

## **Sovereign Debt And Sustainable Economic Growth Of Developing Countries: Further Empirical Analysis In Nigerian Context**

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### **Abstract**

Despite the giant strides made across the world in the last three decades, many developing countries in Sub-Saharan Africa are still faced with grave problems of poverty, economic deprivations, poverty, insecurity, political instability, environmental concerns among other issues. Research suggests that substantial progress against poverty is a function of sustainable economic growth through strategic, prudent management of financial resources. Growth, in turn, is fostered most effectively by level of financial leverage and policies that promote sustainable capitalism, but concerns have also been expressed regarding the “crowded-out” effect on private enterprise by predominant government borrowing with implications for stable financial system. Contemporarily, unsustainable increases in sovereign debt have presaged economic crises in many countries and accumulating enormous debts are increasingly associated with volatility in several bond markets. Consequently, the real value of increasing public Debt-to-GDP ratio (DGR) to meet growth objectives has remained a controversial subject. The present study seeks to investigate the issue in the Nigerian context by deploying econometric tools to analyze annual time series from 1981 to 2014 in an attempt to establish the causal relationship between its DGR and real GDP growth rate. Unit root test for stationarity, Johansen’s co-integration, and Vector Error Correction tests were conducted to determine the long-run equilibrium behaviour between the paired variables. The presence of a significant one-directional causality running from DGR to GDP growth rate was shown from the analysis. The empirical evidences suggest that although a developing economy like Nigeria can attract higher level of DGR, higher levels of DGR could threaten sustainable economic growth. Based on these findings, towards the end, the paper briefly highlights some useful pointers to where long-term policy priorities and deeper structural reforms could be needed.

**Keywords:** *DGR, Fiscal policy, GDP growth, Granger causality, Nigeria, Business environment.*

**Related Conference Theme:** *Public Economics*

**JEL Classification:** *C58, E62, H63*

## **Introduction**

There is a great deal of diversity among developing economies which are spread across the world, but their essential common feature remains their relatively low per capita income. The pressing need in these countries is to accelerate economic growth so as to eliminate poverty and unemployment and ensure environmental sustainability and quality of life. Improving the living conditions of the people in these countries requires sizable financial and social capital investment by their governments and this has often meant borrowing locally and externally to finance large-scale infrastructure projects such as electricity supply, communications, and transportation needed for sustainable wealth-creation and poverty-reduction. Thus, globally, there is the attraction of public debt on one hand, but there is also the macroeconomic danger of excessively accumulating the debt stock on the other hand, hence the need to ensure scientific caution in the use of public debt as a fiscal policy instrument, basically because fiscal policy objectives become jeopardized when public debt goes beyond certain boundaries. History has shown that different economies deal with debt burden in different ways (Svaljek, 2002). While the developing countries of Sub-Saharan African (SSA) in particular may have been experiencing high GDP growth in recent years, an average of 4.6 percent in 2014, up from 4.2 percent in 2013, the region is still faced with fiscal challenges, largely due to their heavy dependence on oil and commodity revenues the global prices of which took a plunge in recent times. This has necessitated budgetary adjustments for many of the oil exporting countries including Angola, Cameroon, Chad, Equatorial Guinea, Gabon, and Nigeria. Nigeria's economy is the largest in Africa, 76 percent of ECOWAS sub-region, 30 percent of SSA, and 21 percent of Africa as a whole (Okonjo-Iweala, 2014). In Nigeria, the oil price assumption in the 2015 budget was revised down to US\$53/bbl from the earlier forecast of \$65/bbl leading to a corresponding cut in public spending, particularly capital expenditures. The country's gross international reserves reduce by 18 percent from US\$45.66 billion in December 2013 to US\$37.44 billion in December 2014 drawn down by the central bank in its attempt to support the Naira. In March 2015, Standard & Poor's downgraded Nigeria's credit rating from B+ to BB. Additionally, many of the region's economies have issued Eurobonds in recent years to finance infrastructure projects and this has also triggered a rise in the Debt-to-GDP ratios (GDRs). GDR is the ratio, generally expressed as a percentage, between a country's government debt and its gross domestic product (GDP), thereby serving as a crucial measure of the state of finances or financial leverage of an economy as a whole. Generally, a low GDR suggests that an economy is productive and have adequate resources to pay back debts without incurring additional debt. One of the Euro convergence criteria for sustainable public finance is that government GDR be below 60 percent (European Commission, 2015). While DGRs in developing economies like Nigeria are believed to be much lower (around 30% on the average) than what are obtainable in the rich countries of US (104.5%-2013) and Japan (243.2%-2013) for instance, there are fears that currency depreciations against the US dollar could lead to increase in these countries' external debt stock and that fiscal deficits will likely remain high because of low revenues (CIA World Factbook, 2013; Piketty, 2014; The World Bank, 2015). With both rich and developing economies having interminable debt crisis, the question of sovereign debt is not a question of absolute wealth, but, as Piketty (2014) asserts, a question of debt sustainability in terms of distribution of national wealth among the populace. In the oil-rich Nigerian context, despite the country's strong fundamentals, it is floundering because of recurring challenges such as inadequate electricity power supply, poor infrastructure, delays in the passage of legislative reforms, an inefficient property registration system, an inconsistent regulatory environment, a slow judicial system, insecurity, and pervasive corruption, while economic diversification and strong growth have not yet transformed into a significant decline in poverty levels - over 62% of Nigeria's 170 million people live in extreme poverty (CIA, 2015).

