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MONETARY POLICY AND EXCHANGE RATE STABILITY IN NIGERIA: AN EMPIRICAL INVESTIGATION

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ABSTRACT

This study focuses on the investigation of the efficiency of monetary policy in ensuring stability in exchange rate in Nigeria. Data covering from 1981 to 2014 were obtained from secondary sources particularly Central Bank of Nigeria (CBN) statistical Bulletin and National Bureau of Statistics of various issues. Analysis was carried out using multiple regression method, Augmented Dicky-Fuller unit root test, Johansen co-integration test and Error Correction Mechanism (ECM). The results revealed that all variables were not stationary at their level form rather stationary after first differencing hence they are integrated of order one 1(1). The results also showed that a long-run relationship exists among the variables as well as the presence of one co-integrating vector in the model. The result also showed that the impact of monetary policy on exchange rate was significant while the ECM showed the extent of reverting to stability when deviated from stable path. On this note, the authors made the following recommendations among others: sincere efforts need be made to reduce the disparity between the official exchange rate and parallel market rate; the CBN should intensify its efforts in monitoring or regulating foreign exchange demand to discourage speculative demand; and the economy should be diversified to expand the sources of foreign exchange to satisfy demand.

KEYWORDS: Exchange Rate, Investigation, Monetary Policy, Stability

INTRODUCTION

There is this argument of fact that market mechanism alone cannot perform all economic functions without other supporting policies-monetary policy inclusive (Madu 1998). Therefore, monetary policy is needed to guide and regulate the value and supply of money in an economy in consonance with the level of economic activities. Evidence from literature has shown that even in the most advanced capitalist state like (USA), there is an increasing believes that government should intervene in protecting the economy. However, the efficiency of monetary policy depends on the time lag, forecasting accuracy and structural changes in the financial market (Nzota, 2000). Monetary policy is therefore regarded as the key tool in economic management and macroeconomic stabilization. Macroeconomic aggregates such as output, employment, and prices are in turn affected by the stance of monetary policy through a number of ways including interest rates, credit, wealth or portfolio and exchange rate channels.

The monetary authorities apply their discretionary power in influencing the money stock and interest rate to make money either expensive or cheaper depending on the prevailing economic condition and policy stance. According to Nanna (2001), monetary policy is an attempt to regulate the economy by regulating the supply of money and availability of credit. Specifically, it is designed to regulate the availability, cost, and direction of credit to attain stated economic objectives including exchange rate stability. The primary goal of monetary policy in Nigeria has been the maintenance of price and

exchange rates stability since it is critical for the attainment of sustainable economic growth and external sector viability (Sanusi, 2012).

Exchange rate is the price of one currency expressed in term of another. When exchange rate rises, it makes exported goods priced in Naira more expensive in foreign currency. This tends to put downward pressure on inflation and interest rates. Similarly, a fall in exchange rate makes imports more expensive, putting upward pressure on demand, inflation and interest rates (Jason 2010, Umar and Soliu, 2006; Oleyede, 2002, Ahmed and Zarma, 1997). Exchange rate helps in ensuring international exchange of goods and services as well as achieving and maintaining international competitiveness and Balance of Payment viability. Exchange rate serves as an anchor for domestic prices and contributes to internal balance in price stability (Isard 2007, Serven and Solimano, 1993).

Between 1960 and 1973, monetary policy framework in Nigeria Centred on exchange rate targeting. The primary objective of this frame work was to promote price stability as a basis for economic growth (Adeoye, 2005, Babatunde and Olufemi, 2004). The frame was broken into regimes and incorporated several features of the basket, band and crawling peg regimes. First, Naira was managed against different weights, depending on Nigeria's extent of partnerships in trade. Second, the Central Bank of Nigeria (CBN) operated the Inter-bank Foreign Exchange Market (IFEM) which was conducted as a managed float (Aliyu, 2011). Later the Dutch Auction System (DAS) was introduced where the exchange rate of the Naira was determined by auctioning and the clearing rate determined the exchange rate.

