

# Public Debt and Public Expenditure in Nigeria: A Causality Analysis

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## Abstract

This study investigated the causal relationship between total public debt and public expenditure in Nigeria from 1980 to 2015. The focus of the study is to determine if government borrowing in Nigeria is based on the need to provide social services and infrastructure as provided in the budget or by mere reason of privileged access to financial institutions both domestically and internationally as posited by Adam Smith (1776) in his theory of public debt. Applying co integration, vector error correction model and Wald test econometric tools of analysis to public debt, government capital expenditure, government recurrent expenditure and interest rate variables within the study period, the study obtained the following results. The trace statistics indicates two (2) co integration equations at five percent (5%) level of significance, suggesting that there is a long run relationship among the variables tested and that the results can be relied upon in taking long run policy decisions in the economy. The findings of the VEC test indicate that government capital and recurrent expenditure has significant positive relationship with public debt in the Nigerian economy. The Wald test result shows that unidirectional causality runs from both capital and recurrent expenditure to public debt in Nigeria. An obvious implication of this result is that government borrowing in Nigeria is triggered by government deficit budgeting, a situation which is well known in Nigeria at both federal and state levels. It therefore becomes necessary that the government budgeting process need to be reexamined to ensure that allocative efficiency is achieved in our budgeting system and that borrowing to finance budget deficit must be done objectively and realistically. This study therefore recommends the introduction of planning-programming-budgeting systems (PPBS) and Zero based budgeting (ZBB) in preference to the current practice of incremental budgeting (IB) in our public finance at both federal and state levels as is the current global practice considering that these budgeting approach seeks to intensify competition for budget resources and consequently aids the realization of government fiscal policy goals in the economy.

**Keywords:** public debt, government capital expenditure, government recurrent expenditure, causality, Allocative efficiency, Zero based budgeting, fiscal policy.

## 1. INTRODUCTION

### 1.1 Background to the Study

Fiscal policy is the use of taxation and government spending for the purposes of achieving set macroeconomic goals in the economy. Such goals includes, increase in economic growth, reduction in unemployment, reduction on rate of inflation and money supply etc, by the use of either expansionary or contractionary means. Expansionary fiscal policy is fiscal strategies adopted to enlarge an economy such as reducing tax rates, increasing direct payments to consumers through tax refunds and increase in government spending in order to boost economic activity as the activity of the private sector decreases. These policies contribute to growth in total demand as well as expansion in total supply leading to greater production and improvement in economic output. It is followed by expansionary monetary policies such as reducing interest rates and increasing money supply in money markets thus making access to money easier in order to maintain economic activity or enhance it during a depression. On the other hand, contractionary policy remains those measures adopted to decrease activities in the economy in order to achieve growth in the long run, such as increasing taxes and reducing government spending. It is essentially adopted to control inflation and can be denoted as "cooling down" an economy as the policy reduces the total demand and total supply which in turn brings down production and economic output at large. The policies are usually accompanied by contractionary monetary policies such as increasing interest rates and decreasing money supply in the money markets thus making access to money more difficult in the economy.

Public debt also known as government debt or national debt is money owed by government or total debt of all governmental units, including state and local governments. Public debt is defined as the total financial responsibilities acquired by governmental bodies of a nation, which includes money that is owed to individuals, mutual funds, hedge funds, pension funds, foreign governments and others. It considers government liabilities, future pension payments and payments for goods and services that the government contracted but not yet paid for. Public debt is one of the methods of financing government operations; governments can also create money to settle her debts in order to avoid interest payment, though creation of money will only reduce interest cost and will not cancel the debt itself which may cause hyperinflation. And in some other times government might

increase tax so as to finance debt repayment in the economy. Public debt is in different forms: internal or domestic debt (owed to lenders within the country) and foreign or external debt (owed to foreign lenders). Debt repayment arises in short term (on or less than one year), medium term (between boundaries of short and long term) and long term (more than ten years).

Public expenditure describes spending made by government on common needs of a country in terms of pension, provision of infrastructure and lots of other economic issues. Until the 19th century, public expenditure according to Adam Smith in his 'Wealth of Nations'(1776) should be restricted to defence against foreign assault, protection of home peace and order, public development work. Further functions in addition to these were seen as beyond the ability of the state and expenses on them were treated as unjust and wasteful. However, there had been a startling growth in the activities of state and this resulted in incomparable boost in public spending. In the 20th century, John Maynard Keynes argued the role of public expenditure in determining levels of income and distribution in the economy. Keynes opines that government should borrow money to spend on public works; and deficit spending would create jobs and enhance purchasing power in the economy as trying to balance the government's budget during a depression would make things worse, not better. Keynes's supposition laid the basis for the field of macroeconomics which treats the economy as a whole and focuses on government's use of fiscal policy spending, deficits and tax in overall economic management, since then government expenditures has shown a rising trend. Valentino (2001) pointed out that public expenditure is the value of goods and services bought by the State and its articulations. He maintained that public expenditure performs such functions as contribution to current effective demand, coordinating inclination on the economy, which can be used for stabilization of fluctuations in business cycle and growth purposes. Public expenditure also increases public endowment of goods for everybody which gives rise to positive externalities to specific sectors, geographical areas and the nation at large through its capital component. He stressed that democratically, public expenditure is an expression of people's will and how they are managed through political parties and institutions, characterized by a high degree of apathy and law dependency, which tempers the will of current majority.

