

## Spending and Public Debt Nexus in Nigeria: The Role of External Reserves

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### Abstract

*Despite the numerous studies on military spending and external debt, almost none of the researchers focus on the impact of defense spending and external reserves on public debt, particularly in Nigeria. The paper used Autoregressive Distributed Lag (ARDL) technique to study the relationship between spending and public debt from 1980-2019 in Nigeria. Also, the authors examine the role of external reserves in the country. The findings reveal that a cointegration exists between the military expenditure, public debt and external reserves. Furthermore, the outcomes show that both military expenditure and external reserves have a significant and negative effect on public debt in the long run. Based on the empirical results, the article suggests that: government should take appropriate steps to increase military expenditure in order to reduce rising debt in Nigeria. Also, government should provide measures that raise external reserves in Nigeria.*

**Keywords:** Defense Spending, External Reserves, public Debt

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### Introduction

Debt is a universal phenomenon in many nations across the globe, due to the nature of developing and transition countries, particularly their financial institutions (Sadik-Zada & Gatto, 2019). The World Development Indicators (WDI, 2019) show that African countries have been experiencing increasing public debt due to the factors such as corruption, budget deficit, low output, large expenditure and inflation rate. The public debt crises in Nigeria dates back to 1958 due to the need for railway construction which was constructed at the sum of \$28 million (Matthew & Mordecai, 2016; Uzoma et al, 2015). Furthermore, the Debt Management Office (DMO) report that the country's total debt stood at N22.43 trillion in 2018, a rise of 85.06 per cent when compared with that of June 2015. Moreover, as at June 2020 the debt stock stood at N31.01 trillion compared to N28.63 trillion recorded in March 2020 (DMO, 2020).

To check rising debt, Nigerian government took a number of steps: One of the measures taken was the Decree promulgated in 1970 which put a ceiling of N1 billion on external borrowing. Later, the ceiling was adjusted, with drastic cut in imports, tight monetary and fiscal policy (Ogbe, 1992), establishment of (DMO) in 2000. In addition, the country adopted international policies including Baker plan

(1985) and Paris Club plan (1987). More recently, the establishment of Economic Recovery and Growth Plan (ERGP) in line with the DMO's medium term plan to reduce domestic debt. Despite the effort by the government, there is a rising concern on the increase in Nigeria's debt.

Giving that public debt has been increasing it might be as a result of the rising defense spending and increase in external reserves. It is in line with this, that the present study seeks to investigate the nexus of defense spending and external reserves on public debt in Nigeria.

## **Literature Review**

### **Theoretical Literature Review**

Foreign reserve is hypothetically linked with debt. It was affirmed that the relationship exists between expenditure and foreign reserve is adverse (Azam & Feng, 2015; Looney, 1987). In explaining the hypothesis, Looney (1987) opined that, since public spending in general and military spending in precise are often foreign exchange intensive, the adverse relationship is assumed since the problem is zero-sum game. Sheikh et al. (2013) concluded that, economies with less foreign reserves have to rely more on debt. Furthermore, military expenditure is theoretically linked with public debt. According to the Neo-Classical theory, for a country to finance its expenditure the state has various choices for raising the funds. It can resort to domestic sources including taxes and fees or through barrowing if the domestic source is not adequate to overcome the budget deficit.

### **Previous Related Literature**

Numerous studies were made to examine the impact of defense spending on public debt. Studies focusing on the impact of external reserves on public debt are not many. For instance, Azam and Feng (2015) investigated the effect of military spending on external debt, considering ten Asian countries during the period 1990 - 2011. The authors employed Hausman's test, Random-Effects and Fixed-Effects techniques. The outcomes indicated that the impact of foreign exchange reserves on public debt is negative. Sheikh et al. (2013) investigated the defense expenditure and debt relationship in Pakistan and India from 1972 to 2010. By employing ARDL technique. The authors reveal that foreign reserve has a negative influence on debt.

Looney (1987) studied the effect of defense spending on debt in third world countries over the period 1970 - 1985, using OLS. The results reveal that foreign reserve affect external debt negatively. Qian and Steiner (2017) investigated the foreign reserves effect on the maturity structure of external debt, covering 66 developed and developing nations. Employing various econometric methods. The result shows that reserves rise external debt. On the other hand, Khan et al. (2020) employed the Pooled Mean Group (PMG) approach and teste the effects of defense expenditure on external debt of 35 arms importing countries, using the annual panel data over 1995 to 2016 period. The results of the finding submit that military expenditure rises the external debt burden. Also, Abbas and Wizarat (2018) assessed the effect of military spending on the exploding external debt in five South Asian economies, during 1990 to 2015 period. Employing panel fixed effect regression model. The authors disclose that the external debt of selected South Asian countries is inversely influences their military spending.

