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Exchange Rate Volatility and the Relative Effectiveness of Monetary and Fiscal Policies on the Nigerian Economy: An ARDL Model Approach

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Abstract:

In Nigeria, regrettably, exchange rate has continued to maintain steady disequilibrium trend over the years and its stability in the near future seems not to be possible given the unfavorable macroeconomic conditions such as high inflation rate, interest rate differentials, depletion of foreign reserves, structural deficiency in the economy which are among the factors responsible for exchange rate depreciation in Nigeria. This study is an attempt to investigate the effect of exchange rate volatility and the relative effectiveness of monetary and fiscal policies on economic growth of Nigeria for the period 1981-2018 with specific objectives; to determine the effect of exchange rate volatility on economic growth in Nigeria, to ascertain the relative effect of monetary policy on economic growth in Nigeria, to investigate the relative effect of fiscal policy on economic growth in Nigeria and to determine the joint effects of monetary and fiscal policies on economic growth in Nigeria. The specified model was estimated using the Autoregressive Distributive lag Model to determine the level of impact that one variable has on the other. While E-views 10 statistical software was employed in computing the result, time series data were obtained from World Bank national accounts data and OECD National Accounts data files and the study established that Exchange Rate Volatility (EXRVT) is ineffective on its effect and influence on economic growth (RGDP) of Nigeria, Broad Money Supply (LM2) had a negative a positive relationship with economic growth (RGDP) in the short run and in the long run at 5% level of significance while Inflation Rate (INFR) had a negative and statistical relationship with RGDP in the current year and also in the long run at 5% level of significance and finally, Total Government Expenditure (LTGEXP) had a negative relationship with RGDP in the short run and in the long run but statistically insignificantly at 5% level of significance. Based on the findings, the study recommended that efforts should be made to ensure exchange rate stability in order to stabilize Nigeria's economy and that they government should do everything economically possible to strengthen the value of Naira in the FOREX market. This however excludes pumping billions of dollars into the FOREX market as this only creates a temporary economic condition.

Keywords: Exchange rate volatility, monetary policy, fiscal policy, economic growth

1. Background to the Study

Exchange rate policy in Nigeria has undergone a good number of changes. It has developed from a fixed parity in 1960 when it was solely tied with the British Pound Sterling (Balogun 2015). By 1967, following the devaluation of the Pound Sterling the US dollar was included in the parity exchange. In 1972, the parity exchange with the British Pound was suspended as a result of the emergence of a stronger US dollar. In 1973, Nigeria reverted to a fixed parity with the British Pound following the devaluation of the US dollar. In 1974, in order to minimize the effect of devaluation of a single individual currency, Nigerian currency was tied to both the pound and dollar (Balogun 2015).

Almost throughout the 1970s there was persistent appreciation of the nominal exchange rate of the naira occasioned by increases in the price of oil in the international market. These appreciations in the nominal exchange rate gave rise to over-reliance on imports with its accompanying capital flight, discouraging non-oil exports which ultimately led to Balance of Payments problems and depletion of external reserves (Balogun 2015). The increase in the marginal propensity to import collapsed the agricultural sector in Nigeria (Osaka, Mashe, and Adamgbe 2003). In 1978, the naira was pegged to a basket of 12 currencies comprising Nigeria's major trading partners. However, the 1978 policy was jettisoned in 1985 in favour of quoting the naira against the dollar.

Before 1986, the prevailing exchange rate policies encouraged over-valuation of the naira. To solve the problems associated with the over-valuation, the naira was deregulated in September 1986 under the Structural Adjustment Programme Package. To enhance the implementation of the Structural Adjustment Programme was the introduction of the

Second-tier Foreign Exchange Market (SFEM). SFEM was expected to usher in a mechanism for exchange rates determination and allocation in order to ensure short term stability and long term Balance of Payments equilibrium. As stated by Mordi (2006), the essential objectives of SFEM include to achieve a realistic naira exchange rate through the market forces of demand and supply, more efficient allocation of resources, stimulation of non-oil efforts, encourage foreign exchange in flow and discourage outflow, eliminate currency trafficking by wiping out unofficial parallel foreign exchange market, and lead to improvements in the Balance of Payments (Balogun 2015).

Several modifications were made in order to achieve the objectives of SFEM, from Foreign Exchange Market (FEM) to Autonomous Foreign Exchange Market (AFEM), to Dutch Action System and, to the wholesale Dutch Auction System. The FEM was introduced as a result of the problem arising from the first and second tier market rates in July 1987. Bureau de change was introduced in 1989 with a view to enlarging the scope of FEM. In 1994, the fixed exchange rate system was reintroduced. In 1995 there was a policy reversal of guided deregulation referred to as the Autonomous Foreign Exchange Market (AFEM). In 1999 was the reintroduction of the interbank foreign exchange market (IFEM). This brought about the merger of the dual exchange rate, following the abolition of the official exchange rate from January 1, 1999 (Balogun 2015).

Following the failures of the variants of the flexible exchange rate mechanism (the AFEM introduced in 1995 and the IFEM in 1999) to ensure exchange rate stability, Dutch Auction System (DAS) was reintroduced on July 22, 2002. The DAS was to serve the triple purposes of reducing the parallel market premium, conserve the dwindling external reserves and achieve a realistic exchange rate for the naira. The DAS helped to stabilize the naira exchange rate, reduce the widening premium, conserve external reserves and minimize speculative tendencies of authorized dealers. Finally, in order to further liberalize the market, narrow the arbitrage premium between the official interbank and bureau de change segments of the markets and achieve convergence, the CBN introduced the Wholesale Dutch Auction System (WDAS) on February 20, 2006. Up till now, exchange rate regime in Nigeria is characterized as oscillating between fully managed and freely floating regimes.