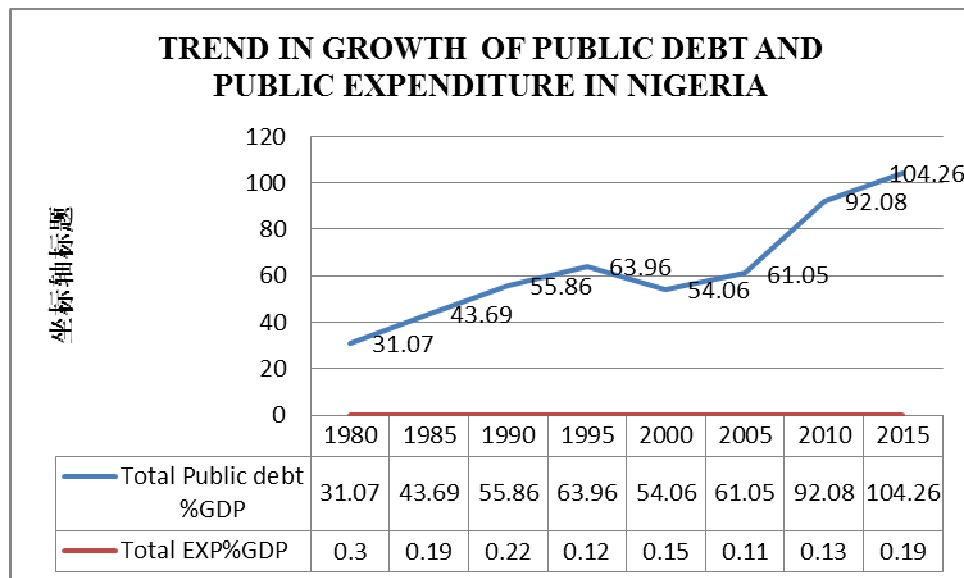
It has been observed that there is a correlation between government expenditure and government debt in the economy and that increase in deficit spending by government will also bring an increase in the amount of debt. Government borrowing shrinks accessible funds and increases the cost of capital, thereby causing businesses to abandon investment projects in the economy. Similarly, if government spends more than her receipts (deficit), her decision to borrow funds to finance that deficit will in most cases result to crowding out of private investments and deadweight loss on future taxation. This means that when governments borrow from financial markets, they effectively crowd out other interested borrowers (private investors) and compel them to pay higher interest rates which has the capacity to discourage investment implicitly the higher cost of capital will then make the private investors to abandon the expansion plans that would have brought positive economic outcome. The multiplier effect of government spending has not helped out in counterbalance of impact of public debt in the economy which necessitates further increase in taxes and places burden on current/future generations.

#### TREND OF PUBLIC DEBT AND PUBLIC EXPENDITURE IN NIGERIA

The table and graph below explains a 5 year interval of growth rate of public debt and public expenditure between 1980 and 2015 based on data obtained from central bank of Nigeria (CBN) statistical bulletin.

Table 1: Five Years interval of Public debt and expenditure

YEAR	TOTAL PUBLIC DEBT%GDP	TOTAL PUBLIC EXPENDITURE%GDP
1980	31.07	0.3
1985	43.69	0.19
1990	55.86	0.22
1995	63.96	0.12
2000	54.06	0.15
2005	61.05	0.11
2010	92.08	0.13
2015	104.26	0.19



The table and graph above give details on the pattern of public debt and public expenditure in Nigeria over the period under consideration. With the foregoing, we can see that the growth rate of public debt (Total public debt% GDP) and public expenditure (Ratio of total expenditure % GDP) have irregular relationship which shows inconsistent trend in the economy meaning that as public debt increases, public expenditure decreases and vice versa. The graph above shows a significant decrease in 2005, this effect is attributed to the debt relief obtained during the Obasanjo's regime and debt profile kept rising after that period till now. It is this steady rise in public debt without a corresponding match in expenditure as indicated in the graph and table above that motivated this research.

## 2. THEORETICAL FRAME WORK AND LITERTURE REVIEW

### 2.1 Theoretical framework

#### Theory of Allocative Efficiency in Public Expenditure

All financial plans ration resources by allocating money for some uses and withholding it from other areas depending on the desired direction of the government in power. The efficacy of public programs depends on these allocations, but governments face numerous challenges to making accurate competent allocations in the economy. The main task of modern public expenditure management is to create the conditions that promote allocative efficiency. Allocative efficiency means the ability of government to allocate resources on the basis of the effectiveness of public programs in meeting its strategic target. This involves the power to transfer resources from previous priorities to new ones, and from less to more useful programs in the economy. Allocative efficiency demands that the government establishes and prioritizes targets and that it assess the real contribution of government spending to those set targets. To allocate efficiently government must be tactical and evaluative; it must both look ahead and identify what it wants to realize and look back to scrutinize the outcome. The relationship of deliberate planning and program appraisal to ongoing budget technique has been a regular issue in government expenditure management. Establishing a tight link has been a frequent theme in budget reform during the past half century in developing economies yet many governments have tried, only few have succeeded. The rate of failure had been soaring for the reason that striving for allocative efficiency increases informational burdens, transaction costs, and political conflict in an economy. Informational needs are higher because of the demand for additional facts on program impacts; political conflict escalates because of efforts to redistribute budgetary resources. The duty of modern public expenditure management is to improve allocative efficiency without overstraining the ability of government to process information and deal with conflict. Except information demands and budgetary conflict are manageable, governments may favor sub optimal allocations that permit them to muddle through the yearly financial plan exercises which has become an annual ritual in developing economies.

