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# Determinants of External, Domestic, and Total Public Debt in Nigeria: The Role of Conflict, Arms Imports, and Military Expenditure

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## ABSTRACT

Nigeria's external and domestic debt have been rising very rapidly in recent years despite the crushing weight of debt burden that almost crippled its economy in previous decades. This study examines the likely determinants of public debt in Nigeria over the period 1970–2020 with a focus on the effects of armed conflict, arms imports, and military spending. Unlike most previous studies that focus only on external debt, this study employs the three separate measures of public debt, namely, government gross debt, external debt, and domestic debt. In addition to being more applicable to the case of Nigeria, this also allows us to investigate whether the drivers of public debt vary with the measure of debt used. Employing the ARDL approach to cointegration and a number of robustness checks, findings suggest that whereas conflict, arms imports, and military spending have statistically positive effects on external debt, they do not have a significant effect on domestic debt. Conflict and arms import have positive effects on gross government debt which is unsurprising given that gross debt includes foreign currency denominated debt. Policy recommendations based upon these findings are discussed.

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Total public debt; external debt; domestic debt; socio-political factors; Nigeria; conflict

## Introduction

The empirical literature on the determinants of public debt is predominantly made up of cross-country panel studies. One of the main findings driving the current discussions is that the evidence from cross-country panels may not apply to individual countries due to the influence of country-specific factors that may not be well captured in a panel framework. Oatley (2010), for example, finds that some developing countries were more heavily indebted than others during the late 1990s because of the differences in political regimes. Autocratic regimes are shown to have a higher tendency to borrow from foreign sources than democratic regimes, often for reasons other than to invest in the provision of public goods. Similarly, there is considerable amount of evidence to support the role of governance in explaining the differences in public debt burdens across countries (see, for example, Alesina and Perotti 1999; Alesina et al. 1999; Woo 2003). The tendency, therefore, is for each country's public debt to respond uniquely to different underlying factors (Ajayi 1991; Panizza and Presbitero 2013; Ahlborn and Schweickert 2018).

There are a number of ways to address this widely acknowledged heterogeneity in the public debt literature. One way is to employ empirical approaches that allow for heterogeneous slope coefficients (Pesaran and Smith 1995; Pesaran, Shin, and Smith 1999; Chudik and Pesaran 2015). Another way,

which is useful for accounting for idiosyncratic country or region-specific factors, is to focus the analysis on a country case or on a particular group of countries that assume similar characteristics. This study follows the latter approach to examine the determinants of public debt in Nigeria with particular focus on the roles of conflict, arms import, and military spending. Armed conflict is one of the more recurrent socio-political issues that Nigeria has been facing since gaining independence in 1960. Notable cases are the Biafran War of the late 1960s, the crisis of armed militias in the Niger-Delta region which heightened during the democratic dispensation of Goodluck Jonathan from 2010 to 2015, the Islamist insurgency (Boko Haram) which began in 2009, and more recently, the farmer-herder crisis, armed banditry, and insurgencies in many parts of the country.

The economic implications of conflict have been widely debated (see for example, Collier 1999; Guidolin, Ferrara, & Guidolin, 2010; IMF 2019a; Ali 2013). It is reasonable that military spending will tend to respond positively to an increase in conflict, as scarce resources are justifiably channelled into the purchase of arms and ammunitions (Guidolin and Ferrara 2010). In support of this, Dunne, Nikolaidou, and Chiminya (2018) and Okwoche and Nikolaidou (2022) show that military spending is higher in SSA countries that have experienced conflict. Relatedly, there are allegations in Nigeria of massive scandals relating to the misappropriation of resources allocated to the purchase of arms<sup>1</sup> (Willett 2009). Such cases of corruption end up increasing government spending on defence to no avail. Analysts have decried the relentless growth of military spending in the face of rising conflict in Nigeria. Thus, the tendency towards the growth of conflict-related military spending is also likely to raise government deficits and debt given the inadequacy of public finance and the recurrent fluctuations in government revenues in Nigeria.

There are several reasons to justify our focus on Nigeria. First, it is the most populated SSA country. With a population of over 200 million people as of 2019 (WDI, 2020), the country represents a substantial part of SSA. Second, the history of Nigeria's public debt typifies that of SSA countries, in terms of magnitude, structure and composition. Prior to the debt relief interventions, Nigeria's public external debt stood at US\$36 billion, making it SSA's most indebted country at the time<sup>2</sup> (Ajayi 1991; Ogunyemi 2011). Moreover, similar to what is obtainable in many SSA countries, domestic debt and external debt have been rising along with the growing tendency to borrow from the international private capital markets (Olabisi and Stein 2015; IMF 2019a). Third, evidence shows that Nigeria was SSA's highest military spender during the period of the Civil War and remains one of the largest spenders due to the growing insecurity threats in recent years (Tian, Wezeman, and Yun 2018).

The study contributes to the existing literature in two unique ways. First, previous studies focusing on Nigeria have ignored the role of conflict and military spending despite the possibility that these could help to explain the debt problem in the country. Second, previous studies have focused mainly on external debt which may not be representative given the large size of domestic debt in Nigeria during 1970–2020 period. This study examines the underlying drivers of Nigeria's public debt with emphasis on the role of conflict, arms import, and military spending, and employs three separate measures of public debt, namely, government gross debt, external debt, and domestic debt. In Nigeria, both external and domestic debt have contributed significantly to public debt over the study period, suggesting that both components of debt should be included in a representative analysis. Empirical analyses are aided by time series data spanning 1970–2020. Data analyses are carried out using the framework of the autoregressive distributed lag (ARDL) approach to cointegration.

The rest of the paper is organized as follows: Section 2 reviews the literature. Then, Section 3 specifies the model and provides details about the data and estimation methods. Section 4 presents and discusses the findings. Finally, section 5 concludes the paper and provides policy recommendations.