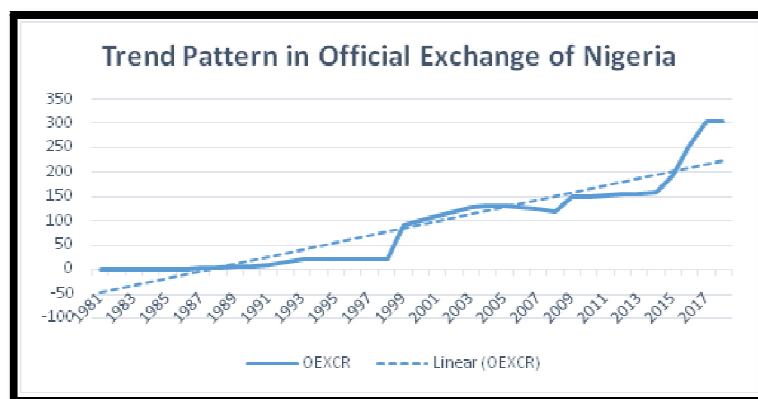


Figure 1

Source: Central Bank of Nigeria Statistical Bulletin, 2018

Prior to 1971 Nigeria operated a fixed exchange rate system, following the Breton Wood Agreement Nigeria's exchange rate was kept constant at ₦1 = \$0.40 irrespective of the development within the domestic or external sector of the economy. However, during the 1970s, unprecedented changes occurred in the international financial system, such that intransigent high rate of both inflation and unemployment compounded by low productivity and instability in the industrialized countries to change their exchange rate policies, thus, the early 1970s witnessed the advent of the floating rate system. In 1972-1974, the monetary authority, Central Bank of Nigeria (CBN), opted to peg the naira to U.S. Dollar even though most of Nigeria's trading partners allowed their currencies to float and stabilize at a realistic level. Shortly after the naira was pegged to the U.S. Dollar, the dollar was devalued by 10 per cent in order to stimulate the U.S. exports. This action inadvertently caused a devaluation of the naira by the same percentage, hence the exchange rate of U.S. \$1.52 to the naira emerged, and the floating system was discontinued giving way to a system of pegging the naira to a basket of currencies. The period coincided with the oil boom era and Nigeria therefore adopted a policy that led to progressive devaluation of the naira from ₦1.00 = \$0.65 in 1974 to ₦1.00 = \$1.85 in 1981, despite the growing deficits in the non-oil current account and the prevalent international inflation. This situation was exacerbated by the pursuit of policies designed to keep consumer prices low even in an era of rising world inflation. As a result of this policy, the naira became over valued in real terms and the policy of industrialization through import-substitution was translated to one of high proportion of imported input needed for such unit of output (Onwioduokit and Nwachukwu, 1998). The slump in the world oil market in 1991, coupled with the emergence of large deficit on current account made it unwise to continue the policy that led to the appreciation of the naira. Consequently, the monetary authorities began a policy that led to the depreciation of the naira while it systematized the policy of exchange control through the use of comprehensive import licensing scheme as well as outright prohibition of some goods.

The depreciation of the naira has several implications for economic development in Nigeria. First, the argument that, the depreciation of the naira would stem imports since the increase costs arising there from would discourage importers is faulty because the economy is heavily import dependent, the propensity to import is very high in Nigeria today, thus the imports are price inelastic. Secondly, it was argued that, devaluation usually make export products cheap

or at least competitive in the international market, thus enhancing demand. This argument did not take into account two important factors: the elasticity of demand for the export and the pricing pattern. The reality that emerged shows that Nigeria export products are essentially inelastic and the prices of the export products are fixed by the international market and are not positively correlated to changes in the naira exchange rate. Other adverse effects of depreciation include: unemployment, lack of direct foreign private investments, increased external debts, balance of payments disequilibrium and low per capita income. It also undermined the international competitiveness of non-oil export, making planning and projections difficult at both micro and macro levels.

In addition business capacity utilization in Nigeria became low up to 40 per cent with accumulated inventories while a number of small and medium scale enterprises were strangulated as a result of the low dollar/naira exchange rate. In a continuous search of a realistic exchange rate, the Second- Tier Foreign Exchange Market (SFEM), the Autonomous Foreign Exchange Market (AFEM), Inter-bank Foreign Market (IFEM), Dutch Auction System (DAS), and the Bureau de Change was established essentially to provide an institutional framework through which a realistic market determined exchange rate could evolved.

In sum, SFEM was expected to make foreign exchange management in Nigeria more efficient and less costly to administer, but the operation of this market led to a huge devaluation of the naira such that from an exchange rate of ₦1.55355 to the dollar in 1986, the naira depreciated by 71 per cent to ₦5.3530 to \$1.00 at the last bidding session in 1988. On the average, the naira was depreciated to ₦0.6702, ₦0.7486 and ₦0.8083 to the United State dollar in 1982, 1983, and 1985 respectively. As the situation became increasingly critical the pace of depreciation increased in 1986 when the currency average ₦3.9696 and ₦19.4966 per dollar in 1992. The most significant depreciation occurred in the last quarter of 1986 as a result of the adoption of SFEM. In 1993, the average official exchange rate stood at about ₦21.8861 to \$1.000. However, between the first forex action in 1986 and 1994, the exchange rate depreciated by about 93 per cent. The rates were however, fixed by administrative fiat at ₦21.8888 to a \$1.00 from 1993 to 1998. Immediately after the pegging of the naira to the US dollar, the depreciation became uncontrollable. It depreciated to ₦103.1052, ₦120.9702, ₦133.5004, in 2002, 2003 2004 respectively and currently ₦360 to 1\$.

In spite of the various reforms to the foreign exchange market, the unabated and unidirectional depreciation of the naira against other currency continue to give cause of concern to monetary authorities and end-users of foreign exchange. While some economists attributed the naira depreciation to wrong policies implementation occasioned by lack of harmony between monetary and fiscal policies, others are of the views that, movement in the external sector and the macroeconomic performance constitute the driving force behind the persistent devaluation.

