IMPACT OF EXCHANGE RATE ON ECONOMIC GROWTH IN NIGERIA (1981-2016): AN ARDL APPROACH

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Abstract

The study assessed empirically the impact of exchange rate on economic growth in Nigeria from 1981 to 2016. Data on GDP, Exchange rate, inflation rate, interest rate, foreign direct investment (FDI), imports, exports, trade openness, final consumption expenditure (FCE) and government expenditure were obtained from the various issues of the Central Bank of Nigeria Statistical Bulletin. Data series were tested for stationarity with the aid of the ADF test. Bound test was conducted and the model was estimated within the ARDL framework supported by the relevant post estimation diagnostic tests. The bound test revealed that there was long run relationship among variables in the model. Model estimation revealed that import, lag of trade openness, FDI, lag of exchange rate, interest rate and inflation significantly affected economic growth in the short run. In the long run, economic growth was affected by trade openness, FDI, exchange rate, government expenditure and interest rate. It was concluded that the present year exchange rate did not affect economic growth in the short run but its one year lag did while exchange rate had negative effect on economic growth in the long run. In order to achieve growth in the economy, effective exchange rate management system alongside expansionary fiscal policy and encouragement of importation of capital goods are recommended.

Key words: exchange rate, economic growth, ARDL approach

A. Introduction

Money is anything that is generally acceptable as a means of payment for goods and services and repayment of debt in a country. Money generally has different functions which are; measure of value, store of value, unit of account and standard for deferred payment. Since money is the key to exchange i.e. facilitates exchange, the rate at which goods are exchanged for each other depends on the value of the money. Similarly, money is the determining factor of exchange between two countries which also depends on the value of each country’s currency. This is because the value of each currency differs depending on the economic situation of each country and other accompanying macroeconomic dynamics. The comparison of different currencies of different countries is needed because of exchange which takes place across international borders through trade.

Exchange rate can be defined as the price of one currency in terms of another. It can also be seen as a medium by which the prices of commodities in two different economies are connected together. Exchange rate also known as foreign exchange rate between two currencies is the rate at which one currency is exchanged for the other. It is also regarded as the value of one country’s currency in terms of another currency. According to Obansa, Okoroafor, Aluko & Millicent (2013), exchange rate determines the strength of external sector participation in the international trade. Exchange rate regime and interest rate remain important issues of discourse in international finance as well as in developing nations, with more economies embracing trade liberalization as a requisite for economic growth. Exchange rate can be seen as one of the important macroeconomic variables that a country uses to achieve its macroeconomic objectives of economic growth (e.g as being practiced by China, Japan and South Korea to stimulate export), reduction in unemployment level, price stability and increase in standard of living.

The argument of the traditional school is that exchange rate depreciation would promote trade balance, alleviate BOP difficulties and consequently expand output and employment, provided the Marshall–Lerner condition is met. The Marshall–Lerner condition
states that depreciation would lead to expansion in output if the sum of price elasticity of
demand for export and the price elasticity of demand for imports is greater than unity. The
mechanism behind these positive effects is to make export industries more competitive in
international markets, stimulate domestic production of tradable goods and induce domestic
industries to use more domestic inputs (Iyoboyi & Muftau, 2014).

A major goal of macroeconomic policy is rapid economic growth in a country. Economic
growth is measured in terms of persistent growth in national income which translates to
increase in the amount of goods and services produced in an economy. Growth is said to occur
when a country’s productive capacity is on the increase (Akpan, 2008). Production of goods
and services stimulates exports and sometimes requires imports (of raw materials) which in
turn involve transactions in foreign exchange (Oyovwi, 2012).

Jin (2008) showed that the implications of Nigeria’s over-dependence on export of oil is that
economy is highly prone to external shocks because in the event of any major fall in oil price
foreign exchange earnings will decline noticeably and there will be destabilizing effects on
exchange rate as there will not be enough stock of foreign currencies to defend the local
currency at the foreign exchange market. This major shift in relative prices (exchange rate)
would result in a corresponding shift in the allocation of domestic resources and possibly move
the economic structure away from the production of export goods (agriculture), and into
services sectors.

The structural adjustment programme (SAP) was adopted owing the unfavourable
economic situation in the 1980’s which made Nigeria to implement the devaluation policy. This
policy was adopted mainly to discourage imports and encourage exports by increasing the
nations’ productivity and income thereof but there has not been noticeable increase in export
since. The rate of exchange between the naira and US Dollar for example continues to rise and
imports continue to rise which was not the original motive of adopting and implementing the
devaluation policy.

Furthermore, according to Nwosu (2016), exchange rates that emerged after the
collapse of Bretton Wood System has been characterized by instability and this has raised
concern about its effects on economic growth. For instance, the naira to US Dollar exchange
rate was N4 in 1987 while the real GDP was about N204.8Billion. In 1995, it depreciated to N21
to one US Dollar while the real GDP was N281.4B. As at 2014, the exchange rate was N168 to one USD and the exchange rate depreciated to N365 in 2017.