Sadik-Zada and Gatto (2019) explored the main determinants of the public debt growth in 184 countries. The fundamental cross-country investigation is conducted in order to enhanced gathering of data on the federal government borrowing for 2013. The authors reveal that defense expenditure is negatively related with public debt. Çolak and Özkaya (2020) used panel threshold regression approach and studies the nexus between external debts and defense expenditures for the selected transition economies from 1997 to 2016. The findings reveal the existence of double threshold effects that are rooted in military spending, and the debt-accelerating effect of defense spending arises.

Selcuc and Evren (2017) investigated the effects of defense spending on external debt, by employing annual panel data for 36 developing economies, and employing Pooled OLS Model and Dynamic Panel approaches from 1996 to 2013. The outcomes indicated that a variation in military spending affect external debt positively in the transition economies studied. In addition, Sheikh et al. (2013) studied the defense/debt relationship in Pakistan and India from 1972 to 2010, by employing ARDL technique. The authors reveal that military expenditure affect external debt positively. Also, Azam and Feng (2015) empirically explored the effect of military expenditure on external debt, using a sample of ten Asian economies over the period from 1990 to 2011. Employing Hausman's test, Random-Effects and Fixed-Effects Models, the outcomes reveal that the effect of defense spending on external debt is positive. Shahbaz et al. (2013) used ARDL approach to examine the effect of military spending on external debt in Pakistan

from 1973 to 2009. The results reveal that increase in military expenditure rises the stock of external debt. Moreover, Dunne et al. (2013) employed a panel cointegration test and studied military spending and debt in South America (Argentina, Brazil and Chile). From 1970 to 2000 using OLS. The findings reveal that military burden had no effect on the progress of debt in Argentina and Brazil, but military burden tended to increase debt in Chile.

Moreover, Ahmed (2012) assessed the debt burden, defense expenditure and growth in 25 Sub-Saharan African Countries from 1988 to 2007. The Authors employed panel cointegration technique Fully Modified OLS (FMOLS), Dynamic OLS (DOLS) and Dynamic Fixed Effect (DFE). The result reveals that defense expenditure has a positive and significant impact on external debt stock. Moreover, Georgantopoulos and Tsamis (2011) used the Johansen cointegration Models to examine the Interrelationship between defense expenditure and external debt in Northern Africa Countries from 1988 to 2009. The findings show that military spending robustly affects the country's external debt.

Furthermore, Solarin (2017) assessed the effect of disaggregated defense spending and the debt profile in Nigeria for the period of 1981–2012. The ARDL, FMOLS and DOLS techniques were employed. The results demonstrated that a rise in military spending encourages public debt. In addition, Anfofum et al. (2014) explored the nexus between military spending and external debt burden in Nigeria by applying Granger causality, variance decomposition and VAR, from 1986 to 2011. The results illustrate that there is a unidirectional causality between military spending and external debt. Thus, studies conducted in Nigeria left out external reserves as a variable in their analysis (see Anfofum et al., 2014; Solarin, 2017).

### **Theoretical Framework**

The framework for this study is based on the Neo-classical theory and the hypothetically linked of external reserves with public debt. Many public debt models have been developed using Neo-classical framework (Dunne et al., 2013; Solarin, 2017). The article used certain variables which have been mentioned in the previous studies as potential factors influencing public debt (PD) in a country. One of the variables is the defense spending. Solarin (2017) hypothesize that an increase in government expenditure will cause debt to rise. Similarly, defense spending can encourage more public debt as a result of high cases of insecurity and

dependent on imported arms and military related equipment (Azam & Feng 2015; Sheikh et al., 2015).

