

## Effects of Public Debts on Economic Growth in Nigeria: A Cointegration Analysis

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### Abstract

*This paper examines the long-run effects of external and domestic debts on economic growth in Nigeria, using the dynamic OLS cointegration technique and data spanning 1981 to 2017. The results show that none of external and domestic debts enhances growth in Nigeria in the long-run. Although domestic debt tends to have a positive long-run effect on growth, the effect is not statistically significant. On the other hand, external debt has a negative and statistically insignificant long-run effect on growth. However, when government revenues (oil and non-oil revenues) are included in the analysis, only oil revenue has a statistically significant positive effect on economic growth in the long-run, indicating the high importance of oil in Nigeria. These findings imply that the country should reduce the use of debts to finance expenditure and seek to enhance growth with oil revenue maximally without relying unnecessarily on oil.*

**Keywords:** External debt, domestic debt, economic growth, cointegration

**JEL Classification:** H3, H6, E63

### 1. Introduction

Developing countries such as Nigeria usually finance public expenditure with public debts largely. Many developing countries run fiscal deficits, which necessitates financing expenditures with debts secured internally and externally. External debts are usually sourced from international organizations (the World Bank) and international capital markets. On the other hand, domestic debts are usually secured through instruments such as bonds and treasury bills.

Basically, fiscal policy is usually procyclical in developing countries, in that they tend to spend largely during booms (Talvi & Vegh, 2005; Barhoumi, Cherif & Rebei, 2016). Nigeria in particular usually over-spends when its oil revenues are large, hence it relies largely on public debts to finance expenditures when oil revenues are low. Therefore, public debts are very important instruments of fiscal policy in Nigeria.

Public debts are inevitable and can stimulate economic performance, if they are used in the right way. However, when the level of public debts is too high, they hinder economic performance. When public debts are too large, they make government size to be big, which crowds out the activities of the private sector. Besides, the burden of debt repayments may hinder economic performance. Sometimes, debts may also have political implications. For example, opposing parties may refer to the high level of the debt of the ruling party as a flaw in campaigning to gain the support of people during elections. Therefore, public debts have vital growth implications.

Existing studies (e.g. Egbetunde, 2012; Elom-Obed, Odo, Elom & Anoke, 2017; Eke and

Akujuobi, 2021) on the effects of public debts on growth in Nigeria examines the short-run and long-run effects of the country's debts without accounting for the influence of other sources of government finance (i.e. oil revenue and non-oil revenue) in their analyses. Hence, these studies do not account for the role of public revenues in the impact of public debts on growth in Nigeria. Yet, public revenues, particularly oil revenue, influence the size and impact of public debts in Nigeria.

In line with the foregoing facts, this paper examines the long-run effects of external and internal debts on economic growth in Nigeria and accounts for the influence of oil revenue and non-oil revenue in its analysis, using the dynamic OLS cointegration technique. The remaining part of the paper is organized as follows: Related literature is reviewed in section two. Section three is devoted to discussing data and methodology. Results are presented and discussed in section four, while concluding remarks are made in section five.

## **2. Literature Review**

Conceptually, public debts are borrowings of governments at all levels, sourced from internal and external sources, for the purpose of financing expenditures, hence they are sources of government financial receipts apart from revenues generated from taxes and profits (Christabell, 2013; Isaac & Rosa, 2016). Hence, public debts are financial resources owned by other economic agents that are transferred to governments for temporary use, while revenues are financial resources owned by governments themselves.

Debts point to an obligation to pay back funds given based on specified agreement between creditors and debtors (Nassir and Wani, 2016). Hence, external debts are debts owned by the residents of a country to creditors that reside in other countries, while domestic debts are debts involving creditors and debtors that reside in the same country (Panizza, 2008). This means that external debts are issued in foreign currencies, while domestic debts are issued in domestic currencies. Besides, external debts are regulated by the laws of the foreign countries in which they are issued, while domestic debts are regulated by domestic laws.

