

THE EXCHANGE RATE FLUCTUATIONS, DOMESTIC PRICES AND MONETARY POLICY IN NIGERIA

Tella, S.A

Prof. of Economics, Department of Economics,
Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria

Adesoye, A.B

Associate Prof. of Economics, Department of Economics,
Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria

Ologundudu, M.M 

Senior Lecturer, Economics Department,
Mountain Top University, Prayer-City Ogun State, Nigeria
mmologundudu@mtu.edu.ng, mologun.dudu@yahoo.com

Abstract

Exchange rate fluctuation is seen as general phenomenon around the globe which might have effect on macroeconomic performances. Economists are also interested in knowing how macroeconomics variable influence the operations of exchange rate especially in developing countries. The study evaluated the macroeconomic effect of domestic prices and monetary policy on exchange rate fluctuation in Nigeria using US\$-NIG Real Exchange Rate (REER) using the time series annual data generated from various issues of Central bank of Nigeria and Statistical Bulletin during the study period (1987-2014). The study empirically employs trends analysis, the Johansen Co-integration and Ordinary Least Square techniques. The theoretical framework of this study was based on purchasing power parity (PPP) postulated by Gustar 1921. The results of the ADF unit root test for each of the model at 5% level of significance were analyzed. In the long run, only commodity price and crude oil have a negative significant effect while other variables do not have any significant negative effects on exchange rate fluctuations in Nigeria. The study, therefore, conclude that there were significant relationship between commodity price, Nominal interest rate, Crude oil price, monetary policy and exchange

rate in Nigeria and that there exist short and long run relationship between exchange rate fluctuations, domestic prices and monetary policy in Nigeria. The major recommendation of the study was that the monetary authorities should initiate and implement an appropriate monetary policy for keeping domestic prices at a reasonable level in order to stabilize exchange rate movement in Nigeria.

Keywords: Exchange rate fluctuation, Monetary Policy, Domestic Prices, Generalized Autoregressive Conditional Heteroskedastic

INTRODUCTION

The assessment of exchange rate fluctuation effects on the economy remains an active subject of empirical investigation. This stems from the substantial increase in the fluctuation of exchange rates of major industrial countries including those of developing countries after the breakdown of the Bretton Wood System in March 1973. Fluctuation in exchange rates was initially perceived to be temporary. However, it has persisted and varied considerably over time and across countries (Pozo, 1992; Jeong, 2000; and Chit, 2008). The collapse of Bretton Wood system in 1970s caused the world economies to shift from fixed to flexible rate system. With this development, the variability of exchange rate (both nominal and real) increased in the overall economic outlook became the central focus of the monetary authorities in Nigeria.

Statistically, it was noted that exchange rate fluctuation and domestic price instability in Nigeria between 1987 and 2017 are closely related. While there was depreciation of Naira value from N2.02, N8.04 and N500 – US\$1.00 in 1987, 1995 and 2017 respectively, the inflationary spiral in the country (Commodity price) within that period was at highest 26.71% in 1987, reduced to 15.5% in 1990 and again increased to 29.6% in 1995. Throughout 2017, the inflation rate hovered between 25% and 19% and currently stands at 15.91%. Similarly, the frequent swings in oil prices have important implications on exchange rate and external reserve accumulation in the country. Crude oil fell from US\$34.00 to US\$17.01 per barrel between 1987 and 1990 and external reserve declined from US\$4682.90 million to US\$981.81million. In the reference period, exchange rate appreciated from N0.64 to N0.99 per dollar. Recently, crude oil price declined from \$111.46 per barrel in 2011 to \$63.28 per barrel at the end of 2014 and by August 2017, the crude oil price declined further to \$52.04 per barrel and increased slightly to \$54.1 per barrel in the first six weeks in 2018 (CBN, 2017). This development has led to substantial reduction in external reserve and further depreciation of the exchange rate in the country. By the same token, interest rate “nosedived” from 30.2%, 28.4% to 25.5%, 27.5%

respectively between 1987 and 1990 and later increased to 10.67% in 2007 from as low as 6% in 2006 and later increased to 14.0% in 2016 and the Central Bank of Nigeria left its benchmark unchanged at 14.0% in November, 2017 in line with the market expectations.

On the other hand, interest rate, crude oil price together with inflation rate are among the most significant factors affecting exchange rate fluctuations. An increase in interest rate of the home currency will increase the number of home currency deposits. A higher interest rate means higher rate of return thus the demand for home currency will increase. These situations lead to an appreciation of home currency relative to foreign currency. From this trend, it could be inferred that the relationship between exchange rate fluctuation and domestic prices in Nigeria between 1987 and 2017 are bi-directional; implying that either of the variables can influence each other.

The broad objective of this study is to evaluate the macroeconomic effects of domestic prices and monetary policy on exchange rate behaviour in Nigeria. Emanating from this, the study seeks to specifically:

- (i) Examine the effects of inflationary rate and Interest rate on exchange rate behaviour in Nigeria.
- (ii) Analyse the effects of Crude Oil price on exchange rate behaviour in Nigeria.
- (iii) Determine the effects of Monetary Policy on exchange rate behaviour in Nigeria.
- (iv) Establish whether there is a short and long run equilibrium relationship between exchange rate behaviour, domestic prices and monetary policy in Nigeria.

This study is divided into five sections; following this introduction is section two which presents the literature review. Section three considers the methodology of the study. Section four discusses model specification and analysis of data while section five covers the summary of findings, conclusion and policy recommendations.

LITERATURE REVIEW

Conceptual Review

Exchange Rate

Foreign exchange rate is the price of one currency in terms of another. It is usually expressed as the price of local currency to one unit of a foreign currency, thus the exchange rate between the naira and dollar is the amount of naira needed to purchase one unit of dollar. The demand for the foreign exchange is a derived demand; it arises from the import of Nigeria goods and services by the national of other nations and from the flow of capital/investments into Nigeria. The demand for naira indirectly implies the supply of other currencies. When other countries buy

Nigerian goods and services and make capital transfers to Nigeria, they create demand for the Nigerian naira. The supply of naira arises from the import of goods and services and capital movements from Nigeria to other suppliers in the market at various prices of the foreign currency. Foreign exchange transaction takes place in two types of markets which are either, the spot or the forward markets. While the spot market is where the delivery of the foreign exchange is to be done on the spot, which is usually within two days of the transaction.

The forward market is where the foreign exchange is bought and sold for delivery at a future date at an agreed rate today. In forward market, people face the risk of either receiving less or having to pay more in terms of the local currency than anticipated. Therefore the use of hedging which is an act of avoiding or covering exchange rate risks arising from agreed forward contracts becomes necessary. Hedging also keeps the supply of and demand for forward exchange which depends upon the volume of trade and the avoidance of risk by exporters and importers. The disadvantage it has is that it cannot function efficiently under forward contract that are beyond three months as it fails to cover risks resulting from exchange rate volatility (Jhingan, 2005). There are basically two types of measure of exchange rate nominal and real. It is important to know the different measure used. For some, the obvious measure of the exchange rate is a nominal bilateral exchange rate, as it is that which is determined directly in the financial markets. However, most theories of equilibrium exchange rates refer to real effective (whole economy) measures of the rate, albeit using different definitions of the relevant price index (Zhang et al, 2005).

Monetary Policy

Understanding the role of monetary policy and how the macroeconomic policy affects the economy requires the description of the concept of the monetary policy transmission mechanism. Taylor (1995) describes the transmission mechanism as the process through which monetary policy decision is transmitted into changes in real GDP and inflation. Mishkin (1995) discusses the various channels (Interest rate, exchange rate, asset price and bank lending etc.) through which monetary policy action(s) changes the nominal money stock or how short-term nominal interest rate affect real variables. In a modern economy, the concept of monetary policy refers to the specific actions taken by the monetary authorities (Central Bank of Nigeria and Federal Ministry of Finance) to regulate the value, supply and cost of money in the economy with a view to achieving predetermined macroeconomic goals (CBN 2011). Ubogu (1985) sees monetary policy as actions by monetary authorities to influence the national economic objectives by controlling or influencing the quantity and direction of money supply, credit and the cost of credit. This according to him is aimed at ensuring adequate supply of

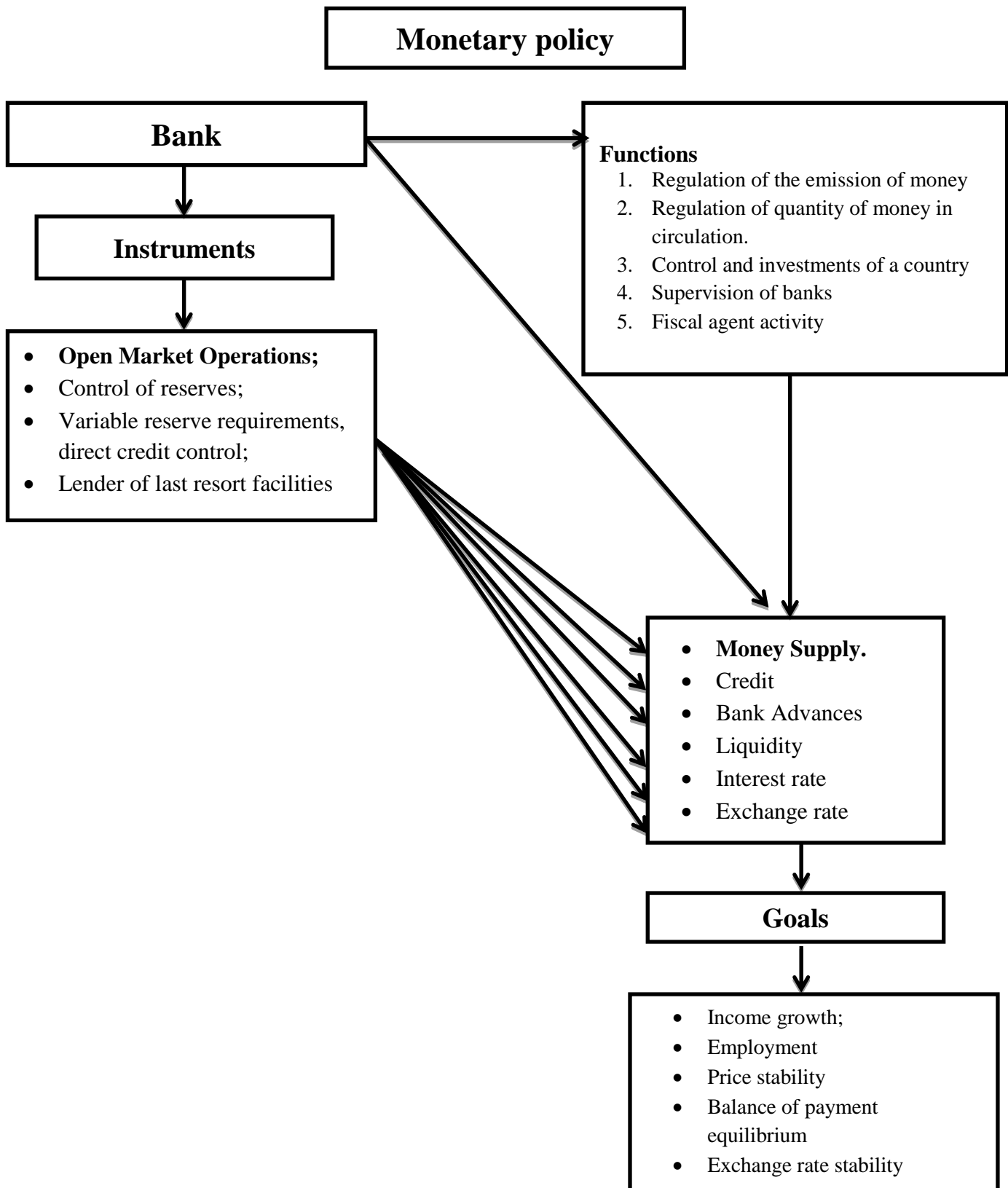
money to support financial intermediation for growth and development programmes. Aaogu (1998) defines monetary policy as an attempt by the monetary authorities to achieve a reasonable level of aggregate economic activities by controlling the quantity and direction of money and credit availability.

