

Impact of Foreign Exchange Rate on Balance of Trade in Nigeria

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ABSTRACT

The paper examined the impact of foreign exchange rate on balance of trade in Nigeria using annual time series data, from 1980 to 2020. The data were sourced from World Development Indicators (WDI) 2022, while ARDL technique was employed for data analysis. The balance of trade was the dependent variable, whereas real exchange rate, GDP growth rate and real money supply were used as independent variables. The study found that there is long-run relationship among all variables. In the long-run, real exchange rate has significant positive relationship with balance of trade while real money supply has negative significant impact on balance of trade. However, GDP growth rate has positive and insignificant impact. Therefore, the study recommended a stable exchange rate regime which can stimulate exports and restrict imports in order to solve the problem of deficits in the balance of trade. Also the study recommended a proper management of money supply in the country because too much money in circulation contributes to inflation while persistent inflation leads to devaluation of domestic currency.

KEYWORDS:

exchange rate
fluctuation, devaluation
of currency, exchange
rate, money supply,
balance of trade.

Introduction

One of the conventional concerns in International Economics is the impact of exchange rate fluctuations on the foreign sector of the economy. Fluctuations in exchange rate can affect foreign trade in a number of ways. They may increase the costs, the price and the uncertainties of trade, inducing foreign economic agents to directly reduce their international transactions. More indirectly, they may induce producers and traders to alter the structure of their output and investment, in order to reduce their exposure to risk. This in turn can have implications over the long-run for trade flows (International Monetary Fund (IMF), 1984).

Since the introduction of the SAP in 1986, the economic situation in Nigeria has mostly been characterized by exchange rate fluctuations and deficit in the balance of trade. As Friedman and Schwartz (1982) argued exchange rate fluctuation is a monetary phenomenon and symptom of instability in the balance of trade. The achievement of stable exchange rate and favorable balance of trade has been the focus of Central Bank of Nigeria (CBN) through manipulation of money supply

in the country. As such, the government of Nigeria adopted monetary policy reforms and exchange rate adjustments policies to tackle the exchange rate fluctuations coupled with deficit balance of trade. Some of the various monetary policy reforms introduced include, deregulation of interest rate, the establishment of market based foreign exchange system and restrictive monetary policy. The exchange rate adjustments policies, on the other hand, include Second-tier Foreign Exchange Market (SFEM), Dutch Action System (DAS), and the Wholesale Dutch Action System (WDAS). In essence, these reforms and policies failed to restore stability in exchange rate and maintain surplus balance of trade in Nigeria. Nevertheless, the exchange rate has continuously been fluctuating in the country, all of which has been negatively affecting the country's trade and the economy in general.

Besides, Aliyu (2008) argued that exchange rate fluctuations have much significant impacts on the trends of trades of Nigeria and different policies have been put in place over the years to stabilize exchange rate so as to mitigate the adverse impact on the balance of trade and balance of payment. Nevertheless, the desired result of stabilizing the the sector and the economy have not been achieved. The period of study is chosen because it covers a mix of policy application involving regulated and deregulated periods. In view of the foregoing, the study is therefore set to examine the impact of foreign exchange rate fluctuations on the balance of trade in Nigeria from 1980 to 2020. In so doing, the paper is structured in five sections. Following this introduction is the literature review. Next is section three which is data sources and methods. Section four is the results and discussion of findings, and section five is conclusions and recommendations.

Theoretical Framework

The study adopts three theories which are considered relevant and also important in our analysis. These theories include; Monetary Approach to the balance of trade, the Elasticity Approach (Bickerdike, Robinson and Metzler (B-R-M) Condition), and the Absorption Approach. The empirical model adapted is also derived from these theories. The Monetary approach to balance of trade argued that any discrepancy in the balance of trade is as a result of disequilibrium between demand for and money supply of money in the money market. Britto and McCombie (2009) argued that currency depreciation can only be successful, in the monetary approach, if and only if there is increase in the nominal demand for money relative to the supply, or if the price level rises, or by reducing the real supply of money in relation to the real demand.

