AN ANALYSIS OF THE EFFECT OF EXCHANGE RATE DEPRECIATION ON BALANCE OF PAYMENT IN NIGERIA

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ABSTRACT
This paper analyses the effect of exchange rate depreciation on balance of payment in the Nigeria spinning the period 1981-2021. Autoregressive Distributed Lag Model of data analyses is used after conducting unit root test. ARDL bound result indicates a long term association among the macroeconomic models. Empirical evidence reveals that exchange rate depreciation had a positive and significant effect on balance of payment both in the long and short run. Moreover, the results revealed that depreciation of exchange rate improves balance of payment and that Marshall-Lerner (ML) condition subsists for Nigeria. The paper advocates that the Nigerian government should adopt import substitution strategy in order to discourage importation so as to promote local production as well as balance of payment, Nigerian government should also encourage growth of local industries that will satisfy the domestic demand and also compete in a global market, increase investment in agriculture and manufacturing sector as well as promote entrepreneurial skills so as to correct the deficit in the balance of payment accounts.

Keywords: Balance of Payments, Exchange Rate, Money Supply, Depreciation, Co-integration

JEL Classification: D51, E51, C32, E62

1. INTRODUCTION
Exchange rate is an effective monetary policy tool used in achieving certain objectives; such as equilibrating the balance of payments. The rate of exchange indicates the rate at which domestic and foreign currency is exchanged. Balance of payment is merely a way of listing receipts payments in international transactions for a country (Sodesten, 1980). It depicts the country's trading position, changes in its net position as foreign lender or borrower, and changes in its official reserve holding. In other word, Balance of payments systematically summarizes for specific period, the economic transaction of an economy with other countries. It accounts for transactions that give rise to sets of entries which indicates all the movement of values between the indigenous of one country and that of the other.

Exchange rate depreciation is a reduction in the rate of a currency in relation to another currency. A currency that is depreciated will be less expensive and hence can be exchanged for

a smaller unit of foreign currency. A devaluated currency implies that domestically produced goods and exports are less expensive while imports would be more expensive.
Fluctuation in exchange rate is important factor originating internally that affect economic performance, due to its impact on macro-economic variables.
A lot of studies have been carried out on the relationship between rate of exchange and balance of payments. In spite of many evidence on the subject, the impact of exchange rate on balance of payments remains ambiguous.
There are various measures embarked by Nigerian government to maintain a relatively stable rate of exchange, the recent redesigned new notes was one of the measures to help Central Bank of Nigeria implement better monetary policies but despite these efforts naira has continued to depreciate, these issues have raised a number of questions which need answers, various research were conducted examine the effect of rate of exchange on other macroeconomics model while few research were conducted on effects of depreciation in rate of exchange on BOP using ARDL in Nigeria, this paper intends to analyses effects of depreciation in exchange rate on BOP in Nigeria from 1981-2021.
The main objective of this paper was to empirically analyses the effect of exchange rate depreciation on balance of payments in Nigeria from 1981-2021. While the specific objective aims to examine the short run and long run relationship between exchange rate depreciation and balance of payments in Nigeria.
This paper is organized as follows: section 2 literatures review; presentation of the methodology in section 3 while 4 and 5 present's results and discussion, conclusions and policy recommendations respectively.

2. LITERATURE REVIEW

2.1 Theoretical Literature

Elasticity approach to balance of payments

The elasticity approach to balance of payments is a theory that provides analysis of how price level and exchange rate devaluation impacted on trade balance which depends on the elasticity of demand and supply for foreign goods and exchange.
The rate of exchange is considered as the most important price in this approach this is because exchange rate is closely related to balance of trade. The theory analyses the demand for net exports and reasons that the difference between imports and exports is what gives rise to balance of payment deficits or surplus (Akpansung, 2013).

2.2. Empirical Literature

Employing multiple regression analysis using Ordinary Least Square method for both linear and log linear form, the trends of balance of payments in Nigeria was examined by Imoisi (2012). His study reveals that the explanatory variables come out with the correct sign, but the association between inflation rate and BOP was insignificant. Rufai etal (2022) assesses the impact of FDI on exchange rate in Nigeria using the Gregory-Hansen and Bayer-Hack cointegration. The results showed that there is a presence of long term association between FDI and exchange rate. Mohammed and Maduechesi (2022) investigate the impact of exchange rate on total export in Nigeria. The study employs ordinary least square. The findings reveal positive and significant relationship between exchange rate and total export in the short run.

