Exchange Rate implication on Raw Materials Import in Nigeria 1981-2015

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ABSTRACT

There is no any self-sufficient country on this globe as all countries get involved in economic relationships through the trade of goods and services. Developing countries like Nigeria needs foreign inputs to facilitate its developmental desires. This process involves the use of different currencies, whose values can only be determined through exchange rate. This study therefore, used Auto Regressive Distributed Lag (ARDL) model to analyze the implication of exchange rate on raw material imports in Nigeria from 1981-2015. Augmented Dickey Fuller (ADF) test is used to test the stationarity of each of the variables. Maximum lag of 2 is used for the model based on Schwarz information criterion (SIC). The ADF result shows that all the variables are stationary at their first difference at 1% level of significance. The short run result shows that exchange rates have a negative and significant effect on raw material import where as inflation shows a positive and insignificant effect on raw material import and trade openness has a negative and insignificant effect on raw material import. While in the long run, the result shows that exchange rate has a positive and significant impact on raw material import while inflation has a negative and insignificant impact on raw material import and trade openness has a positive but insignificant impact on raw material import. It is recommended that; Effective exchange rate policy administration be pursued, foreign exchange demand be monitored, and finally, adopt an exchange rate policy that would discourage imports of finished goods and enhance export in Nigeria.

Key Words: Exchange Rate, Raw Materials' Import, Inflation, Openness, Balance of Payments.
JEL classification codes: F18, F33, F37, C01, C22

1. Introduction

There is no any self-sufficient country on this globe that will warrant it exists in isolation from other countries. By implication, all countries are involved in economic relationships with other countries, they trade goods and services with each other; they buy and sell each other's assets; often, they engage in the direct transfer of factors of production between one another in the form of foreign direct investment or migration to have what it lacks and as well part with its excesses. Especially the case of developing countries like Nigeria aspiring to attain a reasonable level of development needs foreign inputs to facilitate such desires. This process involves the use of different currencies, whose values can only be determined through exchange rate. Exchange rate is therefore "the price of one currency in terms of the other". It is the rate at which one currency exchanges for another (Okonkwo 1991).This view is corroborated by Usman (1991), when he reviewed "the exchange rate as the value of a country's domestic currency in terms of a foreign currency".

Prior to the introduction of Structural Adjustment Program (SAP) in 1986, Naira (Nigerian Currency) enjoyed appreciable value against US dollar, a factor that creates opportunity for rapid economic growth and stability. With introduction of new economic program, the country began to suffer unstable exchange rate that caused a high degree of uncertainty in the Nigeria's business environment. The situation must equally have an effect on importation level of the country. Nigeria is a developing country striving to develop its industrial needs to enable domestic investors import relevant machineries, equipment and raw materials for industrial consumption.

Exchange rate is a key macroeconomic variable in the context of general economic policy making and of economic reform programmes. Its management determines the pace at which a country's economic activities will grow. Thus the analysis of exchange rate management and the variability associated with exchange rate has been a recurring topic in international monetary economics (Charity, 2016). Several studies have analyzed the impact of exchange rate on economic growth and other macroeconomic variables. However, not many studies have analyzed the impact of exchange rate on industrial production (raw materials import). Analyzing the impact of exchange rate on raw materials importation is very crucial because the manufacturing sector together with agricultural sector constitutes the real sector of the economy Olufisayo and Adebayo (2015). Understanding the responses of the disaggregated components of the real economy is important for a number of reasons: a disaggregation is imperative in given that different sectors have different capital intensities that generate different responses in sectoral output. These differences in responses are largely disguised at an aggregate level- thus making the disaggregated approach more informative than aggregate method for the purpose of analyzing the impact of exchange rate on raw material import. Undoubtedly, changes in this subsector will have serious effects on the other sub-sectors and macroeconomic components such as employment, inflation and economic growth.

In the light of this background the main objective of this paper is to analyze the impact of exchange rate on raw materials import in Nigeria and as well recommend how to make Nigerian currency appreciate, by and large have a favorable balance of trade. The paper is structured in five sections: section one is the introduction of the research. The next section summarizes some literature reviews and Economic theories involved in past and current study. Section three describes the Research Methodology applied in the study and the Data Source, while section four is on the Presentation and Discussion of the Result. The last section which is five, gave the Conclusion and Recommendation.