Alessandro (2013) was of the view that the monetary approach stresses that the devaluation has only a transitory beneficial impact on the balance of trades provided the monetary authorities do not at the same time engaged in an expansionary open market operation. Boniface (2014) argued that real money supply is reduced by an increase in domestic prices level as result of nominal depreciation of domestic currency. Reduction in real money supply will in turn lead to reduction in spending and ultimately improve the trade balance. To this

end, balance of trade problems may be solved by restoring the balance between money supply and demand.

The second theory adopted is Elasticity Approach: Bickerdike, Robinson and Metzler Condition (B-R-M). According to the B-R-M model, balance of trade is a function of initial volume of trade, and demand and supply elasticities. The B-R-M model showed that depreciation or devaluation has a direct influence on the level of domestic exports and depicts a reduction in level of domestic imports (Boniface, 2014). According to the theory, the elasticity of imports and exports can cause some changes in exchange rates, and exchange rate in turn impacts the balance of trade (Machlup, 1956). The Marshall-Lerner condition states that devaluation will improve the balance of trade whenever the sum of the foreign price elasticity of demand for exports (x^e) and domestic price elasticity of demand for imports (m^e) are greater than unity, in absolute value, I. e. if: $x^e + m^e > 1$ (Anoke, Odo, & Ogbonna, 2016).

According to Meniago and Eita (2017), the theory is made up of the Marshall-Lerner condition and the J-curve. The Marshall-Lerner condition entails that the depreciation (devaluation) of a nation's currency has a significant influence on the improvement of balance of trade. A depreciation/devaluation of a currency will enhance domestic commodities to be cheaper while the foreign commodities to be more costly in the international market, thus improve the trade balance. While J-curve theory which advocates the existence of a lag period before both the total volume of exports and imports could lead to some changes which may arise from movements in exchange rates. As for this theory, economists established the hypothesis that in the short-run, following a devaluation of a nation's currency, the balance of trade will deteriorate but as time goes on, by the elasticity will improve thereby causing the balance of trade to improve.

The third theory this study adopts is absorption approach. The central argument of the theory is that the balance of trade disequilibrium on current account occurs as the outcome of the discrepancy between decisions to produce and spend, or to save and invest. If production (domestic output) is greater than consumption (domestic spending), surplus in the balance of trade arises otherwise deficit in the balance of trade occurs. A surplus balance of trade reduces the exchange rate, while a deficit balance of trade raises the exchange rate. The theory postulates that devaluation would only have positive impacts on the balance of trade if the propensity to absorb is lower than the rate at which devaluation would induce increases in the national output of goods and services. It therefore advocates the need to achieve deliberate reduction of absorption capacity to accompany currency devaluation.

Review of Empirical Studies

Relationship between the Exchange Rates and Balance of Trade

In Nigeria, Ewubare and Merenini (2019) conducted a research on the relationship between exchange rate fluctuations and foreign trade in Nigeria from 1980 to 2014. The study used Johansen co-integration test and Vector Error Correction Mechanism (VECM). The study found that there is co-integration

among variables. The results showed that exchange rate has positive significant impact on balance of trade (measured by net export) during the periods.

On the other hand, Olumba (2014) examined the impact of exchange rate fluctuations on balance of trade in Nigeria from 1980 to 2008 using ANOVA-f-test. The study found that exchange rate fluctuations (measured by real exchange rate) have negative significant impact on balance of trade (measured by net export) in Nigeria. Also, Ihuoma, Felix, and Frances (2015) examined the impact of exchange rate fluctuations on the balance of trade of Nigeria from 1970 to 2012. The Johansen co-integration test and VECM were adopted for data analysis. The study found that there is co-integration among variables. The results revealed that exchange rate fluctuations (measured by real exchange rate) have a negative significant impact on balance of trade (measured by net export) in Nigeria during the periods. A study by Nwobia, Ogbonnaya-Udo, and Okoye (2020) examined the impact of exchange rate fluctuations on Nigeria's balance of trade from 2000 to 2019. The study adopted OLS and found that exchange rate has negative significant impact on the balance of trade (measured by net trade). In the same vein, Anoke *et al.*, (2016) studied the relationship between exchange rate depreciation and balance of trade in Nigeria for periods from 1986 to 2014. The study employed Johansen co-integration test and VECM. The study found that there is co-integration among variables and that exchange rate depreciation has negative significant impact on balance of trade (net export).

