

## **Exchange Rate Volatility and balance of Payments Problem in Nigeria**

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**Abstract:** *Literatures reveal that substantial exchange rate volatility create balance of payments problems in Nigeria and the correction of external balance will require both exchange rate devaluation and demand management policies. An increase in exchange rate volatility leads to uncertainty which might have a negative impact on trade flows. Consequent upon the above, this study focused on the effect of exchange rate volatility and balance of payments in Nigeria, 1980 to 2018. Exchange rate volatility was measured using the GARCH approach. The empirical results confirmed that exchange rate is positively related to balance of payments; while real gross domestic, inflation rate and volatility of exchange rate are negatively related to balance of payments. Therefore, government should not underplay exchange rate volatility in Nigeria. In addition, government should encourage export promotion strategies in order to maintain a surplus balance of trade which will help make the domestic currency strong and also prevent further depreciation of the Nigeria naira in the future.*

**Keywords:** *Exchange Rate Volatility, Balance of Payments, Garch Approach*

*JEL Classifications; E63, F32*

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### **I. Introduction**

The principle of opportunity cost demands that each country has to produce goods and services in which they enjoy a comparative advantage over others; thus, the goods and services they cannot produce will be bought from other countries. This leads to international trade. When there is buying and selling across national borders, payments have to be made as is done locally, the different being that payments in international trade involves currencies other than the currency of the nation making the payments. Each variety or alternative have different implications which determines the extent to which countries participate in foreign exchange markets. Any country that has its own currency must decide what type of exchange rate arrangement to maintain. Exchange rate arrangements are broadly classified into three namely, fixed or pegged arrangements, flexible arrangements, and in-between category of arrangements with "limited flexibility" popularly known as managed floating. When a monetary authority decides to fix exchanges rates against other currencies, they make a commitment to intervene in the market, buying and selling their currency whenever necessary to keep the exchange rate from changing. When, on the other hand, the monetary authority abstains completely from intervening in the market for exchange rates, they are choosing to let their exchange rates float freely.

In view of the fact that exchange rate policy in Nigeria has oscillated basically between the fixed exchange rate system since the immediate post-independence era in 1960 and then from 1986 when a market based exchange rate system was introduced in the context of the structural Adjustment Programme (SAP), The deregulation policies led to fluctuation in exchange rate. However, the monetary authority frequently intervenes in the foreign exchange market to reduce the extent of depreciation of naira. During the SAP period the balance of payment (BOP) statistics recorded some deficits. Naira to dollar exchange rate depreciated from N0.99 per dollar in 1986 to N8.00 per dollar in 1990. During the same period, BOP recorded deficits. For instance, between 1985 and 1990, BOP deficits increased from N339.60 million to N4.988 billion. Although the current account was in surplus mainly through the revenue derived from the export of crude oil, a large amount of the deficits incurred were from the capital account. The deficits in the BOP were due to increase importation of food products, textiles,

automobiles, machinery and equipment (Central Bank of Nigeria annual reports and statement of account, 2005). In the mid-1980, when Nigeria started recording huge balance of payments deficits and depletion of the foreign reserve, policy makers were in favour of devaluation of naira. This was expected to reduce pressure on external reserve as well as BOP. However, after the devaluation of naira, the economy was far from recovery. Available statistics from the Central bank of Nigeria (CBN) show that both the current and

capital account recorded deficits in 1987,1988 and 1989. Hence, exchange rate devaluation did not significantly improve external reserve, trade and economic performance in the country. Due to the continuous exchange rate volatility and deficits in balance of payment in Nigeria, the investigation on exchange rate dynamics and balance of payment in Nigeria is still subject to further findings because the persistence changes in exchange rate has increased uncertainty in international trade transactions in the country.