1.1. Statement of the Problem

Nigeria has passed through different exchange rate regimes in order to find a realistic exchange rate for macroeconomic stability, but without remarkable success. For example, from 1970 to 2012 about seven different exchange rate regimes were introduced, which include: fixed exchange rate system, freely floating regime, adjusted peg system, crawling peg system, target zone system and managed floating system, Dutch auction system, wholesale Dutch auction system (Bakare and Olubokun, 2011). Exchange rate steady fluctuations seem to have far reaching implications for inflation, price incentives, fiscal viability and competitiveness of exports in Nigeria.

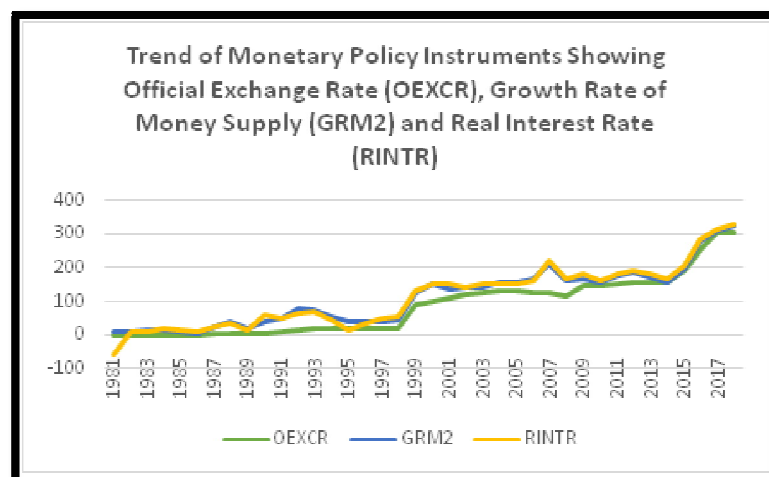


Figure 2

Source: Researcher's Compilation from World Bank Data Files 2020

Regrettable, exchange rate has continued to maintain steady disequilibrium trend over the years and its stability in the near future seems not to be possible given the unfavorable macroeconomic conditions in Nigeria such as high inflation rate, interest rate differentials, depletion of foreign reserves, structural deficiency in the economy which are among the factors responsible for exchange rate depreciation in Nigeria. Looking the above trend, the volatile nature of official exchange started right from 1998 having a value of ₦22 to \$1 with an unstable increase to ₦93 1 USD having a relative stability from 2001 to 2003 and dropping back to a low point of ₦113 to 1 USD in 2008 following a continuous unstable increase to 2018 with an absolute value of 306 USD to Naira. Also, made-in-Nigeria goods have high prices due to

high costs of imported raw materials, in turn caused by high exchange rate volatility, infrastructural problems and inadequate incentives. Other factors working against the strength of the naira at the foreign exchange market include corruption and expansionary fiscal operations by federal and state governments, reckless importation, unnecessary and avoidable foreign trips by political office holders, external debt and interest payment problems are also traced to mismanagement of exchange rate.

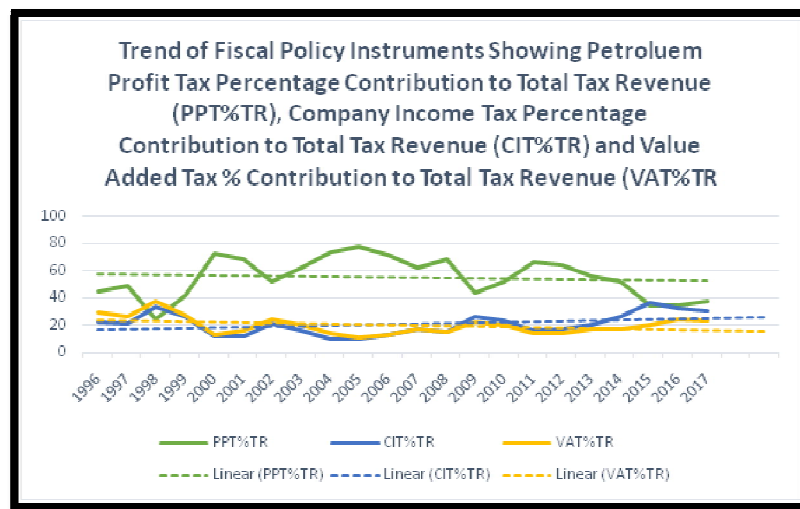


Figure 3

Source: Researcher's Compilation from World Bank Data Files 2020

Nigeria's potential for growth and poverty reduction is yet to be realized. A key constraint has been the recent conduct of macroeconomics, particularly fiscal and monetary policies. This has led to rising inflation and decline in real incomes. National economic management became a Herculean task as the economy has to contend with volatility of revenue and expenditure. The widespread lack of fiscal discipline was further exacerbated by poor co-ordination of fiscal policy among the three tiers of government. Also, there is a weak revenue base arising from high-marginal tax rate with very narrow tax base, resulting in low tax compliance for example looking at the trend of fiscal policy using taxation as a fiscal policy tool, Petroleum Profit Tax which is a tax applicable to upstream operations in the oil industry and particularly related to rents, royalties, margins and profit sharing elements associated with oil mining, prospecting and exploration leases. It is the most important tax in Nigeria in terms of its share of total revenue contributing 60 and 85 percent of foreign exchange earnings and government revenue, respectively is on a continuous trend over the years, increasing and decreasing over the years as can be seen in figure 3 above that from 1997, PPT contributed 49% to Total Revenue and down 24% in 1998 and rising again to 73% in 2000 i.e. showing a consistent instability in PPT and this is also the case of other forms of taxes such as Company Income Tax and Value Added Tax with a continuous up and down trend over the years to present. Government taxes in turn aids government revenue which serves as government expenditure on both capital and recurrent basis, so this goes to show that the instability and volatility in the three main taxes used by the government as an automatic stabilizer if not well managed can go a long way impacting negatively to the Nigerian economy. It is against this backdrop, the study seeks to investigate exchange rate volatility and the relative effectiveness of monetary and fiscal policies on the Nigerian economy.

