

## THE IMPACT OF EXCHANGE RATE ON BALANCE OF PAYMENTS

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<https://doi.org/10.37602/IJSSMR.2023.6602>

### ABSTRACT

The purpose of this study is to look at the relationship between the exchange rate and the balance of payments. The article is divided into five chapters: chapter 1 offers a fundamental overview of the subject, chapter 2 gives a summary of the pertinent literature, and chapter 3 describes the technique in more detail. The ordinary least square regression (ols) technique will be used to assess the R-squared test (explanatory power of the variables), the economic apriori criteria, and the D.W test, which is the econometric criterion for testing for the presence of an auto-regressive scheme. The result the impacts of the exchange rate on the nation's balance of payment can be described to be weak and negative ( $\beta = -0.0518$   $p = 0.041$ , where  $p < 0.05$ ). The researcher hereby rejects the null hypothesis to accept the alternate hypothesis which states that there is a weak negative relationship between exchange rate and balance of payment in Nigeria.

**Keywords:** Exchange rate, Balance of Payments,

### 1.0 INTRODUCTION

Foreign exchange, according to Nzotta (2004), is the worth of a foreign country's currency in terms of the currency of the home country. The exchange rates, sometimes referred to as the foreign exchange rate or forex rate in the world of finance, indicate how much one currency is worth in relation to another. Devaluation lowers a currency's worth relative to other currencies when there is a fixed exchange rate. Therefore, the goal of this study is to ascertain how the depreciation of one currency in relation to another country's currency affects the record of all financial transactions between two countries over time, whether they are visible or not. This is crucial because no country, no matter how independent or self-sufficient, can live on its own; instead, every country needs to have relationships with other countries that involve the exchange of commodities, services, and money. Gains and losses may have been recorded when accessing the involved nation. As a result, a country's balance of payments and foreign exchange can influence how quickly or slowly its economy grows. Given that it primarily concerns economic interactions, this will also have an impact on the citizens, either positively or negatively. Due to its very poor foreign exchange rating in compared to other nations and its balance of payments, which is blatantly out of balance and in deficit, our nation Nigeria is currently experiencing major issues. As a result, the government is regressing, and it is obvious that the population are suffering. This study is important because it aims to determine why this is the case and how it might be resolved.

The main determinants of a nation's well-being are foreign exchange and the balance of payments. They should be taken into consideration when comparing a country's connections

with other countries. Numerous other aspects that are extremely important in any country are affected by these factors either directly or indirectly. As a result, these elements might be viewed as crucial to the expansion and advancement of the country. The Nigerian economy is currently devastated by these two issues, and its residents' lives have become miserable. These elements have pushed the nation to a point where progress and growth seem to be illusions. Due to the nation's currency's negative competitiveness with other foreign currencies, the country's exchange rate has fallen to an all-time low.

We have been experiencing a balance of payment deficit as a result of our economy's attempts to address the issue of external and internal balance. The devaluation of the Nigerian naira, the country's currency, has also caused a great deal of criticism. According to relevant literature and opinion on the subject, exchange rate policy is crucial for maintaining both internal and external balance. On the other hand, some authors have argued that devaluation is not the best course of action for less developed nations due to a variety of results. Despite all the effort of the Government and CBN to control foreign exchange payment to improve the balance of payment it is not positive. This study specifically analyzed foreign exchange movements and the balance of payments, and how exchange rates affect the Nigerian Balance of Payments

## **2.0 LITERATURE**

### **2.1 Foreign Exchange Rates**

As mentioned, Nzotta (2004) defines foreign exchange rates as the price of one currency relative to another. The foreign exchange rate is the rate at which one currency is transformed into another. An arbitrage is a strategy used in economics and finance to make money off the price difference between two or more markets by negotiating a series of agreements that are complimentary and profit from the imbalance. Arbitrage is another term for the practise by which traders purchase foreign currency at a discount in one market and sell it at a premium in another. According to Fidelis (2009), a currency is said to have appreciated when it costs more in terms of another currency; on the other side, a currency is said to have depreciated when more domestic currency is needed to buy another.

