EFFECT OF EXCHANGE RATE ON NIGERIAN BALANCE OF PAYMENT

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ABSTRACT

Serious deficits on balance of payment in many developing countries have caused external reserve depletion, currency instability, and economic growth deceleration. One of the prominent variables for the surplus or the deficit of the balance of payment is exchange rate. Nigeria is facing unstable balance of payments, Monetary and fiscal authorities in Nigeria embarked on various measures to streamline exchange rate being one of the leading policies to solve this problem. This study seeks to find out how exchange rates affects balance of payments, secondary data where obtained from World Development Indicators (WDI) online database 2021,Natinal Bureau of Statistics Annual report and Central Bank of Nigeria Statistical Bulletin from 1980-2022. Values of Trade Openness (TOP), exchange rate (EXH), foreign direct investment (FDI), Interest Rate (INTR), Inflation Rate (INFL), and balance of payment (BOP) were collected. Data were analyzed using Augmented Dickey Fuller, Phillips Perron and Kwiatkoski-Phillips-Schmidt-Shin Stationarity test and Autoregressive Distributed Lag Model to detect possible long run and short run dynamic relationship between the variables used in the model. The bounds test indicated a long-run relationship among the macroeconomic variables, ARDL results provided evidence that real exchange rate had negative and insignificant effect on the balance of payments in the long-run. The Researcher recommends that monetary and fiscal policies should ensure strict compliance of policies to stabilize the real exchange rate which encourages exports and take care of disequilibrium in balance of payments.

***Keywords**: Exchange rate, Balance of Payment, Foreign Direct Investment, Inflation Rate, Trade Openness*

1.0 Introduction

A country's exchange rate and balance of payment is usually regarded as signal by which a nation's strength can be measured especially its economic strength. Exchange rate plays a major role in countries international trade because no nation can be self-sufficient due to varying factor endowments of different economies of the world. Nigerian economy continues to experience chronic deficit on the balance of payment account, fall in the value of Naira and difficulties in monetary actions, decline in gross domestic product due to over-dependency on imported products, reliance on revenues from oil as major source of income, massive imports of refined petroleum.

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However, 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).

Globally, exchange rate and its direct and indirect effects are currently a widely discussed topic. In particular, the exchange rate influences on balance of payments (current account, capital account and financial account), inflation, interest rate, remittance, foreign direct investment, money supply, unemployment, tourism, government operations (public debt, budget deficit) and certain other macroeconomic variables. However, among other macro-economic variables, the exchange rate has a significant effect on the balance of payments (Priyatharsiny, 2017).

Basically, exchange rate is a fundamental macroeconomic variable which affects not only the country's economic performance but also other countries around the world. In international economic integration, exchange rates play a major role because all nations do not have an independent balance, so they have international economic relations with other countries (Oladipupo and Onataniyohuwo, 2011). Openness to trade asserts that the exchange rate is an integral endogenous variable as it opens the door to foreign trade (Priyatharsiny, 2017).

Nigeria's exchange rate fluctuation tends to affect the value of Naira which in turn encouraged importation and discourages exportation. Several efforts were made by the monetary and fiscal authorities to correct imbalance in balance of payment. The study determines how exchange rate affects balance of payment from 1980 to 2020. The study aimed to analyze how balance of payment performance in Nigeria is influenced by the level of foreign direct investment, exchange rate, trade openness, inflation rate and interest rate because the need for effective exchange rate system has been recognized as the most important variable to achieve favourable balance of payment. The main objective of this study is to empirically investigate the effect of exchange rate on balance of payment in Nigeria using annual data from 1980 to 2022. The paper is organized as follows; introduction, review of related literature, methodology, analysis and discussion. Finally, conclusion, recommendation and policy implication.

Most of the Developing countries have deficit balance of payment due to exchange rate instability which affect the general performance of the economy, Nigerian government embarked on various policies/measures to stabilize exchange rate and improve balance of payment, the adoption of multiple windows (such as E&I window) and suspension of allocation of Foreign exchange to Bureau-de-change is a pointer to that fact, various research were conducted to examine the effect of exchange rate on balance of payment abroad but few research were conducted using ARDL in Nigeria, this study intends to investigate effect of exchange rate on balance of payment in Nigeria from 1980-2022

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2.0 Literature Review

This session dwells on the review of related literature; conceptual review, reviews of empirical studies and theoretical framework.

2.1 Conceptual Framework

2.2 Concept of Balance of payment

According to Sodesten (1980) "the balance of payment is merely a way of listing receipts and payments in international transactions for a country. It shows the country's trading positions, changes in its net position as foreign lender or borrower, and charges in its official reserve holding.

Iyoboyi and Muftau (2014) opined that Balance of payment (BOP) is a needed statement in a country because it will give an account of import of a country and this will act as signal for some domestic policies. On the export side, balance of payment (BOP) tells us our export composition and the extent to which a country depends on certain commodities for our foreign exchange earnings.

When a payment is received from a foreign country, it is a credit transaction while payment to a foreign country is a debit transaction. The principal items shown on the credit side (+) are exports of goods and services, unrequited receipts in the form of gifts, grants etc. from foreigners, borrowing from abroad, investments by foreigners in the country and official sale of reserve assets including gold to foreign countries and international agencies. The principal items on the debit side (-) include imports of goods and services, transfer payments to foreigners as gifts, grants, etc. lending to foreign countries, investments by residents to foreign countries, and official purchase of reserve assets or gold from foreign countries and international agencies. Balance of payment account is composed of four main elements namely: current account balances, capital and financial account balances, balancing items (Errors and omission) and reserves balances (Mannur, 2012).