2. Literature Review

2.1. Exchange Rate Volatility

Exchange rate is defined as the price of one currency in terms of another currency. In a floating exchange rate regime, the transaction costs are higher than with a pegged or fixed exchange rate (Jones and Kenen, 1990). Volatility is defined as an unobservable or latent variable, deterministic or stochastic. There have however been studies that try to make the exchange rate volatility an observable variable, with varied results (Bauwens and Sucarrat, 2005). Exchange rates are highly volatile in the short run and are very responsive to political events, monetary policy and changes in expectations. In the long run, exchange rates are determined by the relative prices of goods in different countries (Samuelson and Nordhaus, 2001). The exchange rate is more volatile than the fundamental variables which determine the exchange rate in the long run (Gärtner, 1993).

Exchange rates have become more volatile in recent years due to the abandonment of the fixed exchange rates, which have resulted in a massive volume in foreign exchange transactions. These transactions have grown faster than international trade and international investments flows of capital. The risk associated with foreign exchange transactions and trading at the foreign exchange market has increased but so has also the awareness and knowledge about the subject. There are also better instruments to cover the risk. International private capital flows are much larger than trade flows today which indicates that exchange rates reflect mostly financial rather than trade flows, especially in the short run. However, the trade flow has a large influence upon exchange rates in the long run (Salvatore, 2004).

Exchange rate volatility is directly influenced by several macro variables, such as demand and supply for goods, services and investments, different growth and inflation rates in different countries, changes in relative rates of return and so forth. The present floating rate has been affected by previous real and monetary disturbances. Expectations about current events and future events are also important factors due to the large influence it has on exchange rate volatility. The volatility can also arise from 'overshooting' behaviour which occurs when the current spot rate does not equal a measure of the long-run equilibrium calculated from a long-run model. If this behaviour arises because the financial market is not working correctly, high exchange rate volatility does not have to imply high transaction costs (Jones and Kenen, 1990).

Historically exchange rate theories have differed. The modern exchange rate theory is conducted on the assumption that exchange rates are based on the decision on how to spread wealth over different assets, instead of the assumption that exchange rate is determined by the demand for foreign currency which was used earlier (Gärtner, 1993).

2.2. Exchange Rate and Economic Growth

There is no fixed agreement on choosing the most suitable exchange rate to maintain macroeconomic stability. The choice of an appropriate exchange rate system must depend on the particular features of each country. Free floating exchange rate regimes adopted by developed countries might not suit developing countries whose insurance markets are not so well developed and whose economy is not stable enough to absorb the risks from exchange rate volatility. Therefore, in theory, if the right regime is adopted, it could facilitate better business climate and potentially enhance economic growth in the long run. Two interesting trends were found in a study conducted by Huang and Malhorta (2004) in 12 developing Asian countries and 18 advanced European countries over the period of 1976-2001. Firstly, they discovered that the choice of exchange rate regimes did not have significant impact on economic growth in European nations, although more flexible regimes were associated with higher growth. Secondly, developing countries in Asia which adopted managed float seemed to outperform other countries in the area which adopted different regimes. Therefore, their study concluded that exchange rates do impact economic growth but may depend on how developed the economy is. Moreover, (Ghosh, Gulde, Ostry, & Wolf, 1996) found that there was a moderately weak connection between exchange rate regime and growth of output—one measure of economic growth. In his study, countries that maintained pegged exchange rate achieved higher investment, yet attained lower productivity compared to countries with floating exchange rates (Ghosh, Gulde, Ostry, & Wolf, 1996). Overall, per capita growth was slightly lower in countries with fixed exchange rates.

2.3. Monetary Policy

The term monetary policy has been defined by experts from many perspectives. According to CBN (2006), monetary policy concept was defined as 'Any policy measure designed by the federal government through the CBN to control cost availability and supply of credit. It also referred to as the regulation of money supply and interest rate by the CBN in order to control inflation and to stabilize the currency flow in an economy. Also CBN (1997), defined monetary policy as combination of measures designed to regulate the value, supply and cost of money on an economy in consonance with the expected levels of economic activities.

Monetary policy influences the money supply through adjustments of the interest rates, bank reserve requirements, and the sale of government securities and foreign exchange (Mark Horton and Asmaa El-Ganainy, 2009). Monetary policy can either be contractionary, expansionary, neutral or accommodative. Contractionary monetary policy is the use of monetary tools to reduce money supply or to raise the interest rate, while expansionary aim at increasing the money supply. Accommodative policy tends to lower the cost of capital in order to stimulate economic activities and engender economic growth, while monetary policy is neutral when such policy is not targeting the expansion of economic activities nor reducing inflation.

2.4. Concept of Fiscal Policy

The term fiscal policy has conventionally been associated with the use of taxation and public expenditure to influence the level of economic activities. Fiscal policy deals with government deliberate actions in spending money and levying taxes with a view to influencing macro-economic variables in a desired direction. This includes sustainable economic growth, high employment creation and low inflation (Microsoft Corporation, 2004). Thus, fiscal policy aims at stabilizing the economy. Increases in government spending or a reduction in taxes tend to pull the economy out of a recession; while reduced spending or increased taxes slow down a boom (Dornbusch & Fischer, 1990). Fiscal policy involves the use of government spending, taxation and borrowing to influence the pattern of economic activities and also the level and growth of aggregate demand, output and employment.

The two main instruments of fiscal policy are government taxation and expenditure. Geoff (2012) contended that fiscal policy involves the use of government spending, taxation and borrowing to affect the level and growth of aggregate demand, output and jobs creation. It is the government spending policies that influence macroeconomic conditions. These policies affect tax rates, interest rates and government spending, in an effort to control the economy. Fiscal policy is the means by which a government adjusts its levels of spending in order to monitor and influence a nation's economy.