While, in more recent times, there has been some equilibrium between the country's debt burden and its GDP growth rate, it is remarkable that its public debt, which rose to a record height of \$66 billion in 1999 and later declined to a record lowest of \$17 billion on the backdrop of the 2005/2006 external debt-relief negotiations, has been on the rise again, reaching some \$58 billion in 2014 dominated by domestic debt. Thus, insights derived from long-term relationship between sovereign debt and economic growth is pivotal to robust monetary-fiscal policy formulation of developing economies like Nigeria. During the oil boom of the 1970s, the Nigerian government accumulated a significant foreign debt to finance major infrastructural investments. With the fall of oil prices during the 1980s oil glut, the country struggled to keep up with its loan payments and eventually defaulted on its principal debt repayments, limiting repayment to the interest portion of the loans. Arrears and penalty interest accumulated on the unpaid principal which increased the debt stock. After negotiations by the Nigeria authorities, in October 2005 Nigeria and its Paris Club creditors reached an agreement in which Nigeria repurchased its debt at a discount of approximately 60 percent. Nigeria used part of its oil profits to pay the residual 40 percent, freeing up at least \$1.15 billion annually for poverty-reduction programmes. This, Nigeria made history in April 2006 by becoming the first African nation to completely pay-off its debt (estimated \$30 billion) owed to the Paris Club. The achievement of macroeconomic goals such as poverty reduction, full employment, price level stability, high and sustainable goal, is imperative for successful development process. In this context, government's increasing role has resulted in rapid increase on government expenditures. Thus the Nigerian government's fiscal policy has been characterized by fiscal deficits for most part of the last decades since 1970, except for 1971, 1973 – 74, 1979, and 1995-96, with negative impacts on national savings and economic development (Musa et al, 2014).

Thus, the question of sovereign or government debt and economic growth borders on sustainable public finance and this has substantial implications for the development of private wealth, real estate and financial assets (Piketty, 2014). Amidst the debates on the utility of sovereign debt in Nigerian economy, there seems to a consensus to some extent that high level of sovereign debt (SD) and Gross Domestic Product (GDP) growth rate are negatively correlated (Reinhart *et al*, 2012). The possibility of the presence of negative relationship between DGR and GDP growth has led to the emergence of the issue of causality. Does increasing level of DGR drive sustainable economic growth, or does rapidly growing domestic economy attract more DGR? Neither of these possibilities can be ruled out, hence the need for empirical studies on the subject.

### **Significance of Study**

The sustainability of fiscal deficits and sovereign debt has received renewed attention in recent years because of its significant bearing on the state and direction of aggregate output and overall business environment per time (Paul, 2008). Every country has its own history as well as its own socio-political agenda and economic growth trajectories. For many years up to the 1990s, Nigeria encountered a number of problems managing its debts which led the Federal Government to establish a relatively autonomous debt management office on 4<sup>th</sup> October 2000 to centrally coordinate the management of Nigeria's debt, which was hitherto performed by several establishments, in an uncoordinated manner. This uncoordinated debt management system led to many inefficiencies and problems. Some of the critical challenges include the lack of consistent, well-defined borrowing policies and debt management strategies; hence the country experienced many years of borrowing spree with negative impact on economic and business development. Nigeria became the second African country after South Africa to be listed on the JP Morgan's emerging markets government bond index in October 2012. This came after the CBN removed the restriction for foreign investors to hold government bonds for a minimum of one

year before they could exit, among other policies that favour foreign investors. JP Morgan, however, placed Nigeria on what it called 'Negative Index Watch' in January 2015 and warned that currency controls introduced by the CBN were making bond market transactions too complex to meet its rules. This phenomenon of post-2008 upsurge in debts and investors' concerns is not peculiar to Nigeria as several other developing African economies, notably, South Africa, Egypt, Angola, Kenya, Morocco face similar conditions (The World Bank, 2013). The debt issue appears paramount for the new administration in Nigeria which seems poised to effect fundamental 'changes' in the economy, and that is one of the motivations for this paper.

This paper consists of five broad sections. The paper begins with this introduction including the need for the present research study. The second section reviews the general literature and highlights some of the significant studies carried out on the subject in the Nigerian context. The third section deals with the methodology adopted for the research, describing the essential parameters of the econometric models and techniques, while the fourth section presents the results of the empirical tests to draw appropriate inferences. The paper ends with a summary of the findings, a few policy implications and some suggestions for future studies.

### **Literature Review**

Taxes and debt are the two main ways for a government to finance its expenses, but is sovereign or public debt significantly contributory to economic growth in the long-run? The issue has remained contentious in the field and has spawned a large literature many of which appears to suggest that output and growth are adversely affected by public debt and that while countries do graduate from debt overhang; the process is usually a prolonged one and varies across economies. In his famous book on *Wealth of Nations*, Adam Smith (1776) warned, albeit in the old European empire-building context, that accumulated debts will in the long-run probably have negative economic consequences. While there have always been limited mechanisms for enforcement for sovereign debt, overseas legal instruments and reputational considerations work to minimize default – failure of a government to meet a principal or interest payment on time or rescheduling a debt on terms less favourable to the creditors (Aguiar & Amador, 2013). Nevertheless, default happens regularly in history as the multi-country debt crisis of the Great Depression, the Latin American crisis of the 1980s and the on-going European debt crisis and concerns in America and other countries of the world indicate (Afonso, 2005; Aguiar & Amador, 2013; Basu, 2009; Carson, 2014). Such countries will find it difficult to borrow again, unless certain conditionalities of the international financial markets are complied with, hence the crucial knowledge of DGR as a sustainability technique to monitoring sovereign debt (Svaljek, 2002).

The literature on standard open-economy growth model suggests that a country with above average growth prospects should attract capital for both investments and consumption smoothing, and also that under-performing economies increase their public indebtedness (Aguiar & Amador, 2013). Thus, all things being equal, a large stock of outstanding debt is associated with negative consequences such as more volatile consumption because it lowers the present value of consumption and impedes risk-sharing, especially when the country is heavily indebted. The antidote is to introduce a borrowing constraint as an incentive to save so as to achieve high endowment realizations. In essence, sustainable growth is not necessarily financed through sovereign debt, but rather associated with a government reducing its debt or accumulating net foreign reserves.