Depreciation is also thought to refer to a decline in a currency's worth. Yakubu (2007) claims that appreciation and depreciation represent a system in which supply and demand in the market influence exchange rates. It frequently goes hand in hand with a system of freely fluctuating currency rates. However, according on their evaluations of the macroeconomic condition in the country, the monetary authorities could decide on an exchange rate decree or executive apartments. When the publicly stated exchange rate is changed such that one unit of a country's currency suddenly buys less in terms of foreign currency, this is known as devaluation. On the other hand, we refer to a revaluation when the monetary authorities modify the exchange rate to enable the local currency to purchase more units of foreign currency. Devaluation and revaluation, respectively, are the official responses of the government to an overvalued and an undervalued currency of a nation. When the exchange rate departs from the equilibrium exchange rate, overvaluation takes place. The exchange rate is now more expensive when compared to other currencies. A currency's value declines in relation to other currencies during a devaluation, whereas an undervaluation is the opposite of an overvaluation.

### **2.2 Factors Affecting Rates of Exchange**

Paul (1996) and Jinghan (1997) both concurred that fluctuations in currency rates are the result of variables that affect supply and demand on the foreign exchange market. According to Jinghan (1997), changes in the relative price levels are what affect the exchange rate. Both Paul (1996) and Jinghan (1997) agreed that factors affecting supply and demand on the foreign exchange market are to blame for changes in currency rates. Changes in the relative price levels are what influence the exchange rate, claims Jinghan (1997). When imports exceed exports, there is an increase in the demand for foreign exchange, which causes the foreign exchange rate to rise while the domestic exchange rate falls. Conversely, when exports exceed imports, there is a decrease in the demand for foreign exchange, which causes the domestic exchange rate to rise while the foreign exchange rate falls. According to him, both short- and long-term capital movements have an impact on currency rates. The value of the currency of the country importing the capital tends to increase, while the value of the currency of the country exporting the capital tends to decrease. The currency will fluctuate in favor of the nation importing capital and against the nation exporting capital. Given the supply curve of foreign exchange, the demand for the currency of the capital-importing country will increase, its demand curve will move upward and to the right, and the exchange rate will be set at a higher level. He claims that trading in foreign securities such as stocks, bonds, and shares has a significant impact on the exchange rate. The demand for domestic currency will increase on the part of the foreigners and the exchange rate will also tend to increase if the stock market aids in the sale of securities to foreigners, such as debentures, shares, and other types of securities. The situation for foreigners buying securities, debentures, shares, etc. through domestic stock exchanges will be the exact opposite. He claims that structural changes are yet another major aspect that affects a nation's exchange rate. The consumer demand for commodities fluctuates as a result of structural changes. They include technical advancements and other changes that have an impact on both the structure of costs and consumer demand. The demand for domestic goods usually increases as a result of these structural changes. It suggests an increase in exports, more local currency demand, an increase in value, and a rise in the exchange rate

### **2.3 Exchange Rate Policy in Nigeria**

The main goals of exchange rate policy are a growth in production and its optimum distribution, which are also those of economic policy. This might be referred to as the ultimate goals. The proximal objectives are those that can be more immediately impacted by exchange rate policy, such as achieving internal and external balance and improving resource allocation efficiency. External balance does not necessitate constant current account balance. In fact, intentionally off-balancing the account to allow for capital inflow may be desirable and practical. Therefore, achieving external balance also means achieving a sustainable current account deficit, which is a current account deficit supported in the short- to medium-term by an appropriate inflow of capital. The condition is required since running a current account deficit over the long term is neither desirable nor practical.

Internal balance denotes the accomplishment of strong employment levels in line with a manageable inflation rate. Here, it is important to carefully consider the trade-off between inflation and employment levels since sustained high demand pressure may enhance employment but at the expense of a higher rate of inflation. Resource allocation efficiency indicates that resources go to places where their influence on real production will be highest.

## 2.4 Balance of Payment

The most current and effective theory for determining the exchange rate is the balance of payments theory. The demand and supply theory of currency rates is another name for it. This theory holds that the balance of payments, namely the market's supply and demand for foreign currency, determines the exchange rate on the foreign market. Here, the term "balance of payments" refers to the market balance; if demand for a nation's currency declines at a specific rate of exchange, we can talk about a deficit and that nation's balance of payments. Similar to this, a country's balance of payments can be said to be in excess if demand for its currency increases at a specific rate of exchange.

A negative payment balance causes the country's currency's value to decline or depreciate. The value of the nation's currency increases or appreciates when the balance of payments is in excess. The demand and supply of foreign exchange generate a rate of exchange that automatically clears the markets so that no actual or export payments deficit or surplus can develop, according to Eusworth (1999). According to Walter, the state of a country's balance of payments tends to determine the value of its currency in relation to the currencies of other countries if the exchange rate is allowed to completely adjust to changing supply and demand conditions. The balance of payments and the supply and demand for foreign currency are closely related. According to Walter, the state of a country's balance of payments tends to determine the value of its currency in relation to the currencies of other countries if the exchange rate is allowed to completely adjust to changing supply and demand conditions. The balance of payments and the supply and demand for foreign currency are closely related.

