Asian Journal of Economics and Empirical Research
Vol. 8, No. 1, 39-47, 2021
ISSN(E) 2409-2622 / ISSN(P) 2518-010X
DOI: 10.20448/journal.501.2021.81.39.47

Empirical Analysis of External Debt Exposure to Exchange Rate Risk in Nigeria

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Abstract

This study investigates external debt exposure to exchange rate risk in Nigeria. The secondary data used were sourced from the World Bank Development Indicators for all the variables for the period from 1981 to 2019. By employing the augmented Dickey–Fuller unit root test and the ordinary least squares (OLS) estimation technique, the study found that external debt service payment (EXTDSP), total payment on external debt (TPEXTD), and trade openness (TROP) are significant, while external debt service payment (EXTDSP) and trade openness (TROP) negatively impact the exchange rate (EXCHR). TPEXTD has a positive significant impact on EXCHR at a 5% level of significance. The rest of the explanatory variables – external debt stock (EXTDS), gross domestic product growth rate (GDPGR) and real interest rate (RINTR) – are all positive and insignificant at all levels of significance. The study, therefore, recommends that the government should take out concessional loans which have low-interest rates and are long-term in nature and as well encourage international trade with other countries.

Keywords: External debt, Exchange rate risk, OLS, Unit root, Model stability, International trade.
JEL Classification: E3; E4; C15.

Citation | Afamefuna A. Eze; Stephen Obinozie Ogwu; Obehi Destiny Obozua; Chukwuemeka Valentine Okolo (2021). Empirical Analysis of External Debt Exposure to Exchange Rate Risk in Nigeria. Asian Journal of Economics and Empirical Research, 8(1): 39-47.
History:
Received: 26 April 2021
Revised: 28 May 2021
Accepted: 18 June 2021
Published: 14 July 2021

Publisher: Asian Online Journal Publishing Group

Acknowledgement: All authors contributed to the conception and design of the study.
Funding: This study received no specific financial support.
Competing Interests: The authors declare that they have no conflict of interest.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study was reported; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained.
Ethical: This study followed all ethical practices during writing.

Contents

Contribution of this paper to the literature
This study contributes to existing literature by investigating external debt exposure to exchange rate risk in Nigeria.

1. Introduction

In recent times, debt owed by countries worldwide has been in the news due to the increasing rate at which countries borrow from external and domestic sources. Arguably, borrowing is not a bad idea if the borrowed funds are channeled into capital projects, such as railway construction, road construction, human capital development, and electricity generation. As a result, government revenue will increase in the near future because many taxpayers will be empowered due to the new infrastructure facilities put in place. From the revenue generated, the government can afford to repay the debt with interest because countries that borrow, especially from multilateral sources such as the International Monetary Fund (IMF) and the World Bank, are given time (often long-term) to pay back their debt. However, when borrowed funds are not used for investment purposes, the concept of debt financing will lead to an economic setback. As Ijirshar, Joseph, & Godoo (2016) note, a country will be less prosperous if the loans obtained for investment projects are not adequately managed. They further note that only when the investment project's gains exceed the interest paid on the loans will the economy be better off.

On an annual basis, the Nigerian government uses fiscal policy to influence the country's economy. For instance, if the Nigerian government's planned expenditure exceeds its revenue collection for the fiscal period, the budget is a deficit. Therefore, many economists argue in favor of budget deficit as they believe that tax cut increases aggregate demand, thereby increasing government revenue in the near future. In line with this reasoning, governments often borrow from domestic and external sources to fill the gap between revenue and expenditure. Domestic borrowing differs from external borrowing in that the former is borrowed in local currency, whereas the latter is often in foreign currency, so there is a possibility that external debt influences the foreign exchange rate. As Ezenwa (2012) notes, external debts are needed to cover the foreign exchange gap and the investment-savings gap to achieve economic growth. Anyafo, cited in Nwanne & Eze (2015), stated that the public sector's debts can make foreign exchange resources available for financing imports, supplements foreign exchange earned from exportation of goods and services, increase capital formation, developmental aid programs as well as annual support budget and capital project implementation. He further stated, just as external debt increases national income, their servicing constitutes a major leakage as the loan repayment and the interest deplete foreign reserves which, in turn, affects the exchange rate.

According to Iyoboyi & Muftau (2014), exchange rate is an essential endogenous element that impacts economic performance due to its impact on macroeconomic variables, such as outputs, imports, export prices, interest rates, and inflation. They went on to say that depending on the exchange rate system (fixed or floating) implemented in a country, it can be useful for balancing payment adjustments, managing crises linked with pressure for currency revaluation, fulfilling internal policy objectives, the ability to adapt to external shocks, maintaining foreign exchange reserves, driving investments, and handling speculation and levels of discipline in economic management.