Among some actual studies, Rasaq (2013) using correlation matrix, ordinary least square and granger causality, examines the impact of exchange rate volatility on macroeconomic variables. The results showed that the volatility of exchange rate has influence on trade openness, gross domestic product and foreign direct investment positively, but influenced the inflationary rate in the economy negatively. In a related study, Akpansung (2013) study the applicability of

monetary approach to the balance of payments in Nigeria, using simultaneous equations modeling. The paper shows that domestic credit and balance of payment had causal associations. Furthermore, it shows that expansion in prices and incomes were associated with surpluses in BOP.

Yunana (2016) using ordinary least square technique and Autoregressive Conditionally Heteroscedastic and Generalized Autoregressive Conditionally Heteroscedastic models, analyses the influence of the volatility of exchange rate on macroeconomic models. The study shows that exchange rate volatility has a positive influence on GDP, but negatively influenced rate of interest and inflationary rate in Nigeria. Using bound test and ECM model, Waliullah (2010) found that coefficient of exchange rate and income were significant and positive both in long and short run. Where in both long and short run the coefficient of money supply was negative. Applying ECM model and co-integration, Ali (2011) observed that inflation rate; exchange rate and net foreign assets are positive while domestic credit and supply of money were negatively related to BOP but significant. However, rate of interest was negative and insignificant.

Employing the Johansen co-integration test and error correction mechanism, Mohammed (2016) conducted a study on exchange rate depreciation and Nigeria's economic performance after Structural Adjustment Programme 1986-2012. The results show that broad money supply, net export and total government expenditure have significant impact on real output performance in the long run, while exchange rate has direct but insignificant effect on Nigerian economic growth in the long run. Furthermore, Trunin (2012) uses VAR model to reveals that money supply, portfolio investment, GDP, rate of inflation and rate of exchange were positively related to inflow of capital and significant.

Again, Okorontah and Odoemana (2016) analyses the effects of fluctuations in rate of exchange in Nigeria from 1986-2012 using the Johansen co-integration, the OLS and ECM. The study shows that the association that exists between economic growth and movement in exchange rate in Nigeria is strong. Besides, Iyoboyi and Muftau (2014) examine the impact of depreciation in exchange rate on BOP in Nigeria spinning the period 1961-2012. The paper utilizes multivariate VAR model. A long term association exists between exchange rate, government expenditure, BOP, GDP, trade openness, interest rate and money supply. Employing both Autoregressive Distributed Lags and error correction mechanism, Dayo and Akindele (2017) assess the effect of exchange rate on aggregate balance of payment, current account balance and capital account from 1971-2014. The result shows 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. Furthermore, Amassoma and Odeniyi (2016) conducted a research on fluctuation of exchange rate on economic growth in Nigeria. This study exhibited that there exists a positive but insignificant impact of fluctuations of exchange rate on economic growth in both long run and short run.
Finally, Nwachukwu Nnamdi (2021) examines the impact of exchange rate on balance of payments in Nigeria over the period 1981-2019. The study reveals that there is a positive association between exchange rate and balance of payments in Nigeria, rate of exchange has impacted significantly, while presence of causal association between fluctuation in exchange rate and Nigeria's BOP (p-value = $0.0174 < 0.05$).

3. METHODOLOGY

3.1 Types and Sources of data

This study employed annual time series data from 1981-2021. The data were obtained from different sources which include Central Bank of Nigeria's Bulletin, National Bureau of Statistics Bulletin, and World Development Indicator.

Table 1. Description of the variables.

Variables	Code	Description	Source
Balance of payment	BOP	Merely a way of listing receipts and payments in international transactions for a country as a percentage of GDP.	WDI
Exchange rate depreciation	EXR	This is a decrease in the value of one currency relative to another currency.	CBN
Money supply	BMS	Defined as narrow money plus savings and time and savings deposits with banks including foreign currency deposits as a percentage of GDP.	WDI,NBS
Interest rate	INT	The amount of interest due per period as a proportion of the amount lent, deposited or borrowed measured in percentage.	WDI
Degree of Openness	TOP	The measure to which a country depends on trade with other countries or region expressed in percentage.	WDI
Foreign Direct investment	FDI	This is a category of cross border investment in which an investor resident in one economy establishes a lasting interest in and a significant degree of influence over an enterprise resident in another economy measured in billions of naira.	WDI

3.2 Methods of data analysis

The paper employs Autoregressive Distributed Lag bound testing procedure to measure the long term equilibrium association between balance of payments and the independent variables.