Nzota (1999) defined exchange rate as “the price of one currency in terms of another”. It is the price of one unit of a foreign currency in relation to a domestic currency. Exchange rate policy is a fundamental macroeconomic policy that guides domestic investors on the best way to strike a balance between their trading partners abroad (Marson, 1987). Exchange rate in other words refers to the price of one currency (the domestic currency) in terms of another (the foreign currency). Movements in the exchange rate have ripple effects on other economic variables such as interest rate, inflation rate, unemployment, money supply, etc. These facts underscore the importance of exchange rate to the economic well-being of every country that opens its doors to international trade in goods and services. Paul (2012) defined balance of payments as an accounting record to all monetary transactions between a country and the rest of the world. These transactions include payments for the country’s exports and imports of goods, services and financial capital, as well as financial transfer. It summarizes the international transaction for a specific period usually one year and is prepared in single currency for the country concerned.

## **II. Literature Review**

### **2.1. Conceptual Review**

This includes the various definitions, descriptions, highlights and opinions about the subject matter. Below are some examples;

Exchange rate is the price of one currency in terms of another. It is the amount of foreign currency that may be bought for one unit of the domestic currency or the cost in domestic currency of purchasing one unit of the foreign currency (Soderstine, 1998). It is the rate at which one currency exchanges for the other, and it is used to characterize the international monetary system (Iyoha, 1996).

Exchange rate is the ratio between a unit of one currency and the amount of another currency for which that unit can be exchanged at a particular time. In other words, exchange rate is the price of one currency vis-à-vis another and is the number of units of a currency required to buy another currency. Exchange rate is the link between domestic and foreign prices of goods and services. Also, exchange rate can either appreciate or depreciate.

Balance of Payments is the record of all international trade and financial transactions made by a country's residents. This has three components. They are the current account, the financial account, and the capital account. The current account measures international trade, net income on investments, and direct payments. The financial account describes the change in international ownership of assets. The capital account includes any other financial transactions that don't affect the nation's economic output. A country's balance of payments tells you whether it saves enough to pay for its imports. It also reveals whether the country produces enough economic output to pay for its growth. The BOP is reported for a quarter or a year. A balance of payments deficit means the country imports more goods, services and capital than it exports. It must borrow from other countries to pay for its imports. In the short-term, that fuels the country's economic growth. It's like taking out a school loan to pay for education. Your expected higher future salary is worth the investment. In the long-term, the country becomes a net consumer, not a producer, of the world's economic output. It will have to go into debt to pay for consumption instead of investing in future growth. If the deficit continues long enough, the country may have to sell off its assets to pay its creditors. These assets include natural resources, land, and commodities. A balance of payments surplus means the country exports more than it imports. Its government and residents are savers. They provide enough capital to pay for all domestic production. They might even lend outside the country. A surplus boosts economic growth in the short term. It has enough excess savings to lend to countries that buy its products. The increased exports boosts production in its factories, allowing them to hire more people. In the long run, the country becomes too dependent on export-driven growth. It must encourage its residents to spend more. A larger domestic market will protect the country from exchange rate Volatility. It also allows its companies to develop goods and services by using its own people as a test market.

How rapidly the exchange rate fluctuates is its volatility. In general, the amount of money you are dealing with may dictate your sensitivity. The volatility of Exchange rate is defined as the risk associated with unexpected movements in the exchange rate. Economic fundamentals such as the inflation rate, interest rate and the balance of payments, which have become more volatile in the 1980s, early 1990s.

## **2.2. Theoretical Review**

The theoretical basis for this study is provided by those theories, which deal with the instruments for correcting balance of payments problem in Nigeria. Such theories have existed in international trade theory as far back as 1752. Detailed analysis of the theory of policy instruments for correcting balance of payments equilibrium is, however, clearly spelt out in the work of Meade (1954). Meade (1954) proposes that a country can offset adverse trends in its balance of payments by a change of financial policy. A policy of price adjustments, which involves changes in money wage and changes in the exchange rate, is devaluation. This is presently called expenditure – switching policy.