The preceding paragraphs show that the exchange rate's role in the Nigerian economy's growth is critical. Given this, the Nigerian government should consider the relationship between external debt and the foreign exchange rate when formulating external debt policies. The Debt Management Office (DMO) is a government agency established to manage the risk associated with public debt. During its 2018 annual report and statement of accounts, the DMO stated that the link between external debt and foreign exchange rate is now very clear; as the fraction of external debt to total debt increased to 32% as of December 31, 2018, from 27% as of December 31, 2017. It went on to say that the 5% increase, which coincided with a rise in the foreign currency rate, was due to debt portfolio restructuring in line with the debt management strategy's aims of achieving a 60:40 ratio for domestic debt stock to external debt stock.

As a consequence, external debt from non-concessional sources increased in 2018 relative to 2017. As of December 31, 2017, the DMO data shows that external debt from concessional and non-concessional sources was 59.80% and 40.20%, respectively. In contrast, in 2018, the concessional debt dropped to 50.32%, while the non-concessional debt increased to 49.68%. It was noted that the interest rate on concessional external debt is low relative to non-concessional debt. Moreover, concessional loans are often long-term loans from multilateral and bilateral sources, such as the World Bank, the International Monetary Fund, the African Development Bank, and the Export-Import Bank of China, unlike non-concessional sources, such as the International Capital Market, where financial instruments are traded.

Regardless of the reasons why the DMO officials increased external debt relative to domestic debt, the data in the preceding paragraph shows that external loans from commercial sources with high-interest rates and less time to repay have increased relative to multilateral and bilateral sources, which are concessional (low interest rate and enough time to repay). Therefore, the vital question that motivated this study is: What is the behavior of foreign exchange rate in Nigeria in the face of increased external debt relative to domestic debt, especially now that the bulk of external debt is from commercial sources? Answering this question has become essential following the realization that external debt affects exchange rate, as explained by DMO officials during the 2018 annual report and statement of accounts. According to the Debt Management Office (DMO) (2018), Eurobonds increased by US$4,868.35 million to US$10,868.35 million in 2018 from its previous year's value of US$6,000.00 million, bringing the ratio of external commercial debt to 44.19% in 2018, compared to 33.33% in 2017. The growth in foreign debt stock is in keeping with Nigeria's debt management plan, which strives to attain a 60:40 ratio between domestic and external debt, according to DMO officials.

The largest currencies in Nigeria's external debt stock are the US Dollar (USD) and the Special Drawing Right (SDR), which account for 63.81% and 34.55% of the currency composition, respectively (Debt Management Office (DMO), 2018). This means that paying back external loans, especially loans obtained from commercial sources, will deplete our foreign reserve due to the scarcity of foreign currency. It is well known that macroeconomic stability depends on price stability, exchange rate stability, moderate inflation rate, etc. The danger inherent in the poor

management of external debt is that it affects vital variables, such as exchange rate, leading to poor macroeconomic performance. In light of Nigeria's debt management plan, the goal of this study is to examine the risk associated with foreign exchange/currency rate in Nigeria due to external debt stock and external debt service payment.

This study departs from the studies conducted by Nwanne & Eze (2015) and many others in the sense that, at the time the study was undertaken, Nigeria's debt management strategy was not in existence. Therefore, there is a need to analyze the exchange rate behavior in recent times. This new strategy has increased external debt from commercial sources with high interest rates and short periods for the repayment of loans.

1.1. Trend Analysis on Exchange Rate, External Debt Stock, and External Debt Service Payment in Recent Years

Some stylized facts on external debt stock, external debt service payment, and the exchange rate is provided in this section. The Nigerian currency, the naira, has been depreciating in recent times and it now exchanges for fewer dollars. This unfavorable exchange rate has been attributed by many researchers and policymakers to a fall in crude oil prices. However, the diagrams below are insightful as they show a link between external debt stock, external debt service payments, and the exchange rate in Nigeria.