A record of international payments made as a result of different international activities, such as imports, exports, investments, and other (commercial, financial, and speculative transactions), is known as a balance of payments. All payments made by foreigners to nationals as well as payments made by citizens to foreigners are included in the balance of payments. Outgoing payments are debits, and incoming payments are credits. The supply of foreign exchange was made by the exporting nation and was represented by the credit in the balance of payments of the exported goods.

The demand for foreign exchange, on the other hand, comes from the importing nation and is represented by the debits in the balance of payments or the imported goods. Any balance of payments deficit or surplus alters the supply and demand for foreign currency, which in turn creates volatility in the exchange rate. When there is a balance of payments deficit, the debit (or demand for foreign currency) will be greater than the credits (or demand for foreign currency). When debits (or the demand for foreign exchange) outpace credits (or the rate of exchange), the exchange value of domestic currency will increase, which will cause the rate of exchange to decline and the external value of domestic currency to increase.

Balance of payments, according to Otaki (2005), is a systematic record of all economic transactions between one country and the rest of the globe during a given period, both visible and invisible. It depicts the link between a nation's total outgoing payments to all other nations and its total inward receipts. Therefore, an account of payments, receipts, and international transactions is known as a bop. There are three types of international account payments and receipts;

## **(a) The visible balance of trade (b) The invisible items and (c) Capital transfers.**

In the words of Benhan, "Balance of payments of country is record of the monetary transactions over a period with the rest of the world." Kindle Berger defines balance of payments as "a systematic record of all economic transactions between the residents of the reporting country and the residents of foreign countries during a given period of "time." It is a statistical record of the nature and scope of the nation's economic interactions with the rest of the globe, according to Benjamin (2007).

## **2.5 Components of Balance of Payment**

According to Hayashi (1982), the current account, capital account, and official settlements account make up the balance of payments.

## **2.6 Features of Balance of Payment**

The concept of double-entry bookkeeping governs a nation's balance of payments account. These transactions are recorded on the balance sheet's debit and credit sides, although balance of payments accounting is distinct from business accounting in one way. In accounting for businesses, the balance sheet's left side displays debits, while the right side displays credits. However, in balance payment accounting, it is customary to present credits on the left side and debits on the right. A credit transaction occurs when money is received from a foreign nation. Exporters of goods and services, unrequited (or transfer receipts in the form of gifts or other forms of borrowing from foreigners), foreign investments in the nation, and the official sale of reserve assets, including gold, to foreign nations and international organizations are the main items that appear on the credit side. Imports of products and services, payments made to overseas lenders, investments made by residents in foreign nations, and international organizations are the main items on the negative side. In accordance with the debit entry bookkeeping principle, these credit and debit items are displayed vertically in the balance of payments account of a nation. The current account, the capital account, and the official settlement account, sometimes known as the official reserve assets account, are the three divisions made horizontally. According to Anyanwu (1993), transactions include gifts and grants in addition to buying, selling, borrowing, investing, and dis-investing. They also include income from investments and the repatriation of profit and difference. According to Barwa (2004), all transactions that result in an inflow of payments are regarded as credit plus entries, while transactions that result in an outflow of payments are seen as debit or minus entries. The following characteristics of Bop include: It is a comprehensive record of all economic interactions between one nation and the rest of the world. It is often an annual statement that includes all visible and unseen transactions that occurred over a given period of time. It uses a double entry technique for bookkeeping. Credit side and debit side are its two sides. Payments are recorded on the debit side, and receipts are recorded on the credit side. When a receipt equals a payment, the balance of payments is in equilibrium. This occurs when receipts are recorded on the debt side in the accenting sense and payments are recorded on the red side.

## **3.0 THEORETICAL REVIEW**

### **3.1 Monetary Model:**

Nzotta (2004) asserts that this model guarantees that changes in the money supply have an impact on the exchange rate, either positively or negatively. The model seeks to explain variations in exchange rates in terms of shifts in the supply and demand of money for two different currencies. (1991 Olisadebe) In theory, a rise in real income combined with a stable nominal money supply causes prices to decline and the exchange rate to appreciate. On the other hand, a rise in money demand causes prices to rise, which ultimately results in a decline in the value of the currency. The quantity theory of money is a major source of inspiration for the monetary model. The link between the money stock and the various price levels is expressed by Fisher's model. There is a presumption that changes in the actual velocity of money circulation are influenced by monetary expansion, real output growth, and inflation rates. In addition to stating that the rate of output growth was considered to have an impact on the development of actual velocity and, eventually, on the rate of inflation, Obaseki (1990) agreed with the points made above. Changes in exchange occur as the rate of inflation increases. The model takes a naive approach to understanding exchange rate movements. Differences in yields and interest rates typically have an impact on how exchange rates are calculated.

