approach was championed by the contributions of Harry Johnson and Jacob Frenkel in the early 1970s, nearly the same time the J-Curve theory emerged (Dhakir, Fuadah & Mohammad, 2014). The Monetary Approach suggests that devaluation should be understood in a monetary context. Hence, a balance of payments deficit is solely a monetary phenomenon mainly caused by excessive money supply. Currency devaluation has an impact on the balance of payments only through its effect on real money supply. Therefore, devaluation increases the balance of payment by increasing domestic prices and thereby reducing the real money supply. The devaluation of domestic currency fails if it is followed by further increases in the nominal money supply that re-establish the original disequilibrium. The long-run effect on the trade balance is thus ambiguous ((Edwards & Wilcox, 2003). When a country devaluates currency, the real value of the money supply decreases due to the increase in prices of traded commodities and services measured in the domestic prices.

2.2 Theoretical Framework

The research adopts the Elasticity Approach-Marshall-Lerner condition theory as the theoretical framework relevant for this study. The Elasticity Approach-Marshall-Lerner condition assumes that trade in services, investment-income flows, and unilateral transfers are equal to zero, so that the trade account is equal to the current account. the MLR condition states that a real devaluation or a real depreciation of the currency improves the trade balance if the sum of the elasticities of the demand for imports and exports with respect to the real exchange rate is greater than one, ($\varepsilon + \varepsilon^* > 1$).

In the view of the importance of theoretical postulation to export performance to an economy, the study would instead of employing the functions $X = f(\varepsilon + \varepsilon^* > 1)$, now modified the functions as XP = f(OXP, NOXP, EXR, GDP, INR); where XP depicts exports, OXP is oil exports, NOXP is non-oil export, EXR is exchange rate, GDP is gross domestic product, and INR is interest rate.

2.3 Empirical Review

Dania and Ogedengbe (2019), empirically investigated the impact of exchange volatility on non-oil export performance in Nigeria for the period 1981-2017, using Augmented Dickey-Fuller (ADF) unit root test, Johansen cointegration test, Arch test used to test for volatility, and error correction model (ECM) employed to investigate the speed of adjustment. The model specified in the study consists of non-oil export, exchange rate volatility, interest rate, foreign direct investment, and total government expenditure. The results of the unit root test indicated at level, none of the variable was stationary; however, all the variables became stationary at first differencing. The estimation results also revealed that exchange rate volatility had negative and significant effect on non-oil export performance in Nigeria. More so, the results indicated that interest rate and foreign direct investment had negative and significant influence on non-oil export while total government expenditure had positive and insignificant impact on non-oil export in the economy.

Ngondo and Khobai (2018), studied impact of exchange rate on exports in South Africa for the period 1994-2016 through the applications of the Augmented Dickey-Fuller (ADF) and Philips Perron (PP) unit root tests, and autoregressive distributed lag (ARDL) model. The variables utilized in the research include exports, real exchange rate, real interest rate, inflation, and investment; where the study incorporated real interest rate, investments and inflation as control variables. By applying the Autoregressive Distributed Lag (ARDL) approach, the study empirically investigated the impact of real exchange rate on exports in South Africa. The results obtained from the estimation revealed evidence of long-run equilibrium relationship among the variables. The estimation results also indicated that exchange rate has a significant and negative influence on exports while real interest rate and investment had positive and insignificant impact on exports in South Africa. More so, the results indicated that inflation had positive and significant influence on the exports of South Africa.

Osabohien et al. (2019), examined the impact of agricultural export on Nigeria's economic growth for the period from 1986 to 2016, through the application of unit root test, cointegration test and vector error correction model (VECM) technique to analyze the long run impact and short-run dynamics of agricultural exports on Nigeria's economic growth. The variables utilized in the investigation include real gross domestic product, proxied for economic growth, agricultural exports, foreign direct investment, real exchange rate, inflation rate and labour force. The results of the unit root test indicated that all the variables were non-

stationary at levels; however, all the variables became stationary at first differencing. The results of the cointegration test indicate evidence of long-run equilibrium relationship among the variables. More so, the results from the VECM technique revealed that agricultural exports negative and significant impact on Nigeria's economic growth.