Balance of payments (BOP) is a statistical statement that systematically summarizes the economic transaction of an economy with the rest of the world for a specific period. Its records transactions that give rise to sets of accounts that indicates all the flows of value between residents of one country and the residents of other countries of the world that enter into economic dealings.

2.3 Concept of exchange rate

Exchange rate has been defined as the price of one currency in terms of another (Mordi, 2006). Exchange rate is the price at which one country exchanges its currency for another currency. The increase or decrease of real exchange rate indicates strength and weakness of a currency in relation to foreign currency and it is a standard for illustrating the competitiveness of domestic industries in the world market.

Iyoboyi and Muftau (2014) defined exchange rate as the price of one country's currency in relation to another country currency. This means that exchange rate deals with price strength of one currency against another currency.

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Fixed exchange rates

Under fixed or pegged exchange rates all exchange transactions take place at an exchange rate that is determined by the monetary authority. It may fix the exchange rate by legislation or intervention in the currency. It may buy or sell currencies according to the needs of the country or may take policy decision to appreciate or depreciate the national currency. The monetary authority (Central Bank) holds foreign currency reserves in order to intervene in the foreign exchange market, when the demand and supply of foreign exchange are not equal at the fixed rate (Anyanwu, 1993).

Flexible Exchange rate

In this system the exchange rate is determined by the free market forces of demand and supply of foreign exchange. The exchange rate moves up and down freely without any intervention by monetary authority. Thus, it is simply the system of free-floating exchange rate (Oladipupo & Onotaniyahuwo, 2011).

2.4 Empirical Literature

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.

Amassoma and Odeniyi (2016) examined the impact of exchange rate fluctuation on the Nigerian economic growth using an annual data of forty-three (43) years covering the period (1970–2013). The study employed Multiple Regression Model, Johansen Co-integration test and the Error Correction Model (ECM). Evidence from this study exhibited that there exists a positive but insignificant impact of exchange rate fluctuation on Nigerian economic growth in both the long run and short run. Their result is attributed to the ability of the Nigerian government to effectively regulate some other important macroeconomic variables which can infuriate exchange rate which has thereby helped curtail the effects of exchange rate fluctuation during the study period.

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.

Priyatharsiny (2017) analyzed the effect of the exchange rate on the balance of payments Using Sri Lankan data from the period of 1978 to 2016, The Johansen cointegration approach is used to identify the number of cointegrating relationships and long-term relationships, using the error correction model to

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analyze short-term relationships and long-term change. In the equation method, Johansen cointegration Trace test statistics and Maximum Eigen value both describe two co-integrating relationships. The results found by Johansen co-integration have a positive and important long-run balance of payment relationship. The study found that the long-term equilibrium between the exchange rate and the balance of payments in Sri Lanka is a positive and important adjustment.

Dayo and Akindele (2017) examined the effect of exchange rate on aggregate balance of payment, current account balance and capital account from 1971 to 2014. The study employed Autoregressive Distributed Lags (ARDL) and error correction mechanism (ECM). 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.

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 Balance of payment 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.

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.

Mohammed and Nuhu (2021) assess impact of exchange rate on Nigerian balance of payment using data from World Bank development indicators for periods covering from 1986 to 2019. The key method of analysis used in the research includes quantile regression and Granger causality test. The quantile regression results revealed that exchange rate and openness have a negative impact on balance of payment, while foreign direct investment has a positive impact on balance of payment. The Granger causality test results revealed that there is unidirectional causality running from exchange rate to balance of payment.

Aniekan O.A (2021) examined the impact of the real effective exchange rate variations on the overall balance of payments in Nigeria between 1986-2019. The autoregressive distributed lag (ARDL) bounds co-integration technique was used to analyze the data based on the outcome of the stationarity test. The bounds test indicated a long-run relationship among the macroeconomic variables in the balance of payments function. Empirical evidences indicated that real exchange rate had insignificant negative effect on the balance of payments in the long-run, but exerted significant positive effect in the short-run.

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Jayasooriya (2020) showed that in the long-run, real effective exchange rate was negatively significant while GDP growth, trade openness, and broad money were positively significant on current account balance. In the short-run, economic growth and real effective exchange rate were negatively significant.

Literature Map

S/N	Author	Title	Methodology	Variables	Scope	Findings	weakness
1	Muhammad, A.M & Nuhu,A.B (2021)	Impact of exchange rate on balance of payment in Nigerian Economy	Quantile Regression & Granger Causality	EXR,TOP,FDI & BOP	1986-2019	EXR & TOP has Negative Impact on BOP	Long run relationship was not tested
2	Aniekan, (2021)	Impact of Real Effective Exchange rates on balance of payments: Empirical evidence from Nigeria	Autoregressive Distributed Lag Model (ARDL)	BOP,EXR,RGDP,MS, GEXP, INFL &CPS	1986-2019	R-EXR has Negative insignificant effect on BOP	Short run result is not much needed in the body but Long run result
3	Limbore & Moore (2019)	Effect of exchange on balance of payment in India	Autoregressive Distributed Lag Model (ARDL)	EXR,BOP, MS & INFL	1986-2018	EXR has positive influence on Bop	LM Test result indicated serial correlation.
4	Okwuchukwudil (2014)	Exchange rate and balance of payment: ARDL Econometrics Investigation on Nigeria	Autoregressive Distributed Lag Model (ARDL) & Marshall Lerner (ML) condition	BOP,EXR,XM &IM	1971-2012	EXR has positive and significant relationship in long run	Variables like FDI, Money Supply & Inflation rate are not included in the model

