

DETERMINANT OF EXTERNAL DEBT IN NIGERIA: AN ARDL AND ECM APPROACH

BY

Salimatu Rufai Mohammed: Department of Economics, Umaru Musa Yar'adua University
Katsina State; E-mail: salimarufai@gmail.com

Abstract

Despite the low and unstable economic growth rate, the Nigerian external debt has been on the increase. This study therefore seeks to examine the determinants of external debt in Nigeria using Auto Regressive Distributed lag and Error Correction Model approaches. Data from 1981 to 2020. The result of the bound test indicates there is longrun relationship between the variables studied. The estimation results shows that Military expenditure, debt servicing and deficit significantly and positively affect debt while corruption and oil revenue have negative and significant effect on external debt. The error correction coefficient is correctly signed and significant. The study therefore recommends that appropriate measures should be put by the government to invest the money borrowed in infrastructural and industrial sector development. This will reduce deficit corruption and curtail insecurity.

Keywords: *Debt, Corruption, Military Expenditure and Nigeria*

Introduction

Several studies have pointed out the importance of debt in financing economic development process and supplement domestic savings (Ariyo 1997; Wein 1994). Nigerian government has resort to accumulating external debt because it has failed to make adequate use of its human and material resources' needed to attain higher and sustained levels of economic development. The present government have succeeded in increasing the volume of debt from \$32bn in 2015 to \$54bn in 2019 (DMO, 2020). The debt to GDP ratio also ranges from 25.34% to 34.98% between 2017- 2020. This is not a good prediction for a country that is aiming to attain sustainable development goals and meet the needs of its increasing population. Corruption and diversification of public fund are also on the rise within this period.

External debt refers to the borrowings of government from foreign countries to finance infrastructural development due to the insufficiency of their own resources. In Nigeria it has become a frequent phenomenon for government to borrow money when it wills without putting into considering some macroeconomic factors and state of the nation. This is despite the annual budget on capital expenditure and revenue. According to the Debt Management Office (2005), the Nigerian government like most oil producing countries started borrowing after the oil boom in 1970 in order to overcome the short fall in the provision of basic services resulting from reduction in foreign exchange earnings during the boom. It became an increasing phenomenon by successive government justifiably and sometimes not justifiable Al-Fawaz (2016) stated that external debt is a global phenomenon that is acceptable to a certain extent and under certain controls. If it exceeds certain limit and goes out of these controls, it would have a negative effects on GDP and sustainable development of a country.

Based on external debt report, the outstanding external public debt rose during the democratic regime especially in the present administration from \$29bn in 1999 to \$54bn in 2019. In 2010 the external debt was \$21bn, in 2015 it was \$32 and rose to \$43bn in 2017 which is 25.6% increase from 2016. In 2018 alone it was \$50bn which was 16.81% increase from 2016(DMO, 2020). Within the same period, exchange rate rose from N197 to N381 in 2020. Although studies conducted by Tiruneh in 2004, and Menbere in 2009 explained that high level of indebtedness by less developed countries (LDCs) is as a result of high capital flight, high ratio of debt service payments, high imports and its ratio to GDP, income per capita, slow growth rate, oil price shock, poverty, bad governance, unfavorable terms of trade and change in global economic policies.. Loser (2004) stated that among the external debt indicators were the net international reserves, real effective exchange rate, inflation, output growth, export and import behaviour, terms of trade, monetary indicators, interest rates and fiscal deficit and credit to the public sector.

Tajudeen (2004) also identified two reasons that result to external debt as follow: for the purpose of stimulating higher consumptions or deficit payment and to circumvent stiff budget constraints. Thus, external debt is incurred in the case of needing funds, when governments suffer from shortages of domestic savings and foreign currencies needed (Abu Siddique et al., 2015). Being the largest crude oil producer in Africa, Nigeria is facing a rise in its external debt which is generating national and international concern

coupled with the rate of increasing unemployment, dilapidating power supply, inflation, increasing corruption, increasing expenditure and low GDP growth rate. But the justifications of indebtedness in Nigeria are constantly to meet infrastructural development and capital formation unfortunately the output from previous debt have not been justified. There is lack of evidence on the actual factors that led to external borrowing in Nigeria. This study therefore intends to look at the major factors that determine debt acquisition and accumulation in Nigeria and how they can be addressed. It will also include combination of variables not employed by previous researchers.