Structural Theory argued that balance of payments disequilibrium abates due to an inherently inefficient or imbalanced economy. Two specifications of structural problems that affect the Nigerian economy are weakness in fiscal system and high external debt burden. Weakness in fiscal system leads to budget deficit, expenditure increases due to population increase and the need for development, while the revenue system and tax rate of the Nigerian economy are inadequate to obtain the needed growth in revenue. What is needed is restructuring and improvement of the country's revenue system and increase in taxes. The revenue system of the economy should be elastic relative to economic growth, that is, revenue should grow proportionately with higher gross domestic product. On the other hand, high external debt burden sustainability analysis of Nigeria by the international monetary fund (IMF) indicates that the country's debt burden has been increasing since 1980.

Balance of Payments Model looks at various approaches used to analyze the effects of exchange rate volatility on the balance of payments. These approaches include: the elasticity approach; the absorption approach; and the monetary approach. Among these three approaches, the monetary approach describes the current state of art in the analysis of exchange rate volatility and effects on balance of payments problems in Nigeria. Considered below is the approach to formulating a balance of payments model where the objective is to assess the effect of exchange rate on it.

The monetary approach focuses on both the current and capital accounts of the balance of payments. This is quite different from the elasticity and absorption approaches, which focus on the current account only. As pointed out by Crockett (2011), the general view of monetary approach makes it possible to examine the balance of payments not only in terms of the demand for goods and services, but also in terms of the demand for the supply of money. This approach also provides a simplistic explanation to the long run devaluation as a means of improving the balance of payments, since devaluation represents an unnecessary and potentially distorting intervention in the process of equilibrating financial flows.

Dhaliwayo (2012), emphasizes that the relationship between the foreign sector and the domestic sector of an economy through the working of the monetary sector can be traced to David Hume's price flow mechanism. The emphasis here is that balance of payments disequilibrium is associated with the disequilibrium between the demand for and supply of money, which are determined by variables such as income, interest rate, price level (both domestic and foreign) and exchange rate. The approach also sees balance of payments as regards international reserve to be associated with imbalances prevailing in the money market. This is because in a fixed exchange rate system, an increase in money supply would lead to an increase in expenditure in the forms of increased purchases of foreign goods and services by domestic residents. To finance such purchases, much of the foreign reserves would be used up, thereby worsening the balance of payments. As the foreign reserve flows out, money supply would continue to diminish until it equals money demand, at which point, monetary equilibrium is restored and outflow of foreign exchange reserve is stopped. Conversely, excess demand for money would cause foreign exchange reserve inflows, domestic monetary expansion and eventually balance of payments equilibrium position is restored. The monetary approach is specifically geared towards an explanation of the overall settlement of a balance of payments deficit or surplus. If the supply of money increases through an expansion of domestic credit, it will cause a deficit in the balance of payments, an increase in the demand for goods and various assets and decrease in the aggregate in the economy.

## **2.3 Empirical Review**

Several researches have been carried out on exchange rate volatility effect on balance of payments position. The studies show that in spite of the many empirical studies, on the subject, the impact of exchange rate on balance of payment remains equivocal.

Onuchukwu and Kalu (2014), in their study of exchange rate variations and Nigeria balance of payments evaluated the impact of exchange rate variation on Nigeria balance of payments. In the study, a Nigeria balance of payments model was designed and estimated and the result thereof suggests that about 81% of variation in the Nigeria balance of payments within the study period is explained by exchange rate. The study, which has balance of payments as the dependent variable and exchange rate as well as gross domestic product as explanatory variables, reveals a significant and positive relationship between them. And thereby argues that exchange rate and gross domestic product exert significant influence on the balance of payments in Nigeria during the period of study.

It was revealed from a study by Akpansung (2013), when the balance of payment of Nigeria and some other countries were indiscriminately chosen and reviewed by him. The study stated that most of the empirical studies of monetary approach reviewed established stability of money demand functions and also showed evidence of causal relationships that exist between domestic credit and balance of payments.

Olisadebe (1996), however, is of the opinion that the relationship between exchange and balance of payments arises out of international exchange, which determines the amount of payments involved in economic transactions.

