

## **Exchange Rate Movement, Import Demand and Economic Growth: Evidence from Nigeria**

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**Abstract:** Exchange rate movement has been a key issue bedeviling developing economies which in turn have implication for imports to meet the diverse needs of the growing populace. In this regard, the study presents a comparative study on the empirical analysis of the impact of exchange rate movement and import demand on economic growth in Nigeria for the period 2003 to 2017. Applying the Autoregressive Distributed Lag (ARDL) framework, this paper uncovers the existence of both short run and long run relationship between exchange rate movements and import demand for Nigeria. In the short-run imports move towards their equilibrium when there is a disturbance. The results from the ARDL model show a negative ECM value suggesting that there exists long run relationship among the variables. The highly significant error correction terms show that following a shock, about 7% of the adjustment would be corrected back to the long run equilibrium on annual basis implying adjustment is slow in the process. The recommendation from the study is that, policymakers should give due attention to promoting policies that propel international trade. Pragmatic trade policies should be ensured to better regulatory and monitoring systems as it relates to tariffs, waivers, quota etc. that will keep a stable relationship with her trading partners for a sustained period.

**Keywords:** Exchange rate, Import demand, Economic Growth, Cointegration

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### **I. Introduction**

Economic growth remains a key issue of any society in the world and it is also a necessary condition for rapid economic development. In the literature, the nexus between exchange rate, import demand and economic growth have dominated empirical discussions for so many years. Development influences import demand, and movement in exchange rate which in turn affects economic growth (Iyoha and Okim, 2017).

Domestic investors are uncertain between committing resources to invest or not because variation in the exchange rate cannot be predicted. This in-turn has an effect on the level of importation into the country (Shehu, 2008; Oloba and Abogan, 2013). In view of this, developing countries making concerted effort to develop her industrial base, harness its foreign exchange market to enable domestic investors import relevant machineries, equipment and raw materials for industrial consumption (Abba, 2009).

One standard theoretical argument that emanates from the above is that exchange rate movement may hinder trade flows in the sense that exchange rate gyration creates uncertainty which impose costs on risk-averting economic agents (Isitua and Neville, 2006). Taking Nigeria, as a case in point, available data have shown that exchange rate has fluctuated widely since the breakdown of the Bretton Wood System in 1973 and more particularly after the implementation of the recent trade liberalization policy. Mckenzie (2009), noted that developing countries particularly those within the Sub-Saharan African region have witnessed wide gyration in exchange rate in modern times.

There have been so much controversies as to whether external trade, being one of the major components of the national income, is favourable or unfavourable. Developing countries survives majorly on export of primary products and import of manufactured goods. It is therefore expected that the movement in the exchange rate will have affected both the export and import components of trade.

Most empirical researches have focused solely on the export component of trade performance with minimal focus for import aspect of trade performance. The import aspect of trade flows is a vital component since economic theory stipulates that the Gross Domestic Product of an economy is an important determinant of import. So, evidences from the import side of trade flows can help a country not only ascertain domestic output but also make relevant policies that would put the economy on the path of growth. In view of this lopsided situation, the basic objective of the paper is to examine the effect of exchange rate movement, import demand and economic growth using Nigeria as a case study between the period 2003 and 2017.

The main objective of this paper is to examine the impact of exchange rate and import demand on economic growth in Nigeria. The sub-objectives are:

- (i) To investigate the impact of exchange rate on economic growth in Nigeria;
- (ii) To examine the impact of import demand on economic growth in Nigeria;

The hypotheses for this study include:

- (i) There is no relationship between exchange rate and economic growth in Nigeria;
- (ii) There is no relationship between import demand and economic growth in Nigeria;

The paper is justified based on the premise that developing economies have witnessed greater exchange rate movement in the last few years (Imimole, 2010). For instance, the global economic meltdown, which started during the last quarter of 2008 and lasted through to the second quarter of 2009, apparently did not aid the course of stabilizing the exchange rate in developing countries. Hence, it is imperative to embark on this study in a bid to uncover fresh evidences given this trend.

