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AN ANALYTICAL ASSESSMENT OF THE DETERMINANTS OF EXCHANGE RATE: AN EMPIRICAL EVIDENCE FROM NIGERIA

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Abstract

The study utilised econometric techniques as data analysis technique and it is indicated that there is no significant relationship between real terms of trade and real exchange rate in Nigeria; there is no significant relationship between real trade restrictions and real exchange rate in Nigeria; there is no significant relationship between technological progress and real exchange rate in Nigeria. However, it is demonstrated that there is a significant relationship between real government expenditure and real exchange rate in Nigeria and there is a significant relationship between nominal exchange rate and real exchange rate in Nigeria. Therefore, the study concluded that, at the long run level, the real variables alone that influences real exchange rate in Nigeria were insignificant. However, real exchange rate in Nigeria was determined by both real and nominal variables are the core fundamentals that determined real exchange rate in Nigeria mostly in the short run. It is therefore recommended that there is need for the monetary authority in Nigeria to create enabling environment that will encourage and attract international trade activities by investing in the infrastructure of the nation.

Keywords: *exchange rate; term of trade; trade restriction; government expenditure; technological process.*

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Introduction

Research related to exchange rate management still remains an area of interest to economists and finance experts, especially in developing countries, despite a relatively enormous body of literature in this area. This is largely because the exchange rate is not only an important relative price of one currency in term of other that connects domestic and world markets from goods and assets, but it also signals the competitive of a country's exchange power with the rest of the world in a global market. Exchange rate serves as an anchor which supports sustainable macroeconomic balances in the long-run.

Ajao (2015), exchange rate has traditionally played a crucial role in Nigerian monetary policy. production, which is considered to be the main source of external and government revenuesbecause of its crucial impact on the country trade relation with other countries, first, as a mono-product (oil) export dependent economy and second, as an import dependent (developing) nation; besides the country's competitiveness and overall economic growth. Thus, exchange rate is being regulated via exchange rate policy. This policy for exchange rate can be fixed or flexible and has substantial transformation since post-independence era when the country operated a fixed exchange rate system that was in alliance with the IMF per value or fixed system and its goals is to achieve price stability.

In recent years, policy discussions have increasingly included references to real exchange rate stability and correct exchange rate alignment as crucial elements in the important of economic performance in Nigeria. Real effective exchange rate movement affects economic activity in Nigeria, mainly owing to its dependence on imported capital goods and specialization in commodity exports. The country has experienced a series of exchange rate depreciations in an effort to improve output growth.

The government has considered the exchange rate to be an important macroeconomic instrument for ensuring a low inflation rate and a stable financial system, promoting exports, controlling imports, and enhancing economic growth. In the literature, the real exchange rate serves as a better international price for determining the competitiveness of a given country than the normal exchange rate. Management of the nominal exchange rate depends on the real exchange rate, which is influenced by, inter alia, the nominal exchange rate (Montiel, 1997).

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Statement of the Problem

Nigeria continues to face serious depreciation of the naira against major currencies in the world and in a bid to stabilize it; monetary authorities have adopted one exchange rate policy to another. The difference policies have not helped in stabilizing the naira. Naira has depreciated so low in value from 0.6159 in 1975 to over 350.16 in 2016. This has had major constraints to economic growth and development in areas of investments in-inflow, competitiveness of the tradable sectors, and the high cost of doing business. The ability to have a stable and viable currency is a solid foundation for growth and sustainability in key sectors of the economy especially as Nigeria focuses on shifting its position from being the 39th economy in the world to becoming one of the 20th economy in world by the year 2020 as this has not been achieved.

The aspiration in this vision is to improve the nation's global competitiveness and a nation's global competitiveness comes in terms of strong, stable currency and a viable export sector but Nigerian economy still experiences.

Several steps have been taken by the Nigerian government towards the creation of a less distorted and stable economy. However, the persistent failure of government efforts to restore fiscal and monetary stability resulted in the reversal of the most important aspect of Nigeria's economic liberalization process. , that is, the liberalization of her foreign exchange regime towards the end of 1993. This was responsible going back to the fixed exchange rate system along with the centralization of foreign exchange in 1994 and restricting bureau de change to buying foreign exchange as agents of the Central Bank of Nigeria (CBN).

