

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/336838889>

ASSESSMENT OF SHORT RUN AND LONG RUN DETERMINANTS OF EXCHANGE RATE IN NIGERIA 1980 TO 2015

Article · April 2018

DOI: 10.29816/sjss.8.1.5

CITATIONS

0

READS

180

2 authors:



Musa Abdullahi Sakanko

Federal University of Technology Minna

62 PUBLICATIONS 266 CITATIONS

SEE PROFILE



Mohammed Yelwa

University of Abuja

22 PUBLICATIONS 190 CITATIONS

SEE PROFILE

ASSESSMENT OF SHORT RUN AND LONG RUN DETERMINANTS OF EXCHANGE RATE IN NIGERIA 1980 TO 2015

Musa Abdullahi Sakanko¹ and Mohammed Yelwa²

¹Department of Economics, Ibrahim Badamasi Babangida University Lapai, Niger State

²Department of Economics, University of Abuja, Nigeria

Corresponding Author's email:



DOI: 10.29816/sjss.8.1.5

ABSTRACT

This study is based on the investigation of the determinants of exchange rate in Nigeria using time series data from 1980 to 2015 and employed Autoregressive Distributed Lagged Model (ARDL) and Error Correction Mechanism (ECM) to capture both the short-run and long run determinants of exchange rate in Nigeria. The results revealed that the past value of interest rate, current inflation rate and current government expenditure causes the Nigeria exchange rate to appreciate, hence, they have a negative relationship with the exchange rate while past value of exchange rate, current value of interest rate, past value of trade openness, past value of government expenditure and current value of foreign direct investment causes depreciation of the Nigeria exchange rate due to their positive relationship with the exchange rate. The author recommend that the monetary authority should employ strategies that will prevent the rise in the interest rate differentials and previous value of exchange rate as well increase the inflation rate by employing the expansionary monetary policy. In addition government should increase their consumption expenditure and reduce the openness of the Nigeria economy by employing trade barriers which will lead to appreciation of the Nigeria exchange rate. As such, the government should discourage the inflow of capital from foreign countries as they cause the Nigeria exchange rate to depreciate.

Keywords: Short, Long run, Nigeria, Autoregressive Distributive Lagged Model, Error Correction Model

1.0 Introduction

The most important and recognized tie between the external or international economy and the internal economy is the exchange rate. As such, it stand out to be an important macro-economic variable which if not gotten right will lead to disequilibrium in

the internal and external balances of the economy. To avoid distortion of the internal and external equilibrium, the analysis of actual determinants of the exchange rate needs special devotion and critical attention by government that tend towards achieving a

sustained growth rate in the economy (Dosse, 2007).

When it comes to economic policy making, the exchange rate is an important macroeconomic variable and thus much attention is given to the foreign exchange policies to ensure its appropriateness. Since the performance of other macro-economic variables are affected by its changes in value (depreciation and appreciation).

The appreciation of exchange rate means less of local currency is required to get a foreign currency, and depreciation of the exchange rate means, more of the local currency is required to get less of the foreign currency. When there is depreciation in one country's currency in terms of the other, there is equally an appreciation in the currency of the other country's currency. Therefore every country is on the go to attain appreciation in its currency, hence the need to find out the determinants of the exchange rate so as to focus on those that appreciate the exchange rate.

The determinants of exchange rate has been a serious issue of deliberation among economic scholars, policy makers and politicians in and outside of Nigeria. From available literatures sourced, the determinants of exchange rate tend to change from one country to the other, also from time to time in a particular country. Reasons may be due to numerous exchange rate policies and programs set up by different successive administrations in the country, since there may be variation in the economic health of the country at different time. So as to strengthen the Naira against the US Dollars, the Central Bank Governor early this year introduced a new exchange rate policy which its implication is a floating exchange rate as there will be a single market for the acquisition of the foreign currency.

In Nigeria, it has not been an easy task in the determination of appropriate exchange

rate. Before the introduction of Structural Adjustment Policy (SAP) in 1986, the Naira was said to be overvalued since it was on a fixed exchange rate regime, this led to the practice of flexible exchange regime so its actual value could be determined by the forces of demand and supply. Even after the devaluation that followed, the Naira has not been able to get its appropriate value, the desired objectives are yet to be achieved by the exchange rate policies formulated overtime.

The implementation of the fluctuating exchange rate policies such as the Second-tier foreign exchange market (SFEM), Dutch Auction System (DAS), Modified Dutch Auction System (MDAS), Weighted Dutch Auction System (WDAS), among others which did not give the required results led to the revert of the fixed exchange rate policy in 2008.

According to Ibrahim (2015), the depreciation of the exchange rate has been a serious problem since the beginning of democracy rule in Nigeria, as a result of the fall in the price of crude oil in the international market, which has been Nigeria's main source of foreign earning. As a result, there arise a need to find out the main factors that determine the Nigeria exchange rate, so as to focus on the factors that significantly determine the exchange rate and can be used to strengthen the Naira against the currencies of Nigeria's trade partners as well reduce the level of fluctuation of the Naira.

Among factors that induced the inappropriateness of the Nigeria exchange rate is the nature of its production base, high dependence in importation, weak earnings from exportation of non-oil products, faulty policies by the fiscal and monetary authorities, insufficient inflow of foreign capital, shortfall between the demand and supply of foreign exchange, instability in the price of crude oil in international market, activities of speculators and reselling of foreign exchange by authorized dealers in the foreign exchange

market in an inappropriate rate (round tripping), and the nature of the foreign exchange markets.

Other factors that led to the misalignment of exchange rate in Nigeria is excessive debt burden, foreign capital moving out of the country due to unfavorable policy, and weak position of the balance of payment as there is problem of import exceeding export (Obadan, 2006).

Due to the recognition of the importance of the exchange rate in attaining sustained growth, its fluctuation has led to debate among scholars, monetary authorities, policy makers and researchers. This has led to the continuous effort of monetary authorities and government to get the appropriate rate of the exchange rate which will stimulate growth in the economy (Udoye, 2009).