This study intends to cover the period 2003 to 2017. This period was chosen because it includes pre and post global economic recession of the last two decades which resulted in various financial and economic reforms that were introduced to revamp the ailing economy.

This paper is partitioned into six (6) sections. Section 1 presents an introduction and background of the study while section 2 discusses the macroeconomic performance of the Nigerian economy over the period under review. In section 3, we have the literature review: theoretical and empirical literature while section 4 presents the theoretical framework, specification of the model and econometric technique applied in the study. Section 5 presents and analyses the econometric results obtained post estimation while Section 6 concludes the study by presenting the summary of findings and recommendations.

## **II. Macroeconomic Performance of Nigeria**

A trend analysis is done below to review the macroeconomic performance of Nigeria.

**Table 2.1 Average GDP in Nigeria (2003 – 2017) in billions of constant 2010 US\$.**

Country	2003 – 2007		2008 – 2012		2013 – 2017	
	Exchange rate	Import demand	Exchange rate	Import demand	Exchange rate	Import demand
Nigeria	129.57	31.61	146.00	71.24	157.31	66.83

*Source: Author's computation from World Development Indicators (2018)*

A view of table 2.1 above clearly reveals an upward trend in average GDP in Nigeria within the period reviewed. It is observed that Nigeria reported an average per capita real GDP less than \$1000, which justifies their classification as low-income countries by the World Bank (Iyoha&Okim, 2017).

The general trend in GDP between 2003 and 2017 revealed that the Nigeria exhibited minimal reduction in the rate of economic growth in 2001 and 2009. This was attributed to a host of factors such as the global economic recession and its attendance effects between 2006 and 2008, policy somersault and political instability in some of these countries (WDI, 2018).

**Table 2.2 Averages share of Import Demand in billions of US\$ and Exchange Rate in LCU per US\$ (2003 – 2017)**

Country	2003 – 2007	2008 – 2012	2013 – 2017
Nigeria	257.51	358.53	451.84

*Source: Author's computation from World Development Indicators (2018)*

The above table shows the trend in exchange rate and import demand in Nigeria for the period 2003-2017. Exchange rate and import demand within the period under review generally trended upward. This could be attributed to high level of import demand owing to low level of domestic production. Essentially as a country's currency appreciates, imports tend to be more expensive. This speaks volume of the high import dependent nature of developing countries. Inspite of the rising exchange rates, imports increase so as to meet-up with the short fall in domestic production.

Overall, there has been a wide gyration of exchange rate during the period under review in Nigeria. The table reveals that exchange rate appreciated continuously as a result of the growth experienced until 2009 when financial crisis broke out, causing economic activities to be on a downward trend. The resultant effect was a depreciation of exchange rate in the following year (2010). Despite the rise in exchange rate, import demand continued to be on the rise. This clearly shows Nigeria is highly import dependent.

Within the period 2003-2012, demand for imports in Nigeria was driven by income. However, the period 2013-2017 experienced a decline in import demand. This could be attributed to implementation of trade policies that were targeted at controlling imports in the country (Oyovwi, 2012). For instance, in 2016, there was a ban on importation of textile, rice, etc., which are some of the main import item demanded by the country.

### **III. Literature Review**

This section presents a background to the theoretical investigation of exchange rate and import demand on economic growth and the relation between them. Theories of import demand posit that exchange rate plays an important role in improving the welfare of the citizenry. In lieu of this, trade can positively impact economic growth (Iyoha & Okim, 2017).

#### **3.1 Review of Theoretical Literature**

There is no gainsaying of the germane nature of theoretical models in forecasting and explaining exchange rate and import behaviour on growth. Below is presented two key theories that help to explain these causal relationships.