In the light of the above, it is important to evolve a research whose aim is to investigate
the effect of exchange rate on economic growth in Nigeria as at present. This study bridge the
knowledge gap by answering the relevant research question of “how does exchange rate affects
economic growth in Nigeria” using most updated available data. Findings from the study is
expected to be useful for policy making aimed at achieving economic growth from the exchange
rate point of view.

B. Literature Review

Purchasing Power Parity (PPP)

Gustav Cassel, a great economist from Sweden developed the theory of exchange rates
known as purchasing power parity (PPP) in a series of post-World War I memoranda presented
to the League of Nations. The term PPP is applied to a number of related but quite different
ideas within international trade theory. The first interpretation of PPP is a strict one in which
some ratio of prices will exactly determine the equilibrium exchange rate. The second variant of
the theory claimed that relative price change is the only germane determinant of exchange
rates. The third and most general interpretation considered price change as the primary
deteminant of the exchange rate. It however gave allowance for some useful secondary
variables such as tariffs and other trade hindrances, capital flows, transport costs and
expectations. Cassel’s work actually espoused the third version. Majority of the criticisms by
authors such as Balassa (1964), Samuelson (1964) and Viner (1937) have been against the
narrow version while authors who believe in the theory such as Keynes (1924) and Yeager
(1958) argued for the intermediate or most general version as an explanation of exchange rate
behavior. In summary, there seems to be significant acceptance of relative price changes as an important factor in determining exchange rates.

The concept of purchasing power parity allows one to estimate what the exchange rate between two currencies would have to be in order for the exchange to be at par with the purchasing power of the two countries’ currencies. This emphasizes that the rate of exchange of currency between two economies will be determined by the purchasing power of the currency.

Observed deviations of the exchange rate from purchasing power parity are measured by deviations of the real exchange rate from its PPP value of 1. PPP exchange rates help to minimize misleading international comparisons that can arise with the use of market exchange rates. For example, suppose that two countries produce the same physical amounts of goods as each other in each of two different years. Since market exchange rates fluctuate substantially, when the GDP of one country measured in its own currency is converted to the other country’s currency using market exchange rates, one country might be inferred to have higher real GDP than the other country in one year but lower in the other; both of these inferences would fail to reflect the reality of their relative levels of production. But if one country’s GDP is converted into the other country’s currency using PPP exchange rates instead of observed market exchange rates, the false inference will not occur. The purchasing power parity exchange rate serves two main functions. PPP exchange rates can be useful for making comparisons between countries because they stay fairly constant. Second, over a period of time, exchange rates tend to move in the direction of the PPP exchange rate and there is some value to which direction the exchange rate is more likely to shift over the long run.

**The Traditional Flow Model**

*Augustus (2003)* posits that the traditional flow model views exchange rate as the product of the interaction between the demand for and supply of foreign exchange. In this model, the exchange rate is in equilibrium when supply equals demand for foreign exchange (*Olisadebe, 1991*). The exchange rate adjusts to balances; the demand for foreign exchange depends on the demand domestic residents have for domestic goods and assets.

**The Monetary Approach**

The monetary approach happens to be one of the oldest approaches to determine the exchange rate. It is also used as a yardstick to compare the other approaches to determine exchange rate. The monetary model assumes a simple demand for money curve. The monetary model also assumes a vertical aggregate supply curve. A vertical aggregate supply curve does not imply constancy in the output but a flexible price. It identifies exchange rate as a function of relative shift in money stock, inflation rate as a proxy and domestic output between an economy and a trading partner economy. It is important to know that the Purchasing Power Parity (PPP) is a major component of the monetary approach. The monetary approach is a recent development in the theory of exchange rate determination. It views the exchange rate as being the relative prices of two asset (national monies) and it is determined primarily by the relative supplies of and demand for those monies and that the equilibrium exchange rate is attained when the existing stocks of the two monies are willingly held (*Gbosi, 2003*). It therefore argues that a theory of exchange rate should be stated conveniently in terms of the supplies of and demands for these monies.

**Exchange Rate Policy in Nigeria.**

A country can adopt any policy or mechanism by which she manages her exchange rate. Any policy adopted is geared towards achieving the macroeconomic objectives of a nation. Exchange rate directly or indirectly affects all the macroeconomic objectives but the degrees differ. By convention, there is a relationship between exchange rate and prices and/ or prices of goods traded among nations i.e. price of imports and exports; therefore, every nation seeks to adopt a reasonable exchange rate policy that will help her attain its objectives especially in the aspect of price stability. *Obadan (2007)* stated that the choice of an exchange rate regime coupled with the right level of the exchange rate tends to be perhaps the most important decision in an open economy due to the fact that the impact of exchange rate on economic
performance, the wealth of citizens, resource allocation, income distribution, standard of living, balance of payment and some other economic aggregate.

There are two major classifications of exchange rate systems which can be adopted by a country: These are the fixed exchange rate system and a floating exchange rate system.

A fixed exchange rate system or regime is a system by which the price of a domestic currency with respect to other currency is predetermined by the monetary authorities (Central Bank of Nigeria in this case). It can also be known as a regime by which the amount of a foreign currency (Dollar for instance) needed to get a domestic currency (the naira) or vice versa is fixed by the monetary authority who is usually saddled with such responsibility. Fixed exchange rate system has a number of advantages which include avoidance of upward and downward movements (fluctuations); encouragement of investment and control of inflation especially in an importing country like Nigeria.