Therefore, the importance of exchange rate in an economy cannot be over emphasized, as such factors that determines it's appreciation as well as depreciation need to be known thereby increasing and decreasing this factors respectively Even though in 2016 the Central Bank of Nigeria (CBN) launched a new foreign exchange policy, the floating exchange rate to enable the market forces to determine the exchange rate instead of the monetary authority as well strengthen the Naira against the currency of its major trade partners, especially the US dollars, it is still important to know the macro-economic variables that determine the behavior of the exchange rate in Nigeria, thus the relevance of this study. Though many scholars and authors such as Udoye (2009), Ibrahim (2016), Ben et al (2010), among others have studied the determinants of exchange rate in Nigeria. The research was carried out when the Nigeria economy is still enjoying some amount of economic prosperity and the exchange rate is relatively stable unlike present when the Nigeria economy is in recession and the exchange rate is

depreciating rapidly and the possible macro-economic variables are high (such as inflation, unemployment, exchange rate etc) which will give adequate result on the main determinants of exchange rate in Nigeria.

The problems above gave rise to the following research questions; what are the macro-economic variables that determines the exchange rate in Nigeria? Do the determinants of exchange rate have a long-run relationship with exchange rate? And finally, do the past value of exchange rate determine current exchange rate?

Apart from the controversy surrounding the determinants of exchange rate variation on existing empirical literature, it must be stated that a lot of works has been done on the determinants of exchange rate in Nigeria. But only few authors examines how the past value of exchange rate influence its current value in Nigeria in different period. This study finds it expedient to fill this gap in the literature. Therefore, the study will adopt the methodology employed by Udoye (2009), which means this study will employ the ARDL-ECM model to capture the impact of the lag value of independent variables on the dependent variable. Also use the ECM to capture the speed at which the variables will return to equilibrium in the long-run. For this study, the lag of exchange rate and trade openness both the present and previous value will be included in the model, as well as other macro-economic variables which have the possibility of influencing the Nigeria exchange rate.

The objective of this study is to ascertain the determinants of exchange rate in Nigeria for 36 years (1980-2015). The study is divided into five sections. Section two after the introduction is literature review, section three methodology, section four recommendations and conclusions and section five References.

2.0 Literature Review

Ibrahim (2016) studied the determinants of real effective exchange rate in Nigeria from 1960 to 2015 using the Vector Error Correction Mechanism (VECM) was used to separate the short-run fundamentals of exchange rate in Nigeria from the long-run fundamental. The regression result reveals that M2, Nominal Effective Exchange Rate (NEER) and the three dummy variables (civil rule dummy, SAP dummy and change to civil rule dummy) were the major short-run fundamentals of exchange rate in Nigeria, while term of trade, net inflow of capital into Nigeria, degree of openness and government expenditure are the long-run fundamentals of exchange rate in Nigeria.

Ibrahim (2016) examined the impact of real effective exchange rate misalignment on economic growth in Nigeria from 1960 to 2011 using purchasing power parity (PPP) and generalized method of moment (GMM) approaches. The result from the PPP approach shows that the period of flexible exchange rate regime is characterized by a relatively lower real exchange rate misalignment over time compared with the fixed exchange rate regime. The GMM estimate reveals that real exchange rate misalignment has negative but significant impact on economic growth over the period under consideration.

Adelowokan, Adesoye and Balogun (2015) in their study of the effect of exchange rate volatility on investment and growth in Nigeria using the vector error correction method found out that exchange rate volatility has a negative effect with investment and growth while exchange rate volatility has a positive relationship with inflation and interest rate in Nigeria.

Chowdhury and Hossain (2014), used a time series data from 1990 to 2011 to study the exchange rate determinants for Bangladesh. Using OLS method of regression and found that the GDP growth rate, inflation, interest rate and current account balances are

the major determinants of exchange rate in Bangladesh.

Nwude (2012), investigated the determinants of foreign exchange rate in Nigeria from 1960 to 2011, employed the OLS method of regression and concluded from the regression result that the inflation rate, Gross Domestic Product (GDP), balance of payment, interest rate and external reserve have no possibility of influencing the Nigeria's exchange rate.

Oriavwota and Oyovwi (2012) examined the determinants of real exchange rate in Nigeria from 1970 to 2010, employed OLS method of regression analysis, Johansen test for co-integration and error correction mechanism. The co-integration result reveal that exchange rate and variables included in the model has long-run relationship. The regression result employing the mechanism of error correction method shows that inflation rate, inflow of capital, and NEER are the main long-run determinants of exchange rate in Nigeria, while other variables such as terms of trade (TOT), government expenditure and technology progress included in the model do not determine exchange rate in Nigeria.

Shabana Parveen, Khan and Ismail (2012) analyzed the factors affecting exchange rate variability in Pakistan from 1975 to 2010, employed the ordinary least square (OLS) method and the result revealed that inflation is the main variable that affect and cause fluctuation in the exchange rate of Pakistan economy.

Ben, et al (2010) empirically studied the determinants of exchange rate in Nigeria from 1970 to 2007, employed the error correction mechanism (ECM) and Johansen co-integration. The finds revealed that the variables possess long-run relationship and inflation, GDP and the ratio of investment to GDP has a negative relationship with exchange rate while rise in foreign exchange reserve,

interest rate and degree of openness has a positive influence on exchange rate..

Udoye (2009) empirically analysed the determinants of exchange rate from 1970 to 2006 using the Auto-Regressive Distributed Lag Model and error correction mechanism (ARDL-ECM) and found that the main determinants of exchange rate are lag of exchange rate and the current and past year value of trade openness and also the existence of long run relationship between exchange rate and the GDP and trade openness.

Hsing (2006), studied the determinants of exchange rate fluctuations for Venezuela applying the extended mundell-fleming model. The study employed the OLS method of regression and was based on the examining of the short-term behaviour of Venezuela exchange rate. The result shows that liquid assets (M2 money balances) and government expenditure has a positive relationship with the exchange rate of Venezuela while variables like the interest rate, inflation rate and the nature of risk of the country has a negative relationship with the exchange rate.