3.3 Model specification

In order to analyses the effect of exchange rate depreciation on Nigeria's balance of payments, the models to be estimated were specified based on the reviewed literature as follows:

BOP= f (EXC, BMS, INT, TOP, FDI) ……..... (3.1)

BOP = $\alpha_0 + \alpha_1 EXR + \alpha_2 BMS + \alpha_3 INT + \alpha_4 TOP + \alpha_5 FDI + \mu$…… (3.2)

Where; BOP = the dependent variable (Balance of payments measured in percentage of GDP).

EXC = Real effective exchange rate (₦/USD)

BMS = Broad money supply as a percentage of GDP

INT = Real interest rate measure in percentage.

TOP = Degree of Openness which is calculated as $\frac{IMPORT+EXPORT}{GDP}$ expressed in percentage

FDI = Foreign Direct Investment (measured in billions of naira)

α_0 = constant, $\alpha_1 - \alpha_5$ are variable parameters, μ= white noise error term.

3.4.1 ARDL Approach to Co-integration

There are three methods to test for the co-integration as developed by Engel and Granger (1987), Johansen (1988) and Pesaran *et al.* (2001). This paper employed the autoregressive distributed lag (ARDL) bounds testing procedure suggested by Pesaran, Shin, and Smith (2001) to investigate the long-term associations between included variables.

Under this approach, we specify balance of payments (percentage of GDP) as function of the lagged value of itself and the current and lagged values of the explanatory variables included in the study. Thus, the ARDL regression model is expressed as:

$$\Delta BOPY_t = \alpha_0 + \alpha_1 BOP_{t-1} + \alpha_2 EXR_{t-1} + \alpha_3 BMS_{t-1} + \alpha_4 INT_{t-1} + \alpha_5 TOP_{t-1} + \alpha_6 FDI_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.3)$$

Following Pesaran *et al* (2001) ARDL approach, the unrestricted error correction model (UECM) of equation 3.4 is given as:

$$\Delta BOPY_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i \Delta BOPY_{t-i} + \sum_{i=1}^{p} \pi_i \Delta BMS_{t-i} + \sum_{i=1}^{p} \rho_i \Delta INT_{t-i} + \sum_{i=1}^{p} \sigma_i \Delta TOP_{t-i} + \sum_{i=1}^{p} \theta_i \Delta EXR_{t-i} + \sum_{i=1}^{p} \vartheta_i \Delta FDI_{t-i} + \gamma_1 BMS_{t-1} + \gamma_2 INT_{t-1} + \gamma_3 TOP_{t-1} + \gamma_4 EXR_{t-1} + \gamma_5 FDI + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.4)$$

The terms with summation signs signify the error correction relationship; the second part of the equation with γ coefficient corresponds to long run relationships, Δrepresent short run or difference factor, and *p* is the maximum number of lags in the model.

From equation (3.4),

The alternative hypothesis that there is long term association is used to test the null hypothesis of no association.

Ho: $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = 0$

H_1: $\gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq 0$

If there is long term association, then the study will proceed to estimate the short-run behaviour of (ECM) formulated as equation (3.5):

$$\Delta BOP_t = \alpha_0 + \sum_{i=1}^{p} \varphi_i \Delta BOP_{t-i} + \sum_{i=1}^{p} \pi_i \Delta EXR_{t-i} + \sum_{i=1}^{p} \rho_i \Delta BMS_{t-i} + \sum_{i=1}^{p} \sigma_i \Delta INT_{t-i} + \sum_{i=1}^{p} \theta_i \Delta TOP_{t-i} + \sum_{i=1}^{p} \vartheta \Delta FDI_{t-i} + \emptyset ecm_{1t-1} + \varepsilon_t \ldots\ldots\ldots\ldots (3.5)$$

Where $\emptyset$ represent short run speed of adjustment parameter, which measures return to long term equilibrium after a short run shock. It is expected to have a negative sign. The coefficient α_0 is the drift coefficient.

4. RESULTS AND DISCUSSION OF FINDINGS

4.1 Unit Root Test Result

A summary of the unit root test results with regards to order of integration is presented in Table 2.