Source: Author Computation

On the basis of the above reviewed literatures, most of the studies have been conducted in other countries and the few studies conducted in Nigeria have concentrated much on the impact of balance of payment on other macroeconomic variables neglecting the effect of those variables on balance of payment in Nigeria. Hence, this study focused on the effect of exchange rate as one of the macroeconomic variables on balance of payment in Nigeria from 1980 to 2022 period.

2.5 Theoretical Framework

In order to assess the effect of exchange rate on Nigeria's Balance of Payments, it was crucial that we reviewed some theories that explain the concept of Balance of Payments. These theories are:

i. Elasticity approach

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ii. Absorption approach
iii. Monetary approach, introduced by Kreinin (1983); and
iv. Portfolio management, introduced by Dornbusch (1973).

For the purpose of this study the elasticity approach will be adopted, elasticity theory states that the effect of devaluation on trade balance depends on the elasticity of imports and exports. The proponents of this theory are of the view that a short-term change in the exchange rate may be dominated by transactions which could lead to a fall in the trade balance. This phenomenon changes in the long run and exports and imports quantities adjust resulting in increase in their elasticity and there by trigger a quantity change. As quantity changes, there is a reduction in the price of the devaluing country's exports but a rise in the price of imported goods and lowers its demand hence snatching expenditure away from foreign goods to domestically produced ones, thereby improving the balance of payment of the country. The elasticity approach focuses on the impact of relative price on the trade balances as pointed out by Husted and Michael (1995).

The Marshal – Lerner condition provides the analytical ground for the elasticity approach. This was proposed by Sterm (1980). The Marshal – Lerner condition rests on several restrictive assumptions:

i. Partial equilibrium provides the theoretical base, that is, it considers the effect of exchange rate variations on import and exports.
ii. It assumes that the price elasticity of supply at home and abroad both equal infinity.
iii. It ignores the monetary effects of exchange rate variations.
iv. Marshall – Lerner condition assumes an initial balance of trade

Devaluation of local currency is weak because;

1- It takes a long time to affect trade
2- Decline in currency value will initially worsen the deficit before improvement.

According to this approach, devaluation of domestic currency improves the balance of trade if the sum of price elasticity of domestic and foreign demand for imports is greater than unity. The essence of this approach works through substitution effects in consumption and production in response to changes in relative prices (domestic vs. foreign) as a result of devaluation. More precisely, the Marshall Lerner Condition states that for a favourable impact of devaluation on the trade balance it is necessary that absolute values of the sum of the demand elasticity of export and import must be greater than unity. Given that the Marshall Lerner condition is met, if exchange rates is above the equilibrium rate it will imply excess supply of foreign exchange and conversely if the exchange rate is below the equilibrium rate it will imply excess demand for foreign exchange.

3.0 Methodology

3.1 Sources of Data

To obtain reliable information that will help the researcher to determine the effect of exchange rate on Nigerian Balance of payment, data were collected from secondary time series data sourced from World Development Indicators 2021 database. The dependent variable is Balance of payment (BOP) whereas the independent variables are Exchange rate (EXR), Foreign Direct Investment (FDI), Inflation rate (INFL), Interest rate (INTR), Trade openness (TOP).

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3.2 Model Specification

The model of this study focuses on effect of exchange rate on Nigerian balance of payment, the model specification is as follows:

Functional relationship of the model is given as

$$BOP = f(EXR, TOP, FDI, INF, INTR) \quad (1)$$

The econometric relationship to be estimated is specified as:

$$BOP = \beta_0 + \beta_1 EXR + \beta_2 TOP + \beta_3 FDI + \beta_4 INFL + \beta_5 INTR + \mu_t \quad (2)$$

Where:

BOP = Balance of Payments (As percentage of GDP)

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

FDI = Foreign Direct Investment

EXR = Real Effective Exchange rate (₦/USD)

INFL =Inflation rate (Consumer Price Index)

INTR = Real Interest rate (Measured in percentage)

A prior Expectation

$\beta_1 > 0\ \beta_2 > 0\ \beta_3 > 0\ \ \beta_4 > 0$

This implies that the coefficient of exchange rate, openness of the economy, interest rate and foreign direct investment is expected to be positive (+). The variables in this study are explained using regression analysis.

3.3 Estimation Strategy

The estimation strategies are unit root test, Lag selection, ARDL co-integration test and error correction test as well as post diagnostic tests.