## Literature review

Theoretically, public debt has been attributed, first to purely economic factors such as growth, government size, and inflation (Barro 1979; Lucas and Stokey 1983; Kirchgassner 2001), and then to socio-political factors such as the quality of governance (see, for example, Alesina & Perotti, 1995; Alesina and Perotti 1996) and regime (Olson 1993). Given the debt crisis of previous decades in SSA countries, researchers have given various empirical attempts at characterising the problem and determining its causes. The majority of the existing studies are cross-country studies employing panel data methods.<sup>3</sup> A very limited number of country case studies have been published for either developed or developing countries (see recent study by Kollias, Paleologou, and Zouboulakis (2021) that uses long time series for the case of Greece, Nikolaidou's (2018) study for Greece, Beyene and Kotosz's. (2020) for Ghana, inter alia). For Nigeria, the studies that investigate the determinants of public debt include those by (Ajayi 1991; Ogunyemi 2011; Abdullahi, Bakar, and Hassan 2015). However, studies for Nigeria focus on macroeconomic variables and fail to consider the role of conflict, military expenditure, arms imports and socio-political factors.

Ajayi (1991) examines the determinants of external debt taking a macroeconomic approach, and considering factors like fiscal surplus/deficit, foreign interest rates, terms of trade, real exchange rate, and growth of the industrialised countries. Similarly, Abdullahi, Bakar, and Hassan (2015) focus on the macroeconomic drivers of external debt in Nigeria and consider the contribution of high interest rate, low savings, weak exchange rate position and fiscal (surplus/deficit) position of government. Ogunyemi (2011) gives a historical perspective to Nigeria's debt problem, showing the evolution of Nigeria's debt before after independence in 1960. The study's main argument is that the foundation of debt problems that came to plague Nigeria's economy post-independence was laid in the colonial era, between the period 1914–1960. The study shows that government's fiscal position is the most important determinant of Nigeria's debt and that the leaders of post-independent Nigeria were much less careful in this regard than the colonia rule.

In an interesting perspective on SSA's previous debt crises, Danso (1990) and Ajayi (1991) argue that the drivers of public debt can be categorized either as internal or external. External factors are those that lie outside the control of the debtor country, while internal factors are within the country's control and are thus of particular importance in determining debt sustainability. For example, factors like oil price shocks, the global interest rate, and the growth rate of the advanced countries<sup>4</sup> have been classified as external, while factors like economic growth, fiscal deficits, and inflation, are classified as internal. External factors have received a lot of attention in the literature in relation to the previous debt crises in SSA countries (e.g. Greene and Khan 1990; Easterly 2001; Pattillo, Poirson, and Ricci 2002). However, focusing only on such factors, though relevant, may be of little help in preventing future debt problems according to Danso (1990).

Internal factors on the other hand are idiosyncratic to the individual country. For Taiwo (1988, 1989), in characterising the nature and trends of public expenditure in Nigeria, indicates that government consumption is strongly influenced by previous habits and tends to be persistent. Similarly, Ogunyemi (2011) in a historical perspective to Nigeria's public debt problem, emphasises the effects of ambitious government spending and persistent budget deficits. Also, Nyatepe-Coo (1993) highlights the key role of fiscal restraint in the avoidance of debt crisis in Nigeria. Notably, the internal factors that have been emphasized for the case of Nigeria, such as economic growth and oil price, are mainly economic in nature. However, some internal factors that may play an important role in explaining Nigeria's public debt are socio-political in nature. Factors such as governance quality (e.g. Woo 2003; Alesina et al. 1999), system of government (Olson 1993; Oatley 2010), social polarization, and the related factor of armed conflict (Woo 2003; Dunne, Nikolaidou, and Chiminya 2018; Okwoche and Niklaidou, 2022) are relevant to Nigeria as to other SSA countries. The major focus of this study is to examine the effects of armed conflict, arms import, and military expenditure, as well as the effects of purely economic factors identified in the literature, such as growth, inflation, and oil price.

The role of armed conflict has been ignored in the public debt literature focusing on Nigeria, but it poses an increasing level of risk to the country's public finance. Since the Biafran War in 1967–1970, several incidences of conflict have been recorded. There is the persistent Boko Haram conflict which began in 2009 and remains a major source of concern to the authorities. Even more deadly is the farmer-herder conflict mostly witnessed in the North Central of Nigeria which has reportedly claimed many lives and displaced many others. The problems of insurgencies, armed banditry, and kidnapping continue to plague many parts of Nigeria, restraining travels, and constraining agricultural production in some of the rural areas (OECD 2013). The many-sided economic effects of conflict have been explored widely in the literature including its demographic, growth, and fiscal performance effects (e.g. Barrett 2018; Fang et al. 2020). Regarding its effect on fiscal performance, conflict may have severe negative consequences for the revenue-generating capacity of the government as it may contract the tax base and make fiscal consolidation difficult (Ndikumana 2001). An important effect of conflict arises from its likelihood to increase military expenditure at the expense of other important growth-enhancing capital spending (IMF 2019b).

### Model Specification, Data, and Methods of Estimation

Following Dunne, Nikolaidou, and Chiminya (2018), we model public debt as a function of conflict, military expenditure and other economic variables. A number of important extensions are made in light of the particularities of the Nigerian context. First, instead of focusing only on external debt, we employ three measures of public debt, namely general government gross debt, external debt, and domestic debt. In addition to being more representative for Nigeria, it also helps us to examine whether the effects of conflict and military spending vary with the measure of debt employed. Second, as an alternative to conflict and military spending, we employ arms import to facilitate the robustness of results. Third, using a debt relief dummy, we account for the Paris Club debt cancellation which was finalised in 2006. Finally, we control for a different set of economic variables, namely oil price, economic growth, government's fiscal position and inflation. The model is specified as follows:

$$d_t = \alpha_0 + \beta' X_t + \gamma' Q_t + \varepsilon_t \quad (1)$$

where the dependent variable ( $d_t$ ) denotes either the log of government gross debt ( $ggd_t$ ), log of external debt ( $ed_t$ ) or log of domestic debt ( $dd_t$ ), each expressed as a share of GDP. The log level of total external debt is also considered for robustness. The intercept and error terms are denoted by  $\alpha_0$  and  $\varepsilon_t$ , respectively, includes the main explanatory variables of interest, namely, conflict, arms import or military expenditure over GDP while the vector  $Q_t$  includes the set of control variables, namely, the log of real GDP, the fiscal (surplus/deficit) position of government as a share of GDP, the log of inflation using the consumer price index, and the log of real average crude oil price.