### 3.2 Keynesian Theory

It should be noted right away that this theory is referred to as the Keynesian theory not because it was created by Lord Keynes, but rather because it employs the method (marco analysis) that Keynes primarily used in his General Theory and other publications. It does not, as did the traditional economists, explain the disequilibrium in the balance of payments in terms of disparities in relative costs and prices, but rather in terms of relative changes in incomes in various nations. Of fact, Keynes was not the first to use the incomes method. JJacob Viner claims: The idea of using an income-based approach to international commerce is not wholly new. Changes in relative needs or movements in purchasing power have been mentioned sporadically by writers on international commerce for more than a century. (Jacob, 1937). In contrast to the Keynesian income effect, Haberler claims that "income effects have been considered by some of the early classical writers." The income effect was only taken into account by classical economics when it came to changes in the magnitude of national incomes (and subsequently global income) as a result of changes in exports, imports, domestic consumption, and domestic investment.

This theory states that a nation will have a balance of payments deficit if its revenue is rising faster than the pace at which it is rising in other nations with whom it has trading links. Income has an impact on imports. As a result, the growth in imports will be greater in the nation whose income is growing relatively quicker, which will cause an imbalance in its balance of payments. The theory's basic premise, as indicated above, is that every country has an identical marginal tendency to import. If all nations have a marginal inclination to import, a specific country's relative income growth may not bring its balance of payments into equilibrium. A gain in nation A's income higher than a rise in country B's income may not result in a deficit in A's balance of payments with B, for example, if the marginal propensity to import is sufficiently lower in country A than in country B. Similar to this, even though the rate of income growth is the same in both nations, disequilibrium might develop due to a difference in the marginal inclination to import.

### 3.3 Empirical Review

Numerous studies on the performance of the external sector and the consequences of exchange rate depreciation have been done by economists. Using Jamaica as a case study, Gafar (1980) investigated the effects of devaluation on the re-balancing of payments. Using the elasticity approach and the Marshall-Lerner criteria for exchange rate stability, he assessed whether devaluation is an appropriate policy instrument for balance of payments adjustment. He determined the import and export revenues and price elasticity for Jamaica, including tourism. The Marshall-Lerner criterion was shown to be met in both situations when tourism was first excluded from the model and then included. Devaluation is a useful policy instrument to resolve balance of payment imbalances, but when used alone without additional monetary and fiscal policies, it may have unexpected repercussions. This was his conclusion. It is significant to note that, despite their close relationship to the income variable, foreign exchange reserves are not included in any of the two estimated models. Ajakaiye (1985) also used the elasticity technique to investigate the impact of different combinations of import structures and rising short runs. After looking at various import structure limits under various sets of price elasticity of demand for exports and imports in Nigeria, he came to the conclusion that devaluation might not be successful if the elasticity is such that the suitable import structure does not hold. Along with devaluation, there should be a certain form of import restructuring. However, devaluation may be effective if the real import structure fails within the parameters where the difference between the price elasticity of demand for competitive imports and exports is greater than zero. If the price elasticity of demand for non-competitive imports exceeds one when weighted by the proportion of non-competitive imports in the total, import structure must be continuously monitored to prevent it from out of control, especially if elasticity are unstable. When the actual import structure is outside the range where exports and non-competitive imports are completely insensitive to price changes, where exports and competitive imports are insensitive to price changes, where the price elasticity of demand for imports is zero, and where the competitive imports have a zero price elasticity of demand, devaluation policies should be pursued in conjunction with trade liberalisation policies. In his article titled "Devaluation and the Nigerian Economy: Some Observations" from 1985, Oluremi explored the probable effects of devaluation and based part of his model on Marshall-Lerner's condition. He came to the conclusion that depreciating the naira would not be supported by Nigeria's present political structure. According to him, devaluation is only successful as a last resort when all other measures have failed and when it is used only to achieve the targeted aim. Devaluation was examined from both a theoretical and an empirical angle by Olutim et al. (1986). Theoretically, they argued that none of the approaches—the absorption approach, the monetary approach, the perspective of relative prices (elasticity) approach, or the monetary approach—gave a clear indication of the circumstances in which a developing deficit country struggling with internal adjustment might benefit from devaluation