However, these measures were not able to narrow the official and parallel market spread, which was very high; and this negative development prompted the government to adopt a guided deregulation from 1995 to data which have not yielded desirable results as. the official rate of the naira to the US $ and other foreign currencies has consistently depreciated on yearly basis. This has put pressure on the naira exchange value both at the AFEM and at the parallel market let to further depreciation of the naira continually. It cannot be categorically pointed that certain elements determine the exchange rate fluctuation in Nigerian economy. Thus, the study capture international terms of trade shocks, government expenditure patterns, trade restrictions, net capital inflow (remittances), foreign aid flow and technological progress, as well as to expansionary macroeconomic Nigeria's real exchange rate dynamics and have explored several policies stance bothering RER in Nigeria. The issues addressed include the extent to which

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observed movement in Nigeria's RER represent a movement from the position of equilibrium, monetary variables influence and macroeconomic instability on the actual RER in Nigeria, and the impact of changes in nominal exchange rate on observed trends of RER movement.

Objective of the Study

The broad objective of this study is to examine the real exchange rate determinants in Nigeria. The specific objectives include:

i. To examine the effect of real terms of trade on real exchange rate in Nigeria;
ii. To assess the effect of real trade restrictions on real exchange rate in Nigeria;
iii. To investigate the effect of real government expenditure on real exchange rate in Nigeria;
iv. To investigate the effect of technological progress on real exchange rate in Nigeria;
v. To determine the impact of nominal exchange rate on real exchange rate in Nigeria;
vi. To determine the impact of domestic money supply on real exchange rate in Nigeria

Literature Review

Exchange Rate

Exchange Rate could be seen as the rate at which a local currency exchanges for a foreign currency; it is otherwise called foreign exchange rate and usually stated as the amount of a local currency that will exchange for a unit of foreign currency. Once the exchange rate of a currency has been fixed, the rate will be maintained all over the world through arbitrage. The exchange rate of a particular currency to other currencies are different in values. An increase in the exchange rate of Naira to the dollar indicates depreciation while a decrease in the exchange of Naira to the dollar indicates appreciation.

Exchange rate could be nominal or real exchange rates but the focus of the study is real exchange rate. Real exchange rate can be defined as the nominal exchange rate that takes the inflation differentials among the countries into account. It is also defined as the ratio of nominal exchange rate to price level (GDP Deflator).

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Terms of Trade

Terms of Trade (TOT) is one of the most important external real exchange rate determinants and is often included as one of the major determinants of both development and developing countries. The overall effects of TOT on the real exchange rate are ambiguous. The price of tradables is a weighted average of the price of exportables and importables. TOT may have two different effects on the real exchange rate, namely, income and substitution effects. The income effect results when an increase in export prices, or a fall in import prices, raises the income of an economy and increases the demand for nontradables.

Thus, in turn, tends to reduce the relative price of tradables to nontradables and causes then RER to appreciate. On the other hand, the substitution effect can be observed, because nontradables are relatively cheap. An improvement in TOT due to an export price increase brings about RER depreciation for given levels of nominal exchange rate and nontradables prices. However, if the improvement in the current account balance would increase income and the aggregate price of nontradables and cause an appreciation of the RER. The income effect would be more prominent in this case. Because of the ambiguity about the final effects of a TOT shock on the RER, the price of importables and exportables should be regards as two separate variables in determining real exchange rate behaviour.

Government Expenditure

Government expenditure is another fundamentals real variable when can cause the real exchange rate to deviate from its equilibrium value. Increases in government expenditure increase the demand for nontradables. If the major portion is spent on nontradable goods and services. In the short run, this excess demand for nontradables bids up their price and results in RER appreciation. However, there will be depreciation of the RER if the larger share of government expenditure is spent on the tradable sector rather than on consumption of nontradables. Thus, the sign of this variable can be either positive or negative in determining behaviour of the equilibrium real exchange rate.

Trade Restrictions

Trade restrictions in the form of tariffs generally cause a RER appreciation. If the tariff worsens the current account position and increases the demand for the price of nontradables, the RER appreciates. An increase in binding quantitative trade restriction (import quota) also increases the demand for import substitutes,

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which behave as nontradables due to imposition of quantitative trade restrictions during boom period. This results in higher prices and profitability for nontradables and leads to a long run equilibrium real appreciation. In these cases, the increase in the price of nontradables due to trade restrictions is higher than the increase in the composite price of tradables. However, if trade restrictions lead to a worsening of the current account deficit and reduce the demand for nontradables, there will be RER depreciation. In this case, the negative income effect will outweigh the positive substitution effect.

Technological Progress

The non-policy domestic fundamental variable, namely, technological advancement (growth rate of real gross domestic product (GDP), generally increases the efficiency and productivity of the tradable sector. Increased productivity induced by technological progress increases factor availability. By reducing the cost and price tradables, increased productivity makes the tradable sector more competitive and tends to depreciate the RER of the sector. In this situation, supply effects of technological progress offset the demand effects according to the Rybczynski principle (Edwards, 1989). If the advancement in technology increases income, however, which, in turn, increases demand for nontradables and reduces the relative price of tradables to nontradables, there will be a real appreciation. In this case, the demand effects of technological progress are greater than the supply effects and this is known as the Ricardo-Balassa effect (Edwards, 1989).