To avoid definitional ambiguities, we refer to government gross debt as all liabilities requiring payment(s) of interest and/or principal at a date or dates in the future (Abbas et al. 2011). It is more encompassing than external or domestic debt. Data on government gross debt are obtained from the Historical public debt database (Abbas et al. 2011). External debt is defined as debt owed to non-residents, repayable in currency, goods, and services. Data on external debt as a share of GNI and total external debt are obtained from the World Development Indicators (WDI). Domestic debt is not uniquely defined, but the three commonly used definitional criteria are applicable given the concept of the original sin.<sup>5</sup> These are, the residence of the creditor, the currency of issue, and the jurisdiction of issue (Bua, Pradelli, and Presbitero 2014). The first criterion defines domestic debt as debt issued to residents; the second defines it as debt issued in domestic currency, while the third defines it as debt issued in local financial markets. These definitions satisfy Nigeria's domestic public debt, which is referred to as debt issued to residents, in domestic currency, and in local financial markets (Asogwa

and Ezema 2005). Data on domestic debt are collected from the Central Bank of Nigeria Statistical Bulletins of various years.

Turning to the key explanatory variables of interest as captured by  $X_t$ , armed conflict ( $con_t$ ) is measured as a dummy variable which takes one in a year of armed conflict, that is, a year in which there are at least 25 battle deaths, and zero otherwise. The conflict dummy is constructed using Uppsala Conflict Data Program (UCDP) and the Peace Research Institute Oslo (PRIO) armed conflict database. A positive relationship between and debt is expected *a priori*.

Military spending is made up of all expenditures related to the armed forces, including peace-keeping forces, the defence ministry, and other government agencies involved with defence projects. We include the log share of military expenditure in GDP hereinafter referred to as the military burden ( $mxy_t$ ) in the baseline regression, and for robustness employ the log of real military expenditure ( $rmex_t$ ). Data on these series are obtained from the SIPRI database. Military expenditure is likely to lead to increased borrowing which is suggestive of an expected positive effect on public debt. Although we employ three separate measures of public debt, we hypothesise that military expenditure is associated more with external debt than domestic debt given that some components of military spending such as the procurement of arms and ammunition have to be done in foreign currency. Arms import data, also provided by SIPRI, covers the supply of weapons through sales, aids, gifts, and manufacturing licences. The data also include the supplies of weapons to and from rebel forces in times of armed conflict. Arms import is also expected to have a positive effect on public debt.

Regarding the control variables included in, log real GDP ( $y_t$ ) is an important determinant of public debt in the literature. A fast and sustained increase in the real national output is expected to bring about declines in the debt burden. It is, however, possible that an increase in the variable or the expectation of it could lead a government to accumulate more debt (Woo 2003). Thus, the expected sign of this variable is not clear *a priori*. Data on real GDP are from the WDI. Log oil price captures the importance of oil in the Nigerian economy. Improvements in oil revenues are expected to have a debt-reducing effect. Data on real average crude oil price are drawn from World Bank Commodity price database.

In line with the preponderance of evidence supporting the role of persistent government spending and deficits, the model includes government's fiscal position, measured as government surplus/deficit as a share of GDP ( $\Delta$ ). The variable is computed as the difference between government's spending and the total receipt from revenue which could either be a surplus or deficit, depending on the size of spending *vis-à-vis* the revenue. It is expected to have a negative sign in the regression as government surpluses will tend to lead to a fall in debt while deficits will have the opposite effect. Data on government's fiscal position are obtained from the CBN Statistical Bulletins.

The influence of macroeconomic instability is captured using the consumer price index ( $\pi$ ), a proxy for inflation. High inflation could create volatility in budget deficits through its effect on government revenue and spending (Javid, Arif, and Arif 2011). In this case, the variable is predicted to have a positive sign in the regressions. However, given the fact that inflation reduces the real interest rate paid on debt (Escolano 2010), inflation may be debt-reducing in cases where the governments employs it as a means reducing the debt burden (Reinhart and Sbrancia 2015; Akitoby, Komatsuzaki, and Binder 2014). The plausibility of such argument derives from the large share of domestic debt in total public debt in Nigeria (Forslund, Lima, and Panizza 2011; Ngangnon 2014). Data on consumer price indices are obtained from the World Development Indicators.

Finally, the debt relief dummy captures the impact of the 2005–2006 debt cancellation on Nigeria's public debt. The expected sign of the variable is not clear. On one hand a negative sign could be attributed to the drastic debt reductions resulting from the debt relief. On the other hand, a positive sign could reflect the increased fiscal space created by the debt relief which has quite often been associated with the growing levels of public debt.

Annual time series data spanning 51 years from 1970 to 2020 are employed for the analyses. Table 1 presents summary statistics on the variables and shows that on average, government gross

**Table 1.** Descriptive Statistics

	mean	standard error	maximum	minimum
gross govt debt/gdp	52.50	51.20	193.7	7.276
external debt/gdp	29.84	28.88	120.8	3.771
total external debt	15.27	11.60	32.55	0.452
domestic debt/gdp	11.78	4.006	23.18	5.756
milex/gdp	1.745	1.999	8.124	0.348
real milex	1970	1493	7325	416.1
real GDP	232.3	133.8	502.9	99.80
fiscal position/gdp	-2.177	2.935	9.80	-8.80
inflation	18.17	15.48	72.83	3.457
oil price	41.91	25.18	95.31	5.212

Note: Total external debt in billions of US dollars; real GDP (y) in billions of US dollars; real milex in millions of US dollars; milex stands for military expenditure.

debt is 52% of GDP, external debt is 29% of GDP, while domestic debt is about 12% of GDP over the study period. Each of the debt variables has quite a large standard deviation and a considerable difference between the minimum and maximum values which reflect large variations in the series. The military burden seems quite low relative to GDP on average, but real military expenditure is as large as 1.8 billion dollars on average during the study period. Average fiscal position of government is a deficit which seems to point to the persistence of government spending even through periods of low or dwindling government revenues. We also report a considerably large double-digit inflation on average which suggests that macroeconomic uncertainty was high over the period.