2.5. Theoretical Literature

2.5.1. The Traditional Flow Model

The theory states that, exchange rate is determined simply by the forces of supply and demand of foreign exchange. The exchange rate is in equilibrium when supply equates demand. The current account imbalance is offset by

the net flow of capital in the opposite direction. A current account surplus is financed by acquisition of financial assets abroad or outflow of capital. Similarly, a deficit is financed by an inflow of capital. The current account is assumed to be determined by changes in relative prices and real income. Increases in domestic prices relative to foreign prices leads to exchange rate depreciation.

2.5.2. Purchasing Power Parity

The purchasing power parity approach to the exchange rate determination was, and continues to be, a very influential way of thinking about the exchange rate. The PPP posits that the exchange rate between two currencies would be equal to the relative national level prices. The PPP derives from the assumption that in the world there exists the 'law of one price'. This law states that identical goods should be sold at identical prices. (Note this assumption not law). The law of one price implies that exchange rates should adjust to compensate for price differentials across countries (Hoontrakul 1999).

2.6. Empirical Literature Review

Iyeli and Utting (2017) study the effect of exchange rate volatility on Economic Growth in Nigeria from 1970 to 2011. We employ the Johansen Co-integration estimation techniques to test for the short and long runs effect of the variables used. The ADF test reveals that all the variables are stationary. From the parsimonious model, the results show that OREV and EXR are positively related to GDP. Further findings reveal that there exist two equations at 5% level in both trace and Max – Eigen statistic. This implies that exchange rate volatility and oil revenue contributes positively to GDP in the long run.

Ndu- Okrereke and Nwachukwu (2017) employed the use of vector auto regression (VARs) models on the time series data, the result reveal that supply of foreign exchange has a positive and significant relationship with output level of Gross Domestic Product while the demand for foreign exchange has a negative relationship with gross demand product. The study in question is the effect of exchange rate fluctuations on the Nigerian economy. The justification for the use of these models was based on the volatility of exchange rate in impacting on macro- economic variables using a 14- year period. The hypotheses stated will be tested using the two-stage least square (2LS). The statistical properties of the 2LS are contained in the popular Gauss- Markov theorem which sees the least squares estimators as unbiased linear estimator, having minimum variance.

Eneji (2018) examined the effect of exchange rate policy and its volatility on economic growth in Nigeria. The primary focus of monetary policy is to determine the exchange rate that stabilizes prices, resulting to sustained growth in the economy. The problem of study is exchange rate volatility and the continued depreciation of the naira, surrounded by negative or sluggish growth indices. The model adopted is time series model; a dynamic distributed-lag model. It is a causal dynamic economic model that shows the long-run and short-run relationship as the parameters are restrictedly estimated, using secondary data. The results show negative relationship between exchange rate volatility and economic growth.

3. Methodology

3.1. Theoretical Framework: The Portfolio Balance Model

This approach to exchange rate determination conceptualizes exchange rate as the result of the substitution between money and financial assets in the domestic economy and the substitution between domestic and foreign financial assets (CBN, 1998). Macdonald and Taylor (1992) posited that an exchange rate is determined at least in the short-run by the supply and demand in the markets for wide range of financial assets would not be automatic. This is an asset pricing view of the exchange rate. The idea is that agents have a portfolio choice decision between domestic and foreign assets. Those instruments (either money or bonds) have an expected return that could be arbitrated. This arbitrage opportunity is what determines the process of the exchange rate (Dornbusch, 1988).

In other words portfolio balance model assumes that residents distribute their wealth among three forms of assets namely: monetary base, domestic bonds and foreign bonds. The exchange rate is in equilibrium when the holdings of these assets are in their desired proportion.

Thus:

$$W = f(\text{MB}, \text{DB}, \text{FB})$$

Where: W= wealth, MB = Money base, DB = Domestic bonds, FB = Foreign bonds. An increase in wealth increases the demand for foreign bonds or assets leading to a depreciation of the exchange rate as a result of capital outflow so generated. However, an increase in private sector holding of government bonds drive bond prices down and raises interest rate. This causes an appreciation of the exchange rate. Thus, an increase in domestic government bonds has an uncertain effect on the exchange rate.

3.2. Model Specification

Mathematically, the functional form of the research model is specified below as:

$$\text{LRGDP} = \beta_0 + \beta_1 \text{EXRV}_t + \beta_2 \text{LM}_2_t + \beta_3 \text{LTGEXP}_t + \beta_4 \text{INFR} + \text{U}_t \dots \text{I}$$

Based on the Autoregressive Distributive Lag Model, the model is re-stated below:

$$\Delta \text{LRGDP}_t = c_0 + \delta_1 \text{LRGDP}_{t-1} + \delta_2 \text{EXRV}_{t-1} + \delta_3 \text{LM}_{2,t-1} + \delta_4 \text{LTGEXP}_{t-1} + \delta_5 \text{INFR}_{t-1} + \sum \phi_i \Delta \text{LRGDP}_{t-1} + \sum \phi_j \Delta \text{EXRV}_{t-j} + \sum \phi_k \Delta \text{LM}_{2,t-k} + \sum \phi_l \Delta \text{TGEXP}_{t-1} + \sum \phi_m \Delta \text{INFR}_{t-m} \dots \text{II}$$

Where:

LRGDP = Log of Real Gross Domestic Product, EXRVT = Exchange Rate Volatility, LTGEXP = Log of Total Government Expenditure, LM₂= Log of Broad Money Supply, INFR = Inflation Rate, INFR = Inflation Rate, U_t = White noise assumed to be normally distributed. t = lag order selected by Akaike's Information Criterion (AIC).

4. Presentation

4.1. Pre-Estimation Test

4.1.1. Descriptive Statistics

Preliminary analysis was conducted with the aim to determine the normality of the data, measures of central tendency and measures of dispersion. The mean and median are measures of central tendency and they indicate the average value of the sample. Standard deviation is the positive square root of variance. It is a measure of dispersion, that is, it shows the extent of the deviation from the mean. The null hypothesis of the Jarque-Bera test says that the distribution is a normal one. Therefore if the probability is less than 0.05, we reject the null.