The action(s) of the monetary policy makers do not affect the macro economy (output and inflation) directly but through a target variable which can be controlled having been linked to the ultimate objective. The monetary policy flow chart below in Figure 1 describes channel through which action (s) of monetary policy makers affect the ultimate objective of government. According to the monetary policy flow chart, monetary policy seeks and aims to attain some ultimate goals which include stable and sustained output growth, a stable price level; a stable exchange rate for a desirable balance of payment, financial market stability and low employment rate (CBN 2006).

Domestic Prices

A domestic price level represents the current price for a specific goods or services in an economy. These specific goods or services could be commodity price (inflationary rate), Crude oil price, nominal interest rate on time and demand deposit with commercial banks, nominal wage rate paid to labour and commercial rent paid on Capital. Within the scope of this study, our domestic prices shall be limited to three of the component; inflationary rate, crude oil price and interest rate.

Figure 1: Monetary Policy Instruments, Targets and goals.



Sources: Adapted by the Author (2016), CBN 2011 in Handa (2009)

Conceptual Framework of the Study

The conceptual framework upon which, monetary policy conduct is based can be traced to the classical economists such as J.B. Say, Marshal and Fisher; who observed a link between money supply and prices. However, the quantity theory of money, the purchasing power parity, money supply and demand framework show how the monetary policy shocks are transmitted to exchange rate. If the money stock rises, for instance, without a corresponding increase in output, the additional money supply will simply bid up prices based on the quantity theory of money. As the price level rises, the exchange rate depreciates based on the purchasing power parity theory (Chamberlin and Yueh, 2006). Given the demand for money, the rise in money supply causes a fall in domestic interest. The fall in domestic interest rate leads to an increase outflow of short-term finance from the country and a reduce inflow; depositors seek to take advantage of relatively higher interest rate abroad. The supply of the domestic currency on the foreign exchange market rises and demand falls. Thus cause a depreciation of the exchange rate (Sloman, 2006).

As such, the following specification of VAR adopted by Kamin and Clay, (1987) as cited in Ajasa (2013) reveal both simultaneously and interaction among variables that are closely related to exchange rate and inflation as stated in equation (2.0)

$$\text{REER} = f(\text{CPI}, \text{MSP}, \text{INTR}, \text{EXCHR}) \quad 2.0$$

Where, CPI = Consumer price Index representing the price level, MSP = Money Supply, INTR = Interest rate, EXCHR = Exchange Rate and REER = Real Exchange rate.

In order to establish the transmission mechanism from exchange rate to consumer price index, this study complements the quantity theory of money, the purchasing power parity theory and the money supply and demand framework with the demand pull and cost push theories of inflation as depicted in Figure 2. On the demand pull theory of inflation, the depreciation of the exchange rate as a result of expansionary monetary policy causes a rise in demand for exports since they are now cheaper for people abroad to buy. It also causes a fall in demand for imports, since they are now more expensive. The rise in exports and a fall in imports will lead to an increase in net exports and aggregate demand and will cause a multiple rise in national income (Sloman, 2006). But in a short run, faster real growth may be associated with more rapid inflation. Often, this is because strong growth is the result of a rise in aggregate demand that causes real output to increase at the same time as it bid up prices (Tabi and Ondo, 2011). Based on the demand pull inflation theory of inflation, the net exports (NEXP) that is also closely related to exchange rate and inflation is included in the VAR model as specified in equation (2.1)

$$\text{REER} = f(\text{CPI}, \text{MSP}, \text{INTR}, \text{EXCHR}, \text{NEXP}) \quad 2.1$$

In the system of floating exchange rates, exchange rate fluctuations can have a strong impact on the level of prices through the aggregate demand and aggregate supply.

Aggregate Demand

The demand side of the economy is specified using standard IS-LM equation with a modification for an open economy. The demand side of the economy combines equilibrium condition in the Goods and Money markets. In this specifications below, all co-efficient are positive and throughout the study, lower case denotes the logarithm of the corresponding level variable. The subscript denotes the current value of the variables.

$$C_t = C_0 + C_1 Y_{dt}, 0 < C_1 < 1 \quad 2.2$$

$$Y_{dt} = Y_t - t_t \quad 2.3$$

$$t_t = t_0 + t_1 Y_t, t_t > 0 \quad 2.4$$

$$i_t = i_0 + i_1 r_t, i_t > 0 \quad 2.5$$

$$\text{Log}(R_t) = \text{Log} S_t \left[\frac{P_t^*}{P_t} \left(\frac{= S_t +}{\text{---}} \right) P_t - P_t \right] \quad 2.6$$

$$X_t = X_0 - X_1 \log(R_t), X_i > 0 \quad 2.7$$

$$im_t = m_0 + m_1 y_t - m_2 \text{Log}(R_t), m_1, m_2 > 0 \quad 2.8$$

$$Y_t = C_t + i_t + g_t + X_t - im_t \quad 2.9$$

$$M_t - P_t = X(r, t(\epsilon_i P_t - P_t)) + \emptyset y_t - \emptyset(\epsilon_t S_{t-1} - S_t), \lambda, Q, \emptyset > 0 \quad 2.10$$

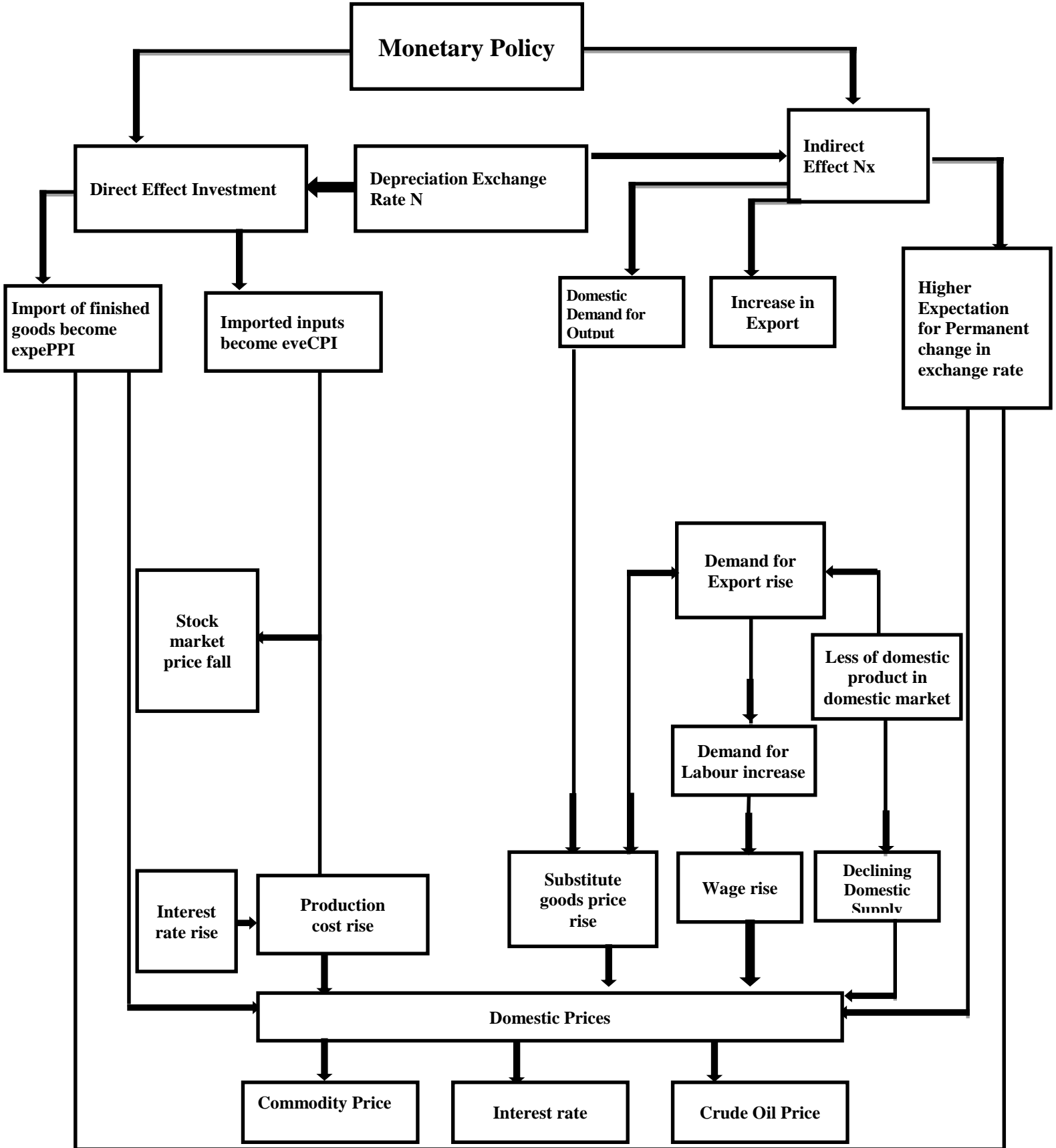
Equations (2.2-2.10) describe equilibrium conditions in the Good market. In equation (2.2), real Consumption expenditure, C, varies positively with real disposable income, Yd. In equation (2.3) disposable income is defined to be the net of real income, Y, minus taxes t. In equation (2.4) real taxes are specified as a linear function of real income. In equation (2.5) real investment expenditure, I, varies negatively with the real interest rate, r. In equation (2.6) let the domestic price level be represented by P and the foreign price level in foreign currency by P*. The spot price of foreign currency is denoted by S and defined as the number of domestic currency units per units of foreign currency. R is the price of foreign produced goods and services relative to the prices of domestically produced goods and services. i.e. the real effective exchange rate of the foreign currency. When R increases, the domestic currency depreciates in real terms. The value of R measures the degree of competitiveness of foreign produced goods and services to those produced domestically. In equation (2.5) real exports are related to an autonomous elements X₀, which rises when the income level abroad rises, and to relative prices.

