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## Article

# Exchange rate and balance of payments in Nigeria

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## Exchange Rate and Balance of Payments in Nigeria

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**Abstract:** Exchange rate policy is a fundamental economic policy that affects other macroeconomic variables and balance of payments. Nigeria is currently experiencing unstable balance of payments with exchange rate policy being one of the leading policies to solve this problem. In line with this, the study explored the policy effect and implication of exchange rate on balance of payments in Nigeria. Secondary data which covered the period of 1986 to 2018 were obtained from Central Bank of Nigeria Statistical Bulletin. Augmented Dickey – Fuller (ADF) and Bound Test were conducted to test for stationarity and long run relationship among exchange rate, money supply, trade openness, inflation and balance of payments. Pairwise casualty test was also conducted to ascertain the direction of causality between exchange rate and balance of payments. In line with the unit root result, Autoregressive Distributed Lag (ARDL) was employed for analysis. The ARDL result revealed that exchange rate and trade openness stimulate overall balance payments performance in Nigeria while the causality result showed independent relationship between exchange rate and balance of payments in Nigeria. The implication of these findings is that exchange rate stability is germane for enhancing balance of payments performance through the promotion of trade activities. Thus, it was recommended that exchange rate stability should be pursued vigorously because internal and external performance of the nation hovers around exchange rate stability.

**Keywords:** ARDL; Balance of Payments; Devaluation; Exchange Rate

**JEL Classifications:** F31; E23; F43

### 1. Introduction

Economies of the world are interdependent and interrelated through international transactions and relations. The fact that no country has all resources required to enhance growth led to high rate of interdependency and the need for exchange of goods and services among nations. Exchange of goods and services among countries which could only be possible through the use of the selling country's currency resulted in the need for exchange rate (Dalimus, Obumneke & Muhammed, 2018). Exchange rate expresses the value and unit of a country's currency in relation to foreign currencies. It links domestic currency to foreign countries currencies. Balance of payments records a nation's state of affairs with the rest of the world (Beatrice, 2001). Oladipupo and Ogbenovo (2011) asserted that exchange rate is germane in international relations because it connects the monetary unit of nations together thereby making the exchange of goods and services to be possible.

Olanipekun and Ogunsola (2017) stated that exchange rate policy has a wide range of effects on both internal and external balances. Appreciation of domestic currency by monetary authority in an import based economy may have unfavorable effect on real sector, general price level and balance of payments

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position. Thus, movement in exchange rate and its linkages with balance of payments has been a major focus to not only policy makers but also scholars and experts (Nwanosike, Uzoechina, Ebenyi & Ishiwu, 2017). Maintaining balance of payments equilibrium remains the major target of exchange rate policy because underperformance in balance of payments can have a retarding effect on a country's reserves and economic growth. Shafi, Hua, Idrees and Nazeer (2015) asserted that, balance of payments serves as a useful external performance measure index and determines the strengths of a nation's trade position.

The linkages between exchange rate and balance of payments do not only determine a country's trade position but also serve as an important determinant of the inflow of foreign financial and real investments which are germane for promoting sustainable growth (Agundu, Akani & Kpakol, 2013). The issue of exchange rate instability and its management has dominated major policy thrust in Nigeria. Since 1970, government has embarked on different exchange rate regimes. In Nigeria up to the era of Structural Adjustment Programme (SAP), it appeared that Nigerian's exchange rate policy tended to encourage overvaluation of the Naira with the aim of encouraging export and discouraging non-oil export products and overdependence of Nigeria's economy on imported input over exported output (Abdullahi, Abubakar, Fakunmoju & Giwa, 2016).

The overreliance of Nigeria on oil and the mono-culture nature of the economy which resulted in the neglect of agriculture and industrial sectors have done much harm to the country's currency which has continued to fluctuate against major currencies of the world like pounds sterling, dollar and euro which Nigeria has a strong trade relationship with. Government in a bid to reduce the negative effect of Naira appreciation on trade balance and balance of payments which has continued to be in deficit devalues the Naira with other major currencies of the world. In 2019, the US dollar is being exchanged for ₦306.8, pounds sterling for ₦401.7958 while Euro and SWISS FRANCS are being exchanged for ₦358.9152 and ₦308.9069 respectively (CBN, 2018).

