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Exchange Rate Regimes and Real Sector Performance in Nigeria

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Abstract

Exchange rates and the choice of the exchange rate regime have critical influence on the real sector performance and the behaviour of several other macroeconomic variables, especially in a high import dependent economy like Nigeria. Exchange rate reforms put in place by the Nigerian monetary authorities have not put the economy on the path of macroeconomic stability, recovery and sustainable development. Arising from this problem, this study investigates the relationship between exchange rate and the performance of Nigeria's real sector with emphasis on the agricultural, industrial, building and construction, wholesale and retail trade and service sectors over the period of 1961-2017. The study adopts the modified Mundell-Fleming IS-LM framework. Autoregressive Distributed Lag and pairwise Granger Causality techniques were used to examine the relationship between exchange rate regime and real sector output performance. The results of the study reveals a long-term inverse and significant relationship between exchange rate and aggregate real output in regulated exchange rate regime but a long-term direct and significant relationship in the guided deregulated regime. The study therefore recommends that the monetary authorities should re-assess and adequately monitor the existing exchange rate policies in Nigeria with a view to stimulating increased performance of the real sector of the economy. The exchange rate system adopted should be aligned with the overall macroeconomic policy structure and also takes into consideration the integrity of the institutional arrangements on which the country's development and stability prospects depend. The government should also develop a broad programme of development of domestic industries in both rural and urban areas to enhance domestic production, exports, create employment and reduce poverty. There is also the need to implement coordinated macroeconomic policies that would attract foreign private investment, impact inflation positively and stimulate exchange rate stability.

Key words: Exchange rate; Real output; Regulated and guided deregulated regime; Nigerian economy

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1. BACKGROUND TO THE STUDY

Research related to exchange rate and real output performance still remains of great interest in developing countries like Nigeria. Exchange rate has conventionally played a crucial role in Nigerian monetary policy because of its crucial impact on the country trade relation with other countries, especially with a country like Nigeria which is a mono-product (oil) export dependent economy and an import dependent (developing) nation. Consequently, the monetary authority (Central Bank of Nigeria) on several occasions in recent past had engaged in different exchange rate adjustment policies (fixed and flexible) in a bid to attain the macro-economic objective of price stability (Ajao & Igbekoyi, 2013). It is sad that, despite the huge amount of foreign exchange derived mainly from its oil and gas resources, Nigeria's economic growth has been weak and the poverty level has increased greatly (Omojimite and Akpokodje, 2010). Like other countries, the Nigerian real sector is strategic to the growth of the entire nation and it is the main motivating force of a nation's economic growth and development. If the real sector is vibrant, it is capable of fast-tracking economic

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growth and development, including creating huge level of employment (Ibadin, Moni & Eikhomun, 2014). Sanusi (2011) classified the real sector into agriculture, industry, building and construction and services. However Mordi *et al*. (2013) and Amoo *et al.* (2014) expanded this scope to include Agriculture (AGR), Industry (IND), Building and Construction (BUID), Services (SER) and Wholesale and Retail (WRT) in consistent with the Central Bank of Nigeria (CBN) reporting format.

An effectively managed exchange rate policy is considered a veritable way of the Nigerian economy pursuing vigorously rapid and sustainable economic development to become one of the twenty largest economies in the world by 2020 and the 12th largest economy by 2050 (CBN, 2009). It is depressing that the Nigerian real sector had been grossly underdeveloped and underperformed relative to her enormous resource endowment; the weak performance due largely to lack of proper exchange rate management (Odusola, 2006; Umar & Soliu, 2009; Sanusi, 2010). It is imperative for nations that seek to pursue the macroeconomic goals of healthy internal and external stability of her economy to articulate a sound exchange rate policy (Chang & Tan, 2008). Exchange rates and the choice of the exchange rate regime retain central stage in the post- crisis environment especially for emerging economies (Klein & Shambaugh, 2010; Rose 2011).