Vinh and Duong (2019), investigated the impact of exchange rate volatility on exports in Vietnam for the period 2000Q1 to 2014Q4, through the applications of unit root test and aut-regressive distributed lag (ARDL) bounds test. The ARDL bound was employed to analysis the level of relationship between effective exchange rate volatility and exports. The variables used in the investigation include real exports, gross domestic product proxied for real foreign income, real effective exchange rate, and exchange rate volatility. The results of the ARDL bounds test showed evidence of long-run relationship among the variables. The results also revealed that exchange rate volatility had negative and significant impact on export volume in the long run, while exchange rate had positive and insignificant influence on export volume in Vietnam. This result imply that a depreciation of the domestic currency affects exports negatively in the short run, but positively in the long run, which is consistent with the J curve effect. Surprisingly, an increase in the real income of a foreign country actually decreases Vietnamese export volume.

Samuel (2019), estimated the long-run and short-run effects of the real exchange rate on Ethiopian export earnings for the period 1997-2016, through the applications of panel unit root test, panel cointegration test, and panel causality test. The variables utilized in the study include export earnings, real exchange rate, and real foreign income. The results of the study showed that the real exchange rate had a significant impact on export earnings in the long-run, while it had no effect in the short-run. This implies that the depreciation of the real exchange rate improves export earnings of the country. The study as reviewed showed that stationarity of the variables were achieved at both levels and first differencing, which implies the ARDL model was the appropriate estimation technique needed to estimate the coefficients of the variables but the study failed to use the right procedures in the investigation.

Kamal, Dharmendra, and Franklin (2020), researched on the effect of exchange rate volatility on export performance in Southeast Asia by examining this relationship for the ASEAN-5 group, including Thailand, Malaysia, Singapore, Indonesia and the Philippines for the period 1975-2016 for Indonesia, 1994-2016 for Thailand, and 1979-2016 for other ASEAN-5 countries. The variables modeled in the research include real exports, real gross domestic product, real world output, terms of trade, and exchange rate volatility. From a statistical perspective, export volatility was derived from the real effective exchange rate using a GARCH model. The estimation techniques used in the study include panel unit root test, Johansen-Fisher panel cointegration tests and error correction model (ECM). The results suggested that changes in both domestic and world output had a positive effect on export volume, while deterioration in the terms trade had a negative effect on export volume, at least for countries in this region. Finally, exchange rate volatility had a negative impact on the export performance of the ASEAN-5.

Anthony, Jonathan, Chiamaka and Onyinye (2019), examined the impact of exchange rate movements on the agricultural exports in Nigeria for the period 1981-2015, through the applications of unit root test and ordinary least square (OLS) regression analysis. The variables employed in this study were exchange rate, agricultural exports, government capital expenditure, foreign direct investment, credit to private sector, and Lending interest rate. The estimation results also indicated that exchange rate movements had a positive and significant influence on agricultural exports in Nigeria. Specifically, the findings showed that exchange rate, government capital expenditure, foreign direct investment and lending interest rate were positively related to agricultural exports while credit to private sector was negatively related to the exports.

Andreas and Ali (2018), investigated the effect of exchange rate on export performance of agriculture in Switzerland for the period from 1999 to 2012, using unit root test, cointegration test, autoregressive distributed lag (ARDL) model, and static and dynamic panel data analysis. The variables used in the investigation were exports, real exchange rate and gross domestic product. The unit root test revealed evidence of stationarity for all the variables after first differencing. The cointegration test showed that long-run equilibrium relationship exists among the variables. The study found that in the long-run, a one percent appreciation of the Swiss exchange rate led on average to a decrease in exports of agricultural and food products.