##### **3.1.1 Standard Import Demand Model**

This model assesses the impact of exchange rate fluctuations on imports. The standard imports model uses exchange rate, income and exchange rate volatility to predict imports (Tsen, 2014).

Caves, Frankel and Jones (1999) opine that import is inversely related to exchange rate and import prices. This is expressed by multiplying the local currency in foreign currency by the exchange rate.

Depreciation increases prices of imports which in-turn, reduces demand for imports. A major flaw of this model is that it excludes some major variables that influence demand for imports such as GDP, real effective exchange rate uncertainties, among others.

##### **3.1.2 The Marshall-Lerner condition**

The Marshall-Lerner condition theory is closely related to the J-curve theory of devaluation. The theory helps to explain the nexus between exchange rate of a country and trade balance.

The Marshall-Lerner condition theory posits that devaluation tends to bring an improvement in a country's balance of trade so long as a country's elasticity for imports plus foreign demand elasticity for exports exceeds one. The Marshall-Lerner condition basically states that the summation of a country's value of import (that is absolute values) and export elasticities should be equal or more than unity. In essence, if the percentage change in quantity supplied/demanded in response to a one percent change in price must be equal to one or greater, then depreciation is expected to move trade balance towards surplus. Bahmani-Oskooee (1985) opines that when the summation of the import and export demand elasticities is less than one in absolute value, then it is almost always associated with J-curve effects. According to Ziramba and Chifamba, (2014) the J-Curve explains the effect of exchange rate depreciation or devaluation on imports and exports which in turn affects the trade balance.

#### **3.2 Empirical Literature Review**

While a number of studies (Oyovwi, 2012; Odili, 2015; Owuru and Farayibi, 2016; Adaramola, 2016) have tried to examine the relationship between exchange rate and economic growth, others (Akosah, 2014; Shuaibu and Fatai, 2014; Birchwood and Jhinkoo, 2012; Ogbonna, 2015), have also examined the import demand – economic growth nexus. Only Oloba, (2014) to the best of my knowledge have attempted to examine the nexus between exchange rate, import demand and economic growth jointly, albeit in a country specific context.

In a study to examine the effects of real exchange rate uncertainty on import demand in Thailand during the period from July 1997 to December 2011, Jiranyakul (2013), adopted the AR(1)-EGARCH(1,1) and bounds testing for cointegration. The study showed uncertainty in exchange rate significantly impacts Thailand's imports.

Samimi, Adibpour and Heydarizadeh (2012) empirically investigated the impact of real exchange rate uncertainty on Iranian import demand (1979-2007). The study employed the auto-regressive conditional heteroskedasticity (ARCH) methodology to estimate uncertainties in the real exchange rate. The study revealed exchange rate uncertainty negatively impacts Iran's imports.

In a study by Mohammadi, Taghavi and Bandidarian (2011) impact of exchange rate on Iran's import trade was investigated by utilizing the TARCH model. An annual data covering 1959-2009 was utilized. The study revealed that volatility is greatly impacted by negative shocks.

Olayungbo (2011) examined the impact of exchange rate volatility on trade in a panel of 40 selected SSA countries for the period 1986-2005. The study adopted a gravity model which was estimated with pooled OLS allowing for fixed effect and panel Generalized Methods of Moment (GMM) techniques. The results showed the net effect of exchange rate volatility on aggregate trade to be positive using both approaches.

Joseph and Akhanolu (2011) investigated the link between exchange rate volatility and trade in Nigeria. Employing annual data for the period of 1970-2009, the study estimates exchange rate volatility with

the use of Generalised Autoregressive Methods. Findings from the study revealed trade to be inversely related and statistically insignificant in Nigeria.

Akpokodje and Omojimite (2009), conducted an empirical investigation on the link between exchange rate volatility and imports in ECOWAS countries for the period 1986-2006. Using GARCH model, the study found a significant negative effect on imports of all ECOWAS countries as a sub region. There was a dichotomy in results of finding between the CFA and non-CFA countries. The study reported that exchange rate volatility negatively influenced the imports of non-CFA countries but positively influenced CFA countries.