1.1 Statement of Problem and Objectives of Study

Exchange rate has a significant influence on the real output performance and the behaviour of several other macroeconomic variables, especially in a country like Nigeria that had followed the course of rapid economic growth with attendant high import dependency (Oyejide, 1985; Adeniyi, 2012). The achievement of favourable exchange rate policy has therefore become a major challenge facing Nigerian monetary authority (Central Bank of Nigeria) over a few years and the failure to achieve a stable exchange rate has subjected the Nigerian real sector and its component units to dwindled fortune, fragile productive base and poor performance (Opaluwa, Umeh & Abu, 2010 and Fapetu & Oloyede, 2014). Government policies; particularly exchange rate policies can only be deemed effective if they impact positively on the production and distribution of goods and services (Akinmulegun & Falana, 2018). The current economic woes facing Nigeria are related strongly to the exchange rate with the CBN working assiduously to defend the naira against the dollar to achieve exchange stability in the face of unwholesome speculation and corruption (Olajide, 2016). According to Ayodele (2004) the Nigerian economy faced severe development problems, exchange rate volatility, import dependence, weak industrial base, low level of agricultural production, a weak private sector, high external debt overhang, inefficient public utilities and low level of social services which all combined to hamper the performance of the real sector. Generally, Nigeria has witnessed some fluctuations in fate with regards to growth and successive exchange rate policies have not guided Nigerian real sector to the desired place of pride internationally (International Monetary Fund, 2017). The reasons are not far-fetched; unabated depreciation in Naira due to the continuing disappearance of the traditional exports/absolute reliance on oil for foreign exchange earnings, dependence on this narrow and inelastic export base which exposes the country to the uncertainties of world oil market that has become increasingly erratic (Olorunfemi & Fatukasi, 2011). Mordi (2006) claimed that the failure to properly manage the exchange rate is capable of inducing distortions in consumption and production patterns and excessive volatility in exchange rate creates uncertainties and several destabilizing effects on the macro economy. Nigeria, like some Sub-Sahara African countries resorted to harmful exchange rate restrictions to stem the large terms-of-trade shock, tighter external financing conditions and depletion of reserves. Unfortunately, the restrictions only created policy uncertainties, deep economic distortions, widening of spreads in parallel markets and this situation obviously calls for greater exchange rate flexibility by lifting exchange rate restrictions to remove distortions that are inflicting serious damage on the real economy (International Monetary Fund, 2017).

Despite the situations discussed above, empirical evidences on the aggregate real output response to exchange rate regimes in Nigeria are scanty. Most of the existing studies had largely focused on the relationship between exchange rate and the aggregate output without regime perspective. But in reality, differences in policies focus under the different exchange regimes suggest that the impact of exchange rate regime could vary substantially on the aggregate output. Moreover, Nigeria has continued to struggle in terms of macroeconomic performances as the different regimes have been accompanied by instability and uncertainties, hence the need for the present study to examine the relationship between exchange rate regimes and real output performance in Nigeria in both regulated regime (1961-1986) and deregulated regime (1987-2017).

The specific objectives of the study include to:

- Investigate the nature of causality between exchange rate and real sector output in Nigeria
- Evaluate the performance of the aggregate real sectors output in the regulated and guided deregulated exchange rate regimes in Nigeria.

The following hypotheses which are all in null form were formulated and tested in the study:

- There is no causal relationship between exchange rate and the performance of aggregate real output in Nigeria.
- There is no existence of significant difference

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between the performance of the real output in Nigeria under regulated exchange rate regime and deregulated exchange rate regime

1.2 Relevance and Scope of the Study

The analysis of the alternative exchange rate regimes with regards to a nation's overall economic performance is an unresolved issue and perhaps one of the most important topics in international Finance. However, literature in this area is still scanty in Nigeria. The significance of this study is predicated on the fact that it extends literature in the area of relative performance of aggregate real output under different exchange rate regimes in Nigeria. This study is country-specific, focusing on the Nigerian economy with the spotlight on the response of the Nigeria real output to exchange rate between 1961- 2017; making a time horizon of Fifty –Seven (57) years. The period was further divided into two Exchange rate policy regimes: Fixed/Regulated Exchange Rate Regime (1961-1986) and Flexible/Guided Deregulated Exchange rate regime (1987-2017) so as to capture the effect of policy change with the introduction of Structural Adjustment Programme (SAP) in 1986. The choice of the period was based on the need to cover the period Nigeria took charge of her monetary policy management.

2. REVIEW OF EXTANT LITERATURE ON EXCHANGE RATE REGIMES AND REAL SECTOR PERFORMANCE

The choice of exchange rate regime is of critical importance for monetary policy and it is the main responsibility of central bank of any country. Although, a huge body of empirical works exists on the effect of exchange rate regime on the real economy especially in advanced world, there remain many unresolved issues. The literature has shown that there was no 'one size fit all' exchange rate regime that was suitable for all countries at all times. In other words, the controversy of the effect of exchange rate regime on the performance of the real economy is far from been resolved on both theoretical and empirical sides of literature. This section looks at the conceptual review, theoretical review/framework and the review of empirical studies on the subject matter.

2.1 Conceptual Literature

Exchange rate is the price of one currency in terms of another. In the Nigerian context, it is the units of naira needed to purchase one unit of another country's currency e.g the United States dollar (Oloyede, 2002; Campbell, 2010; Ngerebo-a & Ibe, 2013). The general definition of exchange rate is a reflection of the strength of a domestic currency when considered in terms of strength of another country's (trading partner) currency (Jhingan, 2003). Obi, Oniore and Nnadi (2016) described Exchange rate as one of the most important prices in an open economy, which determine the flow of goods, services, and capital in a country, and exerts great pressure on the balance of payments, inflation and other macroeconomic variables. The exchange rate is therefore relevant to the understanding of the growth path of all countries of the world and its misalignments can lead to output contraction and extensive economic hardship (Umar & Soliu, 2009). According to Akpan and Atan (2011) the exchange rate policy in Nigeria has gone through a substantial transformation from the immediate post-independence period when the country maintained a fixed/regulated system to the floating of the currency in 1986. In each of these eras, the economic and political considerations underpinning the exchange rate policy had important consequences for inflation, the balance of payments and the real output. An exchange rate regime simply refers to the system adopted by a country's monetary authority (usually the Central Bank) to determine the value of its currency in relation to other nations' currencies. Traditionally, exchange rate regimes are classified into fixed and flexible regimes on the basis of the degree of flexibility the central bank shows towards changes or variations in the exchange rates (CBN, 2016). However, in recent times, the IMF has reclassified the regimes into three broad categories, the hard exchange rate pegs, soft exchange rate pegs, and floating exchange rate regimes based on observed country's practices and the degree of monetary policy autonomy (IMF, 2003). In dealing with exchange rate regime issues, it is difficult and almost impracticable to have a clear-cut classification, especially for regimes under 'floating': pure float regimes are not that common and many countries prefer managed (guided) float (Kowalski Paczynski & Rawdanowicz, 2003). In Nigeria, a managed floating exchange rate regime has been the most predominant since the introduction of Structural Adjustment Programme in 1986 (Akinmulegun & Falana).