Literature Review

2.1 Conceptual Framework

Exchange rate is a critical macroeconomic variable that can never be wiped away in any economic reform agenda (Okeke, 2004). This means for an exchange rate to emerge, two or more countries with different currencies are involved. The exchange rate is important in the study of the macroeconomic management, since it reflect the performance of both domestic and external sectors of the economy. The relationship between a country's exchange rate and import is a crucial issue from both the descriptive and policy prescription perspective. It has been defined by different scholars both in narrow and broad terms. Powell (1993) defined exchange rate as the external price of a currency expressed in term of an official unit such as weighted average of "sample" or "basket of leading trade currencies". Olukole (1992) saw exchange rate as the numerical expression of the value of the currency at any given time. Also, Okonkwo (1991) define exchange rate as "the price of one currency in terms of the other". To him, exchange rate is the rate at which one currency exchanges for another. This view is corroborated by Usman (1991), when he reviewed "the exchange rate as the value of a country's domestic currency in terms of a foreign currency". Following similar line of arguments, Elumelu (2002), saw exchange rate as any other price that is determined by the forces of demand and supply in a perfectly competitive market and in a world where free international exchange is the rule. Exchange rate is the price of one currency in relation to other. It expresses the national currency's quotation in respect to foreign ones (Azid, Jamil and Kousar, 2005).Exchange rate is the ratio between a unit of one currency and the amount of another currency for which that unit can be exchanged at a particular time (Ngerebo-a and Ibe, 2013).Exchange rate is the price of one currency vis-à-vis another and is the number of units of a currency required to buy another currency (Mordi, 2006).In the Nigerian context, exchange rate is the units of naira needed to purchase one unit of another country's currency e.g. the United States dollar (Campbell, 2010).

2.2 Evolution of Exchange Rate

Exchange rates evolve naturally with the development of international trade and exchange. The United Kingdom was the first to fix the value of their currency (pound sterling) in terms of gold, through the activities of goldsmiths in the 17th century (Awake, 2005).However, 1945 ushered in the US dollar as the standard by which external values of other countries were measured; following

the fall of England pound sterling. In Nigeria before 1971, the parities of the naira vis-à-vis the pound sterling and US dollar were determined using the gold contents of the naira, the pound sterling and the US dollar. (Powell, 1993)

The Bretton Wood's conference of 1944 that created the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD/World Bank) was another exchange rate regime. All members agreed on implementing a system of fixed exchange rates with the U.S. dollar as the key currency.

2.3 Classification of Exchange Rate

In this paper therefore, five versions of exchange rate is discussed.

Nominal exchange rate is the exchange rate which people ordinarily deal with. It is the price of one currency in terms of another. In Nigeria, it is quoted as units of naira per unit of a foreign currency (example US dollar). In UK, it is quoted as units of foreign currency per unit of pound sterling (Ghosh, 1997). The concept of nominal exchange rate is important in many respects. It determines the cost of imports and the level of revenue to exporters. It is also used for policy purposes as variable to compensate for movements in differential rate of inflation.

Nominal effective exchange rate is the weighted average of nominal exchange rates between one country and its trading partner. For policy makers, exchange rate policy in practice requires the adjustment of the nominal rate to achieve "Real Effective Exchange rate" equilibrium. (Obaseki, 1991).

Real exchange rate, according to Olisadebe (1995) is the ratio of price tradable to the price of non-tradable. It is employed in measuring a country's price competitiveness. It is define as nominal exchange rate deflated by index of relative inflation rates.

The real effective exchange rate is a trade-weighted average of real exchange rate between one country and its trading parties. The weight reflects the proportion of trading with a country's party (Aizenman, 1994).

Equilibrium exchange rate is adopted to achieve certain macro or microeconomic objectives. This includes the adjustment of balance of payment viability, the maintenance of internal balance and promotion of efficiency in resource allocation. In this premises, equilibrium exchange rate may be define as the rate which promotes the achievement of external balance in a manner consistent with the other targets of economic policy (Olisadebe, 1991).

2.4 An Overview of the Exchange Rate Regimes

Numerous exchange rate regimes are practiced globally, ranging from the extreme case of fixed exchange rate system, such as the currency boards and unions to a freely floating regime.

A fixed exchange rate regime entails the pegging of the exchange rate of the domestic currency to either a unit of gold, a reference currency or a basket of currencies, or the special drawing rights (SDR), with the private objective of ensuring a low rate of inflation, and to eliminate balance of payments (BOP) disequilibrium (Sanusi, 2004).

Flexible/Floating exchange rate on the other hand has been named differently by different scholars. Nobbs (1983), describes a flexible exchange rate as the rate that results when currencies of different countries are allowed to fluctuate and find their own market level in accordance with the conditions of demand and supply. Like nominal price determination, the analysis will require demand and supply curves. The demand curve represents demand for dollars, but every demand for foreign exchange requires a simultaneous supply of local currency (naira) (Afolabi, 1999). The reason is simply that anybody who wants to buy foreign exchange, say dollar has to supply or pay the local currency, say naira to the central bank through his bankers. Supply of dollars similarly brings along with it a simultaneous demand for naira.