Laetitia and Hongbing (2019), examined the impact of real exchange rate depreciation on trade balance in Cameroon for the period from 1980 to 2016, through the applications of unit root test, cointegration test, vector error correction model (VECM), and Granger causality test. The variables modeled in the research were real exports, real imports, real exchange rate index, domestic income, proxied by gross domestic product, and foreign income, proxied by trading partners' GDP. The results of the unit root test revealed that all the variables were non-stationary at levels but at first differencing all the variables became stationary. Similarly, the Johansen cointegration test indicated evidence of long-run equilibrium relationship among the variables. The estimation of short-run and long-run relationships between the variables using Johansen cointegration and the vector error

correction model (VECM) as a mean to examine whether the Marshall-Lerner condition (MLC) and the J-curve phenomenon hold in the case of Cameroon yielded mitigated results. Although the Marshall Lerner Condition was not met for Cameroon, as the sum of the elasticities of demand for exports and imports was not greater than unity, the empirical analysis results provide evidence of correction over the long-run of a prior deterioration of the trade balance; thus, supporting the existence of the J-curve pattern.

III. Methodology

To examine the effect of exchange rate depreciation on export performance in Nigeria between 1981 and 2018, exports are classified into oil exports, and non-oil exports. The stationarity test and auto-regressive distributed lag (ARDL) model are utilized in the analysis. The variables specified in the model include oil exports (OXP), non-oil exports (NOXP), exchange rate (EXR), gross domestic product (GDP), and interest rate (INR). Data on these variables are obtained from the Central Bank of Nigeria (CBN) statistical bulletin, volume 29, 2018, ranging from 1981 to 2018.

3.1 Model Specification

The model of this study follows the leads of Bickerdike-Robinson-Metzler (BRM) Elasticity Approach-Marshall-Lerner condition theoretical framework with modifications. This condition is illustrated below.

$$\frac{dB}{dE} = P_x X^s \left| \frac{(1+\mathcal{E})\eta^*}{(\mathcal{E}+\eta)} \right| - \dots L\,(\mathcal{E}+1) \quad 1$$

Where; η and Ɛ represent the price elasticities (in absolute values) of domestic demand for imports and supply of exports; ɳ* and l depict the respective foreign price elasticities. In that, if B = 0 (initial equilibrium), then dB/dE> 0 if and only if

$$(\mathcal{E}+\eta)(\mathcal{E}+\eta) \quad 2$$

The model is modified to accommodate the variables of this study in a functional form as:

Equation 1

$$OXP = f(EXR, GDP, INR) \quad 3$$

In linear function, it is specified as:

$$OXP = \varphi_0 + \varphi_1 \mathrm{EXR}_t + \varphi_2 \mathrm{GDP}_t + \varphi_3 \mathrm{INR}_t + \mathcal{E}_t \quad 4$$

In log function, it is illustrated as:

$$LOXP = \varphi_0 + \varphi_1 \mathrm{LEXR}_t + \varphi_2 \mathrm{LGDP}_t + \varphi_3 \mathrm{INR}_t + \mathcal{E}_t \quad 5$$

Equation 2

$$NOXP = f(EXR, GDP, INR) \quad 6$$

In linear function, it is specified thus:

$$NOXP = \varphi_0 + \varphi_1 \mathrm{EXR}_t + \varphi_2 \mathrm{GDP}_t + \varphi_3 \mathrm{INR}_t + \mathcal{E}_t \quad 7$$

In log function, it is illustrated as:

$$LNOXP = \varphi_0 + \varphi_1 \mathrm{LEXR}_t + \varphi_2 \mathrm{LGDP}_t + \varphi_3 \mathrm{INR}_t + \mathcal{E}_t \quad 8$$

Where; OXP is oil exports, NOXP is non-oil exports, EXR is exchange rate, GDP is gross domestic product, and INR is interest rate. $\mathcal{E}_t$ = stochastic variable; φ_0 = constant term; L is the log function, whereas φ_s are the coefficients of the regression equation.

3.2.1 A Priori Expectation

Theoretically, it is expected that exchange rate and gross domestic product would have positive relationship with exports while inflation and interest rate are expected to assume negative relationship with the exports of Nigeria. The patterns of the a priori expectation behaviour of the variables in relation to their parameters in the equation are: $\varphi 1>0$, $\varphi 2>0$, $\varphi 3<0$.