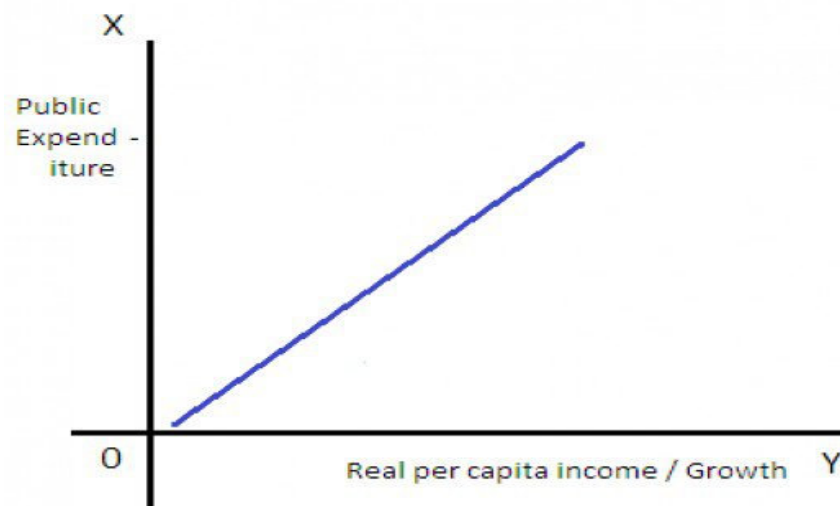
It is instructive to note that allocative efficiency cannot be achieved under the current incremental budgeting system in Nigeria. Incremental budgeting suited the times but it is an improper means of allocating resources. It promotes inefficiency and has the tendency to swell the size of the public sector. Incremental budget does not encourage fiscal discipline by supposing that expenditure will grow annually and thereby expanding the totals as such budgeting principle calls to question due process assumption in public finance. Consequently, recent developments in the field of public finance tend to favour planning-programming-budgeting systems (PPBS) and Zero based budgeting (ZBB) instead of incremental budgeting. PPBS gives budgeting a longer time

period to grow its analytical capacity while zero based budgeting seeks to redistribute resources within the context of initial programs and expenditure. Even though the duo are procedurally different, both PPBS and ZBB seek to intensify competition for budget resources while PPBS provides information on the cost effectiveness of alternative means of realizing government goals, ZBB strives to have every spending unit prepare alternative budgets each with incremental resources and output.

### Adolf Wagner's' Hypothesis

Wagner opined that there is a tendency for the range of public spending to swell with bigger levels of economic growth. Wagner's input to public expenditure hypothesis is principally important if we understand that prior to Wagner's explanation, the existing concept was the view that as a country grows richer, government programs would have a propensity to decrease (Henrekson, 1993). It is known that such opinion is still common in contemporary economic thought yet, several conventional economists in the discussion on the role of government affirm that the increase of government programmes in macroeconomic affairs connected with the Keynesian revolution is an unfortunate digression (Menyah and Yamane). The dimension and expansion of public expenditure are intricate societal processes that cannot be limited entirely to the subject of economics. Indeed, there are many underlying reasons responsible for the volume and expansion of public expenditure. Wagner's theory is not actually a supposition of public expenditure growth but, instead, a simplification about the material trend of public spending (Goffman and Mahar, 1971). Bird (1971) asserts that as per capita income increases in developed countries, their public sectors will develop in comparative value. Wagner suggested reasons in support of his theory. He believes that as economies evolve they experience bigger intricacy of legal relationships and communications, as a consequence of the enormous division of labour that is associated with growth and development. Based on this, Wagner anticipated a greater responsibility for the state in the form of public, regulatory and defensive programs. Improved development and population growth would lead to greater public expenditure on law and order, and economic regulation due to the related menace of added disagreement in heavily populated urban communities. Through the replacement of private for public programmes, the administrative and defensive roles of the state would increase. Therefore, as economies become more complex the rate and enormity of market failures would compel the state to become more regulatory in nature, thereby increasing its role and this would unavoidably involve higher public expenditures. (Dhires, 2013).

This can be explained with the help of a diagram as shown below;



According to Wagner, there is an essential correlation between economic growths with respect to the growth in public expenditure. In the figure, real per capita income or growth is represented on the 'y' axis and changes in public expenditure on 'x' axis. Higher public expenditure involuntarily increases the function of the state and this will gradually lead to higher economic growth this is as a result of planning, modernization, higher social demand, and industrial development and associated costs of modern democracy.