	LRGDP	LM2	LTGEXP	INFR	EXRVT
Mean	4.467209	2.888914	2.666347	19.28353	1102.061
Median	4.374534	2.943722	2.976666	12.21778	197.9559
Maximum	4.843918	4.399323	3.892859	72.83550	14151.56
Minimum	4.139226	1.198382	0.984077	5.382224	7.781374
Std. Dev.	0.242640	1.088806	0.958597	17.49138	2923.483
Skewness	0.306816	-0.131965	-0.453499	1.726694	3.427311
Kurtosis	1.614617	1.612430	1.819067	4.727915	14.00782
Jarque-Bera	3.539405	3.075638	3.418257	22.98868	259.2435
Probability	0.170384	0.214849	0.181024	0.000010	0.000000
Sum	165.2867	106.8898	98.65482	713.4905	40776.27
Sum Sq. Dev.	2.119469	42.67794	33.08069	11014.14	3.08E+08
Observations	37	37	37	37	37

Table 1

Source: Researchers Extract from Eviews 10 Output

From Table 1 it could be seen all the variables i.e. LRGDP, LM₂, LTGEXP, INFR, EXRVT had p-values greater than 0.05 signifying that they are normally distributed at 5% level of significance.

4.1.2. Unit Root Test

In order to verify the reliability of the time series data used for this analysis, a unit root test will be conducted on the selected time series data to determine whether they are stationary or non-stationary in level form. The unit root test that will be employed in this task is the Augmented Dickey Fuller unit root test. The result of the ADF Test is presented below:

Variable	Adf Stat. (Levels)	5% Critical Value	Adf.Stat. First Difference	5% Critical Value	Remark
LRGDP	1.156966	-2.945842	-5.384634*	-2.948404	I(1)
LM2	1.155131	-1.952066	-3.169360*	-1.950687	I(1)
LTGEXP	1.248448	-1.950394	-5.020427*	-1.950687	I(1)
CNPI	-2.996907	-1.951000	-7.334882*	-1.950687	I(1)
EXRVT	-4.460564	-2.945842*			I(0)

Table 2: Summary of Stationarity Test

Source: Researcher's Compilation from Eviews 10 Regression Output (2020).

The Asteriks (*) Sign Is Used to Indicate Stationarity at The 5% Significance Level

The application of unit root tests in autoregressive distributed lag (ARDL) technique is necessary in order to ensure that the variables are integrated of order one and none of the variables is integrated of order 2 because the computed F-statistic provided by Pesaran & Shin (2001) are valid for only variables that are I(0) or I(1) and a combination of both. The outcome of the unit root test in Table 2 above indicated that the LRGDP, LM₂, LTGEXP and CPNI, M₂ were integrated of order I(1) while only Exchange Rate Volatility was integrated of order zero 1(0). Therefore, the variables under study are of mixed integration order and this justified the use of ARDL bounds test approach to co-integration over other conventional approaches that require the variables to be integrated of the same order.

4.1.3. Selection of Lag Length Criteria

VAR Lag Order Selection Criteria						
Endogenous variables: LRGDP LM2 EXRVT LTGEXP CPI						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-429.9220	NA	88818.28	25.58365	25.80811	25.66020
1	-178.0554	414.8392 *	0.144834 *	12.23855 *	13.58534 *	12.69784 *
2	-156.8168	28.73458	0.200082	12.45981	14.92892	13.30185
3	-130.5775	27.78275	0.246573	12.38691	15.97835	13.61169

Table 3: VAR Lag Order Selection Criteria
Source: Researches Extract from Eviews 10 Output

Using the Vector Autoregressive Lag Length Criteria, it enables us to determine the appropriate lag periods in evaluating and estimating the required test for our model. Observing the lag length criteria above, it is obvious that the dominating and appropriate lag for the model is lag period 1. The study will make use of the AIC i.e. Akaike Information Criterion for estimation using the p-1 lag.

4.1.4. Autoregressive Conditional Heteroscedasticity (ARCH) Estimate for Exchange Rate Volatility

Dependent Variable: EXR				
Method: ML ARCH - Normal distribution (BFGS / Marquardt steps)				
GARCH = C(3) + C(4)*RESID(-1)^2				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	7.416572	1.746812	4.245777	0.0000
EXR(-1)	1.006224	0.013584	74.07493	0.0000
Variance Equation				
C	7.752855	21.05975	0.368136	0.7128
RESID(-1)^2	3.574988	2.020025	1.769774	0.0268

Table 4
Source: Extract from Eviews 10 Software Output

To check for the presence of ARCH effect (Volatility), based on the decision rule of the presence of ARCH when $b_1 \neq 0$ and statistically significant, we therefore conclude that there is presence of ARCH in Official Exchange Rate in Nigeria since our RESID(-1) has a positive coefficient of 3.574988 and statistically significant at 5 % level of significance. We transformed the official exchange rate time series into the GARCH variance series to generate the volatility in official exchange rate for the period 1981-2018.

4.1.5. Cointegration Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.131042	10%	2.45	3.52
k	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Table 5: Autoregressive Distributed Lag Bounds Test for Co-Integration
Source: Researcher's Compilation from Eviews 10.

From the ARDL Bounds Test and going by the decision rule of the Bounds Test, we cannot accept the null hypothesis of no cointegration since the F-Bounds Statistic of 5.131042 is greater than the I (0) and I (1) bounds at 10%, 5% and 1% respectively, therefore we conclude that there exists a long run relationship among the variables.