3.3.1 Unit Root Test

This study attempted to examine the order of integration of the variables using the Augmented Dickey-Fuller (ADF) test statistic of unit roots. After confirming that all the variables are stationary either at level or first differencing, Augmented Dicker Fuller (ADF) test for stationarity is applied to know the order of integration of the variables in the model. We specify the ADF test as follows:

$$\Delta BOP_t = \beta_1 + \beta_2 + \delta BOP_{t-1} + \alpha \sum \Delta BPO_{t-1} + \varepsilon_t \quad (3)$$

$$\Delta EXR_t = \beta_1 + \beta_2 + \delta EXR_{t-1} + \alpha \sum \Delta EXR_{t-1} + \varepsilon_t \quad (4)$$

$$\Delta INFL_t = \beta_1 + \beta_2 + \delta INFL_{t-1} + \alpha \sum \Delta INFL_{t-1} + \varepsilon_t \quad (5)$$

$$\Delta INTR_t = \beta_1 + \beta_2 + \delta INTR_{t-1} + \alpha \sum \Delta INTR_{t-1} + \varepsilon_t \quad (6)$$

$$\Delta TOP_t = \beta_1 + \beta_2 + \delta TOP_{t-1} + \alpha \sum \Delta TOP_{t-1} + \varepsilon_t \quad (7)$$

$$\Delta FDI_t = \beta_1 + \beta_2 + \delta FDI_{t-1} + \alpha \sum \Delta FDI_{t-1} + \varepsilon_t \quad (8)$$

Where:

Δ = First difference operator of the variables,

t = time or trend taking the value of 1, 2, till the end of the sample and

ℓ = white noise error term.

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Autoregressive Distributed Lag Model:

The model estimation technique chosen for the study is the autoregressive distributed lag (ARDL) bound testing approach to co-integration. The study first of all looked at the` time series properties of the data used in the analysis since the ARDL stipulates that none of the variables should be more than I(1) and the Lag selection criteria. This study therefore estimates the following regression equation.

$$\Delta BOP = \alpha_0 + \sum_{k=1}^{p1} \alpha_1 BOP_{t-1} + \sum_{k=1}^{p2} \alpha_2 \Delta EXR_{t-1} + \sum_{k=1}^{p3} \alpha_3 TOP_{t-1} + \sum_{k=1}^{p4} \alpha_4 \Delta INFL_{t-1} + \sum_{k=1}^{p5} \alpha_5 \Delta FDI_{t-1} + \sum_{k=1}^{p6} \alpha_6 \Delta INTR_{t-1} + \sum_{k=1}^{p5} \alpha_5 \Delta FDI_{t-1} + \lambda ECM_{t-1} + \beta_1 BOP_{t-1} + \beta_2 EXR_{t-1} + \beta_3 TOP_{t-1} + \beta_4 FDI_{t-1} + \beta_5 INFL_{t-1} + \beta_6 INTR_{t-1} + \mu_t \quad (9)$$

Where ΔBOP is the difference of the balance of payment, ΔEXR is the difference of the exchange rate, ΔTOP is the difference Trade of openness, ΔFDI is the difference in Foreign Direct Investment, ΔINFL is the difference in Inflation Rate and ΔINTR is the difference of Interest rate. α_1, α_2, α_3, α_4, α_5, α_6 represents the short-run coefficient and β_1, β_2, β_3, β_4, β, β6 represents the long-run coefficient of balance of payment, exchange rate, Trade openness, Interest rate, Foreign direct investment respectively. ECM_{t-1}represents the error correction term lagged for one period, while λ is the coefficient for measuring speed of adjustment. It measures how fast errors generated in one period are corrected in the following period and μ_t is the stochastic error term.

3.3.2 Error Correction Model (VECM)

The Vector Error Correction Model This is based on vector introgressive framework; where an error correction term is incorporated into the model. The reason for the error correction term is the same as with the standard error correction model, it measures any movements away from the long run equilibrium and measures the speed of adjustment of the short run dynamics to the long run equilibrium time path. The coefficient is expected to be negatively signed, statistically significant and lie between zero and one.

4.0 DATA PRESENTATION AND ANALYSIS

In order to use the right technique in analysis pre-testing of variables were conducted to identify the order of integration of the underlying variables, there was need to ensure that the variables are I(0) or I(1), Hence, each series entering the model was examined to determine whether it is stationary and its order of integration. The results of the Augmented Dickey-Fuller (ADF) unit root test are reported in Tables 1 and Phillips Perron unit root test in Table 2. The result shows that balance of payment as percentage of GDP (BOP), Foreign Direct Investment(FDI), Inflation Rate(INFL) and Interest Rate (INTR) were stationary at levels, while Exchange rate (EXH) and Trade openness (TOP) were stationary at first difference (integrated of order one). The results are presented in Tables below respectively

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Table 1: ADF Unit Root Test Result (with intercept only)

Variables	ADF T-stat	Critical Values			P-Values	Order of Integration
		1% Level	5% Level	10% Level		
EXH	-5.408223	-3.600987	-2.935001	-2.605836	0.0001	I(1)
FDI	-4.533230	-3.596616	-2.933158	-2.604867	0.0007	I(0)
TOP	-8.059786	-3.605593	-2.936942	-2.606857	0.0000	I(1)
BOP	-3.069525	-3.596616	-2.933158	-2.604867	0.0367	I(0)
INFL	-3.134514	-3.596616	-2.933158	-2.604867	0.0315	I(0)
INTR	-3.695533	-3.596616	-2.933158	-2.604867	0.0077	I(0)

Source: Author's Computation using Eviews 10

ADF Unit Root Test Result (with Trend & intercept)

Variables	T-statistic	Critical Values			P-Values	Order of Integration
		1%	5%	10%		
EXH	-6.394565	-4.198503	-3.523623	-3.192902	0.0000	I(1)
FDI	-4.433754	-1.192337	-3.520787	-3.191277	0.0053	I(0)
TOP	-4.354230	-4.296729	-3.568379	-3.218382	0.0087	I(2)
BOP	-5.794857	-4.211868	-3.529758	-3.196411	0.0001	I(1)
INFL	-3.829252	-4.198503	-3.523628	-3.192902	0.0248	I(0)
INTR	-5.647754	-4.192337	-3.520787	-3.191277	0.0002	I(0)

Source: Author's Computation using Eviews 10.