Danquah (2008) examined the effect of exchange rate on external trade in Ghana between 1986 and 2005. To this end, ARDL test was employed to examine the long run relationship of the variables. The result shows that trade flows (exports & imports) and the real exchange rate to be stable in the long run.

In an effort to determine the impact of exchange rate volatility on trade flows in Nigeria between 1985Q1 and 2005Q4, Isitua and Neville (2006) employed the generalized auto-regressive conditional heteroskedasticity (GARCH), cointegration analysis and Error Correction Model (ECM). The result revealed that increase in exchange rate leads to a decrease in economic growth.

In sum, from the theoretical and empirical survey above, we can conclude that findings from the researchers have not been clear cut. More recently, researchers are beginning to look into this area with keen interest based on the inconclusive findings of previous studies in relation to theoretical postulates. However, empirics revealed studies conducted in the developed countries concentrated on import component of trade flows more than export component and yet there are mixed results (Oloba, 2014). Hence, this study seeks to examine the impact of exchange rate movement, import demand and economic growth.

#### **IV. Theoretical Framework, Methodology and Model Specification**

This section presents the theoretical framework, methodology and specification of the model. The data used and sources for the study is also considered.

##### **4.1 Theoretical Framework**

We begin with the basic Solow (exogenous) growth model which gives the growth rate of output or income as depending on the rate of growth of technical change, labor or population and capital stock Solow (1956).

Consider the standard neoclassical production function:

$$Y = f(A, K, L) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3.1)$$

Where A is the level of technology, K is the capital stock, L is the quantity of labor and Y is output. Assume that the production function is twice differentiable and subject to constant returns to scale, and that technical change is Hicks-neutral.

Differentiation of equation (1) with respect to time, dividing by Y and rearrangement of terms yields:

$$\dot{Y}/Y = \dot{A}/A + (FKK/Y) \cdot (\dot{K}/K) + (FLL/Y) \cdot (\dot{L}/L) \quad \dots \quad \dots \quad (3.2)$$

Where  $\dot{Y}/Y$  is the continuous time rate of growth of output,  $\dot{K}/K$  is the rate of growth of capital stock and  $\dot{L}/L$  is the rate of growth of labor force;  $f_K$  and  $f_L$  are the (social) marginal products of capital and labor, respectively; and  $\dot{A}/A$  is the Hicks-neutral rate of change of technological progress.

Thus, the basic Solow (exogenous) growth model gives the growth rate of output or income as depending on the rate of growth of technical change, labor or population, and capital stock. In empirical applications, this basic Solow model has been modified to obtain the augmented Solow growth model, where the rate of growth of income depends not only on technical change, labor and capital but also on policy variables like exchange rate and inflation. [See Barro, (1991); Mankiw *et al*, (1992); Easterly and Levine, (2001) and Ologu, (2003)]. In this paper, the list of policy variables is expanded to include imports. Disaggregating the total stock of capital into two components, namely, physical capital and human capital, the augmented Solow theory of economic growth yields the following specification for the determinants of economic growth in the countries under study:

$$GDP = f(IMPORT, INV, EXRT, OPN) \quad \dots \quad \dots \quad (3.3)$$

$f_2, f_5 > 0$ ; while  $f_1 < 0$ , and  $f_3 < 0$ .

Where:

GDP = per capita real income;  
IMPORTS = total imports;

INV	=	real gross domestic capital formation;
EXRT	=	Real exchange rate;
OPN	=	Trade Openness.