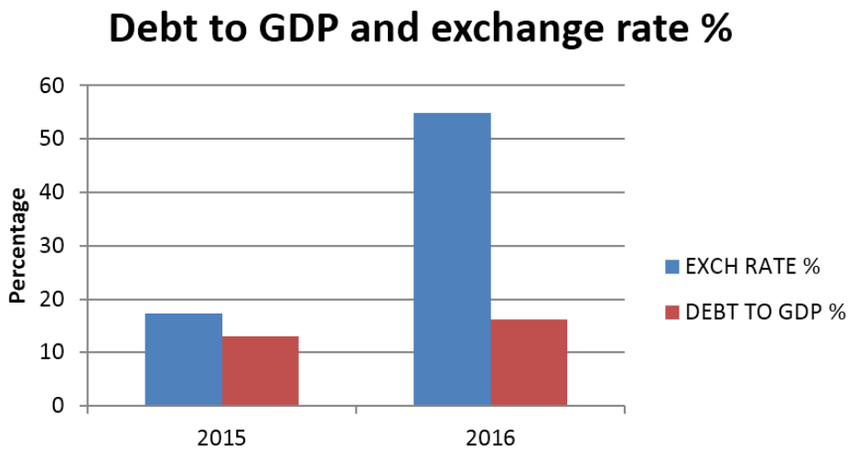

Figure 1. Recent trends in exchange rate and external debt stock.

As Figure 1 above shows, the ratio of external debt stock to gross domestic product (GDP) increased in 2016 relative to 2015. It also increased in subsequent years (18.20% in 2017 to 19.09% in 2018). This means that foreign resources entering Nigeria are partly in the form of debt and not exclusively in exchange for goods and services. And because it takes time for foreign loans to impact the economy, the exchange rate has increased. When the percentage of external debt relative to GDP increases, it means that foreign resources entering the country in the form of debt have increased relative to the exchange of goods and services in the international market. This means that a drop in the export of goods and services decreases the demand for local currency, hence motivating a rise in the exchange rate in the last couple of years (₦168 in 2014, ₦197 in 2015, ₦307 in 2018, ₦379 in 2019), as shown by the Central Bank of Nigeria's statistical bulletin. In the preceding section, it was shown that external debt from commercial sources has increased relative to multilateral and bilateral sources. This means that the bulk of the debt will be repaid within a short period. The diagram below shows debt repayment in 2017 and 2018.

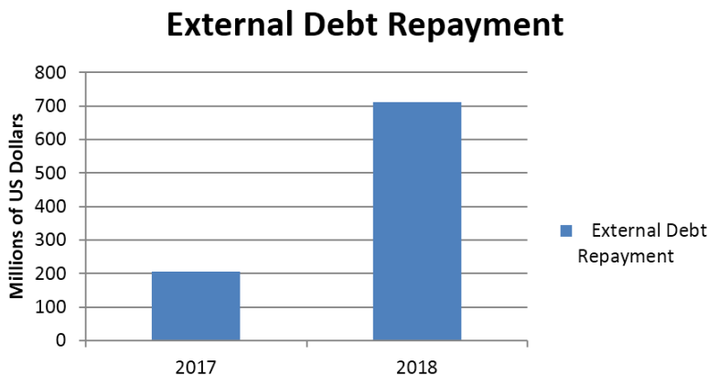

Figure 2. Public Debt Repayment in Millions of US Dollars.

Figure 2 above shows a wide gap between the repayment of debt in 2017 relative to 2018. This gap is attributed to an increase in interest payment. The Debt Management Office (DMO) (2018) explained that the increase in interest payment by US$1,521.62 million, or 30.30%, reflects a repayment of 5.12% (five hundred million dollars) Eurobonds, which was due for repayment in July 2018, and principal repayment of bilateral and multilateral debts. The short-term repayment of external debts from commercial sources is problematic because it will continuously drain foreign reserves and further weaken the strength of the naira, thereby raising the exchange rate. The risk associated with this development is the motivation for this study. There is a possibility that public debt will be unsustainable in the near future.

Moreover, the current strategy to stem the escalation of public debt will likely cause more harm than good. All indications suggest that increased external debt relative to domestic debt will weaken the naira even more. This will culminate into an unfavorable balance of trade, capital flight, high inflation rate, increased unemployment rate, and a general decline in GDP. The diagram below shows the percentage increase in external debt stock relative to total debt stock in recent years.

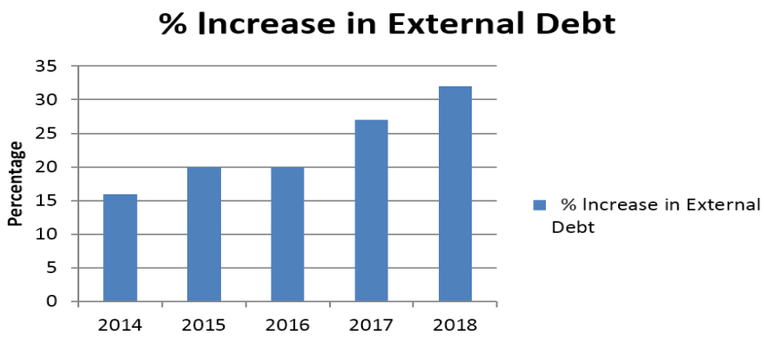

Figure 3. % Increase in External Debt Relative to Total Debt Stock.