Table 2: Phillips Perron Unit Root Test Result (with intercept only)

Variables	PP T-stat	Critical Values			P-Values	Order of Integration
		1% Level	5% Level	10% Level		
EXH	-5.482568	-3.600987	-2.935001	-2.605836	0.0000	I(1)
FDI	-4.486936	-2.933158	-2.933158	-2.604867	0.0008	I(0)
TOP	-2.954919	-3.600987	-2.935001	-2.605836	0.0478	I(0)
BOP	-2.979554	-3.596616	-2.933158	-2.604867	0.0451	I(0)
INFL	-2.996825	-3.596616	-2.933158	-2.604867	0.0433	I(0)
INTR	-3.970576	-3.596616	-2.933158	-2.604867	0.0037	I(0)

Source: Author's Computation using Eviews 10.

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Phillips Perron Unit Root Test Result (with Trend & intercept)

Variables	PP T-stat	Critical Values			P-Values	Order of Integration
		1%	5%	10%		
EXH	-6.394565	-4.198503	-3.523623	-3.192902	0.0000	I(1)
FDI	-4.379248	-4.192337	-3.520787	-3.191277	0.0061	I(0)
TOP	-11.67656	-4.205004	-3.526609	-3.194611	0.0000	I(1)
BOP	-13.84693	-4.198503	-3.523623	-3.192902	0.0000	I(1)
INFL	-11.98341	-4.198503	-3.523623	-3.192902	0.0000	I(1)
INTR	-6.001400	-4.192337	-3.520787	-3.191277	0.0001	I(0)

Source: Author's Computation using Eviews 10.

Kwiatkoski-Phillips-Schmidt-Shin Unit Root Test Result (with intercept)

Variables	KPSS T-stat	Critical Values			P-Values	Order of Integration
		1%	5%	10%		
EXH	0.504550	0.739000	0.463000	0.347000	0.0042	I(1)
FDI	0.177753	0.739000	0.463000	0.347000	0.0000	I(0)
TOP	0.282933	0.739000	0.463000	0.347000	0.0000	I(0)
BOP	0.137715	0.739000	0.463000	0.347000	0.0000	I(0)
INFL	0.270822	0.379000	0.463000	0.374000	0.0000	I(0)
INTR	0.571670	0.739000	0.463000	0.347000	0.0000	I(0)

Source: Author's Computation using Eviews 10.

The result from the stationarity tests indicates that the variables were not integrated of the same order; however, none of the variables was integrated at second difference with the exception of Trade openness with Trend and intercept using ADF Unit root test. This necessitated the adoption of Pesaran *et al*'s (2001) Autoregressive Distributed Lag (ARDL) - bounds tests for co-integration to find out if there exists a long-run relationship among the variables.

Based on the result of the unit root test Balance of payment and foreign direct investment were found to be stationary at level as their ADF statistic value -3.244074 and -4.301236 is less than the critical value at 5% level of significance -2.957110 and -2.936942. Thus they are integrated of order zero I(0). Exchange Rate, Trade openness, Interest rate and Inflation rate were not stationary at level but later gained stationarity at first difference as the ADF statistics value -4.301236, -7.955722, -5.913019 and -6.367032 is less than the critical value at 5% level of significance -2.938987, -2.938987, -2.941145 and -2.941145 thus it is integrated of order one I(1).

Lag Selection Criteria

The choice of the lag length is a crucial part of empirical research based on the Autoregressive Distributed Lag (ARDL) model since all inferences in this model hinge on the correct model specification. The

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procedure requires that the choice of deterministic variables and maximum lag length (K) be such as to prevent serial correlation in the disturbance.

Table 2 Lag Selection Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1605.496	NA	2.75e+29	84.81557	85.07414	84.90757
1	-1482.805	200.1792	2.95e+27	80.25291	82.06288*	80.89688
2	-1428.798	71.06248*	1.32e+27*	79.30515	82.66651	80.50110
3	-1384.863	43.93454	1.33e+27	78.88754	83.80030	80.63547
4	-1332.883	35.56516	1.53e+27	78.04650*	84.51065	80.34640*

Based on the order selection criteria given above, the result showed that the appropriate lag for the estimation of the ARDL model is lag 4. The selected lags are based on Akaike Information criteria and Hannan Quinn Information Criteria test statistics). The optimum Lag selection has been done to ensure that we are dealing with the right lags throughout the analysis.

ARDL Bound Test

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 cointegration.

Table ARDL Bound Test Results

Test Statistic	Value	K
F-Statistics	6.328954	5
	Critical Values Bounds	
Significance	I(0) Bound	I(1) Bound
10%	2.75	3.79
5%	3.12	4.25
1%	3.93	5.23

Source: Author's Computation Using Eview 10

Base on the result of the ARDL Bound test given in the table above the f- statistics for the Bound test is 5.588020 which is greater than both the lower bound critical values and the upper bound critical values at both 10 and 5 per cent levels of significance. Hence, the null hypothesis of no long-run relationship was strongly rejected, meaning that there was long-run relationship among the variables used in the model. This implies that balance of payments, real exchange rate, trade openness, interest rate, inflation rate and foreign direct investment all had equilibrium conditions that kept them together in the long-run. evidently greater than even the 5% critical value for the upper bound 3%.