IV. Results And Discussion

This section of the study reveals the results estimated from the econometric approaches used in the study; and consequently, discusses the results in line with the objectives of the research. The results are presented below.

4.1 Unit Root Test

The unit root test is conducted primarily to examine the level of integration among the variables under consideration, through the application of the Augmented Dickey-Fuller (ADF) unit root test. The results are shown in Table 1 below.

Table 1: ADF Unit Root Test

Trend and Intercept

Level			First Difference			
Variables	**ADF Statistic**	**5% Critical Value**	**ADF Statistic**	**5% Critical Value**	**Remarks**	**Rank**
LOXP	-1.266502	-3.536601	-6.446318	-3.540328	Stationary	I(1)
LNOXP	-2.589144	-3.536601	-7.179816	-3.540328	Stationary	I(1)
LEXR	-1.274749	-3.536601	-6.692424	-3.540328	Stationary	I(1)
LGDP	-0.927619	-3.536601	-3.180352	-2.945842	Stationary	I(1)
INR	-3.212879	-2.943427	-8.453603	-2.945842	Stationary	I(0)

Sources: Researcher's computation from E-view 9

Table 1 above indicates the results of unit root test via the application of the Augmented Dickey-Fuller (ADF) stationarity test. The results revealed that all the variables including LOXP, LNOXP, LTEXP, LEXR, and LGDP except INR were non-stationary at levels at 5% level of significance. However, the test showed evidence of stationarity for all the variables after first differencing. These claims are supported by the ADF statistics and the p-values of the corresponding variables which proved to be greater than the critical value after first differencing. These results, indicates that the series used in the study possessed long-run properties. In that, it implies that the covariance, variance and mean are constant over time. Therefore, the study concludes that mixed order of integration [i.e. I(1) and I(0)] exist among the variables.

4.2 Auto-Regressive Distributed Lag Model between Oil Exports and Exchange Rate Depreciation

The ARDL model is an estimation technique employed to investigate the long-run association and short-run dynamics among the underlying variables. The technique was developed by Pesaran, Shin, and Smith (2001); and Pesaran and Shin (1999) in their attempts to study the long-run and short-run coefficients of the variables. The use of the ARDL model is most appropriate when there is evidence of mixed order of integration or when the data size is small [i.e. I(1) and I(0)]. The ARDL results are revealed in the below tables 2 and 3.

Table 2: ARDL Short-run Coefficients Test

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEXR)	0.431178	0.110405	3.905423	0.0005
D(LGDP)	0.301940	0.135828	2.222957	0.0334
D(INR)	-0.005559	0.017178	-0.323644	0.7483
CointEq(-1)	-0.569923	0.129748	-4.392554	0.0001

Source: Researcher's compilation from E-view 9

Model: LOXP = -0.333530 + 0.431178LEXR + 0.301940LGDP - 0.005559INR

(0.110405) (0.135828) (0.017178)

[3.905423] [2.222957] [-0.323644]

R^2 = 0.986682; F-stat = 592.6835, and Prob(F-stat) = 0.000000, DW stat = 1.895139

Table 2 above depicts the results of the ARDL short-run coefficients test between oil exports and exchange rate depreciation. The results revealed that exchange rate (LEXR) and gross domestic product (LGDP) have positive and significant effects on oil exports (LOXP) in the short-run. It also revealed that interest rate (INR) has a negative and insignificant influence on LOXP in the short-run.

These claims are supported by the coefficients and p-values of the variables estimated from the ARDL short-run coefficient test. From the results, the coefficients of LEXR, LGDP, and INR are 0.431178, 0.301940, and - 0.005559, respectively, and their associated p-values include 0.0005, 0.0334, and 0.7483, respectively. Similarly, the results indicate the ECT value of -0.569923 with a p-value of 0.0001, which implies that the short-run disequilibrium corrected towards the long-run equilibrium relationship by the way of the speed of adjustment is 56.99% annually. The ECT is negative, fractional and significant, which satisfies all conditions required for the application of econometric techniques in any study.