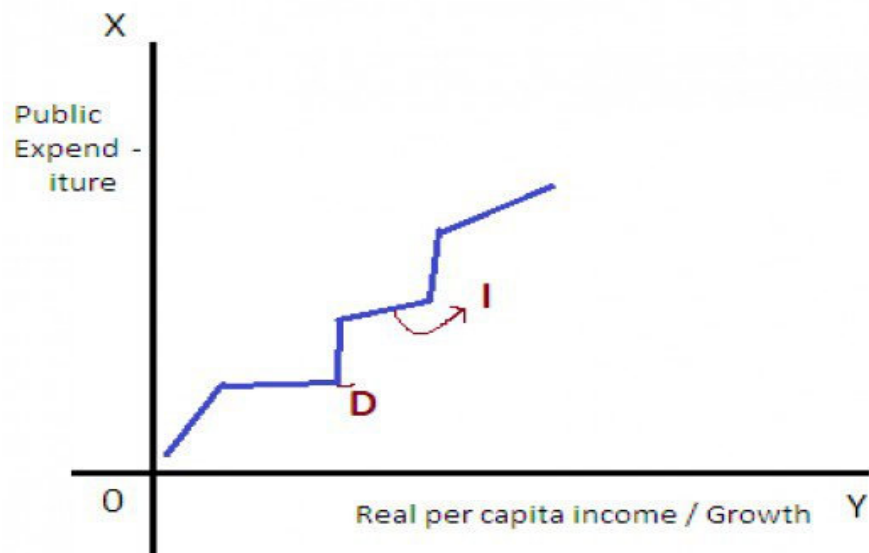
### Peacock and Wiseman Hypothesis

Peacock and Wiseman in a study of public expenditure from 1891 to 1955 in U.K. asserted that Wagner's Law is valid as they made the following conclusions:

- a. That increase in government spending depends on income generated by the government as economic development brings in considerable proceeds to the governments; which make it possible to increase her spending.
- b. There is a difference between the hope of the people about public expenditure and the tolerance level of

taxation in the economy. Hence, governments will not disregard the demands made by people concerning varied services, particularly, when the revenue is growing at regular rate of taxation.

- c. That throughout the times of war, the government increases the tax rates, and expands the tax base to generate more money to finance the growth in defence spending however, after the war, the new tax rates and tax structures may remain the same, as people get used to them. Therefore, the increase in revenue results in rise in government expenditure as can be seen from the diagram below,



From the diagram above, real per capita income or growth rate is represented on 'y' axis and public expenditure on 'x' axis. According to this hypothesis, there are three basic effects in an economy which can be seen in the growing path of a country; Displacement effect, Inspection effect and Concentration effect.

#### Displacement effect

Every economy faces many social disturbances in different periods which may affect the economic stability in an economy and some of the social disturbances are war, natural calamities, political instabilities etc. In such cases, government requires huge public expenditure to restructure the economy hence displacement effect is the increasing of public expenditure due to social disturbances causing the economy to change its public expenditure structure. In Nigeria, the insecurity problem in the North East have lead to a substantial increase in government expenditure which have put so much pressure on governance especially with the sharp decline in revenue arising from the fall in the price of crude oil in the international market.

#### Inspection effect

As an economy experiences displacement effect, new and higher public expenditure will come in to existence and with the rise in public expenditure, government will initiate efforts aimed at raising the revenue base by adjusting the tax structure. This will lead to a new equilibrium in the economy, which will be greater than the previous equilibrium level. Point 'I' in the figure represents inspection effect.

#### Concentration effect

After the displacement effect, the economy will follow a new equilibrium level in the economy called concentration. This condition will persist until a new social and economical displacement arises. According to Peacock and Wiseman, an economy can grow after experiencing social disturbances and such economic challenges will promote the authority to increase its expenditure.

### Dependency Theory

Dependency theory is based on a Marxist view of the world, which sees globalisation in terms of the spread of market capitalism, and the exploitation of cheap labour and resources in return for the obsolete technologies of the Western economies. The foremost view of dependency theorists is that there is a leading world capitalist system that depends on a division of labour between the rich 'core' countries and poor 'peripheral' countries which makes the core countries use their supremacy over an increasingly marginalised periphery. The theory advocated an innermost approach to development and an increased role for the state in terms of imposing barriers to trade, making inward investment difficult and promoting nationalisation of key industries.

Dependency theory states that the poverty of the countries in the border is not because they are not integrated or fully integrated into the world system as is often argued by free market economists, but because of how they are integrated into the system. This means that dependency theory is the notion that resources flow from a "periphery" of poor and underdeveloped states to a "core" of wealthy states, enriching the developed at

the expense of the developing nations. It is a central contention of dependency theory that poor states are impoverished and rich ones enriched by the way poor states are integrated into the world system. The theory arose as a reaction to modernization theory, an earlier theory of development which held that all societies progress through similar stages of development, arguing that underdeveloped countries are not merely primitive versions of developed countries, but have unique features and structures of their own; and, importantly, are in the situation of being the weaker members in a world market economy. Dependency theory no longer has many proponents as an overall theory, but some writers have argued for its continuing relevance as a conceptual orientation to the global division of wealth.

### **Liberal Economic Theory**

The liberal economic hypothesis also offers reasonable argument on the debt predicament in developing countries. The key disagreement here is that economic liberalization will help in the increase of flow of overseas investment into the developing countries, as a result of the reduction of trade and exchange limitations. The idea is that in the process of homogenizing the political economy of every member state of the international community that the purpose of creating a market society on an universal scale is within reach (Biersteker, 1993). One of the major objectives of liberalization is to decrease the resource gap in the LDCs, by improving the trade balance and encouraging a net capital inflow. Thus, the rising significance of global organizations such as the G7, IMF and World Bank is indicative of the sway of liberal economic internationalism in the post-Cold War period. Nevertheless, events in the developing world provide us with some reasons why attempts made in redressing the situation through the encouragement of increased foreign borrowing have contributed to the current debt crisis by increasing the resource gap even further. These influential transnational bodies which embody free trade liberalism as their governing ideology however impose free market restrictions on developing societies.