3.0 Methodology

Data on exchange rate (US Dollar equivalent), annual inflation rate (consumer price index), lending interest rate and interest rate on deposit differentials, foreign direct investment, country's degree of openness (as proxy by the ratio of import to export by GDP), and government expenditure used for this study were sourced basically from the World Bank data bank 2016 (WDI).The Autoregressive Distributed Lagged (ARDL) and Error Correction mechanism (ECM) methodology of regression analysis will be employed for this study as it also follows the properties of OLS.

Model Specification

The model was adapted from the empirical analysis of Udoye (2009). Though other variables which influences exchange rate from literature will be added to the model so as to suite the objectives of the study.

The model in its functional form is as follows:

$$EXC = f(INT, INF, TOP, GEX, FDI) \text{-----}(3.1)$$

Where;

EXC = Exchange rate

INT = Interest rate differentials

INF = Inflation rate

TOP = Degree of Trade Openness

GEX = Government Expenditure

FDI = Foreign Direct Investment

For empirical analysis, equation (3.1) is transformed to:

$$EXC_t = \delta_0 + \delta_1 INT_t + \delta_2 INF_t + \delta_3 TOP_t + \delta_4 GEX_t + \delta_5 FDI_t + \mu_t \text{-----}(3.2)$$

Where;

t = no. of time series observation

$\delta_0 - \delta_5$ = coefficients to be estimated

μ_t = the error term

The response of the dependent variable to the sets of independent variables is not usually instantaneous, it usually takes lapse of time, and thus equation (2) is transforms into a dynamic model.

$$EXC_t = \delta_0 + \delta_1 INT_{t-i} + \delta_2 INF_{t-i} + \delta_3 TOP_{t-i} + \delta_4 GEX_{t-i} + \delta_5 FDI_{t-i} + \mu_t \text{-----} (3.3)$$

Where; t-i is the lag length, one of the model selection criteria will be used to select the maximum lag for each of the variables in the model.

Therefore Equation (3.3) will be transform to an Autoregressive Distributed Lagged (ARDL) model as the past and present values of the independent variables and as well as the past values of the dependent variable are included in the model.

$$EXC_t = \delta_0 + \delta_1 EXC_{t-1} + \delta_2 INT_{t-1} + \delta_3 INF_{t-1} + \delta_4 TOP_{t-1} + \delta_5 GEX_{t-1} + \delta_6 FDI_{t-1} + \mu_t \text{-----} (3.4)$$

Where; EXC_{t-1} = past year value of the dependent variable.

Since Equation (3.4) include the past year value of the dependent variable as a regressor in the model with the lagged values of the independent variables, the model is therefore Autoregressive Distributed Lagged (ARDL) in nature.

As against the universal assumption that time series data are stationary, the Augmented Dickey-Fuller (ADF) statistics will be used to check for unit root (non-stationarity) in our data. This will aid to avoid generating a spurious result due to the unit root. Therefore before estimating our ARDL model in equation (4), we test for stationarity.

$$\Delta EXC_t = \delta_0 + \alpha t + \gamma \Delta EXC_{t-1} + \lambda_1 \Delta EXC_{t-1} + \dots + \lambda_p \Delta EXC_{t-p} + \mu_t \text{-----} (3.5)$$

$$\begin{matrix} : & : & : & : \\ : & : & : & : \\ : & : & : & : \end{matrix}$$

$$\Delta FDI_t = \delta_0 + \alpha t + \gamma \Delta FDI_{t-1} + \lambda_1 \Delta FDI_{t-1} + \dots + \lambda_p \Delta FDI_{t-p} + \mu_t \text{-----} (3.6)$$

Where; δ_0 is the constant term,

αt = coefficient on a time trend

The stationarity check are thus carried out under the hypotheses;

$$H_0: \gamma = 0 \text{ and } H_1: \gamma < 0$$

If γ is 0, ρ will be unitary (1), which as situation of unit root (non-stationary). If the null hypothesis is rejected base on the ADF statistics being greater than its critical values, the alternative hypothesis which is a condition for no unit root (stationary) for ρ will be 0, will be accepted. Since the alternate hypothesis is less than zero (0). Most time series data are usually stationary after first or second differencing. Therefore our differenced model will be;

$$\Delta EXC_t = \delta_0 + \delta_1 \Delta EXC_{t-1} + \delta_2 \Delta INT_{t-1} + \delta_3 \Delta INF_{t-1} + \delta_4 \Delta TOP_{t-1} + \delta_5 \Delta GEX_{t-1} + \delta_6 \Delta FDI_{t-1} + \mu_t \text{-----} (3.7)$$

If after checking for the unit root (non-stationarity), the dependent variable (exchange rate) and the independent variables are made stationary at same order, it thus means that the dependent variable and independent variables are stationary at same order, we then reject the null hypothesis and accept alternative hypothesis. The residuals obtained from their linear combination [$\mu_t = EXC_t - \delta_0 - \delta_i DET_t$. Where; DET are the independent variables] will be stationary at level or integrated of order 0 "I(0)".

$$\Delta EXC_t = \delta_0 + \delta_1 \sum_{i=0}^n \Delta EXC_{t-i} + \delta_2 \sum_{i=0}^n \Delta INT_{t-i} + \dots + \delta_6 \sum_{i=0}^n \Delta FDI_{t-i} + \delta_7 \mu_{t-1} + \epsilon_t \text{-----} (3.8)$$

Where;

δ_7 = Error Correcting Term coefficient

μ_{t-1} = the error Correction Term

Therefore Equation (3.8) is Autoregressive Distributed Lagged Model – Error Correction Model (ARDL-ECM). If there exist co-integration among the variables Equation (3.8) will be estimated, else Equation (3.7) will be estimated.

Also a post-estimation test on autocorrelation, heteroscedasticity, normality, stability and multicollinearity will be carried out to check if the model violates the assumptions of the classical linear regression model.