Table 3: ARDL Long-run Coefficients Test

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXR	0.756554	0.191641	3.947760	0.0004
LGDP	0.529790	0.157307	3.367877	0.0020
INR	-0.009755	0.030021	-0.324927	0.7474

C	-0.333530	0.991469	-0.336399	0.7388

Source: Researcher's compilation from E-view 9

Model: LOXP = - 0.333530 + 0.756554LEXR + 0.529790LGDP - 0.009755INR
(0.191641) (0.157307) (0.030021)
[3.947760] [3.367877] [-0.324927]

R^2 = 0.986682; F-stat = 592.6835, and Prob(F-stat) = 0.000000, DW stat = 1.895139

Table 3 shows the results of the ARDL long-run coefficients test between oil exports and exchange rate depreciation in Nigeria. The results indicate that exchange rate (LEXR) and gross domestic product (LGDP) have a positive and significant impact on oil exports (LOXP) in the long-run, while interest rate (INR) has a negative and insignificant influence on LOXP in the long-run.
Evidence of these claims is revealed by the coefficients and the p-values of the underlying variables. The coefficients of LEXR, LGDP, and INR are 0.756554, 0.529790, and -0.009755, respectively, while their p-values include 0.0004, 0.0020, and 0.7474, respectively.

Table 4: ARDL Bounds Test
Null hypothesis: There is no existence of a long-run relationship

Test Statistic	Value	
F-statistic	5.383593	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Researcher's compilation from E-view 9

The bound test is used to investigate the presence of long-run relationship between the underlying variables. In this view, the test would reject the H_0 of no existence of equilibrium long-run association of the variables modeled in the research, if the F-statistic is greater than the 0.05 critical value of the upper bound. From the results, the value of F-statistic is 5.383593 while the upper bound of 5% critical value is 4.35. Since the F-statistic of 5.383593 is greater than the 4.35 critical value of the upper bounds, the study rejects the null hypothesis (H_0) of no evidence of long-run equilibrium relationship among the variables and concludes that long-run equilibrium relationship exists among the variables under consideration.

4.2.2 Diagnostic Tests

The validity of the regression underlying the VECM model was undertaken to check for serial correlation and heteroscedasticity in the model. These diagnostic tests were utilized with the objective of determining the stability of the parameters of the model as proposed by Pesaran and Pesaran (1997). The below table 5 revealed the results of the tests

Table 5: Diagnostic Tests

S/N	Diagnostic test	Obs*R-squared	Prob. Chi-Square(2)	Remarks
1.	Serial Correlation LM Test	0.341771	0.8429	No evidence of serial correlation in the model
2.	Heteroskedasticity Test: ARCH	0.119610	0.7295	No evidence of heteroscedasticity in the model

Source: Researcher's compilation from E-view 9

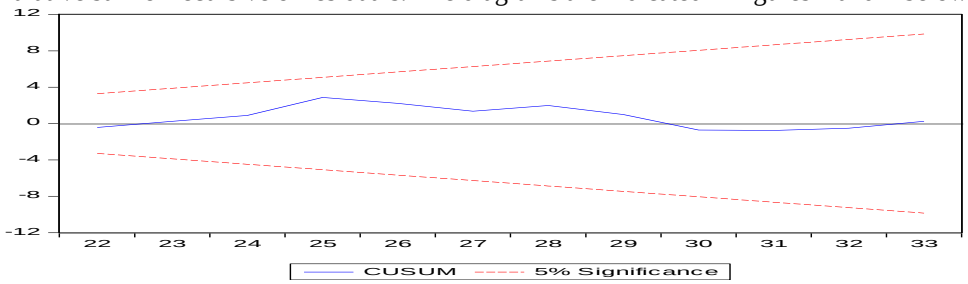
Table 6: Non-Stability Test

	Value	Df	Probability
t-statistic	1.268425	31	0.2141
F-statistic	1.608901	(1, 31)	0.2141