### **2.2 Empirical literature**

Uguru, Leonard C. (2016) studied the link between public debt and government expenditure in Nigeria from 1980 to 2013. Using data from Central Bank of Nigeria Statistical Bulletin for the years under consideration, the author estimated a model with public debt as the dependent variable and the independent variables were capital expenditure and recurrent expenditure respectively. The author made use of the ordinary least square estimation technique at 5% level of significance which revealed a significant relationship between public debt and government expenditure in Nigeria. Based on his result, he recommended the government of Nigeria to hurriedly reduce its recurrent expenditure and focus more on capital expenditure so as to meet the Vision 20:2020. He also suggested the need for diversification of the economy so as to reduce much reliance on crude oil proceeds and thereby reducing the tendency of the government contracting more debt obligation.

Obademi (2012) undertook an analysis of the long-run relationship and impact of debt from the perspective of the value impact and proportional impact on the Nigeria economy. The value impact variables used include the external debt value, domestic debt value, total debt value and budget deficit. The result showed that the joint impact of debt on economic growth is negative and quite significant in the long-run though in the short-run the impact of borrowed funds and coefficient of budget deficit is positive. The study concluded that though in the short-run the impact of borrowed fund on the Nigerian economy was positive, the impact of debt in the long-run depressed economic growth as a result of incompetent debt management.

Adofu and Abula (2009) investigated the relationship between domestic debt and economic growth in Nigeria. The result shows that domestic debt has affected the growth of the economy negatively. The study recommended that Government domestic borrowing should be discouraged and that increasing the revenue base through its tax reform programmes should be encouraged.

Antra Bhatt (2015) investigated the active nature of public expenditure components and public debt through an intertemporal optimization framework based on Turnovsky (2007). He explained that public expenditure is classified as 'productive' and 'less-productive' based on the rationale that a percentage of the productive public expenditure corrects disequilibrium in the public debt in the long-run. He reported the 'second-order' conditions from the model which stated that as physical infrastructure increases, the marginal social value of a unit of capital reduces, meaning that beyond its optimal level, an increase in physical infrastructure could still affect public debt inversely; however, this will be at the cost of 'crowding out' of private investment. He used Indian Public Finance data (1980-2013) to test the theoretical representation and analyses of the relationship between public expenditure and debt, using time series methods to discuss the hypothesis that capital expenditure of government is productive public expenditure. The result of the correlation, co integration and ECM shows that real capital expenditure is co integrated with real public debt of the Central and the General government and in the long run, real capital expenditure adjusts to bring real public debt on a convergent path. The amount of disequilibrium corrected is 0.01 and 0.035 for the Central and the Consolidated General Government respectively. He recommended that key policy implications towards increasing public capital expenditure in the Indian economy should be made while complementing it with private investment stimulus to

stabilize public debt in the long run.

Duc-Anh, Phu and Arnelie (2015) analyzed the correlation among government expenditure, tax on returns to asset, public debt, and economic growth. The authors described public debt in two forms, domestic and external debt. Their study show that an increase in the tax rate on returns to asset leads to an increase in government expenditure, consumption, and domestic debt which brings uncertain impact of tax rate on external debt. They further explained that when the productivity of capital on production is low (high) and the tax rate is lower (higher) than a threshold, the relation between external debt and the tax rate will have a bell-shaped form, i.e. external debt firstly rises then decreases with the tax rate.

Grace G. (2014) examined the implications of shocks of public debt and government expenditure on human capital development and growth looking at the role of fiscal constraints through the introduction of government budget constraint for a set of preferred developing countries from 1980-2013. The study captured fiscal challenges facing developing countries in developing human capital which is essential for sustainable growth. The results disclosed that high stocks of public debt, beyond the 30-40% debt/GDP threshold, affect human capital on output growth by limiting government expenditure resources available for developing human capital. The result of the study also indicates that government expenditure has a positive role to play in developing human capital and sustainability seems uncertain for countries that have fiscal constraints. The study concluded that developing countries that are faced with fiscal challenges like, high public debt and poor revenue prospects for government expenditure sustainability should not depend on domestic resources but seek global support on capacity building (human capital development). The author suggests public debt management strategies and efficient government expenditure management frameworks supported by sustainable revenue prospects to provide fiscal sustenance thrust to enhance the growth process in developing countries.

Joshua, Kenneth and Brian (2007) assessed the optimal public investment and fiscal policy for developing countries that have limited tax and debt capacities. The study estimated a non stochastic constant returns to scale (CRS) endogenous growth model where public expenditure is an input in the production process, in countries where distortions and policy enforcement neglect affect fiscal abilities, as captured by a maximal effective tax rate. They explained how constant differences in growth rates across countries could cause differences in public finance, public expenditure and public infrastructure. They argued that the flow of public expenditure raises productivity, the government should not borrow to finance it as the resulting increase in public debt would lower welfare and the growth rate. By their result, the exceptional public debt has the best fiscal policy which ought to keep the debt-to-GDP ratio constant in the economy with or without a binding constraint on tax revenues as a share of GDP.