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ARDL Long Run Result

Table: 5 Long Run Coefficients

Variables	Coefficient	Std. Error	T-Statistics	Prob
TOP	-7.4217760	1.25E+08	-0.593629	0.5714
FDI	5.58E+09	1.11E+09	5.052618	0.0015
INFL	-4.98E+08	78616949	-6.336112	0.0004
INTR	6.98E+08	8.49E+08	0.822848	0.4377
EXH	-3.8447893	18420976	-2.087180	0.0753

The result of the long run relationship in table above reveals that exchange rate has negative and insignificant effect on balance of payments with coefficient of -3.8447893 which implies that 1-unit increase in exchange rate will lead to -3.8447893 decrease in balance of payments as a percentage of gross domestic product, Furthermore, the result show that Foreign direct investment with coefficient of 5.58E+09 has positive and significant effect at 5% on balance of payment which means 1-unit increase in Foreign direct investment will lead to 5.58E+09 increase in Balance of payment.

Also, the result indicates that there is negative and significant relationship between inflation rate and balance of payments as a percentage of gross domestic products such that 1unit increase in inflation rate will lead to -4.98E+08 fall in balance of payments as a percentage of gross domestic product. However, the result reveals that interest rate has positive and insignificant effect on balance of payments with coefficient 6.98E+08. Lastly Trade openness has negative and insignificant effect on balance of payment with coefficient -7.4217760 as reported in table.

Table: 6 Summary of Error Correction Result

Variables	Coefficient	Std Error	T-Statistics	Prob
CointEq(-1)*	-4.016073	0.497758	-8.068322	0.0001

Source: Author's Computation Using E-View 10

Based on the result in the table, it is clear that the error correction coefficient is negative (-4.016073) as required, and it is highly statistically significant. This means that there is a valid error correction. The result suggests that about 40.1% of the disequilibrium error is being corrected each year and 40.1 is adjusted/reverted back to the long run equilibrium hence, there exist good adjustment in BOP when EXR, TOP, INFL, FDI and INTR change each year. Based on the long run coefficients reported in table, there is evidence of long run equilibrium relationship between, Balance of payment, Exchange rate, Trade openness, and Inflation rate, Interest rate and Foreign Direct Investment.

Diagnostic Tests

Since the validity of the bounds test relies on normally distributed error terms that are homoskedastic and serially uncorrelated, as well as stability of the coefficients over time (Kripfganz & Schneider, 2018), there was the need to conduct various post estimation diagnostic tests such as heteroskedasticy test, serial correlation LM test, as well as the stability tests using CUSUM and CUSUMSQ.

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Residual Diagnostic Test

Residual diagnostic test has been conducted for the lags selected to ensure that the selected lags are free of serial correlation and heteroscedasticity also ensure that the residuals of the selected lags are normally distributed. Based on the residual serial correlation test result using LM test, given below, we cannot reject the null hypothesis of no serial correlation as F-statistic is greater than prob. F (30, 7) also with probability value of 0.7008 which is not greater than 0.05 significant levels.

Table 3 Breusch Godfrey Serial Correlation LM Test

F-Statistic	1.091779	**Prob.F(4,3)**	0.4909
Obs*R-squared	22.52583	**Prob. Chi-Square(4)**	0.0002

Source: Author's Computation Using E-View 10

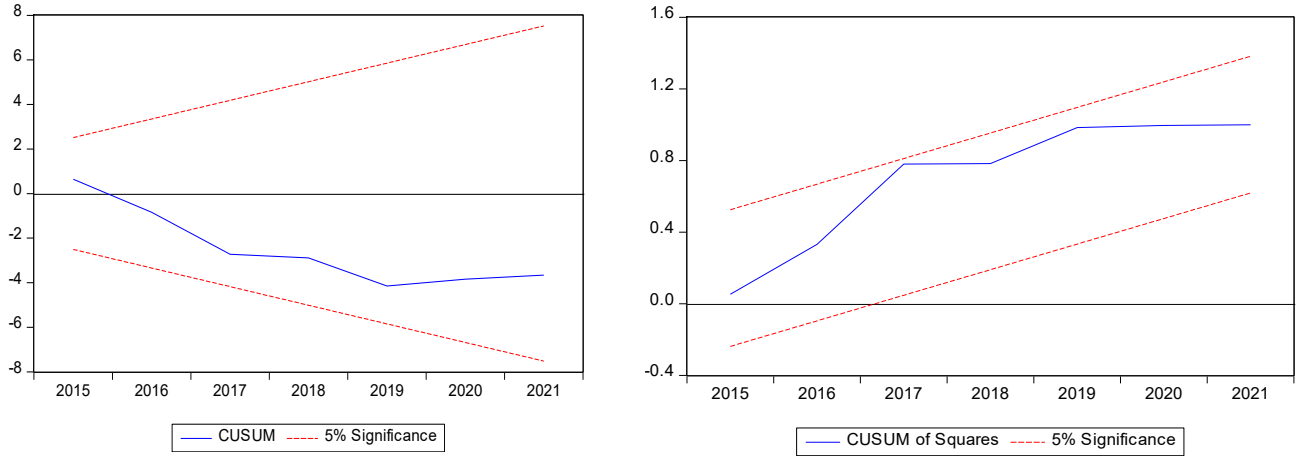
The Breusch Godfrey Serial Correlation LM Test indicates the absence of serial correlation in the regression's residual with probability value 0.4909 which is greater than 0.05 significance level.