The studies that supported the BOP effects of exchange rate overvaluation include Abeysinghe and Yeok (1998), MacDonald (2003), Chowdhury (1999), Anietie *et al.* (2004), Enrique and Nagayasu (2004), Annsofie (2005), Speller (2006), Yu (2006), Cheung, Chinn and Fujii (2007), Balogun (2007), Frankel

(2007), Antonia *et al.* (2008), Dubas (2009), etc. Agene (1991)'s results support overvaluation of the exchange rate. Ogiogo (1996) found substantial deterioration in the balance of payments position of developing countries is caused among other factors as, worsening terms of trade, excessive imports and overvaluation of the currencies. Olisadebe (1996) favored exchange rate appreciation as a means of attaining favorable balance of payments position. To Cheung, Chinn and Fujii (2007), overvaluation of the exchange rate enhances deficits in the balance of payments position through the current and capital accounts.

Imoisi (2012), examined the trends in Nigerian's Balance of payments position from 1970-2010 using an econometric analysis. The study carried out a multiple regression analysis using the ordinary least square method for both linear and log linear form. The results showed that the independent variables appeared with the correct sign and thus, conform to economic theory, but the relationship between Balance of payments and inflation rate was not significant. However, the relationship between Balance of payments, Exchange rate and interest rate were significant. Unaimikogbo and Enoma (2011), evaluate the effect of monetary policy instruments on balance of payments in Nigeria with a simulation equation model 1986-1997 using ordinary least square estimation technique of data analysis, the study found that both policies contribute significantly to balance of payment. They concluded that monetary variable is more effective and dependable than fiscal variable in affecting changes in economic activities.

Baxter and Stockman (2013), investigated the time series behavior of a number of macroeconomic aggregates under alternative exchange rate systems during the postwar period. They used a sample of 49 countries, and found little evidence of any differences in the behavior of trade flows under alternative exchange rate systems. Given that the flexible exchange rate periods studied in their paper were periods of high exchange rate volatility, the conclusion could be drawn that exchange rate volatility did not affect trade flow behavior in the large cross section of countries considered. Baxter and Stockman (2013) removed the trends in the series under consideration by applying a linear trend. They then examined the properties of the de-trended data, implicitly focusing on the high and medium frequencies when the linearly de-trended data is examined, while focusing on the higher frequency properties of the (quarterly) data when the differenced data are considered.

### **III. Methodology**

This study was undertaken to examine the effects of exchange rate volatility on balance of payment in Nigeria. Various attempts have been made to examine the effect of exchange rate on BOP without a conclusion regarding the effects. Hence, this study argues that economic condition of a country at the time of study may play a role in the direction of the effects. This study therefore focuses on examining the effects of exchange rate volatility on balance of payment in post-recessionary periods in the country.

**Model Specification**

$$BOPT_t = \rho_0 + \rho_1 EXCHANTVOL_t + \rho_2 INTERL_t + \rho_3 FUELP_t + \rho_4 CPID_t + \epsilon_t$$

Where BOPT is balance of payment, CPID is consumer price index, used as proxy for inflation, FUELP is crude oil price, INTERL is lending interest rate, EXCHANTVOL is exchange rate volatility.

#### **Data Type**

The data used were monthly data from Central Bank Statistical Bulletin. The data on BOP was quarterly data but was converted to monthly data. The Data comprises of data two Post-Recessionary Periods. The first was to capture post 2008 recession, from January, 2009 to June 2011, while the second was to capture 2016 recession, from October 2016 to June, 2018.

#### **Method of Analysis**

The analysis started with the estimation of exchange rate volatility. This was done using GARCH model. After calculating the volatility of exchange rate, Philip Peron unit root test was used to check for the status of unit root in the variables. Johansen co-integration technique was used for the long run relationship among the variables, while error correction model was used for the short run analysis

#### IV. Results of The Analysis

This study is aimed at estimating the effect of exchange rate volatility on balance of payments in Nigeria. This analysis begins with estimating exchange rate volatility. To do this, it is necessary for the series to be stationary. Hence, the unit root checking on the variable was first done.