Managed floating exists when government intervenes in the foreign exchange market in order to influence the exchange rate, it does not commit itself to maintain a certain fixed rate or some narrow limits around it. The exchange rates are permitted to float daily in order to grope towards equilibrium levels. (Sanusi, 2004).

Crawling peg or gliding-parity retains fixed exchange rate but invoke frequent, modest realignments in parity or par values that are frequent devaluation and revaluations. The drawback of the crawling peg is that the adjustment mechanism may not be sufficiently powerful (Olisadebe, 1991).

2.5 Choice of exchange rate regime

Every country has a wide range of exchange rate regimes to choose from, depending on the desired directions of economic policies, desired degree of flexibility of the exchange rate regime and the nature of shocks faced by the economy. The goal of an exchange rate regime is the optimization of output stabilization (Cordon, 2002).

An diversified economy lowers the cost of exchange rate rigidity as the associated cost are more diversely distributed among the sectors of the economy , and a shock to any one sector is insignificant to tilt the balance of overall output of the economy. The more diversified an economy is, the greater the openness of the economy, the better for the country to adopt flexible exchange rate adjustment regime. Such regime reflects economic fundamentals and aims at achieving a stable exchange rate (Flood, Edwards & Gafar, 1989).

It has however, been suggested that trade should be higher under fixed regimes since exchange rate volatility and uncertainty will be lower, which will tend to reduce the cost of trade and increases its volume (Frankel & Rose, 2002).

Hausman and Gavin (1996) have suggested that the terms of trade shocks are more fundamental to output fluctuations in developing countries, because of their reliance on export of primary products. However, the choice of an exchange rate regime does not provide an insurance cover against the vagaries of the terms of trade shocks.

The choice of a ruling exchange rate therefore, becomes a matter of conjecture of the monetary authority of their perceived trade-off between the desires to dampen exchange rate and control of inflation.

2.6 Theories of Exchange Rate

The Mint Parity Theory This theory is associated with the working of the international gold standard. Under this system, the currency in use was made of gold or was convertible into gold at a fixed rate (Jhingan 2004). Here, the value of the currency unit was defined in terms of certain weight of gold and the Central Bank of the country concerned was always ready to buy and sell gold at the specified price. The rate at which the naira could be converted into gold is called the mint price of gold.

The Purchasing Power Parity Theory This Theory states that spot exchange rate between currencies will change to the differential in inflation rate between countries. The theory states that the equilibrium exchange rate between two inconvertible paper currencies is determined by the equality of their purchasing power. That is, the exchange rate between two countries is determined by their relative price levels (Obadan, 2006).

The Balance of Payment Theory This theory stipulates that under free exchange rates, the exchange rate of the currency of a country depends upon its balance of payment. According to Jhingan (2004), a favourable balance of payments raises the exchange rate, while an unfavourable balance of payments reduces the exchange rate. Thus the theory implies that the exchange rate is determined by the demand for and supply of foreign exchange.

2.7 The Concept of International Trade

All countries are involved in economic relationships with other countries, they trade goods and services with each other; they buy and sell each other's assets; often, they engage in the direct transfer of factors of production between one another in the form of foreign direct investment or migration. The nature of these relationships experiences constant change. Over time variety of formal and informal regional trading blocs and monetary unions has evolved. Increasing liberalization and integration of the world economy has led to an explosion of international trade and movement of capital. In April 1998, average daily global foreign exchange trading was already a staggering $1.5 billion but by April 2013 daily turnover exceeded $5.3 trillion (Source: Bank of International Settlements), making foreign exchange markets the largest financial markets in the world.

2.8 Theories of International Trade

a. Absolute Cost Advantage: Adam Smith propounded the theory of absolute cost advantage as the basis of foreign trade; under such circumstances an exchange of goods will take place only if each of the two countries can produce one commodity at an absolutely lower production cost than the other country. We speak of an absolute- differences in costs because each country can produce one commodity at an absolutely lower cost them the other. Thus, in such a situation, a division of labour between them must lead to an increase in total output.

b. Comparative Cost Advantage It was developed by David Ricardo in the early nineteenth century. Ricardo's model shows that mutual gains from trade (and specialization) arise even when one of the countries (say, the 'poor' country) is less efficient in the production of both goods.

