

Public Debt And Economic Growth Nexus Revisited: Insights From Nigeria

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Abstract

The Nigerian economy is characterized by high level of public debt concurrently with persistent low economic growth. Thus, an understanding of the dynamic interation between public debt and economic growth is crucial. To this end, the current study investigate the relationship between public debt and economic growth in Nigeria between 1981 and 2014, using Vector Error Correction Model (VECM) and Granger Causality test as estimation techniques. The study extends the literature and trace a long-run equilibrium relationship between public debt and economic growth while the VECM results reveals a very slow 0.30% convergence speed toward their long-run equilibrium path with the contribution of external debt and domestic debt, The study shows a higher impact of domestic debt to external debt, implying Nigeria borrows more within from multi-national and internal financial institutions relative to foreign institutions like IMF and the world Bank. Results of the Granger causality shows an unidirectional causalty running from both domestic and external debt to real gross domestic product per capita. Given the findings emanating from the study, the following recommendations was offered first, the encouragement of domestic saving. Second, borrowed funds should be adequately ploughed into viable and produtive investments with good payback that foster growth and economic development in the long-run.

Keywords: public debt, economic growth, Granger causality.

Jel classification: E21,H63,O11

1. Introduction

Public debt serves as a menamce faced by many developed and developing nations across the globe (Bacilar,2012). Most countries in Europe have had a steady hike in public debt to their

gross domestic product (GDP) ratio after the world war II. The united state (U.S) also exhibited same trend of high debt ratio to gross domestic product; on the other hand,debt ratio in most developing nations among which Nigerian is one have an alarming and overwhelming debt ratio above the debt ceiling threshold level. These highly indebted developing nation can only overcome this situation by outsourcing from international financial institutions like World Bank and the International monetary funds (IMF) as well as other financial outfits.The general believe which was also posited by (Avramovic,1964) is that external outsourcing serves as a cushion, are relief to lack of sufficient domestic savings in developing nations and that borrowing will be ploughed into viable and productive investment and in the long run increase domestic saving enough to finance capital investment and also service debt payment. Adepoju et al, (2007) asserted that capital accumulated in any economy both developed and developing is basically sourced by public debt.

It is worthy of mention that most insufficient capital formation are offshoot of low productivity, low income level and also low savings. This occurrences necessitates the bridge of variance between the resource deficiency. Nigerian like most developing sub-saharan African countries majorly runs on public debt for financing key and capital intensive projects such as electrification, access roads and water projects among others. Theses outsourcing usually comes from borrowing from financial institution like IMF,world Bank (See Osinibi et al. 2010).

Generally, evidence from literatures have continue to indicate lack of concensus in studying the relationship between public debt, budget deficit and economic growth. Nigeria is known as less developed countey (LDC) among other cuntries in sub-saharan Africa by the world bank since 1992, Ajayi & Oke (2012). Nigeria incapability to measure up to its debt obligation has form a major baricage to the influx of external resources to the country. Amaeteng & Amoaka (2002)

investigated the nexus between economic growth and foreign debt service and their finding revealed a unidirectional and positive causal relationship between GDP and foreign debt; Although they argued unless the loans are geared into impactful and viable investment otherwise it leads to negative impact which breeds low income level as well as living standard in Nigeria which is the current situation since 1980s after the colossal loan acquisition in the 1980s. Similarly Hasen, Audu (2001) in his study on the impact of external debt in growth, the study also found overwhelming positive relationship. Ndungu (1988) in his study tries to analyze the dynamics of the impact of public debt accumulation on private investment and economic growth in sub-Saharan Africa. Ndungu asserted that the accumulated debt stock in Nigeria has birthed a halt and decline in growth and development in the long run. To buttress this claim the empirical work of Elbadawi et al (1997), to explicitly demonstrate the dynamics of how a nation moves from one side to another of the Laffer curve and the ripple impact on investment opportunity and economic growth.

Public debt which is the amount of money a country owes to other parties, could be institutions, agencies domiciled in the country or outside. There has been several discrepancy of the exact meaning of debt and external debt (Nzotta, 2004). Nigeria's journey to indebtedness is traced to the early 1980s, when there was incessant plunge of exchange rate earnings as explained by the fall in prices in the international oil market and knowing that Nigeria's economy is oil driven, this birthed the acquisition of indiscriminate loans. These debts accumulated over the years and increased the debt stock with hitches servicing them, which has translated into adverse macro and poor social economic condition in the country (Nzotta, 2004). Thus it is on this premise, that forms the motivation and basis for this current study to investigate the relationship between public debt and economic growth in Nigeria under the period of review in order to chart a blue print for

policy and decision makers for better debt management and economic prosperity. In a nutshell, the above empirical studies reveals three (3) key routes through which public debt have effects on growth namely the disincentive effect, the crowding out effect as well as the import compression effect. It is on this framework that birth the need for this current study.