Thus, there seems to be a large body of literature that points to the strong, albeit, negative relation between accumulating sovereign debt and economic growth. D'Esramo *et al* (2015) used a linear fiscal

reaction function to analyze post-2008 debt sustainability in the United States and Europe after the recent upsurge in public debt, and raise serious questions about its fiscal consequences in these advanced economies. The authors suggest in the case of Europe that the capacity to use taxes to make higher DGRs sustainable is nearly fully exhausted. Similarly, surveying the seven most indebted nations of the world, Patton (2014) suggests that the rising trend of DGR in these countries connotes a ticking time bomb or a slow path to recovery. Reinhart *et al* (2012) observes a negative correlation in advanced economies between DGRs and growth. Perhaps a significant work in the context of this paper is the one conducted by Reinhart and Rogoff (2010) that examined economic growth and inflation at different levels of government and external debt, using data on forty-four countries spanning about two hundred years. The dataset incorporates over 3,700 annual observations covering a wide range of political systems, institutions, exchange rate arrangements, and historic circumstances. The authors found that the relationship between government debt and real GDP growth is weak for debt/GDP ratios below a threshold of 90 percent of GDP, whether or not the economy is advanced or emerging. However, emerging markets face lower thresholds for external debt (public and private) - which is usually denominated in a foreign currency. When external debt reaches 60 percent of GDP, annual growth declines by about two percent; for higher levels, growth rates are roughly cut in half. There are also interesting results about inflation's nexus with GDP, but this will be outside the scope of the present analysis. It is also argued in the context of the Maastricht criterion of public debt sustainability that monetary union without fiscal convergence could trigger economic instability (Buiter *et al*, 1993). Domar (1944) shows that the higher the growth rate, the lower the interest rate on public debt and by extension the debt burden. So far, all these studies go to show the strong relation between DGR and economic growth, but this perhaps only in the context of the more advanced economies of the US, Japan, Singapore, Italy, and the like, thus, pointing to need to ascertain the scientific status in the developing economies, a gap that the present study attempted.

A point is noteworthy regarding the current posture of the cited literature. Advocates of the positive approach (along with its variants; "public choice school", "new political economy") to public debt management studies does not see the government as a benevolent social planner, but rather, politicians in modern democracies decide on public financing direction based on their self-interest and specific institutional limitations (Heinemann, 1992). In this context, Grilli, *et al* (1990), among other studies, suggest that fiscal deficit is correlated with permanence of the government with long-lasting governments having lower deficits.

A further review of the empirical literature shows that, methodologically, perhaps beginning with (Hamilton & Flavin, 1986) who proposed the Dickey-Fuller unit root test for testing the non-stationarity of real debt and economic growth, there has been some active application of econometric tools or time series analysis methods in assessing the impact of various factors on economic growth across many countries. Before testing for presence of causality between time series, tests of stationarity are usually performed on the empirical data to avoid the syndrome of spurious correlation and the unit root test is widely used approach in this respect (Gujarati & Sangeetha, 2007). Granger (1969 & 1988)'s seminal work critically considers the relationship between causation and co-integration and asserts that if a pair of series are co-integrated, there must be causation in at least one direction. The author suggests that causality tests be used for policy evaluation but that they should be applied with care. In the Indian context, Venkatraja (2015) applied the Unit Root Test (URT), Johansen's Co-integration Test (JCIT), Vector Error Correlation Model (VECM), and the Granger Causality Test (GCT) to document the evidence that high capital formation contributes significantly to the growth of the Indian economy. Interestingly, several similar studies focused on gross capital formation in the Nigerian context such as Shuaib and

Dania (2015), Kanu (2014), and Ugochukwu and Chinyere (2013), among others adopted similar methodology including ordinary least square (OLS) technique and Phillip-Perron (PP) stationarity test in some cases, but the preponderant focus on capital formation perhaps reinforce the present perspective that the issue of the public debt management in Nigeria has been given little or no research attention. It is pertinent to note that public debt management issue in Nigeria remains blurred (Nwankwo, 2014; Boyo, 2012 & 2015), thus pointing to the need for in-depth investigation, a gap that motivated the present research study. The related contribution of Venkatraja and Sriram (2015) also documents the behaviour of time series between Foreign Direct Investment (FDI) and economic growth of the emerging economy over the period 1993 to 2013 using the same econometric quartet, URT, JCIT, VECM, GCT, for their analysis. The authors used these econometric models to evidence that inflow of foreign direct investment significantly impacts on the GDP of India. A similar econometric approach is used by Obinwanne *et al* (2015) and Ajide (2014) in investigating the determinants of economic growth in Nigeria, and this help to document the evidence that the depreciating value of the Naira and the large size of government have negative effect on sustainable economic growth respectively. Also, using data for the period 1970 to 2010 and Augmented Dickey-Fuller URT, Egbetunde (2012), Udoka and Ogege (2012) and Uzochukwu (2015) found long-run positive relationship between total debt stock and per-capita GDP, but the crucial issue of DGR's impact on sustained growth of Nigerian economy was not part of the authors' studies, leaving unfilled the current gap in the research.

### **Research Gap**

It is realized that quantitative analysis of the role of sovereign debt in modern economic development is an active area of research and has already generated a number of vital perspectives, as highlighted above. Admittedly, a series of recent papers have touched on sustainability of GDP in relation to such factors as FDI, size of government, inflation, exchange rate, total debt, etc., but it is worth noting that little or no emphasis has been given to the relationship between DGR and GDP growth in the Nigerian context. Even then, the empirical evidence on the causal linkages between several key variables and economic growth is mixed and warrant in-depth investigation especially in the context of emerging economies. Filling this gap is an active area of current research and important question in fiscal policy literature particularly in Nigeria.

### **Objectives**

The main objective of this study is to explore the causal link between DGR and economic growth in Nigeria. The specific objectives are:

- I. To assess the dynamics of short-term linkages between DGR and economic growth.
- II. To explore the presence of long-term equilibrium relationship between DGR and economic growth
- III. To capture the linear inter-dependence among the variables under study in the Nigerian context.