The positive relationship between R and X in equation (2.7) refers to the fact that when the foreign price is higher relative to domestic goods, exports will increase. In equation (2.8), real imports, im , are assumed to rise with the level of real income and decrease with the real effective exchange rate of the foreign currency. Equation (2.9) describes the equilibrium condition in the goods market. Real government spending, g , is assumed to be exogenous. The total expenditure by domestic residents in real term (y) is the sum of real consumption expenditure (c), real investment (i), real government spending (g), and net exports (the real value of exports, x minus the real value of imports, im). After substituting all equations into the equilibrium condition for the goods market, we obtain the expression for real income which is a function of the exchange rate, the domestic price level, the foreign price level and domestic interest rate. This expression is the IS equation which describe the negative relationship between real income and the real interest rate.

In equation (2.10), equilibrium in the money market is obtained by equating the demand and supply of real money balances M , deflated by price, P . The demand for real money balances is positively related to real income and inversely related to nominal interest rate. The nominal interest rate is defined as the sum of the real interest rate and inflation expectation at time t . $E_t S_{t-1}$ is the expected future value of the foreign currency at time t . Consumers in each country must hold domestic money for transactions purpose but they may speculate by holding foreign money. An unexpected depreciation of the domestic currency in period t would lead to speculation of appreciation in period t to restore the steady – state normal trend of the exchange rate. i.e. $E_t S_{t+1} - S_t < 0$.

Consequently, consumer increases the speculative demand for domestic currency establishing a negative relationship between the demand for real money balance and consumer's expectation of the future value of the domestic currency relative to its current value. The LM equation is determined by the equilibrium condition in the money market, establishing a positive relationship between real income and the real interest rate solving for the interest rate, r , from the LM equation and substituting the result into IS equation gives us the equation for aggregate demand.

Figure 2: Conceptual Framework: Exchange rate, Monetary policy and Domestic prices in Nigeria



Source: Authors' compilation (Adapted CBN, 2000)

Aggregate Supply

The aggregate supply depreciation (devaluation) of domestic currency can affect the price level directly through imported goods that domestic consumers pay. However, this condition occurs if the country is the recipient countries of international prices. Non direct influence from the depreciation (devaluation) of currency against the price level of a country can be seen from the price of capital goods (Intermediate goods) imported by the manufacturers as inputs. The weakening of exchange rate will make the price of input more expensive, thus contributing to a higher cost of production.

Manufacturers will certainly increase the cost to the price of goods that will be paid by consumers. As a result, the price level aggregate in the country increases or if it continues it will cause inflation (Achani, Fauzi and Abdullah, 2010). As exchange rate depreciates, the import price index increases and an increase in import price index will lead to an increase in producer price index. However, the increase in producer price index will lead to an increase in wholesale and retail price index and thus lead to an increase in consumer price index. Based on the Cost-push theory of inflation, this import price index, producer price index, wholesale and retail price index that are related to exchange rate and domestic prices are also included in the model as follows:

$$REER = (CPI, MSP, INTR, EXCHR, NEXP, IPI, PPI, WRPI) \dots \dots \dots 2.11$$

Where: IPI is import price index, PPI is producer price index, WRPI is wholesale and retail price index)

Market Equilibrium

Internal balance requires that aggregate demand for domestic output be equal to aggregate supply of domestic output at full employment. It is assumed that demand and supply shifts in the model are constructed of two components: anticipated (Steady State) components and an unanticipated (random) component. The combination of demand and supply – side channels indicates that the real output depends on unanticipated movements in the exchange rate, the money supply, government spending, and the domestic price. In addition, supply – side channel establish that output varies with anticipated changes in the exchange rate and the domestic price.

Given demand side channels, aggregate demand increases with an unexpected increase in government spending or money supply, creating positive surprises and hence, increasing output and price in the short run. Changes in the domestic price both anticipated and unanticipated, increase the cost of the output produced, decreasing output and raising prices.

Theoretical Review

The study essentially would adopt purchasing power parity (PPP). The PPP by Gustar (1921) gives us a basic and fundamental relationship between the exchange rate, Monetary Policy and Domestic Price level. In this model, the Real Effective Exchange Rate (REER) for country (i) if defined with respect to the US Dollar as the numeracies currency is constructed as:

$$Qit = Eit (Pt^*/Pit) \dots\dots\dots 2.12$$

Where, Qit = The Real Effective Exchange Rate

Eit = The Nominal Effective Exchange Rate

Pt^* = The US Consumer Price Index (CPI)

Pit = The Consumer Price Index (CPI) for country i.

According to PPP, in the absence of transportation costs, tariffs and other barriers to trade and with free trade, the same good should cost the same across national boundaries. In other words, the "law of one price" is based on the premise that prices of comparable goods should not be different in two locations. However, markets enforce the law of one price, because the pursuit of profit to equalize prices of identical goods in different countries is grossly uncertain. Even though Short run deviations from PPP may occur, the relationship is expected to hold in the Long run. The theories stress that countries that experienced high depreciation should have high inflation rate and vice-versa. Under absolute PPP the Nominal Effective Exchange Rate is proportional to a ratio of domestic to foreign price levels. By implication the relative forms of PPP affirms that starting from a base of an equilibrium Exchange Rate between two currencies, the future of Exchange Rate between the two countries will be determined by the relative movement in the price level in the two countries such that:

$$St = a + \beta_0 Pt - \beta_i Pt^* \dots\dots\dots 2.13$$

Where,

St = The Nominal Effective Exchange Rate

Pt = Domestic Prices

Pt^* = Foreign Prices

All equations were measured in Log form.

Equation (2.13) is known as trivariate relationship while a bivariate relationship between the nominal effective exchange and domestic to foreign price ratio is given as:

$$St = a + \beta (Pt - Pt^*) + Ut \dots\dots\dots 2.14$$

This PPP frame work does impose an a- priori restriction on the counteracting vector. The difference between the PPP frame work represented by equations (3.2) and (3.3) is that in the latter the symmetry condition on the price co-efficient has been imposed.

Another specification of PPP that is commonly used in Unit root tests is given by

$$qt = St - Pt + Pt^* \dots\dots\dots 2.15$$

Where qt = the Real Effective Exchange Rate.

The PPP equation in (2.15) requires $\beta = 1$ this also implies $\beta_i = -\beta_o$, which impose the joint symmetry/proportionality restriction. Since all unit root tests on the Real Effective Exchange Rate assume implicitly that such a restriction holds, a failure of these tests to find evidence favouring mean reversion in the real exchange rate may be caused by a failure of such restriction. However, these models which are based on credible, efficient and functional financial market are presented along with their basic feature, followed by a discussion on how exchange rate are determined and how monetary policy affects exchange rates.

Empirical Review

Our review of empirical evidence on the issue of Exchange Rate Fluctuations and domestic prices and monetary policy in Nigeria revolves majorly on recent contributions from the literature. In a more recent study, Adeoye and Saibu (2014) conducted a work on monetary policy shocks and exchange rate volatility using Nigeria's data which include; exchange rate, interest rate, money supply, inflation rate and real output. The study employed Granger Causality and the Error Correction econometric modeling technique in the period 1980-2008. They found that both the real and nominal exchange rate was unstable and that there is a causal link between exchange rate, volatility and monetary policy variables. Suffice to mention that the study did not employ GARCH technique to test for volatility and the issue of uncertainty of the variables were not considered. Another very recent study on monetary policy and exchange rate by Baghebo and Stephen (2014) for the period 1980-2011 examined and analyzed the following samples; GDP, inflation, balance of payments, liquidity ratio, money supply. They estimated the regression relationship using OLS and found that monetary policy plays an important role in Nigeria's economy by regulating and stabilizing the exchange rate fluctuation. A forward looking study by Feridun, Folawewo and Osinubi (2005) focused on monetary policy and macroeconomic instability in Nigeria: A Rational Expectation Hypotheses. This study spans from 1980:1-2000:4 on a quarterly sample comprising; inflation rate, nominal effective exchange rate. The econometric technique of analysis was the ARCH. They found that inflation affects volatility of its own rate as well as the rate of real exchange. This defeats the purpose for which monetary policy objective should be defined and achieved. In a paper on risk based supervision and inflation targeting framework of monetary policy Tella (2008) evaluated the challenges of the monetary policy makers in adopting two frameworks (Monetary Targeting and Inflation Targeting) and submits that the CBN must take steps to adopt and implement the

two. If the inflation targeting is taken seriously, by his suggestion, the monetary policy maker must factor in uncertainty of both inflationary trends and estimation of the output gap. The paper went on to recommend that inflation targeting is a desirable goal for successful monetary policy management in Nigeria. Aliyu and Englama (2009) in a related study to that of Tella using quarterly data from 1986 to 2007 with VAR technique used for statistical analysis. The variables in the empirical model consist of the gross domestic product, consumer price index, domestic money supply, fiscal spending, interest rate and exchange rate. The ordering of the variables follows the lower diagonal value of a correlation matrix and the degree of endogeneity to current economic conditions in line with Cholesky ordering criteria. Results from the study shows that inflation in Nigeria is impassive to monetary transmission variables in the model. Specifically, weak link between prices and credit, interest rate and exchange rate channels were established. However, evidence of strong inverse link between exchange rate and domestic prices was found in the model. This suggests exchange rate pass-through on the level of the domestic prices in the economy. The study, therefore, recommends the pursuance of Inflation Targeting. This was earlier suggested by Tella (2008) for the CBN hence the recommendations of the two studies complement each other but the issue of fluctuation of exchange rate was not considered in the two studies.