### 3. DATA AND METHOD OF ANALYSIS

#### 3.1 Data

This study used a time series data covering 1980 – 2015 periods which were obtained from CBN bulletin, online service from – [data.worldbank.org/indicators](http://data.worldbank.org/indicators) and world development indicators 2012/2015. This scope was chosen because the relevant data are available and the time is sufficient to influence policy decisions in the country.

#### 3.2 Method of Analysis

The method of analysis used in this study to estimate the relationship among the variables are Vector Error Correction Model (VECM) for obtaining the numerical estimates of the coefficients of the equation which is used only when the variables are co integrated. The Augmented Dickey - Fuller (ADF) and Philip peron tests were used to test the stationary of variables. Likewise, Johansson co integration procedure was used to test the existence of long run equilibrium relationship among the economic variables while the wald test was applied to determine the direction of causality. In order to get VECM, multiple linear regression analysis was applied where the public debt (TPD), government capital expenditure (GCEX), government recurrent expenditure (GREX) and interest rate (INTRT) are the relevant variables. The TPD is the dependent variable while the GCEX, GREX and INTRT are the independent variables.

#### 3.3 Model specification

The model used in this study is the growth model developed by Barro (1990) and Greiner (2007). This model explains government activities in terms of tax collection on returns to assets by private agents at each period time (t). It can also borrow from the domestic and international financial markets, which explains the types of public debt (domestic debt D, with interest rate  $r_t$  and external debt B; with interest rate  $r_t$ ). Expenditure side shows how the government can share its resources between public expenditure dedicated to production of final good and reimbursement of interests and capital of domestic and external debts (Duc – Anh et el, 2015). The model for government budget constraint can be expressed in a general form as;

$$G_t + (r_t^B + 1)B_t + (r_t^D + 1)D_t = \tau_t r_t^A A_t + B_{t+1} + D_{t+1} \dots \dots \dots 1$$

where  $A_t$  is the stock of assets held by private agents,  $T_t$  is the tax rate on returns to asset,  $G_t$  is the flow of government expenditure,  $B_t$  represent external debt,  $D_t$  shows domestic debt and  $r_t$  is the interest rate.

Since our interest is on public debt (external/domestic) and public expenditure, we articulate the debt/expenditure model as;

$$Y = C + I + G + NX - PDT \dots\dots\dots 2$$

Where  $Y$  is income,  $C$  is consumption,  $I$  is investment,  $G$  is government expenditure,  $NX$  is net export and  $PDT$  is public debt. This is further step down into;

$$C = C_0 + C_1 \dots\dots\dots 3$$

$$I = S - C \dots\dots\dots 4$$

$$G = \text{Capital Exp} + \text{Recurrent Exp} \dots\dots\dots 5$$

$$NX = \text{Export} - \text{Import} \dots\dots\dots 6$$

$$TPD = B_t + D_t = B_{t-1}(1 + r_t^B) + D_{t-1}(1 + r_t^D) - S_{t-1} \dots\dots\dots 7$$

Where  $r_t^B$  and  $r_t^D$  are interest rate in domestic and external debt, while  $S_t$  is the debt sustainability parameter.

In order to obtain the functional expression for estimation in this study, we state thus;

Total Public debt =  $f$  (government capital expenditure, recurrent expenditure, interest rate)... 8

linearly specified as:

$$TPD = \beta_0 + \beta_1 GCEX + \beta_2 GREX + \beta_3 INTRT + Ect + \dots\dots\dots 9$$

Where  $TPD$  = total public debt,  $GCEX$  = government capital expenditure,  $GREX$  = government recurrent expenditure,  $INTRT$  = interest rate,  $b_0 + b_1 + \dots\dots + b_n$  are parameters and  $Ect$  = error correction term.

#### 4.0 EMPERICAL RESULTS AND DISCUSSION

##### Unit root Test

The Augmented Dickey-Fuller (ADF) and Philip Perron (PP) formulae were employed to test for the existence of unit roots in the data using trend and intercept. The results are presented in table two to four below.

**Table 2: Augmented Dickey Fuller Unit Root Test**

Trend and Intercept @ Levels

Series	ADF Test Statistic	5% critical values	P values	Remarks
TPD	-3.467699	-3.544284	0.0588	Not Stationary
GCEX	-2.433328	-3.544284	0.3572	Not Stationary
GREX	-1.342441	-3.544284	0.8601	Not Stationary
INTRT	-2.841819	-3.544284	0.1929	Not Stationary

Sources: Researcher's compilation from E-view (version 7.0)

**Table 3: Phillips-Perron Unit Root Test**

Trend and Intercept @ Levels

Series	PP Test Statistic	5% critical values	P values	Remarks
TPD	-3.484779	-3.544284	0.0567	Not Stationary
GCEX	-2.456301	-3.544284	0.3464	Not Stationary
GREX	-1.276631	-3.544284	0.8773	Not Stationary
INTRT	-2.657152	-3.544284	0.2593	Not Stationary

Sources: Researcher's compilation from E-view (version 7.0)

**Table 4: Augmented Dickey Fuller Unit Root Test**

Trend and Intercept @ 1<sup>st</sup> Difference

Series	ADF Test Statistic	5% critical values	P values	Remarks
TPD	-7.481332	-3.548490	0.0000	Stationary
GCEX	-5.970119	-3.548490	0.0001	Stationary
GREX	-7.042070	-3.548490	0.0000	Stationary
INTRT	-7.534719	-3.548490	0.0000	Stationary