Domestic Money Supply

In order to maintain a sustainable macroeconomic equilibrium in an open economy, fiscal and monetary policies must be consistent with the exchange rate regime. Misalignment of the real exchange rate occurs due to inconsistencies between macroeconomic policies and the official exchange rate policy. Under a fixed exchange rate regime, expansionary monetary or fiscal policy raises the real stock of money, increasing the demand for both tradables and nontradables goods and financial assets. The excess demand for tradable goods results in a higher trade deficit and loss of international reserves, whereas the increased demand for nontradables raises their price and tends to cause the actual RER to deviate further from its equilibrium value.

The over-valuation of the RER, which is a fall in the actual real exchange rate from its long run equilibrium, will be short-lived and the economy adjusts through

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reduction of the money stock. The higher demand for nontradables, induced by the higher stock of money, would require a higher (actual) RER to re-establish equilibrium in the nontradables market. The stock of international reserves will fall by the decline of the real domestic money supply. The actual RER will continuously depreciate through reductions in the price of nontradable good and revert towards the long run sustainable equilibrium RER position in the long run. The time involved in the readjustment of a misaligned RER to its long run equilibrium depends on the original stock of money as well as a number of other variables.

Theoretical Framework

Edward's theory of real exchange rate determination

The role of the real exchange rate in the economic performance of both developed and developing economies has been one of the major issues of macroeconomic policy debate in recent times. There is growing agreement among economists and policy makers that while stability in the Real Exchange Rate (RER) promotes economic expansion and improved welfare, misaligned real exchange rate hinders export growth and generate macroeconomic instability. In spite of the crucial role of real exchange rate in policy discussion, empirical analyses of the factors behind the behaviour of the real exchange rate in developing countries are sparse.

In particular, there have been very limited attempts to distinguish formally between equilibrium real exchange rate (ERER) and the deviation or misalignment of RER from its equilibrium level. The real exchange rate reacts to a series of real and nominal disturbances, including international terms of trade shocks, government expenditure patterns, trade restrictions, net capital inflow (remittances), foreign aid flow and technological progress, as well as to expansionary macroeconomic policies and nominal devaluation.

The basic theoretical framework used in this study has been adopted from Edwards (1989) theory of real exchange rate determination. The theory captures most of the stylized features of a small open developing economy, including the existence of exchange and trade controls. This theory allows only the "fundamentals" or real variables to play a role in determining the long run equilibrium real exchange rate, whereas both real and nominal factors influence the actual real exchange rate in the short run.

The theory assumes as small, open economy, which produces and consumes two goods (tradable and non-tradables). Importables and exportables are aggregated into one tradable category. The government sector consumes both

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tradables and nontradables and finances its expenditures by non-distorionary taxes and domestic credit creation. The country holds both capital controls, and that there is some capital flows in and out of the country. The nominal exchange rate of the country is fixed with a basket of currencies of its major trading partners. It is also assumed that there is a tariff on imports. The price of tradables in terms of foreign currency is fixed and equal to unity, that is, $P_T = 1$. Finally, perfect foresight is assumed in this theory.

The Balassa-Samuelson Hypothesis

The Balassa and Samuelson hypothesis (BS) (Balassa 1964, Samuelson, 1964) offers in general a theoretical justification of the long run trends in real exchange rates in relation to productivity and prices. Their natural point of departure is the Salter-Swan (dependent economy) model, i.e., taking into consideration the important real world feature of having both tradable and non-tradable goods.

BS states that if a given country's productivity in producing tradable goods compared to its productivity in making non-tradable goods and services rises more rapidly than in a (certain) foreign country, then the home country real exchange rate will experience appreciation. Thus, if productivity of factors of production grows father in the home country tradable sector, then relative price in the non-tradable sector should rise (Nahuis & Geurts 2004). This would cause a faster rate of domestic inflation relative to the country with the slower rate of productivity growth and as a result the real exchange rate would appreciate. Or seen from the perspective of the income terms of trade approach the booming sector (i.e., high oil premiums) originate larger spending on both tradable and non-tradable goods and services.

Given that the tradable products are linked to the international market by the price taker (small country) supposition, the increased demand would generate higher imports. However, the prices of the non-traded goods would have to rise as they are determined by the interaction of domestic supply and demand, resulting in higher inflation.Consequently, the real exchange rate of the country under consideration would appreciate. The existence of the BS effect is corroborated by substantial empirical support, though its strength in commonly found to be quite smaller in comparison to the theoretically expected one.