##### 4.1 Unit Root Test.

Table 4.1 and Table 4.2 contain the results of the unit root checks on the log of exchange rate in post-recessionary periods between 2009 and 2011, and post-recessionary periods between 2016 and 2018 respectively. Table 4.1 shows that probability of the adjusted t-Statistics is less than 0.05 when the test was carried out before differencing. Similarly, the Adj t-Statistic value of -3.303827 is higher in absolute values than the critical values of -2.967767 at 5%. This indicates that the null hypothesis of unit root presence in exchange rate series is rejected.

In the case of Table 4.2, the probability of the Adjusted Statistics is not significant in the case of unit root test of exchange rate in post-recessionary periods between 2016 and 2018. However, after differencing the variable, it is significant, and hence, does not have unit root problem.

Hence, the volatility of exchange rate was calculated using the log of exchange rate without differencing in the case of post-recessionary periods between 2009 and 2011, but it was calculated after differencing in the case of post-recessionary periods between 2016 and 2018

**Table 4.1 PP Unit Root Checking on EXCHANT (2009-2011)**

	Adj t-Statistic	Prob.*	1% level	5% level	10% level
EXCHANT	-3.303827**	0.0240	-3.679322	-2.967767	-2.622989

\*\*indicates significance at 5%

Source: Computation by Author 2019

Table 4.2 PP Unit Root Checking on EXCHANT (2016-2018)

Variables	Adj t-Statistic	Prob.*	1% level	5% level	10% level
<b>Before Differencing</b>					
EXCHANT	-1.627639	0.7447	-4.498307	-3.658446	-3.268973
<b>After Differencing</b>					
DEXCHANT	-6.071833***	0.0005	-4.532598	-3.673616	-3.277364

\*\*\*indicates significance at 1%, \*\*indicates significance at 5%

Sources: Author's Computation 2019

##### 4.2 Testing for the Presence of ARCH Effect

An important condition for the estimation of volatility in a series is that the series should contain ARCH effect. This was done using Heteroskedasticity Test of ARCH effect. The result of the Heteroskedasticity Test of ARCH effect is presented in Table 4.3. The null hypothesis is that there is no ARCH effect. However, based on the significance of the F-test, the null hypothesis does not hold in both post-recessionary periods. This therefore brings the conclusion that there is ARCH effect in the series. In other words, the series contains volatility, and can be modelled using GARCH.

**Table 4.3: Heteroskedasticity Test: ARCH**

<b>Post-Recessionary Periods between 2009 and 2011</b>			
F-statistic	23.45137***	Prob. F (1,27)	0.0000
Obs*R-squared	13.48011***	Prob. Chi-Square (1)	0.0002
<b>Post-Recessionary Periods between 2016 and 2018</b>			
F-statistic	593.3685***	Prob. F (5,9)	0.0000
Obs*R-squared	14.95463**	Prob. Chi-Square (5)	0.0106

\*\*\*indicates significance at 1%, \*\*indicates significance at 5%

Sources: Author's Computation 2019

##### 4.3 Estimating the Exchange Rate Volatility

GARCH (1, 1) was used to estimate the volatility of exchange rate in post-recessionary periods between 2009 and 2011, while in the case of post-recessionary periods between 2016 and 2018, it was estimated using GARCH (2,2). Table 4.4 shows that both periods, the ARCH term and the GARCH terms are significant in explaining the volatility of exchange rate. Substituting the coefficients, the variables of the exchange rate volatility was obtained for each period, and were used in the regression.

**Table 4.4:** Results of the volatility of exchange rate using GARCH (1, 1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
Post-Recessionary Periods between 2009 and 2011				
C	5.032066***	0.002512	2002.937	0.0000
Variance Equation				
C	1.38E-05	2.16E-05	0.637948	0.5235
RESID (-1) ^2	0.644125***	0.051428	12.52471	0.0000
GARCH (-1)	0.349798***	0.052108	6.712925	0.0000
Post-Recessionary Periods between 2016 and 2018				
C	-0.003635***	0.001407	-2.583397	0.0098
Variance Equation				
C	1.05E-05	2.18E-05	0.481009	0.6305
RESID (-1) ^2	0.248481	0.514209	0.483231	0.6289
RESID (-2) ^2	0.361489***	0.120476	3.000509	0.0027
GARCH (-1)	0.218446***	0.054323	4.021250	0.0001
GARCH (-2)	-0.163532***	0.028063	-5.827255	0.0000