However, Akinwale, Solawon, Adekunle and Obagunwa (2018) assessed the impact of exchange rate fluctuations on balance of trade in Nigeria from 1986 to 2016. The study employed VECM. The study found that there is co-integration among variables and that exchange rate fluctuations (ratio of Naira to Dollar) have no significant impact on balance of trade (measured by net export). In another study by Okonkwo (2019) determined the relationship between exchange rate fluctuations and balance of trade on the Nigerian economy for periods from 1988 to 2018. The study utilized OLS technique. The results showed that exchange rate does not have significant impact on balance of trade (measured by net export).

In the case of Malaysia, Ling, Mun and Mei (2009) studied the nexus between real exchange rate and balance of trade in Malaysia for periods from 1995 to 2006. The study employed Engle-Granger test, VECM, and impulse response analyses for the data analysis. The study found that there is co-integration between variables, no evidence of J-curve hypothesis and that real exchange rate has positive significant impact on balance of trade (ratio of export to import). In another study, Tarawalie and Kpana (2022) assessed the impact of exchange rate fluctuations on trade balance in Sierra Leone using the ARDL model with annual time series data covering the period from 1980 to 2020. The results showed that there is long-run equilibrium relationship and that in the long-run, real effective exchange rate has negative significant impact on trade balance.

In a panel analysis, Meniago and Eita (2017) explored the impact of exchange rate fluctuations on foreign trade of 39 Sub-Sahara African countries from 1995 to 2012. The study adopted fixed effect technique. The study found that exchange

rate fluctuations (measured by nominal exchange rate) have positive significant impact on balance of trade (net export). In a study by Kedir (2017) evaluated the impact of exchange rate devaluation on balance of trade of African countries from 1990 to 2014. Panel co-integration and FMOLS estimation technique were adopted for the data analysis. The study found that there is co-integration among variables and that in the long-run exchange rate devaluation has negative significant relationship with the trade balance.

Relationship between Domestic Product and Balance of Trade

In Nigeria, Ihuoma *et al.* (2015) examined the impact of domestic product on the balance of trade in Nigeria from 1970 to 2012. The Johansen co-integration test and VECM were adopted for the data analysis. The study found that there is co-integration between variables. The VECM revealed that domestic product (measured by GDP) has positive significant relationship with balance of trade (measured by net export). Also, Ewubare and Merenini (2019) conducted a research on relationship between domestic product and balance of trade in Nigeria from 1980 to 2014. The study used Johansen co-integration test with VECM for data analysis. Johansen co-integration test showed that there is co-integration among variables. VECM revealed that domestic product (measured by GDP) has positive significant impact on balance of trade (measured by net export) during the periods. A study by Nwobia *et al.* (2020) examined the impact of domestic product on Nigeria's balance of trade from 2000 to 2019. The study adopted OLS technique for data analysis. The study found that there is positive significant relationship between balance of trade (measured by net trade) and domestic product (measured by GDP).

In the case of Malaysia, Ling *et al.* (2009) studied the nexus between domestic product and balance of trade in Malaysia for periods from 1995 to 2006. The study employed Engle-Granger test, VECM, and impulse response analyses for the data analysis. The study found that there is co-integration between the variables. impulse response showed no evidence of J-curve hypothesis; VECM revealed that domestic product (measured by Malaysia's GDP) has positive significant impact on balance of trade (ratio of export to import). In the case of Zambia, Chulu (2020) assessed the impact of domestic product on balance of trade in Zambia from 1978 to 2019. Engle-Granger Co-integration and VECM were adopted for the data analysis. The Engle-Granger co-integration test revealed that there is co-integration among variables and results of VECM revealed that domestic product (measured by Zambian GDP) has positive significant impact on balance of trade (net export).

However, in the case of Kenya, Boniface (2014) studied the relationship among domestic product, real exchange rate, current account balance and real income in Kenya from 1980 to 2011. The study employed ARDL technique, ARDL bounds test showed that there is long-run equilibrium relationship among variables, and ARDL long-run estimations revealed domestic product (Kenya's GDP) has negative significant impact on current account balance.