Figure 3 above confirms that the strategic plan has been implemented as the ratio of external debt relative to total debt has increased in the last couple of years. Since total debt stock consists of domestic and external debts, the graph indicates that domestic debts have decreased relative to external debts. The focus of this study is to find out how this development affects the exchange rate in Nigeria. In addition to the descriptive analysis in this section, a suitable data analysis method is adopted (see section four) to make recommendations that will address the possible problems of unfavorable debt policies and exchange rate risk.

This paper is divided into five sections. The first is the preceding section in which the study is introduced, the second section is the literature review in which relevant literature is reviewed, section three contains the methodological framework fitted to the data used in the study, section four focuses on the discussion of the results, and section five exposes the diagnostic tests that validates the regression result for the study. Finally, section six contains a summary, conclusion, and policy recommendation.

2. Empirical Review

Kouladoum (2018) studied the effect of foreign debt on the real exchange rate in Chad from 1975 to 2014. Using the generalized method of moments (GMM) estimation methodology, the results showed that foreign debt has a positive and significant effect on the real exchange rate at a 5% level of significance. Furthermore, debt servicing has a major negative impact on the real economy. Fida, Khan, & Sohail (2012) investigated Pakistan's foreign debt and exchange rate volatility. Quarterly data from 1983:Q1 to 2008:Q4 were tested using the autoregressive distributed lag (ARDL) cointegration technique. The results show that the exchange rate and external debt variables have no long-run relationship.

Ijeoma (2013) used the ordinary least squares (OLS) estimation approach on data from 1980 to 2010 to analyze the impact of debt on selected macroeconomic indicators in the Nigerian economy. The findings show that Nigeria's external debt stock has a positive and significant impact on the country's economic growth. Furthermore, the findings show a statistically significant association between debt service payment and gross fixed capital formation (GFCF). Liliana (2014) investigated the effect of foreign debt on Romanian exchange rate volatility. External debt constituents were asked to agree to the econometric modeling of the RON/EUR exchange rate using a statistical analysis. When the evolution of public and private external debt is taken into account, the results show that the evolution of the RON/EUR exchange rate cannot be predicted. This may be attributed to the fluctuation of the exchange rate's unpredictability.

Draz & Ahmad (2015) used data from Nigeria and Pakistan from 1965 to 2009 to examine the foreign debts and exchange rates of oil-producing and non-oil-producing countries using the OLS process. According to the results, external debts have a statistically significant impact on the exchange rate of the Pakistani Rupee but not on global oil prices.

Ibi & Aganyi (2015) investigated the effect of foreign debt on Nigeria's economic growth. The study discovered that the causal relationship between external debt and economic growth is weak, and thus cannot be used to forecast either economic growth progress or decline using the vector autoregression (VAR) econometric model. As a result, fluctuations in GDP cannot be anticipated by changes in the economy.

Quilent (2015) looked at the effect of foreign public debt on Kenyan exchange rate volatility. The OLS technique was used to analyze time series data from 1993 to 2013. The foreign debt to GDP ratio was found to have a negative and large impact on exchange rate volatility, while the interest rate has a positive and large impact. Inflation, GDP growth rate, and the money supply to GDP ratio all had no significant impact. Finally, Kenya's enormous and unsustainable external state debt was found to cause high real effective exchange rate (REER) volatility.

The effect of foreign debt servicing and receipt on Nigeria's exchange rate was studied by Nwanne & Eze (2015). Using the OLS method and the cointegration test on time series data from 1981 to 2013, the analysis discovered positive short- and long-run relationships between foreign debt receipts and external debt servicing with naira exchange rate fluctuations. Although external debt receipts have a positive impact on the exchange rate, external public debt servicing has a negative impact, according to the report. Similarly, Saheed, Sani, & Idakwoji (2015) investigated the exchange rate impact of Nigeria's public foreign debt. External debt, debt service payments, and foreign reserve all had a role in explaining currency rate changes in Nigeria. The payment of debt service was found to have the greatest impact.

Iyoboyi & Muftau (2014) empirically investigated the impact of exchange rate depreciation on Nigeria's balance of payments from 1961 to 2012. Using a multivariate vector error correction system, the researchers discovered a cointegrating relationship between the balance of payments, exchange rate, and other related variables. The results of the causal effect test also showed bidirectional causality between the balance of payment and the other variables. In addition, generalized impulse response functions were used in the study, and the results showed that a one standard deviation shift in the exchange rate reduces the positive balance of payments in the medium and long terms. The variance decomposition results show that major variations in Nigeria's balance of payments are not due to changes in exchange rates.