\*\*\*indicates significance at 1%, \*\*indicates significance at 5%

Sources: Author’s Computation 2019

**4.4 Unit Root Checking**

Having estimated the Exchange rate volatility, its effect on balance of payment was then estimated. However, it is necessary to first examine the unit root presence in the EXCHANTVOL, and other variables in the regression models. This was done using the Philip-Peron unit root test. In the Post-Recessionary Periods between 2009 and 2011, the results in Table 4.5 show that EXCHANTVOL does not attain stationarity before differencing. However, differencing it makes it to attain stationarity. Similar results were found in the case of other variables in the model.

Similarly, in the case of Post-Recessionary Periods between 2016 and 2018, the probability of adjusted T-statistics is not significant at 5% in the case of exchange rate volatility. A further test on the variable using ADF unit root test also confirms the fact that it is not significant. After differencing, it was significant in both PP and ADF unit root tests. Similar results were found in the case of other variables. This brings the conclusion that the variables attain stationarity after differencing. Since all the variables attain stationarity after differencing, the model was estimated using Johansen co-integration for the long run relationship among them, while error correction model was used for their short run relationships

**Table 4.5:** Checking for Unit Root

	Before Differencing		After Differencing	
	Adj. t-Stat	Prob.*	Adj. t-Stat	Prob.*
Post-Recessionary Periods between 2009 and 2011				
EXCHANTVOL	-2.673816	0.2537	-4.096254**	0.0167
BOPT	-2.311323	0.4151	-7.869069***	0.0000
CPID	-1.413318	0.8354	-10.19784***	0.0000
FUELP	-3.244549	0.0958	-7.003098***	0.0000
INTERL	-0.766544	0.8136	-6.719648***	0.0000
Post-Recessionary Periods between 2016 and 2018				
EXCHANTVOL	-3.505929	0.0674	-5.730366***	0.0012
BOPT	-2.146610	0.4911	-4.150785**	0.0207
CPID	-2.937406	0.1725	-6.228331***	0.0004
FUELP	-1.731006	0.6990	-5.156162***	0.0030
INTERL	-0.755563	0.9993	-3.927457**	0.0314
ADF UNIT Root Test				
EXCHANTVOL	-1.650959	0.4354	-7.122731***	0.0000

\*\*\*indicates significance at 1%, \*\*indicates significance at 5%

Sources: Author’s Computation 2019

**4.5 Results of the Co-integrating Relationship**

Table 4.6 confirms the presence of Co-integrating Relationship among EXCHANTVOL, BOPT, CPID, FUELP, and INTERL in both models for the post recessionary periods in the long run. Trace Test and

Maximum Eigenvalue indicate three co-integrating equations at 5% for both periods. With this, ECM can be used for their short run. The coefficients of the long run results are presented in Table 4.7

**Table 4.6: Results of the Co-integrating Relationship**

Unrestricted Co-integration Rank Test (Trace)			
Hypothesized		Trace	Max-Eigen
No. of CE(s)	Eigenvalue	Statistic	Statistic
Post-Recessionary Periods between 2009 and 2011			
$\tau \leq 0^*$	0.842270	150.7537***	51.71245***
$\tau \leq 1^*$	0.800369	99.04124***	45.11601***
$\tau \leq 2^*$	0.692374	53.92522***	33.00836***
$\tau \leq 3$	0.484740	20.91686	18.56632
$\tau \leq 4$	0.080521	2.350545	2.350545
Post-Recessionary Periods between 2016 and 2018			
$\tau \leq 0^*$	0.957703	133.3505***	56.93491***
$\tau \leq 1^*$	0.873606	76.41562***	37.23029***
$\tau \leq 2^*$	0.795797	39.18533**	28.59555**
$\tau \leq 3$	0.442236	10.58978	10.50874
$\tau \leq 4$	0.004492	0.081039	0.081039