Relationship between Money Supply and Balance of Trade

In Nigeria, Yusuf and Sule (2023) evaluated the impact of monetary policy on international trade in Nigeria using Error Correction Mechanism from 1981-2021. Result shows that monetary policy (measured by real money supply) has positive significant impact on the international trade (measured by net trade). Ashamu (2020) examined the impact of monetary policy on foreign trade in Nigeria from 1981 to 2017 using Johansen co-integration test. The study found that monetary policy (measured by money supply) has positive significant impact on the foreign trade (net export).

In Sierra Leone, Tarawalie and Kpana (2022) assessed the impact of money supply on trade balance in Sierra Leone using ARDL model with annual time series data covering the period 1980 to 2020. The ARDL bound test shows that there is long-run equilibrium relationship. The ARDL long-run results indicate that money supply has negative impact on balance of trade. In panel data study, Meniago and Eita (2017) explored the impact of money supply on balance of trade of 39 sub-Sahara African countries from 1995 to 2012. Fixed effect technique was selected by Hausman test. The study found that money supply has no significant impact on foreign trade (net export).

Arising from the review of related literature this study identified some gaps. First, most of the studies stopped at 2014 except Nwobia *et al.* (2020) which covered periods of 2000 to 2019. Secondly, most of the studies employed either Ordinary Least Squared (OLS) or Vector Error Correction Mechanism (VECM) in their analysis. But the research conducted by Ling *et al.* (2009) in Malaysia measured balance of trade by ratio of export to import. Therefore, these gaps identified by the study can be filled by examining the impact of foreign exchange rates on balance of trade in Nigeria from 1980 to 2022 measuring balance of trade as was used by Ling *et al.* (2009) and adopting ARDL Bound technique for the data analysis.

Data Sources and Methods

Types of Data and Sources

The study employed secondary data spanning from 1980 to 2020, which is an annual time series data. The data (on real exchange rate, export and import (balance of trade), GDP growth rate, and money supply) were drawn from World Development Indicators (WDI, 2022), a unit of World Bank. The export and import are measured in US Dollar but money supply is measured in local currency unit, which is Naira. Balance of trade is the dependent variable while real exchange rate is the independent variable. Other control variables are GDP growth rate and real money supply. The study employs ARDL Bound test to analyse the data

Table 1 Variables Measurement

Variable	Measurement	Author(s)	Source of Data
Trade Balance	$\frac{\text{Export}}{\text{import}} \times 100$	Ling <i>et al.</i> , (2009)	WDI, 2022
Real money supply	$\frac{\text{Nominal money supply}}{\text{general price level (inflation rate)}}$	Yusuf & Sule (2023)	WDI, 2022
Domestic product	GDP growth rate	Ling <i>et al.</i> , (2009)	WDI, 2022

Model Specification

To facilitate the analysis of data this study adopted the work of Ling *et al.* (2009) with little modification by incorporating real money supply into the model. However, incorporation of real money supply into the model was done to replace trading partner income, as such the model was found to be suitable for the study. This is because balance of trade is a function of real exchange rate, GDP growth rate and real money supply. Thus specified as follows:

$$BOT_t = f(RER_t, GDP_t, RMS_t)$$

Equation 1 can be expressed into econometric model specified as follows:

$$BOT_t = \beta_0 + \beta_1 RER_t + \beta_2 GDP_t + \beta_3 RMS_t + \mu_t \dots \dots$$

Where:

BOT= Balance of Trade

RER= Real Exchange Rate

GDP= Gross Domestic Products growth rate

RMS= Real Money Supply

t= time series data

Results and Discussion**Unit Root Tests**

Unit root test is the first test in time series analysis and it deals with stationarity of the series. In this study, two popular techniques are employed to test for unit root, namely; ADF and PP. The results are reported in Table 2.

Table 2 Unit Root Tests Results

ADF APPROACH			PP APPROACH		Remark
AT LEVEL					
Variable	Constant	Cons.& trends	Constant	Cons& trends	
BOT	0.0685*	0.0783*	0.0670*	0.0963*	Significant
RER	0.3129	0.8964	0.3125	0.8826	Not sign.
GDP	0.0003***	0.0005***	0.0003***	0.0005***	Significant
RMS	0.19106	0.1043	0.9123	0.1137	Not sign.
AT FIRST DIFFERENCE					
ADF APPROACH			PP APPROACH		Remark
RER	0.0001***	0.0002***	0.0001***	0.0002***	Significant
RMS	0.0000***	0.0000***	0.0000***	0.0000***	Significant

* and *** imply 10% and 1% level of significances respectively.