At the theoretical side of the literature, the neo-classical fiscal deficit theory shows that an increase in fiscal deficit increases external and internal debts, because revenues are larger than expenditures and external and internal borrowings have to be employed to finance expenditures, with the side effect that large government spending through borrowing may crowd-out the activities of the private sector (Bhattarai, 2016; Carrasco, 1998; Cebula and Hung, 1992).

While the neo-classical theory shows that government expenditures financed via public debts will have crowding-out effects, the Keynesian school of thought shows that increased government spending financed through public debts will have "crowding-in" effects, in that investment and production activities will increase in the private sector when the economy is stimulated via government spending (Hussain and Haque, 2017). Hence, theoretically, external and internal debts can affect overall economic performance, measured through the GDP, negatively or positively, depending on the specific conditions of individual countries.

One of the key reasons for fiscal deficits in oil-exporting countries such as Nigeria that warrant public borrowings is that their governments over-spend during oil booms, due to political and growth pressures (Liuksila, Garcia and Bassett, 1994). As these authors show, the governments usually find it difficult to reduce spending after the booms cease, hence financing expenditure with external and internal borrowing becomes necessary.

However, developing countries such as Nigeria prefer external debts to internal debts and only choose to borrow internally when undesirable conditions hinder them from borrowing in the

international capital markets (Borensztein, Cowan, Eichengreen & Panizza, 2008; Panizza, 2008). Examples of such undesirable conditions are unfavourable loan terms and international financial crisis such as the 2007-2009 crisis. Other factors that make developing countries to prefer external debt are their longer maturity rates and the concessional rates at which they are issued (Beaugrand, Loko & Mlachila, 2002; Panizza, 2008). Domestic debts are not issued at concessional rates but at market rates, because they are driven by profitability. For example, the buyers of bonds in the domestic bonds market are usually investors who are driven by profits. Domestic debts also have shorter maturity rates, which usually cause repayment burdens (IMF, 2006; UNCTAD, 2002).

Existing empirical studies on the effects of public debts on growth in Nigeria show that external and domestic debts have different effects. Yusuf and Mohd (2021) examine the effects of government debt on economic growth in Nigeria, using the autoregressive distributed lag (ARDL) model and find that external debt has negative long-run effect and positive short-term effect, while domestic debt has positive long-term effect and negative short-term effect. However, Egbetunde (2012) shows that economic growth induces changes in public debts in Nigeria just as public debts induce changes in growth in the country. The author shows through a causality analysis that there is evidence of bi-directional causality between public debts and economic growth in the country.

The implication of causality running from growth to public debts in Nigeria is that increasing growth induces more spending through both revenues and debts, which means that fiscal policy is procyclical in the country. Generally, it has been observed that fiscal policy tends to be procyclical in developing countries such as Nigeria (Barhoumi, Cherif & Rebei, 2016; Talvi & Vegh, 2005).

### **3. Data and Methods**

This paper employed the experimental research design involving studying the effects of two main independent variables (external debt and domestic debt) on a dependent variable (economic growth) and the influence of two control variables (oil revenue and non-oil revenue) on the analysis. In the analysis, unit root tests were first conducted on the variables of the study to examine their stationarity properties, after which the dynamic OLS (DOLS) cointegration technique was employed for further analysis. The augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) techniques were employed for the unit root tests. Basically, results of unit root tests reveal the orders of integration of variables. This makes it possible to use variables in regressions in a way that does not lead to spurious regressions.

The variables used in the study are Nigeria's GDP, external debt, domestic debt, oil revenue and non-oil revenue. Each of the variables was deflated with the GDP deflator to obtain its real values. Data spanning 1981 to 2017 on the variables were collected from the Nigeria's Central Bank of Nigeria's statistical bulletin. Table 1 summarizes information on the data of the study.

The DOLS cointegration technique was introduced by Saikkonen (1992) and Stock and Watson (1993). It is a single-equation technique designed for variables that are integrated of order one. The technique involves an OLS regression in which the dependent variable is regressed against the level values of the independent variables and the leads and lags of their first differences. The leads and lags of the first differences of the independent variables are included in the regression to make the error term of the regression to be free from all past stochastic innovations of the independent variables.