Empirical Literature

The following regarding the determinants of real exchange rate has been mixed.Udousung and Umoh (2012) analyzed exchange rate determinants in Nigeria

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from 1971 to 2000. Six variables were included in the exchange rate model, including openness of the economy, import tax, balance of payment, the fiscal deficit, exports tax and trends. Their result revealed that import tax, openness of economy and export tax had positive coefficients, implying a direct positive relationship between these variables and the real exchange rate

Ajao and Igbekoyi (2013) investigated the determinants of real exchange rate volatility in Nigeria from 1981 to 2008. Using generalized auto-regression condition heteroskedasticity (GARCH) techniques and the error correction model (ECM) to examine the various determinants of exchange rate volatility in Nigeria. However, the result of their analysis suggest that the openness of the economy, government expenditures, interest rate movements and the legged exchange rate among others, were the significant variables that influenced real exchange rate volatility during the period reviewed. In terms of real exchange rate misalignment. Aliyu (2011) employed the Johansen's cointegration approach and vector error correction model to investigate RER misalignment in Nigeria. He identified terms of trade, crude oil volatility, monetary policy performance and government fiscal stance as major determinants of the RER and his study showed that the Naira was overvalued by about 5.9 per cent during 2005Q4, just before the introduction of WDAS in 2006Q1. Also, Omotosho and Wambai (2012) found that the Naira was misaligned by 0.29 percent during the period 2000 – 2011.

Rano (2008) estimated the long-run behavioural equilibrium exchange rate in Nigeria. The regression results showed that most of the long-run behaviour of the real exchange rate could be accounted for by real net foreign assets, terms of trade, the index of crude oil volatility, the index of monetary policy performance and government fiscal stance. Victor and Dickson (2012) investigated the determinants of the real exchange rate in Nigeria, where their main objective was to present a dynamic model of real exchange rate determination using data from 1970 to 2010. They considered government spending, GDP, terms of trade, capital flow, price level, technological progress and nominal effect exchange rate. The Johansen co-integration test they applied suggested that a long relationship existed among the variables.

In Angola, Takaendesa (2006) established that terms of trade, the real interest rate differential, domestic credit, the degree of openness of the economy and technological progress have long-run impact on the real exchange rate. Terms of trade, domestic credit and degree of openness of the economy have significant influence on the real exchange rate in the short-run.In a similar study for Venezuela,

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Yu-Hsing (2006) concluded that broad money supply, world interest rate country risk, and the estimated rate of inflation have adverse effect on exchange rate while government deficit appreciates the exchange rate. Quite a number of studies have also been conducted to investigate the determinants of real exchange rate in Nigeria and the extent of real exchange rate misalignment. Mapenda (2010) revealed that any increase in government consumption expenditure, the terms of trade, net foreign aid inflow and openness significantly led to currency depreciation, while an increase in world cocoa process appreciated the Ghanaian currency.

Jimoh (2006) provide evidence which shows decisive trade liberalization program of 1986 – 87 led to the depreciation of the Nigerian real exchange rate and made the real exchange rate more responsive to changes in terms of trade but other less decisive changes in trade regime produced no significant changes in the real exchange rate. Empirical findings on other emerging economies include; Mungule (2004) which attempted to explain the movement of Zambia's real effective exchange rate using a vector error correction model and quarterly time series data through the use of purchasing power parity tests, impulse response and variance decomposition functions, the study indicates that Zambia's real exchange rate depends significantly on the prevailing real fundamentals, price differentials, and real shocks similar to most studies about the nature of the determinants of the real exchange rate.

Nganda (2005) to find whether there is evidence of an empirical relationship between commodity prices and the exchange rate and whether the presence of such a link has any implications on the level of labor intensive manufacturing employment. The findings are that minimum prices are a significant determinant of the real exchange rate in South Africa and there is evidence that point to the conclusion that the exchange rate has an important impact on manufacturing output and employment as suggested by the Dutch Disease literature,. There is also evidence that shows a link between the exchange rate and export performance with appreciations positively impacting export performance.

Holtemoller and Mallick (2008) found that the higher the flexibility of the regime the lower is the misalignment. Toulaboe (2006) did a study on the impact of exchange rate misalignment on economic growth of developing countries using data from 33 countries. The result shows that average real exchange rate misalignments are negatively correlated with economic growth. The link between real exchange rate uncertainty and private investment in developing countries was done by Serven (2002) and the empirical result shows; that exchange rate volatility

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has a strong negative impact on investments, the real exchange rate uncertainty on investments is significantly larger in economies that are highly open and in those with less developed financial systems.