4.2. Dynamic Short Run ARDL Error Correction Model and Discussion

The Distributive lag and Short Run Estimates of the Model is summarized below

Dependent Variable: D(LRGDP)				
Selected Model: ARDL(4, 2, 0, 3, 4)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.733358	0.127782	5.739152	0.0000
D(LRGDP(-1))	0.359896	0.123585	2.912138	0.0102
D(LRGDP(-2))	-0.015327	0.127619	-0.120101	0.9059
D(LRGDP(-3))	0.417182	0.128413	3.248742	0.0050
D(LM2)	-0.067615	0.044875	-1.506747	0.1514
D(LM2(-1))	0.085239	0.039396	2.163613	0.0460
D(INFR)	-0.000361	0.000160	-2.256973	0.0383
D(INFR(-1))	0.000175	0.000139	1.260190	0.2257
D(INFR(-2))	0.000478	0.000127	3.752197	0.0017
D(LTGEXP)	-0.071634	0.021866	-3.276087	0.0048
D(LTGEXP(-1))	-0.035424	0.022603	-1.567242	0.1366
D(LTGEXP(-2))	0.010114	0.023057	0.438681	0.6668
D(LTGEXP(-3))	0.077358	0.020777	3.723267	0.0018
CointEq(-1)*	-0.176926	0.031243	-5.662951	0.0000
R-squared	0.833877	Mean dependent var		0.020726
Adjusted R-squared	0.725897	S.D. dependent var		0.015690
F-statistic	7.722516	Durbin-Watson stat		2.434914
Prob(F-statistic)	0.000032			

Table 6: ARDL Error Correction Regression
Source: Researcher's Compilation from Eviews 10

4.3. Static Long Run Estimates of Exchange Rate Volatility and the Relative Effectiveness of Monetary and Fiscal Policies on the Nigerian Economy

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LM2	0.445572	0.127861	3.484827	0.0031
EXRVT	1.64E-06	4.73E-06	0.347072	0.7331
INFR	-0.003212	0.001845	-1.741340	0.1008
LTGEXP	-0.324903	0.133433	-2.434946	0.0270

Table 7: ARDL Long Run Form
Source: Researchers Extract from Eviews 10

4.4. Discussion of Findings of Dynamic Short Run Error Correction Model and Long Run ARDL Estimates.

Based on the outcome of the ARDL regression estimates, the focus of the study was to investigate exchange rate volatility and the relative effectiveness of monetary and fiscal policies on economic growth in Nigeria. For the period under review, the following findings were uncovered as follows:

4.4.1. Constant (C)

From the ARDL ECM regression result above, the coefficient of the constant term is positive and significant and conforms to a priori expectation. The value of the constant term is 0.733358 and this shows that when other explanatory variables are held constant, RGDP will decrease by 0.733358 units.

4.4.2. Broad Money Supply (Lm2)

Analysis of the short run coefficient of LM2 is negatively signed in in the current year, decreasing economic growth (RGDP) by 0.067615 units. In the 1st year lag, LM2 was a strong contributor to RGDP, increasing RGDP significantly by 0.085239 units at 5% level of significance. Analysis of the coefficient of LM2 in the long run was also positively signed and statistically significant this is because increase in economic activities in any economy aids growth of that economy while keeping an eye on inflation. Increase in money supply affects vitally the rate of economic growth. In fact, it is now regarded as a legitimate instrument of economic growth. Kept within proper limits it can accelerate economic growth but exceeding of the limits will retard it.

4.4.3. Inflation Rate (Infr)

Analysis of the short run coefficient of INFR had a negative and statistical relationship with RGDP in the current year. In the 1st year lag, INFR had a negative and significant relationship with RGDP but was found to positively contribute to RGDP in the 2nd year but was insignificant. This finding is not surprising since high inflation rates can leads to a fall in real wages. When inflation is higher than nominal wages, the real incomes will fall. High Inflation Rate also causes a fall in the value of money. This means that as a saver, you will be worse off if the rate of inflation is higher than the rate of

interest. High inflation might cause a redistribution of income in society. In most cases, pensioners lose the most when inflation is high.

4.4.4. Total Government Expenditure (Ltgexp)

Analysis of the short run coefficient of TGEXP had a negative relationship with RGDP, decreasing RGDP insignificantly by 0.035424 units. In the 2nd year lag, TGEXP had a positive and insignificant influence on RGDP and also in the 3rd year lag which was significant at 5% level of significance. This finding may be attributed to the known fact that increased government spending is likely to cause a rise in aggregate demand which can lead to higher growth in the short-term but can also potentially lead to inflation. Higher government spending sometimes has an impact on the supply-side of the economy, depending on which area of government spending is increased

4.4.5. Error Correction Mechanism (Cointeq)

The Error correction mechanism met the required conditions. The significance and rule of ECM holds that negative and statistical significant error correction coefficients are necessary conditions for any disequilibrium to be corrected. In light of this, the coefficient of CointEq (-1) is -0.176926. The above result shows that the ECM (-1) value is -0.18% implying that there is convergence of the equilibrium should there be system disequilibrium. The negative sign of the coefficient satisfied one condition while the fact that its P-value [0.0000] is less than 5% [0.05] level of significance satisfied the second condition of statistical significance. The coefficient indicates that the speed of adjustment between the short run dynamics and the long run equilibrium is 18%. Thus, ECM will adequately act to correct any deviations of the short run dynamics to its long-run equilibrium by 18% annually.

R-squared of 0.833877 indicated that 83% of the total variation in economic growth as captured by Real Gross Domestic Product (RGDP) is accounted for by Inflation Rate (INFR), Broad Money Supply (M2), and Total Government Expenditure (TGEXP). However, the total variation of 17% in the dependent variable is attributable to the influence of other factors not included in the regression model.

4.5. Diagnostic Test/Post Estimation Test

4.5.1. Test for autocorrelation

Durbin Watson (DW) = 2.434914

- Decision: Since the value of Durbin Watson = 2.434914 and clearly above to 2, we therefore conclude and accept H₀ that there is no autocorrelation present in the Model

4.5.2. Heteroscedasticity Test

Heteroscedasticity is the violation of the ordinary least square. Regression assumption states that the variance of the Error terms is homoscedastic that is, the error terms have a constant variance. Simply put, heteroskedasticity occurs when the variance of the error terms are not constant for all values of X.