Sources: Researcher's compilation from E-view (version 7.0)



**Table 5: Phillips-Perron Unit Root Test**  
 Trend and Intercept @ 1<sup>st</sup> Difference

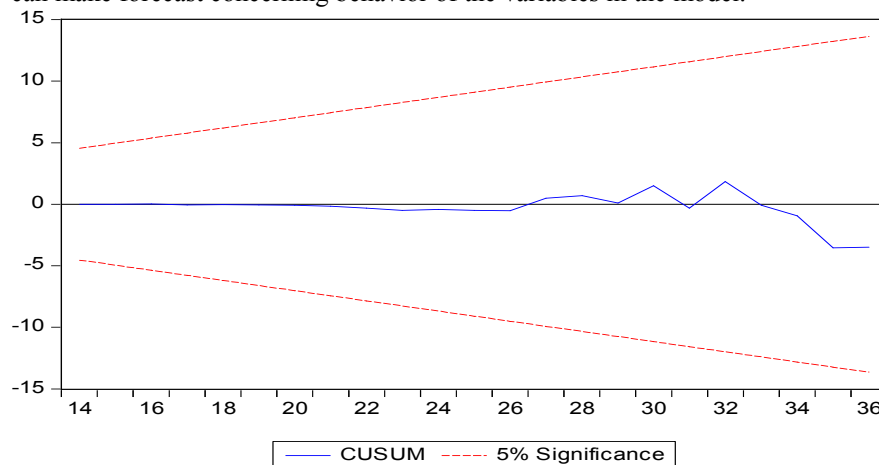
Series	PP Test Statistic	5% critical values	P values	Remarks
TPD	-13.79704	-3.548490	0.0000	Stationary
GCEX	-5.970119	-3.548490	0.0001	Stationary
GREX	-6.931419	-3.548490	0.0000	Stationary
INTRT	-7.655979	-3.548490	0.0000	Stationary

Sources: Researcher's compilation from E-view (version 7.0)

The above unit root test shows that TPD, GCEX, GREX and INTRT are not stationary at levels. However, all the variables are stationary at first difference in both ADF test and PP test. Considering the time series using Augmented-Dickey Fuller and Phillip Perron at Trend & Intercept, all their calculated statistics are greater than the critical values at 5% level of significance. The results show that the time series are integrated of the same order; I (1), with the application of both ADF and PP test respectively. Thus, a linear combination of series integrated of the same order are said to be co-integrated. The level of their integrations indicates the number of time series have to be differenced before their stationarity is induced.

### Cusum Test

The Structural stability test of the model was conducted using the Cumulative Sum of recursive residuals (CUSUM) test. This is necessary in view of the fact that stability of model will determine the extent to which we can make forecast concerning behavior of the variables in the model.



In the CUSUM test, it became necessary to incorporate stability of the model by testing for the public debt equation. To this end, we follow Brown, Durbin and Evans (1975) to apply the cumulative sum of recursive residuals (CUSUM) test statistic, it is updated recursively and plotted against break points in the data. For stability of short-run dynamics and the long-run parameters of the variables, it is important that CUSUM statistic stays within the 5 percent critical bound lines, represented by two straight lines. The test finds parameter instability if the CUSUM go outside the area between the two critical lines. In other words, the significance of any departure from the zero line is assessed by reference to a pair of 5% significance lines. However, from the results of the plots above, it shows that the equation stated as TPD as a function of GCEX, GREX and INTRT in the VECM were significant and has the right picture of stability during the period of the study. Their stability is confirmed as the line trend does not go beyond their two red lines Thus, the variables in the model specification are deemed fit for estimation.

### 4.2 Co integration Test

**Table 6: Johansen co-integration test for the series; TPD, GCEX, GREX and INTRT**

This technique is employed to testing for the presence of co integration between the series of the same order of integration through forming a co integration equation. The basic idea behind co integration is that if, in the long-run, two or more series move closely together, it is possible to regard these series as defining a long-run equilibrium relationship, as the difference between them is stationary. Lack of co integration implies that such variables have no long-run relationship.

Hypothesized No. of CE(s)	Eigenvalue	Trace statistics	0.05 critical value	Prob.*
None*	0.801760	94.59737	47.85613	0.0000
At most 1*	0.587767	39.57601	29.79707	0.0028

\* denotes rejection of the hypothesis at the 0.05 level, \*\* Mackinnon – Haug – Michel (1999) P – value.

The trace statistics indicates three (2) co integration equations at the five percent (5%) level of significance, suggesting that there is a long run relationship among the variables tested.

### 4.3 The VECM Result

The existence of co integration among the variables as indicated above presents an evidence of long-run economic relationship among the variables. This implies that, vector error correction model is the best option for further analysis. It captures both the long run equilibrium and short run dynamic relationships associated with the above results.