The next section of this paper is brief review of relevant scholarly literature to this study ;section 3 forms the data and methodology ;section 4 dwells on the empirical finding while section 5 tells on the conclusion as well as policy implications from the study.

2. Data And Empirical Approach

The annual data used in this study span over 30 years (1981-2014), the data were sourced from the world Bank development indicators index (WDI), Nigerian statistical Bulletin (NSB) and also the Nigerian central Bank statistical bulletin. The time lag chosen was based on the availability of the data. This study uses Gross domestic product per capita to proxy economic growth as dependent variable while public debt was disaggregated into domestic and external debt for better analysis as explanatory variables to capture the dynamics of indebtedness of the country under review. The model formulation is given below as:

$RGDP / CA = f(DDEBT, EXTDEBT)$ while the stochastic form of the model is

$$RGDP / CA_t = \beta_0 + \beta_1 DDEBT_t + \beta_2 EXTDEBT_t + \varepsilon_t$$

Here,

$RGDP/CA$ = Real Gross domestic product per capita

B_0 = intercept

$EXTDEBT$ = External debt

$DDEBT$ = Domestic Debt

ε_t = Disturbance term

2.1. Empirical Approach

2.1.1. Unit Root Tests

The conventional and general practice engaged when working with timeseries data is the visual plot or eyeball test. Although not sufficient and formal but gives a glimpse about the nature of the data of interest. Empirical studies based on times series data posit that observed data are stationary. That is, such data has a mean, variance and auto-covariance at several lags that are time invariant i.e. Not changing over time. Nevertheless, most financial macro variables exhibits trends and volatility meaning they change over time. Thus, the implication of dealing with such data is running into the problem of spurious regression that is, nonsense regression. Granger & Newbold (1974) and Nelson and Plosser (1982) asserted that its key to know that the outcomes and analysis based on spurious regression is misleading as well as such models lack forecasting power and policy implication drawn from such also is not valid. The solution to these outcomes is to engage the use of unit root testing techniques to get the stationarity as well as the order of integration of the series. This current study employs the famous Augmented Dickey Fuller (ADF) postulated by Dickey & fuller (1981) test and phillips perron (PP) test proposed by Phillips and perron (1988) and Kwiatkowski Phillips Schmidt and Shin's (KPSS) as a confirmatory test to validate the findings of ADF and PP. The general form of the equation is given as:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^m \alpha_i \Delta Y_{t-i} + \epsilon_t \quad (1)$$

Where ϵ_t represents Gaussians white noise that is assumed to have a mean value of zero, and possible auto correlation represents series to be regressed on the time t . Also, the variables descriptive statistics are expressed in Table (1).

Table 1: Descriptive Statistics

	Mean	Maximum	Minimum	Std. Dev.	JB	p-val. JB
Lndomestic debt	6.002462	8.975127	2.415253	1.997188	2.336689	0.310881
Lnexternal debt	5.969692	8.495003	0.846383	1.934478	5.760554	0.056119
Lnreal GDP/Ca	6.521092	7.351213	6.203019	0.278850	6.949057	0.030976

Source: Authors Creation

2.1.2. Cointegration Test

It's a well known fact that most macro economic variables such as Real gross domestic product per capita, external debt and domestic debt shows some trend at their level forms given the existence of trends, Inorder to capture for the long-run relationship between the variables of interest in a model, the need for a cointegration test arise. Granger (1981) and Engle & Granger (1993) recommended a cointegration test to determine the long-run equilibrium relationship among series. This study engages the well know Johansen (1988) cointegration test with both equation (2) and results (Table 1) given below to certain the existence of any long-run relationship among variables being investigated in this study.

$$\Delta Y_t = \Gamma_1 \Delta X_{t-1} + \dots + \Gamma_{K-1} \Delta X_{t-K+1} + \Pi X_{t-K} + \mu + e_t \quad (2)$$