Corruption was introduced in the study because misallocation of resources and diversification of fund meant for investment and development is widespread in Nigeria. The amount of debt flow into the country is not also seen in capital formation. It was argued that corruption slowdown economic growth via reduction in human capital development in the form less spending on education and healthcare, misallocation of resources, inadequate domestic investment, lack of project execution and high inequality and poverty, among other thing (Abu, 2015; Benfratello, Del Monte & Pennachio, 2015). Military expenditure was also included in the study due to present increase in government spending to combat the increasing insecurity menace in the economy. According to Karagol (2004) military expenditure is the amount of financial resources dedicated by a state to raise and maintain armed forces or essential defense purposes.

Theoretical and Empirical literature

There is no comprehensive theory that explains the linkage between External debt and its potential determinants. This makes it a bit challenging to come up with a theoretical model or employ an empirical method by studies in the area. Nevertheless, researchers have relied on a few theories when attempting to investigate the determinants of external debt. One of the theories is the Neo-classical theory of debt (Solarin, 2017; Sheik, Chaudhry & Faridi, 2013). According to the theory, a state has a number of options for raising funds to finance its activities. It can borrow if internal sources such as taxes and savings are not enough to finance deficit. The theory believed that the domestic saving is not sufficient to finance needed investment in developing countries but if government perform its minimum functions, there will be no need for borrowing. This is because an increase in government expenditure, deficit and fall in tax increases the urge to borrow. In Nigeria, corruption among government officials magnifies the minimum functions of government and slows down development process. These results to borrowing.

Empirical Literatures

Studies have made effort to examine the major determinants of external debt. Most focused on group of countries employing panel data or cross section analysis. Studies focusing on external debt determinants in Nigeria are not much. For instance, Tiruneh (2004) conducted a panel data study for sixty heavily indebted poor countries and non-heavily indebted less-developed countries to explore the demand for external borrowing in the 1980s and 1990s. He employed panel analysis for cross sectional pooled data of 1982-1998. The result showed that capital flight, debt service payments, the imports to GDP ratio, income per capita, and the growth rate of GDP are the key determinants of the demand for external borrowing. Colombo and Longoni (2009) also analyzed the determinants of long term external debt for developing countries. The study included 61 developing countries, some of them were HIPC, and covered the period 1970-2000. The study found that external debt is positively correlated to the level of economic development, the degree of openness, inflation, financial depth level of education and open electoral system. This shows that higher transparency of the electoral system and higher political stability are rewarded by international financial markets.

Forslund, Lima and Panizza (2011) identified the determinants of public debt in a large sample of developing and emerging market-countries. The data set consists of an unbalanced panel of 1558 observations covering 104 countries for the 1990-2007 period. The study found that financial deepening and GDP have significant positive effect on public debt, while past debt and real exchange rate depreciation have significant negative effect on public debt. The study did not find any significant effect of inflation, current account, bank crisis, default, openness, debt contraction, and debt explosion on public debt in the full sample. Waheed (2017) examined the determinants of external debt for oil and gas exporting and importing Countries. He employed panel least square method for 12 oil and 12 non-oil countries from 2003 to 2013. The result shows that for oil exporting countries, GDP, General Government Revenue (GGR), price of oil, foreign reserve and investment affect external debt negatively while current

account balance government expenditure and inflation affect it positively. For the non-oil exporting countries, GDP, GGR and Gross Domestic Savings affect it negatively while Trade balance, price of oil FDI and investment affect debt positively.

Awan, Anjum and Rahim (2015) studied the determinants of external debt in Pakistan during the period (1976-2010), annual time series data were used to find long run equilibrium relationship while short run dynamics have been analyzed using ARDL model. The results revealed that there is a positive, statistically significant relationship between the following economic variables :(fiscal deficit, nominal exchange rate and trade openness) and external debt. It also found that there is also a positive relationship between foreign aid and external debt, but this relationship was insignificant. Al-Fawwaz (2016), examined the determinants of External debt in Jordan using VECM and covered the period (1990-2014). His result shows that deficit, exchange rate and GDP all have negative effect on External debt while trade openness and terms of trade have a positive effect on external debt. Hencourt (2017) used a panel time series analysis technique to determine Government and external debt of South America. His result shows that economic growth reduced debt ratio in the area while trade openness and inflation negatively determine debt, broad money supply positively determine external debt.

Methodology

Data for this study was obtained from the central Bank of Nigeria Bulletin, Nigeria Bureau of Statistics and World Development indicators between 1996 and 2020 for the purpose of capturing the long-run determinants of external debt. The period was chosen because data for corruption index is available from 1996, there is increase in military expenditure and rise in corruption. Quarterly interpolation method suggested by Gandolfo (1981) was employed to interpolate the data from 1996:Q1 to 2016: Q4. This frequency increases sample size and provide more accurate estimations in our model.