A floating exchange rate system is one in which the monetary authority does not determine the price of the domestic currency. This is a regime in which the market forces of demand and supply determine the rate at which currencies are exchanged. The greatest advantage of this system is the monetary policy independence. However, the authorities make policies that influence the domestic interest rates and inflation. The disadvantages of the freely floating regime have been documented. These include persistent exchange rate volatility, high transaction cost and inflation.

Fapetu, and Oloyede (2014) examined foreign exchange management and the Nigeria economic growth and revealed that managing the economy’s foreign exchange rate does affect most economic variables, which in turn affects growth in the economy. In the same vein, Eze and Okpala (2014) after a study on the quantitative analysis of the impact of exchange rate policies on Nigeria’s economic growth asserted that exchange rate regime, neither fixed nor flexible matters in determining economic growth but what was important was the effectiveness of the management of the policy(s).

Economic Growth

Economic growth in simple terms can be defined as the increase in the productivity or in the productive capacity of a country. There are many or diverse ways of measuring growth of an economy, the commonly used is gross domestic product (GDP). Others include per capita income e.t.c. Hence, growth can be defined as the rise in the gross domestic product or an increase in the per capita income. In other words, it can be referred to as the increase in the productive capacity of a country. Gross domestic product can be defined as the market value of all goods and services produced within a country usually a year. It can be measured as:

\[ C + I + G + (X - M) \]

where:

- \( C \) = Consumption or consumer spending,
- \( I \) = Investment
- \( G \) = Government spending
- \( (X - M) \) = Exports minus imports, or net exports.

Review of Some Previous Studies

Economic growth is usually measured as persistent growth in national income which results into increase in the amount of goods and services produced in an economy. The said production of goods and services involve exports and imports which in turn involves transaction in foreign currency. It is noteworthy that exchange rate is at the middle of the whole process playing a pivotal role. Obadan (2007) stated that the choice of an exchange rate regime coupled with the right level of the exchange rate tends to be perhaps the most critical decision in an open economy because of the impact of the exchange rate on economic performance, resource allocation, the wealth of citizens, standard of living, income distribution, the balance of payment and other economic aggregate. Several studies have assessed the relationships between exchange rate and economic growth. The results from these studies have been as diverse as the number of the said studies. For instance, Adeniran (2014) reported that there was no significant relationship between exchange rate and economic growth in Nigeria. This emanated from a study covering the period from 1986 to 2013 which was analyzed using the ordinary least square (OLS) regression.
Nwosu (2016) examined the impact of exchange rate volatility on economic growth in Nigeria between the periods of 1987 to 2014. The study reported that volatility in exchange rate imparted negatively on economic growth in Nigeria. Amassoma and Adeniyi (2016) assessed the nexus between exchange rate variation and economic growth in Nigeria. The study covered the period between 1970 and 2013 and reported that exchange rate fluctuation did not have any significant effect on economic growth both in the short and the long-run based on the result of the error correction model estimation. Obi et al., (2016) also investigated the relationship between exchange rate regimes and economic growth in Nigeria using data from 1970 to 2014. Based on the results obtained from a Generalized Method of Moment (GMM), the study concluded that fixed exchange rate constrained economic growth while it was established that exchange regimes indeed mattered in real economic performance in Nigeria because the study's result revealed that deregulated exchange rate regimes enhanced economic growth.

The study of Azeez, Dada Aluko (2014) established that exchange rate volatility had significant and positive relationship with macro-economic performance both in the long and short run. Due to exchange rate volatility, investor utilize the opportunity of an appreciating Naira to imports required capital and technology. Danmola (2013) analysed the impact of exchange rate volatility on the macro-economic variables in Nigeria and reported a positive influence of exchange rate volatility on Gross Domestic Product.

A study was carried out on the effect of exchange rate movement on economic growth in Nigeria by Akpan and Atan (2012). The study adopted a GMM approach to analyze a simultaneous equation model within a fully specified but small macroeconomic model, and, it was reported that exchange rate movement did not significantly affect economic growth in Nigeria. Ismaila (2016) carried out a study aimed at assessing the relationship between exchange rate depreciation and Nigeria economic performance after the Structural Adjustment Programme (SAP). The study reported that exchange rate did not have any robust effect on economic growth in Nigeria. Furthermore, Okorontah and Odoemena (2016) assessed effects of exchange rate fluctuations on economic growth of Nigeria. The study adopted annual data covering the period 1986 to 2012 and employed the ordinary least square (OLS) technique, the Johansson co-integration test and the error correction mechanism (ECM). It was reported that there was no strong relationship between exchange rate and economic growth in Nigeria. However, Khondker (2012) reported a positive relationship between exchange rate depreciation and economic growth in Bangladesh. It was reported that a 10 percent depreciation in exchange rate resulted in 3.2 percent increase in economic growth. Though, majority of the studies reported a negative relationship between exchange rate and economic growth, some reported positive relationship while some reported no significant relationship. This diversity actually warrant further studies.