Using Co-integration-Causality Analysis, Adesoye (2012), conducted a study on the relationship amongst Price, Money and Output in Nigeria for the period 1970 to 2009. The econometric findings suggest that inflation is a monetary phenomenon and that previous price and output gap are strong indicators of controlling monetary aggregate in Nigeria. The result is an indication that monetary policy is more effective in Nigeria compared with the results of Faridun *et al* (2005). Amassoma, Wosa and Olaiya (2011) on the Appraisal of Monetary Policy and Its Effect on Macro Economic Stabilization in Nigeria based in the period 1986-2009 found that monetary policy have witnessed the implementation of various policy initiatives and has therefore experienced sustained improvement over the years. The result also shows that monetary policy was observed to have an insignificant influence on price instability. The differences on the issue of inflation between the study of Adesoye and Amassona *et al* may be due to different econometric approach used and or differences in the period of study. Ogun, and Akinbo, (2010) on the Effectiveness of Exchange Rate Channel of Monetary Policy Transmission unlike the others investigated whether exchange rate channel did exist in Nigeria (1986 to 2006). Based on VAR technique found that exchange rate fluctuations responded slowly to monetary policy shock. Monetary policy shock also contributed very little to the forecast errors of domestic prices variables. The study concluded that the exchange rate channel is ineffective in Nigeria. These studies based on transmission mechanism like the

others did not consider the issue of uncertainty while tracing the transmission mechanism of monetary policy in Nigeria, Bature (2014) assessed monetary policy transmission mechanism in Nigeria in a descriptive study and identified the following channels; interest rate channel. This is an improvement on a similar study by Ajayi (2007) identified four channels. Bature (2014) recommended that effective policy transmission mechanism among other factors would facilitate the growth of the real sector in Nigeria.

RESEARCH METHODOLOGY

Model Specifications

This study aims at establishing the macroeconomic effect of domestic prices and monetary policy on exchange rate in Nigeria. Ordinarily Least Square (OLS) multiple regression model techniques were used using the data sourced from Central Bank of Nigeria (CBN) and Statistical Bulletin report 2014 derived from selected annual key macroeconomics time series in Nigeria for a period of 28 years (1987-2014) as indicated in the attached appendix A. In line with the purchasing power parity theory in equation (2.14) & (2.15) above which makes the exchange rate dependent on domestic price, a GARCH model from the work of Bollersler (1986) was adapted. By implication, the Real Exchange Rate is a function of domestic prices and monetary policy in Nigeria as specified thus:

$$\text{REER} = f(\text{Domestic Prices and Monetary Policy}) \quad 2.16$$

Where:

$$\text{Domestic prices} = (\text{CP}_t, \text{C}_o\text{P}_t, \text{DR}_t) \quad 2.17$$

$$\text{Monetary Policy} = (\text{MPR}_t) \quad 2.18$$

Substituting (2.17& (2.18) in (2.20), we shall have

$$\text{REER} = f(\text{CP}_t, \text{C}_o\text{P}_t, \text{DR}_t, \text{MPR}_t) \quad 2.19$$

To enhance the robustness of the GARCH model, other variables such as Foreign Exchange Reserve (FXRES), Foreign Interest Rate (FR), and Import/Export Price (TOT) that could influences the Real Effective Exchange Rate stability are incorporated in the model. Thus, the mathematical function is stated in functional form as follows:

$$\text{REER} = f(\text{Cp}_t, \text{Dr}_t, \text{C}_o\text{P}_t, \text{Fxr}_t, \text{Tot}_t, \text{Fr}_t, \text{MP}_t) \quad \text{---} \quad 2.20$$

Where:

REER = Exchange Rate Fluctuations (Computed from Real Effective Exchange Rate)

CP_t = Inflation Rate (Commodity Price)

DR_t = Domestic Interest Rate

C_oP_t = Crude Oil Price

FXRES _t	=	Foreign exchange reserves
TOT _t	=	Import/Export Price
FR _t	=	Foreign/Interest Rate
MPR _t	=	Monetary Policy Rate

Equation (2.20), an appropriate Ordinary Least Square (OLS) linear model (Assuming intrinsic linearity among variables) therefore considered the Inflation Rate (Commodity Price), Crude Oil Price, Foreign Exchange Reserves, Import/Export Price, Foreign Interest rate, Domestic Interest rate, Monetary Policy (proxy by monetary policy rate) as independent variables while the Real Effective Exchange Rate (REER) as dependent variables. But the above function is exact or deterministic in nature. In order to allow for the inexact relationship among the variables as in the case of economic time series variables, stochastic error item u_t is added to form econometric equations. Thus, we can express the econometric models in natural log as:

$$\text{Log REER} = \beta_0 + \beta_1 \log CP_t + \beta_2 \log DR_t + \beta_3 \log CoP_t + \beta_4 \log FXRES_t + \beta_5 \log ToT_t + \beta_6 \log FR_t + \beta_7 \log MPR_t + U_t \quad 2.21$$

Where:

β_0	=	Constant and β_1 to β_8 = Co-efficient of the variables
Log REER	=	Log of real exchange rate fluctuations
Log CP _t	=	Log of Inflation Rate (Commodity Price)
Log DR _t	=	Log of Domestic Interest Rates
Log CoP _t	=	Log of Crude Oil Price
Log FXRES _t	=	Log of Foreign Exchange Reserves
Log TOT _t	=	Log of Import/Export Prices
Log FR _t	=	Log of Foreign Interest Rates
Log MPR _t	=	Log of Money Supply.

However, all variables are expressed in natural logarithm form because apart from helping to produce better result when compared to ordinary linear functional forms, it also helps to reduce the problem of Heteroscedasticity. The choice of using OLS for the econometrics analysis in the study is simply because it is easier to manipulate than other alternatives techniques such as Generalized Method of Moments (GMM) and Maximum Likelihood (ML) estimation that require more mathematical sophistication and more computing power. Besides, despite its limitation OLS results have desirable characteristics which are considered as a very good attribute of any estimator to be a good predictor.

However, the model for estimation in this study includes equations 2.16 – 2.21 which are further decomposed into four models to achieve the study objectives.

Model one: The Ordinary Least Square (OLS) multi regression analysis approach is employed to examine the effect of inflationary rate and Interest rate on exchange rate fluctuations in Nigeria as stated in research hypothesis one.

$$REER = f(CP_t, DR_t, FXRES)$$

$$\text{LogREER} = \beta_0 + \beta_1 \log CP_t + \beta_2 \log DR_t + \beta_3 \log FXRES + U_t \quad 2.22$$

Model Two: Also adopt Ordinary Least Square (OLS) multi regression analysis approach to determine the effect of Crude Oil price on exchange rate fluctuation in Nigeria as stated in research hypothesis two.

$$REER = f(CoP_t, TOT_t, FR_t)$$

$$\text{LogREER} = \beta_0 + \beta_3 \log CoP_t + \beta_4 \log TOT_t + \beta_5 \log FR_t + U_t \quad 2.23$$

Model Three: The Ordinary Least Square (OLS) multi regression analysis approach was used to analyse the effect of Monetary Policy on exchange rate fluctuations in Nigeria as stated in research hypothesis three.

$$REER = f(MPR_t, DR_t)$$

$$\text{LogREER} = \beta_0 + \beta_2 \log MPR_t + \beta_3 \log DR_t + U_t \quad 2.24$$

Model four: will adopt Ordinary Least Square (OLS) multi regression analysis approach to investigate if there is any short and long run relationship between exchange rate fluctuations, domestic prices and monetary policy in Nigeria as stated in research hypothesis four.

$$REER = f(Cp_t, Dr_t, CoPt_t, Fxres_t, Tot_t, Fr_t, MPr_t)$$

$$\text{Log REER} = \beta_0 + \beta_1 \log Cp_t + \beta_2 \log Dr_t + \beta_3 \log CoPt_t + \beta_4 \log Fxres_t + \beta_5 \log Tot_t + \beta_6 \log Fr_t + \beta_7 \log MP_t + U_t \quad 2.25$$

A Priori Expectation

The A – priori expectations of the study from equation 2.17 – 2.21 provides expected signs and significance of the value of the coefficient of the model parameters to be estimated in light of economic theory and empirical evidence. However, there are sound theoretical reasons for believing strong positive links exist between domestic prices, terms of trade, monetary policy rate and Real effective exchange rate, while negative links exist between the explained variables, foreign exchange reserve and foreign interest rate. Such that:

$$\beta_0, \beta_1, \beta_2, \beta_3, \beta_5, \beta_7 > 0 \text{ while } \beta_4, \beta_6, \beta_8 < 0 \quad 2.26$$

1. The coefficient ($\beta_1 > 0$) inflationary rate is expected to be positive. The lower the level of inflation, the higher the value of domestic currency and thus result in exchange rate appreciation.
2. The coefficient ($\beta_2 > 0$) of the domestic interest rate is expected to be positive. Higher interest rates attract foreign investments and lead to currency demand increase, which in turn results in exchange rate appreciation.
3. The coefficient of the Crude oil price is expected to be positive that is the slope of the coefficient $\beta_3 > 0$ which shows that ceteris paribus a country dependent on a resource, for it major revenue will definitely affect the exchange rate of the country and influences its movement, causing it to move in the same direction that it moves.
4. The coefficient of ($\beta_5 > 0$) Term of trade is expected to be positive. Implies that if the country experience favourable balance of trade, the exchange rate of that country will appreciate.
5. The coefficient of ($\beta_7 > 0$) Monetary policy rate is expected to be positive. The lower the cost of fund to the commercial bank, the higher the level of investment climate in the country and thus appreciate the exchange rate value.
6. The coefficient of ($\beta_4 < 0$) foreign exchange reserve and ($\beta_6 < 0$) foreign interest rate respectively will depreciate the value of exchange rate.

RESULTS AND DISCUSSION

This section presents the empirical findings using the time series annual data generated from various issues of Central Bank of Nigeria (CBN) and Statistical bulletin spans the time period 1987 to 2014.

Normality Test

Normality test was carried out to verify if the error terms are normally distributed. The Jarque-Bera (JB) test was employed to ascertain this assumption. The Jarque-Bera statistic would not be significant for disturbance to be normally distributed around the mean. The test also presents the descriptive statistics of the dependent variables and explanatory variables included in the study. The result of the Jarque-Bera test of is presented in table 1.