### **Theoretical Framework**

Before now, presuming the existence of asymmetry of the Keynesian-type stabilization policies, classical research areas had focused more on debt burden and short-run or temporal effects of sovereign debt. However, lately, research focus appears to have shifted towards analyzing the impact of public debt on various domestic economies from two broad perspectives; one using the normative approach, the main

advocate of which is Robert Barro (1974), and the other, using the positive approach. The advocates of the normative approach to public debt, also known as Barro's theory of neutrality of debt, see the government as "benevolent social planner" whose aim is to maximize the welfare of members of the society through the use of fiscal policy instruments of tax financing and debt financing. Thus, debt issuance has no influence on the economy, wealth, aggregate output, interest rate, gross capital formation, and involves no sacrifice on the part of the lenders; its only role is to provide government with greater flexibility for balancing of public revenues and debts (Barro & Grilli, 1994; Buchanan, 1999). To advocates of the normative theory, any debt level is sustainable as long as it is stable. The point with the normative approach is that its validity can only be confirmed by empirical data, hence the emergence of the positive approach which investigates the real appearance and trends of sovereign debt. Advocates of the positive approach (along with its variants; "public choice school", "new political economy" or "mercantilist theory") does not see the government as a benevolent social planner, but rather, politicians like any other citizens pursuing their own benefit instead of social welfare, decide on public financing direction based on their self-interest and specific institutional limitations (Heinemann, 1992). While one would not want to be totally associated with the mercantilists who go as far as to discredit public debt as unproductive, wasteful, or evil (Sharp, 2006), whether public debt is useful or harmful to the society depends perhaps on the extent to which government deploys the proceeds to enhance real economic development. All the same, reviewing sovereign debt and sustainability of economic growth of developing countries in Nigerian context is considered a part of the positive approach deployed in determining the impact of debt on modern economies. Time series analysis methods based on positive analysis was used in the present study monitoring DGR and economic growth in the Nigerian context because they are empirically much more confirmed than approaches based on the normative approach (Svaljek, 2002; D'Esramo *et al*, 2015)

## Methodology

Sovereign Debt (SD) and economic growth form the two main variables for the empirical causality analysis. The GDP was used as the proxy for economic growth. The empirical analysis was based on time series for the period from 1981 to 2014, that is, annual observations of 34 years of secondary data sourced primarily from The World Bank and Central Bank of Nigeria. GDP, the proxy for economic growth, is the sum of gross value added by all resident producers in an economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. SD is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It includes long-term and short-term domestic and foreign liabilities such as currency and money deposits, securities other than shares, and loans. Domestic SD values were converted to US dollars for meaningful analysis. The ₦/USD traded at ₦199.05 on Thursday September 10, 2015, according to interbank foreign exchange market quotes. The Nigerian Naira averaged ₦127.14/USD from 1960 until 2015, reaching an all-time high of ₦204/USD in February of 2015 and a record low of ₦0.53/USD in September of 1980.

Data were processed and analyzed by applying econometric tools and techniques through EViews statistical package. The analysis comprised of (i) testing the stationarity of data using graphical analysis combined with the popular Augmented Dickey Fuller (ADF) Unit Root Test Method, (ii) testing the co-integration between SD and GDP growth rate by administering Johansen's Co-integration Test (JCIT), (iii) fitting a vector error correction model (VECM) if co-integration was established, and (iv) proceeding towards testing the presence of causal relationship between SD and GDP by administering the Granger

Causality Test (GCT) upon confirmation of variables being co-integrated. Data visualization by way of line graphing provided an initial clue regarding the likely nature of the series. The above-stated tests were conducted following the standard procedure and decision rules indicated in the literature (Dickey & Fuller, 1981; Gujarati & Sangeetha, 2007; Ray, 2012; Engle & Granger, 1987; Granger, 1969 & 1988) briefly described below:

After getting an initial feel on the possible nature of the time series between DGR and GDP growth rate, the study proceeded with the next test of stationarity based on Unit Root Test using the ADF which basically consisted of estimating the following regression:

$$\Delta Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 \Delta Y_{t-1} + \dots + \epsilon_t \quad (1)$$

where,  $Y_t$  represents the time series to be tested,  $\alpha$  is the intercept term,  $\beta_1$  is the coefficient of intercept in the URT,  $\beta_2$  is the parameter of the augmented lagged first difference of the dependent variable,  $\beta_i$  represents the  $i$ th order auto regressive process, and  $\epsilon_t$  is the white noise error term. The number of lagged difference terms to include in the autoregressive process was determined empirically so that enough terms were included such that the error term was serially uncorrelated. The stationary condition under ADF test requires that  $\beta_1 < 1$ , that is,  $p$  value must be less than 1. One-sided  $p$ -values were used for the present empirical analysis because they are more powerful than their two-sided counterparts (Demos & Sentana, 1998). In essence, the null hypothesis of non-stationarity would be rejected if  $\beta_1 < \tau$ , where  $\tau$  is the critical value obtained from the Table. Contrariwise, if  $\beta_1 > \tau$ , then the null hypothesis that the series is non-stationary would not be rejected.

If from the ADF test results, the time series exhibited stationarity and both data sets were integrated at the same order, then the study proceeded to examine whether or not there existed a long-run relationship between DGR and GDP growth by administering JCI<sub>T</sub> as follows:

$$\Delta Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 \Delta Y_{t-1} + \dots + \epsilon_t \quad (2)$$

where,  $Y_t$  is an  $n \times 1$  vector of non-stationary  $I(1)$  variables,  $\alpha$  is an  $n \times 1$  vector of constants,  $p$  is the maximum lag length,  $\beta$  is an  $n \times n$  matrix of coefficient and  $\epsilon_t$  is an  $n \times 1$  vector of white noise terms. The  $\beta$  is indicative of the extent of relationship or cointegration, while the preceding (+ or -) sign to the beta is indicative of whether the long-run relationship is positive or negative.