More recently, Ogbonna, Ibenta, Chris-Ejiogu, & Atsanan (2019) critically analyzed Nigeria's public debt servicing and economic development from 1970 to 2017. The augmented Dickey–Fuller unit root test, Johansen cointegration test, and vector error correction model were used in this analysis. According to the findings, total public debt services and the consumer price index have a negative and positive impact, respectively, on economic development. The outcome of the exchange rate, on the other hand, had a negative and insignificant effect on economic growth. The results of the cointegration test also showed the existence of a long-term relationship.

Adeniran, Azeez, & Aremu (2016) conducted a report on the impact of foreign borrowing on Nigerian economic growth. The results of applying the ARDL cointegration method to time series data from 1987 to 2018 indicate that external debt stock has a positive and significant impact on economic growth, while debt servicing has an adverse impact on growth both in the short and long runs.

Adamu & Rasiah (2016) investigated the complex impact of external debt on Nigerian economic development from 1970 to 2013. The ARDL bounds test was used in this analysis, and the results indicate a cointegrating association between the variables. External debt has a negative long-term impact on economic growth, while the external debt sustainability index has positive short- and long-term impacts on economic growth.

Using the vector error correction model, Adeniran et al. (2016) investigated the effect of external debt on economic growth in Nigeria from 1980 to 2014. External debt has a negative and substantial effect on economic development, according to the empirical results of the impulse response study. The Granger causality test also showed that real GDP and exchange rate have a one-way causal relationship between external debt service payment and real GDP.

Kharusi & Ada (2018) looked into the relationship between government external borrowing and economic growth in Oman. The ARDL cointegration approach was used to analyze time series data from 1970 to 2015. According to the findings, external debt has a negative and significant effect on economic growth.

Ali & Mustafa (2012) examined the long- and short-term impacts of external debt on Pakistan's economic growth from 1970 to 2010. According to empirical studies, external debt has a negative effect on economic growth.

Jebran, Ali, Hayat, & Iqbal (2016) investigated the effect of public debt on Pakistan's economic growth from 1972 to 2012. The study used the ARDL bounds testing method to evaluate the long-run and short-run relationships between external debt and economic development. The findings showed both positive and significant relationships between external debt, GDP and GNP in the long and short terms. In the short term, debt servicing was found to have a negative impact on GDP and GNP.

The effect of Sri Lanka's public debt on economic growth and investment was examined by Akram (2017). According to the study, which used the ARDL method, public external debt has a positive impact on economic growth, while debt servicing has a negative impact on per capita GDP and investment. Furthermore, both per capita GDP and expenditure demonstrated positive and meaningful relationships with public external debt and debt servicing. Udeh, Ugwu, & Onwuka (2016) investigated the impact of external debt on Nigerian economic growth from 1980 to 2013 using the OLS technique. According to the results, external debt is positively related to GDP in the short run but negatively related in the long run. Further analysis showed that debt service is negatively correlated with GDP, while the exchange rate is positively correlated.

From the review above, it is clear that none of the studies was able to look at the external debt exposure to exchange rate risk in Nigeria, hence the gap in the literature.

3. Methodology

Both the classical and Keynesian schools of thought recognized the demand-side and supply-side factors as the main determinant of the exchange rate. When further expanded, this reveals that interest rate, inflation rate, government debt, and terms of trade among others, are the key macroeconomic variables that determine the exchange rate. For this study, the following variables will be adopted for modeling purposes and they include interest rate, trade openness, GDP growth rate, and public debt. The data for the study were sourced from the World Development Indicators (WDI) and were converted from annual to quarterly using EViews 9.0. The stated model below is estimated with the use of OLS:

$$EXCHR_t = \alpha + \beta_1 EXTDS_t + \beta_2 EXTDSP_t + \beta_3 GDPGR_t + \beta_4 RINTR_t + \beta_5 TPEXTD_t + \beta_6 TROP_t + \mu_t \quad (1)$$

Where $EXCHR$ is the dependent variable and represents the exchange rate in the country; $EXTDS$ is the external debt stock of the country; $EXTDSP$ is the external debt service payment; $GDPGR$ is the GDP growth rate in the country; $RINTR$ is the interest rate in the country; $TPEXTD$ is the total payment on external debt; $TROP$ is the country's trade openness; α is the intercept; $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficients of the explanatory variables, respectively; μ is the error term which captures the variables not included in the model; and t represents the period since it is a time series study.