Table 1. Descriptive Statistics

	EXRF	CP	DR	COP	FXRES	TOT	FR	MP
Mean	0.059357	21.01379	23.20828	15769.10	18774.76	-2.60E+12	2.585748	4430237.
Median	0.046129	12.40000	22.42000	10963.10	9009.100	-2.40E+12	1.218300	1269322.
Maximum	0.524395	72.80000	36.09000	57990.20	53000.40	0.000000	8.468500	18901303
Minimum	0.001045	5.400000	17.60000	190.9000	1429.600	-1.10E+13	0.000000	27573.58
Std. Dev.	0.092707	19.35561	4.246614	15012.29	17326.84	2.07E+12	2.724395	5999956.
Skewness	4.564457	1.431968	1.208821	0.879333	0.681294	-2.430455	0.956776	1.220571
Kurtosis	23.45115	3.566948	4.311823	3.207971	1.899121	10.48232	2.456091	3.046884
Jarque-Bera	606.0839	10.29930	9.142090	3.789522	3.707868	96.19979	4.782004	7.203327
Probability	0.000000	0.005801	0.010347	0.150354	0.156620	0.000000	0.091538	0.027278
Sum	1.721353	609.4000	673.0400	457304.0	544468.1	-7.55E+13	74.98670	1.28E+08
Sum Sq. Dev.	0.240650	10489.91	504.9444	6.31E+09	8.41E+09	1.20E+26	207.8251	1.01E+15
Observations	29	29	29	29	29	29	29	29

The Jarque-Bera statistic presented in Table 1 indicated a P-value less than 0.05 for exchange rate fluctuations (EXRF), commodity price level (CP), domestic interest rate (DR), commodity term of trade (TOT) and monetary policy (MPR). Hence the null hypothesis that the residuals of these variables are normally distributed is rejected at the 5% significance level. However, the P-value is greater than 0.05 for foreign exchange reserve (FXRES), Crude oil price (COP) and foreign interest rate (FR) indicating that their residuals are normally distributed.

The descriptive statistics revealed that the average fluctuation in exchange rate during period was N0.059357 while the minimum and maximum fluctuations in exchange rate recorded during this period was N0.001045 and N0.524395 respectively. The minimum score indicates that, during the study period, the lowest fluctuations in the Naira exchange rate was N0.001045, while the highest fluctuations in exchange rate is N0.524395, which is more than two fold of the average fluctuations indicated above. With respect of commodity prices (inflation), the average level was 21.01379 during the period while the minimum and maximum level of inflation experience in the country was 5.400000 and 72.80000 respectively indicating high level of price instability in the country. The average domestic interest rate was 23.20828 while the minimum and maximum domestic interest rate was 17.60000 and 36.09000 respectively indicating high cost of borrowing in Nigeria. The average Crude oil price N15769.10 while the minimum and

maximum Crude oil price was N190.9000 and N57990.20 respectively. The average foreign exchange reserves was N18774.76 while the minimum and maximum was N1429.600 and N53000.40 respectively. The average term of trade was $-2.60E+12$ while the minimum and maximum was $-1.10E+13$ and 0.000000 respectively indicating a negative term of trade. The average foreign interest rate 2.585748 while the minimum and maximum was 0.000000 and 8.468500 indicating a relatively stable price level. The average monetary policy was N 4430237 while the minimum and maximum was N27573.58 and N18901303 respectively.

Correlation Analysis

Table 2 is a correlation matrix table for the variables used in the analysis. The correlation coefficient indicates the strength of a linear relationship between two variables. The purpose of undertaking the correlation analysis is therefore to check whether there is Multi-collinearity problem in the models and to indicate whether or not the variables move together in the same direction.

Table 2. Correlation Matrix

	REER	CP	DR	FXRES				
Model 1	REER	1						
	CP	-0.058818	1					
	DR	0.06548	-0.058818	1				
	FXRES	0.087522	-0.486677	0.436671	1			
Model 2	REER	1						
	COP	0.109432	1					
	TOT	0.106530	0.058818	1				
	FR	-0.113456	0.074304	0.086601	1			
Model 3	REER	1						
	DR	0.135945	1					
	MPR	0.469404	0.670301	1				
Model 4	REER	1						
	CP	-0.140023	1					
	FXRES	-0.147679	-0.484233	1				
	DR	0.109432	0.145272	-0.296623	1			
	FR	-0.113456	0.366253	-0.355570	0.074304	1		

COP	-0.139393	-0.499324	0.895027	-0.237933	-0.497776	1		
TOT	0.005169	0.096738	-0.052507	-0.205649	0.025751	-0.105614	1	
MPR	-0.160682	-0.396330	0.742409	0.064980	-0.292478	0.693260	-0.527884	1

Table 2...

As a rule of thumb, Bryman and Cramer (2001) mentioned that Multi-collinearity exists when correlation exceeds 0.80. The result of the correlation analysis for model one indicates that there is no significant correlation among the explanatory variable since there is no explanatory variables with correlation coefficients which exceeds 0.80. While foreign exchange reserve is positively related to exchange rate fluctuations, commodity price level (CP) is negatively related to exchange rate fluctuations in Nigeria.

The values on the second model indicate that there is no significant correlation among the explanatory variable. While domestic interest rate is positively related to exchange rate fluctuations, foreign interest rate is negatively related to exchange rate fluctuations in Nigeria. The values on the third model indicate that there is no significant correlation among the explanatory variable. Crude oil price, term of trade and monetary policy are positively related to exchange rate fluctuations. The values of the third model indicate that there is no significant correlation among the explanatory variable. Crude oil price, term of trade and monetary policy are positively related to exchange rate fluctuations. The values of the fourth model indicate that there is no significant correlation among the explanatory variable. While the domestic interest rate, foreign interest rate, term of trade and monetary policy are positively related to exchange rate fluctuations, commodity price level, foreign exchange rate reserve and crude oil price are negatively related to exchange rate fluctuations.

Trend Analysis

This section presents vivid display of time plot of real exchange rate fluctuations (EXRF), commodity price level (CP), foreign exchange reserve (FXRES), domestic interest rate (DR), foreign interest rate (FR), crude oil price (COP), commodity term of trade (TOT) and monetary policy (MPR). This was plotted over time (1987–2016).

Trend of Exchange Rate Fluctuations, Inflation and Foreign Exchange Reserve

The figure 3 below shows that exchange rate fluctuations, commodity price level and foreign exchange reserve move in the same direction, although the value of Nigeria foreign exchange reserve was far above commodity price level and exchange rate fluctuations, commodity price level was more than exchange rate fluctuations. Evidently, the three variables have been

fluctuating upward and downward over the period. Indicating, high level of macroeconomic uncertainty in exchange rate and inflation in Nigeria which can be attributed to the occasional international oil price shocks in Nigeria since the country is dependent oil as the single commodity for her foreign exchange earnings.

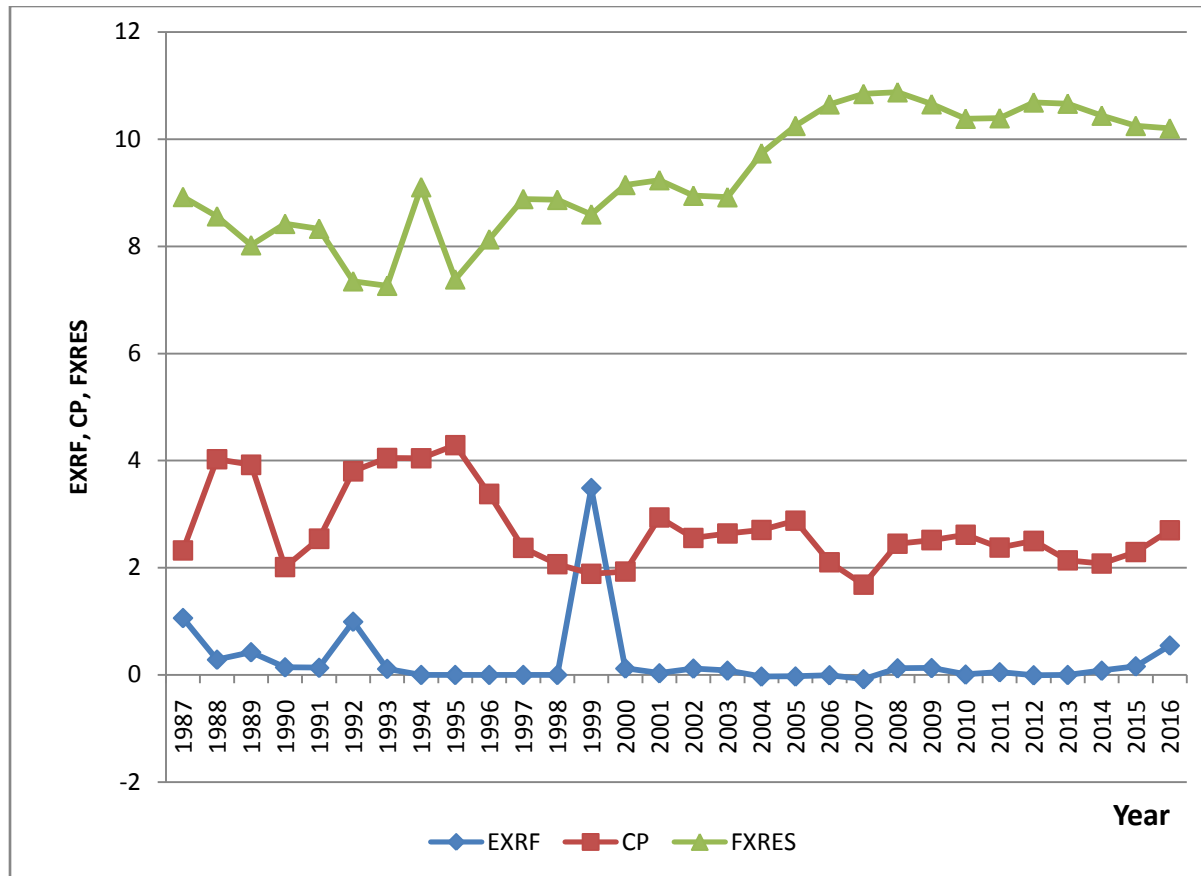


Figure 3. Trend in Exchange Rate Fluctuations, Inflation and Foreign Exchange Reserve

Trend of Exchange Rate Fluctuations, Crude Oil Price and Foreign Interest Rate

The figure 4 shows that exchange rate fluctuations, crude oil price and foreign interest rate are moving in somewhat same direction, although the value of Nigeria crude oil price was far above foreign interest rate and exchange rate fluctuations, both exchange rate fluctuations and foreign interest rate has galloping upward and downward intersecting one another. Evidently, the three variables have been very unpredictable in their trend.