In 2005, the exchange rate policy allowed the exchange rate to fluctuate with a policy band of (± 3). The band provided a mechanism to accommodate short-term fluctuations in the foreign exchange market and flexibility in the management of exchange rate. The general objectives of monetary policy in Nigeria have been anchored on ensuring a narrow gap between the official and parallel markets and prevent disequilibrium in the foreign exchange market, ensuring stability and sustainability of exchange rate, maintain favourable external reserve position and to ensure external balance without compromising the need for internal balance while keeping in view, the overall goal of sustainable output, growth and employment (Idika, 1998 and Akinlo, 2007).

The achievement of stable exchange rate in Nigeria which is heavily dependent on oil export receipts and on imports of consumer and production goods have been very difficult. The exchange rate regimes (fixed and floating) have not yielded the optimum result. The reasons attributable to that may include the fact that our economy is characterized by structural rigidities, bottlenecks and most of our imports and exports are characterized by inelasticity either on the demand or on the supply side or both.

Moreover, the guidelines of the Central Bank of Nigeria (CBN) on the purchases of foreign currency are often cumbersome, causing some frustrations on the users and leading to high patronage to parallel markets. To this end several efforts and programmes put in place to ensure a viable exchange rate for the naira vis-à-vis other currencies of the world has not yielded the desired results as Nigerians are still battling with a continuous downward fall of Naira's competitiveness among currencies. This situation therefore constitutes the problem and thus raises a fundamental question thus: To what extent has monetary policy been effective in ensuring stable and favourable exchange rate for the naira? The main objective of this paper is to determine the efficacy of monetary policy in ensuring stability in exchange rate between 1981-2014. It is therefore hypothesized that monetary policy does not have any significant impact on exchange rate stability in Nigeria.

On this note, the paper is organized thus: section two is the review of empirical literature; methodology is the section three; data analysis and result presentation is the section four while recommendations and conclusion is the last section.

2.0. REVIEW OF EMPIRICAL LITERATURE

Quite a number of researches have been conducted world over on issue of exchange rate stability and monetary policy and on how exchange rate responds to monetary policy shocks. Some of the empirical literatures on this subject are reviewed below. Oliver and Thepthida (2005) used a general equilibrium model to discover that real exchange rate fluctuations arise from two sources, changes in the relative cost of credit and movement in the relative price of imports across countries. In their conclusion, they maintained that monetary growth impacts significantly on exchange rate stability.

Michael (2010) analysed the impact of monetary policy rate on exchange rate fluctuation in Nigeria economy using a time series data spanning 1986-2005 and observed that changes in monetary policy rate play a significant role in determining the direction of exchange rate movement. Aregha (2010) examines the impact of interest rate on exchange rate stability in Nigeria, using a time series data 1970-2002, employed instrumental variable technique and found that variations in interest rate played a negative and highly significant role on exchange rate determination in the economy. Zafar and Sabo (2013) examine the effects of monetary policy variables on exchange rate. Employing multiple regression analysis and time series data over the period 1980-2010, the quantitative evidence shows that money supply, Treasury bill rate and cash reserve ratio negatively and significantly impact on exchange rate. Empirical results also suggested that monetary policy rate is negatively related to exchange rate suggesting that timely and effective implementation of monetary policy decisions is the best alternative to exchange rate management.

Umar (2013) maintained that monetary policy is fundamental basis of sustainable exchange rate stability in Nigeria. This is because, it increases national savings, and private investment, improves exports and balance of payment with competitiveness. An exchange rate stability, to a large extent guarantees economic growth. To this end, there are several factors identified as potential determinants of exchange rate stability. These include diversification of exports, to discourage over dependence on oil; improved trade relations and increased inflows of foreign direct investment. Using time series data for the period 1980-2011 and adopting Granger causality test and Error Correction Mechanism (ECM), the results revealed that money supply has positive and significant effect on exchange rate while monetary policy rate and liquidity ratio impact negatively on exchange rate.

The study concluded that for exchange rate stability to be achieved in Nigeria; appropriate monetary policy should be formulated and implemented. Masha (2011) examined the economic implications of monetary policy actions on exchange rate determination in Ghana using time series data ranging from 1982 to 2009 and adopting the Johansen's method of co-integration analysis. The findings revealed that timely application of monetary actions translates to short-term and long-term exchange rate stability. Hence policy tools such as money supply, interest rates, liquidity and cash reserve ratios, should be used by the government to ensure exchange rate stability.