Model Specification

This study utilizes Autoregressive Distributed Lag (ARDL) approach to cointegration in its analysis. The justification for using the ARDL approach and its preference over the conventional cointegration methods such as the residual-based technique (Engle & Granger, 1987) and the maximum likelihood test (Johansen, 1988; 1991; Johansen & Juselius, 1990) has been explained by several authors. This approach can be applied to assess the existence of cointegration between variables whether the variables are integrated to order zero (i.e. I(0)), order one (i.e. I(1)), or a mixture of the two (i.e. I(0) and I(1)). The ARDL technique can be applied to small sample, which is not possible under the conventional cointegration methods because they require a relatively large sample size to be valid. In addition, the conventional cointegration techniques do not permit for different lags, the ARDL method allows the variables to have different lags. Finally, the ARDL technique uses a single reduced form equation to estimate both long-run and short-run parameters of the model simultaneously while conventional cointegration methods employ a systems of equations. The ARDL model is represented below

Following Adamu and Rasia (2016) the functional form of the determinants of external debt is specified in model 1:

$$DEBT_t = f(COR, ME, GDS, DEFICIT, OILR, TDBS) \quad (1)$$

Where DEBT is the external debt stocks as a percentage of GNI (dependent variable); COR is the Control of Corruption (Estimate); ME is the Military expenditure (% of GDP); GDS is the Gross domestic savings (% of GDP); DEFICIT is the Current account Deficit (% of GDP); OILR is the Oil Revenue and TDBS is the total debt service (% of GNI).

The econometrics model:

$$DEBT_t = \beta_0 + \beta_1 COR_t + \beta_2 ME_t + \beta_3 GDS_t + \beta_4 DEFICIT_t + \beta_5 OILR_t + \beta_6 TDBS_t + \varepsilon_t \quad (2)$$

The ARDL model to be estimated is specified as follows:

$$\begin{aligned} \Delta DEBT_t &= \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta DEBT_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta COR_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta ME_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta GDS_{t-i} \\ &+ \sum_{i=0}^n \beta_{5i} \Delta TDBS_{t-i} + \sum_{i=0}^n \beta_{6i} \Delta LOILR_{t-i} + \sum_{i=1}^n \beta_{7i} \Delta DEFICT_{t-i} + \phi_1 DEBT_{t-1} + \phi_2 COR_{t-1} \\ &+ \phi_3 ME_{t-1} + \phi_4 GDS_{t-1} + \phi_5 TDBS_{t-1} + \phi_6 LOILR_{t-1} + \phi_7 DEFICT_{t-1} \\ &+ \varepsilon_{1t} \end{aligned} \tag{3}$$

The error correction model is expressed as follows:

$$\begin{aligned} \Delta DEBT_t &= \beta_0 + \sum_{i=1}^n \beta_{1i} \Delta DEBT_{t-i} + \sum_{i=0}^n \beta_{2i} \Delta COR_{t-i} + \sum_{i=0}^n \beta_{3i} \Delta ME_{t-i} + \sum_{i=0}^n \beta_{4i} \Delta GDS_{t-i} \\ &+ \sum_{i=0}^n \beta_{5i} \Delta TDBS_{t-i} + \sum_{i=0}^n \beta_{6i} \Delta LOILR_{t-i} + \sum_{i=1}^n \beta_{7i} \Delta DEFICT_{t-i} + \theta_1 ECT_{t-1} \\ &+ \varepsilon_{1t} \end{aligned} \tag{4}$$

Results and Discussion

Results of Unit Root Tests

This paper conducted the unit root tests using Augmented Dickey- Fuller (ADF) and Phillips-Perron (PP) to determine the order of integration of the variables. The results of the ADF and PP unit root test presented in Table 1 revealed that most of the variables have unit root at their levels, which means they are not stationary. The only exception is GDS which is found to have no unit root at level and hence, is stationary at level or integrated of order zero, i.e. [I(0)]. After taking the first difference of the remaining variables they became stationary, hence, they are integrated of order one [I(1)].

Table 1: Results of Unit Root Tests

Variables	ADF		PP		Stationarity Status
	Level	First difference	Level	First difference	
DEBT	-0.8204	-5.0703***	-0.7442	-5.0592***	I(1)
ME	-2.3940	-2.3245**	-2.4368	-5.5294***	I(1)
COR	-3.6709**		-2.0734	-5.1938***	I(0)
TDBS	-3.0217	-5.0046***	-3.1650	-5.5573***	I(1)
GDS	-3.6024**		-3.2827*		I(0)
LOILR	-2.1985	-3.8256**	-1.5527	-5.1216***	I(1)
DEFICIT	-3.1754	-3.6686**	-2.2704	-5.7277***	I(1)

Notes: ***, ** and * denote significance at 1%, 5% and 10% respectively. L denotes logarithm and lag length are selected based on SIC.