#### **3.3. Model Specification**

The model of this theory follows the theory of Keynes (1936) on government finance that shows that public expenditure, financed through debts and revenues, influences the economy and induce growth, so that causality runs from public finance variables, such as public debts, to growth. According to the theory, government and its activities, such as borrowings, play the leading role in the growth performance of the economy. Therefore, theoretically, external debt and domestic debt as sources of public finance are determinants of growth.

However, the long-run growth effects of public debts and revenues, which are the sources of funds employed to finance government expenditure may be positive, negative, or with no effect, depending on other factors working in the economy. Bhattarai (2016) shows that the effects of public debts on growth may be negative, in line with the neo-classical theory of public finance, if the expenditure done by the government with the funds got from public debts crowds out the activities of the private sector. The author also shows that the effects of public debts may have a neutral effect on growth, in line with the Ricardian equivalence theory on public finance, if the savings of the private sector offset the increased aggregate demand that arise from the expenditure done by the government through funds got from borrowings. Economic agents in the private sector save, because they have the expectation that the government will levy higher taxes in the future in order to pay the debts it secures to finance expenditure in the current period. However, the savings eventually neutralize the effects of government spending.

The model of the study follows the model of Yusuf and Mohd (2021) with some modifications. The latter model specifies growth as a function of external debt, domestic debt and some control variables. In functional form, the model of Yusuf and Mohd (2021) is as follows:

GDP = f(external debt, domestic debt, debt service payments, foreign reserve position, effective interest rate, gross fixed capital formation and foreign direct investment). In the model, external debt and domestic debt are the main independent variables, while the remaining independent variables are control variables.

The present paper modifies the model of Yusuf and Mohd (2021) by replacing its control variables with oil revenue and non-oil revenue, in order to investigate the influence of the revenues, which are the other sources of government funds apart from public debts, in the growth-debt nexus. Revenues, particularly oil revenue, play important roles in Nigeria, hence their influence as control variables in the growth-debt nexus needs to be investigated.

In line with the modification, the DOLS model used in this study is of the form

$$Y_t = \beta_0 + \vec{\beta}X + \sum_{j=-q}^P \vec{d}_j \Delta X_{t-j} + u_t$$

where

$Y_t$  = dependent variable which is real GDP

$X$  = matrix of independent variables which are external debt, domestic debt, oil revenue and non-oil revenue

$\vec{\beta}$  = cointegrating vector which indicates the long-run effect of a change in  $X$  on the dependent variable

$P$  = lag length

$q$  = lead length

After the DOLS regression is estimated, it is necessary that unit root tests are conducted on the errors of the regression, in order to determine whether the estimated regression is spurious or not. If the errors are stationary, then the estimated regression is not spurious, implying that its

coefficients are valid long-run coefficients.

**Table 1: Data of the Study**

Variables	Description of Variable	Source of Data
Gross Domestic Product	The sum of the monetary values of the goods and services produced in the economy in a year in nominal terms.	Central Bank of Nigeria Statistical Bulletin.
Oil revenue	The total value of the oil revenue collected by the federal government in nominal terms.	Central Bank of Nigeria Statistical Bulletin.
Domestic debt	The total value of the domestic debt of the federal government in nominal terms.	Central Bank of Nigeria Statistical Bulletin.
External debt	The total value of the external debt of the federal government in nominal terms.	Central Bank of Nigeria Statistical Bulletin.
GDP deflator	Implicit price deflator, which is a price index that measures the average price level in the economy as a whole.	Central Bank of Nigeria Statistical Bulletin.

**Note:** The GDP deflator was employed to deflate the other variables in order to obtain their real values.

**Source: Author's Compilation (2019)**

#### 4. Data Analysis and Discussion of Findings

##### 4.1. Unit Root Tests Results

The results of the unit root tests are presented in Table 2 revealed that all the variables of the analysis are stationary in the first-difference form, implying that they are all  $I(1)$ . This makes the variables to be suitable for use in the DOLS model.