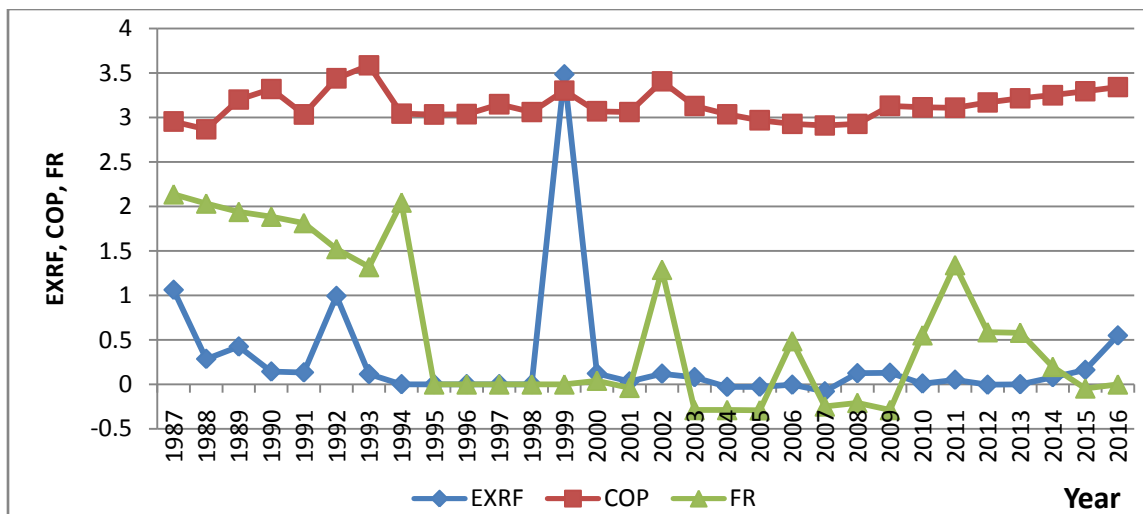


Figure 4. Trend in Exchange Rate Fluctuations, Crude oil Price and Foreign Interest Rate

Trend of Exchange Rate Fluctuations, Crude oil price, Commodity

Term of Trade and Monetary Policy

The figure 5 shows that both Crude oil price and monetary policy are positively slope indicating that their value has been on the persistent increase over the period. The level of fluctuation in these two variables is relatively predictable. However, both the term of trade and exchange rate fluctuations which were well below crude oil price and monetary policy have fluctuated upward and downward with intersections in some years.

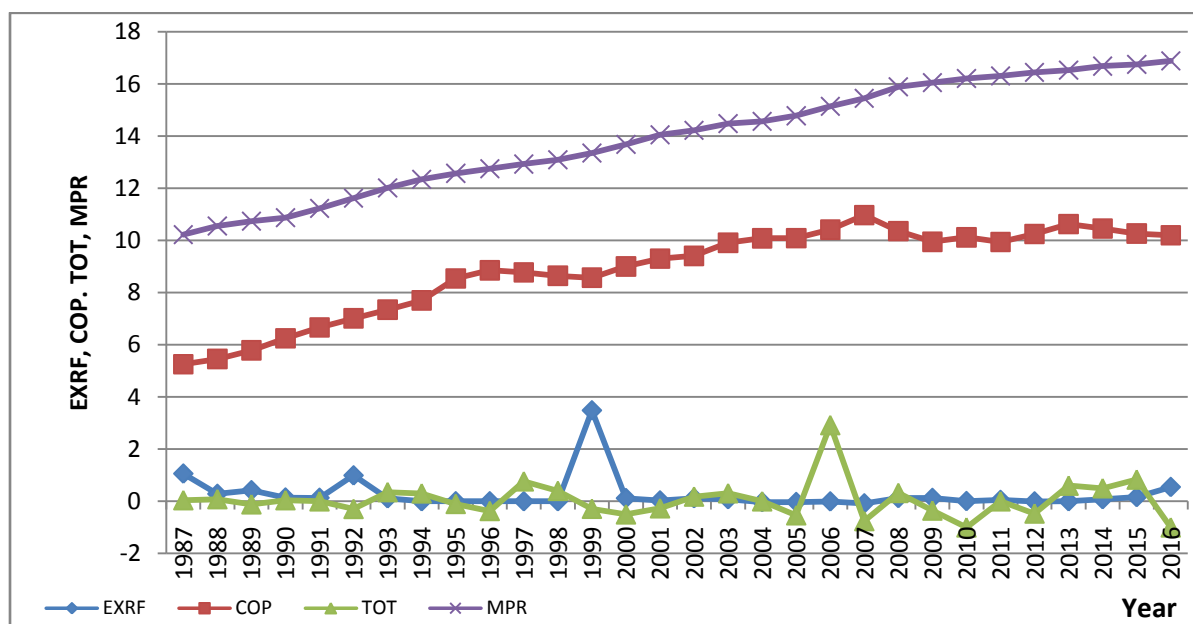


Figure 5. Trend in Exchange Rate Fluctuations, Crude oil Price, Commodity Term of Trade and Monetary Policy

Trends in macroeconomic variables

The figure 6 shows that exchange rate fluctuations, commodity price level and foreign exchange reserve move in the same direction, although the value of Nigeria foreign exchange reserve was far above commodity price level and exchange rate fluctuations, commodity price level was more than exchange rate fluctuations. More also, exchange rate fluctuations, domestic interest rate and foreign interest rate are moving in somewhat same direction, although the value of Nigeria domestic interest rate was far above foreign interest rate and exchange rate fluctuations, both exchange rate fluctuations and foreign interest rate has galloping upward and downward intersecting one another. Evidently, the three variables have been very unpredictable in their trend. It also shows that both crude oil price and monetary policy are positively slope indicating that their value has been on the persistent increase over the period. The level of fluctuation in these two variables is relatively predictable. However, both the term of trade and exchange rate fluctuations which were well below crude oil price and monetary policy have fluctuated upward and downward with intersections in some years.

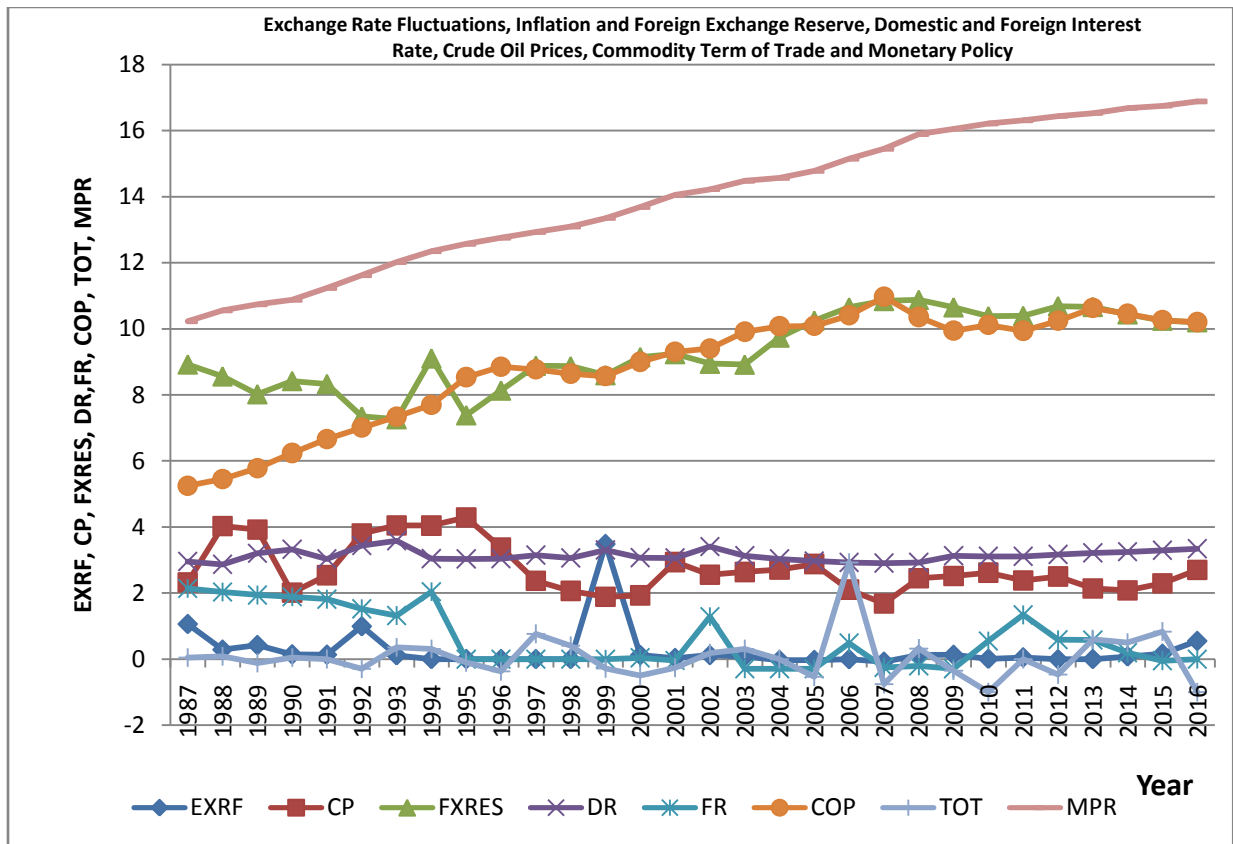


Figure 6. Trend in Exchange Rate Fluctuations, Inflation and Foreign Exchange Reserve, Domestic and Foreign Interest Rate, Crude Oil Price, Commodity Term of Trade and Monetary Policy

Unit Root Tests

This section reports the results of stationarity analysis conducted on the time series data in the study. Using the conventional Augmented Dickey-Fuller (ADF) unit root tests expressed in three model forms, without intercept and trend, with intercept, and with intercept and trend for the aggregate variables in Table below.