2.2 Theoretical Literature

Friedman (1953) laid the foundation for the discussion on the choice of exchange rate regime with strong argument for a flexible exchange rate and its insulating role in circumstances of foreign demand shocks. Further developments on this occurred in the 1960s. Mundell (1960), for example, proposed a simple analytical framework demonstrating that the relative effectiveness of an exchange rate regime in helping a country adjust to shocks depends in principle on government policy rules, capital mobility and the speed of price adjustment to excessive or poor demand. Subsequent contributions expatiated on the tangible evidence of the impact of exchange rate regime choices. Despite this progress, Stockman (2000) pointed out the lack strong evidence on how exchange rate systems affect the economic variables and that an evaluation of an exchange rate regime is only possible when an economic model is formulated.

Tille (2002) introduced another dimension into the

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topic by proving that the widely exaggerated benefits of a floating exchange rate regime in terms of its shock-absorbing properties are severely diminished if one considers incomplete sectoral specialization (i.e. firms from one sector can be located in various countries) and sector-specific shocks (as opposed to commonly assumed country-specific shocks). Other theories on the choice of exchange regimes include Optimal Currency Area (OCA) theory, developed by McKinnon (1963), Dornbusch (1976) overshooting model and Nominal anchor theory of Barro and Gordon (1983), Edwards and Savastano (2000) and Frankel (2003) among others.

Mundell–Fleming model is the traditional theoretical standard policy for real output exchange rate policy analysis. The model, which by assumption, treats output as a homogeneous good which is produced, consumed and traded internationally (Kowalski *et al*., 2003).This study is constructed on Calvo (1999) version of Mundell-Fleming IS/LM model. The Mundell–Fleming IS-LM model was an economic model first set forth (independently) by Mundell (1963) and Fleming (1962). The model is an extension of the traditional IS-LM Model that deals with economy under autarky (or a closed economy). Also, the model describes an open economy and portrays the short-run relationship between an economy's nominal exchange rate, interest rate, and output with the assumption that output is demand determined. The Mundell-Fleming model provides understanding of how exchange rate is determined. In the model, the balance of international payments is considered as another equilibrium condition in addition to the money and goods markets (Kanamori& Zhao, 2006).

Calvo (1999) version of Mundell-Fleming IS/LM model is represented by the following:

$$y = \alpha * e + u \quad , \alpha > 0 \tag{2.1}$$

$$m = y + v \tag{2.2}$$

Where y denotes output, e the nominal exchange rate, m money (all in logarithms) and u and v *are stochastic* disturbances. Equation (2.1) represents an IS curve, and (2.2) an LM curve. In both equations interest rate effects are included in stochastic terms and elasticity of money in relation to output in (2.2) is set to unity.

Under a full and immediate pass-through from the exchange rate to the price of domestic output, the equations (2.1) and (2.2) can be transformed as follows:

$$y = u \tag{2.3}$$

$$m = y + e + v \tag{2.4}$$

The above equations simply show that variance of output is equal to variance of real shock *u,* independent of the exchange rate policy.

It is logical to conclude the choice of model by saying that the advances in modelling techniques does not substantially change the insights and potency provided by the Mundell–Fleming type of models especially in disaggregated analysis of the real sector (Kowalski, *et al* 2003).