Source: Author's computation (2022)

Results of ARDL bounds tests

The ARDL bounds testing approach tests the null hypothesis of no cointegration among the variables by comparing the computed F-statistic with the critical values provided by Pesaran et al. (2001). The decision rule states that, if the computed F-statistic is greater than the upper bound [I(1)], the null hypothesis of no cointegration among the variables is rejected. But if the computed F-statistic is smaller than the lower bound [I(0)], the null hypothesis of no cointegration among the variables cannot be rejected. In the situation where the F-statistic falls between I(0) and I(1), the inference will be inconclusive.

Table 2 Results of ARDL bounds tests

Dependent Variable	Function				F-Statistic			
DEBT	f(COR,ME,GDS,DEFICIT,OILR,TDS)				15.7293***			
Critical Values Bounds								
10%		5%		2.5%		1%		
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
2.53	3.59	2.87	4.0	3.19	4.38	3.6	4.9	

Source Authors' computation (2022). *** denotes statistical significance at 1% level.

The bounds testing results reported in Table 2 indicates that the computed F-statistic (15.7293) is greater than the I(1) at 1% level. This implies that there is cointegration or long run relationship between the variables. The optimal lag-length of (4,6,8,4,8,8,8) suggested by Akaike Information Criterion (AIC) was used

Given the confirmation of a cointegration relationship, we proceeded to estimating the relationship between the variables

Results of the Parsimonious Long-run and Short-run Estimates

The results of the long-run and short-run of the determinants of debt in Nigeria are reported in panel A and panel B respectively in Table 3.

Table 3: Long-run and Short-run Estimates

Panel A: Long-run Coefficients - Dependent variable is DEBT				
Independent Variable	Coefficient	Standard Error	t-Statistic	Prob.
C	47.863***	5.4689	8.7519	0.0000
COR	-2.4485*	1.3974	-1.7522	0.0878
ME	92.4434***	2.8858	32.0339	0.0000
GDS	-0.1805***	0.0337	-5.3543	0.0000
DEFICIT	5.7598***	0.3586	16.0601	0.0000
LOILR	-16.9366***	0.2303	-73.5443	0.0000
TDBS	4.4981***	0.1893	23.7662	0.0000
Panel B: Short-run Coefficients - Dependent variable is ΔDEBT				
ΔCOR	4.5005**	1.8009	2.4991	0.0169
ΔME	6.5580***	1.9292	3.3993	0.0016
ΔGDS	-0.4849	0.4778	-1.0147	0.3166
ΔGDSt ₁	-1.1593*	0.6320	-1.8343	0.0744
ΔGDSt ₂	-1.6544***	0.4635	-3.5692	0.0010
ΔDEFICIT	-0.4849	0.4778	-1.0147	0.3166
ΔDEFICITt ₁	-1.1593*	0.6320	-1.8343	0.0744
ΔDEFICITt ₂	-1.6544***	0.4635	-3.5692	0.0010
ΔLOILR	-1.5115***	0.5359	-2.8202	0.0076
ΔTDBS	0.6580***	0.1866	3.5258	0.0011
ECT _{t-1}	-0.6620***	0.0586	-11.2912	0.0000
Adjusted R ²	0.9876			
F-stat	74.4529			0.0000

Note: Δ is the first difference operator.

Source: Author's computation (2022)

The parsimonious results of the long-run estimates reported in Table 3 reveals that reducing corruption has a significant and negative effect on external debt in the long-run and vice versa. A 1 unit increase in the corruption index (decrease in corruption) reduces external debt by 2.45% in the long-run. Hence, lowering corruption is associated with lower external debt in Nigeria, and vice versa. This finding lends support to the works of (Cooray, Dzhumashey & Schneider 2017; Del-Monte & Pennacchio 2020) whose analysis shows that decrease in corruption leads to decrease in external debt. Where as in the short run, a 1% increase in corruption index (decrease in corruption) leads to 4.45% increase in external debt. This implies that in the short run, corruption does not have much impact on external debt. This is line with the work of (Kim et al, 2017; Henri, 2018)