Source: Researcher's compilation from E-view 9

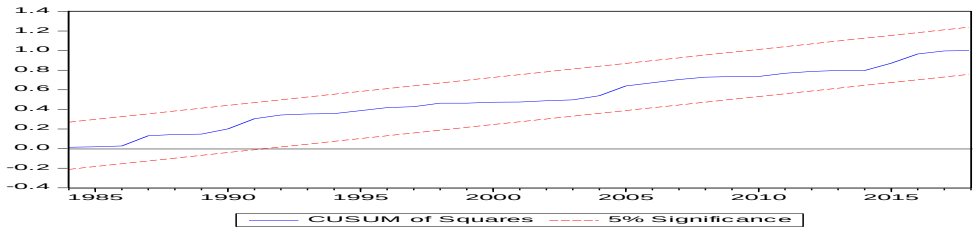
Table 6 indicates the test of stability in the regression specification model using the RESET test. The test investigates the error specification in the regression model. From the table 6, the results show evidence of stability in the model. This claim is evidenced by the p-value of the t-statistic and F-statistic of the Ramsey RESET test. The results showed F-statistic and t-statistic of 1.608901 and 1.268425, respectively and the p-value of 0.2141, which further supports the earlier claim since 0.2141 of the p-value is statistically insignificant at 5% significance level. Since the p-value is greater than the level of significance, the study concludes that evidence of error specification is not found in the model.

To validate the estimated results, a stability test is carried out using the cumulative sum of recursive of squares and the cumulative sum of recursive of residuals. The diagrams are indicated in figures 1 and 2 below.



Source: Compilation from E-view 9

Figure 1: CUSUM Stability Test



Source: Compilation from E-view 9

Figure 2: CUSUM of Square Stability Test

Recursive cumulative sum (CUSUM) of residuals and the CUSUM of square stability tests are utilized to determine whether there is stability in the parameters and constancy in the random variables of the regression model. From figures 1 and 2, the results showed evidence of stability in the parameters as the plots of the statistics of both the CUSUM test and CUSUMSQ test fell within the critical bands at 5% significance.

4.2.1 Auto-Regressive Distributed Lag Model between Non-oil Exports and Exchange Rate Depreciation

Table 7: ARDL Short-run Coefficients Test

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNOXP(-1))	0.407265	0.190046	2.142974	0.0478
D(LNOXP(-2))	0.235001	0.195802	1.200197	0.2475
D(LEXR)	-0.022877	0.262976	-0.086991	0.9318
D(LEXR(-1))	0.153896	0.317399	0.484867	0.6343
D(LEXR(-2))	0.427518	0.239517	1.784919	0.0932
D(LGDP)	3.079905	0.863854	3.565308	0.0026
D(LGDP(-1))	-2.769967	1.725225	-1.605569	0.1279
D(LGDP(-2))	-0.475434	1.626906	-0.292232	0.7739
D(LGDP(-3))	1.942196	0.917769	2.116214	0.0504
D(INR)	0.035555	0.023552	1.509624	0.1506
D(INR(-1))	0.002640	0.022738	0.116107	0.9090
D(INR(-2))	-0.055397	0.025290	2.190445	0.0436
D(INR(-3))	0.046071	0.027741	1.660722	0.1162
CointEq(-1)	-0.992240	0.193149	-5.137172	0.0001

Source: Researcher's compilation from E-view 9

Model: LNOXP = -7.444654 + 0.153896LEXR + 3.079905LGDP - 0.055397INR
(0.317399) (0.863854) (0.025290)
[0.484867] [3.565308] [2.190445]
R^2 = 0.986682; F-stat = 592.6835, and Prob(F-stat) = 0.000000, DW stat = 1.895139

Table 7 depicts the results of the ARDL short-run coefficients test between non-oil exports and exchange rate depreciation in Nigeria. From the results, exchange rate (LEXR) has a positive and insignificant impact on non-oil exports (LNOXP), whereas gross domestic product (LGDP) has a positive and significant influence on non-oil exports (LOXP) in the short-run. The results further indicated that interest rate (INR) has a negative and significant effect on non-oil exports (LOXP) in the short-run.