C. Methodology

Theoretical Framework

The study was based on the Keynesian model of an open economy which states that aggregate output (Y) equals aggregate consumption (C) plus investment (I) plus government expenditure plus (G) plus net income from abroad which is the difference between export and import of goods and services in the economy i.e. (X-M).

\[ Y = C + I + G + (X-M) \]
\[ Y = C + I + G + X - M \] ...........................(1)

From economic theory it is widely known that exchange rate affects some of the variables in the model, for instance, exchange rate devaluation affects exports, imports and investment in the economy. The present study included other variables believed to be relevant to economic growth.

Method of Data Analyses

(a) Pre-estimation

(i) Descriptive Statistics: Descriptive analyses of all the study variables was carried out. These included mean, median, maximum, range, standard deviations, skewness test,
normality test e.t.c. In addition graphical illustration of the study variables were also carried out.

(ii) **Unit Root test:** This is necessary in order to examine whether the series had constant mean and variances over time (i.e. whether they were stationary or not). If a series is stationary, such a series will be predictable, stable over time and it could be used for meaningful analyses and forecast with high predictive power. Therefore the stationarity of the series were assessed with the aid of Augmented Dickey-Fuller (ADF) test.

(iii) **Co-integration test:** The presence of long run relationship among the variables in the model otherwise referred to as cointegration of variables was assessed with the aid of the ARDL Bound test. The choice of the ARDL bound test technique to assess co-integration was based on the result obtained from the unit root test. Since the series were not integrated of the same order, the Engle-Granger co-integration test approach became inapplicable. Hence, the choice of the Auto-Regressive Distributed Lag Bounds Co-integration Test (Bound Testing Approach) became important and relevant.

(b) **The Empirical Model**

\[
\text{GDP} = (\text{EXR, INF, INT, FDI, TO, FCE, GEXP, IMP, EXP})
\]

The static econometric form of the model by double logging can be specified as:

\[
\ln \text{GDP}_t = \lambda_0 + \lambda_1 \ln \text{EXR}_t + \lambda_2 \ln \text{INF}_t + \lambda_3 \ln \text{INT}_t + \lambda_4 \ln \text{FDI}_t + \lambda_5 \ln \text{TO}_t + \lambda_6 \ln \text{FCE}_t + \\
\lambda_7 \ln \text{IMP}_t + \lambda_8 \ln \text{EXP}_t + \lambda_9 \ln \text{GEXP}_t + \mu_t
\]

**Apriori Expectation**

\( \lambda_1 < 0 \) or \( > 0 \), \( \lambda_2 < 0 \) or \( > 0 \), \( \lambda_3 < 0 \), \( \lambda_4 > 0 \), \( \lambda_5 > 0 \), \( \lambda_6 > 0 \), \( \lambda_7 > 0 \) or \( < 0 \), \( \lambda_8 > 0 \) and \( \lambda_9 > 0 \)

**Estimation Technique:** The model was estimated based upon the result obtained from the unit root and the co-integration test. Since the series were integrated of different order i.e I(0) and I(1), Autoregressive Distributed Model (ARDL) estimation procedure was adopted and it is stated as:

\[
\Delta \text{GDP}_t = \alpha + \mu \text{TREND} + \sum_{m=1}^{M} \theta_m \Delta \text{GDP}_{t-m} + \sum_{j=0}^{I} \theta_j \Delta \text{EXR}_{t-j} + \sum_{r=0}^{R} \theta_r \Delta \text{INF}_{t-r} \\
+ \sum_{p=0}^{P} \phi_p \Delta \text{INT}_{t-p} + \sum_{q=0}^{Q} \delta_q \Delta \text{FDI}_{t-q} \\
+ \sum_{i=1}^{I} \epsilon_i \Delta \text{TO}_{t-i-1} + \sum_{i=0}^{I} \pi d \Delta \text{FCE}_{t-d} + \sum_{b=0}^{B} \omega_b \Delta \text{IMP}_{t-b} + \sum_{a=0}^{A} \gamma_a \Delta \text{EXP}_{t-a} \\
+ \sum_{s=0}^{S} \tau_s \Delta \text{GEXP}_{t-s} + \lambda_1 \text{EXR}_t + \lambda_2 \text{INF}_t + \lambda_3 \text{INT}_t + \lambda_4 \text{FDI}_t + \lambda_5 \text{TO}_t + \lambda_6 \text{FCE}_t \\
+ \lambda_7 \text{IMP}_t + \lambda_8 \text{EXP}_t + \lambda_9 \text{GEXP}_t + \text{E}_t
\]

The short-run and the long-run models were generated.

Where:

- **GDP** = Gross Domestic Product (Naira value)
- **EXR** = Exchange rate of the naira to the US Dollar.
- **FCE** = Final Consumption Expenditure (in Naira).
- **IMP** = Imports (Naira value of import per year)
- **EXP** = Exports (Naira value of total export per year)
- **INF** = Inflation rate (Measure in percentage)
- **FDI** = Foreign Direct Investment per year (Naira Value)
- **TO** = Trade Openness (as the ratio of total import and export to GDP)
- **GEXP** = Government expenditure (in Naira)
- **LN** = Natural Logarithm
- **t** = time
- **µ** = Error term
- **λ₀** = Constant term
\[ \lambda_1 - \lambda_{10} = \text{Slope coefficients.} \]

**Data Sources:** Data used in the study were sourced from the various issues of the Central Bank of Nigeria statistical bulletin.