Table 7: VECM – System Equation

Error correction:	Coefficient	Std. Error	T – statistics	P – values
cointEq1 = C (1)	-0.573737	0.169204	-3.390807	0.0025
D(TPD(-2)) = C(3)	-0.183797	0.094097	-1.953276	0.0631
D (GCEX (-2)) = C (5)	5.429313	1.095804	4.954640	0.0001
D (GREX (-1)) = C (6)	5.498771	0.830249	6.623041	0.0000
D (INTRT (-1)) = C (8)	-62457.47	36149.15	-1.727772	0.0974
C = C (10)	-693248.9	245772.2	-2.820697	0.0097

$R^2 = 0.875340$ , F – statistics = 17.95, Prob (F – statistics) = 0.000000, DW = 2.323575. Sources: Authors' computation 2016 using E – view 7.0

Based on the above result, government capital expenditure has a t-statistics of 4.954640 with a positive coefficient of 5.429313 and a P –value of 0.0001 which is less than the 5% level of significance. This indicates that government capital expenditure has significant positive relationship with public debt in the Nigerian economy. This is also applicable to government recurrent expenditure having a t-statistics of 6.623041 with a positive coefficient of 5.498771 and a p-value of 0.0000 which is less than 5% significant level showing positive relationship between government recurrent expenditure and public debt in the economy. These results are in line with the Keynesian postulation which asserts that increase in government borrowing will lead to more government spending in the economy which will consequently lead to increase in national income, this result also agrees with a similar work by Uguru (2016). However, interest rate based on the above result, has insignificant negative relationship with public debt as indicated by p value of 0.0974 and a negative coefficient of -62457.47. This implies that an increase in government borrowing triggers the interest rate upward which in turn affects the economy negatively since the private sector will find it difficult to borrow for investment at the market interest rate.

From the above result also, the coefficient of ECM (-1) is -0.573737 satisfying the negative condition and its P value is 0.0025 that is less than 0.05 level of significance satisfy the second condition of statistical significance. The coefficient indicates that the speed of adjustment between the short run dynamics and the long run equilibrium is 57.37% in absolute value. The computed coefficient of determination ( $R^2 = 0.875340$ ) shows that 87.53% of the total variation in the dependent variable are accounted for by the variation in the explanatory variable while 12.47% of the total variation in public debt is attributable to the influence of other factors not included in the regression equation.  $R^2=87.53\%$  is relatively high to be dependable for policy decision; it tells more on the (true) relationship between public debt and public expenditure in Nigeria.  $R^2$  in the neighborhood of 80-90% is seen to be ideal for the power of explanatory variables (explaining dependent variable).

The F – statistics of 17.95, with p value of 0.000000 which is less than 0.05 shows that the influence of explanatory variables on the dependent variables is statistically significant. The Durbin Watson test determines the presence or level of autocorrelation among the residuals, since the DW has the value of 2.323575; it indicates the absence of auto correlation among the residuals.

#### 4.4 VEC Granger Causality

Table 8: VEC Granger – Wald Test

Dependent variable: D(TPD)

Excluded	Chi-sq	Df	Prob.
D(GCEX)	24.57868	2	0.0000
D(GREX)	66.15198	2	0.0000
D(INTRT)	3.931633	2	0.1400
All	129.2864	6	0.0000

Dependent variable: D(GREX)

Excluded	Chi-sq	Df	Prob.
D(TPD)	1.553275	2	0.4600
D(GCEX)	15.19657	2	0.0005
D(INTRT)	0.275524	2	0.8713
All	20.90170	6	0.0019

From the table above, it reveals that there is a causal relationship among total public debt government capital expenditure and government recurrent expenditure in Nigeria. This is seen by their p values of GCEX (0.0000) and GREX (0.0000) which are less than 0.05. It means that there is a unidirectional causality running from both capital expenditure and recurrent expenditure to public debt (TPD) in Nigeria implying that government expenditure granger causes public debt in Nigeria within the period of the study. Another obvious implication of this result is that government borrowing in Nigeria is triggered by government deficit budgeting, a situation which is well known in Nigeria at both federal and state levels. It therefore becomes necessary that the government budgeting process need to be reexamined to ensure that allocative efficiency is achieved in our budgeting system and that borrowing to finance budget deficit must be done objectively and realistically.

#### 5 SUMMARY OF FINDINGS, POLICY IMPLICATION AND POLICY RECOMMENDATION

This study investigated the causal relationship between total public debt and public expenditure in Nigeria from 1980 to 2015. The focus of the study is to determine if government borrowing in Nigeria is based on the need to provide social services and infrastructure as provided in the budget or by mere reason of privileged access to financial institutions both domestically and internationally as posited by Adam Smith (1776) in his theory of public debt. Applying co integration, vector error correction model and Wald tests econometric tools of analysis, the study obtained the following results.

The trace statistics indicates two (2) co integration equations at five percent (5%) level of significance, suggesting that there is a long run relationship among the variables tested and that the results can be relied upon in taking long run policy decisions in the economy. The findings of the VEC test indicate that government capital and recurrent expenditure has significant positive relationship with public debt in the Nigerian economy. The Wald test result shows that unidirectional causality runs from both capital and recurrent expenditure to public debt in Nigeria. An obvious implication of this result is that government borrowing in Nigeria is triggered by government deficit budgeting, a situation which is well known in Nigeria at both federal and state levels. It therefore becomes necessary that the government budgeting process need to be reexamined to ensure that allocative efficiency is achieved in our budgeting system and that borrowing to finance budget deficit must be done objectively and realistically. This study therefore recommends the introduction of planning-programming-budgeting systems (PPBS) and Zero based budgeting (ZBB) in preference to the current practice of incremental budgeting (IB) in our public finance at both federal and state levels as is the current global practice considering that these budgeting approach seeks to intensify competition for budget resources.

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