Table 2: ADF, PP and KPSS Tests of Unit Root

Statistics (Level)	GDP/CA	DDEBT	EXDEBT
τ_T (ADF)	-0.533	-1.405	-1.665
τ_μ (ADF)	1.716	-1.491	-2.043
τ (ADF)	1.520	2.335	1.105
τ_T (PP)	0.284	-1.657	-2.184
τ_μ (PP)	1.566	-1.397	-3.148
τ (PP)	1.383	4.122	0.734
τ_T (KPSS)	0.21**	0.154**	0.183**
τ_μ (KPSS)	0.54**	0.672**	0.567**

Statistics (First Difference)	GDP/CA	DDEBT	EXDEBT
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τ_T (ADF) -4.16**	-4.379**	-4.554**
τ_μ (ADF)-2.88***	-4.306**	-4.443**
τ (ADF) -2.66**	-2.385**	-4.282**
τ_T (PP) -2.87	-4.367**	-4.570**
τ_μ (PP) -2.89***	-4.306**	-4.443**
τ (PP) -2.63**	-2.184**	-4.291**
τ_T (KPSS) 0.126	0.064	0.0748
τ_μ (KPSS) 0.698	0.209	0.419

2.1.3. Estimation of Long-Run Coefficient

For the establishment of long-run association, variables have to be integrated of same order. Cointegration implies that among the variables being investigated, there exist a possible convergence in the long-run. Series reach their equilibrium in the long-run by adjustment with time. The Vector Error Correction Model (VECM) under the vector Auto regressive framework procedure is employed in the study to capture the dynamics between the short , long-run and also impact as well. The Error Correction term (ECT) show and capture the speed of adjustment of the variables toward their long-run equilibrium value.

2.2. Granger Causality Test

The general econometrics regression don't necessarily implies causation. The study employs Granger causality test to ascertain the direction of causality. A variable say Y is said to granger cause another variable say X, if the present X_t is better predicted by the past values of Y($Y_{t-1}, Y_{t-2}, \dots, Y_0$) rather than the past values of X alone. The wald test is used to test for granger causality.

3. Empirical Results

This section of the paper explains as well as discuss the result of the findings of the study. The visual plot of all variables as seen in Fig. (1) to (3) of interest to this current study indicates some level of trend and the need for formal stationarity test was carried out with ADF, PP and KPSS.

LNGDP_CA

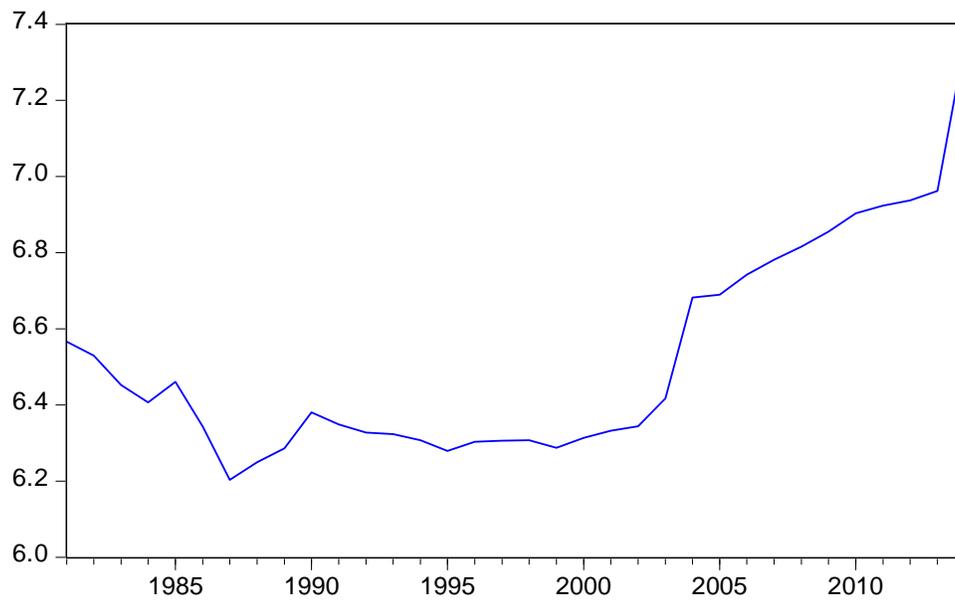


Fig 1: Line Plot of lnGDP_CA.