**Post-Estimation Analysis**

As a follow-up to the main analyses, it was necessary to assess the validity of the estimated model and to determine whether some basic assumptions have been violated or not. Therefore, relevant tests examined under this section included the test for linearity using the Ramsey RESET test, test for normality of distribution of residual using Jarque-Bera test, heteroskedasticity using the ARCH-LM test and test for serial correlation using the Breusch-Godfrey test.

**D. Results and Discussion**

**Description of Study Variables**

Table 1 shows the descriptive statistics of the study variable. It presents the mean, median, standard deviation and other relevant statistics related to the distribution of the series. These included the skewness, kurtosis, and Jaque-Bera test statistic.

It was revealed that all the series in the study were positively skewed. The kurtosis analyses which shows the degree of peakedness revealed that only export, FDI and interest rate were mesokurtic in nature as their values were approximately three (3). Other variables were platykurtic in distribution as their values were lower than 3. The Jaque-Bera test of the normality of the series distribution utilizes information from both skewness and kurtosis. The results showed that export, FDI and government expenditure were not normally distributed while other variables were confirmed to be normally distributed.

**Table 1: Descriptive Statistics of Study Variables**

<table>
<thead>
<tr>
<th></th>
<th>EXP</th>
<th>EXR</th>
<th>FCE</th>
<th>FDI</th>
<th>GDP</th>
<th>GEXP</th>
<th>IMP</th>
<th>INF</th>
<th>INT</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.48E+10</td>
<td>73.13</td>
<td>7.09E+10</td>
<td>5467</td>
<td>0.63</td>
<td>493.236</td>
<td>1541.0</td>
<td>2.00E+10</td>
<td>73.58</td>
<td>11.71</td>
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<tr>
<td>Median</td>
<td>2.54E+10</td>
<td>57.37</td>
<td>4.49E+10</td>
<td>1819.71</td>
<td>390.78</td>
<td>594.09</td>
<td>1.44E+10</td>
<td>63.56</td>
<td>10.40</td>
<td>5.37</td>
</tr>
<tr>
<td>Maximum</td>
<td>8.08E+10</td>
<td>161.31</td>
<td>1.66E+11</td>
<td>2409.945</td>
<td>991.112</td>
<td>5185.3</td>
<td>4.92E+10</td>
<td>215.99</td>
<td>23.60</td>
<td>30.05</td>
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<tr>
<td>Minimum</td>
<td>1.62E+10</td>
<td>0.61</td>
<td>2.60E+10</td>
<td>22.23</td>
<td>227.25</td>
<td>9.64</td>
<td>4.31E+09</td>
<td>1.03</td>
<td>5.50</td>
<td>0.06</td>
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<tr>
<td>Std. Dev.</td>
<td>2.02E+10</td>
<td>65.59</td>
<td>4.39E+10</td>
<td>8686.95</td>
<td>246.297</td>
<td>1879.6</td>
<td>1.40E+10</td>
<td>65.22</td>
<td>4.35</td>
<td>10.11</td>
</tr>
<tr>
<td>Skewness</td>
<td>1.24</td>
<td>0.11</td>
<td>0.84</td>
<td>1.26</td>
<td>0.85</td>
<td>0.97</td>
<td>0.74</td>
<td>0.37</td>
<td>0.86</td>
<td>0.61</td>
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<tr>
<td>Kurtosis</td>
<td>3.22</td>
<td>1.21</td>
<td>2.24</td>
<td>2.91</td>
<td>2.40</td>
<td>2.35</td>
<td>2.17</td>
<td>1.90</td>
<td>3.26</td>
<td>1.80</td>
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<tr>
<td>Jarque-Bera</td>
<td>9.32</td>
<td>4.89</td>
<td>5.13</td>
<td>9.49</td>
<td>4.95</td>
<td>6.26</td>
<td>4.36</td>
<td>2.65</td>
<td>4.52</td>
<td>4.38</td>
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<td>Probability</td>
<td>0.01</td>
<td>0.09</td>
<td>0.08</td>
<td>0.01</td>
<td>0.08</td>
<td>0.04</td>
<td>0.11</td>
<td>0.27</td>
<td>0.10</td>
<td>0.11</td>
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<tr>
<td>Sum</td>
<td>1.25E+12</td>
<td>2632.65</td>
<td>2.55E+12</td>
<td>1968.143</td>
<td>17756.30</td>
<td>55478.07</td>
<td>7.19E+11</td>
<td>2648.89</td>
<td>421.711</td>
<td>348.6</td>
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<td>Sum Sq. Dev.</td>
<td>1.43E+22</td>
<td>1505.617</td>
<td>6.75E+22</td>
<td>2.63E+11</td>
<td>21231.93</td>
<td>1.24E+08</td>
<td>6.87E+21</td>
<td>14889.0</td>
<td>663.2620</td>
<td>3576.20</td>
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<td>Observations</td>
<td>36</td>
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</table>

Source: Author’s computation, 2018.
Trends of the Study Variables
Figure 1 presents the graphical illustration of the various series in the study. Most of the series have been rising steadily with noticeable fluctuation overtime except for interest rate which started rising from 1981 reaching its maximum of about 24 percent in 1993 and had since fallen and has been fluctuating between 10 and 15 percent till date. The observed general upward trend of most of the series is not surprising as most economic variables tend to move together in the same direction depending on the nature of their relationships as background economic situations change.