## 4.0 METHODS

### 4.1 Model Specification

In her explanation of model specification, which displays the mathematical and economic link between the dependent and independent variables, Koutsoyaniss (1997) emphasised the significance of expressing the relationship under study in a mathematical manner. Exchange rate, openness, and foreign direct investment are utilised as the independent variables (exogenous) in the study, while the balance of payments is used as the dependent variable

(endogenous). A formula called Bop=+ (EXR, OPN, FDI) is used to determine the effect of exchange rate depreciation on the balance of payments in Nigeria. The model mentioned looks like this.

$$\text{Bop} = b_0 + b_1 \text{EXR} + b_2 \text{OPN} + b_3 \text{FDI} + U_t$$

Where BOP=Balance of payment (dependent variable)

EXR=Exchange rate

OPN=openness of the economy

FDI =foreign direct investment

U =stochastic error term

b0.....b3 = regression coefficients of the parameter estimate.

## 4.2 Techniques for Estimation and Data Analysis

In our model, the coefficient of the parameter used to indicate the link between the dependent variable and independent variable is estimated using the (OLs) ordinary least square method. The statistical validity of the estimated results will be assessed using the adjusted R2, t-values, D.W., and F ratio.

## 5.0 RESULT

**Table 5.1: Descriptive Statistics of the Study Variables**

Variable	Observation	Mean	Std. dev.	Min	Max
Year	20	2011.5	5.91608	2002	2021
Log_BOP	20	6.012	8.231752	-10.2	10.56
Exchange Rate	20	195.987	89.46983	116.91	399.36
Economic Openness	20	0.345	0.0986488	0.16	0.53
Foreign Investment	20	9.5705	0.2782742	8.89	9.95

**Source:** STATA Output

Table 5.1 show the descriptive statistics of the study variable, the mean, standard deviation, the minimum and maximum value of each study variable are presented accordingly. The scope of the secondary data collected included the year, balance of payment, exchange rate, economic openness and foreign investment of Nigerian economy for a span of twenty years (2002 to 2021) and all data were sourced from the CBN website.



5.1 Answers to Research Questions

Table 5.2: ANOVA Table

Number of Observation	20
F (3, 16)	5.14
Prob > F	0.0111
R-Squared	0.4910
Adj R - Squared	0.3956
Root MSE	6.3998

Source: STATA Output

Table 5.2 present the ANOVA statistics of the OLS regression. The overall model fit well as F – statistics,  $F(3, 16) = 5.14$ , and  $p = 0.0111$ , where  $p < 0.05$ . Also, the overall coefficient of determination denoted by R – square is 0.4910 and the overall coefficient of correlation between the independent variable and the dependent variable is 0.70. This implies that there exists a statistical relationship between the combined independent variables and the dependent variable and the model used for fit for the OLS regression.

Table 5.3: Ordinary Least Square Regression of the Study Variable

Balance of Payment	Coefficient	Std_Error	t	P >  t	95% Confidence Interval	
					Lower	Upper
Exchange Rate	-0.0518845	0.0233922	-2.22	0.041	-0.1014738	-0.0022952
Economic Openness	19.44605	19.92	0.98	0.343	-22.78247	61.67457
Foreign Investment	-2.639734	6.035516	-0.44	0.668	-15.43446	10.15499
_Constant	34.73537	59.83725	0.58	0.570	-92.11393	161.5847