Discussion of Result

From Table 4.1 it can be seen that under the mean parameter column, the dependent variable EXC has an average value of 69.44041 across 36 years under observation. This can be attributed to the unstable nature of the exchange rate. The independent variables TOP, INF, GEX, INT and FDI have the average value of 51.05468, 19.44403, 9.429540, 6.058930 and 2.892737 respectively. Under the standard deviation column, it can be seen that all the variables have high volatility except the FDI which has a relatively low standard deviation. The high value of the standard deviation of the EXC certify the diversity of our sample. Furthermore, the overall maximum value from Table 4.1 is the EXC having 192.4405 and the overall minimum value is FDI having -1.150856. All the variables have 36 observations included except for the GEX whose 1980 value was not available.

Table 4.2 shows the result from the ADF unit root test. EXC, INT, INF, TOP, GEX and FDI were made stationary after first differencing. Given 1% and 5% level critical value and the ADF test statistics. Conventionally, when the ADF test statistic is greater than the critical value at either 1%, 5% or 10% critical value, the null hypothesis is rejected (H_0 = Variable has a unit root) and the H_1 is accepted. Since EXC the dependent variable and the independent variables are integrated of same order, this prompts the test for co-integration using the Johansen Co-integration method to test if the variables have a long-run relationship.

From the co-integration result in Table 4.3, it shows that the variables are co-integrated or have a long-run relationship since the trace

statistics exceeds the critical value. The Max-Eigen value also confirms the long-run relationship of the variables.

The Trace statistics and max-Eigen value in Tables 4.3 and Table 4.4 confirms that the dependent variable (EXC) and the independent variables have a long-run relationship. Since the long-run relationship between EXC and the independent variables have been established, the long-run regression is therefore carried out.

Since the dependent variable EXC and the independent variables (INT, INF, TOP, GEX, and FDI) are integrated of same order, and the trace and Max-Eigen value of co-integration also confirms the existence of long-run relationship among the variables. Thus we run a long-run regression analysis.

From the long-run estimation established in Table 4.5, it was discovered that interest rate has a positive relationship with exchange rate as a result of its coefficient of 13.8. It implies that, on average, when the lending interest rate and deposit interest rate differentials increase by a unit, it will lead to an increase (depreciation) in exchange rate by 13.8 percent. Going by the t-statistics and p-value of the interest rate, it is statistically significant in explaining exchange rate at 5% level of significance. Inflation, unlike the interest rate shows a negative relationship with exchange rate. On average, a percent increase in the rate of inflation in Nigeria, will cause the exchange rate to appreciate by 1.58 percent. Also the t-statistics and p-value of inflation in the model is statistically significant in explaining the Nigeria exchange rate. Trade openness having a coefficient of -0.91 shows a negative relationship between the degree of trade openness and the exchange rate. Thus, a percent increase in the degree of openness of the Nigeria economy will bring about 0.91 percent decrease (appreciation) in the Nigeria exchange rate. Going by its t-statistics and probability value, it is statistically significant in

explaining the Nigeria exchange rate on 10% level of significance.

When government increases its expenditure, it will cause the exchange rate to appreciate by 4.0 per cent. This is because government expenditure has a negative relationship with the Nigeria exchange rate. It is a decreasing function of exchange rate. It is statistically significant in explaining the Nigeria exchange rate on a 10% level of significance.

Finally, the variable representing net inflow of capital from foreign countries (FDI) has a positive relationship with the Nigeria exchange rate. When the volume of foreign direct investment increases on average by a unit, it will cause the Nigeria exchange rate to depreciate by the tune of 1.5 per cent. It is not a long-run determinant of exchange rate due to its low t-value and very high p-value. Therefore it is not statistically significant in explaining the Nigeria exchange rate, and thus not a determinant of exchange rate.

The long-run estimate in Table 4.5 shows that the interest rate, inflation rate degree of trade openness and government expenditure are statistically significant in explaining the Nigeria exchange rate in the long-run model. Interest rate and foreign direct investment rate has a positive impact on the Nigeria exchange rate while Inflation rate, degree of trade openness and government expenditure has a negative impact on the Nigeria exchange rate respectively. The negative relationship of the inflation rate, trade openness and government expenditure to exchange rate means appreciation of the exchange rate while the positive relationship of the interest rate and foreign direct investment means depreciation of the exchange rate. Therefore the interest rate, inflation rate, degree of trade openness and government expenditure are the major long-run determinants of exchange rate in Nigeria.

The F-statistics and R^2 both affirm to the correctness of the model. The major long-run

determinants of exchange rate in Nigeria explains about 56% of deviation of exchange rate in the model. The D-W statistics shows that the model is faced with a positive autocorrelation. The result in Table 6 is the short-run ARDL and ECM estimate of the long-run estimate in Table 4.5. The choice for the one (1) period lag length is guided by the Akaike Info Criteria (AIC). The R^2 value of 0.696490 shows that the model is rightly fitted, for about 69.6% of the deviations of the dependent variable EXC is explained by the independent variables, which include their one period lag and the past value of exchange rate. Also the F-Statistic Value coupled with its probability value shows that the independent variables are jointly significant in explaining the dependent variable EXC. In the ARDL-ECM model, the past value of exchange rate, current interest rate differentials, past value of interest rate, current inflation rate, one period lag value of trade openness, current value of government expenditure, past year value of government expenditure and the current value of foreign expenditure are the only statistically significant variables or determinants of exchange rate in Nigeria. The past value of exchange rate, interest rate, lagged value of trade openness, past value of government expenditure and current value of foreign direct investment cause the Nigeria exchange rate to depreciate as they influence exchange rate positively, while the one period lag value of interest rate, past value of inflation, the current value of government expenditure and foreign direct investment leads to the appreciation of Nigeria exchange rate as they influence the exchange rate negatively.

The ECM result is rightly stated as the error correction term is negative and highly significant. The coefficient of the error correction term measures the speed of adjustment of the determinants of exchange rate to equilibrium.

The empirical result shows that the macro-economic variables including the lags account for about 69.6% variation in the exchange rate. About 69.6% variations in the dependent variable is explained by the independent variables. The F-statistic shows that the model is correctly fitted as all the included variables are jointly significant in explaining the exchange rate in Nigeria. Base on the DW-statistic and Breush-Godfrey serial correlation LM test, the regression is not faced with autocorrelation of whatever. Also the Breush-Pagan-Godfrey and White's test for heteroscedasticity confirms that there is no heteroscedasticity (homoscedasticity) in the model.