Regardless of the policy thrust of governments in Nigeria, the country has continued to witness unstable exchange rates with undesirable effects on balance of payments. The issue of exchange rate and the achievement of a realistic exchange rate for Naira posed a great challenge to policy makers, owing to its unarguable significance in bringing about economic prosperity and growth (Onoh, 2002; Nnanna, 2004; Ogbonna, 2010). In the face of scarce foreign exchange, the Central Bank of Nigeria closely monitors the use of periodic releases of foreign exchange to ensure that appropriation and application by various sectors are in line with strategic economic priorities (Agundu, *et al.*, 2013).

Nigeria continually experienced chronic deficit in the balance of payments and faced many challenges in taking monetary actions to correct this situation due to over-dependency on imported products. The situation continued to worsen from 2008 with a current account balance of ₦3,455.7 billion, ₦2,064.9 billion in 2009, ₦1,970.6 billion in 2010, ₦1,641.5 billion in 2011, ₦2,736.4 billion in 2012, ₦2,99.6 billion in 2013, ₦142.6 billion in 2014 and deficit balance of ₦3,033.5 billion in 2015 before improving to ₦687.9 billion and ₦3,174.4 billion in 2016 and 2017 respectively and later fell to ₦1,630.1 billion in 2018 (CBN, 2018).

The relationship between exchange rate and balance of payments performance has drawn attention of empirical studies. However, most of the reviewed studies focused on component parts of balance of payments rather than overall balance of payments. For instance, the study of Oladipupo and Ogbenovo

(2011); Eke, Eke and Obafemi, (2015); Abdullahi, *et al.*, (2016) focused on the investigations of exchange rate on capital account while the study of Ahmad, Ahmed, Khoso, Palwishah and Raza (2014); Odili (2014); Olanipekun and Ogunsola (2017) focused on the effect of exchange rate on current account. Also, few studies documented the direction of causality between exchange rate and overall balance of payments. Finally, this study improved on reviewed literature by expanding the scope to 2018 to reflect the current trends in Nigeria exchange rate and balance of payments. However, Nigeria with her vast abundance of resources is faced with many challenges of poverty, low standard of living, unemployment, drastic fall in foreign direct investment which is an indication of the bad state of the economy and there is no other proper time than now to evaluate the policy effects and implication exchange rate on balance of payments position which is the objective of this paper. This study was structured into introduction, literature review, methodology, analysis and interpretation of results and lastly, concluding remarks.

## **2. Literature Review**

Exchange rate is the price of one currency in terms of another. Balance of payments records a country's international financial transaction and trade position with respect to other nations of the world (Imoisi, 2012). The effect of proper exchange rate management in enhancing economy development cannot be jeopardized. This is because exchange rate movement has a significant effect on other macroeconomic variables such as inflation, interest rate, money supply, balance of trade and balance of payments position. The issue of exchange rate management is of great importance to policy makers due to the fact that no country exists in isolation and every nation desires equilibrium in balance of payments.

Stučka (2004) examined the effects of exchange rate change on trade balance in Croatia employing a reduced-form model approach to estimate the trade balance response to permanent domestic currency depreciation and long-run and short-run using three modeling methods along with two real effective exchange rate measures. It was found that on average, a 1 percent permanent depreciation improves the equilibrium trade balance by between 0.94 percent and 1.3 percent. The new equilibrium is established after approximately 2.5 years and evidence of the J-curve is also found. Gligorić (2010) examined the relationship between exchange rate and trade balance checking out for the j-curve effect in Serbia. Both Johansen's and autoregressive distributed lag approach showed that real exchange rate depreciation improved trade balance.

Huchet-Bourdon and Korinek (2011) studied the extent to which exchange rates volatility affect trade flows in China, the Euro area and the United States in agriculture and manufacturing and mining sector. It was found that exchange volatility impacted trade flows slightly while exchange rate levels affected trade in both agriculture and manufacturing and mining sectors. Mungami (2012) examined the effects of exchange rate liberalization on the balance of payments of Kenya. The results showed that the exchange rate liberalization improved the overall BOP but did not improved current account. Barasa (2013) evaluated the relationship between exchange rate volatility and BOP in Kenya using data from financial market players and regulators, that is, banks, insurance companies, mutual and pension funds and importers/exporters. It was found that, the exchange rate affects the prices at which a country trades with the rest of the world and is important for economic analysis and policy formulation.