Following Ray (2012), given that there might be some disturbance or disequilibrium in the short-run, VECM was used to measure the speed of correction or convergence into the long-run steady of equilibrium. JCI<sub>T</sub> equation (2) had to be converted into a vector error correction equation thus:

$$\Delta Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 \Delta Y_{t-1} + \dots + \epsilon_t \quad (3)$$

where,  $\Delta$  is the first difference,  $\beta_1$  is  $n \times n$ , and  $\beta_2$  is equal to identity metrics  $I_n$ .

While DGR and GDP growth might be correlated, JCI<sub>T</sub> would not conclusively provide causality, hence, as earlier mentioned, testing the presence of causal relationship between the two series was performed by administering the GCT upon confirmation of variables being co-integrated. The GCT method measures the degree to which information provided by one variable explains the latest value of another variable. Conceptually, if X causes Y, then, changes of X happened first then followed by changes of Y (Granger,

1969). In the present study based on two variables, namely, DGR and GDP, the following equations were applied for the relevant GCTs:

If the causality runs from DGR to GDP growth rate, then the Granger causality regression equation is:

$$\dots \quad (4)$$

If the causality runs from GDP growth rate to DGR, then the Granger causality regression equation is:

$$\dots \quad (5)$$

From the equation (4), DGR Granger-causes GDP growth rate if the coefficient of the lagged values of DGR as a group is significantly different from the zero based on F-test. In the same vein, from equation (5), GDP growth rate Granger-causes DGR if it is statistically significant. The “F value” statistic - the ratio of the mean regression sum of squares divided by the mean error sum of squares - tests the overall significance of the regression model. Specifically, it tests the null hypothesis that all of the regression coefficients are equal to zero. Thus, F-value will range from zero to an arbitrarily large number (Parasuraman *et al*, 2012). If the null hypothesis is rejected based on the F-test, then there is a presence of Granger-causality.

### Hypotheses

The following hypotheses were developed to meet the objectives of the present study:

GDP has a unit root.

DGR growth rate has a unit root.

There is no co-integration between GDP and DGR.

GDP growth does not Granger-cause DGR.

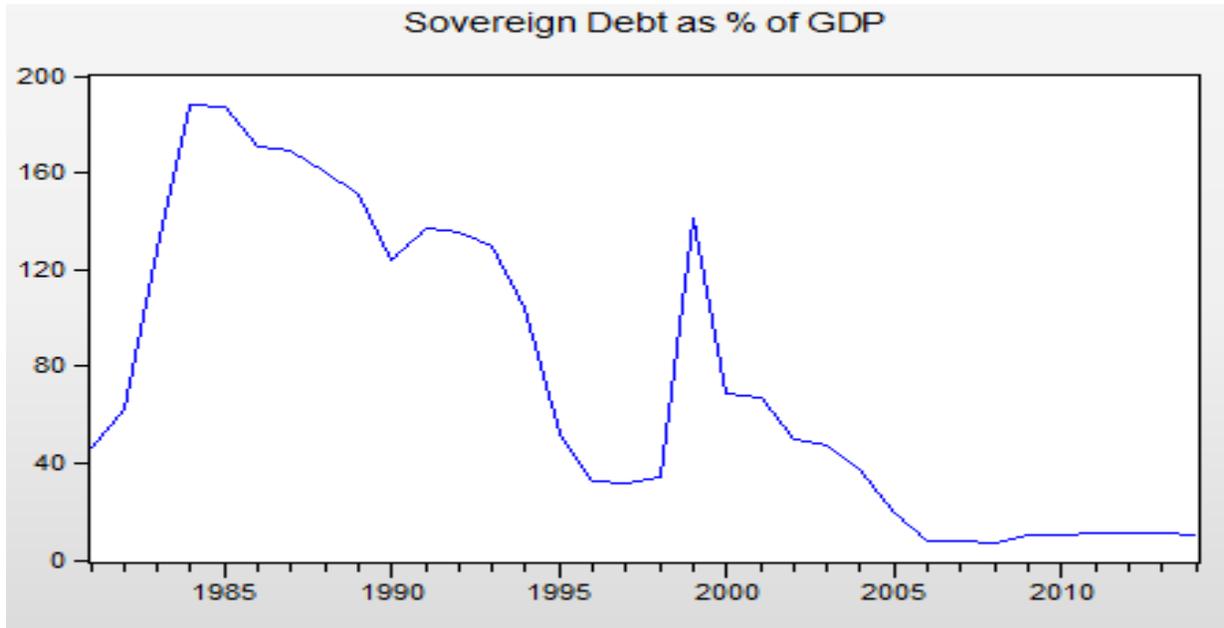
DGR does not Granger-cause GDP growth.

### Results and Discussion

**Graphical Analysis:** The first impression obtained from Figures 1, 2, and 3 was that both GDP growth rate and DGR appear to be trending upwards until more recently when they both seem to have stabilized. Between 1981 and 2005, the GDP growth rate averaged 2.75 percent, compared to higher level of 6.85 percent in the subsequent years between 2006 and 2014. Similarly, between 1981 and 2005, the DGR averaged 110.46 percent, compared to lower level of 33.12 percent in the subsequent years between 2006 and 2014, which raises doubts about stationarity or non-stationarity of both series, hence further tests had to be conducted.