## Methods of Estimation

### The ARDL Approach to co-integration

This section discusses the approach through which the analyses of the determinants are carried out. Co-integration methods are popular for their applicability in modelling long-run time-series relationships. While several of these approaches have been employed in the relevant literature,<sup>6</sup> this study employs the autoregressive distributed lag approach (ARDL) approach (Pesaran and Shin 1999; Pesaran, Shin, and Smith 2001). The ARDL technique is the workhorse for the analyses of dynamic single-equation models and has several advantages. First, it obviates the limiting requirement in previous co-integration techniques that all variables in the model must be uniformly non-stationary of the first order (hereinafter,  $I(1)$ ). By allowing a mixture of stationary, non-stationary and mutually integrated variables,<sup>7</sup> the model eliminates a great deal of uncertainty from the analysis (Pesaran, Shin, and Smith 2001; Narayan 2004). Second, the method facilitates the simultaneous estimation of long-run and short-run parameters through the error-correction process. This feature of the ARDL model is useful in this study given the long-term approach to the formulation of debt-management policies (DMO 2005). Third, the ARDL model is relatively more efficient in small-sized or finite samples in determining the existence of long-run relationships (Narayan 2004). Finally, it allows each variable in the model to have its own lag structure.

### The ARDL Model

Given equation (1), let the long-run equation be expressed as follows:

$$d_t = \alpha_0 + \alpha_1 m_t + \alpha_2 y_t + \alpha_3 fpy_t + \alpha_4 inf_t + \alpha_5 oilp_t + \varepsilon_t \quad (2)$$

here, the dependent variable,  $d_t$  captures the log of either one of the debt variables as defined previously; stands for the log of the military expenditure as share of GDP, the log of real military spending, or the log of arms import; is the log of real GDP,  $fpy_t$  is government's fiscal (surplus/deficit) position as share of GDP;  $inf_t$  is the log of consumer price index;  $oilp_t$  is the log of real oil price;  $\alpha$  denotes the long-run parameters, and  $\varepsilon_t$  are the residuals.



The short-run error correction model (ECM) can be represented by the following ARDL process and short-run equation.

$$\begin{aligned}\Delta d_t = & \beta_0 + \sum_{i=1}^p \gamma_{1i} \Delta d_{t-i} + \sum_{i=0}^q \gamma_{2i} \Delta m_{t-i} + \sum_{i=0}^q \gamma_{3i} \Delta y_{t-i} \\ & + \sum_{i=0}^q \gamma_{4i} \Delta fpy_{t-i} + \sum_{i=0}^q \gamma_{5i} \Delta inf_{t-i} + \sum_{i=0}^q \gamma_{6i} \Delta oilp_{t-i} \\ & + \beta_1 con_t + \beta_2 rel_t + \beta_3 t + \theta_{t-1} + e_t\end{aligned}\quad (3)$$

where  $p$  and  $q$  are the lag lengths to be determined by the AIC<sup>8</sup> criterion;  $\Delta$  is the difference operator used to depict the short-run dynamics;  $\beta_0$  is the intercept, is the time trend,  $\theta$  is the error correction term (ECT) that defines the speed of adjustment to the long-run following a short-run shock, and  $e_t$  is the error term; the fixed regressors, conflict and debt relief, being included as dummy variables, are not differenced. The short-run parameters are denoted by  $\gamma$ . Given equations (2), the error correction term in equation (3) can be expressed as:

$$\varepsilon_{t-1} = d_{t-1} - \alpha_0 - \alpha_1 m_{t-1} - \alpha_2 y_{t-1} - \alpha_3 fpy_{t-1} - \alpha_4 inf_{t-1} - \alpha_5 oilp_{t-1} \quad (4)$$

By substituting  $\varepsilon_{t-1}$  in equation (3) with its full expression in equation (4), we obtain the following combined ARDL long-run and short-run equation:

$$\begin{aligned}\Delta d_t = & \psi + \delta_0 d_{t-1} + \delta_1 m_{t-1} - \delta_2 y_{t-1} - \delta_3 fpy_{t-1} \\ & - \delta_4 inf_{t-1} - \delta_5 oilp_{t-1} + \sum_{i=1}^p \eta_{1i} \Delta d_{t-i} \\ & + \sum_{i=0}^q \eta_{2i} \Delta m_{t-i} + \sum_{i=0}^q \eta_{3i} \Delta y_{t-i} + \sum_{i=0}^q \eta_{4i} \Delta fpy_{t-i} + \sum_{i=0}^q \eta_{5i} \Delta inf_{t-i} \\ & + \sum_{i=0}^q \eta_{6i} \Delta oilp_{t-i} + \beta_1 con_t + \beta_2 rel_t + \beta_3 t + \xi_t\end{aligned}\quad (5)$$

### Unit Root Test

A fundamental assumption of the bounds cointegration test is that all variables must either be  $I(0)$  or  $I(1)$ . This implies that the test may yield spurious results in the presence of  $I(2)$  variables. To ensure that the variables do not violate this basic requirement, there is a need to test for the presence of unit root. We employ two alternative methods, namely, the Dickey-Fuller Generalized Least Squares (DF-GLS) test (Elliott, Rothenberg, and Stock 1996) and the Phillips-Perron, and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test (Kwiatkowski et al. 1992). The DF-GLS test is essentially the augmented Dickey-Fuller (ADF) test, except that in this case the variable is first transformed using a GLS regression before unit root test is performed. It has been shown to have significantly more power than previous versions of the ADF test (Elliott, Rothenberg, and Stock 1996). Whereas the DF-GLS test employs the null hypothesis of unit root, the KPSS test employs the null of no unit root, being a complimentary test. The results of the tests are in Table 2 where we report similar findings from both of the tests. The results are a mix of  $I(0)$  or  $I(1)$ . Specifically, in both the DF-GLS and KPSS tests, all variables are first difference stationary except *fiscal position/GDP* and the *inflation* which are stationary in their level.