These claims are evidenced by the coefficients and p-values of the variables estimated using the ARDL short-run coefficient test. From the results, the coefficients of LEXR, LGDP, and INR are 0.153896, 3.079905, and - 0.055397, respectively, with their associated p-values of 0.6343, 0.0026, and 0.0436, respectively. More so, the results revealed the ECT value of -0.992240 with a p-value of 0.0001. The result showed that the speed of adjustment of short-run deviation corrected towards the long-run equilibrium relationship annually is 99.2%. The ECT is negative, fractional and significant, which satisfies all conditions required for the application of econometric techniques in any investigation.

Table 8: ARDL Long-run Coefficients Test

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEXR	-0.128903	0.179681	-0.717397	0.4835
LGDP	1.323961	0.135745	9.753319	0.0000
INR	-0.079184	0.038031	-2.082065	0.0537
C	-7.444654	0.980803	-7.590369	0.0000

Source: Researcher's compilation from E-view 9

Model: LOXP = -7.444654 -0.128903LEXR + 1.323961LGDP - 0.079184INR
(0.179681) (0.135745) (0.038031)
[-0.717397] [9.753319] [-2.082065]
R^2 = 0.986682; F-stat = 592.6835, and Prob(F-stat) = 0.000000, DW stat = 1.895139

Table 8 above reveals the results of the ARDL long-run coefficients test between non-oil exports and exchange rate depreciation in Nigeria. From the results, exchange rate (LEXR) and interest rate (INR) have negative and insignificant influence on non-oil exports (LNOXP), while gross domestic product (LGDP) has a positive and significant impact on non-oil exports (LNOXP) in the long-run. The evidence of these claims is supported by the coefficients and the p-values of the variables under consideration. From the estimation results, the coefficients of LEXR, LGDP, and INR are -0.128903, 1.323961, and -0.079184, respectively, whereas the associated p-values include 0.4835, 0.0000, and 0.0537, respectively.

Table 9: ARDL Bounds Test
Null hypothesis: There is no existence of a long-run relationship

Test Statistic	Value	
F-statistic	7.888098	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Source: Researcher's compilation from E-view 9

The ARDL bound test is utilized to test for the presence of long-run relationship between the variables employed in the study. The results of the test showed the F-statistic value of 7.888098 while the upper bound of critical value bounds is 4.35. Since the F-statistic of 7.888098 is greater than the 4.35 critical value bounds of the upper bounds, the study rejects the null hypothesis (H_0) of no long-run relationship among the variables and concludes that evidence of long-run equilibrium relationship is found among variables.

4.2.1.1 Diagnostic Tests

Table 10: Diagnostic Tests

S/N	Diagnostic test	Obs*R-squared	Prob. Chi-Square(2)	Remarks
1.	Serial Correlation LM Test	2.381976	0.3039	No evidence of serial correlation in the model
2.	Heteroskedasticity Test: ARCH	0.012260	0.9118	No evidence of heteroscedasticity in the model

Source: Researcher's compilation from E-view 9

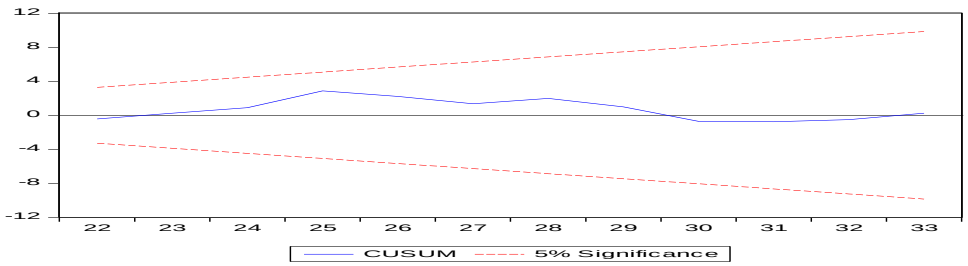
Table 11: Non-Stability Test

	Value	Df	Probability
t-statistic	0.108574	15	0.9150
F-statistic	0.011788	(1, 15)	0.9150