**Figure 1**

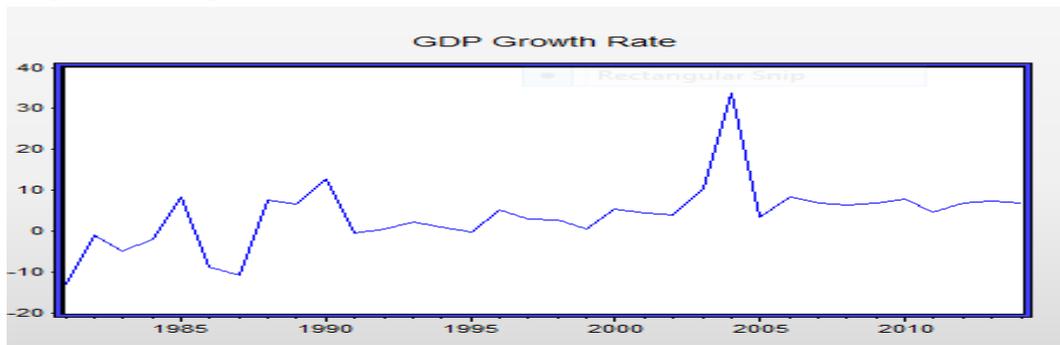
Debt-to-GDP Ratio (DGR) % in Nigeria, 1981 - 2014



Source: EViews graph analysis (2015)

**Figure 2:**

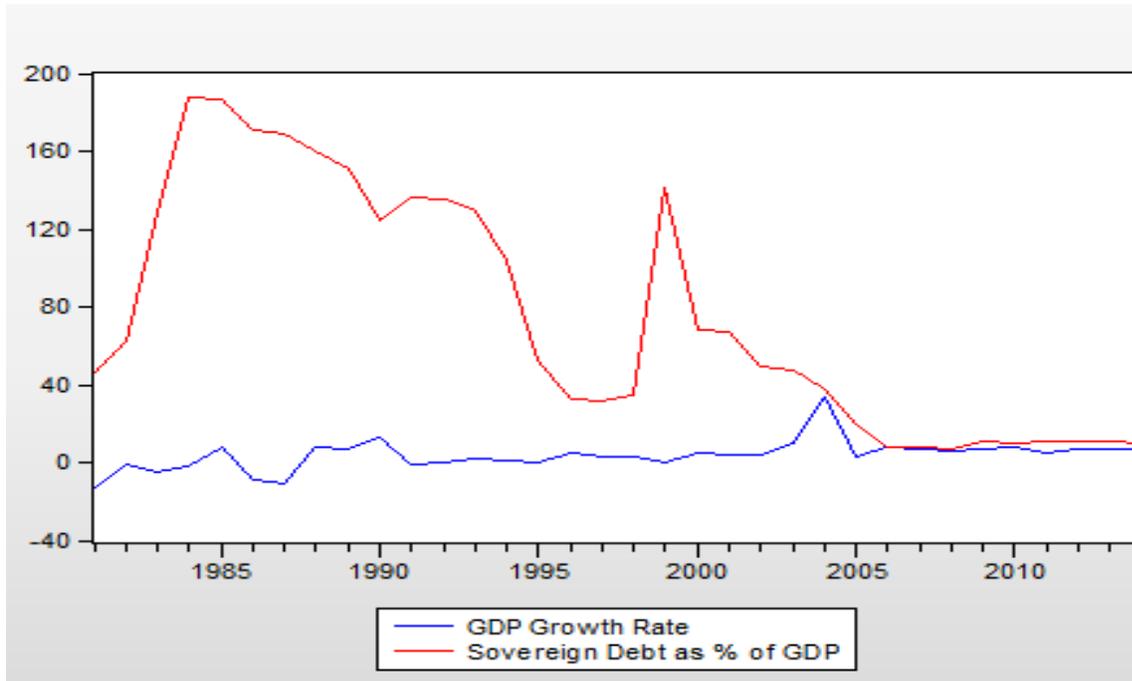
Real GDP growth in Nigeria %, 1981 - 2014



Source: EViews software analysis (2015)

**Figure 3:**

DGR and real GDP Growth rate in Nigeria, 1981 – 2014



Source: EViews software analysis (2015)

**Unit Root Test:** Table 1 shows the results of the ADF Unit Root Test. The results show that the null hypotheses  $H_1$  and  $H_2$  that DGR and GDP have unit roots can be rejected since the critical t-value is less than 0.05 respectively at first difference (I(1)) at 5 percent significance level. For DGR, the t-value is -5.4141, which is lower than the computed ADF critical value (-2.9571) at 5 percent level of significance. Similarly, in the case of GDP, the t-value is -8.5980, which is also smaller to the calculated ADF critical value (-2.9571) at 5 percent level of significance. It was therefore concluded that DGR and GDP time series do not have unit root problem and the data good enough to proceed to co-integration test.

**Table 1:**

**ADF Unit Root Test for DGR and GDP in Nigeria, 1981 – 2014**

Particulars	DGR			GDP				
	t-statistic	Critical Value		P-value	t-statistic	Critical Value		P-value
At level	-1.2628	1%	-3.6463	0.6348	-4.6899	1%	-3.6463	0.0006
		5%	-2.9540			5%	-2.9540	
		10%	-2.6158			10%	-2.6158	
At first difference	-5.4141	1%	-3.6537	0.0001	-8.5980	1%	-3.6537	0.0000
		5%	-2.9571			5%	-2.9571	
		10%	-2.6174			10%	-2.6174	

Source: EViews software analysis results (2015)

**Johansen’s Co-Integration Test:** Table 2 presents the results of the JCiT which was conducted to establish whether there was any long-run equilibrium between DGR and GDP in Nigeria over the period 1981 – 2014. The null hypothesis (H3): there is no cointegration between DGR and GDP – is rejected at 5 percent level of significance since p-value (0.0098) is lower than 0.05. Moreover, the trace statistic indicates one co-integrating equation at 5 percent significance level; this is evidenced by the p-value (0.2243) which is greater than .05, which leads to the acceptance of the alternative hypothesis that there is co-integration between DGR and GDP.

**Table 2:**

**Results of Johansen Co-integration Test on DGR and GDP growth time series in Nigeria, 1981 – 2014**

Level	Eigen Value	Trace Statistic	Critical Value at 5%	P-values
H <sub>0</sub> : r = 0 (none)*	0.4395	20.0028	15.4947	0.0098
H <sub>1</sub> : r = 1 (at most 1)	0.0451	1.4766	3.8415	0.2243

\*denotes rejection of the hypothesis at the 0.05 significance level.