### Results and Discussion

Having now confirmed the unit root properties of the variables, the next step in the analysis involves testing for the presence of a long-run relationship in the models. Optimal lags are



**Table 2.** Unit root tests

variables	DF-GLS test				KPSS test		
	levels	5% cv	1 <sup>st</sup> diff	5% cv	level	1 <sup>st</sup> diff	5% cv
total debt/gdp	-2.27	-2.93	-4.54	-3.20	0.53	0.21	0.46
external debt/gdp	-1.27	-3.23	-4.88	-3.20	0.72	0.29	0.46
total external debt	-1.27	-3.23	-4.88	-3.20	1.04	0.27	0.46
domestic debt/gdp	-1.92	-2.86	-6.17	3.20	0.69	0.05	0.46
milex/gdp	-2.00	2.74	-8.68	-3.20	2.14	0.23	0.46
real milex	-2.14	2.73	-4.32	-3.18	0.63	0.33	0.46
real GDP	-1.65	-2.86	-4.36	-3.20	1.59	0.21	0.46
fiscal position/gdp	-1.93	-2.86	..	..	0.11	..	0.46
inflation	-4.73	-3.17	..	..	0.19	..	0.46
oil price	-2.27	-2.99	-6.83	-3.20	1.23	0.23	0.46

Note: \*, \*\*, and \*\*\*, denote significance at 10%, 5%, and 1% respectively. The DF-GLS test tests the null hypothesis of unit root.

The KPSS provides complementary evidence by testing the null that a variable is stationary at levels. All variables are taken in logs except government's fiscal position.

selected using the Akaike information criterion (AIC) following which we then proceed to the cointegration test for the levels relationship. The results of the test are presented in [Table 3](#) for each of the three sets of ARDL models, namely the government gross debt model, external debt model, and domestic debt model. The computed F-test statistics are compared with the lower and upper critical bounds of Pesaran, Shin, and Smith (2001) and Kripfganz and Schneider (2018). In all three models the results support the rejection of the null hypothesis of no co-integrating relationship among the variables, which confirms the presence of a long-run relationship in the models.

The next step is to explore the long-run and short-run error correction dynamics of the ARDL models. This procedure allows us to make inferences about the adjustments to the long-run (equilibrium) path in the event of short-run deviations. The results for the long-run models are reported in [Table 4](#). For each of the three sets of regressions, column 1 presents the conflict equation, column 2, the arms import equation and column 3, the military burden equation. In the government gross debt model, conflict has a statistically positive (debt-inducing) effect as expected (column 1). The arms import is also positive and significant at 5% (column 2). In column 3, the military burden not significant. Turning to the external debt model, conflict, arms import, and the military burden are all positive and significant as expected. It turns out that our variables of interest are not significant in the domestic debt model.

These results are quite revealing, particularly in regard to the component of debt most affected by conflict and military spending in Nigeria. The significance of conflict and arms import in the government gross debt model is unsurprising as it also includes foreign

**Table 3.** Bounds test with Pesaran, Shin, and Smith (2001) and Kripfganz and Schneider (2018) critical values

	Govt gross debt model			External debt model			Domestic debt model		
	1	2	3	1	2	3	1	2	3
F-stat	4.583*	7.114**	4.876*	7.017**	11.538**	9.286**	8.527**	6.441**	6.818**
Pesaran, Shin, and Smith (2001) lower and upper critical bounds									
I(0)	3.03	3.12	3.03	3.12	3.12	3.12	3.12	3.12	3.12
I(1)	4.06	4.25	4.06	4.25	4.25	4.25	4.25	4.25	4.25
Kripfganz and Schneider (2018) lower and upper critical bounds									
I(0)	3.17	3.51	2.90	3.76	3.57	3.44	3.75	3.51	3.43
I(1)	4.42	5.05	4.21	5.21	5.22	4.92	5.19	5.05	4.90
Obs.	49	43	48	48	39	48	49	43	49

Notes: \* & \*\* denote significance at 10% and 5%, respectively. Kripfganz and Schneider (2018). reports approximate p-values along with the critical values.

**Table 4.** ARDL long run estimates (1970–2020)

variables	Govt gross debt model			External debt model			Domestic debt model		
	1	2	3	1	2	3	1	2	3
conflict	0.261* (0.144)			0.254** (0.116)			0.084 (0.108)		
log arms import		0.074** (0.031)			0.097** (0.034)			0.012 (0.019)	
log milex/gdp			−0.174 (0.107)			0.230** (0.112)			−0.062 (0.087)
log real GDP	−0.555* (0.277)	−0.412 (0.251)	−0.077 (0.357)	−0.363 (0.284)	−0.334 (0.306)	−0.547* (0.320)	−0.045 (0.181)	0.086 (0.138)	0.109 (0.187)
fp/gdp	−0.058** (0.020)	−0.063** (0.020)	−0.059** (0.022)	−0.072** (0.021)	−0.077** (0.021)	−0.083** (0.017)	−0.067** (0.018)	−0.073** (0.018)	−0.067** (0.016)
log inflation	−0.146** (0.063)	−0.208** (0.066)	−0.152** (0.057)	−0.152** (0.036)	−0.216** (0.033)	−0.164** (0.035)	−0.041 (0.037)	−0.077* (0.038)	−0.040 (0.035)
log oil price	−0.063 (0.081)	−0.284** (0.112)	−0.218** (0.097)	−0.079 (0.058)	−0.208** (0.077)	−0.175** (0.062)	−0.118** (0.057)	−0.175** (0.067)	−0.094 (0.067)