2.3 Empirical Literature on Exchange Rate Regime and Real Sector Performance

There is a growing literature on the relationship between exchange rate regime and real output in cross countries and country specific with varied findings and conclusion. Ghosh,Gulde, Ostry, and Wolf (1997) employed a descriptive analytical technique to evaluate the growth performance under alternative regimes in 145 IMF-member countries for 30 years after 1960 and found a slightly higher GDP growth under a float compared to under a peg (1.7% under floating as against 1.4% under a peg). Levy-Yeyati, and Sturzenegger (2003) in their study of to float or fix: evidence on the impact of exchange rate regime on growth using a new de facto classification of regimes found a disparity in growth between developing countries and their counterpart in the industrial world. In developing countries, it was found that less flexible exchange rate regimes were associated with slower growth, as well as with greater output volatility but for industrial countries, regimes did not appear to have any significant impact on growth. Rogoff, Husain, Mody, Brooks, and Oomes (2003) examined the evolution and performance of exchange rate regimes using recent advances in the classification of exchange rate regimes and found strong support for intermediate regimes as against the popular bipolar view that countries will tend over time to move to the polar extremes of free float or rigid peg. The analysis suggested that economic maturity determines the exchange rate flexibility. In other words, when countries are at a relatively early stage of financial development and integration, fixed or relatively rigid regimes appear to offer some anti-inflation credibility gain without compromising growth objectives but as countries develop economically and institutionally, there appear to be considerable benefits accruable from more flexible regimes. Huang and Malhorta (2004) investigated the relationship between exchange-rate regime and growth focusing on two aspects: exchange-rate-regime classification and differentiation between developing and developed economies. The study used 12 developing Asian countries and 18 advanced European economies over the period 1976-2001. Using descriptive statistics and regression technique, the findings suggested that the exchange-rate regime matters for developing economies as fixed and managed floating regimes outperform the others in terms of growth. However, for advanced economies, no significant relevance of exchange rate regime was discovered.

Obi et al (2016) considered the relationship between exchange rate regimes and output growth in Nigeria in different periods from 1970 to 2014 using the Generalized Method of Moments (GMM). The study suggested that exchange rate regimes indeed matter in terms of real economic performance in Nigeria as the results

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revealed that deregulated exchange rate regime spurred economic growth in the country as against the whole period and fixed exchange rate regime. Eze and Okpala (2014) carried out a quantitative analysis of the impact of exchange rate policies on Nigeria's economic growth and revealed that exchange rate (EXR), money supply (M2) and government expenditure (GEX) are highly significant in the determination of Nigeria's economic growth performance. The study further revealed that no matter the exchange rate regime, whether fixed or flexible, what matters is the effectiveness of the management. Falana (2018) investigated the relationship between exchange rate and the performance of Nigeria's real sector over the period of 1961-2015. The study adopted the modified Mundell-Fleming IS-LM framework and results of the Impulse Response Functions and Forecasting Error Variance Decompositions showed that the five components of Nigeria real sector responded differently to exchange rate under the two alternative regimes and that exchange rate accounted for greater shocks in output in regulated regime than guided deregulated regime. Apart from the controversy surrounding the effect of exchange rate variation on output that exists in empirical and theoretical literature, it must be stated that a lot of works has been done on the impact of exchange rate on economic growth in Nigeria and outside Nigeria. But the author is not aware of any study which examines the link between exchange rate regimes and economic growth in Nigeria in different periods. This study finds it expedient to fill this gap in the literature.

3. THEORETICAL FRAMEWORK AND METHODOLOGY OF RESEARCH

This study is empirical and analytical in nature designed to quantitatively determine the relationship between exchange rate and the performance of components of real sector in Nigeria. Due to the nature of this study and the variables that are involved, ex-post facto design was adopted. Ex-post designs rely heavily on secondary (already computed) data.

3.1 Theoretical Framework for Model Formulation

This study examined the relationship between exchange rate regimes and the aggregate real output (real GDP). The data for this study was mainly time series obtained from four main secondary sources, namely: the National Bureau of Statistics (NBS) annual publications (various issues), Central Bank of Nigeria Statistical Bulletin and Annual Reports/Statement of Accounts (various issues) and World Development Indicators of World Bank. Annual data for the period 1961–2017 was employed in the study.The theoretical construct of the model adopted is rooted in the modified traditional IS-LM framework, drawing on the implications of the theoretical model in Kandil and Mirzaie (2002, 2005). The main advantage of this model over other models is that it incorporates consumption, investment, government spending, taxes, exports, imports, interest rate exchange rate, current account balance, capital account and national output in a single framework. In this model, exchange rate does not affect output directly, it affect it indirectly through the import-export and money supply channels (Lizondo &Montiel, 1989).

In light of the theoretical predictions, the reduced-form solution of the theoretical model in Kandil and Mirzaie (2002) used in the study is stated below:

$$AY_t = \alpha_o + C(L)\, Y_{t-1} + B\varepsilon_t \quad (3.1)$$

The adapted model was modified accordingly based on peculiarity of this research, the structure of data used and to accommodate some relevant variables in order to reflect the reality of Nigerian economy. Net Export was added to the models as an open economy indicator. Other relevant variables (such as prime lending rate, inflation rate, government capital expenditure and credit to the private sector) were added in aggregate output equation which was presented accordingly in the models.

Two models were formulated based on the objectives of this study.

Model 1: Causal relationship between the Exchange Rate and Real Output in Nigeria.

Model 1 tests whether there is a causal relationship between Exchange rate and the aggregate Real Output in Nigeria. The null hypothesis that there is no causal relationship between Exchange rate and the performance of aggregate real output in Nigerian was tested using Granger Causality Test following Kelbore (2014). In a simple definition, using our series, EXR is said to Granger-cause GDP if GDP can be better predicted using the histories of EXR and GDP.