From the Table 2, at level, balance of trade is significant at 10% and GDP growth rate is significant at 1% using the ADF and PP approaches but real exchange rate (RER) and real money supply (RMS) are not significant. However, at the first difference, the two variables (RER and RMS) are significant at 1% using the two unit root approaches. Therefore, all variables are stationary and the order of integration is the combination of I(0) and I(1). This enables the study to adopt the ARDL technique.

Co-integration (ARDL Bounds Test) and Error Correction Mechanism (ECM)

Secondly, after testing for the stationarity of the series, it is imperative to establish co-integration or long-run equilibrium relationship between variables, if any. To do this, ARDL Bounds Test is employed, and result is shown below in the Table 3.

Table 3 ARDL Bounds Test Results

F-statistic		6.4630	K=3
Critical values			
Significance levels	I(0) lower bounds	I(1) upper bounds	Remark
10%	2.97	3.74	Co-integration
5%	3.38	4.23	Co-integration
1%	4.3	5.23	Co-integration
ECM	-0.5419***		

*** implying 1% level of significance.

From the Table 3, it can be seen that the value of F-statistic (6.4630) is greater than the critical values of both lower bounds I(0) of 4.3 and upper bounds I(1) of 5.23 bounds at 1% level of significance. This signifies that there is long-run equilibrium relationship, otherwise called co-integration, among variables of the study. This result is known as conclusive and implies that only long-run estimations will be reported. K is the number of independent variables included in the model. Furthermore, the speed of adjustment (ECM) is 54% per annum. In case, there is disequilibrium or divergence between foreign trade and its determinants (real exchange rate, domestic product and real money supply) in the short-run, they restore to equilibrium in the long-run at relatively low speed of 54% per annum.

Long-run ARDL Estimations Results

ARDL long-run estimations show the extent to which each explanatory variable influences the explained variable in the long-run since the variables are co-integrated. The Table 4 presents the result of ARDL long-run estimations.

Table 4 ARDL Long-Run Effects Results

Dependent Variable: LBOT				
Variables	Coefficient	Std error	t-statistic	P. value
LRER	0.6597**	0.2613	2.5249	0.0240
LGDP	0.4361	0.3447	1.2652	0.2251
LRMS	-0.8637***	0.2024	-4.2670	0.0007
R-squared	0.5842			
F-statistic	2.3415			
Prob(F-statistic)	0.0699			

*** and ** imply 5% and 1% level of significance respectively.

From Table 4, it can be seen that the coefficients of log real exchange rate and log GDP growth rate depict positive impact while log real money supply depicts negative impact on the balance of trade in Nigeria in the long-run. It can also be seen that log real exchange rate and log real money supply are significant at 5% and 1% levels of significance respectively but the coefficient of log GDP growth rate was not significant during this study in Nigeria. This means that real exchange rate and real money supply can individually influence balance of trade in Nigeria in the long-run. However, GDP growth rate (domestic product) cannot influence it in the long-run.

The coefficient of real exchange rate is 0.6597 and statistically significant at 5% level of significance, which implies that real exchange rate has a positive significant impact on balance of trade in Nigeria in the long-run. It coincides with a priori expectation or theoretical framework. For instance, if the foreign exchange rate rises by 1%, the balance of trade will increase by 0.66% in Nigeria in the long-run.

Also, the coefficient of real money supply is -0.8637 and statistically significant at 1% level of significance. It coincides with a priori expectation or theoretical framework. The monetary approach to balance of trade stated that the increase in real money supply will boost imports and consequently worsen the balance of trade. This is because increase in real money supply raises the purchasing power of people as they have more money at their disposal. And those who have preference for imported items may demand for more imported items. The monetary approach also argued that too much of money in circulation causes inflation, and exports become relatively expensive. As a result, the volume of exports is bound to decrease. For instance, in Nigeria, if the real money supply rises by 1%, the balance of trade declines by 0.86% through the increases in imports in the long-run. The policy implication is that the terms of trade will be worsening and the country will become dumping area.