3.1. Unit Root Test

The unit root test is necessary to verify if the data for the variables are all stationary. The OLS estimation technique is hindered by mixed stationarity; hence, all the variables must have a uniform stationary status to permit the use of the OLS and produce a reliable regression result. Below is the common rule of thumb for the unit root test:

$$E(Y_t) = E(\varepsilon_t - \varepsilon_{t-1}) = 0$$
$$Var(Y_t) = (Y_t^2) = \sigma^2$$
$$Cov(Y_t, Y_{t-1}) = E(Y_t - \dot{Y})(Y_{t-1} - \dot{Y}) = -\sigma^2$$

3.2. Autocorrelation

When a mutual relationship or effect exists between two or more members of a series, it is regarded as autocorrelation (Orji, Ogwu, Mba, & Anthony-Orji, 2021). The effect of such a relationship, if not taken care of, will produce spurious regression results that can't be relied upon for policy purposes.

$$E(\mu_i \mu_j) \neq 0, \; i \neq j$$

In this study, the HAC Newey–West coefficient covariance is used to correct for any presence of autocorrelation as well as heteroscedasticity in the regression equation.

3.3. Diagnostic Tests

Aside from the pre-estimation test for the unit root and the autocorrelation and heteroscedasticity tests, which come after the estimation, tests including the Ramsey test of omitted variables, the Jarque–Bera test of normality, and the CUSUM and CUSUM square tests of stability are also performed in this study.

4. Data Analysis and Interpretation

Table 1. Descriptive Statistics.

	EXCHR	EXTDS	EXTDSP	GDPGR	RINTR	TPEXTD	TROP
Mean	95.36890	64.91793	2.683113	3.536163	0.533905	9.19E+08	48.55229
Median	101.6973	60.25287	1.815186	3.668412	2.767927	7.27E+08	50.74836
Maximum	364.5020	228.3718	8.350607	33.73578	25.28227	4.94E+09	81.81285
Minimum	0.617708	4.130462	0.019316	-13.12788	-43.57266	67518065	20.72252
Std. Dev.	95.75284	58.23124	2.725498	6.289357	13.28987	7.78E+08	17.03783
Skewness	1.048110	0.736520	0.664279	1.145153	-0.973938	1.802249	-0.179366
Kurtosis	3.682679	2.803470	1.976149	8.423968	4.005163	8.285146	1.769892
Jarque–Bera	30.98371	14.07899	17.93501	220.9890	30.62915	260.8980	10.46683
Probability	0.000000	0.000877	0.000127	0.000000	0.000000	0.000000	0.005335
Sum	14591.44	9932.443	410.5163	541.0330	81.68749	1.41E+11	7428.500
Sum Sq. Dev.	1393628.	515413.3	1129.107	6012.513	26846.32	9.21E+19	44123.72
Observations	153	153	153	153	153	153	153

The results of the descriptive statistics from the original data in Table 1 shows means of 95.36, 64.91, 48.55 for the exchange rate (EXCHR), external debt servicing (EXTDS), and trade openness (TROP), respectively, which are on the high side. Similarly, the differences between their maximum and minimum values are also high indicating that the three variables are exposed to volatility or shocks. EXCHR was found to be influenced by the explanatory variables. For trade openness (TROP), the activities going on in the international market are a possible cause. On a general level, the data for the entire variable looks good and normal, as shown by the Jarque–Bera probability that the data for the entire variable is significant at the 5% level. The results further show that all the variables are positively skewed except for real interest rate (RINTR) and trade openness (TROP), which are negatively skewed.

Table 2. Unit Root Test.

Augmented Dickey–Fuller		
Variable	**Level (Trend & Intercept)**	**First difference (Trend & Intercept)**
EXCHR	-2.2611(1)	-3.6774(0)**
EXTDS	-2.9139(5)	-4.0870(4)***
EXTDSP	-3.3323(5)*	-4.0859(4)***
GDPGR	-3.0049(9)	-4.2783(8)***
RINTR	-4.3800(9)***	-4.1088(12)**
TPEXTD	-3.9564(9)**	-3.8628(12)**
TROP	-1.7938(5)	-4.1669(4)***

Notes:
1. ***, **, * imply significance at the 1%, 5%, and 10% levels, respectively.
2. The numbers in parentheses for the unit root tests represent the lag of the dependent variable used to obtain the Schwarz information criteria.

The results of the unit root tests in Table 2 show that all the variables are stationary at the first difference I(1) at trend and intercept, thus permitting the use of ordinary least squares (OLS) for the regression analysis in this study.

5. Diagnostic Tests

To authentic the regression results in this study the following diagnostic test is carried out: serial correlation test; heteroscedasticity test; normality test; specification error test; and the dynamic stability test.

Table 3. Diagnostic Test Results.