Figure 1: Graphical illustration of study variables

Stationarity of the Study Variables
The series stationarity was examined with the aid of the ADF test. Non-stationary time series is known to produce spurious regression which may lead to faulty estimation, forecasting and ultimately policy recommendation and formulation. Hence, the need to know whether or not study series were stationary. All the variables except export were not stationary at level but became stationary after first differencing. They are therefore integrated of order one i.e I(1) except export and import which were stationary at level i.e I(0) as presented in Table 2.

Table 2: Results of Augmented Dickey-Fuller Test for Stationarity of Study Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>Intercept</th>
<th>Int&amp;Trend</th>
<th>First Difference</th>
<th>Int&amp;Trend</th>
<th>I(d)</th>
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</tr>
<tr>
<td>LGDP</td>
<td>2.9863</td>
<td>0.4005</td>
<td>-2.6810</td>
<td>-1.908*</td>
<td>-3.922***</td>
<td>-3.916***</td>
</tr>
<tr>
<td>LEXP</td>
<td>1.7954</td>
<td>-3.4466*</td>
<td>-3.95***</td>
<td>-4.733***</td>
<td>-5.52***</td>
<td>I(1)</td>
</tr>
<tr>
<td>LEXR</td>
<td>1.4587</td>
<td>-2.2232</td>
<td>-0.834</td>
<td>-4.10***</td>
<td>-4.93***</td>
<td>-5.52***</td>
</tr>
<tr>
<td>LFCE</td>
<td>1.7796</td>
<td>0.5827</td>
<td>-2.8205</td>
<td>-6.18**</td>
<td>-6.61***</td>
<td>-7.13***</td>
</tr>
<tr>
<td>LFDI</td>
<td>0.2679</td>
<td>-1.177</td>
<td>-1.7987</td>
<td>6.264***</td>
<td>-6.285***</td>
<td>-6.216***</td>
</tr>
<tr>
<td>LGEXP</td>
<td>-0.3835</td>
<td>-1.5278</td>
<td>0.2477</td>
<td>-0.6413</td>
<td>-1.8535</td>
<td>-4.5879***</td>
</tr>
<tr>
<td>LIMP</td>
<td>0.0482</td>
<td>-1.1224</td>
<td>-3.482*</td>
<td>-6.407***</td>
<td>-6.305***</td>
<td>I(1)</td>
</tr>
<tr>
<td>INF</td>
<td>0.2165</td>
<td>-0.9534</td>
<td>-2.3181</td>
<td>-6.231***</td>
<td>-6.407***</td>
<td>-6.305***</td>
</tr>
<tr>
<td>TOT</td>
<td>1.0837</td>
<td>-0.1950</td>
<td>-2.1950</td>
<td>-5.556***</td>
<td>-6.038***</td>
<td>-6.004***</td>
</tr>
</tbody>
</table>
Lag Length Selection
In order to determine the appropriate lag-length for the ARDL model estimated, a lag length selection criteria test was performed. The Akaike Information Criteria (AIC) which penalizes heavily for over-parameterization was followed in selecting the appropriate lag-length (Table 3). The test revealed that a lag length of 2 was the most appropriate.

Table 3: Lag Length Selection Criteria

<table>
<thead>
<tr>
<th>Lag</th>
<th>LogL</th>
<th>LR</th>
<th>FPE</th>
<th>AIC</th>
<th>SC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-368.1197</td>
<td>NA</td>
<td>0.002163</td>
<td>22.24234</td>
<td>22.69127</td>
<td>22.39543</td>
</tr>
<tr>
<td>1</td>
<td>-100.8112</td>
<td>361.6526*</td>
<td>1.46e-07</td>
<td>12.40066</td>
<td>17.33889*</td>
<td>14.08474</td>
</tr>
<tr>
<td>2</td>
<td>57.47164</td>
<td>121.0398</td>
<td>2.96e-08*</td>
<td>8.972257*</td>
<td>18.39978</td>
<td>12.18731*</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion

Long Run Cointegration (Bound Test)
The ARDL Bound test for the presence of long run cointegration among the study variables was performed (Table 4). The F-statistic value of 6.38 which was greater than the upper bound value of 4.24 at 1 percent level implied the presence of long run cointegration among the variables.