LNEXT_DEBT

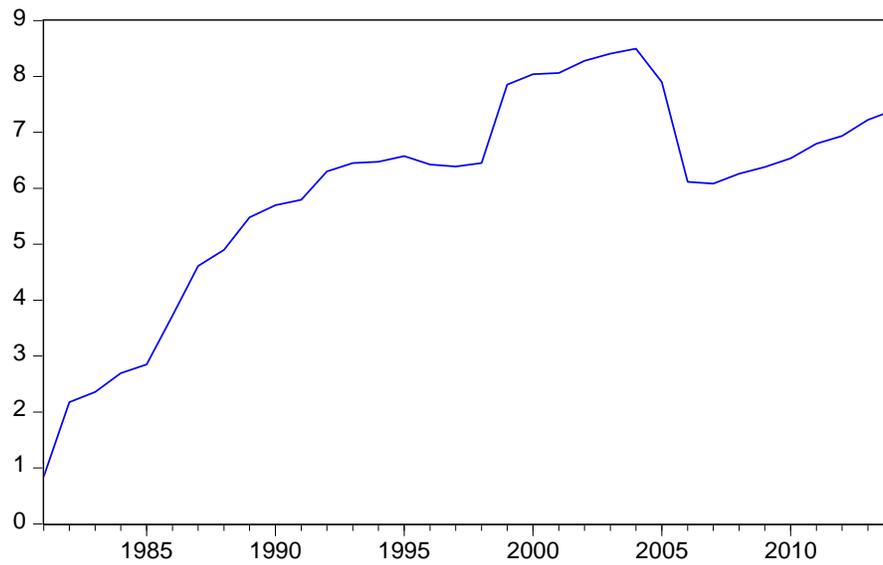


Fig 2: Line Plot of lnEXT_DEBT.

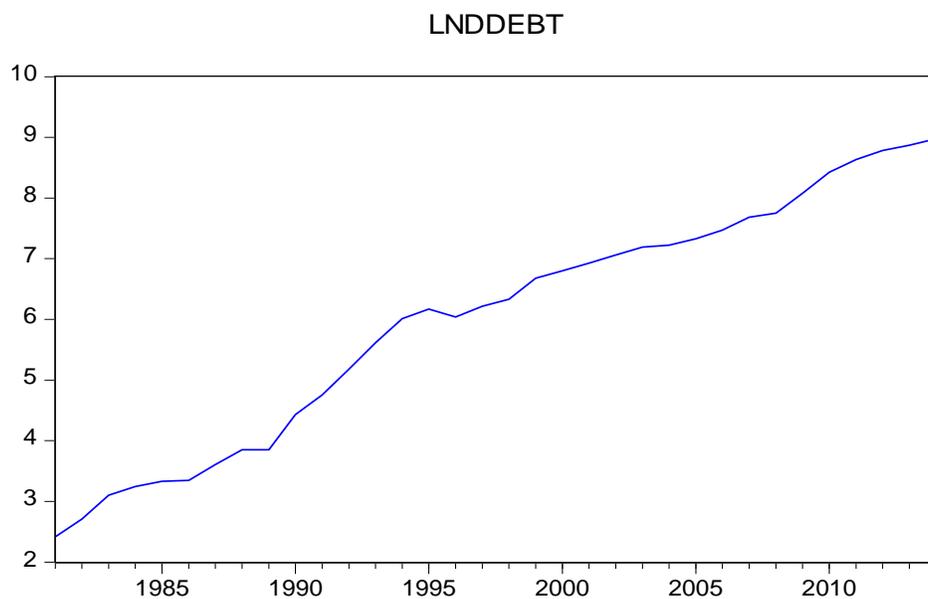


Fig 3: Line Plot of lnDDEBT.

The descriptive statistics of the series¹ Table 1. shows that natural logarithm of real gross domestic product per capita having the highest mean value closely followed by domestic debt then external debt. Domestic debt has the highest maximum value. All series are normally distributed with exception to domestic debt, this is given by Jarque Berra probability value with rejection of 5% critical level. Table 2: represents the unit root test. At level form all variables are not stationary but after first differencing they all became stationary with the ADF and PP test as validated by KPSS. We are able to reject the at 5% critical level for KPSS at level. while at first difference we fail to reject indicating stationarity. The next procedure is to investigate if there exist any cointegration among variabe since they all integrated of the same order $\sim(1)$.