Source: STATA Output

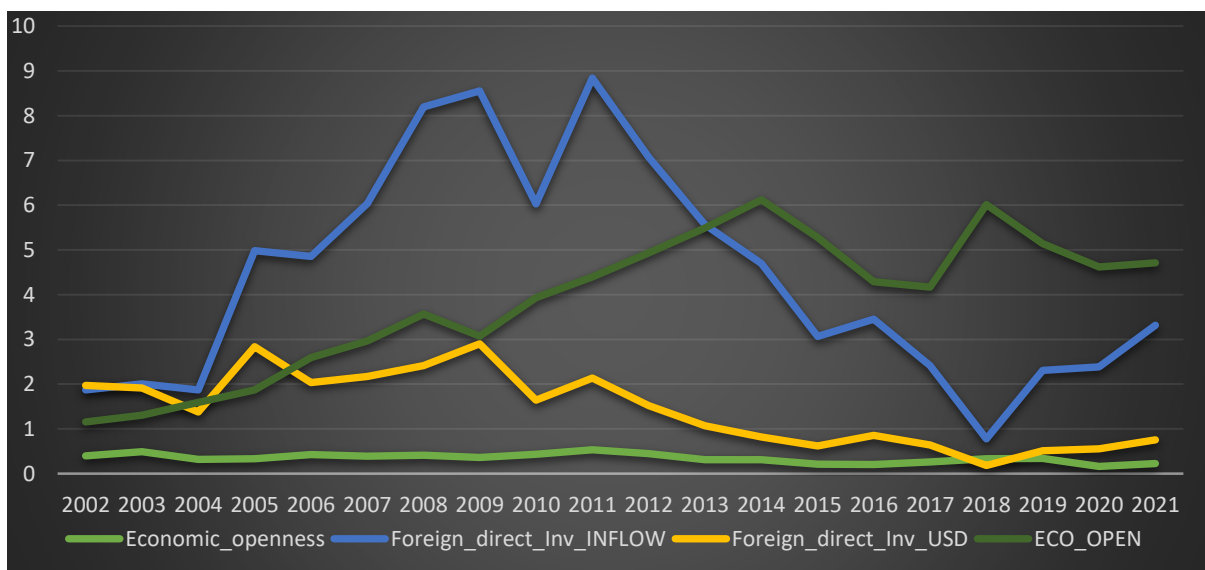
The OLS result presented on Table 5.3 shows that exchange rate has a negative relationship with Nigeria balance of payment between the year 2002-2021. This is evident as  $p = 0.041$ , where  $p < 0.05$  and this result implies that an increase in exchange rate will account for a decrease in the nation’s balance of payment. The extent of this relationship was found to be small, as  $\beta = -0.0518$ , which implies that a unit increase in exchange rate will yield a 5.18% decrease in the nation’s balance of payment all things being equal. It is important to note that economic openness and foreign investment do not have any significant impact on balance of payment because their p-value is greater than alpha value ( $p > 0.05$ ).

5.2 Test of Hypothesis One

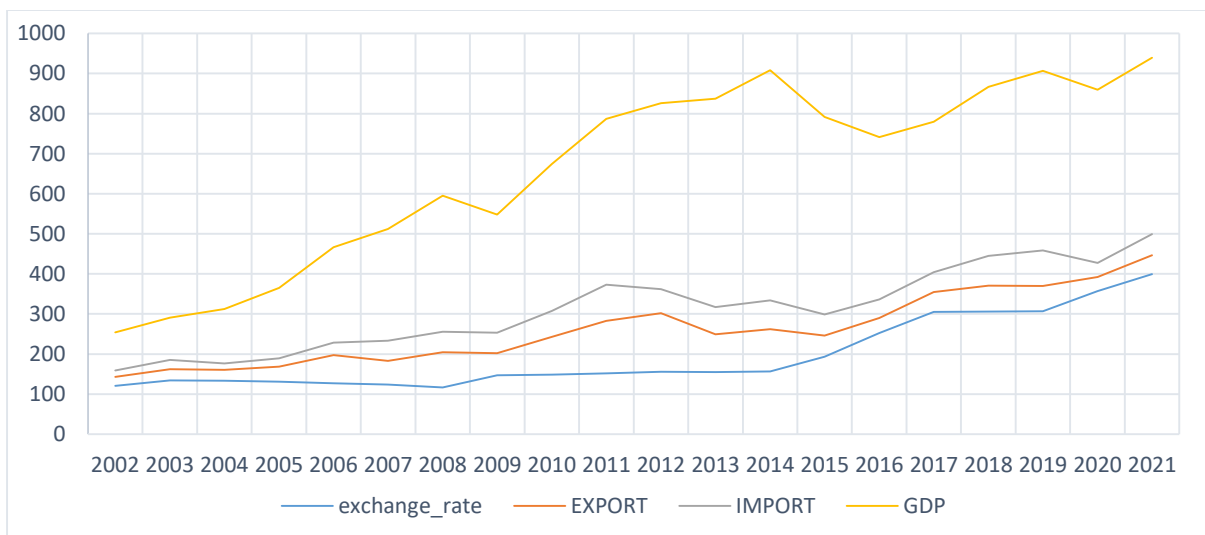
**H0:** There is no significant relationship between exchange rate and balance of payment (BOP) in Nigeria.