Note: \* & \*\* denote significance at 10% and 5%, respectively. Robust standard errors are in parenthesis, *milex/gdp* is the share of military expenditure in GDP, *fp/gdp* is government's fiscal (surplus/deficit) position as a share of GDP. For each of total, external, and domestic debt models, column 1 presents the *conflict equation*, column 2, the *arms imports equation*, and column 3, the *military expenditure/GDP*. Conflict is included as fixed regressor as specified in equation 3.

currency-denominated debt. Of particular interest, however, is the external debt model where conflict, arms import, and the military burden have statistically significant positive effects, affirming our hypothesis that these variables are associated more with the growth of external debt in Nigeria. These results are economically significant and have similarly been confirmed in several related previous studies such as Dunne, Nikolaidou, and Chiminya (2018) and Okwoche and Nikoladou (2022) where the military burden and conflict are found to be significant determinants of external debt in SSA countries, and Dunne, Perlo-Freeman, and Soydan (2004) where the military burden has a positive effect on external debt in a panel of 11 small industrialised economies. One of the more recurrent socio-economic problems of Nigeria over the study period is conflict. Although military spending can, in general, increase for reasons other than to curb conflict and terrorism, evidence shows that military spending statistically explains external debt in conflict-affected SSA countries such as Nigeria (Dunne, Nikolaidou, and Chiminya 2018). Danso (1990) has also linked external debt with conflict-related military spending in SSA countries.

The control variables are, for the most part, significant in addition to carrying the expected sign. The estimate of Real GDP is negative and statistically significant in the conflict equation of government gross debt model and the milex equation of external debt model which confirms the debt-reducing effect of increases in national output. This result accords with several previous panel studies such as Murwirapachena and Kapingura (2015) and Bittencourt (2015). Regarding the role of government's fiscal position, the evidence strongly suggests that government deficit/surplus is a key determinant of Nigeria's public debt. In all three cases, the results present the expected negative and significant effect supporting the conjecture that an improvement in the fiscal position is debt reducing. Persistent government spending vis-à-vis the dwindling revenues has been identified as a key factor in the evolution of Nigeria's debt problems (Ogunyemi 2011). This result has strong support in several previous studies such as those of Taiwo (1988), Ajayi (1991), Ogunyemi (2011), and Jibir and Aluthge (2019), all of which focus on the case of Nigeria. On the effect of oil price, the negative sign on the coefficient is consistent with the a priori expectation. The estimate is significant in almost all the regressions, affirming the debt-reducing role of oil price and giving support for the importance of oil revenues to the sustainability of public debt in Nigeria.

The coefficient on inflation is consistently significant in almost all the regressions. It, however, carries a negative sign in all cases which points to its debt-reducing effect in the model. The economic significance of this result derives from the substantial amount of domestic debt in Nigeria during the study period. That is, inflation may have a stronger effect on debt in countries with large amounts of domestic public debt (de Fontenay and Milesi-Ferretti 1995). Supportive evidence can be found in Bittencourt (2015) who reports panel evidence on South American countries. Hall and Sargent (2011) found some evidence that the US employed unexpected inflation to cut down on the debt burden. Domestic debt has risen very rapidly, particularly following the country's recovery from the external debt crisis that almost crippled its economy in the early to mid-2000s. On the face of that, domestic inflation has been maintained a variable and double-digit level in most of the years from 1970 to 2020. The price level between 1988 and 1995 ranged from a low of 7% to as high as 72% in 1995. Although the rate is relatively lower in more recent years (2000–2020), it ranges from 5% to 18%. These large variations seem to suggest that unexpected inflation is likely being employed for debt reduction in Nigeria.

The results of the short-run error correction model are presented in Table 5 which shows considerable evidence in support of short-run effects. Arms import and military spending are not significant in the government gross debt model, though conflict is positive and significant at 10%. In the external debt model, whereas conflict is positive, arms import and military share in GDP though significant, present unexpected negative effects. This seems to point to the indirect effect of a positive short-run effect of military spending on growth which could lead to a reduction in external debt. As in the long-run model, arms import, and military spending are not significant in the error correction mechanism of the domestic debt model.

Regarding the control variables, real GDP tends to have some debt-reducing effect all three sets of the short-run regressions. This can be observed in the first lag of both the government gross debt and external debt regressions, and in the second lag of the domestic debt regressions. fiscal position as a share of GDP presents a positive and significant effect in all the three models, which seems to imply that in the short run, a strong fiscal position encourages borrowing, while a weak position discourages it. Oil price similarly has a positive and significant effect in some cases and can be given the same interpretation as the fiscal position share in GDP. To wit, increases in oil price could lead the government to increase borrowing in the short-run. Inflation has a positive impact in both the government gross debt and external debt models which is consistent with debt-inducing role of macroeconomic instability in the short-run. The debt relief dummy, included as a fixed regressor, has a debt-reducing effect in line with the effect of debt cancellation on Nigeria's external debt.

The error correction coefficients corresponding to the government gross debt, external debt, and domestic debt models are reported in the lower part of Table 5. In all cases, the coefficient is negative and significant as expected, suggesting that there would certainly be a return to the equilibrium path after a short-run deviation in the models. Each of the coefficients represents the speed of adjustment to the long-run path. For example, the coefficient of (−0.212) in the military expenditure equation (column 3) of the external debt

model implies that a deviation from the long-run level will be corrected by 21.2% in the next year, which suggest that it will take nearly 5 years to fully restore the long-run equilibrium state. The same interpretation can be made for all of the other ECT coefficients. To check for validity and reliability of the foregoing ARDL results, we perform some diagnostic tests including the Breusch-Godfrey LM test for autocorrelation, the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity, and the Jarque-Bera (JB) test for normality of residuals. The results (Table 6) show, overall, that the ARDL models do not violate the fundamental assumptions of the classical linear regression model. For model stability, the plots of the cumulative sum and cumulative sum of squares of the recursive residuals indicate that the ARDL models are dynamically stable.