From *a priori* point of view, real gross domestic capital formation is expected to be positively related to economic growth, while the sign of the coefficient of imports, exchange rate and inflation is expected to be negative. These sign expectations are in tandem with economic theory. Imports usually negatively related to economic growth because it involves expending resources which has a deleterious effect on the reserves of developing countries. Hence, the higher the level of imports is, the decline will be the rate of economic growth. The higher the rate of domestic investment is, the more rapid will be the rate of economic growth since investment increases the capital stock and boosts aggregate demand. There is abundance of literature with studies showing the inverse relationship between inflation and economic growth. Rapid inflation militates against economic growth by reducing real savings and investment, and by increasing uncertainty. Finally, *ceteris paribus*, the higher the exchange rate is, the lower will be the rate of growth of per capita income since an overvalued exchange rate will tend to militate against rapid economic growth.

This analysis of exchange rate and import demand on economic growth in Nigeria will be based on the period 2003 – 2017. The study is generally based on annual secondary data. These variables were sourced from IMF (2016), World Bank World Development Indicators (WDI, 2017), and African Development Bank African Statistical Yearbook of various editions due to the fact that data from these sources ranks among the best and most comprehensive sources of information globally.

## **V. Presentation Andanalysis Of Results**

The variables used in this analysis were estimated for the period 2003-2017. RGDP (dependent variable), investment, import, exchange rate, trade openness and inflation are used in the model. Unit root test is performed to test for the stationarity of the variables. A co-integration test using the Residual based co-integration technique will be performed to ascertain if there exist a long run equilibrium relationship among the variables.

### **5.1 Unit Root Test**

The aim of the unit root test is to determine the underlying properties of the process that generate the time series variables in research. It will also ascertain whether the variables in the model are stationary or non-stationary. Time series data are often assumed to be non-stationary when the time trend is fairly long and thus it is necessary to examine the set of data to ensure that there is a stationary relationship among the variables to avoid the problem of spurious regression.

The time series data on the variables that we have utilized in this study were tested for stationarity using the Augmented Dickey-Fuller (ADF) test. The empirical results obtained from this analysis show that some of variables were stationary at levels while all other variables were stationary at their first difference.

Specifically, the unit root test result shows that INV and EXRT variables were stationary at levels form (since p-value was greater than 5% level of significance). However, all other variables were first difference stationary. Since some of the variables were not stationary at levels form, the co-integration test is performed to check out if there exist a long run equilibrium among the variables. This is done using the Residual based co-integration test.

### **5.2 Co-integration Test**

The stationary linear combination of two or more non-stationary series is called the co-integrating equation and may be interpreted as a long run equilibrium relationship among the variables. Therefore, co-integration test is performed to determine whether the groups of non-stationary series for the study are co-integrated or not.

The results obtained when we estimate our model using data on the variables in their first difference form yields parameters that express the short-run relationship between the dependent variable and the regressors. This implies the loss of valuable information on the long run relationship that exists between the variables. Yet, the relevant long run information is important as well for policy purposes. And to determine the existence of a long run relationship between the variables in the specification in the sense of whether or not they tend towards the same long run equilibrium, a Residual based test is conducted and it interestingly revealed a long run relationship exists between GDP, IMPORTS, OPN, INV, INFL and EXRT.

### **5.3 The Error Correction Mechanism (ECM)**

The short-run dynamics of the behaviour of economic growth in the context of short-term movements in its determinants instruments as well as the other variables is used to capture the effect of economic growth is captured within an Error Correction Model (ECM).

The Autoregressive Distributed Lags (ARDL) approach is used for the ECM, while the R-Bar squared criterion was used for the selection of the parsimonious equation. The result of the estimated error correction representation for growth is presented in table 5.1

**Table 5.1: Economic Growth Result for Nigeria**

Variable	Coefficient	T-Ratio	p-value
D(IMPORTS)	- 1.77510	- 2.108	0.0479
D(EXRT)	6.32768e+07	0.9782	0.3397
D(OPN)	6.23270e+011	2.096	0.0490
D(INV)	- 0.0474091	- 0.1437	0.8872
EC(-1)	- 0.0675524	- 0.7259	0.4763
R <sup>2</sup> = 0.870228	F = 5.74784	D-W-Stat = 1.831828	