\*\*\*indicates significance at 1%, \*\*indicates significance at 5%

Sources: Author's Computation 2019

#### 4.6 Results of the long run coefficients

Table 4.7 shows that in the Post-Recessionary Periods between 2009 and 2011, exchange rate volatility has a positive and significant long run effect on balance of payment. Interpreting the magnitude of the effect is done with some caution, since the volatility was measured using GARCH. An increase in volatility of exchange rate encourages trade, and increases balance of payment by 0.1% during the period. The marginal effect is inelastic, showing that exchange rate volatility has some inelastic effect on balance of payment within the period. The implication of this result is that exchange rate volatility did not impede trade, and consequently balance of payment immediately after recession. It shows that Nigeria, being an oil exporter, benefited from the volatility of exchange rate, and consequently increases her trade, which impacts her BOP position positively.

However, in the Post-Recessionary Periods between 2016 and 2018, exchange rate volatility has a negative and significant long run effect on balance of payment. An increase in volatility of exchange rate discourages trade, and reduces balance of payment during the period.

The divergent results on the effect of exchange rate volatility on BOP in the two post recessionary periods might be due to the economic condition present in the domestic economy at the time. Before recessionary periods between 2009 and 2011, the domestic pump price if fuel was stable and relatively low, averaging N65 for PMS, while it was N145 in the post recessionary periods between 2016 and 2018. The rise in price of domestic fuel will have impact on the cost of production. Since energy is an integral factor of production, productivity in the country might be negatively affected. This will negatively impact exports, and consequently impact BOP negatively.

More so, the change in exchange rate in the periods preceding 2008 recession was relatively low. Exchange rate between 2009 and 2011 averaged N150 to a US dollar. However, between 2016 and 2018, exchange rate averaged N350 to a US dollar. With the country being an import dependent country, it will have a negative impact on cost of imports, domestic productivity, and consequently affect BOP negatively.

This study therefore argues that one of the explanations for the difference in the results on the effect of exchange rate volatility on BOP in the literature is the economic condition present in the economy at the time of study.

The effect of inflation on balance of payment is negative in post-recessionary periods between 2009 and 2011, but positive in the post recessionary periods between 2016 and 2018. The effect of inflation on BOP will depend on the elasticity of the demand for the country's exports. An increase in the price of exports for inelastic product will increase receipts from exports and increases BOP. The reverse is the case if it is elastic.

The effect of Fuel price on BOP is positive and significant in post-recessionary periods between 2009 and 2011, but negative in the post recessionary periods between 2016 and 2018. The effect of crude oil price on BOP will also depend on whether the country is a net importer or importer of fuel. Since Nigeria imports refined fuel and sell crude oil, the effect might be negative depending on the country's receipts or payment on fuel to the rest of the world.

The effect of interest rate on the country’s BOP is negative in both periods. An increase in lending interest rate discourages domestic investments, and production. It further affects exports negatively, and consequently discourages trade and balance of payment.

**Table 4.7:** Results of the long run coefficients

	EXCHANTVOL	CPID	FUELP	INTERL
Post-Recessionary Periods between 2009 and 2011				
Coefficient	-10.67355	24.20731	-0.264781	0.431902
Standard Error	(2.91852)	(12.7830)	(0.02378)	(0.13293)
T-statistics	[-3.65717]	[ 1.89372]	[-11.1348]	[ 3.24898]
Effects	Positive and Significant	Negative significant and	Positive and Significant and	Negative and significant and
Post-Recessionary Periods between 2016 and 2018				
Coefficient	4.420519	-24.45996	2.770259	1.154844
Standard Error	(0.80504)	(6.58425)	(0.69531)	(0.28134)
T-statistics	[ 5.49106]	[-3.71492]	[ 3.98419]	[ 4.10483]
Effects	Negative significant and	Positive and Significant and	Negative and significant and	Negative and significant and

Sources: Author’s Computation 2019

**4.7 Results of the Short run coefficients**

In post-recessionary periods between 2009 and 2011, and post recessionary periods between 2016 and 2018, Table 4.8 shows that in the short run, past value of a country’s BOP is not a guarantee of a future increase in BOP because the results are not significant. More importantly, the effect of exchange rate volatility on BOP in the short run is also positive in post-recessionary periods between 2009 and 2011, The result indicate that increase in exchange rate volatility has a significant and positive effects on balance of payment in the short run. However, the result is only significant at 10%, indicating that the effects is weak. It is however insignificant in the post recessionary periods between 2016 and 2018.