From the short-run ARDL-ECM regression estimate, the constant term (intercept), which is the value of exchange rate when all the macro-economic variables included in the model are held constant, is positive and high though not statistically significant.

The past year value of exchange rate has a negative relationship with exchange rate which translate to depreciation of the Nigeria exchange rate. This is in contrast with the findings of Ibrahim (2016) and Udoye (2009) in which the lag of exchange rate take an appreciation effect on the Nigeria exchange rate. On average, based on the above result, a 1 percent increase in the value of past exchange rate will lead to a 1.67 percent increase (depreciation) in the Nigeria exchange rate. Based on the t-statistics and p-value the past year value of exchange rate is a major determinant of exchange rate in Nigeria for it is statistically significant in explaining the exchange rate.

The interest rate in the current period influence the Nigeria exchange rate positively and influences the Nigeria exchange rate negatively in the one period lag. On average, a 1 percent increase in the lending and deposit interest rate in the present and past value will cause the exchange rate to depreciate by 2.32

and appreciate by -2.26 respectively. Interest rate is thus an increasing (depreciation) function of exchange rate in the current period and a decreasing (appreciation) function of exchange rate in the one year lag. The depreciation effect of interest rate on exchange rate in the result support the findings of Nwude (2012), Obi, Wafure and Abu (2010) and Udoye (2009). Both the current and the past value of interest are the major determinants of exchange rate based on their individual t-statistics and p-value which is statistically significant.

Unlike the interest rate, the present and the past value of inflation both has a negative relationship with exchange rate. This is inline with Nwude (2012), Ben et al (2010), doye (2009) and Oriavwota and Oyovwi (2012) Inflation in Nigeria has an appreciation effect on exchange rate. Base on the empirical result above, on average, a 1 percent increase in inflation rate both the current and past value will lead to -0.38 and -0.23 decrease (appreciation) in the exchange rate respectively. Unfortunately, only the current year of inflation is the major determinant of exchange rate of Nigeria. Based on the t-statistics, the current value of inflation is statistically significant on a 5% level of significance in explaining exchange rate. When the rate of inflation in Nigeria is increased, it will result to appreciation of the exchange rate. On the other hand when inflation reduces, the exchange rate depreciates.

The degree of openness of Nigeria economy in the current year has a negative effect on the exchange rate while the one year past value of degree of openness has a positive and insignificant effect on exchange rate. The result supports Ibrahim (2016), Udoye (2009) and Oriavwota and Oyovwi (2012) that current year degree of openness has a negative impact on the exchange rate in Nigeria, as such it disagree with the findings of Ben, Obida and Nurudeen (2010) that trade of

openness has a negative influence on exchange rate. As such on average, a 1 percent increase in degree of openness in the current period will cause exchange rate to decrease (appreciate) by -0.22. In the one period past of trade openness, a 1 percent increase in the degree of openness will cause the exchange rate increase (depreciate) by 0.56. Based on the t-statistics and p-value, the current value of trade openness is statistically significant in explaining exchange rate, thus it's a major determinant of exchange rate in Nigeria. The past value of trade openness is not a major determinant of exchange rate. When Nigeria increases her degree of openness, it tend to reduce the exchange rate, which is causing appreciation in the exchange rate.

The result above shows that government expenditure in current and one year lag has a negative (appreciation) and positive (depreciation) respectively. The result of the current value of government expenditure to exchange rate in Nigeria is in line with the findings of Ibrahim (2016) and Oriavwota and Oyovwi (2012) that government expenditure has a negative effect on exchange rate. On average when government increase their investment by 1 percent, it will cause the exchange rate to increase (appreciate) in the current period at the rate of -2.52 and decrease (depreciation) of the exchange rate in the one period past of government expenditure by 3.74. Based on the t-statistic and p-value, the current and past one year value of government expenditure are major determinants of exchange rate. When government increase its investment, more money will be eject into the economy and this will stimulate the domestic demand which will transform to better stand of the exporting of the locally produced goods and services in the economy.

The current and the lag past value of foreign direct investment has a positive and

negative effect on exchange rate. Foreign direct investment has a depreciation effect on exchange rate in the current period and appreciation effect in the one period lag. Based on the empirical result above. On average, when foreign direct investment are increased by 1 percent, it will cause the exchange rate to increase (depreciate) by 3.62 in the current year and decrease (appreciate) in the one year past by -0.15 respectively. This result is not in alignment with Ibrahim (2016) in which the foreign direct investment influences exchange rate positively. Base on t-statistics and p-value, foreign direct investment in the current period is a major determinant of exchange rate in Nigeria, while the lag past value of exchange rate is not statistically significant in explaining exchange rate in Nigeria.

Finally, the coefficient of error correction measures the speed at which variables in short-run return to equilibrium. Even though there is deviation in short-run, in the long-run they must return to equilibrium. The coefficient is expected to be negative and highly statistically significant. The coefficient of -2.272044 means that the variables will return to equilibrium at the speed of 2.27%

Recommendation and Conclusion

Based on the findings from this study, it can be concluded that exchange rate is not properly manage given different foreign exchange policies been practiced over the years. There have been change of policies over the years with little or no effect on the exchange rate, though the past value of exchange rate is what investors look at to determine the future value of exchange rate and hence determine their capital flow in or out the economy. If the past year value of exchange rate is high, investors will be willing to invest so as to profit from the exchange rate devaluation as such it will discourage exporters. Foreign direct investment is an increasing function of

exchange rate, when foreign direct investment is increased, it will lead to depreciation of the Nigeria exchange rate since there will be more of import than export which will make the Nigeria balance of payment unfavorable. Based on these the following are recommended:

From the study it was discovered that the past value of exchange is an important factor that determines exchange rate in Nigeria. As such it is an increasing function of exchange rate. When the past year value of exchange rate increases, the current value of exchange rate is bound to increase as well. The appropriate monetary authority is charged with the duty of making sure the past value of exchange rate is as low as possible so as the value for the subsequent year will be low as well.