In addition, per capita GDP is an important determinant of public debt. Sheikh et al. (2013) opined that, an increase in GDP would enhance a country's capacity to pay external debt. This is based on the fact that at higher level of GDP, public debt also increases (Anfofum et al., 2014). On the other hand, Azam and Feng (2015) argued that increases in economic growth will reduce external debt. Also, it was being argued that inflation (INF) can influence public debt. Matthew and Mordecei (2016) stated that inflation can increase external debt. Benfratello et al. (2015) pointed out that inflation rate is expected to have a negative effect on public debt. Furthermore, inflation can reduce the real value of public debt (Corray & Schneider, 2013). Moreover, public debt is dependent on the level of external reserves (EXTRES), because a nation with large external reserves will have better capacity to reduce borrowing than a country lacking in external reserves. Qian and Steiner (2017) mentioned that reserves are expected to have a negative effect on public debt. If government uses foreign reserves to finance the deficit, this may create foreign exchange crises. Based on the issues deliberated above, the public debt model is depicted as:

$$PD_t = \partial_0 + \partial_1 MILEX_t + \partial_2 LGDP_t + \partial_3 INF_t + \partial_4 LEXTRES_t + \varepsilon_t$$

where L symbolizes the logarithm of the variables. Annual data were used from 1980 to 2019. The period was selected due to the data availability. PD is proxied by Total debt service (% of GNI) also defense spending is proxied by military expenditure (% of GDP), GDP is per capita GDP and INF is Consumer price index. The data on public debt, military spending, per capita GDP and inflation were collected from the WDI. Lastly, external reserves were source from central bank of Nigeria.

### **Methodology:**

The method used was Autoregressive Distributive Lag (ARDL). The approach was developed by Pesaran and Shin (1999), and Pesaran, Shin and Smith (2001). The method has advantages over other cointegration tests, such as the residual-based technique by Engle and Granger (1987) and Full Maximum Likelihood (FML) test based on Johansen (1988) and on Johansen and Juselius (1990). Some of the advantages are; the method does not enforce that all the variables must have the same order i.e. all I(1) or I(0) (Nyasha & Odhiambo, 2015). Also, the method generally gives unbiased results of the long-run model and valid t statistics even when some of the regressors are endogenous (Rafindadi & Musa, 2019).

The ARDL model is specified as follows:

$$\begin{aligned} \Delta(PD) = & \partial_0 + \partial_1(PD)_{t-1} + \partial_2(MILEX)_{t-1} + \partial_3(INF)_{t-1} + \partial_4 \ln(GDP)_{t-1} \\ & + \partial_5 \ln(EXTRES)_{t-1} + \sum_{i=1}^n \beta_i \Delta(PD)_{t-i} + \sum_{i=0}^h \beta_2 \Delta(MILEX)_{t-i} \\ & + \sum_{i=0}^j \beta_3 \Delta(INF)_{t-i} + \sum_{i=0}^c \beta_4 \Delta \ln(GDP)_{t-i} \\ & + \sum_{i=1}^n \beta_5 \Delta \ln(EXTRES)_{t-i} + \mu_t \end{aligned}$$

The ARDL approach test the null hypothesis that no relationship exists over the alternative hypothesis that relationship exists for the individual equation stated as follows:

$$\begin{aligned} H_0 &= \partial_0 = \partial_1 = \partial_2 = \partial_3 = \partial_4 = \partial_5 \\ H_1 &\neq \partial_0 \neq \partial_1 \neq \partial_2 \neq \partial_3 \neq \partial_4 \neq \partial_5 \end{aligned}$$

Econometric techniques

The study first tests the non-stationarity/stationarity of our variables using Augmented Dickey Fuller (ADF) and Philips–Perron (PP) tests. The outcomes from ADF and PP unit root tests are given in Table 1. The results portrayed that MILEX and INF are integrated of order zero, i.e. I (0). On the other hand, PD, LGDP and LEXTRES they are integrated of order one, I (1). Therefore, the variables are a mixture of [me (0) & me (1)]. Since the variables are integrated of order zero and one,

**Table 1: Results of Unit Root Tests**

Variables	ADF		PP		Status
	Level	1 <sup>st</sup> difference	Level	2 <sup>nd</sup> difference	
PD	-2.0267	-6.0397***	-2.1086	-9.2228***	I(1)
MILEX	-5.3321***	-----	-7.0410***	-----	I(0)
lnEXTRES	-0.7863	-5.1406***	-0.8187	-6.6453***	I(1)
lnGDP	-2.1587	-7.8459***	-2.1587	-6.9971***	I(1)
INF	-5.7624***	-----	-5.7624***	-----	I(0)

Note\*, \*\* and \*\*\* indicate significance at 10%, 5%, and 1%, respectively.

Having affirm the integration order of the variables. The paper employed ARDL approach to analyze the impact of defense spending and external reserves on public debt in Nigeria.