Based the result presented on Table 4.3 where the impacts of exchange rate on nation’s balance of payment can be describe to be weak and negative ( $\beta = -0.0518$   $p = 0.041$ , where  $p < 0.05$ ). The researcher hereby rejects the null hypothesis to accept the alternate hypothesis which state that there is weak negative relationship between exchange rate and balance of payment in Nigeria.

**Figure 1: Graph showing economic openness, foreign direct investment inflow and foreign direct investment USD**



**Figure 2: Graph showing exchange rate, import, export and GDP**



**5.3 Economic Apriori Criteria:**

The purpose of the test is to ascertain if the results' signs and magnitudes are consistent with the assumptions made by economic theory. Since a rise in any of the explanatory factors causes a drop in the dependent variable, economic theory teaches us that the coefficients are positively

connected to the dependent variable. The table below provides a summary of the variable being considered and the parameter exhibition of apriori indications.

**Table 5.4: Economic Apriori Criteria and Remark**

Variables	Expected signs	Estimate	Remark
Exchange Rate	+	$\beta \triangleright 0$	Does not conform
Economic Openness	+	$\beta \triangleright 0$	conform
Foreign Investment	+	$\beta \triangleright 0$	Does not conform

From the above table, it is observed that only Economic Openness actually conforms to the economic theories. Exchange Rate and Foreign Direct Investment does not conform to the priori criteria because an increased or high Exchange Rate and Foreign Direct Investment over the years will increase Inflation in the economy.

## 5.4 Statistical Criteria {First order test}

### 5.4.1 Coefficient of Determination {R2 }:

The R2 {R-Squared} which measures the overall goodness of fit of the entire regression, shows the value as  $0.4910 = 49.1\%$  approximately 49%. This indicates that the independent variables accounts for about 49% of the variation in the dependent variable.

## 5.5 Econometrics Criteria.

### 5.5.1 Test for Autocorrelation:

The succession values of the random variables are momentarily independent, which is one of the fundamental premises of the ordinary least regression. This indicates that a mistake t is not linked with one or more earlier errors  $U_{t-1}$  in the context of the series analysis. Durbin-Watson (DW) statistics are typically used to identify the issue.

**Table 5.5: Test for Autocorrelation**

```

- tset Year
Time variable: Year, 2002 to 2021
Delta: 1 unit

- reg residual 1.residual 12.residual 13.residual

```

Source	SS	df	MS	Number of obs	=	17
Model	300.189956	3	100.063319	F(3, 13)	=	3.88
Residual	334.94689	13	25.7651454	Prob > F	=	0.0349
				R-squared	=	0.4726
				Adj R-squared	=	0.3509
Total	635.136846	16	39.6960529	Root MSE	=	5.0759

residual	Coefficient	Std. err.	t	P> t	[95% conf. interval]
residual					
L1.	-.3127741	.237469	-1.32	0.211	-.8257947 .2002464
L2.	-.4602841	.2065383	-2.23	0.044	-.906483 -.0140853
L3.	-.7556392	.2702828	-2.80	0.015	-1.33955 -.1717288
_cons	1.58252	1.29636	1.22	0.244	-1.218096 4.383137

Since  $P > |t| = 0.244$  then we reject the null hypothesis of no correlation and accept that there is positive autocorrelation of first order.

**5.5.2 Normality Test for Residual:**

The Jarque-Bera test for normality is an asymptotic, or large-sample, test. It is also based on the ordinary least square residuals. This test first computes the skewness and kurtosis measures of the ordinary least square residuals and uses the chi-square distribution {Gujarati, 2004}.

The hypothesis is:

$H_0 : X_1 = 0$  normally distributed.

$H_1 : X_1 \neq 0$  not normally distributed.

At 5% significance level with 2 degree of freedom.

**Table 5.6: Normal Test for residual**

```
. predict residual, resid
. sktest residual
```

Skewness and kurtosis tests for normality

Variable	Obs	Pr(skewness)	Pr(kurtosis)	Joint test	
				Adj chi2(2)	Prob>chi2
residual	20	0.3695	0.2061	2.72	0.2571

From the result shown above the Pr (skewness) is 0.3695 and Pr (kurtosis) is 0.2661. Since prob> chi2 is 0.2571 at 5% level of significance, we reject the null hypothesis and conclude that the error term does not follow a normal distribution.