Since from the study both current and previous values of interest rate are major determinants of exchange rate, it is recommended that the monetary authority direct the money market, especially the commercial banks to reduce their interest rate on lending and increase the interest rate on deposit, which will increase the interest rate differentials and thus cause the interest rate to appreciate.

The current value of inflation rate is a key determinate of exchange rate in Nigeria. It is a decreasing function of exchange rate. Base on this study, the Central Bank of Nigeria is expected to review its monetary policy so as to adopt an appropriate measure to keep the inflation rate as low as possible so as to allow for fall (appreciation) of the exchange rate. When the inflation rate is relatively high, it will cause the exchange rate to appreciate.

Also the previous value of degree of openness of Nigeria economy is also an important determinant of exchange rate in

Nigeria. The degree of openness of Nigeria economy has an increasing effect on the exchange. As such measures that encourages importation should be removed so as to allow for domestic consumption and export of goods and service. When the Nigeria economy is more open, it will cause the Nigeria exchange rate to depreciate. The Nigeria government is expected to be more stringent with its trade restrictions which will reduce the nature of openness of the economy.

The study find out that government expenditure is also an important macro-economic determinant of exchange rate in Nigeria. It is a decreasing function of exchange rate. The federal government which the largest spender in the economy is expected to spend more. The depreciation of the exchange rate can be greatly attributed to lack of the federal government spending effectively. When the federal government increases her expenditure it will stimulate domestic demand and also improve the exporting of the economy thereby causing the demand for Naira to rise thereby causing the exchange rate to appreciate. The federal government is expected to increase its spending so as to stimulate the economy.

Finally, in the study, the inflow of capital into the country has a positive effect on Nigeria exchange rate. When foreign direct investment increases, it will cause the Nigeria exchange rate to depreciate. When more of capital flow into the country which exceeds the capitals or exports it will lead to deficit in the balance of payment. This will end up depreciating the exchange rate. Federal government and concerned agency should review the amount of capital that will be allowed into the economy that will not affect the appreciation of the exchange rate.

References

- Adelowokan O.A, Adesoye A. B., & Balogun O. D (2015). Exchange Rate Volatility on Investment and Growth in Nigeria, an Empirical Analysis. *Global Journal of Management and Business Research*, 5(10)
- Akinmoladun, C. E. (1990). "Foreign Exchange and International trade in Nigeria", Lagos, Gene Publications. In Udoye, R. A. (2009). "The Determinants of Exchange Rate in Nigeria", A Masters Thesis Submitted to University of Nigeria, Nsukka, Nigeria.
- Auboin, M. and Ruta, M. (2011). "The Relationship between Exchange Rates and International Trade: A Review of Economic Literature", World Trade Organization Economic Research and Statistics Division, Staff Working Paper ERSD-2011-17.
- Ayinla, A. S. (2014). "Modelling Exchange Rate in Nigeria". *IMPACT International Journal of Research in Applied, Natural and Social Sciences*. Vol. 2, Issue 6, pp. 169-176.
- Ben, O., Obida, W. G. and Nurudeen, A. (2010). "Determinants of Exchange Rate in Nigeria, 1970-2007: An Empirical Analysis". *Indian Journal of Economics and Business*. Vol. 9, Issue 1.
- Chowdhury, M. S. R. and Hossain, M. T. (2014). "Determinants of Exchange Rate in Bangladesh: A Case Study". *Journal of Economics and Sustainable Development*. Vol. 5, No.1, pp. 78-81. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Dickey, D. A. and Fuller, W. A. (1979), "Distribution of Estimators for Autoregressive Time Series with a unit Root". *Journal of American Statistical Association*, Vol. 74, pp. 427-431.
- Dickey, D. A. and Fuller, W. A. (1981). "Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root", *Econometrica*, Vol. 49, pp. 1057-1072.
- Dosse T. (2007). "Real Exchange Rate Misalignment and Economic Growth in Developing Countries". *South-Western Economic Review*, vol. 3, pp. 57-72.
- Engle, R. F. (1982). "Autoregressive Conditional Heteroskedasticity with Estimates of Variance of U.K Inflation". *Econometrica*, pp. 987-1008
- Eze and Okpala (2014). Quantitative Analysis of the Impact of Exchange Rate Policies on Nigeria's Economic Growth: a Test of Stability of Parameter Estimates. *International Journal of Humanities and Social Science*, 4(7), 265-272.
- Eichengreen B. (2007). "The Real Exchange Rate and Economic Growth". Paper prepared for the Growth Commission, World Bank. Working paper no. 4. Available <http://documents.worldbank.org/curated/en/868701468152077108/pdf/577040NWP0Box31UBLIC10gc1wp10041web.pdf>.
- Ejaz, R. A. K., Abbas, A. A. and Saeed, A. R. (2002). "Relationship between Exchange Rate and Budgetary Deficit: Empirical Evidence from Pakistan". *Pakistan Journal of Applied Sciences*. 2(8), pp. 839- 842.
- Engle, R. F. and Granger C. W. J. (1987). "Cointegration and Error Correction Representations, Estimation and Testing", *Econometrica*, March, pp. 251 – 276.
- Faulkner, D. and Makrelor, K. (2008). "Determinants of the Equilibrium Exchange Rate for South Africa's Manufacturing Sector and Implications for Competitiveness" in Ayinla, A. S. (2014). "Modelling Exchange Rate in Nigeria". *IMPACT International Journal of Research in Applied, Natural and Social Sciences*. Vol. 2, Issue 6, pp. 169-176.
- Fapetu, O; & Oloyede, J.A (2014). Foreign Exchange Management and the Nigerian Economic Growth (1960 – 2012). *European Journal of Business and Innovation Research* 2(2), 19-31.
- Grigorianm, D., Khachatryan, A., and Sargsyian, G. (2004). "Exchange Rate, Money and Wages: What is Driving Prices in Armenia?" IMF Working Paper, WPS 129. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Hsing, Y. (2006). "Determinants of Exchange Rate Fluctuations for Venezuela: Application of an Extended Mundell-Fleming Model". *Euro-*