The long run granger causality equation is specified as thus:

$$RGDP_t = \sum_{i=1}^{i} \rho_i NER_{t-i} + \sum_{j=1}^{i} \phi_j RGDP_{t-j} + \mu_{6t} \quad (3.2, 3.3)$$

$$NER_t = \sum_{i=1}^{i} \delta_i NER_{t-i} + \sum_{j=1}^{i} \eta_j RGDP_{t-j} + \mu_{7t}$$

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There are three possibilities from Granger causality test:

• Unidirectional Causality flows from NER to RGDP if ρ_i is statistically significant and η_j is statistically insignificant

• Bidirectional causality occurs where ρ_i and η_j are statistically significant.

• Non-causality (Independent) where occurs where ρ_i and η_j are statistically insignificant.

The short run VEC causality is also specified as thus:

$$\Delta RGDP_t = \sigma_1 \Delta NER_t + \sigma_2 \Delta INF_t + \sigma_3 \Delta PLR_t + \sigma_4 \Delta NE_t + \sigma_5 \Delta GCE_t + \sigma_6 \Delta CPS_t + \mu_{8t} \quad (3.4, 3.5)$$

$$\Delta NER_t = \pi_1 \Delta RGDP_t + \pi_2 \Delta INF_t + \pi_3 \Delta PLR_t + \pi_4 \Delta NE_t + \pi_5 \Delta GCE_t + \pi_6 \Delta CPS_t + \mu_{9t}$$

Also, there is short run causality from NER to RGDP if σ_1 is statistically significant and is not, there is short run causality from RGDP to NER if π_1 is statistically significant and is σ_1 not while there will be bi-directional causality if σ_1 and π_1 are both statistically significant.

Model 2: evaluate the performance of the aggregate real output in the regulated and guided deregulated exchange rate regimes in Nigeria.

For Model 2, there is no significant difference between the performance of the real output in Nigeria under regulated exchange rate regime and guided deregulated exchange rate regime was tested.

The model is specified in a functional form as stated below:

RGDP = *f* (NER, INF, PLR, NE, GCE, CPS)

The model can thus be written in econometrics form by specifying that:

$$RGDP_t = \beta_0 + \beta_1 NER_t + \beta_2 INF_t + \beta_3 PLR_t + \beta_4 NE_t + \beta_5 GCE_t + \beta_6 CPS_t + \mu_t \quad \text{---------- (3.6)}$$

From the functional equation, Real Output (RGDP) is a function of Nominal Exchange Rate (NER), Inflation (INF), Prime Lending Rate (PLR), Net Export (NE), Government Capital Expenditure (GCE) and Credit to Private Sector (CPS).

The equation is represented in structural form below:

$PY_t = \alpha_o + R(L)\, Y_{t-1} + Q\varepsilon_t$ (3.7)

Where

Y_t = vector of endogenous macroeconomic variables used in aggregate output The variables were first transformed into natural logs (except the ones in percentage form) before computations, with a view to removing possible heteroscedasticity.

Y_{t-1} = a vector of the lagged values of endogenous variables,

ε_t = a vector of random error of disturbance terms for variable that captures exogenous factors.

$R(L)$ = a matrixpolynomial in the lag operator L of length p,

P= a matrix of $n \times n$ dimension, n is the number of variables, and

Q= a columnvector of dimension $n \times 1$, which contains the contemporaneous response of the variables to the innovations or disturbances.

3.2 Definition of Variables

For the purpose of empirical analyses, data on Real sector Output (proxied by Real GDPs) and Exchange rates in Nigeria were used. Economic indicators covered were the Real GDP of the aggregate sector, Exchange rate (proxied by Nominal Exchange Rate), Inflation rate, Interest rate (proxied by prime lending rate) and Net Export, Total Government Expenditure (TGE) and Credit to Private Sector. The Real GDP is the measure of economic performance used in this study.

Below are short descriptions of various variables adopted as proxies in the specification:

Table 1
Definitions and Measurement of Variables

SN	Variable	Symbol	Measurement
1	Aggregate Output	RGDP	Aggregate RGDP measured in naira
2	Nominal Exchange Rate	NER	Units of the Naira that can purchase a unit dollar
3	Inflation rate	INF	The Consumer Price Index (CPI) which is the average change over time in prices of goods and services consumed by people
4	Prime Lending Rate	PLR	Lending rate to less prime/less risky real sector
5	Net Export	NE	Export minus Import (in Naira). Represent openness
6	Credit to Private Sector	CPS	Total financial resources provided by financial institution in Naira
7	Government Capital Expenditure	GCE	Spending on acquisition of goods and service for future benefit (in Naira)

Source: Author's Compilation (2018)

3.3 Method of Estimation and Diagnostic Techniques

The study adopted the Auto Regressive Distributive Lag (ARDL), an approach used extensively by Pesaran and Pesaran (1997); Pesaran and Smith (1998) and Pesaran, Shin & Smith (2001) to examine the relationship between Exchange rate regime and the Real sector Output. The choice of the ARDL approach is based on consideration of its co integration analysis which is unbiased and efficient. ARDL co-integration approach could be used regardless of whether the underlying variables are *I(0)*, *I(1)* or fractionally integrated. This implies that the ARDL approach avoids the pre-testing problem associated with standard co integration, which requires that the variables be already classified into I(I) (Pesaran*et al*.,2001).