Lencho (2013) examined the effect of exchange rate movement on trade balance in Ethiopia. The error correction model result indicated that in the long run, depreciation succeeded in improving trade balance deficit of Ethiopia. Ibarra and Blecker (2014) studied the structural change among real exchange rate and balance of payments in Mexico using both Ordinary Least Square and Two Stage Least Square. The results indicated that a tightening of the balance-of-payments constraint may account for the post-liberalization slowdown in Mexico's growth only during certain sub-periods, and that the impact of real exchange rate changes on the trade balance has diminished, most likely as a result of the increasing integration of export industries into global supply chains. Lotfalipour and Bazargan (2014) investigated the effect of real effective exchange rate volatility on the balance of trade of Iran during the year 1993 to 2011 using Unit Root Tests, GARCH (1, 1) approach and balanced panel data model. Results demonstrated that the real effective exchange rate had no significant effect on the trade balance.

Ahmad, *et al.*, (2014) assessed the impact of exchange rate on balance of payments in Pakistan. Monthly data were obtained from website of State Bank of Pakistan and analyzed using unit root, ARDL and Granger causality test. The study revealed that there is a significant and positive relation between exchange rate and balance of payments. Oladipupo and Ogbenovo (2011) empirically investigated the impact of exchange rate on balance of payments position in Nigeria using the Ordinary Least Square (OLS) method on data covering the period between 1970 and 2008. It was found that exchange rate had significant impact on the balance of payments position. Agundu, *et al.*, (2013) examined the relationship between foreign exchange dynamics and balance of payments, using time series data drawn from the publications of the Central Bank of Nigeria Statistical Bulletin, Debt Management Office and National Bureau of Statistics. The regression method was adopted in data analysis and it was found that exchange rate had positive effect on current and capital accounts of balance of payments.

Using annual data from 1971 to 2012, Odili (2014) evaluated the impact of exchange rate on balance of payments in Nigeria analyzed. The study employed autoregressive distributed lag (ARDL) co-integration estimation technique. The results revealed positive and statistically significant relationship in the long-run and also a positive but statistically insignificant relationship in the short-run between balance of payments and exchange rate. Eke, *et al.*, (2015) estimated the effect of exchange rate on the balance of trade of Nigeria for the period 1970-2012 using annual data which were analyzed with Augmented Dickey Fuller, Johansen co-integration and error correction mechanism (ECM) techniques. The estimated result showed that exchange rate had significant and negative influence on trade balance in Nigeria during the period.

Shafi, *et al.*, (2015) evaluated the comparative analysis of the impact of exchange rate, inflation rate and interest rate on balance of payments in India and Pakistan. It was revealed that the inflation rate and foreign exchange rate had positive effect on balance of payments while interest rate had negative effect on balance of payments. Abdullahi, *et al.*, (2016) assessed the causal effect of foreign exchange rate on balance of payments in Nigeria by employing secondary data which were obtained from Central Bank Statistical Bulletin and National Bureau of Statistics within the period of 1970-2014 analyzed with ordinary least squares regression technique and granger causality analysis. The results revealed that exchange rate and money supply have positive effect and significantly affect Nigeria balance of payments. Money supply, real gross domestic product, consumer price index and interest rate have negative effect but insignificant on Nigeria balance of payments.

Olanipekun and Ogunsola (2017) examined the effect of exchange rate on aggregate balance of payments, current account balance and capital account. Autoregressive Distributed Lags (ARDL) approach to co-integration and short-run error correction model were employed. It was found that exchange rate appreciation had adverse effect on BOP and current account balance. However, no statistically significant effect of exchange rate on capital account was obtained while inflation rate was found to have negatively affected the BOP in the country. Lamsso and Masoomzadeh (2017) investigated the impact of exchange rate on the balance of payments. The results revealed the existence of the J - curve in Sweden, South Africa, Bulgaria, Iran, and Egypt such that increase in exchange rate deteriorates tourism income, and after the primary periods, the increase improves the tourism income.