Table 3. ADF Unit root test results

Models	Variable	Level			First Difference			Order of Integration
		Constant	Trend	None	Constant	Trend	None	
Model 1	REER	-5.422847 (0.0001)	-5.358251 (0.0008)	-4.812558 (0.0000)	-6.004731 (0.0000)	-5.881929 (0.0003)	-6.128637 (0.0000)	I(0)
	CP	-3.185749 (0.0316)	-3.626743 (0.0455)	-1.603268 (0.1013)	-5.709509 (0.0001)	-5.605411 (0.0005)	-5.78895 (0.0000)	I(0)
	DR	-4.185749 (0.4316)	-4.626743 (0.4355)	-2.603268 (0.1213)	-4.709509 (0.0002)	-4.605411 (0.00056)	-4.78895 (0.0001)	I(0)
	FXRES	-1.141454 (0.6841)	-2.739898 (0.2295)	-0.785573 (0.3667)	-4.009016 (0.0048)	-3.932067 (0.0244)	-3.984888 (0.0003)	I(1)
Model 2	REER	-5.422847 (0.0001)	-5.358251 (0.0008)	-4.812558 (0.0000)	6.004731 (0.0000)	-5.881929 (0.0003)	-6.128637 (0.0000)	I(0)
	COP	-3.75139 (0.0084)	-3.684062 (0.0398)	0.060159 (0.6937)	-6.620377 (0.0000)	-6.47915 (0.0000)	-6.716536 (0.0000)	I(1)
	TOT	-3.367076 (0.1599)	-3.081010 (0.5327)	-3.420904 (0.0175)	-5.767429 (0.0000)	-6.857936 (0.0000)	-6.708869 (0.0000)	I(1)
	FR	-2.367076 (0.1599)	-2.081010 (0.5327)	-2.420904 (0.0175)	-7.767429 (0.0000)	-7.857936 (0.0000)	-7.708869 (0.0000)	I(1)
Model 3	REER	-5.422847 (0.0001)	-5.358251 (0.0008)	-4.812558 (0.0000)	6.004731 (0.0000)	-5.881929 (0.0003)	-6.128637 (0.0000)	I(0)
	DR	-5.719402 (0.0001)	-5.672097 (0.0004)	-4.620734 (0.0000)	-6.085724 (0.00000)	-5.963837 (0.0002)	-6.211388 (0.0000)	I(1)
	MPR	1.559793 (0.9990)	0.502531 (0.9987)	1.501761 (0.9633)	-0.277088 (0.9161)	-2.832642 (0.0091)	3.722714 (0.0051)	I(1)
Model 4	REER	-5.422847 (0.0001)	-5.358251 (0.0008)	-4.812558 (0.0000)	-6.004731 (0.0000)	-5.881929 (0.0003)	-6.128637 (0.0000)	I(0)
	CP	-3.185749 (0.0316)	-3.626743 (0.0455)	-1.603268 (0.1013)	-5.709509 (0.0001)	-5.605411 (0.0005)	-5.78895 (0.0000)	I(0)
	FXRES	-1.141454 (0.6841)	2.739898 (0.2295)	-0.785573 (0.3667)	-4.009016 (0.0048)	-3.932067 (0.0244)	-3.984888 (0.0003)	I(1)

DR	-3.75139 (0.0084)	-3.684062 (0.0398)	0.060159 (0.6937)	-6.620377 (0.0000)	-6.47915 (0.0000)	-6.716536 (0.0000)	I(1)
FR	-2.367076 (0.1599)	-2.081010 (0.5327)	-2.420904 (0.0175)	-7.767429 (0.0000)	-7.857936 (0.0000)	-7.708869 (0.0000)	I(1)
COP	-1.622937 (0.4585)	-2.896505 (0.1780)	-0.644236 (0.4294)	-5.199321 (0.0002)	-5.096016 (0.0017)	-5.122542 (0.00000)	I(1)
TOT	-5.719402 (0.0001)	-5.672097 (0.0004)	-4.620734 (0.0000)	-6.085724 (0.00000)	-5.963837 (0.0002)	-6.211388 (0.0000)	I(1)
MPR	1.559793 (0.9990)	0.502531 (0.9987)	1.501761 (0.9633)	-0.277088 (0.9161)	-2.832642 (0.0091)	3.722714 (0.0051)	I(1)

The results of the Augmented Dickey Fuller (ADF) unit root test for model one in Table 3 indicates that, exchange rate fluctuations, commodity price level and Nominal interest Rate are stationary at level I(0) with the exception of foreign exchange reserve which is stationary only at first difference I(1) at 5% levels. Hence, in model one, there is evidence that while some of the variables are integrated of order zero, some are integrated of order one which suggested the ARDL approach in the estimation of the model. The result of the Augmented Dickey Fuller (ADF) unit root test for second model indicates that, crude oil price, terms of trade and foreign interest rate are stationary only at first difference I(1) while exchange rate fluctuations is stationary level I(0) at 5% levels. Hence, in this model there is evidence that while one of the variables is integrated of order zero, others are integrated of order one, which suggested the ARDL approach in the estimation of the model. The Augmented Dickey Fuller (ADF) unit root test for third model shows that, nominal interest rate and monetary policy are stationary only at first difference (1) while exchange rate fluctuations is stationary level I(0) at 5% levels. Hence, in this model there is evidence that while some of the variables are integrated of order zero, some are integrated of order one, which suggested the ARDL approach in the estimation of the model. The unit root test for fourth model shows that, foreign exchange reserve, domestic interest rate and foreign interest rate, crude oil price, term of trade and monetary policy are stationary only at first difference I(1) while exchange rate fluctuations and commodity price level are stationary level I(0) at 5% levels. Hence, in this model there is evidence that while some of the variables are integrated of order zero, some are integrated of order one, which suggested the ARDL approach in the estimation of the model.

SUMMARY AND CONCLUSION

This thesis evaluated the macroeconomic effect of domestic prices and monetary policy on exchange rate fluctuations in Nigeria using US\$-NIGN Real Effective Exchange Rate (REER) during the study period 1987-2016. The study specifically examined the effects of commodity price (inflation) and Nominal Interest Rate on exchange rate fluctuations in Nigeria; analyzed the effects of crude oil price on exchange rate fluctuations in Nigeria; determined the effect of monetary policy on exchange rate fluctuations in Nigeria. It also established whether there was a short and long run equilibrium relationship between exchange rate fluctuation, domestic prices and monetary policy in Nigeria.

The theoretical framework of this study was based on purchasing power parity (PPP) postulated by Gustar (1921) to establish the basic and fundamental relationship between exchange rate, monetary policy and domestic prices in Nigeria. This theoretical exposition was also complimented by an analytical framework based on generalized Autoregressive Conditional Heteroskedastic (GARCH) modeled developed by TIM Bolerslev (1980) and Exponential Generalized Autoregressive Conditional Heteroskedastic (EGARCH) modeled developed by Daniel Nelson (1991). These models were used to estimate the relationship between domestic prices, monetary policy and exchange rate movement in Nigeria within the period under review.

An appropriate relevant descriptive statistics, Correlation matrix and trend analysis, lag order selection were employed. The Autoregressive distributed lag (ARDL) and Augmented Dickey Fuller (ADF) unit root test were carried out on the yearly time series data. The data set over the period of 30 years (1987-2016) expressed at 2008 Constant market prices for local currency unit were collected from the Central Bank of Nigeria (2016) and World Bank (2016). The conjoin estimates of long run and short run parameters for aggregates over performance of the variables were presented in the ARDL specifications with further integration of short and long run Bound tests.

The results of the ADF unit root test for each of the model at 5% level of significance were analyzed; in all the models, there was substantial evidence that some of the variables were integrated of order zero. While some were integrated of order one which suggests the ARDL approaches to the overall estimated models. The long run and short run relationship among the variables was determined by bounding testing technique while volatility clustering was used to examine ARCH effects of the exchange rate fluctuation over a sample period.

The finding from the analysis of the unit root tests for all the series based on the ADF and ARDL showed that Inflationary rate ($B=0.222397$, $t, 2.363142$, $P<0.05$) exert a significance positive and negative effect on exchange rate fluctuation both in the short run and long run whereas, nominal interest rate ($B=0.047933$, $t = 0.545521$, $P>0.05$) does not shown any short

run and long run in model one. The result in model two indicates that crude oil price ($B = 0.731595$, $t = 2.382283$, $P < 0.05$) exerts a positive significant effect on exchange rate fluctuation, in the short run, foreign interest rate and Terms of trade ($B = 0.014019$, $t = 0.466577$, $P > 0.05$) not show any effect on exchange rate fluctuations and vice versa in the long run. The results in model three show that nominal interest rate ($B = 11.043604$, $t = 2.963991$, $p < 0.05$) exerts a significant positive effect on exchange rate fluctuation both in the short and long run. Whereas, while monetary policy rate ($B = 0.0000038$, $t = 0.575$, $P > 0.05$) does not show any effect on exchange rate fluctuation in the short run, its long run effect has a negative significant influence on exchange rate fluctuation.

The major finding as estimated in model four, shows that in the short run nominal interest rate ($B = -2.1488636$, $t = 4.729726$, $p < 0.05$ and Crude oil price ($B = 0.573112$, $t = 3.516652$, $P < 0.05$) exerts a significant positive effect on exchange rate fluctuations in Nigeria. Whereas, commodity price ($B = 0.447161$, $t = 2.380813$, $P > 0.05$), foreign exchange reserve ($B = 0.041525$, $t = 1.005164$, $P > 0.05$), Terms of trade ($B = 0.117824$, $t = 1.366683$, $p > 0.05$) and monetary policy rate ($B = 1.172867$, $t = 1.793302$, $P > 0.05$) do not have any effect on exchange rate fluctuations in Nigeria. In the long run, only commodity price and crude oil have a negative significant effect while other variables do not have any significant negative effects on exchange rate fluctuations in Nigeria.

The study, therefore, concluded not only that there were significant relationship between commodity price, Nominal interest rate, Crude oil price, Monetary policy and exchange rate in Nigeria but also that there exist short and long run relationship between exchange rate fluctuations, domestic prices and monetary policy in Nigeria. The major recommendation of the study was that the monetary authorities should initiate and implement an appropriate monetary policy for keeping domestic prices at a reasonable level in order to stabilize exchange rate movement in Nigeria.

RECOMMENDATIONS

Arising from result and conclusion from the study, the following recommendations are made for the benefit of policy makers, central banks, researchers and academia:

- i. Monetary authorities should implement contractionary monetary policies for keeping domestic prices at reasonable level. Reason is that persistent inflation remain one the major characteristics of Nigerian economy. The economy experienced both high and low inflationary episodes since attainment of independence in 1960. These upward and downwards trends in inflation contributed significantly to the devaluation of real exchange of naira. Therefore, monetary authority should initiate and implement an

- appropriate monetary policy for keeping domestic prices to a barest minimum in order to stabilize exchange rate movement in Nigeria.
- ii. Timely and rule based monetary policy should be adopted instead of discretionary policy targeting the monetary aggregates. These will safeguard against the nominal factors (Domestic and Foreign Interest rate) having great influence on real exchange rate as compared to real shocks. Hence, it is suggested that only a stable monetary policy can help in making exchange rate stable.
 - iii. Central Bank of Nigeria should adopt fixed exchange rate regime by using real exchange rate as a nominal anchor. Experience in Nigeria has revealed overtime that flexible regime in exchange rate management is inflationary and counter-productive thereby distorting exchange rate movement stability.
 - iv. Adopt the combination of monetary and fiscal policy in executing macroeconomic decisions. This is important because there is the need to co-ordinate monetary and fiscal policy in spite of the fact that a sound rule based monetary policy approach changes in a discretionary fiscal policy could have effect on aggregate demand which ultimately lead to changes in exchange rate behavior.