Table 7 Heteroscedasticity Test (Breusch Pagan- Godfrey)

F-Statistic	0.788780	**Prob (30,7)**	0.7008
Obs*R-squared	29.32516	**Prob. Chi-Square(30)**	0.5006
Scaled explained SS	1.444710	**Prob. Chi-square (30)**	1.0000

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

Figure 1: CUSUM and CUSUMQ



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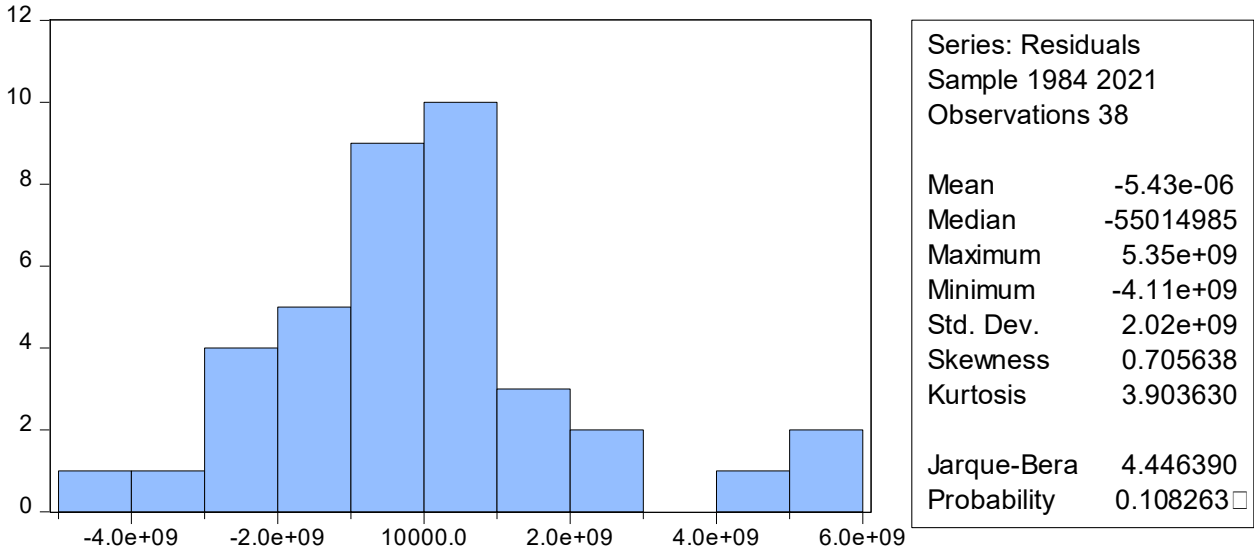
CUSUM square test provided any evidence of instability in the estimated at 5% significance leve l for conventional specification. Therefore, the test is within the 5% critical bound; this implies that all the coefficients in the short run model are stable and robust for prediction.

Table: 8 Result of Jaque-Bera normality test

Jargue-Bera test of normality were conducted to determine residuals of the data distributed in the model, the result is contained in the figure below



The result revealed that, the residuals of the data are normally distributed. The null hypothesis of the residual of data is accepted at 10.82% confidence as indicated by the probability value **0.108263** and jarque-Bera value of **4.446390** which is greater than zero.

4.1 Discussions of the results

The long-run result shows that foreign direct investment and Interest rate were positive and statistically significant with the exception of interest rate which is statistically insignificant while Exchange rate, Inflation rate and Trade openness had negative effects on balance of payments. Although the coefficient was statistically insignificant with the exception of inflation rate, the negative impact of real exchange rate however is not in line with a priori expectation, and indicates that one percent decrease in exchange rate would will lead to -3.844789 decrease in balance of payments. This implies that exchange rate depreciation only cannoy be used to improve balance of payments position in Nigeria. The outcome, however, is in line with other studies Aniekan O.A (2021) and Jayasooriya (2020) where exchange rate was found to be negative and insignificant in the long-run while contradict other studies Priyatharsiny (2017) and Odili (2014) where exchange rate was found to be positive and significant. The coefficient of Trade Openness showed negative effect on balance of payments, and is not in conformity with a priori expectation. The negative impact suggests that Nigeria is a net importer, and any available credit would increase the demand and expenditure on imported goods, which would in turn, reduce the net foreign assets, and hence balance of payments. Although the inflation rate coefficient appeared with the right sign (negative) in the long-run, in consonance with the theoretical expectation and statistically insignificant.

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Error Correction result further shows that the coefficient of the Error Correction Mechanism (ECM) was statistically significant, with the expected negative sign. The coefficient showed a moderate rate of convergence/reversion to equilibrium, and suggested that about 40.1% of the disequilibrium in the previous year was corrected (adjusted) in the current year.