Nwanosike, *et al.*, (2017) employed multivariate regression model to evaluate the effects of devaluation of domestic currency on balance of payments in Nigeria using Marshall-Learn (ML) condition from 1970 to 2014. The result revealed that, devaluation of exchange rate had negative effect on balance of payments (BOP) through balance of trade mechanism. Delimus, *et al.*, (2018) examined the effect of exchange rate on balance of payments in Nigeria from 1999 to 2016 using Autoregressive Distributed Lag (ARDL) approach. Findings from the study revealed that nominal exchange rate had significant effect on Nigeria's balance of payments. Limbore and Moore (2019) examined the effect of exchange rates on balance of payments using secondary data from the RBI (Central Bank of India) covering the period of 2001 to 2018. Variables employed are export, import, trade account balance, current account balance and overall balance data which were analyzed using descriptive method. The study found that exchange rate was highly unstable which negatively influenced balance of payments.

### 3. Methodology

This study employed quantitative method to examine the effect of exchange rate on balance of payments in Nigeria. This study employed time series data obtained from Central Bank of Nigerian Statistical Bulletin (2018). The study covered the period of 1986 to 2018.

#### Model Specification

This study is based on the elasticity theory, which shows what happens to trade balance when a country devalues its currency and conditions that must prevail in the foreign exchange market for a devaluation or depreciation of the currency to improve the trade balance and balance of payment. The model of Odili (2014) which is given as:  $BOP = f(EXR, XM, IM)$  was adapted in this study. Where: BOP is Balance of payment, EXR is exchange rate, XM is total export, IM is total import. However, by modification, trade openness is adopted in this study to capture the level of openness of the country to international trade which determines the level of exchange rate through the demand and supply of currency while money supply and inflation rate are adopted as control variable. Thus, the model for this study is given as:

$$BOPGDP = f(EXCH, TOP, MS, INF)$$

$$BOPGDP = \lambda_0 + \lambda_1 EXCH + \lambda_2 TOP + \lambda_3 MS + \lambda_4 INF + \mu$$

Where:

BOPGDP = Balance of Payments as a percentage of gross domestic product

EXCH = Exchange Rate

TOP = Trade Openness

MS = Money Supply

INF = Inflation Rate

$\lambda$  = Constant Term or Intercept

$\lambda_1 - \lambda_4$  = Parameters of the explanatory variables

$\mu$  = Stochastic Error Term

**Data Estimation Techniques**

For the purpose of achieving the objectives of this research work, the study employed Ordinary Least Square (OLS) techniques to analyze the relationship between exchange rate and balance of payment. However, since this study used time series data, data are subjected to stationary test using Augmented Dickey-Fuller Unit root test.

Furthermore, this study employed Bound Co-integration test in order to check if there is long run relationship among the variables employed. Autoregressive Distributed Lag was employed to determine the short and long run effect of exchange rate, trade openness, money supply and inflation rate on balance of payments. The regression model was subjected to post test evaluation to test the validity of the estimated result. Some of the post test techniques conducted were normality test, serial correlation test using Breusch-Godfrey Serial Correlation LM Test, Heteroskedasticity test using Breusch-Pagan-Godfrey and stability test using Ramsey Test.

**4. Analysis and Interpretation of Results**

**Correlation Matrix**

**Table 1. Correlation Matrix Result**

	<b>BOPGDP</b>	<b>EXCH</b>	<b>TOP</b>	<b>MS</b>	<b>INF</b>
<b>BOPGDP</b>	1.000000				
<b>EXCH</b>	0.520472	1.000000			
<b>TOP</b>	0.287713	0.146610	1.000000		
<b>MS</b>	0.348972	0.892741	0.118270	1.000000	
<b>INF</b>	-0.451037	-0.419528	-0.182576	-0.322498	1.000000

*Source: Researchers' Computation, 2020*

The correlation matrix for the data series is reported in table 1. A correlation above 0.7 or 70 percent indicates evidence of multi co-linearity. Based on this, statistical evidence from table 1 shows the absence of multi co-linearity among the variables under study since the correlation values are less than 0.7%. The correlation matrix result reveals that exchange rate, money supply and trade openness are positively correlated with balance of payments as a percentage of gross domestic product while inflation is negatively correlated with BOPGDP.