Methodology

The study used ex-post facto research design. Secondary data were employed and the data were collected from sources such as theglobaleconomy.com, World Bank database, international financial statistics (IFS) and publications of the National Bureau of Statistics (NBS) and Central Bank of Nigeria (CBN) statistical bulletins.This research employed aggregate annual time series data of the following variables: Real Exchange Rate (RER), Terms Of Trade (TOT), Trade Restrictions (TRT), Government Expenditure (GEXP), Technological Progress (TECHP), Domestic Money Supply (DMS) and Nominal Exchange Rate (EXC).

3.5 Model Specification

The regular method of modeling RER equilibrium is to convey the theoretical bond between RER and its major determinants. This was corroborated by the findings of (Edwards, 19888; Elbadawi, 1994). The normal formula has been employed in several research works (Ghura & Grannes, 1993, Bashir & Luqman, 2014). The estimates of this study follow the relationship found in investigating the causes of real exchange rate behaviour in Nigeria.

RER = f (TOT, TRT, GEXP, TECHP, DMS, EXC)

Its linearized version is given below:

$$\log RER = bo + b_1 \log TOT + b_2 \log TRT + b_3 \log GEXP + b_4 \log TECHP + b_5 \log DMS + b_6 \log EXC + U_t \quad 3.1$$

Where:

RER = Real Exchange Rate

TOT = External Terms of Trade, defined as the ratio of foreign price exportable to weighted foreign import price for Nigeria.

TRT = Trade Restrictions (it is measured using following formula; normal gross domestic product divided by the sun of Price of Exports and Price of Imports. Trade restriction variable is opposite to trade openness. D

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GEXP = Government Expenditure

TECHP = Technological Progress (this has been used as an explanatory variable to capture the Ricardo-Balassa effect on the equilibrium RER and is proxied by the rate of growth of real GDP.

DMS = Domestic Money Supply

EXC = Nominal Exchange Rate

Ut = Error Term.

Techniques of Data Analysis

The study employed unit root to ascertain the stationary of the data andAugmented Dickey-Fuller (ADF) was adopted . The study tested the long run relationship between the exchange rate and its determinants and Autoregressive Distributive Lag (ARDL) model.

Data Analysis and Interpretation

Augmented Dickey-Fuller (ADF) Unit Root Test

In order to establish the integration orders among the variables in the model, the ADF unit root test was employed. The non-stationary amongst data often times made it necessary for the data used in this study to be subjected to the unit root test using the Augmented Dickey-Fuller (ADF) approach to establish the stationary of the data and order of integration. In order to determine if the time series is stationary, the ADF test.

Table 3. Unit root test using the Augmented Dickey-Fuller (ADF) Statistics

Variables	At Level	At 1st or 2nd Difference	Order of Integration
RER	-1.6744	-5.8372	I(1)
RTOT	-2.0942	-5.9779	I(1)
RTRT	-2.7899	-5.3489	I(1)
TECHP	-5.0656	-	I(0)
RGEXP	-4.3927	-	I(0)
EXC	-2.4948	-5.4706	I(1)
DMA	-0.6755	-4.4781	I(1)

Source: E-views 10.0 Econometric Software

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The result of the ADF unit root test is shown in Table 3. The analysis of the ADF unit root test revealed that not all the variables was found to be stationery at levels (I(0) except for RGEXP and TECHP, hence, it becomes impossible at this stage to reject all their null hypotheses. This is so because the test statistic values at level for (RER, RTOT, RTRT, EXC and DMS) variable using the ADF test were below the critical values at one percent, five percent and ten percent levels of significance.

However, when these variables (RER, RTOT, RTRT, EXC and DMS) were differenced once, they were stationery. This is because the tests statistic values were found to be greater than the critical values at one percent, five percent and ten percent levels of significance. Having that all the variables are integrated in order 1(1) for (RER, RTOT, RTRT, EXC and DMS) and order 1(0) for RGEXP and TECHP, hence, all their null hypotheses are rejected.

Test for Long Run Relationship

The long run relationship was done using Johanson cointegration test

Table 4. Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.91485	194.1248	125.6154	0.0000
At most 1 *	0.805875	122.6880	95.75366	0.0002
At most 2 *	0.597782	75.14969	69.81889	0.0176
At most 3 *	0.543069	48.73763	47.85613	0.0412
At most 4 *	0.311719	26.02415	29.79707	0.1280
At most 5 *	0.280772	15.19096	15.49471	0.0555
At most 6 *	0.176548	5.633245	3.841466	0.0176

Trade test indicates 4 cointegrating equ(s) at the 0.05 level

* Denotes rejection of the hypothesis at the 0.05 level

** MacKinnon-Haug-Michelis (1999) p-values

Source: E-views 10.0 econometric software

Seeing that all the series were integrated of order 1(0) and 1(1) suggesting the presence of a unit root, hence, the need to determine if there is the existence of a long run relationship by conducting a co-integration test among the variables. In doing so, the study adopted the Johansen and Jesulius (1990) multi-variate co-integration approach based on trace and maximum eigen value test.