Ahmed and Rafar (2009) examined the determinants of exchange stability in Nigeria considering the role of Global Trade by using annual time series data from 1990-2007. The result showed two co-integrating equations which established the existence of long-run relationship among the variables. The Ordinary Least Square (OLS) statistical

technique was used to examine the degree of influence of broad money; cash reserve ratio, exports and real GDP on exchange rate. The money supply; and cash reserve ratio parameters were significant at 5 per cent. The overall model was significant at 5 percent. The Granger causality test showed that there was causality between the variables and realized a unidirectional relationship. The conclusion was that Nigeria needs to increase or diversify her export to increase the supply side of foreign exchange and to reduce the pressure on naira due to increase in demand for foreign exchange. This in the medium and long-term will ensure exchange rate stability.

Zulu and Paul (2008) evaluate the impact of monetary policy on exchange rate and growth in Zambia for the period which spanned between 1992 and 2006. Employing multiple regression technique in the analysis, it was discovered that money supply and liquidity ratio, have positive impact on exchange rate while monetary policy rate (Minimum Rediscount Rate), exports and dummy variable which captures periodic policy changes have negative and significant impact on exchange rate. They recommended that there is need to introduce greater depth in monetary policy and more efficient utilization of foreign direct investment to make monetary policy more proactive.

Cozier and Selody (1996), based on data from 22 countries belonging to the Organization for Economic Co-operation and Development (OECD), suggest that money supply has a positive relationship with exchange rate which is large and significant. Coneri and Ziba (2001) used a sample of 42 middle-income developing countries to develop an empirical model for exchange rate. The study also presents a wide-range examination of both theoretical and empirical evidence on the many ways monetary policy affects exchange rate. The results suggest that apart from monetary policy effects, open trade policies are necessary for exchange rate stability. Furthermore, the ability to adopt technological changes in order to increase efficiency is also important. Since many developing countries depend most on crude oil and agricultural exports, adverse supply or demand shocks on this exports was found to have a negative impact on exchange rate stability.

Ullah and Rauf (2013) asserted that a sound exchange rate policy has to do largely with the consistent management of short-term monetary policy instruments pursuing a sustainable and predictable pace for aggregate economic growth. They established that monetary and fiscal policies, together with structural reforms, have considerable impacts on exchange rate stability not only in terms of protection against shocks and crisis but also in terms of equity.

3.0. RESEARCH METHODOLOGY AND SOURCES OF DATA

The acceptability and reliability of any research findings depends on the design and the appropriateness of the models specified and the robustness of the analytical tools employed. In view of the fact, secondary data were used for this research; the researcher adopted the ex-post-facto research design. The secondary data were collected from Central Bank of Nigeria (CBN) statistical bulletin (2014), financial reviews, Annual reports and National Bureau of Statistics among others. Data on variables such as exchange rates, and monetary policy indicator variables (1981-2014) were collected and analysed.

3.1. Specification of the Model

A study of this nature concerning monetary policy in relation to exchange rate stability could be based on variables such as money supply, monetary policy rate, Treasury bill rate, cash reserve requirement etc. This is due to the fact that monetary policy is concerned with the regulation of value, cost and availability of credit in an economy. Thus, the functional relationship between the dependent and independent variables is stated as follows:

$$FXR = f(MSP, RMP, TBR, CAR) \quad (1)$$

Transforming to multiple relationship, we have

$$FXR = a_0+a_1MSP+a_2RMP+a_3TBR+a_4CAR+Ut \quad (2)$$

Where

FXR = Exchange Rate

MSP = Broad Money Supply

RMP = Monetary Policy Rate

TBR = Treasury Bill Rate

CAR = Cash Reserve Requirement

U_t = Error Term

a_1- a_4 = parameters/ coefficients

$a_1, a_2, a_3, a_4<0$

3.2. Method of Data Analysis

This research employed the following methods for analysis: Descriptive Statistics, Unit Root test, Co-Integration Test, and Error Correction mechanism (ECM).