Diagnostic tests	F-statistic	Prob.
Autocorrelation test	2553.81	F(2,144) 0.000
Heteroscedasticity test	6.65	F(6,146) 0.000
Ramsey test	9.71	F(1,145) 0.000
Jarque–Bera test	17.53	0.000

Table 3 shows the results of the various diagnostic tests. The autocorrelation test results indicate rejection of the null hypothesis of no serial correlation among the variables of the study at the 5% significant level. Similarly, the result of the heteroscedasticity test permits the rejection of the null hypothesis of no heteroscedasticity at the 5% significant level. In both cases, we accept the alternate hypothesis that states that both serial correlation and heteroscedasticity exist in our model warranting the need to use the coefficient covariance results. Also, the Ramsey test for omitted variables indicates that the null hypothesis should be rejected and the alternative hypothesis accepted at the 5% conventional significance level. This means that some variables were omitted in the model, and this will likely include variables, such as inflation and politically related variables, that create an environment which enables economic activities to thrive in the country. The significance of the constant of the

regression results further validate the results of the Ramsey test of omitted variables. Finally, the Jarque–Bera results also shows that our model is normal, being correctly stated.

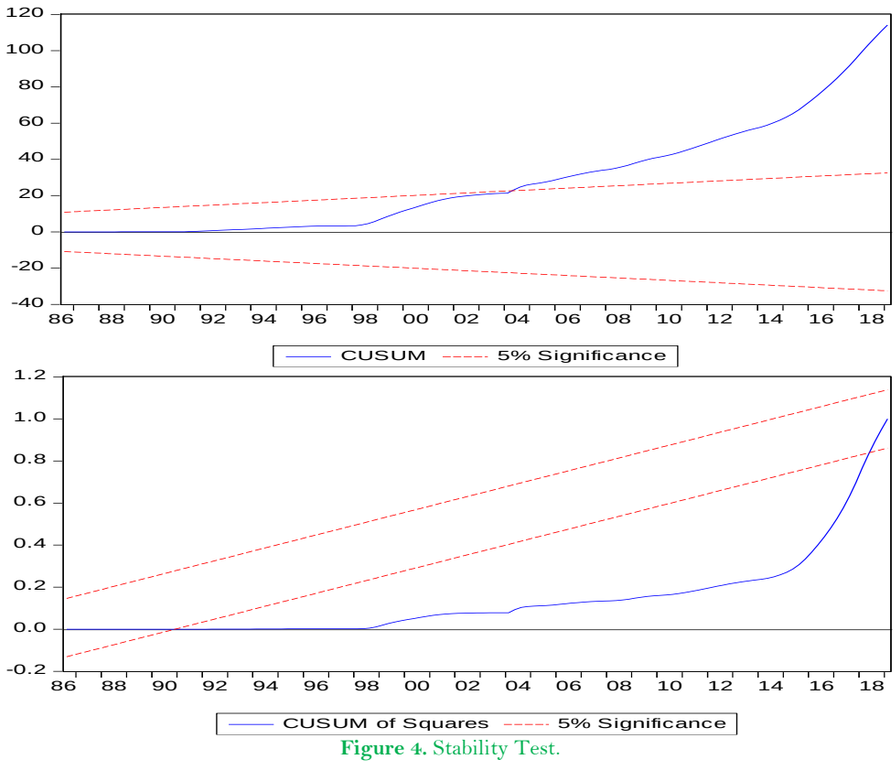

Figure 4. Stability Test.

To check if our model is stable and ideal for prediction purposes, the CUSUM and CUSUM square tests were conducted. In Figure 4, the first CUSUM graph shows how the model line lies within the 5% boundary, and at a later time deviated from the 5% significance boundary. The second graph shows even more severe cases of deviation from the 5% significance line. The two graphs clearly show that the model is not stable and thus not suitable for prediction purposes. In essence, it points to the fact that the exchange rate in Nigeria is highly volatile, looking at it quarterly, and that prediction variables are not capable of predicting the future trend of the exchange rate. This is further validated by the cointegration result, which shows the absence of any long-run relationship, although it is not included here. However, previous studies have come up with similar cointegration results (Fida et al., 2012; Liliana, 2014). The results from the annual data show that the model is stable for the CUSUM test, whereas the CUSUM square test is in line with the result of this study, although the CUSUM and CUSUM square graphs from the annual data are not included in this manuscript.

Table 4. OLS Regression Results.