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Diagnostic tests for serial correlation, normality, stability and heteroskedasticity for the estimated model were carried out. The models were subject to heteroskedasticity tests using the Breusch-Pagan-Godfrey (BPG) tests. The B-G Serial Correlation Lagranger Multiplier (LM) test was used to test for higher order Autoregressive Moving Average (ARMA) errors in the model. Absence of higher order ARMA will imply that in the model, the present value of the residuals did not depend on their past values. The Ramsey (Regression Specification Error Test) RESET was used to examine the stability of the ARDL model.

Table 2
Descriptive Statistics

	RGDP	NER	INF	PLR	NE	GCE	CPS
Mean	21.3 trillion	53.93262	15.83425	13.84213	-7.403703	254billlion	2.84 trillion
Median	17.3 trillion	7.391558	11.80000	16.02131	-10.83766	15.0 billion	30.4 billion
Maximum	69.0 trillion	305.2899	72.73000	29.80000	351.8886	1.16 trillion	22.3 trillion
Minimum	2.50 billion	0.546358	-5.600000	6.000000	-593.7220	63766000	0.117 billion
Std. Dev.	21.9 trillion	75.53028	15.16512	6.381159	196.2250	364 billion	5.98 trillion
Skewness	0.860021	1.294455	1.865542	0.333254	-0.896007	1.240392	2.140235
Kurtosis	2.647167	3.914186	6.442514	2.112929	4.654411	3.141162	6.269618
Jarque-Bera	7.322208	17.90319	61.20824	2.923930	13.87958	14.66377	68.90545
Probability	0.025704	0.000130	0.000000	0.231780	0.000968	0.000654	0.000000
Observations	57	57	57	57	56	57	57

Source: Authors Construct using CBN 2017 Bulletin.

The information provided on table 4.1 reveals that the real GDP maximum value was 69 trillion as reported in 2017 while the least was 2.5 billion as reported in 1961. This shows that overtime, output has grown gulping over 68 trillion within the time horizon. The result of table 4.1 also reveals that exchange rate has also witnessed rising value as the least was 0.55 naira to a dollar and having depreciated up till 305 naira to a dollar as at 2016. The implication of this is that exchange rate has experienced a high level of volatility which can be attributed to the variation in policies culminating from fixed exchange rate regime to managed floating exchange rate regime. Other variables that are strong determinant of output are not left out with its cyclicality as there suggests evidence of fluctuations in inflation rate from -5.6% to a maximum of 72.73%; likewise prime lending rate with little variability ranging between 6% and 29.8%. also, net export growth rate experienced a high value of 351.9% growth and then a negative growth path of up to -593%. Government capital expenditure has also shown a sign of improvement from 63.76 million naira to a whooping 1.16 trillion naira; this is the same for credit to private sector. Following the null hypothesis of normal distribution with the Jarque-Berra statistic, table 4.1 reveals that only prime lending rate is normally distributed.

4.2 Correlation Matrix

This is to check the level of multicollinearity likely to be associated with the regression result.

4. DATA PRESENTATION AND ANALYSIS OF RESULT

4.1Descriptive Analysis

This section carefully presents the data in a bid to achieve the research objectives. Before the result of the regression, it is important to understand the descriptive nature of the data employed in investigation. The data employed for this regression are real gross domestic product (RGDP), exchange rate (NER), and inflation rate (INF), prime lending rate (PLR), net export (NE), government capital expenditure (GCE) and credit to private sector (CPS). The data were available from 1961 till 2017.

Table 3
Correlation Matrix Result

	RGDP	NER	INF	PLR	NE	GCE	CPS
RGDP	1.00						
NER	0.92	1.00					
INF	-0.01	-0.13	1.00				
PLR	0.58	0.46	0.39	1.00			
NE	-0.11	-0.20	0.13	0.15	1.00		
GCE	0.91	0.90	-0.15	0.41	-0.20	1.00	
CPS	0.87	0.86	-0.14	0.24	-0.26	0.83	1.00

Source: Authors Construct using CBN 2017 Bulletin.

The correlation matrix result as reported from table 4.2 reveals that there is no degree of perfect multicollinearity as the correlation between real output and exchange rate, inflation, prime lending rate, net export, government capital expenditure and credit to private sector were all less than unity (0.92, -0.01, 0.58, -0.11, 0.91 and 0.87 respectively). The implication of this is that our OLS regression will not suffer from perfect multicollinearity syndrome.

4.3 Unit Root Test Result

In order to arrive at a robust result and apply the right estimation technique, it is important to verify the stationarity of the time series. It is important that the variables do not suffer from unit root problem in order to arrive at a consistent result. To test for this, this study employs the Augmented Dickey Fuller (ADF) test in order to verify the stationarity of the series. The variables tested

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are real gross domestic product (RGDP), exchange rate (NER), inflation rate (INF), prime lending rate (PLR), net export (NE), government capital expenditure (GCE) and credit to private sector (CPS). The result of the stationarity test as presented in Table 4 reveals that only inflation rate and net export growth rate are stationary at levels while others are at first difference; implying that the order of stationarity are mixed.