Source: EViews software analysis results (2015)

**Vector Error Correction Model (VECM):** Since some co-integration between DGR and GDP growth in Nigeria was empirically established, the next level of analysis involved fitting the series into a VECM and the results, as shown in Table 3 based on the first normalized eigenvector, indicates the presence of long-run relationship between DGR and GDP. The estimated co-integrating coefficient for the GDP growth is as follows:

[2.9970]

The t-statistic of the co-integrating coefficient of DGR is given in the bracket. The coefficient for DGR is negative, which means that increase in DGR can be associated with decline in the economic growth of Nigeria.

**Table 3:**

**Co-integrating Vector of GDP Growth and DGR in Nigeria, 1981 – 2014**

Co-integrating Equation		
GDP	DGR	Constant
1.0000	-0.05844 (0.0195) [2.9970]	-9.0506

Standard errors in ( ), and t-statistics in [ ]

Source: EViews software analysis results (2015)

As shown in Table 4, the error correction coefficient term is negative (-0.9393) and statistically significant at 5 percent level of significance; this is indicated by the lower t-statistic value (-2.7856) than the critical value (-1.96) at 5 percent significance level. This evidences the long-run equilibrium relation between GDP and DGR as far as the Nigerian context is concerned. Thus, it could be inferred that the value of next year's GDP is greatly influenced by the current year's DGR at 95 percent confidence level. From the VECM result, it is evident that DGR has significant long-run negative impact on economic growth of Nigerian economy.

**Table 4:**  
**GDP Growth and DGR in Nigeria, 1981 – 2014: Co-integrating Vector Error Correction Estimates**

Error Correction	D(GDP	D(DGR)
CointEq1	-0.9394 (0.3372) [-2.7857]	-1.9399 (1.3931) [-1.3925]
D(GDP(-1))	0.0759 (0.2711) [0.2801]	1.0003 (1.1202) [0.8929]
D(GDP(-2))	-0.0428 (0.1913) [-0.2234]	0.4464 (0.7913) [0.5641]
D(DGR(-1))	0.0387 (0.0431) [-0.1538]	-0.0431 (0.1771) [-0.2437]
D(DGR(-2))	-0.0066 (0.0431) [0.3289]	0.0781 (0.1780) [0.4389]
C	0.4456 (1.3545) [0.3289]	-4.3508 (5.5961) [-0.7775]

( ) error term

[ ] t-value

Source: EViews software analysis results (2015)

The results of Granger causality test are presented in Table 5. From the results in Table 5, it seems there exists causality between GDP and DGR but it is one-directional; the causality runs from DGR to GDP and not vice-versa. The one-directional causality is contrary to the bi-directional finding by Egbetunde (2012), although it is pertinent to note that Egbetunde (2012) used total debt stock for the analysis rather than DGR. The null hypothesis: GDP growth does not Granger-cause DGR is accepted as the probability value (0.0092) is smaller than .05 required significance level. But the null hypothesis: DGR does not Granger-cause GDP growth is accepted as the probability value (0.8025) is greater than .05

required significance level. This means that to a significant extent, GDP growth does not necessarily have to attract or lead to increasing levels of DGR. However, GDP growth rate is Granger-caused by DGR, and thus the value of DGR can be used to predict future level of economic growth which is in unanimity with some previous studies, notably, Reinhart *et al* (2012) and Reinhart and Rogoff (2010). The negative correlation between Nigeria’s DGR and GDP growth rate is further evidenced by the behaviour of the country’s DGR and GDP growth dynamics over the past three decades. Between 1981 and 2005 (pre-debt relief), the country’s GDP growth rate averaged a low level of 2.75 percent during the same period when its DGR was at the highest level averaging 110.46 percent, whereas, post-debt relief, there has been some decline in DGR to an average of 33.12 percent in the recent years which is associated with higher economic growth rate averaging 6.85 percent up to 2014. It is equally noteworthy that the early 2000s were period of strong global economic growth (Samuelson & Nordhaus, 2010), but Nigeria did not share the spillover to her economy and this can be easily attributed to high DGR that characterized the era. While the DGR level over the past decade approximates maximum international threshold of 30.0 percent of GDP, it has been argued elsewhere that a stable DGR does not necessarily imply sustainability (Svaljek, 2002), hence, there may be some plausible basis for concerns about a possible decline in Nigeria’s economic performance once the stabilized DGR is allowed to rise again. This is regardless of the vaunted fact that, having regard to the maximum international threshold of 30.0 percent of GDP, Nigeria’s current DGR level remains fairly sustainable, but policy makers in the developing world tend to forget that these thresholds are not cast in stone and indeed, arguably, the DGR parameter is more or less based on the advanced economic conditions (relatively very low inflation, low government interest rate, high taxation, for instance) obtainable the rich world. In recent years, there has been an increase in the domestic component of the debt, which constitutes the significant portion of the country’s consolidated debt. The increase in domestic debt has been attributed to the substantial borrowing through the issuance of sovereign bonds and Treasury bills to settle contractual obligations and finance government projects.

**Table 5:**

***DGR and GDP Growth in Nigeria: Results of Granger Causality Test***

Null Hypotheses	Observations	F-Statistic	Probability	Decision
GDP growth does not Granger-cause DGR	26	0.53798	0.8025	Accept
DGR does not Granger-cause GDP growth	26	5.61143	0.0092	Reject

Source: EViews software analysis results (2015)

**Summary and Findings**

The paper was designed to examine the empirical relationship between sovereign debt and economic growth in Nigeria using annual time series from 1981 to 2014. After assessing stationarity of the DGR and GDP growth and conducting series of econometric tests to determine co-integration and causality, the following major findings emerge from the study:

- I. Both DGR and GDP are stationary based on Augmented Dickey Fuller (ADF) test.
- II. The trace test under Johansen co-integration method indicates one co-integrating equation at 5 percent level of significance.