Dependent Variable: EXCHR

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXTDS	0.2157	0.318852	0.676344	0.4999
EXTDSP	-32.3571	9.135584	-3.541878	0.0005
GDPGR	2.5571	1.893060	1.350764	0.1789
RINTR	0.4872	0.521118	0.934927	0.3514
TPEXTD	2.75E-08	1.03E-08	2.673141	0.0084
TROP	-1.9397	0.800535	-2.423057	0.0166
C	227.8307	43.32461	5.272076	0.0000

R-squared	0.644335	Mean dependent var.	95.36890
Adjusted R-squared	0.629718	S.D. dependent var.	95.75284
S.E. of regression	58.26634	Akaike info criterion	11.01260
Sum squared resid	495665.1	Schwarz criterion	11.15125
Log likelihood	-835.4638	Hannan–Quinn criterion	11.06892
F-statistic	44.08307	Durbin–Watson stat.	0.036895
Prob(F-statistic)	0.000000	Wald F-statistic	12.48964

The regression result in Table 4 shows that external debt stock (EXTDS) has a positive and insignificant impact on the exchange rate (EXCHR) with a t-value of 0.67 and a p-value of 0.49. This implies that Nigeria's external debt stock does not influence the exchange rate situation in the country. On the other hand, external debt service payment (EXTDSP) has a negative significant impact on EXCHR at the 5% level, just as the t-value of -3.54 and p-value of 0.00 show, which implies that the payment made in servicing the country's external debt is a strong determinant of the exchange rate (EXCHR). This result is in line with the a priori expectation that increasing the cost of servicing the external debt will make the country's exchange rate worse-off, whereas a declining cost of serving external debt will better the country's exchange rate (EXCHR) system. In the same vein, the gross domestic product growth rate (GDPGR) is expected to improve the country's exchange rate with every increase. However, the result from this study failed to validate this economic theoretical expectation with an insignificant positive t-value of 1.35 and a p-value of 0.17. The real interest rate (RINTR) also has a positive insignificant impact on the exchange rate (EXCHR), thereby falling short of the a priori expectation, as the t-value

of 0.93 and p-value of 0.35 reveals. Based on economic expectation, one would expect the domestic interest rate to be less compared to the international interest rate and thus serve as motivation to borrow from home. In this way, there will be an increase in the demand for local currency thereby improving the exchange rate (EXCHR) in the country. This supports the findings of Nwanne & Eze (2015), who found that the long-term nature and the low interest rate charged on international debt has made external borrowing more attractive than domestic borrowing. The total payment made on external debt (TPEXTD) has a positive significant impact on the exchange rate (EXCHR) in Nigeria, as shown by the t-value of 2.67 and p-value of 0.00. This implies that the more the external loan is repaid, the more the exchange rate will rise. The simple reason is that external borrowing and repayment transactions are conducted in foreign currency. Therefore, since repaying foreign debt requires foreign currency, the demand for this foreign exchange will put pressure on the currency thereby increasing the exchange rate. The result shows that trade openness (TROP) has a negative significant impact on the exchange rate (EXCHR) at the 5% level with a t-value of -2.24 and a p-value of 0.01. This is in line with the economic theory where the more a country is open to trading activities, the greater their foreign exchange earnings will be, which will build up their foreign reserve and international payment account. This will create more availability of foreign exchange for those who need it and reduce the pressure on foreign exchange. Similarly, the more open a country is to trade, the more it will attract investors, thus the demand for domestic currency will increase, leading to appreciation. Therefore, a better trade openness will lead to fewer exchange rate risk problems.

The R^2 of the regression result is 0.64, which shows that 64% of the changes in the dependent variable (EXCHR) were jointly caused by the explanatory variables. The remaining 36% are captured by the constant, which is significant. The Wald F-statistic is 12.46 with a p-value of 0.00, indicating that the joint influence of the explanatory variables on EXCHR is significant. The Hac Newey–West coefficient covariance was used to edge out the effects of serial correlation and heteroscedasticity in the regression results; therefore, the Durbin–Watson result should be overlooked.

On a general note, the issues relating to external debt are key factors influencing the exchange rate in Nigeria given that the country is sufficiently open to trade. This suggests that Nigeria's external debt variables can be used to improve the country's exchange rate system if well managed.

6. Conclusion and Recommendations

This paper examined exchange rate risk and external debt in Nigeria, and the quarterly data was analyzed with the use of the OLS estimation technique. The study found that external debt service payment (EXTDSP), total payment on external debt (TPEXTD), and trade openness (TROP) are significant. Additionally, external debt service payment (EXTDSP) and trade openness (TROP) negatively impact the exchange rate (EXCHR). TPEXTD has a positive significant impact on EXCHR at a 5% level of significance. The rest of the explanatory variables (external debt stock (EXTDS), gross domestic product growth rate (GDPGR), and real interest rate (RINTR)) are all positively insignificant at all levels of significance. This suggests that, given sufficient trade openness in Nigeria, that the explanatory variables can be used to improve the country's exchange rate system if well managed.

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