¹ Note: Gross domestic product per capita (GDP/CA) is used to capture as measure for growth relative to individuals in the country. Domestic debt (DDEBT) represents the country inherent domestic debt in local currency ;while External debt (EXTDEBT) signifies both domestic and foreign debt also called public debt.s All of the series are at their natural logarithms. τ_T represents the most general model with a drift and trend; τ_μ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Numbers in brackets are lag lengths used in ADF test to remove serial correlation in the residuals. When using PP test, numbers in brackets represent Newey-West Bandwith (as determined by Bartlett-Kernel). Both in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models. *, ** and *** denote rejection of the null hypothesis at the 1 percent, 5 percent and 10 percent levels respectively. Test was conducted with E-VIEWS 8.0s

Table 3. Johansen Multivariate Cointegration Results

Null hypothesis	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
$r = 0^*$	0.519303	30.09168	29.79707	0.0462
$r \leq 1$	0.184177	6.651080	15.49471	0.6185
$r \leq 2$	0.004279	0.137226	3.841466	0.7110

*Note: trace test statistics was reported with their corresponding probabilities. As given by Osterwald-Lenum (1992) with lag length 1:1 and model 3 in cointegration equation was chosen. P-value > 0.01. * 1% significance level.*

According to Table 3 there exist of one cointegrating vectors in the model. Since we could reject the null hypothesis, using the Johansen trace statistics, which states no cointegrating vector and also the probability value helps us make rejection decision, otherwise we accept the alternative of there is one cointegrating vector equation. This implies we can conclude there is a long run equilibrium relationship between RGDP per capita the dependent variable external debt and domestic debt which makes up public debt as explanatory variables in the study area. This qualifies us to run the unrestricted VECM.

Table 4: The Table Below Gives the Granger Causality Test Which Reveals the Direction to Causality.

Null hypothesis	Lags	F-stat	P-value	Decision
$\ln \text{externaldebt} \neq > \ln \text{gdp_ca}$	1	0.732366	0.0111	Reject
$\ln \text{GDP_Ca} \neq > \ln \text{Ext_Debt}$	1	0.78566	0.3825	Fail to reject
$\ln \text{DDebt} \neq > \ln \text{GDP_Ca}$	1	6.10994	0.0193	Reject
$\ln \text{GDP_Ca} \neq > \ln \text{DDebt}$	1	0.36134	0.5523	Fail to reject
$\ln \text{DDebt} \neq > \ln \text{EXT_debt}$	1	0.04368	0.8359	Fail to reject
$\ln \text{Ext_debt} \neq > \ln \text{DDebt}$	1	0.01325	0.9091	Fail to reject

Source: Authors Compilation

Note: *** significant at 1 percent ($p < 0.01$) level.

Where $\neq >$ signifies does not granger cause. H_0 : NO causality

According to Table 4 which gives the causality outcome reveals a unidirectional causality running from lnexternal debt to Real gross deomestic product per capita as well as also a unidirectionl causality running form lnDomestic debt to RGDP. This by implication show the impact of both domestic and external debt on the economic prosperity of the Nigerian economy given the debt overhang that well above the tolerance threshold level.

Table 5: Vector Error Correction Model (VECM) Estimation

	Coefficient	Std. Error	t-Statistic	Prob.
α	0.003463	0.001584	2.186737	0.0373
β_1	0.127426	0.270313	0.471402	0.6410
β_2	-0.002527	0.033164	-0.076184	0.9398
β_3	-0.149297	0.108253	-1.379149	0.1788
R-squared	0.141559	Mean dependent vary		0.025680

Source: Authors Compilation

The need for an Error Correction model test was relevant after the establishment of long-run relationship among the variables. The essence was to capture the effect of long and short run causality and the speed of their adjustment to their long run equilibrium path was 0.3463, a very low speed of adjustment by the contribution of both external and domestic debt. Using the error correction term (ECT). The ECT was positive and significant pointing the robustness of the test and model. Other explanatory variables (external and domestic debt) followed the Apriori signs, which is expected to be negative indicating the adverse effect of borrowing on economic growth. The study intrestingly discovered a twist that the Nigerian economy is more domestically

indebted relative to her external debt as validated with the VECM result with 0.25% and 14% for both external and domestic respectively.

4. Conclusion

This study investigates the nexus between public debt and economic growth for the case of Nigeria within a period of over 30 years precise between 1981 to 2014. long run equilibrium relationship was traced by the Johansen cointegration test that real gross domestic product per capita and public debt. The study revealed that there was unidirectional causality running from external debt and gross domestic product per capita and also the study discovered a unidirectional causality from domestic debt to ln gross domestic product per capita. The error correction model result show that both external and domestic debt which makes up public debt, both had negative signs indicating an adverse impact on economic growth as well as development in the long run. The outcomes emanating from the study gives the premise for the following recommendation. Firstly, the study submits that there should be adequate debt management structure, the loan repayment. The study submitted that the acquired loans should be as a matter of urgency ploughed into viable investment.

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Compliance with Ethical Standards

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