Source: Researcher's compilation from E-view 9

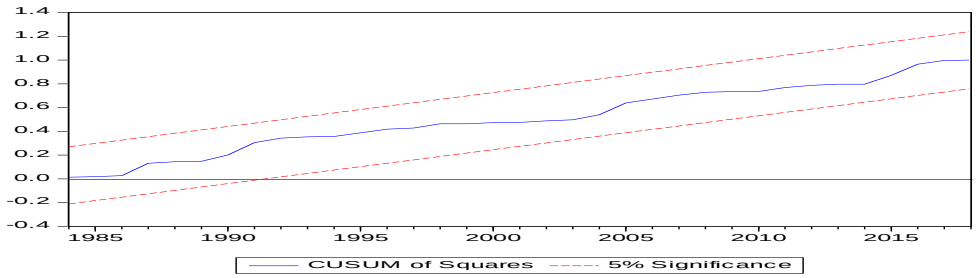
Table 11 reveals the stability test in the regression model using the RESET test. The test investigates error specification in the model specified in the study. The results showed presence of stability in the model. This claim is supported by the p-value of the t-statistic and F-statistic of the Ramsey RESET test. From the estimation results, the value of F-statistic and t-statistic are 0.011788 and 0.108574, respectively and the p-value of 0.9150, which also evidenced the earlier claim since 0.9150 p-value is statistically insignificant at 5% critical value. Since the p-value exceeds the level of significance, the study concludes that presence of error specification does not exist in the model.

In an attempt to validate the estimated results, a stability test is undertaken using the cumulative sum of recursive of squares and the cumulative sum of recursive of residuals. The diagrams are indicated in figures 3 and 4 below.



Source: Compilation from E-view 9

Figure 3: CUSUM Stability Test



Source: Compilation from E-view 9

Figure 4: CUSUM of Square Stability Test

The recursive cumulative sum (CUSUM) of residuals and the CUSUM of square stability tests are employed to investigate whether or not there is stability in the parameters and constancy in the random variables in the regression model. The results showed presence of stability in the parameters as the plots of the statistics of the CUSUM test and CUSUMSQ test fell within the critical bands.

4.3 Policy Implications of the Results

From the results exchange rate depreciation has a positive and significant influence on oil export performance in both the short-run and long-run. It is estimated on the average that 1% increase in exchange rate depreciation will lead oil export performance to increase by 0.4% in the short-run, and 0.8% in the long-run.

More so, the results revealed that exchange rate depreciation has a positive and insignificant effect on non-oil export performance in the short-run, while in the long-run, exchange rate depreciation has a negative and insignificant impact on non-oil export performance in the country. Thus, the research estimated on the average that 1% rise in exchange rate depreciation will lead non-oil export performance to increase by 0.2% in the short-run and 0.13% decrease in non-oil export performance in the long-run in Nigeria.

V. Conclusion And Recommendations

The study investigated the effect of exchange rate depreciation on export performance in Nigeria from 1981 to 2018. Auto-Regressive Distributed Lag (ARDL) model was utilized in the analysis. Unit root test conducted indicated that all the variables including LOXP, LNOXP, LEXR, and LGDP except INR were non-stationary in levels; but all the variables became stationary after first differencing at a 5% level of significance. The estimation results also indicated that exchange rate depreciation (LEXR) has a positive and significant impact on oil export performance (LOXP) in both the short-run and long-run in Nigeria. More so, the results showed that exchange rate depreciation has a positive and insignificant impact on non-oil export performance in the short-run, while it has a negative and insignificant influence on non-oil export performance in the long-run in the economy.

Hence, the study recommends that the government should not over rely on exchange rate depreciation in promoting and stimulating non-oil export performance in the economy. This is because; the non-oil export sector is primarily dominated by primary products which violates the tenet of international trading policies. By the results, a 1% rise in exchange rate depreciation results in a 0.2% increase in non-oil export performance in the short-run; and a 0.13% decrease in the non-oil export performance in the long-run. More so, government should, as a matter of fact, continue to pursue vigorously exchange rate depreciation policy, as a way of accelerating oil export performance in the country. Based on the results, 1% increase in exchange rate depreciation brings about a 0.4% increase in oil export performance in the short-run; and 0.8% improves in oil export performance in the long-run.

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