Table 4: Result of ARDL Bound Test for Long Run Cointegration

<table>
<thead>
<tr>
<th>Source:</th>
<th>Test Statistic</th>
<th>Bound Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-Statistic</td>
<td>6.38</td>
<td></td>
</tr>
</tbody>
</table>

Critical Test Bounds

<table>
<thead>
<tr>
<th>Significance Levels</th>
<th>Lower Bound I(0)</th>
<th>Upper Bound I(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>2.97</td>
<td>4.24</td>
</tr>
<tr>
<td>2.5%</td>
<td>2.67</td>
<td>3.87</td>
</tr>
<tr>
<td>5%</td>
<td>2.43</td>
<td>3.56</td>
</tr>
<tr>
<td>10%</td>
<td>2.16</td>
<td>3.24</td>
</tr>
</tbody>
</table>

Author's Computation, 2018
Short Run Relationship
Table 5 shows the results of the estimated short run model of the impact of exchange rate and other macroeconomic variables on economic growth. Exchange rate serves as a major link between a country's economy (especially through trade) with the outside world or other countries. The result showed that lagged series of exchange rate (α = 0.1), one year lag of import (α = 0.05), lag of Trade Openess (α = 0.05), final consumption expenditure (α = 0.1), inflation rate (α = 0.05), interest rate (α = 0.05) and time trend (α = 0.05) significantly affected economic growth in the short run in Nigeria.

The present study results revealed that the current year exchange rate did not significantly affect economic growth. However, lagged series of exchange rate (α = 0.1) had positive and significant effect on economic growth. A one percent increase in exchange rate in the previous year resulted in 0.04 percent increase in economic growth in the present year.
This finding is in favour of devaluation as means of stimulating economic growth. This may be achieved through aggressive encouragement of export which may eventually enhance economic growth. The finding in this study ran contrary to that of Okorontah (2016) who found no significant relationship between exchange rate and economic growth. However, the effect of lagged exchange rate was not reported in the study for proper comparison. Lawal (2016) also reported no significant relationship between exchange rate fluctuations and economic growth in Nigeria.

Lag of import came up with a positive sign and a coefficient value of 0.06. This implied that one percent increase in import in the previous year increased economic growth by 0.06 percent in the present year. This is usually the case in a situation where majority of importations are on capital goods. Such good like equipment and machineries are engaged in production and services in the subsequent years. This finding corroborated that of Azeez et al., (2014) who also reported a positive relationship between import and economic growth in Nigeria after a study covering the period from 2000 to 2012. Adesuyi and Odeloye (2013) also reported a positive relationship between non-oil import and economic growth in Nigeria.

Trade openness is the ratio of the addition of import and export to GDP. The lag of trade openness had significant and negative effect on GDP. Contrastingly, current year value of trade openness had positive but non-significant effect. Nduka (2013) reported a positive relationship between trade openness and economic growth in Nigeria. It should however be noted that the present year trade openness did not have significant effect on economic growth in this study. Furthermore, in the shorth run, final consumption expenditure positively affect economic growth. One percent increase in final consumption expenditure resulted in 0.16 percent increase in economic growth.

Inflation was found to have significant and negative effect on economic growth in this study. The negative effect of inflation on the economy is contrary to theory and this might be due to the very high inflation rate experienced in the country which might have been beyond the acceptable threshold to enhance noticeable economic growth. The negative relationship between inflation and economic growth reported in this study is in line with the assertion of Hossain et al., (2012) that high inflation is bad for the economy. Interest rate was found to be significant and have positive (though, small) effect on economic growth in the short run. This corroborates the finding of Maiga (2017).

The trend variable was found to be positive and significant which indicated that economic growth has been trending upward overtime. The coefficient of the error correction term fulfilled the three conditions for the existence of long run cointegration relationship in the model. These are being less than one, negative and significant. The error correction term value of -0.68 significant at 1 percent implied that 68 percent of the disequilibrium in the system due to external shock in the previous year is restored back in the current year. In effect, it takes less than two (2) years for the system to restore back unto its long run equilibrium path in the event of any disequilibrium due to an external shock on the system.

Table 5: Short Run Model Result

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>D(LGEXP)</td>
<td>-0.0167</td>
<td>-0.8751</td>
<td>0.4020</td>
</tr>
<tr>
<td>D(LIMP)</td>
<td>0.0178</td>
<td>0.5882</td>
<td>0.5694</td>
</tr>
<tr>
<td>D(LIMP(-1))</td>
<td>0.0602**</td>
<td>3.1142</td>
<td>0.0110</td>
</tr>
<tr>
<td>D(TO)</td>
<td>0.0015</td>
<td>0.4738</td>
<td>0.6458</td>
</tr>
<tr>
<td>D(TO(-1))</td>
<td>-0.0058**</td>
<td>-2.2723</td>
<td>0.0464</td>
</tr>
<tr>
<td>D(LFDI)</td>
<td>-0.0061</td>
<td>-1.2020</td>
<td>0.2570</td>
</tr>
<tr>
<td>D(LFDI(-1))</td>
<td>-0.0029</td>
<td>-0.9411</td>
<td>0.3688</td>
</tr>
<tr>
<td>D(LFCE)</td>
<td>0.1629*</td>
<td>1.8760</td>
<td>0.0901</td>
</tr>
<tr>
<td>D(LEXR)</td>
<td>0.0039</td>
<td>0.2198</td>
<td>0.8304</td>
</tr>
<tr>
<td>D(LEXR(-1))</td>
<td>0.0431*</td>
<td>2.1287</td>
<td>0.0591</td>
</tr>
<tr>
<td>D(LEXP)</td>
<td>0.0559</td>
<td>1.5483</td>
<td>0.1526</td>
</tr>
</tbody>
</table>
Results of the Long Run Model

The long run analysis results revealed that trade openness in line with *a priori* expectation had positive and significant effect on economic growth. This is contrary to the negative effect in the short run. It may be that the positive effect of trade openness took some time to manifest. The positive relationship is in line with the findings of Nduka (2013).