Although the poor country may be less efficient overall, and thus not have an absolute advantage, it may still have a relative efficiency, giving it a comparative advantage.

c. The Heckscher-Ohlin (HO) Model was originally developed by two Swedish economists Eli Heckscher and Bertil Ohlin in the early part of the twentieth century. Technology is assumed to be the same across countries in the HO model, with emphasis placed on differences in factor endowments as the origin of comparative advantage. Accordingly, the model provides a particularly rich account of the mechanisms by which trade influences the economy. A notable insight of the model is that trade in goods can be regarded as a substitute for the international movement of factors (that is, trade in goods is indirectly trade in factors of production).

2.10 Theoretical Framework/ Empirical Framework

The theory underpinning this paper is the "balance of payment theory of exchange rate". According to this theory, under free exchange rates, the exchange rate of currency depends upon its balance of payments. A favourable balance of payments raises the exchange rate; while an unfavourable balance of payments reduces the exchange rate. Thus the theory implies that the exchange rate is determined by the demand for the supply of foreign exchange.

The demand for foreign exchange arises from the debit side of the balance of payments. It is equal to the value of payments made to the foreign country for goods and services purchased from it plus loans and investments made abroad. The supply of foreign exchanges arises from the credit side of the balance of payments. It equals all payments made by the foreign country to our country for goods and services purchased from us plus loans disbursed and investments made in this country. The balance of payments is balance if debits and credits are equal. If debits exceed credits, the balance of payments is unfavourable. On the contrary, if credits exceed debit is favourable. When the balance of payments is unfavourable, it means that the demand for foreign currency is more than its supply. This causes the external value of the domestic currency to fall in relation to the foreign currency. Consequently, the exchange rate falls. On the other hand, in case the balance of payments is favourable, the demand for foreign currency is less than its supply at a given exchange rate. This causes the external forces value of the domestic currency to rise in relation to the foreign currency. Consequently, the exchange rises.

According to this theory, it implies that when the importation of raw materials increases it leads to unfavourable balance of payment which leads to depreciation of the local currency while decrease in the importation will leads to a favourable balance of payment which leads to appreciation of local currency. The appreciation of local currency, make the importation of raw material very cheap while the depreciation make it very expensive.

Oluyemi and Isaac (2017), uses the VAR model to study the effect of exchange rate on imports and exports in Nigeria using a monthly data set spanning from 1996-2015. The VAR results shows that exchange rate has a positive and insignificant effect on import while has a negative and insignificant effect on export.

Odili (2015) studied the effect of real exchange rate volatility on Nigerian imports from 1971 to 2011. Co-integration and Parsimonious Error Correction were used. The result showed that

exchange rate has positive and significant effect on import only in the long run and there is unidirectional causality from exchange rate and import.

Dutta and Ahmed (2006) using co integration and error correction model approaches investigated the behavior of Indian aggregate import demand during the period 1971-1995. The results obtained indicate that import volume is co integrated with relative import price and real GDP. The output of the econometric model estimate shows that import demand in India is largely explained by real GDP and generally less sensitive to import price changes.

Salasevicius and Vicious (2003) using the VECM to test for Marshall Lerner condition in the exchange rate-balance relationship in the Baltic States. The condition is found to be met for Lithuania, but not for Estonia, while the results concerning Latria are ambiguous. Although the traditional influencers are sufficient at explaining trade dynamics in Baltic countries, the analysis reveals that a long-run equilibrium relationship among them exists.

Egwaikhide (1999), examined the determinants of aggregate imports and its components in Nigeria, 1953-1989, using co integration and error correction specification. The results indicate that, foreign exchange earnings, relative prices and real income, all significantly determine the behavior of total import in the reference period. The estimated equation rests on the stock adjustment import exchange rate model that has its roots in the balance of payments theory and in the consumer theory of demand as in the traditional import demand function.

Edoumiekumo and Opukri (2013) examined the contributions of international trade (proxy with export and import values) to economic growth in Nigeria measured by real gross domestic product (RGDP). Time-series data obtained for a period of 27years was analyzed using Augmented Dickey-Fuller (ADF) test, Ordinary Least Square (OLS) statistical technique, Johansen co-integration test and Granger Causality test. The results showed that positive relationship exists between the variables and there is co-integration among the variables. The Granger Causality test realized a uni-directional relationship showing that RGDP Granger cause export and import Granger cause RGDP and export.

Javed, Qaiser, Mushtaq, Saif-ullaha and Iqbal (2012) examined the impact of total exports to GDP ratio, import to GDP, terms of trade, trade openness, investment to GDP ratio and inflation on the Paskitani economy using time-series data from1973-2010. Employing Chow test and Ordinary Least Square method, the estimated results revealed that all the explanatory variables have positive and significant impact on Pakistan. The study further discovered that an increase in the import of raw-materials boosted production, employment and output of Pakistan.