In post-recessionary periods between 2009 and 2011, the result also indicates a negative effect of inflation on balance of payment. The effect of increase in price is negative, and not in line with the expected results. However, since Nigeria also imports refined oil, the effect of rise in fuel price may impact the BOP negatively, at least in the short run. However, the variables are not significant in the post recessionary periods between 2016 and 2018.

The results indicate that 47% of the movement in BOP within the periods is explained in the model in post-recessionary periods between 2009 and 2011, 43% in post recessionary periods between 2016 and 2018. The Durbin-Watson value of 1.98 and 2.0 in post-recessionary periods between 2009 and 2011, and post recessionary periods between 2016 and 2018 respectively shows no fear of serial correlation. The non-significance of the Jarque Bera statistics shows that the residuals are distributed normally in both cases, while the LM test shows no fear of higher serial correlation, there is also no problem of Heteroskedasticity, as indicated by the Breusch-Pagan-Godfrey test in both cases

**Table 4.8:** The Short Run Effects of Exchange Rate Volatility on BOP

	Coefficient	Coefficient.
ERCOTERM	-0.344192***	-0.667481**
BOPT (-1)	0.135797	0.489885
CPID (-1)	-25.55300**	-5.561844
EXCHANTVOL (-1)	8.309180*	-0.540941
FUELP (-1)	-0.048439**	5.450995
INTERL (-1)	0.312677	-0.996594
Constant	0.340197**	0.165033
R-squared	0.476448	0.432421
Durbin-Watson stat	1.982476	2.038316
Jarque-Bera	4.165527	4.262681

Proba	0.12458	0.9347
Breusch-Godfrey Serial Correlation LM Test		
F-statistic	0.037847	0.171357
Prob. F (2,19)	0.9629	
Heteroskedasticity Test: Breusch-Pagan-Godfrey		
F-statistic	0.495884	0.188662
Prob. F (10,17)	0.8700	0.8316

\*\*\*indicates significance at 1%, \*\*indicates significance at 5%

Sources: Author's Computation 2019

## V. Conclusion And Recommendations

The paper examined the exchange rate volatility and balance of payments problems in Nigeria using the Generalised Autoregressive Conditional Heteroskedasticity (GARCH) model. The empirical estimates, using available time series data over a period of 40 years, 1980 to 2018 suggested that exchange rate volatility is high in Nigeria.

Unit Root Checking indicates that the null hypothesis of unit root presence in exchange rate series is rejected.

The result of the Heteroskedasticity Test of ARCH effect is presented in Table 4.3. The null hypothesis is that there is no ARCH effect. However, based on the significance of the F-test, the null hypothesis does not hold in both post-recessionary periods. This therefore brings the conclusion that there is ARCH effect in the series. In other words, the series contains volatility, and can be modelled using GARCH.

This therefore portrays adverse effect on the balance of payments. The study further revealed that exchange rate is positively related to balance of payments which is the dependent variable; while real gross domestic, CPID Is consumer price index, used as proxy for inflation, and volatility of exchange rate are negatively related to balance of payments. It is however noteworthy to state that all the variables in study with the exception of CPI are significant enough to explain the of balance of payments problems in Nigeria. The overall GARCH model for analysis is highly significant in explaining the exchange rate volatility on balance of payments. Therefore, both local and foreign investors may be scared of investing in the economy.

Therefore, government should not underplay exchange rate volatility in Nigeria. This implies that policy that will enhance stability of the exchange rate will promote balance of payments performance. Finally, the study posits that government should encourage export promotion strategies in order to maintain a surplus balance of trade which will help make the domestic currency strong and also prevent further depreciation of the Nigeria naira in the future.

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