Table 4
Unit Root Result

Variable	Method	At Level I(0)			At First Difference I(1)			Order of Integration
		ADF Statistic	ADF Critical Level	Probability	ADF Statistic	ADF Critical Level	Probability	
GDP	ADF	-1.303511	-2.914517	0.6220	-7.424616	-2.915522	0.0000	I(1)
NER	ADF	3.553412	-2.914517	1.0000	-3.883083	-2.915522	0.0040	I(1)
INF	ADF	-3.495842	-2.914517	0.0117	-	-	-	I(0)
PLR	ADF	-1.425285	-2.915522	0.5634	-11.81199	-2.915522	0.0000	I(1)
NE	ADF	-5.523828	-2.915522	0.0000	-	-	-	I(0)
GCE	ADF	-1.154366	-2.914517	0.6879	-7.833138	-2.915522	0.0000	I(1)
CPS	ADF	0.203016	-2.914517	0.9705	-4.850990	-2.915522	0.0002	I(1)

Source: Authors Construct using CBN 2017 Bulletin

4.4 Co-integration Test

Given that there exists a mixed of order of stationarity, the appropriate co-integration technique to employ is the ARDL Bound test by Peseran (2001). The bound test result is presented in Table 5.

Table 5
Co-integration Result

Model	F-stat	I(0) Bound @ 5%	I(1) Bound @ 5%
Regulated Exchange Rate Regime	8.801897	2.45	3.61
Guided Deregulated Exchange Rate Regime	10.34452	2.45	3.61

Source: Authors Construct using CBN 2017 Bulletin.

Table 5 reveals that the F-statistics for both models are greater than the I(1) 5% critical bound value; the implication of this is that the models are co-integrated at order 1.

4.5 Impact of Exchange Rate in the Regulated and Guided Deregulated Regime on Real GDP

The estimation technique employed in examining this objective is the Autoregressive Distributed Lag Model (ARDL) and the results for the two periods are presented in Table 6.

From Table 6, it can be seen that in the long run, exchange rate had an inverse impact on output during the regulated regime but a direct impact in the guided deregulated regime. The implication of this is that in the regulated regime, increases in exchange rate implying devaluation of the currency reduces output while in the guided deregulated regime implying depreciation of the currency increases output; both coefficients are statistically significant at 5%. The result from this analysis implies that in the long run, exchange rate devaluation is not a viable option for sustainable growth. However, in the long run, allowing exchange rate to depreciate will improve output. For the short run period, the results show a contrary to that of the long run. The result shows that there is a direct impact of increases in exchange rate in the form of devaluation on output. In other words, in the short run, increases in exchange rate in the form of depreciation reduce output. The implication of these two results is that devaluation of the currency can be a short term viable option of stimulating output while long term growth can only be achieved by allowing the free market forces to depreciate the currency. For other macroeconomic economic variables affecting output, it can be seen that inflation rate, prime lending rate, net export and credit to private sector have positive impact on real output in the long run and short run during the regulated era while government capital expenditure has negative impact; only credit to private sector, net export and inflation met the a priori expectation while government capital expenditure and prime lending rate did not meet the a priori expectation. However, in the guided deregulated era, only prime lending rate and credit to private sector maintained their positive impact; while inflation rate, net export and government capital expenditure had negative impact. The error correction term is rightly specified having the negative sign and between zero and one non-inclusive. On the robustness of the result, the result shows that the results are well fitted as explained by the F-statistic, there is no serial correlation of order one and that of higher order (as explained by the Durbin Watson and Breusch Godfrey test); the model is stable as explained by the RAMSEY Reset probability.

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Table 6
Autoregressive Distributed Lag Model (ARDL) Estimated Result

	Regime					
	Regulated Exchange Rate Regime			Guided Deregulated Exchange Rate Regime		
		Long Run			Long Run	
Variables	Coefficients	t-statistic	Probability	Coefficients	t-statistic	Probability
NER	-19.429924	-1.913505	0.0798	0.028667	5.142148	0.0000
INF	0.013805	0.545780	0.5952	-0.004333	-4.906947	0.0001
PLR	0.837858	2.050635	0.0628	0.023151	5.184912	0.0000
NE	0.002061	1.443383	0.1745	-0.000014	-0.186943	0.8536
LOG(GCE)	-0.594605	-0.811255	0.4330	-0.178592	-8.385781	0.0000
LOG(CPS)	1.412398	1.408346	0.1844	0.339811	14.814151	0.0000
C	13.489194	1.186550	0.2584	26.166170	86.420771	0.0000
			Short Run			
D(NER)	25.401301	3.575811	0.0038	-0.001195	-4.564440	0.0002
D(INF)	0.012169	0.560370	0.5855	-0.001564	-5.161977	0.0000
D(PLR)	0.458179	1.506180	0.1579	0.005583	4.595727	0.0002
D(NE)	0.000038	0.042513	0.9668	-0.000005	-0.185612	0.8546
DLOG(GCE)	-0.524124	-0.878949	0.3967	-0.008748	-0.630664	0.5354
DLOG(CPS)	1.244981	1.478311	0.1651	0.081107	2.718966	0.0132
CointEq(-1)	-0.881466	-4.515773	0.0007	-0.360960	-5.365267	0.0000
			Post-diagnostics Test			
R-squared	0.980046		0.999086			
Adjusted R-squared	0.963417		0.998583			
F-statistic	58.93709		1986.458			
Prob(F-statistic)	0.000000		0.000000			
D.W.	1.860887		2.217476			
RAMSEY Reset Prob.	0.5839		0.1093			
B.P.G. Prob	0.7292		0.3286			
B.G.	0.0654		0.5866			
Jarque Berra Prob	0.6092		0.4375			