**Table 2: Unit Root Test Results**

ADF					PP				
Variable	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	PP Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	
LNRGDP (with intercept and trend)	-2.421317	-4.243644	-3.544284	-3.204699	-2.566518	-4.234972			
D(LNRGDP) (with intercept and trend)	-3.259346	-4.243644	-3.544284	-3.204699*	-3.259346	-4.243644	-3.540328	-3.202445	
LNREXDEBT (with intercept)	-1.923912	-3.632900	-2.948404	-2.612874	-2.452823	-3.626784	-2.945842	-2.611531	
D(LNREXDEBT) (with intercept)	-4.416515	-3.632900***	-2.948404**	-2.612874*	-4.436945	-3.632900***	-2.948404**	-2.612874*	
LNRDMDEBT (with intercept)	-1.481053	-3.626784	-2.945842	-2.611531	-1.542350	-3.626784	-2.945842	-2.611531	
D(LNRDMDEBT) (with intercept)	-5.168033	-3.632900***	-2.948404**	-2.612874*	-5.154281	-3.632900***	-2.948404**	-2.612874*	
LNROILREV (with intercept)	-1.748374	-3.626784	-2.945842	-2.611531	-1.726254	-3.626784	-2.945842	-2.611531	
D(LNROILREV) (with intercept)	-6.268201	-3.632900***	-2.948404**	-2.612874*	-6.308002	-3.632900***	-2.948404**	-2.612874*	
LNRNONOILREV (with intercept)	-1.110240	-3.632900	-2.948404	-2.612874	-0.987001	-3.626784	-2.945842	-2.611531	
D(LNRNONOILREV) (with intercept)	-8.325025	-3.632900***	-2.948404**	-2.612874*	-15.61226	-3.632900***	-2.948404**	-2.612874*	

**Notes:** ADF stands for Augmented Dickey-Fuller, PP for Phillip Perron; while \*\*\*, \*\*, and \* point to stationarity at 1%, 5% and 10% respectively. LNRGDP, LNREXDEBT, LNRDMDEBT, LNROILREV, and LNRNONOILREV stands for the natural log of real GDP, natural log of real external debt, natural log of real domestic debt, natural log of real oil revenue and natural log of real non-oil revenue respectively; “LN” stands for natural log; while “D” is the difference operator.

**Source: Author’s computation (2019)**

#### 4.2. DOLS Model Results

The DOLS model was first estimated by treating only real external debt and real internal debt as independent variables. Thereafter, the model was augmented by adding real oil revenue and real non-oil revenue as independent variables, in order to examine how the inclusion of the new variables affects the results of the baseline model. The results of the baseline and augmented DOLS models are presented below in Table 3.

In the baseline DOLS model, external debt has a negative and statistically insignificant impact on growth. On the other hand, domestic debt tends to impact positively on growth, but the impact is not statistically significant. So, both external debt and internal debt do not enhance growth in the baseline DOLS model. The negative and statistically insignificant impact of external debt on growth is maintained in the augmented DOLS model. In the same way, the positive and statistically insignificant impact of domestic debt is maintained in the augmented DOLS model. However, oil revenue has a positive and statistically significant impact on growth in the augmented DOL model, while non-oil revenue has a negative and statistically insignificant impact.

The results of Table 3 also show that GDP has positive linear and quadratic (non-linear) trends in the sample period of this study. That is, real GDP grows linearly over time in some years and also grows in a non-linear way over time in some other years, within the sample period. However, the linear trend becomes negative and statistically insignificant when oil revenue and non-oil revenue are included in the augmented DOLS. The good level of the overall fitness of the DOLS regressions is shown by the  $R^2$  and the sum squared residuals.