SCOPE FOR FURTHER STUDIES

In order to strengthen the results of empirical finding in this study, the following suggestions are made for further studies:

- i. The parameters of Central Bank intervention in the foreign exchange market are not explicitly stated in the study. It is, therefore imperative to consider the level of the exchange rate parameters in future research as an alternative or possible trigger for intervention in the Monetary Policy Framework in Nigeria.
- ii. To understand the right connection between Monetary Policy, Domestic Prices, Exchange Rate and the real side of the economy, more empirical researches are needed such as modeling inflation, determinants of exchange rate and economic growth. In light of such models' findings, one might revisit the analysis of monetary transmission mechanism by using new set of variables.

REFERENCES

- Aaogu (1998): "Monetary policy in emerging world; Journal of Monetary Economics, 51 (6), PP 1155 – 1181
- A chami, C; Fausi, D and Abdullahi, E (2010) 'Monetary Frameworks and Institutional Constraints: UK Monetary Policy Reaction Functions, 1985-2003'; Oxford Bulletin of Economics and Statistics, 67(4): 497-516
- Adeoye, B.W and Saibu, O.M (2014): "Monetary Policy Shocks and Exchange Rate Volatility in Nigeria";Asian Economic and Financial Review 4(4) pp 544 – 562

- Adesoye A.B. (2012): "Price, Money and output in Nigeria: A cointegration – causality analysis"; African Journal of Scientific Research vol 8 (5) pp 428 – 442
- Adesoye, A.B, Maku, E.M and Atanda, A.M (2012): "Is monetary policy a growth stimulant in Nigeria? A vector Auto regression Approach. Minich personal RepEc Archive [http: mpra.iosr. Val Mucnchenide 135844](http://mpra.iosr.org/). NPRA paper No. 35844.
- Ajayi, M.A. (2007): "Monetary Transmission Mechanism in Nigeria, Central Bank of Nigeria Economic and Financial Services Vol 45 pp 91 – 99
- Aliyu, S.U and Englama, A. (2009): "Policy rules for open Economy; National Bureau of Economic Research (NBER) pp 127 – 156
- Amassaina, D; Wosa, P. and Olaiya, S.A (2001): "An Approval of monetary policy and its effects on macroeconomics stabilization in Nigeria journal of Emerg trends in Economics and management Sciences, vol 3 pp 232–237.
- Bagbebo M, Stephen, E.T (2014): "Monetary policy, Exchange Rate Volatility and Economic growth in Nigeria. Asian Economic and Financial review 4 (1) 20-32.
- Bature, B. (2014): "An assessment of monetary Transmission Mechanism in Nigeria", IOSR, Journal of Humanities and Social Sciences Vol 19 (3) PP 54-59
- Chambelling, K and Yueh, T (2006) 'Inflation and output gap: unobservable Estimates for G7 Economics'; unpublished manuscripts for Bank of International Settlement.
- CBN (2015) 'Annual Reports and Statement of Accounts of Various Months and Years. Abuja Central Bank of Nigeria.
- Central Bank of Nigeria, (2006): Annual Reports and statements of Accounts. Abuja, Central Bank of Nigeria.
- Central Bank of Nigeria, (2011): Understanding Monetary policy series No. 3 Abuja, Central Bank of Nigeria
- Central bank of Nigeria, (2012): Central Bank of Nigeria Communiqué No 93 of monetary policy committee meeting 20th – 21st January, CBN publication.
- Chit, M.M (2007) 'Exchange Rate Fluctuation and Exports: Evidence from ASEAN-China Free Trade Area'; Journal of Chinese Economic and Business Studies. 6 (3): 261 – 277.
- Daniel, N. (2011). "Investigating the Volatility of Nigerian Currency against Major Developed World (G-4_ Currency Exchange Rates Returns". International Journal of Academic Research Vol. 3. No. 3 May.
- Faridun, M, Folawewo, A and Osinubi, T. (2005): "Monetary policy and macroeconomic instability in Nigeria. A Rational Expectation". Applied Econometrics and international Development AEID vols (2) pp 69-90
- Gustar, M. (1925); External constraints on monetary policy and the exchange rate and inflation accelerator. NBER working paper No. 10128
- Jeong, J. (2000) 'What Drives Exchange Rates? The case of the yen/dollar Rate'; Multinational Business Review, fall: 31-36.
- Jhingan, H. (2005): "Monetary policy and volatility". Bank of Indian review summer, pp 1 –8
- Kamin, G and Clay O. (1997) 'Trade Openess, Economic Size and Macroeconomic Volatility: Theory and Empirical Evidence'; Journal of Economic Integration, 21: 254-272
- Mishkin, F.S, (1995): "Symposium on monetary transmission mechanism"; Journal of Economic perspectives 9 (4): 3 – 10.
- Ogun, S; and Akinbo, k (2010) effectiveness of Bank Credit Channel of Monetary Policy Transmission on Exchange Rate Fluctuation in Nigeria. Journal of applied Econometrics 15 pp 45-58.
- Pozo, S (1992) 'Are Flexible Exchange Rates really more volatile? Evidence from the Early 1900s'; Applied Economics 24:1213-1218.
- Pozo, S. (1992) 'Monetary Policy Rule?' Federal Reserve Bank of St. Louis Review, March/April: 3-12.
- Sloman, K. (2006): 'Improvement in monetary policy and implications for Nigeria' A paper presented as the key note Address Monetary Market Association of Nigeria, Abuja, Nigeria.
- Taylor, J. B (1995): 'Discretion Vs Policy Rules in practice' Carnegie – Rochester conference series in public policy, 39: 195 – 214.
- Tella, S.A. (2008): "Nigeria Economic planning and policies at 50; past, present and future, Lagos Banker". The chartered institute of Bankers of Nigeria vol. 11, No. 1 March, pp 60 – 72

Tella, S.A. (2015): "Inflation Targeting Framework Monetary Policy; Challenges and prospects, Lagos Banker, Vol.1.No3, March-June. Pp.42-49.

Tabi, C and Ondo, K (2011) 'Economic Uncertainty and the effectiveness of Monetary and Exchange Rate policy'; Norgas Bank Research, Working Paper No 17.

Ubogu, K.O. (1985): "Monetary policy framework in Africa;" The Nigerian Experience (Accessed on 24th 1990).

World Bank (2016) 'EMU and Trade'; available of <http://www.hm-treasury.gov.uk/documents/the-euro/assessments/studies/euro>: accessed on 15 July 2016.

Wallance, T.D (1975): 'The causes and effects of Exchange Rate Volatility in the international Monetary System, pp 24 – 64 edited by Dreyer, J. G Haberler and T.D Willett' Washington D.C, American Enterprise institute.

Zhang, S. and Lowinger, T. (2005). "Co-integration in a Monetary Model of Exchange Rate Determination" .ASBBS E-Journal, Volume 1, No. 1.

APPENDIX A

OBS	CP _t (%)	DR _t (%)	COP _t (%)	FXRES _t (NM)	TOT _t (NM)	FR _t (NM)	MPR _t (NM)	REER (%)
1987	10.02	17.5	11	3,043.20	10,836.80	11.2	27,573.58	4.0179
1988	56	16.5	9.5	5,445.60	14,186.70	13.36	38,356.80	4.5367
1989	50.05	26.8	10	2,424.80	11,023.30	16.38	45,902.88	7.3916
1990	7.5	25.5	11.75	1,026.50	8,206.40	12.26	52,857.03	8.0378
1991	12.9	20.01	11.5	781.7	7,502.50	9.09	75,401.18	0.9095
1992	44.5	29.8	13	1,143.80	9,085.00	10.23	111,112.31	17.2984
1993	57.3	18.32	11.75	1,641.10	11,72.80	8.1	165,338.75	22.0511
1994	57	21	12	3,587.40	8,920.60	6.81	230,292.60	21.8861
1995	73.1	20.18	19.2	4,643.30	30,360.60	6.66	289,091.07	21.8861
1996	29.1	19.74	17.6	3,272.70	31,192.80	7.61	345,853.96	21.8861
1997	8.5	13.54	24.6	13,457.10	57,971.20	9.22	413,280.13	21.8861
1998	10.5	18.29	27.7	34,953.10	109,886.10	8.1	488,145.79	21.8861
1999	6.6	21.32	20.8	44,249.60	121,532.40	5.7	628,952.16	92.6934
2000	6.9	17.98	31.2	13,982.50	205,611.70	3.52	878,457.27	102.1052
2001	18.9	18.29	36.09	67,245.60	206,059.20	3.02	1,269,321.61	111.9433
2002	12.9	24.85	21	30,455.90	950,661.40	4.2	1,505,963.50	120.9702
2003	14	20.71	20.79	40,333.20	1,309,543.40	5.84	1,952,921.19	129.3565
2004	15	19.18	20.86	174,309.90	1,241,662.70	5.3	2,131,818.98	133.5004
2005	17.9	17.26	23.32	262,198.50	751,856.70	5.46	2,637,913.73	132.147
2006	8.4	16.94	21.34	226,702.41	1,188,969.80	5.35	3,797,908.98	128.6516
2007	5.4	15.14	27.19	546,873.10	1,945,723.30	4.97	5,127,400.70	125.8331
2008	5.9	18.99	21.55	1,090,148.00	2,001,230.80	6.24	8,008,203.95	118.5668
2009	5.2	17.59	21.34	1,181,652.00	1,882,168.20	3.89	9,411,112.25	148.9017
2010	5.8	16.69	30.19	5,425,578.60	2,889,806.70	1.67	15,585,138.34	150.298
2011	6.4	15.79	22.88	1,065,083.00	4,620,085.00	1.35	12,172,490.28	160.9402
2012	6.4	14.9	18.41	2,232,873.00	5,752,747.70	3.21	13,310,039.64	155.9803
2013	5.15	14.95	19.49	3,647,998.70	5,752,747.70	4.96	14,447,588.99	158.4603
2014	5.14	14.99	20.82	1,013,514.00	6,310,247.70	5.02	11,034,940.93	153.8616