**Table 5.** ARDL error correction representation – short-run model: (1970–2020)

variables	Government gross debt model			External debt model			Domestic debt model		
	1 <sup>a</sup>	2 <sup>b</sup>	3 <sup>c</sup>	1 <sup>d</sup>	2 <sup>e</sup>	3 <sup>f</sup>	1 <sup>g</sup>	2 <sup>h</sup>	3 <sup>i</sup>
$\Delta \ln \text{ debt } (-1)$			0.182* (0.091)				0.305** (0.133)	0.334** (0.116)	0.297** (0.130)
$\Delta \ln \text{ debt } (-2)$								–0.246** (0.114)	
$\Delta \ln \text{ arms import}$		–0.032 (0.024)			–0.079** (0.024)			0.014 (0.017)	
$\Delta \ln \text{ arms imp } (-1)$					–0.060** (0.028)				
$\Delta \ln \text{ arms imp } (-2)$					–0.053** (0.025)				
$\Delta \ln \text{ milex/gdp}$			0.024 (0.175)			–0.372** (0.132)			0.177 (0.116)
$\Delta \ln \text{ milex/gdp } (-1)$			–0.173 (0.134)			–0.296** (0.112)			
$\Delta \ln \text{ milex/gdp } (-2)$			0.083 (0.180)			–0.265* (0.142)			
$\Delta \ln \text{ real GDP}$	–1.769** (0.708)	–2.156** (0.658)	–2.314** (0.717)	–1.396** (0.470)	–1.364** (0.463)		0.582 (0.630)	0.519 (0.508)	0.512 (0.641)
$\Delta \ln \text{ real GDP } (-1)$	0.026 (0.587)	0.646 (0.442)		0.304 (0.656)			–1.455** (0.541)	–1.276** (0.336)	–1.520** (0.592)
$\Delta \ln \text{ real GDP } (-2)$		–1.179** (0.372)		0.481 (0.732)					
$\Delta \text{fiscal position}$	0.032** (0.010)	0.028** (0.009)	0.030** (0.010)	0.065** (0.015)	0.049** (0.014)	0.063** (0.014)	0.028 (0.018)	0.038** (0.018)	0.032** (0.016)
$\Delta \text{fiscal posit } (-1)$				0.038** (0.010)	0.030** (0.008)	0.035** (0.012)	0.021* (0.011)	0.032** (0.010)	0.020* (0.011)
$\Delta \ln \text{ inflation}$	0.093* (0.049)	0.074 (0.047)			0.065* (0.034)	0.074* (0.042)			
$\Delta \ln \text{ oil price}$		0.330* (0.189)			0.348** (0.140)				
conflict	0.248* (0.131)			0.216** (0.099)			0.041 (0.102)		
debt relief	–0.715** (0.094)		–0.842** (0.076)	–1.528** (0.105)		–1.524** (0.089)	–0.127** (0.053)		–0.113 (0.072)
trend	0.011 (0.008)	0.016* (0.009)	–0.007 (0.017)	0.011 (0.009)	0.019 (0.013)	0.040** (0.018)	–0.002 (0.005)	–0.004 (0.006)	–0.010 (0.011)
Intercept	–5.487 (10.65)	–21.38* (11.96)	17.06 (25.58)	–7.443 (11.25)	–25.66 (16.02)	–60.36** (26.73)	6.455 (6.249)	8.444 (7.586)	18.71 (16.53)
ECT	–0.168** (0.061)	–0.187** (0.065)	–0.233** (0.071)	–0.169** (0.066)	–0.193** (0.081)	–0.212** (0.073)	–0.582** (0.121)	–0.523** (0.121)	–0.544** (0.138)

Note: \* & \*\* denote significance at 10% and 5%, respectively. Robust standard errors are in parenthesis; *ECT* is the error correction term. For each of total, external, and domestic debt models, column 1 presents the *conflict equation*, column 2, the *arms imports equation*, and column 3, the *military expenditure/GDP*. Conflict and debt relief are included as fixed regressors as specified in equation 1. The set of lags for each regression is obtained using the AIC criterion as follows:

<sup>a</sup>ARDL (1 2 1 1 0);HT

<sup>b</sup>ARDL (1 1 3 1 1 1);HT

<sup>c</sup>ARDL (2 3 1 1 0 0);HT

<sup>d</sup>ARDL (1 3 2 0 0);HT

<sup>e</sup>ARDL (1 3 1 2 1 1);HT

<sup>f</sup>ARDL (1 3 0 2 1 0);HT

<sup>g</sup>ARDL (2 2 2 0 0)

<sup>h</sup>ARDL (3 1 2 2 0 0)

<sup>i</sup>ARDL (2 1 2 2 0 0)

## Robustness Tests

Given the effects of our key variables on external debt in the baseline regressions, we employ alternative data on external debt and military expenditure to test for the robustness of the results. We use the log levels of total external debt in place of the share of external debt in GDP

**Table 6.** Diagnostic tests

	Total debt model			External debt model			Domestic debt model		
R-squared	0.67	0.72	0.71	0.83	0.79	0.84	0.65	0.73	0.68
BG test	4.52 (0.11)	1.36 (0.24)	1.25 (0.26)	0.82 (0.66)	0.30 (0.58)	2.03 (0.36)	0.15 (0.70)	4.46 (0.11)	0.94 (0.33)
BP test	0.63 (0.43)	1.81 (0.18)	1.95 (0.16)	2.54 (0.11)	1.53 (0.21)	0.69 (0.41)	3.27 (0.07)	0.89 (0.34)	0.29 (0.59)
JB test	0.83 (0.66)	0.57 (0.75)	0.98 (0.61)	0.71 (0.70)	0.58 (0.75)	2.78 (0.25)	0.98 (0.61)	2.54 (0.28)	0.02 (0.99)

Note: P-values in parenthesis; BG is the Breusch-Godfrey LM test for higher-order serial correlation; BP stands for the Breusch-Pagan/Cook-Weisberg test for heteroscedasticity; JB is the Jarque-Bera normality test; The CUSUM and CUSUM Squared plots (not presented for brevity) give support for model stability.