**Table 3: DOLS Regression Results**

Dependent Variable:	Panel A: Baseline DOLS Model (without oil revenue and non-oil revenue)		Panel B: Augmented DOLS Model (with oil revenue and non-oil revenue)	
	Coeff.	P-value	Coeff.	P-value
<b>LNRGDP</b>				
<b>Regressors</b>				
LNREXDEBT	-0.020593	0.4302	-0.025825	0.2800
LNRDMDEBT	0.045440	0.5837	0.106180	0.1544
LNROILREV			0.236044	0.0182
LNRNONOILREV			-0.125593	0.3299
C	4.848179	0.0000	4.434957	0.0000
Trend	0.018611	0.0581	-0.011704	0.4367
Trend <sup>2</sup>	0.000819	0.0080	0.001462	0.0003
$R^2$	0.991748		0.995874	
SSR	0.076602		0.038295	

**Notes:** LNRGDP, LNREXDEBT, LNRDMDEBT, LNROILREV, and LNRNONOILREV stands for the natural log of real GDP, natural log of real external debt, natural log of real domestic debt, natural log of real oil revenue and natural log of real non-oil revenue respectively; “LN” stands for natural log while SSR stands for sum squared residuals.

**Source:** Author’s computation.

### 4.3. Results of Unit Root Tests Conducted on the DOLS Residuals

The results in table 4 shows that the residuals from the baseline and augmented DOLS models are stationary, indicating that the DOLS regressions are not spurious. This means that the coefficients of the DOLS regressions are reliable cointegrating ones that show the long-run effects of the independent variables on the dependent variable.

Overall, the results of the study show that while external debt, domestic debt, and even non-oil revenue do not enhance growth, oil revenue enhances growth, pointing to the important role of oil in stimulating growth in Nigeria. These results are consistent with the findings of other studies on Nigeria. Essien, Agboegbulem, Mba & Onumonu (2016) examine the impacts of external and domestic debts on output and other macroeconomic variables in Nigeria and find that the two forms of debt do not have significant impacts on output in the country. The authors opine that the insignificant impacts is likely be due to the fact that public debts were not employed for growth-oriented purposes in the sample period of their study, but were used for other purposes such as trade-deficit financing.

Obademi (2012) also examines the impacts of public debts on growth in Nigeria and finds that the debts impact negatively on growth in the long-run, although their short-run impacts are positive. The author then argues that the negative long-run impact is due to inefficient debt management. Furthermore, the level of oil dependency is very high in Nigeria (Odularu 2008; Akinlo, 2012), implying that the government will likely not borrow externally and domestically when oil revenue is high and it is impacting growth positively, as the results of this study show.

The policy implication of these results is that among all the sources of government finance in Nigeria, oil revenue has a unique role and should be used maximally to achieve growth objectives, without unnecessary dependence on oil. That is, as Nigeria seeks to increase non-oil revenue and use public debts efficiently, it should seek to use oil revenue maximally in the process, since it is endowed with oil.

**Table 4: Unit Root Tests Results for the Residuals of the DOLS Regressions**

ADF							PP						
Variable	ADF Test Statistic	1% Value	Critical Value	5% Value	Critical Value	10% Value	PP Test Statistic	1% Value	Critical Value	5% Value	Critical Value	10% Critical Value	
Residuals of Baseline DOLS model (without intercept)	-3.085575	-2.639210***		-1.951687**		-1.610579*	-2.820621	-2.636901***			-1.951332**	-1.610747*	
Residuals of Augmented DOLS model (without intercept)	-4.654885	-2.639210***		-1.951687**		-1.610579*	-3.591670	-2.636901***		-1.951332**		-1.610747*	

**Notes:** ADF stands for Augmented Dickey-Fuller, PP for Phillip Perron; while \*\*\*, \*\*, and \* point to stationarity at 1%, 5% and 10% respectively.

**Source:** Author's computation (2019)

### 5. Conclusions

We have reached important conclusions from the analysis of this study. One, external debt and internal debt do not enhance growth in Nigeria in the long-run. Two, relative to external and domestic debts, and even non-oil revenue, oil revenue is the most important source of public



finance in Nigeria, with respect to long-run influence on growth. Three, oil revenue should therefore be used maximally in Nigeria, without unnecessary dependence on oil.

One way to use oil revenue maximally is channeling it to the appropriate sectors of the economy and saving excess revenues during oil booms. If oil revenue is used appropriately, the use of external and domestic borrowings will be reduced. This will in turn reduce the burden of loan repayments and make the government to manage debts effectively. Debts will likely be managed better by the government if they are not large.

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