Table 2: ADF Unit Root Test Result with intercept

Variables	Order of integration	Included in the model	ADF test statistics	McKinnon critical value	P-Values
EXR	I (1)	Intercept	-3.428389	5%=-2.938987	0.0158
FDI	I (0)	Intercept	-4.200859	5%=-2.926942	0.0020
TOP	I (1)	Intercept	-8.059786	5%=-2.936942	0.0000
BOP	I (1)	Intercept	-6.155011	5%=-2.938987	0.0000
BMS	I (1)	Intercept	-4.651037	5%=-2.938987	0.0006
INT	I (0)	Intercept	-7.955722	5%=2.938987	0.0000

Source: Authors Computation using E-views 10.

The result from the stationary tests indicates that the variables were not integrated of the same order; however, none of the variables was integrated at second difference. This therefore necessitated the adoption of Pesaran et al. (2001) ARDL bounds tests for co-integration to find out if there is a long-run relationship among the variables.

4.4 Co-integration Result

The major purpose of estimating an ARDL model in this study is to use it as a basis for applying the bound test so as to determine the existence or otherwise of the co-integration.

Table 3: ARDL Bound Test Results

Test statistics	Value	K
F-Statistics	7.149345	5
Critical values	I(0) Bound	I(1) Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Authors Computation Using E-view 10

From the table above the f- statistics for the Bound test7.149345 which is higher than both the critical values at all the significance level which implies long term association.

4.5 Estimated Long run Coefficient Using ARDL Approach

The result of the estimated long run coefficient of the model is presented in Table 4.

Table 4: Estimated Long run Coefficient Using ARDL Approach

Variables	Coefficient	Std. Error	T-Statistics	Prob
EXR	0.079038	0.020230	3.907030	0.0016
TOP	1.165062	0.181154	6.431342	0.0000
BMS	-0.816751	1.397761	-0.584328	0.5683
FDI	-0.849263	0.306947	-2.766804	0.0151
INT	-5.575911	0.958093	-5.819804	0.0000

Source: Authors Computation Using E-view 10

The result in Table 4 shows that the coefficient of EXR is positive and statistically significant. The significance of the coefficient of the exchange rate during the period may be due to excessive government intervention in the determination of exchange rate despite round tripping on the part of the dealers which causes a serious distortion in the market, the result indicates that 1 percent increase in exchange rate will lead to 5.57 percent decrease in balance of payment. The corroborates with the finding of Trunin (2012).

The coefficient of interest rate is negatively related with BOP but significant. The adverse sign of interest rate is in conformity with economic theory.

The coefficient of money supply is also negatively correlated with BOP with a value of 0.816751 but statistically insignificant with a probability value of 0.5683.

The coefficient of foreign direct investment is negatively related with balance of payments and statistically significant, this implies numerous challenges such as insecurity in some part of the country, high cost of production, unreliable exchange rate discourage some investors in Nigeria, therefore, more need to be done to attract both domestic and foreign investors to improve the country's BOP.

The coefficient of trade openness is positive and statistically significant. This conforms to the economic theory which posits that increase in economic growth has impacted positively on BOP. These empirical findings are in tandem with those of Iyoboyi and Muftau (2014).

4.6 Summary of Error Correction Result

Table 5: Summary of Error Correction Result

Variables	Coefficient	Std.Error	T-Statistics	Prob
C	5.799212	0.845864	6.855960	0.0000
CointEq(-1)*	-0.75911	0.099570	-7.629947	0.0000

Source: Authors Computation Using E-view 10

From table 5 above, the coefficient of error correction term (-0.759711) highly significant statistically, with the correct (negative) sign, and imply a high speed of adjustment to equilibrium after a shock. It implies that 75.9 per cent of disequilibria from previous year's shock would converge back to the long term equilibrium in the current year. From the long term result in the above, it reveals long term association among, Balance of payments and other macroeconomics variables included in the equation.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The study concluded that exchange rate depreciation exerted a positive but significant impact on balance of payments both in the long and short run. The study also established a long run equilibrium association between Nigeria's balance of payments and other macroeconomics

variables employed in the study. Real interest rate, trade openness and foreign direct investment significantly impacted balance of payments while broad money supply insignificantly impacted balance of payment during the study period.

From the findings, the study suggests that the Nigerian government should adopt import substitution strategy in order to discourage importation which will in turn promote local production as well as balance of payment. The Nigerian government should also encourage growth of local industries that will satisfy demand domestically and also compete in the global market, increase investment in agriculture and manufacturing sector as well as promote entrepreneurial skills so as to correct the deficits in the balance of payment accounts.

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