- American Association of Economic Development. Vol. 6, No. 1, pp. 139-146.
- Ibrahim, W. (2016). "Econometric Analysis of Determinants of Real Effective Exchange Rate in Nigeria (1960-2015)". *Timisoara Journal of Economics and Business*. Vol. 9, Issue 1, pp. 62-80.
- Jhingan, M. L. (2008), *Macro-Economic Theory*, 11th Revised Edition. New Delhi: Vrinda Publications (P) Limited.
- Kamin, S. B. and Klau, dan M. (2003). "A Multi-Country Comparison of the Linkages between Inflation and Exchange Rate Competitiveness". *International Journal of Finance and Economics*. Vol. 8, pp. 167-184. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Kamin, S. B. (1997). "A Multi-Country Comparison of the Linkages between Inflation and Exchange Rate Competitiveness". *Bank for International Settlement Working Papers*, No. 45, pp. 1-22. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Kara, A. and Nelson, E. (2002). "The Exchange Rate and Inflation in the UK". *Bank of England External MPC Unit Discussion Paper*. No. 11. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Kuttner, K. N. and Posen, A. S. (2006). "Inflation, Monetary Transparency and G3 Exchange Rate Volatility". *Peterson Institute Working Paper*. No. 00-06. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Ndungu, N. S. (1997). "Price and Exchange Rate Dynamics in Kenya: an Empirical Investigation (1970-1993)". *AERC Research Paper*, 58. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Nucu .A.E. (2011). "Relationship between exchange rate and key macroeconomic indicators. Case Study Romania". *The Romanian Economic Journal*. Vol. XIV, No. 41, pp. 127-145. In Ebiringa, O.T. and Anyaogu, N.B. (2014). "Exchange Rate, Inflation and Interest Rates Relationships: An Autoregressive Distributed Lag Analysis". *Journal of Economics and Development Studies*. Vol. 2, No. 2, pp. 263-279.
- Nwude, E. C. (2012). "A Survey of Foreign Exchange Rate Determinants in Nigeria". *European Journal of Business and Management*. Vol. 4, No.13, pp. 168-174.
- Obadan, M. I. (2009). "Exchange Rate Regimes for Developing and Emerging Markets", A paper presented at the 3-day International Conference on "Central Banking, Financial Stability and Growth", Organized by the Central Bank of Nigeria on May 4, 2009, in Abuja.
- Obadan, M. I. (2006). "Overview of Exchange Rate Management in Nigeria from 1986 to Date", In *The Dynamics of Exchange Rate in Nigeria*, Central Bank of Nigeria Bullion, Vol. 30, No. 3, pp. 1-9.
- Obadan, M. I. (1992) "Overview of Nigeria's Exchange Rate Policy and Management since the Structural Adjustment Programme" *CBN Economic and Financial Review*, Vol.31 No. 8, June. In Udoye, R. A. (2009). "The Determinants of Exchange Rate in Nigeria", A Masters Thesis Submitted to University of Nigeria, Nsukka, Nigeria.
- Ojamenaye, C. (1991). "Naira Exchange Rate Policy since 1986" *Seminar Paper on the Naira Exchange Rate: Problems and Prospects*, Lagos. In Udoye, R. A. (2009). "The Determinants of Exchange Rate in Nigeria", A Masters Thesis Submitted to University of Nigeria, Nsukka, Nigeria.
- Ojo, M. o. (1991). "An Overview of the Central Bank of Nigeria Decree No. 24" *CBN BULLION*, Vol.15, No.4, October December, 1991. CBN,

- Lagos. In Udoye, R. A. (2009). "The Determinants of Exchange Rate in Nigeria", A Masters Thesis Submitted to University of Nigeria, Nsukka, Nigeria.
- Oladapo, F. and Oloyede, J. A. (2014). "Foreign Exchange Management and the Nigerian Economic Growth (1960 – 2012)". *European Journal of Business and Innovation Research*. Vol. 2, No.2, pp. 19-31.
- Ogun, O. D. (2012). "Exchange Rate Determination in Developing Economies". *Scientific Research*. 3, pp. 518-521.
- Oriavwote, V. E. and Oyovwi, D. O. (2012). "The Determinants of Real Exchange Rate in Nigeria". *International Journal of Economics and Finance*. Vol. 4, No. 8, 2012, pp. 150-160.
- Pareshkumar, J., Narendra J. and Ashok R. (2014). "Factors affecting Currency Exchange Rate, Economical Formulas and Prediction Models". *International Journal of Application or Innovation in Engineering & Management*. Vol. 3, Issue 3. pp. 53-56.
- ShabanaParveen, Khan, A. Q. and Ismail, M. (2012). "Analysis of the Factors Affecting Exchange Rate Variability in Pakistan". *Academic Research International*. Vol. 2, No. 3, pp. 670-674.
- Takaendesa, P. (2006). "The Behaviour and Fundamental Determinants of Real Exchange Rate in South Africa", A Masters Thesis Submitted to Rhodes University, South Africa.
- In Ben, O., Obida, W. G. and Nurudeen, A. (2010), "Determinants of Exchange Rate in Nigeria, 1970-2007: An Empirical Analysis". *Indian Journal of Economics and Business*. Vol. 9, Issue 1.
- Udoye, R. A. (2009). "The Determinants of Exchange Rate in Nigeria", A Masters Thesis Submitted to University of Nigeria, Nsukka, Nigeria.
- Vegrune, R. (2007). "Fixed Exchange Rates and the Autonomy of Monetary policy: The Franc Zone Case", *International Working Paper WP/073/34, Journal of Economic Literature*, No.42, pp 31-35.
- Wikipedia (2016), "Foreign Exchange", Retrieved from https://en.wikipedia.org/wiki/Foreign_exchange_market
- Williamson, J. (1994). "Advice on the choice of an exchange rate policy". In E.M. Classen, ed. *Exchange Rate Policies in Developing and Post Socialist Countries*. San Francisco, California: ICEG Publications. In Udoye, R. A. (2009), "The Determinants of Exchange Rate in Nigeria", A Masters Thesis Submitted to University of Nigeria, Nsukka, Nigeria.