Moreover, Military expenditure (ME) has a positive and significant effect on external debt in the long-run and the short-run at 1%. A 1 percentage increase in military expenditure leads to a 92.44% and 6.56% increase in external debt in the long-run and the short-run, respectively. This shows that huge amount of money is spent by government on military to combat insecurity and sourced from external debt. This finding are in line with the work of (Solarin, 2017; Anfonfun et al, 2012). Similarly, Gross domestic savings has a negative and significant effect on external debt in the long-run and the short-run at 1%. A 1 percentage increase in gross domestic savings leads to a 0.18% and 1.65% decrease in external debt in the long-run and the short-run, respectively. This implies that availability of domestic savings will reduce sourcing for external debt and vice versa. Therefore there is the need by government to encourage domestic saving. Deficit has positive significant effect in the longrun. This shows that a 1 % increase in

deficit will lead to 5.76% increase in external debt and vice versa. This implies that as government expenditure continue to be less than its revenue, the tendency to borrow increases. This is supported by the work of (Bader and Magableh 2009). Oil revenue also has negative and significant effect on external debt as 1% increase in oil revenue in the longrun and shortrun leads to 16.94% and 1.16% significant decrease in external debt. This shows that the more oil revenue generated by the country the lesser it will source for external debt. The study further shows that TDBS has positive and significant effect on external debt in the short run and long run. A 1% increase in total debt service leads to 4.50% and 0.66% increase in external debt in the short run and longrun. This implies that the more a country is servicing debt the more it is tempted to source for external debt. The error correction coefficient is correctly signed and significant. The coefficient of 0.66 indicates that a deviation from the long run is corrected within the year.

Results of Residual Diagnostic Tests

The results of residual diagnostic tests reported in Table 4 show that the ARDL model passes all tests including normality, serial correlation, heteroscedasticity and functional form. Hence, the estimated relationship is free from the problems of serial correlation and heteroscedasticity. In addition, normality is not a problem and there is no omitted variable bias.

Table 4: ARDL-ECM model diagnostic tests

Test Statistic	Results
Normality: Jarque-Bera	3.0154[0.2214]
Serial Correlation: Prob. F(1,37)	0.1136[0.7380]
Heteroscedasticity: Prob. F(53,38)	0.6873[0.8973]
Functional Form: Reset F-stat(1,24)	0.0303[0.8633]

Source: Authors' Computation (2022)

Results of Model Stability Tests

The results of model stability tests in figure 1 show that the estimated model is stable, because, the CUSUM and CUSUMSQ lies within the 5% statistically significance level boundary.

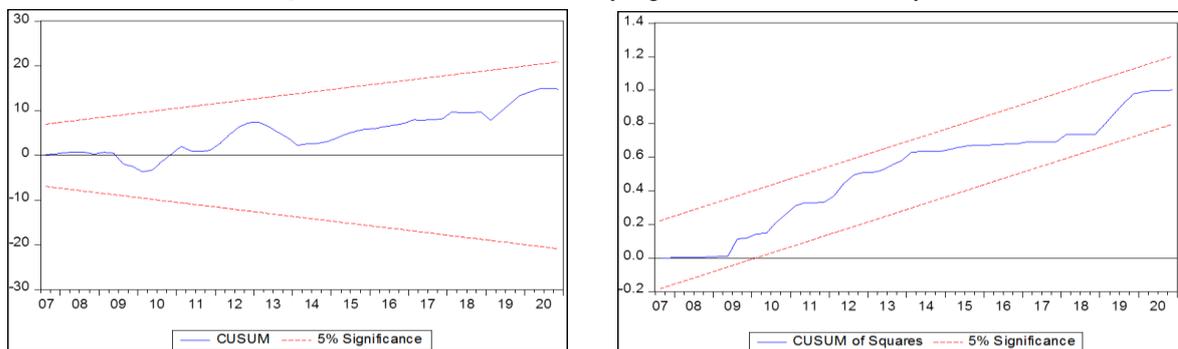


Figure 1: CUSUM and CUSUMSQ

Conclusion

External debt in Nigeria has been on the increase over the years and it is affected by many factors. This is coupled with rising expenditure; increase in exchange rate and low economic growth. The study shows that military expenditure, deficit and servicing debt lead to increase in external debt while Oil revenue and domestic savings reduce the size of external debt. Corruption significantly determines external debt due to its increase overtime.

Suggestions

The following are suggestions for the study

1. Government should improve other sectors of the economy in order to diversify source of revenue thus reducing deficit
2. Revenue from oil should be used judiciously in infrastructural development and not be shared by corrupt individuals
3. Domestic savings should be encouraged and wisely used, this will reduce external borrowing

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