Omoju and Adesanya (2012) examined the impact of trade on economic growth in Nigeria using data from 1980 to 2010. Adopting Ordinary Least Square (OLS) technique, the study showed that trade, foreign direct investment, government expenditure and exchange rate have a significant positive impact on economic growth.

Saibu (2012) investigated the direct and interactive effects of capital inflow, trade openness and economic growth using data from Nigeria over the period 1960 to 2011. The study employed the composite indicator derived from principal component analysis (PCA) in the Autoregressive Distributed Lag (ARDL) bound testing model. It found statistically significant effect of capital

inflow and trade on economic growth. The study further provided new evidence in support of the modernization hypothesis that capital inflow and trade policy are complementary and growth enhancing in developing economies like Nigeria and that trade liberalization policies tend to enhance effectiveness of capital inflow and jointly promote higher economic growth in Nigeria.
Evidence from empirical studies from other countries also reviewed. Li, Chen and San (2010) conducted a research on the relationship between foreign trade and the GDP growth of East China for a period 1981-2008. Adopting the unit root test, co-integration analysis and error correction model, they found out that foreign trade is the long-term and short-term reason of GDP growth, but no evidence proved that there exists long-term stationary causality between import trade and GDP.
Going by the literatures reviewed, none of the literatures explain the implication of exchange rate on raw materials' import in Nigeria using the same variables which this research is going to concentrate on from 1981 – 2015.

Data and Methodology

To achieve the objectives of this study, Secondary data were collected from Central Bank of Nigeria (CBN), World Bank, Ministry of finance and National Bureau of Statistics (NBS). The variables on which the data were sourced are: Raw materials import, Exchange rate, Inflation and Openness of the economy (Nigeria) between the periods of 1981 – 2015.

Assuming a linear relationship between the dependent variable and the independent variables, the linear regression of this study is presented as:

$$RWMI = f(EXR + INF + OPN) \quad \text{(1)}$$

Where:

RWMI = Raw material import

EXR = Exchange rate

INF = Inflation

OPN = Openness

Using econometrics specification, equation 1 is transformed to become:

$$\log RWMI = \beta_o + \beta_1 EXR + \beta_2 INF + \beta_3 \log OPN + U_t \quad \text{(2)}$$

Where;
log = Natural logarithm
β_o, β_1, β_2, , and β_3 are the coefficient of the estimable variables in the model

U_t = Error term representing white noise process

On a priori ground: β_0, β_3 and >O. while β_1, β_2 and <O

The study adopted Autoregressive Distributed Lag (ARDL) model to test the relationship between exchange rate and raw material imports in Nigeria. The ARDL cointegration technique is introduced by Pesaran and Shin (1999) and Pesaran et al. (2001). Researchers are using ARDL estimator due to its several advantages; For example, it does not impose the restriction that all under consideration data series have the same order of integrations and it is applicable irrespective of whether the regressors are I(0) or I(1) order of cointegration (Pesaran and Pesaran, 1997). Pesaran and Shin (1999) note that ARDL estimators produce the true parameters as compared to Johansen and Juselius's cointegration technique in the case of small sample and coefficients from the ARDL estimators are super consistent in small sample sizes. Therefore, this is more relevant in our case where we have a data series of 34 annual observations. Furthermore, endogeneity is less a problem in ARDL framework because it is free of residual correlation. Pesaran and Shin (1999) have shown that the ARDL method can distinguish between dependent and explanatory variables and the estimation is possible even when the explanatory variables are endogenous (Pesaran and Pesaran, 1997; Pesaran et al., 2001). This is an important issue in the case of examining the impact of exchange rate on raw material imports in Nigeria. Therefore, the ARDL modeling is adopted in this study.

ARDL framework of Eq. (2) is as follows:

$$\begin{aligned}\Delta \mathbf{lnRWMI_t} &= \alpha_0 + \sum_{i=1}^{\rho} \alpha_1 \, \Delta \mathbf{lnRWMI_{t-1}} + \sum_{i=1}^{\rho} \alpha_2 \, \Delta \mathbf{lnEXR_{t-1}} + \sum_{i=1}^{\rho} \alpha_3 \, \Delta \mathbf{lnINF_{t-1}} \\ &+ \sum_{i=1}^{\rho} \alpha_4 \, \Delta \mathbf{lnOPN_{t-1}} + \lambda_1 \mathbf{lnRWMI_{t-1}} + \lambda_2 \mathbf{lnEXR_{t-1}} + \lambda_3 \mathbf{lnINF_{t-1}} \\ &+ \lambda_4 \mathbf{lnOPN_{t-1}} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3})\end{aligned}$$

On the right-hand side, the expression from λ_1 to λ_4 depicts the long-run relationship between the variables, while the expression from α_1 to α_4 with the summation signs corresponds to the short-run dynamics of the variables. On the other hand, α_0 represents drift constant and μ_t is disturbance term.