**5.5.3 Test for Heteroscedasticity:**

Heteroscedasticity has never been a reason to throw out an otherwise good model, but it should not be ignored either {Mankiw Na, 1990}. This test is carried out using White’s general heteroscedasticity test {with cross terms}. The test asymptotically follows a chi-square distribution with degree of freedom equal to the number of regressors {excluding the constant term}. The auxiliary model can be stated thus:

$$U_t = \beta_0 + \beta_1OPN + \beta_2EXR + \beta_3FDI + \beta_4OPN^2 + \beta_5EXR^2 + \beta_6FDI^2 + \beta_7OPN*EXR + \beta_8FDI*OPN + \beta_9EXR*FDI + V_i$$

Where  $V_i$  = pure white noise error.

This model is run and an auxiliary R2 form, it is obtained.

The hypothesis to the test is stated thus;

H0:  $\beta_i = 0$  {Homoscedasticity} (i=1., 2,...,9)

H1:  $\beta_i \neq 0$  {Heteroscedasticity} (i=1,2,...,9)

Note: the sample size {n} multiplies by the R2 obtained from the auxiliary regression asymptotically follows the chi-square distribution with degree of freedom equal to the number of regressors {excluding constant term} in the auxiliary regression.

**Table 5.7: Test for heteroscedasticity**

```
. hettest
Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of Log_BOP

H0: Constant variance

      chi2(1) =    5.86
Prob > chi2 = 0.0155
```

From the table Prob>chi2 = 0.0155 we therefore accept the alternative hypothesis of heteroscedasticity showing that the error terms do not have a constant variance and reject the null hypothesis showing that the error terms have a constant variance.

**5.5.4 Test for Multicollinearity**

The term Multicollinearity is due to Ragnar Frisch. Originally it meant the existence of a “perfect” or exact, linear relationship among some or all explanatory variables of a regression model. The tests were carried out using correlation matrix. According to Barry and Feldman {1985} criteria; “Multicollinearity is not a problem if no correlation exceeds 0.80”.

**Table 5.8: Correlation Matrix**

```
. pwcorr Log_BOP exchange_rate Economic_Openness foreign_IV, star(0.05) sig
```

	Log_BOP	exchange_rate	Economic_Openness	foreign_IV
Log_BOP	1.0000			
exchange_rate	-0.6754*	1.0000		
	0.0011			
Economic_Openness	0.5748*	-0.6630*	1.0000	
	0.0080	0.0014		
foreign_IV	0.2669	-0.4826*	0.3603	1.0000
	0.2553	0.0312	0.1186	

From the above table, none of the variables exceeds 0.80; that is, between EXR and OPN; between FDI and OPN; and between FDI and EXR.

## 6.0 CONCLUSION AND RECOMMENDATION

We accept the premise that there is no significant association between exchange rate and balance of payments (BOP) in Nigeria after seeing that exchange rate is statistically insignificant but positively affects balance of payments. The results show the descriptive statistics of the study variable, the mean, standard deviation, and the minimum and maximum value of each study variable are presented accordingly for a span of twenty years (2002 to 2021). Table 4.2 present the ANOVA statistics of the OLS regression. The overall model fit well as F Statistics,  $F(3,16)=5.14$ , and  $p=0.0111$ , where  $p<0.05$ . Also, the overall coefficient of determination denoted by R-square is 0.4910 and the overall coefficient of correlation between the independent variable and the dependent variable is 0.70. Based the result presented on Table 4.3 where the impacts of exchange rate on nation's balance of payment can be describe to be weak and negative ( $\beta=-0.0518$   $p=0.041$ , where  $p<0.05$ ). The R2 {R-Squared} which measures the overall goodness off it of the entire regression, shows the value as  $0.4910= 49.1\%$  approximately 49%. This indicates that the independent variables accounts for about 49% of the variation in the dependent variable. We accept the premise that there is no significant association between exchange rate and balance of payments (BOP) in Nigeria after seeing that exchange rate is statistically insignificant but positively affects balance of payments.

Hence the study recommended that any specific government must consider how well its exchange rate strategy would raise the standard of life of its people as a key problem. Considering the existing facts, we believe that Nigeria need to impose restrictions on openness since it harms the Bop. They shouldn't be too easy to import, particularly into developed nations. Import taxes, quotas, etc. can be used to impose the limitation. A stable economy is one of the elements that draw foreign direct investment. Investors will be hesitant to make investments if the economy is unstable. In order to ensure that the economy is politically and socially stable, the government should do so. It fosters an atmosphere that encourages investment, which enhances the balance of payments. As a result, additional economic development policies that aim to diversify Nigeria's economic foundation should be pursued in order to strengthen the country's economic independence and promote the expansion of homegrown businesses, industries, and investment. The exchange rate between Nigeria and other nations would increase as a result of this.

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