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Table 4 revealed that trace test statistics indicated only four cointegrating equation at five (5) percent level. This is because the trace statistic value in each of the four equations is greater than their critical values. Based on the trace test therefore, we can conclude that there is the presence of long run relationship among the variables in the model.

Table 5. Unrestricted Cointegration Rank Test (Maximum Eigenvalue

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.914850	71.43677	46.23142	0.0000
At most 1 *	0.805875	47.53834	40.07757	0.0061
At most 2 *	0.597782	26.41206	33.87687	0.2962
At most 3 *	0.543069	22.71348	27.58434	0.1860
At most 4 *	0.311719	10.83318	21.13162	0.6639
At most 5 *	0.280772	9.557719	14.26460	0.2426
At most 6 *	0.176548	5.633245	3.841466	0.0176

Max-eigenvalue test indicates 2 cointegrating equ(s) at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level
** MacKinnon-Haug-Michelis (1999) p-values

Source: E-views 10.0 econometric software

On the other hand, the results of the maximum Eigenvalue test in Table 4.5 indicated only two (2) cointegration equations at five percent level of significance. This is so because, the maximum Eigenvalue statistic value in the two equations is greater than their respective critical values at five percent level of significance. Based on the maximum Eigenvalue test, it is also concluded that, there is a long run relationship among the variables in the model. The long run relationship means that variables move together over time so that short-term disturbances from the long-term will be corrected.

ARDL F-Bound Test

Based on the ADF unit root test order of integration 1(0) and 1(1), the autoregressive distributive lag (ARDL) model is most suitable to capture the short run as well as the long run dynamics of our model. The F-test through the Wald test (bound test) is conducted to check the joint significance of the coefficients specified in the model. Being an F-test, the Wald test is conducted by imposing

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restrictions on the estimated long-run coefficients of determinants (RTOT, RTRT, RGEXP, TECHP, EXC, DMS) and RER.

Table 6. ARDL F-bounds Test

Hull Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	0.581711	6
Critical Value Bounds		
Significance	10 Bound	11 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Source: E-view 10.0 Econometric Software

The selection criteria of the ARDL bound test tabulated lower and upper bound are one percent, five percent, and ten percent significance level. The result of the ARDL result conducted revealed that, the coefficients of determinant (RTOT), RTRT, RGEXP, TECHP, EXC, DMS) are not jointly co-integrated with the dependent variable, RER, hence, the absence of long-run relationship between the independent variables. and dependent variable. This is because the calculated F-statistic is 0.58 compared with Pesaran critical value at all levels of significance is lower than the lower bound (2.12) and the upper bound (4.43). This result indicated that there exist no evidence of long-run co-integration between (RTOT, RTRT, RGEXP, TECHP, EXC, DMS) and RER.

ARDL Cointegration and Long Run Test Effects

As a result of the insignificant long run relationship between (RTOT, RTRT, RGEXP, TECHP, EXC, DMS) and RER, there is need to assess and estimate the effects of the long run coefficients. The long run coefficients measure the long run effects of the independent variables on the dependent variable. From the ARDL cointegration test analyzed, the long run estimates are shown in table 7

The result of the long run estimates showed that the long run effect between RGEXP and RER was negative (-10.0861) and insignificant (0.9639); the long run effect between RTOT and RER was negative (-18.4109) and insignificant (0.9639);

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the long run effect between RTRT and RER was positive (16.3261) and insignificant (0.9625); the long run effect between TECHP and RER was positive (0.1188) and insignificant (0.9631); the long run effect between EXC and RER was negative (-16.3222) and insignificant (0.9631); the long run effect between DMS and RER was positive (15.5723) and insignificant (0.9633). With the absence of a long run cointegration between the variables, further tests are conducted to ascertain whether the model is free from serial correlation and problem of stability.

Table 7. ARDL Cointegration and Long Run Effects Result

Long Run Coefficients

Variable	Coefficient Std.	Error	T-statistic	Prob,
LRGEXP	-10.086149	218.867789	-0.046083	0.9639
LDMS	15.572304	332.030340	0.046900	0.9633
LRTOT	-18.410944	399.097971	-0.046131	0.9639
LRTRT	16.326186	340.869864	0.047896	0.9625
LEXC	-16.322272	369.458234	-0.044179	0.9654
TECHP	0.118862	2.523207	0.047108	0.9631
C	40.835869	946.175434	0.043159	0.9662

Source: E-view 10.0 econometric software

Test of Hypotheses

The hypotheses for the study were tested using ARDL Short Run Test

The short run dynamics of the ARDL as shown in table 8 revealed that the ARDL model has a good fit on the data in the short run. This is given by the high value of the R-squared of 0.9985 (99.85 percent) and the adjusted R-squared of 0.9966 (99.66 percent). Based on the value of the adjusted R-squared, about 99.7 percent of the systematic variations in the real exchange rate in Nigeria has been determined bychanges in real terms of trade (RTOT), real trade restrictions (RTRT), real government expenditure (RGEXP), technological progress (TECHP), nominal exchange rate (EXC) and domestic money supply (DMS).