**Results of Bound Test**

Having established the stationary status of the variables, the cointegration test is then conducted using the bounds testing approach. The result of bounds test is presented in Table 2. The results establish that the computed F-statistic (6.664847) is greater than I(1) at all level. This infers that a cointegrating relationship exists between the variables under study. Since a long run relationship exists among the variables, the next is to evaluate this relationship between them.

**Table 2:** Results of Bound Test

Dependent variables	Function		F Statistics				
PD	f(PD/MILEX, ln EXTRES, ln GDP, INF)		6.664847***				
Critical Bounds	Value						
	10%		5%		2.5%		1%
I(0)	I(1)	I(0)	I(1)	I(1)	I(0)	I(1)	I(0)
2.2	3.09	2.56	3.49	2.88	3.87	3.29	4.37

**Note:** \*\*\* denotes statistical significance at the 1% level.

**Results and Discussion**

Based on the results, the optimal lag-length recommended by the Akaike Information Criterion (AIC) is (3,2,2, 4). Both the long and short run results are presented in Table 3. The results illustrate that military expenditure in long run has a negative and significant effect on public debt at the 1% level. An improvement in defense expenditure leads by 1% leads to a 2.1% decrease in public debt. While in the short run, MILEX is positively. Improvement in military spending by 1% leads to a 1.6% increase in public debt. This finding lends support to the works of Khan et al. (2020), Solarin (2017), Sadik-Zada and Gatto (2019). The results of estimation show that an increase in military spending leads to a rise in public debt in the short run and fall in the long run in Nigeria. The findings support the Neo-classical theory of public debt which states that an increase in government (or

military) expenditure tend to raise public debt. This outcome reflects the situation in Nigeria, where rising cases of kidnapping, arm banditry, cattle rustling and the Boko Haram insurgency, necessitate the need for more military spending to check these spates of insecurity in the country. While, in the long run its possible that when the problem was overcome the debt will be reducing. ARDL coefficients for long-run

**Table 3:** Results of ARDL Short Run and Long Run Model

Panel A: ARDL coefficients for long-run - Dependent variable is PD				
Regressor	Coefficient	Standard Error	T-Ratio	Prob.
MILEX	-2.125	0.773	-2.750	0.014
lnEXTRES	-0.598	0.309	-1.936	0.069
lnGDP	-0.936	0.211	-4.436	0.004
INF	0.016	0.012	1.335	0.191
C	18.970	3.098	6.124	0.000
Panel B: Short-run Coefficients - Dependent variable is $\Delta$ PD				
$\Delta$ MILEX	0.359	0.647	0.561	0.583
$\Delta$ MILEX <sub>t-1</sub>	1.598	0.695	2.299	0.034
$\Delta$ INF	0.010	0.0416	2.397	0.028
$\Delta$ INF <sub>t-1</sub>	-0.169	0.047	-3.608	0.002
$\Delta$ lnEXTRES <sub>t-1</sub>	-0.628	0.323	-1.945	0.068
$\Delta$ lnEXTRES <sub>t-2</sub>	1.989	0.349	5.699	0.000
$\Delta$ lnGDP	5.377	1.553	3.463	0.003
$\Delta$ lnGDP	8.136	1.459	5.578	0.000
$\Delta$ lnGDP	-4.044	1.525	-2.652	0.017
$\Delta$ lnGDP	4.262	0.712	5.989	0.000
ECT <sub>t-1</sub>	-1.334	0.185	-7.194	0.000

**Source:** Author's calculation (2020)

Furthermore, EXTERS affect public debt negatively and significantly in the long run and the short run at 10% level. A 1% rise in external reserves leads to a 0.60% and a 0.63% reduction in public debt both in the long and the short run, respectively. This finding is consistent with the outcomes of previous studies (see Azam & Feng, 2015; Looney, 1987; Sheikh et al., 2013). Moreover, Qian and Steiner (2017) argued that, as societies experience increases in foreign exchange reserves, public debt might be reduced. It is likely for a nation with adequate foreign reserves to raises it spending without acquiring anydebt. Also, the hypothesis tested is that a

negative relationship exists between defense expenditure and foreign reserve. It is important to state that the control variables were introduced for robustness check as suggested by Leamer (1983). Moreover, the signs and magnitudes of variables of interest are considered only since the control variables were introduced for robustness check. It might be possible that their signs and magnitudes of other variables will not make any meaningful economic sense (White & Lu, 2014). The error correction term has negative sign and also statistically significant. The coefficient of -1.33 implies that a deviation from the long run is corrected by about 133% within a year.