The robustness of the model has been defined by several diagnostic test such as serial correlation diagnostic test and Jarque-Bera normality test as well as Heteroscedasticity. All the test indicate that the model has satisfactory econometric properties, with a correct functional form and the model's residuals are serially uncorrelated and normally distributed, hence the results reported are valid and reliable for policy making

5.0 Conclusion and Recommendations

The study analyzed the effect of exchange rate on balance of payment in Nigeria from 1980 to 2022. The empirical results from ARDL bound tests revealed that a long-run relationship exists between exchange rate and balance of payment in Nigeria. The elasticity of the exchange rate coefficient on the balance of payment model was negative and statistically insignificant at 5 percent level, thus balance of payment position in Nigeria responded positively to exchange rate policies and Marshall-Lerner condition holds for Nigeria. This implied that change in exchange rate influence balance of payment position in Nigeria in the Long run.

The dynamic error correction mechanism revealed that the speed of adjustment to the long run equilibrium position from the previous period to the current is moderate. The ECM coefficient was correctly signed with a negative sign. The policy implication of the estimation results is simple, depreciation/devaluation improves balance of payment and that Marshall-Lerner (ML) condition subsists for the Nigeria economy, exchange rate management in Nigeria must be seen from the long-run perspective rather than short-run effect. To reduce the excessive balance of payment deficit, the need to discourage over-reliance on imported goods and adoption of import substitution policy as well as the promotion of consumption and exportation of domestic produce is very imperative. This can only be achieved if the Nigerian economy is diversified.

Appropriate monitoring mechanism should be set up by monetary and fiscal authorities to ensure that foreign exchange and available credit are properly allocated to the end users. Policies that will encourage productivity and exportation of locally made goods should be encouraged in order to reduce dependence on importation.

REFERENCES

Aniekan, O. A. (2021). Impact of Real Effective Exchange Rates on Balance of Payments: Empirical Evidence from Nigeria. *African Journal of Economics, Volume IX, Issue IV*, 1-20.

Amassoma, D. & Odeniyi, B.D. (2016) The nexus between exchange rate variation and economic growth in Nigeria. *Singaporean Journal of Business Economics and Management Studies*, 4(12): 8-28.

Dayo, B. O., & Akindele, J. O. (2017). Balance of payment crises in Nigeria: The role of exchange rate.*International Journal of Economics, Commerce and Management, 5*(5), 2-21.

Iyoboyi, M. & Muftau, O. (2014) Impact of exchange rate depreciation on the balance of payments. Empirical evidence from Nigeria. *Cogent Economics & Finance,* 2: 1-23.

Mohammed, A.M & Nuhu, A. B. (2021). Impact of Exchange rate on Balance of Payment in Nigeria: Evidence from Quantile Regression, *Journal of Conflict Resolution & Social Issues,* VOL1. NO1, Website: https://www.researchgate.net/publication/348393455. PP. 114-117

Mordi, M. C. (2006). Challenges of exchange rate volatility in economic management of Nigeria in the dynamics of exchange rate in Nigeria, *CBN bullion*, 30(3), 17-25.

Husted .A. and Micheal M. (1995). "*International Economics*" 3rd Edition. Harper Collins. College Publisher, 422.

Anyanwu, J. C. (1993). Monetary economics theory,policy and institutions. Hybrid publishers, Onitsha, Nigeria. 247-274.

Jayasooriya, S. P. (2020). Movement of exchange rate on balance-of-payments constrained growth in South Asia: Panel ARDL. MPRA Paper No. 98733. https://mpra.ub.uni-muenchen.de/98733.

Priyatharsiny S. (2017) the impact of exchange rate on balance of payment*: an econometric investigation on Sri Lanka. proceedings of 7th international symposium, seals, 7th & 8th December 2017*.

Odili, O. (2014). Exchange rate and balance of payment: An autoregressive distributed lag (ARDL) econometric investigation on Nigeria. *Journal of Economics and Finance*, *4*(6), 21-30.

Olanipekun, D. B. & Ogunsola, A. J. (2017). Balance of payment crises in Nigeria: The role of exchange rate. *International Journal of Economics, Commerce and Management*, *5*(5), 119-140.

Oladipupo, A. O. Onotaniyohuwo, F.O. (2011). Impact of exchange rate on balance of payment in Nigeria. *African Research Review: An International Multidisciplinary Journal, Ethiopia. 5 (4):21*. ISSN 1994-9057 (Print) ISSN 2070--0083, 73-88.

Abdullahi, I. B.; Abubarkar, M. A.; Fakunmoju, S. K. & Giwa, K. O. (2016). Evaluating the granger causality effect of exchange rate on Nigerian balance of payment: A granger causality analysis. *Account and Financial Management Journal*, 1(3), 162-174.

Dalimus, Obumneke & Muhammed, (2018). Effect of nominal exchange rates on Nigeria's balance of payments: 1986-2016. *Benue Journal of Social Sciences, 4*(1), 34 – 52.

Limbore, N. V. & Moore, S. P. (2019). Impact of exchange rates on balance of payment of India. *Review of Research, 8*(7), 1-5.

Umer, M., Muhammad, D. S., Abro, A. A., Sheikh, A. Q., & Ghazali, A. (2010). The balance of payments as a monetary phenomenon: Econometric evidence from Pakistan. *International Research Journal of Finance and Economics*, 38, 210-218.

Mannur, G. (2012). *International economics* (2nd Revised Edition ed.): India: Vikas publishing House Pvt Ltd.