On the same note, the high value of F-statistics (542.6997) shows that the overall model is statistically significant. The overall significance of the short-run model implies the joint significance of all explanatory variables in explaining short-run changes in the real exchange rate position in Nigeria.

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Table 8. ARDL Short Run Dynamics Result

Variable	Coefficient Std.	Error	t-Statistic	Prob.
LRGEXP(-1)	-0.246843	0.115287	-2.141111	0.0535
LDMS	0.739269	0.212300	3.482181	0.0045
LRTOT(-1)	-0.210293	0.161488	-1.302218	0.2173
LRTRT	0.192783	0.121134	1.591482	0.1375
LEXC	0.919039	0.151581	6.063032	0.0001
TECHP	0.001317	0.001028	1.281413	0.2243
C	0.421502	1.051406	0.400894	0.6955
ECT(-1)	0.028530	0.478002	0.059686	0.9534
R-squared	0.998528	Mean dependent var		1.473336
Adjusted R-squared	0.996688	S.D. dependent var		1.593376
S.E. of regression	0.091697	Akaike info criterion		-1.645096
Sum square resid	0.100900	Schwarz criterion		-0.883836
Log likelihood	39.03134	Hannan-Quinn criterion		-1.412371
F-statistic	542.6997	Durbin-Watson statistic		1.972348
Prob(F-statistic)	0.000000			

Dependent Variable LRER

Source: E-view 10.0 econometric software

The result for the variables shows that the unexpected positive sign of error correction term (ECT) is highly insignificant. The highly insignificant ECT further confirms the existence of an unstable and insignificant relationship between real exchange rate and its determinants in Nigeria with their various lags. The coefficient of ECT (0.0285) imply that deviation away from the long run real exchange rate (RER) is uncorrected by 2.85 percent by the following year. This positive sign signal a non-oscillating convergence in real exchange rate (RER) and a movement away from equilibrium.

Analysis of the short-run estimates revealed further that, changes in the previous lagged period of real government expenditure (RGEXP) have a negative but significant impact on the current value of real exchange rate (RER) in Nigeria. The negative value (-0.2468) revealed that, a percent increase in real government expenditure will negatively impact real exchange rate determination in Nigeria by 0.24468 in the short run, ceteris paribus.

Further analysis of the short-run estimated revealed that, changes in the current period of domestic money supply (DMS) have a positive and significant impact on the current value of real exchange rate (RER) in Nigeria. The positive value

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(0.7392) revealed that, a percent increase in domestic money supply will positively impact real exchange rate determination in Nigeria by 0.7392 in the short-run, ceteris paribus.

Analysis of the short-run estimated revealed further that, changes in the previous lagged period of real terms of trade (RTOT) have a negative and insignificant impact on the current value of real exchange rate (RER) in Nigeria. The negative value (-0.2102) revealed that, a percent increase in real terms of trade will negatively impact real exchange rate determination in Nigeria by 0.2102 in the short run, ceteris paribus.

Analysis of the short-run estimated revealed further that, changes in the current period of nominal exchange rate (EXC) have a positive and significant impact on the current value of real exchange rate (RER) in Nigeria. The positive value (0.9190) revealed that, a percent increase in real terms of trade will positively impact real exchange rate determination in Nigeria by 0.9190 in the short run, ceteris paribus.

Finally, the analysis of the short-run estimates revealed further that, changes in the current period of technological progress (TECHP) have a positive but insignificant impact on the current value of real exchange rate (RER) in Nigeria. The positive value (0.0013) revealed that, a percent increase in technological progress will positively impact real exchange rate determination in Nigeria by 0.0013 in the short run, ceteris paribus.

Discussion of Findings

The study empirically examined real exchange rate determinants in Nigeria. The study also adopted the ARDL model technique as a result of the ADF unit root test orders of integration (1(0) and 1(1)). The ARDL bound test revealed the absence of a long run existence in the model. This was as a result of the F-statistics value being lower than the Pesaran lower and upper critical bound values. The ARDL model was also subjected to the serial correlation and stability tests. The results revealed that the model satisfied both the no serial correlation and stability requirements and conditions. The stability test was conducted using the CUSUM stability test.