Surprisingly, FDI had negative effect on economic growth in the long run while exchange rate had negative relationship with economic growth in the long run. Government expenditure was found to be significant (at 10 percent) and had positive effect on economic growth. Government expenditure has the potential of significantly initiating improvement in GDP especially with expansionary fiscal policy. In the same vein, the significance and the positive sign of the trend variable coefficient revealed that economic growth has been trending positively over time (Table 6).

Table 6: Result of the Static (Long run) Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGEXP</td>
<td>-0.0242</td>
<td>-0.8881</td>
<td>0.3953</td>
</tr>
<tr>
<td>LIMP</td>
<td>-0.0885</td>
<td>-1.4120</td>
<td>0.1883</td>
</tr>
<tr>
<td>TO</td>
<td>0.0226**</td>
<td>2.9901</td>
<td>0.0136</td>
</tr>
<tr>
<td>LFDI</td>
<td>-0.0229*</td>
<td>-1.8444</td>
<td>0.0949</td>
</tr>
<tr>
<td>LFCE</td>
<td>0.2369</td>
<td>1.6672</td>
<td>0.1264</td>
</tr>
<tr>
<td>LEXP</td>
<td>-0.0589*</td>
<td>-2.0989</td>
<td>0.0622</td>
</tr>
<tr>
<td>LEXP</td>
<td>0.1522*</td>
<td>2.1892</td>
<td>0.0534</td>
</tr>
<tr>
<td>INF</td>
<td>-0.0002</td>
<td>-0.6204</td>
<td>0.5488</td>
</tr>
<tr>
<td>INT</td>
<td>0.0203**</td>
<td>3.1543</td>
<td>0.0103</td>
</tr>
<tr>
<td>C</td>
<td>-1.8953</td>
<td>-0.5757</td>
<td>0.5775</td>
</tr>
<tr>
<td>@TREND</td>
<td>0.0344***</td>
<td>4.6480</td>
<td>0.0009</td>
</tr>
</tbody>
</table>

***Significant at 1%, **Significant at 5% and *significant at 10%

Source: Authors’ computation, 2018

Post Estimation Diagnoses

Table 7 shows the results of the post estimation analyses. The ARCH-LM test was used to test for the presence of heteroscedasticity in the estimated model. Given the probability level which was more than the acceptable level of 5 percent the null hypothesis of “no heteroscedasticity” could not be rejected. Hence, it was concluded that the model was homoscedastic. The Jaque-Berra test for the normality of the residual revealed that the residuals were normally distributed. The residual of the estimated model was free from serially correlation (autocorrelation) considering the results of the Breusch-Godfrey test. The Ramsey-RESET test was carried out to examine the linearity of the model or to confirm if the model was well specified. The high probability level implied that the null hypothesis of linearity of the model could not be rejected. Hence, it was confirmed that the model estimated was had constant variance, normally distributed, free from autocorrelation and well specified (Table 7).

Table 7: Post Estimation Diagnosis Results

<table>
<thead>
<tr>
<th>Econometric Problem</th>
<th>Test Procedure</th>
<th>Statistics (Probability)</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heteroscedasticity</td>
<td>ARCH-LM</td>
<td>0.6374 (0.4246)</td>
<td>No heteroscedaticity in the model</td>
</tr>
</tbody>
</table>
Normality Jarque-Bera 1.230 (0.5401) Residual Normally Distributed
Autocorrelation Breusch-Godfrey LM 24.38 (0.8970) The is no autocorrelation in the model
Linearity Test Ramsey Reset 0.0024 (0.9667) The model is well specified

Note: Figures in parenthesis are probability values
Source: Author's computation, 2018

E. Conclusion and Recommendations

It was concluded that current year exchange rate did not have any significant effect on economic growth. However, the lag of the exchange rate did have significant effect in the short run. Meanwhile, exchange rate had significant and negative (but marginal) effect on economic growth in the long run. It may be concluded that exchange rate is not a major driver of economic growth in Nigeria in the short-run while exchange rate depreciation is expected to stimulate economic growth in the long-run as it takes some times before the effect of such devaluation on the economy begins to manifest. The implication of this is that exchange rate can be used to spur economic growth in Nigeria. Furthermore, import, lag of trade openness, final consumption expenditure, government expenditure and interest rate significantly drive the economy.

Based on the findings of this study, it was recommended that effective exchange rate management capable of enhancing economic growth should be adopted while the concerned authorities should open up the economy to beneficial foreign trade. In addition, sequel to the significance of government expenditure in the estimated model, expansionary fiscal policy may be adopted by the government in order to enhance the growth of the economy.

References