The R-squared indicates that the model is fit for prediction of impact of foreign exchange rate on balance of trade in Nigeria under the study period. More so, R-

squared is 58% and accounts for about 58% out of 100% total variations in balance of trade is caused by real exchange rate, domestic product and real money supply included in the model while remaining 42% is caused by other variables or factors not included in the model of this study.

The F-statistic (2.3415) is statistically significant at 1% level of significance; this implies that all independent variables in the model jointly influence balance of trade during this study.

Post Estimation Tests Results

The study conducted post estimation tests such as residual normality, serial correlation, Heteroskedasticity misspecification, and among others, to avoid spurious results. Their results are shown in Table 5 below.

Table 5 Post Estimations Tests Results

Techniques	Cal. absolute value	p-value	Remark
Serial Correlation Test			
Breusch-Godfrey Serial Correlation LM Test	0.0893	0.9151	No serial correlation
Heteroskedasticity Test			
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.3315	0.9505	Constant variances
Ramsey RESET Test			
Ramsey RESET Test	0.2045	0.6580	No Misspecification
Normality tests(Histogram)			
Jarque-Bera	1.8994	0.3869	Normally distributed
Multicollinearity Test			
Variance Inflation Factors (VIF)	Mean VIF	3.95	No multicollinearity
Stability Test			
CUSUM and CUSUM of square are with two standard error bounds		0.05	Model is stable

The results of ARDL model obtained are free from classical assumptions of regression. From the Table 5, there is evidence of no serial correlation, heteroskedasticity and no misspecification due to non-significance of their respective p-values at 5% level of significance. Also, residuals are normally distributed; a proof from non-significance of p-value of Jarque-Bera. Variance Inflation Factor (VIF) is not up to benchmark of 10 showing that there is no multicollinearity among independent variables. Finally model is stable for prediction, as the plot is within two standard error bounds at 5% level of significance.

Discussions of Findings

The study found that there is long-run equilibrium relationship or co-integration among balance of trade and its determinants (real exchange rate, domestic product and real money supply) as evidenced from the ARDL Bounds test. This result coincides with the studies by Akinwale *et al.*, (2018); Anoke *et al.*, (2016); Ewubare & Merenini, (2019) & Ihuoma *et al.*, (2015). The speed of adjustment (ECM) to long-run equilibrium relationship is 54% per annum. If there is

disequilibrium between balance of trade and its determinants in short-run, they restore to the equilibrium in the long-run by a speed of 54% annually.

The result of ARDL also revealed that the real exchange rate has positive significant impact on balance of trade in Nigeria in the long-run. The positive impact of real exchange rate influences favorably the exports and unfavorably affects the imports. This implies that in Nigeria, exchange rate devaluation or depreciation increases the volume of exports and decreases the volume of imports which will lead to surplus balance of trade. This finding is in line with the works of Ewubare & Merenini (2019); Ling *et al* (2009); and Meniago & Eita (2017). However, the finding differs from the works of Ihuoma *et al* (2015); Olumba, (2014); Nwobia *et al* (2020); and Tarawalie & Kpana (2022).

Furthermore, the study found that real money supply has negative significant impact on balance of trade in Nigeria from 1980 to 2020. Therefore, level of money supply influences the balance of trade transactions. The monetary approach argued that an increase in real money supply enhances the purchasing power of people to buy more or increases the aggregate demand. To meet such increase in aggregate demand, more items will be imported into the country. Alternatively, increase in the money supply enables Nigerians to demand for more of imported items. This finding supports the study by Tarawalie and Kpana (2022) but contrary the work of Ashamu, (2020); Meniago, & Eita (2017) and Yusuf & Sule, (2023).

Conclusion and Recommendations

This study found that there is long-run relationship between foreign exchange rate fluctuations and balance of trade in Nigeria during the study period. The real exchange rate has positive significant impact on balance of trade. The positive impact of real exchange rate influences the volume of export favorably and decreases the volume of import, thus improving the balance of trade in the country. Therefore, the study concluded that foreign exchange rate fluctuations can significantly influence balance of trade in Nigeria in the long-run. Based on these findings, the study therefore recommends the adoption of stable exchange rate regime which can stimulate exports and restrict imports in order to solve the problem of balance of trade deficit. Also, government should strengthen the management of money supply in the country because too much money in circulation contributes to inflation and persistent inflation could lead to devaluation of domestic currency.

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