The ARDL short run dynamics test was conducted to attempt to correct the existing disequilibrium position in the short run. The error correction (ECM) factor did not have a negative sign and was not statistically significant as theoretically expected. The highly insignificant ECT further confirms the existence of the long

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run insignificant relationship between real exchange rate and its determinants in Nigeria with their various lags.

Further analysis of the ARDL results revealed that, the coefficient of real government expenditure (RGEXP) is both correctly signed and significant statistically. The implication of the negative sign of the coefficient is that increase in government spending relative to GDP induces real exchange rate depreciation. This is because in the long run, higher government spending most likely according to Maesofernandez, Osbat and Schnatz (2001) undermines confidence in a currency thereby leading to distortions and consequently exerts a negative effect on the real exchange rate. This is, however, not to deny the fact that an increase in real government expenditure which increases the demand in the nontradable sector stimulates higher productivity, conserves foreign exchange, which otherwise would be used for imports, and improves real exchange rate. Perhaps this condition is not likely to hold for Nigeria given the low level of capacity utilization, high energy and other operating costs, among others, in the nontradable sector.

This was also supported by Bouakez and Eyquem (2011) that an unexpected increase in public expenditures leads to a fall in the risk-adjusted long-term real interest rate causing the real exchange rate to depreciate. In their study, they proposed a small-open-economy model that features three key ingredients: incomplete and imperfect international financial markets, sticky prices, and a not too-aggressive monetary policy. The coefficient of the RGEXP has the expected negative sign with respect to the RER in the model but it does not have any significant effect in the long run but does in the short run at the conventional five percent level of significance.

The role of macro policy as proxied by domestic money supply is found to be significant in affecting the RER in the model in the short run. A one percent increase in domestic money supply will insignificantly appreciates the RER by 15.57 in the long run though, however, domestic money supply will appreciate RER significantly by 0.739 in the short run. Unsustainable macroeconomic policy, in terms increased domestic money supply, raises the domestic price of nontradables and appreciates the RER, confirming the theoretical analysis of the RER. Furthermore, Yu-Hsing (2006) concluded that broad money supply, would interest rate, county risk, and the estimated rate of inflation have adverse effect on exchange rate while government deficit appreciates the exchange rate.

Theoretically, the sign of coefficient of terms of trade is ambiguous. It depends on whether the substitution or income dominants. Here, the positive income effect

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of a change in terms of trade dominates and hence the coefficient's sign is positive. Although Nigeria is a price taker in the world economy, faces quantity restrictions from the organization of oil producing states (OPEC) and crises in the oil producing region, which adversely affect supply, yet changes in its terms of trade results in appreciation of real exchange rate. This development and indeed those in the above could, however, spur more imports into the economy.

The result indicates that an improvement in RTOT does not have any significant short run and long run impact on the real exchange rate. With the coefficient indicating a negative sign in relation to RER, it is not statistically significant in either the short run or the long run at conventional five percent level of significance. The finding of this study disagrees with Victor and Dickson (2012). They investigated the determinants of the real exchange rate in Nigeria, where their main objective was to present a dynamic model of real exchange rate determination using data from 1970 to 2010. They considered government spending, GDP, terms of trade, capital flow, price level, technological progress and nominal effective exchange rate. The Johansen co-integration test they applied suggested that a long relationship existed among the variables.

With respect to trade restrictions, it is seen that due to more trade restrictions and import barriers on the nation, it would lead to exports and it appreciation of real exchange rate. From the results of this study, real trade restrictions have an insignificant positive effect on RER. The result indicates that the introduction of restrictive trade policies from the mid-1980s appreciated the RER in the long run as well as in the short run. Trade restrictions tend to have appreciated the RER in Nigeria by 16.32 percent in the long run and by 0.19 percent in the short run. Thus, the trade regime has an important bearing on the movement of RER in Nigeria.

Conclusion and Recommendations

The findings showed that there is no significant relationship between real terms of trade and real exchange rate in Nigeria; there is no significant relationship between real trade restrictions and real exchange rate in Nigeria; there is no significant relationship between technological progress and real exchange rate in Nigeria. However, it is demonstrated that there is a significant relationship between real government expenditure and real exchange rate in Nigeria and there is a significant relationship between nominal exchange rate and real exchange rate in Nigeria. The ARDL result concluded that, at the long run level, the real variables alone that influences real exchange rate in Nigeria were insignificant. However,

real exchange rate in Nigeria was determined by both real and nominal variables are the core fundamentals that determined real exchange rate in Nigeria mostly in the short run. It is therefore recommended that there is need for the monetary authority in Nigeria to create enabling environment that will encourage and attract international trade activities by investing in the infrastructure of the nation

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