### **Diagnostic Test Results**

The results presented in Table 4 disclose that the ARDL technique qualified the diagnostic tests such as auto correlation (with 2-lags), normality, functional form and heteroscedasticity. Moreover, it can be realized that the graph of the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMQ) in Figure 1 and 2 are within the critical bounds indicating that all coefficients in the error correction model are stable in the long run.

### **Conclusion**

This study used ARDL bounds testing method to examine the effect of military expenditure and external reserves on public debt from 1980 to 2019. The study concluded that there is long term relationship exists between the defense spending, external reserves and public debt. Furthermore, the resolved that that, in the long term, military expenditure will lead to reduction in public debt. Also, the paper submitted that increase in external reserves have a significant impact in reducing the debt burden in the country. Based on these conclusions, the study makes the following recommendations: government should increase military expenditure in order to reduce rising debt, if the security agencies in the country are able to secure the country through proper funding, the government will stop borrowing to finance insecurity as such reduces debt burden. Also, government should provide measures that raise external reserves in Nigeria, because if there is any outbreak of insecurity government can draw from its foreign reserves in state of borrowing.

**Table 4.** ARDL-ECM Model Diagnostic Tests

Test Statistic	Results
Serial Correlation: CHSQ(2)	0.4862 [0.2011]
Functional Form: Reset F-stat(1, 16)	2.9665 [0.1043]

Normality: Jarque-Bera 1.9436[0.3784]  
 Heteroscedasticity: CHSQ(17) 0.8734 [0.7577]

Source: Author's calculation (2020)

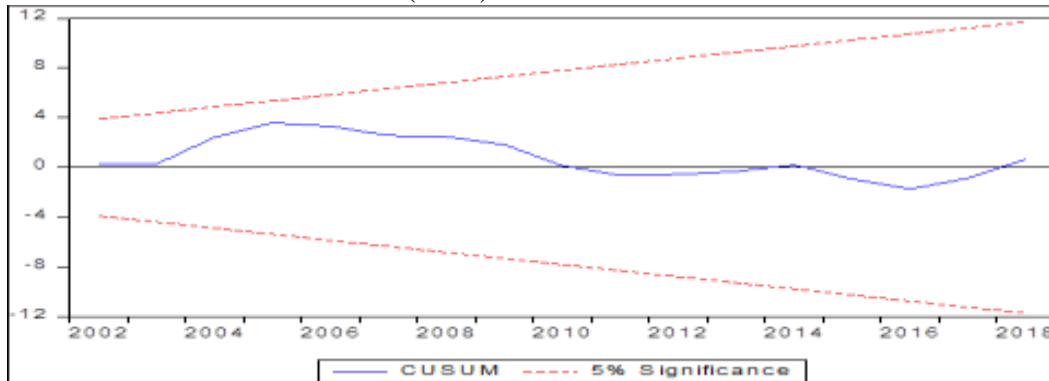


Figure 1: Plots of the cumulative sum of recursive residuals

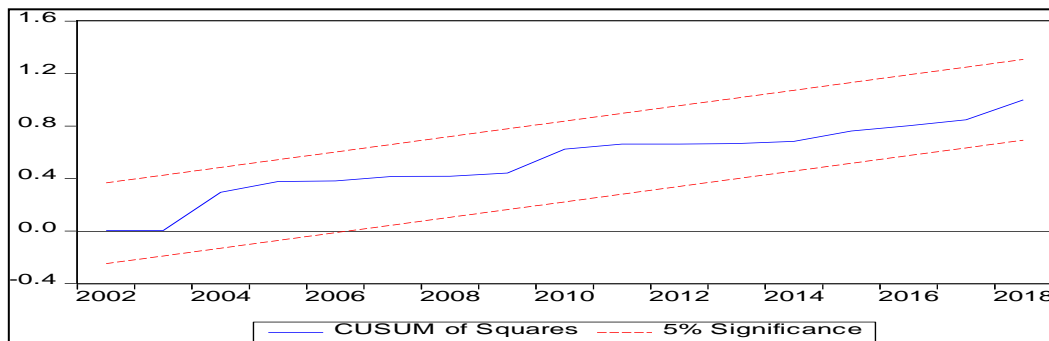


Figure 2: Plots of the cumulative sum of squares of recursive residuals

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