3.2.1. Unit Root Test

The analysis will commence with checking the time series properties of the variables using the Augmented Dickey Fuller (ADF) test to establish the order of stationarity. This is to avoid the problem of spurious regression estimates. The test involved the estimation of the following regression equation.

$$\spadesuit x_t = \alpha + \beta_t \text{ x } \delta x_{t-1} + \sum_t \quad (3)$$

Where x is the variable under consideration. Thus the ADF unit root test states that

Ho: β = O and Hi: β<O, where the ADF statistic was compared with the observed Mackinnon critical values. A series that exhibits a stochastic trend will not be stationary and cannot be forecast far in the future. Stationary series will constantly return to a given value and no matter the starting point, in the long-run, it is expected to attain the value.

Given an auto-regressive AR (I) process as follows: $Y_t = \mu + PY_{t-1} + \sum_t$, where μ and P are parameters and $\sum_t$, is the white noise assumption. Y is a stationary series if -1<P<1. However, the above description is valid only if the series is an AR (1) process. (Dickey and Fuller, 1981). A non-stationary series could be made stationary by differencing once or twice.

3.2.2. Co-Integration Test

In this research, the Johansen (1991) co-integration method was adopted. A non-stationary series could be made stationary by differencing once or twice. This is called an integrated series. It could be integrated of order I which is often denoted as 1(1) or order 2 represented by 1(2). The stationary linear combination of the variables under consideration is

called co-integration equation. Variables are co-integrated implies that they share a long –run relationship and will move closely together over time, meaning that the differences between such variables are stable over time and there is some degree of convergence in the long-run.

Testing for unit root is a formalization approach of differencing. The analysis and testing for unit roots naturally lead to the theory of co-integration (Iyoha and Ekanem, 2002). This is because, co-integration deals with methodology of modeling non-stationary time series variables and the idea rests on the fact that even though two time series variables may not themselves be stationary, a linear combination of two non-stationary time series are said to be co-integrated.

3.2.3. Error Correction Mechanism (ECM)

This study employed the Engel and Granger error correction model (ECM) techniques. Thus the model would be re-specified as follows to include an error correction term.

$$FXR = C_0 + C_1MSP + C_2RMP + C_3TBR + C_4CAR + ECM_{t-1} + U_t \quad (4)$$

The idea behind this is that it has been observed that the body of statistical estimation theory is based on asymptotic convergence theorems which assume that series are stationary. However, the economic tools are increasingly being brought to bear on non-stationary data which are not even asymptotically consistent with the notions of convergence.

4.0. DATA ANALYSIS AND DISCUSSION OF FINDINGS

Table 4.0: Descriptive Statistic

	FXR	MSP	RMP	TBR	CAR
Skewness	0.30485	2.56400	0.67046	0.71267	-0.00267
Kurtosis	1.26126	9.10460	3.9224	3.50440	1.51765
Jarque Bera	4.81104	87.5406	3.96450	3.24076	3.1204
Probability	0.090126	0.0000	0.13862	0.17640	0.21405

***Source*: Summary of E-view results**

From the table 4.0 above, monetary policy rate, Treasury bill rate, and money supply are leptokurtic relative to the normal distribution since their kurtosis values are greater than 3. However, exchange rate (FXR) and cash reserve ratio (CAR) are mesorkurtic implying that the series have a normal peak. The Jarque Bera statistic rejects the null hypothesis of normal distribution for money supply (MSP). However the null hypothesis of normal distribution is accepted for exchange rate (FXR), monetary policy rate (RMP), treasury bill rate (TBR) and cash ratio, since their probability values are greater than 0.05. Thus we conclude that only money supply is not normally distributed, whereas exchange rate, Treasury bill rate and cash reserve ratio are normally distributed.

4.1. Unit Root Test Results

In this study, the Augmented Dickey Fuller (ADF) unit root test was employed to test for the time series properties of the model variables. The hypothesis is that the variable under investigation has a unit root. The choice of lag length was based on Akaike and Schwartz information criteria. The decision rule is to reject the hypothesis if the ADF statistic value exceeds the critical value at a chosen level of significance.