The complete results for short-run and long-run dynamics through ARDL bounds testing are obtained through several steps and procedure. In the first step, Eq. (3) will be estimated through ordinary least square (OLS) method and F-test will be conducted to test the existence of long run

relationship among the variables of Eq (2). The null hypothesis in Eq. (3) is $H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$. This means the non-existence of long run relationship. While the alternative is $H_1: \lambda_1 \neq 0, \lambda_2 \neq 0, \lambda_3 \neq 0, \lambda_4 \neq 0$.

The calculated F-statistics value is compared with upper and lower critical values which are given by Pesaran et al. (2001). If calculated F-value exceeds the upper critical value, then null hypothesis of no cointegration will be rejected irrespective of whether the variable are I(0) or I(1). In the second step, we will estimate long run relationship using the selected ARDL model through R2 criterion, Hannan Quinn Criterion, Akaike Information Criterion (AIC) and Schwarz Criterion (SBC). The following error correction model is estimated in the third step.

$$\Delta \mathbf{RWMI_i} = \beta_0 + \sum_{i=1}^{\rho} \delta_i \, \Delta \mathbf{RWMI_{t-1}} + \sum_{i=1}^{\rho} \emptyset_i \, \Delta \mathbf{EXR_{t-1}} + \sum_{i=1}^{\rho} \omega_i \, \Delta \mathbf{INF_{t-1}} + \sum_{i=1}^{\rho} \lambda_i \, \Delta \mathbf{OPN_{t-1}} + \alpha \mathbf{ECM_{t-1}} + U_t \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (4)$$

The error correction model result indicates the speed of adjustment back to long run equilibrium after a short run shock.

Diagnostic tests are conducted to ensure the goodness of fit of the model. These tests examine the serial correlation and heteroscedasticity associated with the selected model. Furthermore, Pesaran and Pesaran (1997) suggest using Brown et al.'s (1975) stability test to check the stability of the coefficient of the regression. This technique is also known as cumulative (CUSUM) and cumulative sum of squares (CUSUMSQ). The CUSUM and CUSUMSQ statistics are updated recursively and plotted against the break points. If the plots of CUSUM and CUSUMSQ statistics stay within the critical bounds of 5% level of significance, the null hypothesis of all coefficients in the given regression which is stable cannot be rejected.

Empirical Results Presentation and Discussion

The major advantages of using the ARDL estimators is that it can be used without taking the consideration of data series which is either I(0), I(1) or frictionally co-integrated. However, Ouattara (2004) documents that ARDL estimators may not be valid for any data series which is generated by I(2) process or beyond because Pesaran et al. (2001) explicitly mentioned that the ARDL bounds tests is subject to the assumption that the variables are integrated of order (0) or (1). Therefore, testing the level of stationarity is still necessary. For this purpose we use the

Augmented Dickey–Fuller (ADF) estimators to check the stationary process of the data series. The results of the ADF tests are presented in the table 1 below. It is evident from the ADF results that some of the data set are integrated of I(0) while others I(1). Importantly, none of the data series are I(2) or above. Therefore, we are justified for using the ARDL estimators. Unit root test confirms that none of the series is integrated of I(2); therefore, we may apply ARDL bounds testing procedures for establishing the long-run relationship between exchange rate and raw materials import.

Table 1: Augmented Dickey-Fuller Unit Root Test

	Intercept without Trend		**Intercept with Trend**	
Series	**Level**	**1st Difference**	**Level**	**1st Difference**
RWMI	0.233507	-9.059514***	-2.00359	-9.818757***
EXR	0.388655	-5.119957***	-2.193117	-5.208247***
INF	-2.815423*	-5.560841***	-3.764991**	-5.498233***
OPN	-2.397837	-7.025449***	-3.15799	-6.904411***

Note: ***, ** & * denote significance level at 1%, 5% and 10% respectively. The values are the t-statistics for testing the null hypothesis that the series has unit root.

***Source**: extracted from estimation output using E-views*

The ARDL steps are followed to determine the existence of long-run relation among the variables using the bounds f-statistics. Cointegration is established among the series if the calculated F-statistic is beyond the upper critical values at any conventional levels of significance. However, if the value F- statistic is found less than the lower critical bound value, then the long run relationship does not exist. Besides, if the computed value of the F-statistic lies in between the range of lower and upper value then the long run relationship is inconclusive at least using the ARDL bound cointegration approach. The technique establish the existence of a long-run equilibrating relationship for the variables in equation 3 using bounds f-test.