Table 1

Variable	Mean	Standard Deviation	Maximum	Minimum	Observations
EXC	69.44041	66.29326	192.4405	0.546781	36
INT	6.058930	2.857194	11.06417	0.316667	36
INF	19.44403	17.75216	72.83550	5.382224	36
TOP	51.05468	16.35268	81.81285	21.44693	36
GEX	9.429540	3.564065	17.94384	4.833249	35
FDI	2.892737	2.340689	10.83256	-1.150856	36

Source: Author's computation using E-views.

Table 2

Variables	ADF Statistic	1% Critical Value	5% Critical Value	Order of Integration
EXC	-4.579176	-2.634731	-1.951000	I(1)
INT	-6.158469	-2.636901	-1.951332	I(1)
INF	-5.598869	-2.634731	-1.951000	I(1)
TOP	-8.131448	-2.634731	-1.951000	I(1)
GEX	-6.970717	-2.636901	-1.951332	I(1)
FDI	-8.290214	-2.634731	-1.951000	I(1)

Source: Author's computation using E-views.

Table 3

Hypothesized number of CE(s).	Trace Statistic	5 percent critical value
None	140.4044	95.75366
At most 1($r \geq 1$)	76.73158	69.81889

Source: Author's computation using E-views

Table 4

Hypothesized number of CE(s).	Max-Eigen Statistic	5 percent critical value
None	63.67286	40.07757
At most 1($r \geq 1$)	41.80341	33.87687

Source: Author's computation using E-views

Table 5 Dependent Variable: EXC

Variable	Coefficient	Std. Error	T-statistic	Prob.
Constant	97.73267	43.44232	2.249711	0.0322
INT	13.80170	3.408877	4.048752	0.0004
INF	-1.580743	0.576472	-2.742098	0.0104

TOP	-0.907599	0.617904	-1.468834	0.1526
GEX	-4.025950	2.513850	-1.601508	0.1201
FDI	1.475818	5.135877	0.287355	0.7759
R ² = 0.56	Adj. R ² = 0.48	F-stat. = 7.351632	Prob. (F-stat.) = 0.000148	DW stat. 0.70

Source: Author's computation using E-views

Table 6

Dependent Variable: D(EXC)

Variables	Coefficient	Std. Error	T-statistic	Prob.
C	-3.928206	2.565680	-1.531059	0.1414
D(EXC(-1))	1.667657	0.350562	4.757096**	0.0001
D(INT)	2.321471	1.191913	1.947685*	0.0656
D(INT(-1))	-2.256763	1.023762	-2.204382**	0.0394
D(INF)	-0.375955	0.137887	-2.726537**	0.0130
D(INF(-1))	-0.226255	0.152155	-1.486999	0.1526
D(TOP)	-0.217231	0.169075	-1.284821	0.2135
D(TOP(-1))	0.562454	0.204823	2.746048**	0.0125
D(GEX)	-2.518573	0.838126	-3.005005**	0.0070
D(GEX(-1))	3.743818	1.107142	3.381516**	0.0030
D(FDI)	3.617375	1.289667	2.804892**	0.0109
D(FDI(-1))	-0.145220	1.086635	-0.133642	0.8950
μ(-1)	-2.272044	0.433897	-5.236364**	0.0000
R ² = 0.696490	F-statistic = 3.824641	P-value = 0.004015	DW-statistic = 1.545791	

*(**) – 10% (5%) level of significance.

Autocorrelation

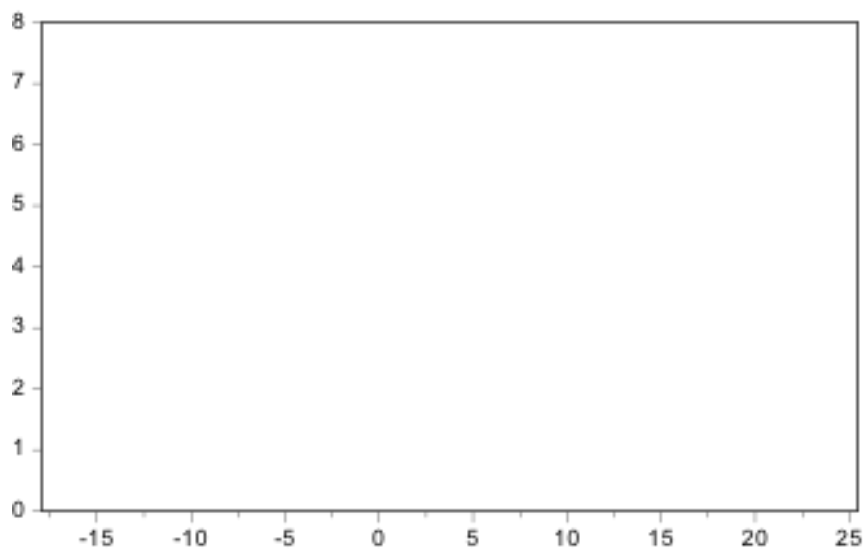
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.15641 3	Prob. F(1,19)	0.69 69
Obs*R-squared	0.26944 7	Prob. Chi-Square(1)	0.60 37

Heteroscedasticity Tests

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.13628 0	Prob. F(12,20)	0.9995
Obs*R-squared	2.49438 0	Prob. Chi-Square(12)	0.9982
Scaled explained SS	1.71794 3	Prob. Chi-Square(12)	0.9997

Heteroskedasticity Test: White			
F-statistic	0.33395 2	Prob. F(12,20)	0.97 24
Obs*R-squared	5.50849 9	Prob. Chi-Square(12)	0.93 88
Scaled explained SS	3.79384 4	Prob. Chi-Square(12)	0.98 69

Histogram of Residual (Normality Test)



Series: Residuals	
Sample 1983 2015	
Observations 33	
Mean	-8.61e-16
Median	-0.759961
Maximum	24.73277
Minimum	-16.14497
Std. Dev.	7.832544
Skewness	0.869999
Kurtosis	4.750111
Jarque-Bera	8.374414
Probability	0.015189