and real military spending in place of the share of military spending in GDP. Other explanatory variables are the same as in the baseline regressions. Cointegration tests (see Table A1 of the appendix) point to the existence of a long-run cointegrating relationship. As in the baseline regressions, the long-run and the short-run results are reported for the conflict, arms import, and military expenditure equations, respectively. Evidence from the long-run regression (Table A2 in the Appendix) corroborates the baseline results: arms import (column 2) and military spending (column 3) have a positive and significant effect on external debt in the long-run. Also, the conflict dummy (column 1), included as fixed regressor, has a positive and significant effect on external debt similarly to the baseline regression. The error correction (short-run) representation (Table A3 in the Appendix) presents evidence on conflict, arms import and military expenditure similarly to the baseline short-run regressions. The control variables are also significant and signed as expected. In all three regressions, the error correction term is negative and significant and the diagnostic tests (Table A4 in the Appendix) provide support for the selected ARDL results.

Furthermore, in order to account for the growth effect of the debt relief and for potential structural changes in the oil price series due to global shocks, we re-estimate the baseline model, first, by including an interaction term between real GDP and the debt relief dummy and, second, by including five-year dummies for global oil shocks, namely, yr1978, yr1985, yr1985, yr1994, yr2001 and yr2010 (see results on Tables A5 and A6 in the Appendix). The breakpoints used in creating the year dummies are located using the method proposed by Ditzen and Karavias (2021). The results show that the interaction term of real GDP and debt relief is not significant in the regressions, which suggests that the growth effect of debt relief is not important to the model. Similarly, the year dummies representing the structural breaks in the oil price series are mostly insignificant, except for yr2010 which is significant in one regression. Overall, our main findings remain mostly the same after accounting for the growth effect of debt relief and the structural changes in oil price. Conflict and arms imports remain significant in the external debt model, while military expenditure although maintains its positive sign, it is now insignificant.

## Conclusion and Policy Recommendations

Nigeria, the most populous country in Africa, was regarded as the continent's most indebted country during the mid-2000s, with \$36 billion in external debt. A debt relief agreement with the Paris Club led to an overall reduction of the external debt stock by \$30 billion in 2006. Despite the crushing debt burden that almost crippled the country's economy prior to the debt cancellation, both external and domestic debt have risen rather rapidly since the intervention, and particularly in recent years. In addition, there have been various incidents of armed conflict, terrorism, and various other breakdowns of law and order. This study is an empirical investigation of the likely underlying drivers of public debt in Nigeria with emphasis on the role of conflict, arms import, and military

expenditure which have not been considered in previous studies focusing on Nigeria. Moreover, whereas previous studies have mainly focused on external debt, we employ three measures of debt, namely, government gross debt, external debt, and domestic debt. This is a more representative approach given the historical importance of internal and external debt during the study period.

Overall, the empirical analyses present compelling evidence in support of the effects of conflict, arms import, and military expenditure on public debt. Notably, we find these variables to be particularly important in explaining external debt. The specific findings are outlined as follows: first, conflict and arms import have statistically positive effects on government gross debt, which is plausible given that gross debt includes foreign currency denominated debt. Second, when we examine the separate effects on external and domestic debt, we find, on one hand, a compelling evidence of a positive effect of armed conflict, arms import, and military spending on external debt, and a lack of significant effect on domestic debt, on the other hand. Third, the additional explanatory variables, namely national income, government's fiscal position, inflation, and oil price, have significant effects in all of the three models. This leads us to conclude that conflict and military spending are more relevant in explaining the growth of external debt in Nigeria and that the selected control variables play a significant role in explaining public debt in Nigeria.

These findings have implications for debt sustainability in Nigeria. We have mainly considered the factors that can be categorised as internal to Nigeria, which means that the government can exercise control over these factors in the pursuance of debt sustainability. For example, conflict is mainly an internal variable in line with government's core responsibility of maintaining law and order within its borders. Along the same line, the amount of funds allocated to the military is the prerogative of government, although such spending can be influenced by the occurrence and intensity of conflict. Regarding the control variables, it is the role of government to exercise restraint on spending by ensuring that deficits are created mainly for investments that can guarantee future streams of income rather than for the purpose of recurrent spending. Similarly, the government can create surpluses or reduce deficits by strengthening its revenue generating capacity. Although this may not a straight-forward solution, it also lies within government's capacity to seek ways of resolving the persistent incidence of conflict in the country given its effect on external debt. The role of other factors like economic growth and inflation should also be put into consideration in the quest to keep public debt within manageable limits.

## Notes

1. One notable incidence is the popular Armsgate' scandal of 2015 which is associated with the embezzlement of over \$2 billion dollars.
2. Ogunyemi (2011) further notes that Nigeria's debt position as of 2005 made it one of the world's most heavily indebted countries.
3. See Barro (1979) and Lucas and Stokey (1983) for the discussion of the tax smoothing model which emphasises the role of economic factors. For the political-economy approach to budget deficits and debt see Buchanan & Wagner (1976) Persson and Svensson (1989); Alesina and Tabellini (1990). Further, Alesina and Perotti (1995) and Alesina and Passalacqua (2016) provide a comprehensive review of the literature.
4. The argument here is that the growth rate of the advanced countries can lead to improvements in Nigeria's terms of trade through increases in demand for oil and other primary commodities' exports
5. Nigeria, like many other developing countries, is a victim of the original sin, a concept used to refer to the inability of a country to borrow abroad in its domestic currency (Eichengreen, Hausmann, and Panizza 2003).
6. Within the single equation framework, Engle and Granger (1987) and Phillips and Ouliaris (1990) discuss the residual-based two-test technique. The multivariate cointegration approaches proposed by Johansen (1988, 1996) and Johansen and Juselius (1990), are within the system-based and maximum likelihood frameworks.
7. This mixture of stationary and non-stationary variables is, however, only allowed for I(0) and I(1) variables. That is, non-stationarity may not exceed the first order.

## Disclosure Statement

No potential conflict of interest was reported by the author(s).

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