Table 2: ARDL Bound Cointegration Test

			Critical Values	
Vector (Model)	**F-statistics**	**Significance level**	**I (0)**	**I(1)**
LOGRWMI	6.311293***	1%	4.29	5.61
EXR	3.814385*	5%	3.23	4.35
LOGINF	4.524765**	10%	2.72	3.77
LOGOPN	2.419664			

***Source**: extracted from estimation output using E-views 9*

The estimated f tests result is presented in table 2 above, shows the existence of three different co-integrating vectors in the model. It is evident that co-integration was detected at 1% level of significance when we considered LOGRWMI as an explained variable. Same detection occurred when EXR and LOGINF was considered as the dependent variable in the model at 5% and 10%level of significance respectively. We can therefore infer that there is a long-run relationship between exchange rate, inflation, openness to trade and raw materials import in Nigeria.
Next, we estimate equation (3) following the ARDL co-integration technique for the long-run estimates. We estimated the model keeping the different criteria, like R2 criterion, Hannan Quinn Criterion, AIC Criterion and SBC Criterion, in mind to find the coefficient of the level of variables. The long-run and short-run results of all models were almost near to identical. Therefore, we present only the results of the model that were selected on the basis of AIC criterion as Monte Carlo experiment of Liew (2004) documented that AIC is superior to other criteria, particularly when time span is less than 60 observations.

Table 3: Long-run ARDL Estimates with RWMI is the dependent variable

Variables	Coefficient	std.error	t-statistics	prob.
EXR	0.010442	0.004383	2.382414	0.0263
LOGINF	-0.723493	0.546435	-1.324025	0.1991
LOGOPN	0.095173	0.083199	1.143922	0.2650
C	24.091678	1.473063	16.354815	0.0000

***Source**: extracted from estimation output using E-views 9*

The long run results are presented in table 3 above. It is observed that the estimated coefficient of the long run relationship shows that exchange rate (EXR) has a positive and significant long run impact on raw material import in Nigeria. This implies that a unit increase in exchange rate will leads to an increase in raw material import in Nigeria by 1.0442 i.e. (0.010442 x 100 = 1.0442). From the statistical result it can now be concluded that exchange rate has a positive and significant impact on raw material import in Nigeria in the long run.
Considering the long run impact of inflation (LOGINF) on raw material import in Nigeria, it shows that inflation has a negative impact on raw material import and statistically insignificant as the probability value is greater than 10% (0.1) i.e. 0.1991 > 0.1. Similarly the long run impact of trade openness (LOGOPN) on raw material import shows that trade openness has a positive impact but statistically insignificant as the probability value is greater than 10% i.e. 0.2650 > 0.1.

Table 4: Short run estimation result and Error Correction Model

Variable	coefficient	std.error	t-statistics	prob.
D(EXR)	-0.0104	0.002877	-3.004674	0.0065
D(LOGINF)	0.7235	0.061749	0.796969	0.4340
D(LOGOPN)	-0.0952	0.008492	-1.188851	0.2472
CointEq(-1)	-0.184180	0.103607	-1.777682	0.0893

***Source**: extracted from estimation output using E-views 9*

Table 4 above shows the results of the short-run analysis and the coefficient of the error correction term are presented in Table 4 above. The short-run results are almost same in the magnitudes and sign as compared to the long-run.

The important outcome of the short run dynamics is the computation of the coefficient of ECM. The Error correction term, CointEq(-1) which measures the degree of adjustments in deviations that occurred in the previous period is expected to be negative and significant at a conventional level of significance. The ECT tells how much disequilibrium that occurred in the short run can converge to an equilibrium again in the long run. Here, it can be deduced that 18% of the disequilibrium that occurred in the short run can revert back to equilibrium in the long run within the period of one year. The Error Correction Term is significant at 10% level of significance. Thus, the negativity and significance of the term confirms the long run relationship that exists between raw materials import and its determinants in the model.

Table 5: Residuals diagnostic tests

Tests	**Probability**
Serial correlation	0.4384
Normality	0.556871
Heteroskedasticity	0.9788

***Source**: extracted from estimation output using E-views 9*

Our model passes through the diagnostic tests. The results are reported in Table 5 above. The null hypothesis for the respective diagnostics tests stated that the residuals had no serial correlation, normally distributed, as well as homoscedastic. All test statistics on each null hypothesis could not be rejected at any conventional level of significance. Hence, we conclude that there is no serial correlation, non-normality and heteroscedasticity. Therefore, the results of the diagnostic test indicates that the coefficients of the estimated model are not associated with the problems of serial correlation, non-normality of residuals and heteroscedasticity.