Source: Authors Construct using CBN 2017 Bulletin

4.6 Causality Result

In this section, the short run and the long run causality test were investigated using the Granger causality technique and VAR Granger Causality/Block Exogeneity Wald Tests respectively.

Table 7
Granger Causality Test

Null Hypothesis	Obs	F-Statistic	Prob.
NER does not Granger Cause LOG (RGDP)	56	7.67270	0.0188
LOG(RGDP) does not Granger Cause NER		0.15090	0.6992

Source: Authors Construct using CBN 2017 Bulletin

The result of table 4.6 shows that exchange rate granger causes real GDP in the long run. The implication of the result shows that in the long run, exchange rate granger causes real GDP while real GDP does not granger cause exchange rate.

The short run causality result was examined using the VAR Granger Causality/Block Exogeneity Wald Tests as presented in Table 8.

Table 8
VAR Granger Causality/Block Exogeneity Wald Tests

	GDP	NER	INF	PLR	NER	GCE	CPS
GDP	1	0.0160*	0.4920	0.8841	0.0582	0.0234*	0.8320
NER	0.8964	1	0.9377	0.8488	0.8379	0.7798	0.7225
INF	0.4938	0.5777	1	0.3468	0.2377	0.8717	0.6314
PLR	0.0866	0.6514	0.0492*	1	0.4204	0.8223	0.6827
NER	0.7303	0.6918	0.6166	0.5121	1	0.5318	0.6694
GCE	0.2094	0.0734	0.1989	0.6359	0.0062**	1	0.2923
CPS	0.9407	0.5113	0.1368	0.2951	0.1715	0.0046**	1

Source: Authors Construct using CBN 2017 Bulletin
* Significant at 5% and ** significant at 1%

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Table 8 exchange rate granger causes real GDP as the probability value is 0.0160 which rejects the null hypothesis of no short run causality but real GDP does not granger causes exchange rate as the result fails to reject the null hypothesis of no causality given that the probability value is 0.8964. Other results from the causality test show that exchange rate granger causes government capital expenditure while inflation granger causes prime lending rate and also, government capital expenditure granger causes credit to private sector.

CONCLUSION AND RECOMMENDATIONS

The study established disparity in the relationship between exchange rate in regulated and deregulated eras; an inverse (negative) relationship between exchange rate and aggregate real output was established in the regulated period while a direct(positive) and significant relationship was established in guided deregulated era. The implication is that exchange rate hampered real output performance in regulated exchange regime but spurred the performance during the guided deregulation period. This established empirically that the choice of exchange rate regime is important to the success of government effort to revamp the Nigerian real economy. This finding is in line with Huang and Malhorta (2004); Obi et al (2016) and Falana (2018) that exchange regime adopted matters for economic growth in developing economies. However, the finding negates the view in Eze and Okpala (2014) that exchange regime does not matter. Also, the study affirmed a unidirectional causality from nominal exchange rate to real gross output in Nigeria while finding no evidence of two-way (bidirectional) causality. This implied that nominal exchange rate had influenced real output performance in Nigeria and not other way round during the period under study.

The results of this study reaffirm the need by Nigeria monetary policy maker to reassess the current guided deregulation with the intention of strengthening the controls and interventions to make it more effective and impact positively on the real sector of the economy. Large scale agricultural activities should be encouraged by government so as to increase the gross domestic product and employment within the country. This will also increase local sourcing of raw materials and input for the industries, strengthen the link between agriculture and the industrial sectors, and consequently reducing pressure on exchange rate that usually arise from sourcing for such raw materials and inputs from abroad. Government should encourage domestic production through industrialization and also providing enabling environment that would promote investment and invariably stimulate export and relax pressure on the exchange rate. Adequate attention should be focused on optimal choice of exchange rate systems and consistency of the exchange rate policy framework. As policy conclusions are concerned, the government should embrace a broad programme of economic reform and diversification to complement exchange rate management efforts. The performance of the real sector should be improved through proactive programmes to enhance exports, create employment and reduce poverty, while cutting non-productive imports, attracting foreign private investment and implementing coordinated macroeconomic policies that stimulate exchange rate stability and spur economic growth.

The findings of this study could be a great deal of interest to other developing countries that share similar development conditions with Nigeria and are desirous of achieving real sector revitalization through exchange rate policy transformation. This would only happen when they see the positive effects of the findings on Nigerian economy. Finding of this study add to the existing body of literature in terms of the relationship between the two variables. A similar study can be conducted in the future based on cross – country analysis.

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