Table 4.1: ADF Unit Root Test Results

Variables	ADF Statistic	1% Critical Value	5% Critical Value	Order of Integration
FXR	-4.5647	-3.6440	-2.94110	1(1)
MSP	-5.72106	-3.6440	-2.94110	1(1)
RMP	-6.14402	-3.6440	-2.94110	1(1)
TBR	-6.42406	-3.6440	-2.94110	1(1)
CAR	-4.81126	-3.6440	-2.94110	1(1)

Source: Summary of E-view results

The result from the table 4.1 above shows that the hypothesis of unit root is rejected since all the variables were stationary at first difference as their ADF statistic are more negative than their critical values at both 5% and 1% . Thus, all the variables are integrated of order one (1) and this suggests long-run relationships among the variables since the variables are integrated in the same order.

4.2. Co-Integration Test Results

A necessary but insufficient condition for co-integrated test is that each of the variables be integrated of the same order.

Table 4.2: Johansen Co-Integration Results

Sample (Adjusted): 1984 – 2014
Included obs: 31 after adjustment
Trend assumption: Linear deterministic trend
Series: FXR, MSP, RMP, TBR, CAR
Lags interval (in first differences): 2 to 2
Unrestricted co-integration rank Test (Trace)

Hypothesized No. of CE(s)	Eigen Value	Trace Statistic	0.05 Critical Value	Prob **
None*	0.81220	93.0246	68.7204	0.00024
At most 1	0.47147	42.1767	46.7246	0.1346
At most 2	0.37420	22.6406	29.4407	0.2640
At most 3	0.26421	8.7424	15.4224	0.3744
At most 4	0.00176	0.06240	3.76402	0.8114

Trace test indicates I co-integrating equ(s) at the 0.05 level
* indicates rejection of the hyp. At the 0.05 level
** Mackinnon – Haug-Michelis (1999) p-values.
Unrestricted co-integration rank test (Maximum Eigen value)

Hyp. No of CE(s)	Eigen Value	Max-Eigen Statistics	0.05 Critical Value	Prob **
None*	0.81220	50.7442	33.7404	0.0002
At most 1	0.47147	20.5420	26.4420	0.3221
At most 2	0.37420	14.1747	20.1404	0.3466
At most 3	0.26421	8.6402	14.2704	0.3420
At most 4	0.00176	0.0628	3.7400	0.8110

Max- eigen value test indicates 1 co-integrating eqn(s) at the 0.05 level
* denotes rejection of the hyp. At 0.05 level
* Mackinnonion =Haug-Michelis (1999) P-values

Source: Author's Computation

Results from table 4.2 above indicate that there is evidence of long-run relationship among the variables in the model as the result indicates at least one co-integrating equation used to model the relationship between monetary policy variables and exchange rate.

4.3. Parsimonious Error Correction Mechanism Result

The Error correction Mechanism (ECM) is meant to tie short-run dynamics of the Co-integrating equations to their long-run disposition. In order to capture the short-run fluctuations, the ECM was employed and the result is shown below on table 4.3.

Table 4.3: Parsimonious ECM Results

Dependent variables: D(FXR) Method: Least squares Sample(adjusted): 1987-2014 Included obs:28 after adjustments				
Variables	**Co-Efficient**	**Std Error**	**t-Stat**	**Prob**
D(FXR(-1))	0.14620	0.12406	1.04246	0.3074
D(MSP(-3))	-4.16e-06	1.10E-05	-0.03640	0.9602
D(RMP(-5))	-2.96204	0.52409	-5.51406	0.0000
D(TBR(-4))	-1000423	0.467070	-2.10407	0.0420
D(CAR(-2))	-0.241120	1.07024	-0.21004	0.02140
ECM(-1)	-0.08420	0.05240	-1.81241	0.0324
C	5.72414	2.01204	2.51240	0.01250
R-squared	0.64024	Mean dep var.		5.50024
Adjusted R2	0.51248	S.D. dep var.		14.1204
S.E. of regr	9.64007	Akaike Infor, crit		7.60420
Sum sgd resid	1987.300	Schwarz crit		7.94402
Log likelihood	-99.4246	Hannan-Quinn crit		7.6070
F – statistic	5.94960	Durbin Watson stat		1.88640
Prob (f-stat)	0.00082			

Source: **E-view result**

The results from, table 4.3 above indicate that about 51 per cent of total variation of exchange rate in Nigeria is influenced by the monetary policy variables. This implies a good fit. The model is significant with F-statistic of 5.94 with probability of 0.00082. The co-efficient of ECM -0.08420 is correctly signed. This means that the speed of adjustment is 0.08 yearly. The DW statistic is approximate to 2 which indicate the absence of both serial and auto correlation.