**Test of Stationarity**

**Table 2. Summary of Unit Root Test Result**

Variables	t-Statistic	5% critical Value	Prob.	Order of Integration	Concession
<b>BOPGDP</b>	-3.724277	-2.991878	0.0103**	1(1)	S
<b>EXCH</b>	-3.986225	-2.960411	0.0045**	1(1)	S
<b>TOP</b>	-3.221243	-2.957110	0.0279**	1(0)	S
<b>MS</b>	-4.983781	-3.562882	0.0018**	1(1)	S

*Note, S = Stationarity. \* = Significance at 5%*

Source: Researchers' Computation, 2020

Table 2 presents the summary of the result of unit root test using Augmented Dickey Fuller technique. The result shows that trade openness is stationary at level while balance of payments as a percentage, exchange rate, money supply and inflation rate are not stationary at level. However, at first difference, 1(1), balance of payments as a percentage, exchange rate, money supply and inflation rate are free from unit root problem, since their respective t-statistics are greater than the critical value at 5%. However, since the macroeconomic variables employed are mixture of I(0) and I(1) variables, the study employs the Autoregressive Distributed Lag – Bound Co-integration technique of short run and long run equilibrium.

**Lag Selection Result**

**Table 3. Lag Selection Criteria**

Lag	0	1	2
<b>LR</b>	NA	211.1768*	27.86530
<b>FPE</b>	5.17e+14	5.70e+11*	8.14e+11
<b>AIC</b>	48.06761	41.23344*	41.45308
<b>SC</b>	48.29890	42.62117*	43.99725
<b>HQ</b>	48.14301	41.68581*	42.28242

Source: Researchers' Computation, 2020

The lag length result is reported in table 3. It shows that the appropriate lag for the estimation of the ARDL model is lag 1.

**Residual Diagnostic Test**

**Table 4. Ramsey Reset Test**

	Value	Df	Probability
t-statistic	1.409318	24	0.1716
F-statistic	1.986176	(1, 24)	0.1716

Source: Researchers' Computation, 2020

The Ramsey Reset stability test presented in table 4 shows that there are no omitted variables in the model and the model is relatively stable given a probability value of 0.1716 which is greater than 0.05.

**Table 5. Breusch-Godfrey Serial Correlation LM Test:**

F-statistic	2.397711	Prob. F(2,23)	0.1133
Obs*R-squared	5.520819	Prob. Chi-Square(2)	0.0633

Source: Researchers' Computation, 2020



The Breusch-Godfrey Serial Correlation LM Test result reported in Table 5 indicates the absence of serial correlation in the regression’s residual with probability value of 0.0633 which is greater than 0.05 significant level.

**Table 6. Heteroskedasticity Test: Breusch-Pagan-Godfrey**

F-statistic	1.487079	Prob. F(6,25)	0.2231
Obs*R-squared	8.416815	Prob. Chi-Square(6)	0.2091
Scaled explained SS	17.92800	Prob. Chi-Square(6)	0.0064

Source: Researchers’ Computation, 2020

The result of the Heteroskedasticity presented in Table 6 indicates that the residual is Homoscedastic as indicated by the probability value of Breusch-Pagan-Godfrey test.

**Long Run Relationship**

**Table 7. Bound Co-Integration Test Result**

Test Statistic	Value	K
F-statistic	4.669041	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
5%	2.86	4.01

Source: Researchers’ Computation, 2020

Table 7 presents the result of the long run relationship among the macroeconomic variables using the bound co-integration technique. In order to reject the null hypothesis of no long run relationship, the F-statistics must be greater than the lower bound (I0) at 5% level of significance. It can be deduced from the result in table 8 that the F-statistics value is 4.669041 and it is greater than the critical value of 2.86. Thus, the null hypothesis of no long run relationship is rejected for the model implying that exchange rate, money supply, trade openness and inflation are good determinants of balance of payments as a percentage of gross domestic product in the long run.