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	3.269352	Prob. F(24,5)	0.0955
Obs*R-squared	28.20283	Prob. Chi-Square(24)	0.2516
Scaled explained SS	0.856360	Prob. Chi-Square(24)	1.0000

Table 8

Considering the Heteroscedasticity table above, we cannot reject the null hypothesis since the Prob Value is 0.2516 > 0.05 level of Significance indicating no presence of Heteroscedasticity in the model.

4.5.3. Stability Test

The cusum and cusum of squares for model stability was employed to check for the stability of the parameters in the model. The result of the stability test is shown below:

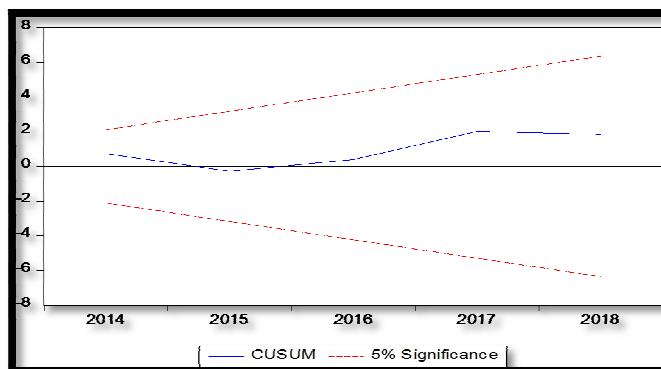


Figure 4

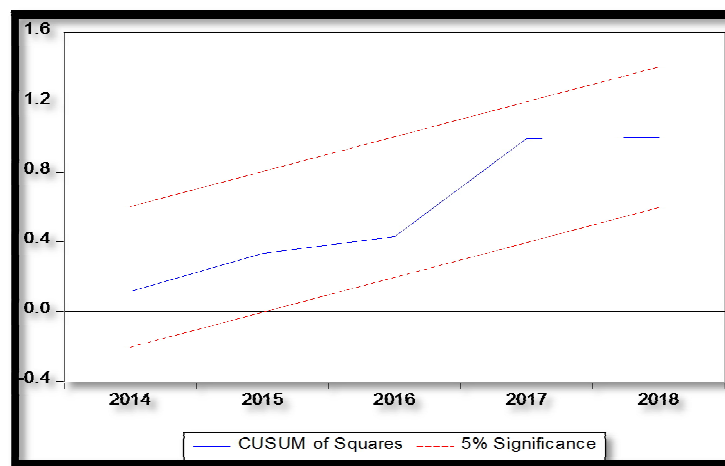


Figure 5

The cusum and cusum squares diagrams shows that the model is stable as the cusum line lies in between the 5% boundary.

5. Summary of Findings, Conclusion & Recommendations

5.1. Summary

The study investigated the effect of exchange rate volatility and the relative effectiveness of monetary and fiscal policies on economic growth of Nigeria for the period 1981-2018 with specific objectives namely; to determine the effect of exchange rate volatility on economic growth in Nigeria, to ascertain the relative effect of monetary policy on economic growth in Nigeria, to investigate the relative effect of fiscal policy on economic growth in Nigeria and to determine the joint effects of monetary and fiscal policies on economic growth in Nigeria. The specified model was estimated using the Autoregressive Distributive lag Model to determine the level of impact that one variable has on the other. While E-views 10 statistical software was employed in computing the result, time series data were obtained from World Bank national accounts data and OECD National Accounts data files and the study establishes as follows:

- Exchange Rate Volatility (EXRVT) was found to be ineffective on its effect and influence on economic growth (RGDP) of Nigeria
- Broad Money Supply (LM2) had a negative a positive relationship with economic growth (RGDP) in the short run and in the long run at 5% level of significance.
- Inflation Rate (INFR) had a negative and statistical relationship with RGDP in the current year and also in the long run at 5% level of significance.
- Total Government Expenditure (LTGEXP) has a negative relationship with RGDP in the short run and in the long run but statistically insignificantly at 5% level of significance.
- The F-test indicated that Broad Money Supply (M2), Inflation Rate (INFR), Exchange Rate Volatility (EXRVT), and Total Government Expenditure (TGEXP) jointly influences economic growth (RGDP) of Nigeria at 5% level of significance.

5.2. Conclusion

This study used the ARDL model to investigate the effect of exchange rate volatility and the relative effectiveness of monetary and fiscal policies on economic growth for the period 1981-2018. From our findings, monetary policy using Broad Money Supply (M2) endogenously contributes to economic growth of Nigeria than fiscal policy using the Total Government Expenditure in Nigeria.

The conclusion to be drawn from this study is Exchange Rate Volatility (EXRVT) and Government Expenditure (TGEXP) has an insignificant economic effect on the performance of the Nigerian economy in the presence of other internal and external macro-economic shocks. Nevertheless, to achieve a high and sustainable growth, we proffer some policy recommendation which when properly implemented will surely stimulate greater growth of output.

5.3. Recommendation for Policy Recommendation

- Nigeria should do everything economically possible to strengthen the value of Naira in the FOREX market. This however excludes pumping billions of dollars into the FOREX market as this only creates a temporary economic condition.
- Efforts should be made to ensure exchange rate stability in order to stabilize Nigeria's economy.
- Also, government should put in place measures to reduce the impact of fluctuations in the international trade through the volatile crude oil prices on Nigeria's economic conditions. This can be achieved by reducing the dependence of the economy not only on crude oil exports by diversifying the productive base of the economy through non-oil exports.

- Government should stimulate the productive capacity of the economy, especially the agricultural sector to increase aggregate supply of basic food products and meet the needs of the industrial sectors so that prices of goods and services could come down and consequently boost economic growth in the country.

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