Money supply at various lags (-4.16E-06) has a negative and insignificant relationship with exchange rate. The RMP, TBR and CAR show negative relationship with exchange rate and their impact is significant in ensuring exchange rate stability in Nigeria. These results are in line with the findings of Zafar and Sabo (2013), Ahmed and Rafar (2009), Zulu and Paul (2008).

5.0. RECOMMENDATIONS

Based on the findings, the following recommendations are put forward first; monetary policy should be used to create a favourable investment environment by facilitating the emergence of market based interest rate and exchange rate regimes which could attract domestic and foreign investments. Second; the Central bank of Nigeria (CBN) need to avoid policy inconsistency or summersault to actually determine its policy impact before contemplating a change. Third, the Government should make the financial sector less volatile to allow smooth execution of CBN monetary policies. Finally, there should be a coordination and balance between monetary and fiscal policies to ensure smooth realization of monetary policy goals.

CONCLUSIONS

Monetary policy has been a major policy used in maintaining a stable exchange rate in both developing and developed economies. The potency of this policy to achieve this objective particularly in developing economies has been an issue of controversy. This study examined the stochastic characteristics of the time series data by testing their statioanrity, long-run relationships, as well as the short-run dynamics of the model using the (ADF) method; Johansen co-integration test and parsimonious (ECM) method respectively. Overall, our results indicated that the impact of monetary policy on exchange rate was significant. There was a negative and significant relationship between monetary policy variables and exchange rate. The conclusion that is drawn from our results is that monetary policy remains an effective and potent tool to ensuring a stable exchange rate in Nigeria. The null hypothesis that monetary policy does not have any significant impact on exchange rate is therefore rejected.

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APPENDIX (DATA)

Monetary Policy and Exchange Rate (1981-2014)

Year	FXR ₦/US Dollar	MSP ₦M	RMP (%)	TBR (%)	CAR (%)
1981	0.61	16161.7	6	5	9.5
1982	0.6729	18093.6	8	7	10.7
1983	0.7241	20879.1	8	7	7.1
1984	0.7649	23370	10	8.5	4.7
1985	0.8938	26277.6	10	8.5	1.8
1986	2.0206	27389.6	10	8.5	1.7

1987	4.0179	33667.4	12.75	11.75	1.4
1988	4.5367	45446.9	12.75	11.75	2.1
1989	7.3916	47055	18.5	17.5	2.9
1990	8.0378	68662.5	18.5	17.5	2.9
1991	9.9095	87499.8	14.5	15	2.9
1992	17.2984	129085.5	17.5	21	4.4
1993	22.0011	198479.2	26	26.9	6
1994	21.8861	266944.9	13.5	12.5	5.7
1995	21.8861	318763.5	13.5	12.5	5.8
1996	21.8861	370333.5	13.5	12.5	7.5
1997	21.8861	4297341.3	13.5	12	7.8
1998	21.8861	525637.8	14.31	12.95	8.3
1999	92.5284	699733.7	18	17	11.7
2000	109.55	1036077	13.5	12	9.8
2001	112.486	1315869	14.31	12.95	10.8
2002	126.4	1599495	19	18.88	10.6
2003	135.40	1988192	15.75	15.05	10
2004	132.84	2263588	15	14.21	8.6
2005	130.55	2814846	13	7	9.7
2006	128.27	4027902	10	8.8	2.6
2007	117.96	5809827	9	6.91	2.8
2008	130.75	8550430.3	9.75	7.65	1.7
2009	147.6	10730500	7.44	6.13	1.3
2010	148.67	115255.3	6.25	10.25	1
2011	153.29	12172.49	12	16.75	8
2012	155.82	13895.39	12	17.2	12
2013	155.7	15160.29	12	13.34	12
2014	159.6	17170.48	13.5	13.20	12

Source: CBN Statistical Bulletin (Various Issues)