**Autoregressive Distributed Lag Result**

**Table 8. Short Run Result**

<b>Dependent Variable: BOPGDP</b>				
ECT(-1)	-0.780472	0.133717	-5.836754	0.0000
D(EXCH)	0.271657	0.097663	2.781561	0.0101
D(TOP)	16.863209	9.407297	1.792567	0.0852
D(MS)	-0.001659	0.000661	-2.511799	0.0188
D(INF)	-0.517453	0.222597	-2.324621	0.0285

Source: Researchers’ Computation, 2020

The result of short run ARDL is presented in Table 8. The result of the Error Correction Term reveals that there is speed of adjustment among the macroeconomic variables with a negative and significant value of -0.780472. This implies that balance of payments as a percentage of gross domestic product will adjust back to equilibrium at speed of 78% annually.

Also, in the short run it is revealed that exchange rate has positive and significant effect on balance of payments as a percentage of gross domestic product. Moreover, the result shows that trade openness

exerts positive but insignificant effect on balance of payments as a percentage of gross domestic product. Finally, both money supply and inflation rate has negative and significant effect on balance of payment in the short run.

**Table 9. Long Run Result**

<b>Dependent Variable: BOPGDP</b>				
EXCH	0.348067	0.087236	3.989935	0.0005
TOP	0.606421	0.236066	2.872945	0.0028
MS	-0.002126	0.000687	-3.094176	0.0048
INF	0.159704	0.201133	0.794025	0.4347
C	-47.553318	13.185721	-3.606425	0.0014

*Source: Researchers' Computation, 2020*

The result of the long run relationship in table 9 reveals that exchange rate has positive and significant effect on balance of payments as a percentage of gross domestic product with coefficient of 0.348067 which implies that 1-unit increase in exchange rate will lead to 0.348067 increase in balance of payments as a percentage of gross domestic product. Furthermore, the result shows trade openness has coefficient of 0.606421 which is significant at 5% indicating that a unit increase in trade openness will lead to 0.606421-unit increase in balance of payments as a percentage of gross domestic product in Nigeria.

Also, the result indicates that there is negative and significant relationship between money supply and balance of payments as a percentage of gross domestic product such that 1unit increase in money supply will lead to 0.002126 fall in balance of payments as a percentage of gross domestic product. Finally, the result reveals that inflation rate has positive and insignificant effect on balance of payments as a percentage of gross domestic product as reported in table 9.

**Granger Causality**

**Table 10. Pairwise Granger Causality Test Result**

EXCH does not Granger Cause BOPGDP	31	1.42806	0.2580
BOPGDP does not Granger Cause EXCH		0.24928	0.7812

*Source: Researchers' Computation, 2020*

Table 10 reveals the granger casualty test between exchange rate and balance of payments. The result shows that there is independent relationship between exchange rate and balance of payments with significant probability value of 0.2580 and 0.7812 respectively which are insignificant at 5%. Thus, the null hypothesis that there is no significant causality between exchange rate and balance of payments in Nigeria is accepted.

**5. Conclusion and Recommendations**

Exchange rate is the price of a country's currency in relation to foreign currencies. Exchange rate serves as one of the major macroeconomic variables that affect the trade positions of a country and ultimately balance of payments. The need for effectively managed exchange rate system is emphasized due to the harmful effect of unstable exchange rate on economic performance. This study thus explored the effect of exchange rate on overall balance of payments in Nigeria. It was established that exchange rate which



has been relatively stable recently promote balance of payments in Nigeria. The implications of this result is that a stable exchange rate would strengthen the value of local currency, promote exportation of local goods, makes the importation of foreign goods dearer and enhances domestic investment and foreign investment which ultimately contribute positively to balance of payments. It is thus concluded that exchange rate stability has the capacity to adjust balance of payments deficit. Thus, it was recommended that the current exchange rate regime employed by the monetary authority should be sustained. Exchange rate stability should be pursued vigorously because internal and external performance of the nation hovers around exchange rate stability. Government should ensure the effective and efficient management of the exchange rate in order to reduce exchange rate fluctuation and instability. Government should embark on policies that would make trade openness work in favor of Nigeria through the diversification of the economy to other sectors like agriculture, tourism and manufacturing amongst others.

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