Finally, the study evaluates the stability of the estimated coefficients using cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squared residuals (CUSUMQ). The plots of CUSUM and CUSUMSQ statistics are well within the critical bounds, implying that all coefficients in the error-correction model are stable (see Figures 1(a) and 1(b)).Therefore, the preferred equation can be used for policy decision-making purposes, such that the impact of policy changes considering the explanatory variables of the equation will not cause major distortion since the parameters in this equation seem to follow a stable pattern during the estimation period.

Figure 1(a) Plot of cumulative sum (CUSUM)

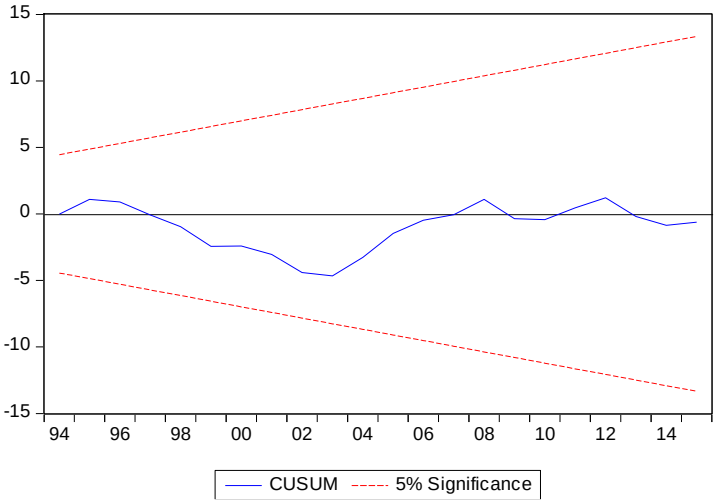
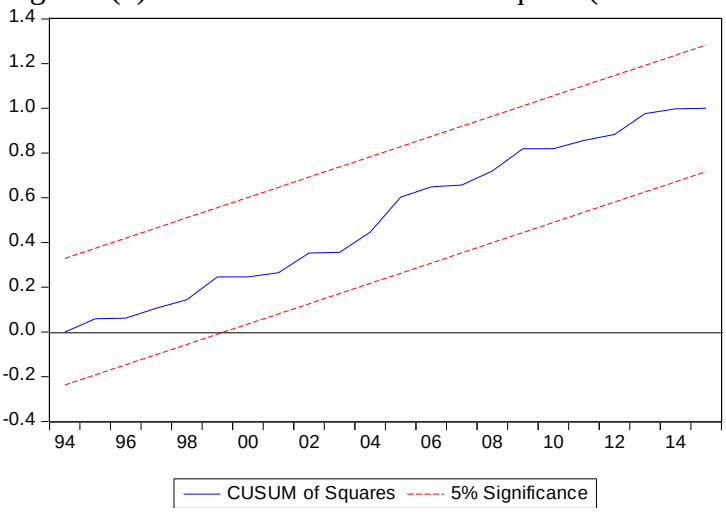


Figure 1(b) Plot of cumulative sum of square (CUSUMSQ)



Conclusion and Recommendations

As we have seen from the research findings that exchange rate has a positive and significant impact on raw material import in Nigeria in the long run. So there is need to adopt an exchange rate policy that will reduce the importation of raw material which will enable the country (Nigeria) to efficiently make use of their resources. So also, the result of the findings also shows that trade openness positively but insignificantly affects raw material import in Nigeria; therefore there is need for the Nigerian government to adopt some trade policies that will leads to import substitution and export promotion like providing soft loan to local industries, tax incentives or tax holiday, low or free excise duties etc. With regards to inflation, the result also shows that it positively but statistically insignificantly affects raw material import. Therefore there is also need for the Nigerian government to review its fiscal and monetary policies to curb inflation in order to reduce raw material importation. In essence, government should control exchange rate, inflation and trade openness to achieve a favorable balance of trade. Based on this results the following recommendations should be pursued:

i. Effective exchange rate policy and administration should be consistently pursued in order to exploit its good effect on the economy.
ii. Exchange rate policy such as currency devaluation be formulated and effectively implemented as it will discourage importation and encourage exports.
iii. Domestic industries should be motivated to produce more for domestic consumption and export by providing them with soft loan, tax incentives, subsidizing source of power e.g. black oil, electricity etc.
iv. Foreign exchange demands should be monitored to ensure that they are demanded for only productive and socially desirable purpose.

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