- III. From the VECM result, it is evident that DGR has significant long-run negative impact on economic growth of Nigerian economy. The long-run negative relationship between DGR and GDP growth tested statistically significant by a negative coefficient of DGR.
- IV. The Granger causality test results showed the presence of one-directional causality; causality runs from DGR to GDP with no feedback. This indicates high level of DGR significantly leads to a slow-down in the economy.

In essence, the results from the present study align with the theoretical and some empirical positions on impact of sovereign debt on the economy, namely, that output and consumption will grow more slowly than they have had there been no large sovereign debt (Samuelson & Nordhaus, 2010; Reinhart & Rogoff, 2010; Egbetunde, 2012; Udoka & Ogege, 2012; Reinhart *et al*, 2012).

### **Concluding Remarks**

The paper has shown one-directional causality between sovereign Debt-to-GDP Ratio and economic growth of Nigeria using time series analysis methods, and this has significant policy implications for robust economic management directed at improving well-being of the people on a sustainable basis. (i) The new economic management team in Nigeria risks becoming inherently heavily re-indebted, unless a self-imposed halt or austerity is applied, thus, rebuilding fiscal buffers, external reserves, is imperative for sustainable and inclusive growth. (ii) Since current high interest rates continue to widen the debt net which now stands at US\$63.81 billion as of June 30, 2015, excluding US\$10.86 sub-national debt stock, it is crucial for government to slow down domestic borrowing and to focus more on diversify its earnings by removing obstacles to enhanced private-sector investment activities and generally improving the business environment. For instance, as politically difficult as that may be, the present global environment of low oil prices provides a unique opportunity to eliminate fuel subsidies; freed resources can be spent on growth-enhancing infrastructure, health care, and private sector-aligned education. (iii) Genuine reforms will be needed to improve infrastructure especially in the area of electrical power supply, transportation, as well as reinventing government institutions to enthrone maximum financial transparency and accountability. In all of these, fiscal policies will need to strike the right balance between scaling up public investment and preserving debt sustainability and ensuring overall macroeconomic stability. The time series approach adopted for the present study continues to face criticism because they look at the past movements of debt and use them as a basis for conclusions about future sustainability of these trends; thus, alternative analytical approaches using more frequent time intervals will remain an important area of research. It is also worth investigating the prospects of validating the evidence in the present study by including the US\$10.86 billion estimated Nigerian sub-national debt stock. Thus, more progress is generally needed in mapping theoretical models to updated empirical data.

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### Appendix 1: Debt-to-GDP Ratio (DGR) and Real GDP Growth in Nigeria, 1981 – 2014

S/No	Year	Domestic Debt (N'bn)	Domestic Debt (US\$'bn)	External Debt (US\$'bn)	Total Debt (US\$'bn)	GDP (US\$'billion)	DGR (%)	GDP Growth (%)
1	1981	11.19	18.35	11.44	29.79	64.1	46.47	-13.13
2	1982	15.01	22.30	11.99	34.29	55.50	61.78	-1.05
3	1983	22.22	30.69	17.58	48.27	37.60	128.38	-5.05
4	1984	25.67	33.56	17.78	51.34	27.30	188.05	-2.02
5	1985	27.95	31.26	18.65	49.91	26.70	186.94	8.32
6	1986	28.44	14.08	22.21	36.29	21.20	171.17	-8.75
7	1987	36.79	9.15	29.02	38.17	22.60	168.90	-10.75
8	1988	47.03	10.36	29.62	39.98	25.00	159.92	7.54
9	1989	47.05	6.37	30.12	36.49	24.20	150.77	6.47
10	1990	84.09	11.38	33.44	44.82	36.10	124.15	12.77
11	1991	116.20	14.45	33.53	47.98	35.10	136.70	-0.62
12	1992	177.96	17.96	29.02	46.98	34.70	135.38	0.43
13	1993	273.84	15.83	30.73	46.56	36.00	129.33	2.09
14	1994	407.58	18.25	33.09	51.34	49.30	104.14	0.91
15	1995	477.73	21.82	34.09	55.91	107.80	51.87	-0.31
16	1996	419.98	19.19	31.41	50.60	154.10	32.83	5.0
17	1997	501.75	22.92	28.47	51.39	163.90	31.36	2.80
18	1998	560.83	25.62	30.31	55.93	162.60	34.40	2.72
19	1999	794.81	36.31	29.37	65.68	46.40	141.55	0.47
20	2000	898.25	10.45	31.59	42.04	61.30	68.58	5.32
21	2001	1,016.97	9.92	30.03	39.95	59.60	67.03	4.41
22	2002	1,166.00	10.50	29.92	40.42	81.60	49.54	3.78
23	2003	1,329.68	11.03	34.14	45.17	95.40	47.35	10.35
24	2004	1,370.33	10.23	36.69	46.92	126.40	37.12	33.74
25	2005	1,525.91	11.61	20.47	32.08	164.80	19.47	3.44
26	2006	1,753.26	13.59	3.96	17.55	217.70	8.06	8.21
27	2007	2,169.64	17.43	3.75	21.18	257.50	8.22	6.83
28	2008	2,320.31	19.70	4.04	23.74	325.40	7.29	6.27
29	2009	3,228.03	21.71	6.76	28.47	270.50	10.52	6.93
30	2010	4,551.82	30.26	7.21	37.47	373.80	10.03	7.84

31	2011	5,622.84	36.63	8.96	45.59	418.80	10.89	4.65
32	2012	6,537.54	41.46	10.06	51.52	467.10	11.03	6.75
33	2013	7,118.98	45.26	13.79	59.05	521.80	11.32	7.31
34	2014	7,904.02	49.96	8.28	58.24	573.70	10.15	6.83

Sources: World Bank, Central Bank of Nigeria, and author's computations (2015)