*Author's results extracted from gretl output.*

From the economic growth result for Nigeria, the R-squared value of 0.734583 is high as it indicates that 73 percent of the systematic temporary variations in economic growth over time are explained by short term movements in the explanatory variables including the EC. Thus, the model possesses a high predictive ability. The overall goodness of fit for the model as observed through the F-statistic-value is 15.37 and easily passes the significance test at the 1 percent level. Thus, we will accept the hypothesis of a significant linear relationship between economic growth and the explanatory variables combined. Indeed, these variables combine to exert significant influence on the short run behaviour of economic growth in Nigeria.

In order to determine the significance of the variables on economic growth, attention is paid to the coefficients of each of the variables in terms of their signs and significance level. A close examination of each of the coefficients in the model reveals that OPN and IMPORTS coefficients in the model have the expected a-priori signs while investment and exchange rate variables are against theoretical postulations.

Particularly, attention is focused on the significance of the coefficients. The result shows that the coefficients of Trade Openness and Imports passes the significance test at 5% level while the INV and EXRT do not pass the significance test at any level. Thus, from the results we can infer that, OPN and IMPORT are deemed to be significant in predicting temporal short run changes in economic growth in Nigeria.

The error correction term in the model possesses the correct negative sign, indicating that equilibrium may be restored in the long run after a temporary movement away from equilibrium. The ec(-1) co-efficient of - 0.0675524 indicates that about 7% of disequilibrium in economic growth is corrected in the first year which is high. Thus, the performance of the adjustment to long run equilibrium based on the explanatory variables in the model is strong and significant. This outcome confirms the co-integration result obtained. Indeed, the results reveal that a long run relationship between economic growth and the independent variables can be estimated.

### **VI. Summary, Recommendation And Conclusion**

This study investigated the impact of exchange rate movement and import demand on growth in Nigeria using the Auto Regressive Distributed Lag model framework from 2003 to 2017. The study confirms the existence of both short run and long run relationship between exchange rate movements and import demand for Nigeria. In the short-run imports move towards their equilibrium when there is a disturbance. The results from the ARDL model show a negative ECM value suggesting that there exists long run relationship among the variables. The highly significant error correction term shows that following a shock, about 7% of the adjustment would be corrected back to the long run equilibrium on annual basis implying adjustment is slow in the process.

The study finds that openness and imports are positive and negative respectively and significant. The significantly positive influence of trade openness on GDP is suggestive that income received from trade when plunged into the economy increases aggregate expenditure as consumers tend to increase their demand for goods whenever they experience an increase in their income levels. This affirms economic theory which posits that trade promotes growth. Nigerian imports are mainly consumer goods and luxury commodities and are expected to be positive and highly income elastic.

By way of recommendation, policymakers need to pay attention promoting policies that propel external trade. They should design pragmatic trade policies and also adhere to better regulatory and monitoring systems as it relates to tariffs, waivers, quota etc. that will keep a stable relationship with her trading partners for a sustained period.

Although, theoretical and empirical studies postulate an indeterminate impact between import demand and economic growth, this study expected and achieved a negative sign. The negative movement implies that an increase in the import tend to have an adverse impact on economic growth. This mean that an upward movement in import demand imposes a restraint on growth.

There should be systematic and measured policy to mitigate imports of commodities produced in the country. This will help reduce the risk level that traders they may face and also protect local industries

. Again, since the results is suggestive that the importers are risk averse because they cut down their volume of imports and shift their attention to domestically produced goods. Since imports are elastic with respect to the level of income. Import responds more to variations in income as such an increase in the income level will cause an increase in the volume of imports by more than the increase in income. Government policies should be directed at motivating domestic industries that are not import intensive. Subsidies, tax holidays, tax rebates and other incentives can be given to import substitution industries in order to boost production levels. Development of such industries will significantly reduce pressure on imports.

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