

GOVERNMENT EXPENDITURE EFFICACY AND THE QUESTION OF GROWTH: EVIDENCE FROM NIGERIA

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Abstract

This study analyzes the causal relationship between government expenditure and economic growth in Nigeria. Using the annual time series data for the period 1981 to 2013, the study used cointegration technique and error correction model to ascertain the long run and short run relationship between government expenditure and economic growth. The study further proceeded by conducting Granger causality test. Findings from this study produced mixed results. In the long run, government expenditure was found to influence economic growth negatively while gross fixed capital formation affected growth positively. However, the short run estimate showed that the coefficients of government expenditure and gross fixed capital formation positively influenced economic growth. The granger causality test did not give expected direction of causality between government expenditure and economic growth. Causality test offers little or no support for Wagner's Law in Nigeria. This study therefore recommends that government expenditure be directed to growth enhancing projects rather than growth retarding ones.

Keywords: Government Expenditure, Economic Growth, Cointegration, Error Correction, Causality

Introduction

The overall objective of government in an economy centres around three critical functions: allocative, distributive and stabilization of economic activities. These objectives are pursued vigorously when markets could not effectively and efficiently steered the pace of economic activities required to catalyzed economic growth and also to mitigate the effects of market failures. Diversed reasons have been advanced for government size in relation to economic growth. However, there are two conflicting views regarding the desirability of government size in the literature. The first view suggests that a large government size play a critical role in the process of growth. The justification in support of this view is premised on prevention of

exploitative tendency by foreign investors, securing an increase in productive investment and also to provide a socially optimal direction for growth and development. The second view contends that a large government size may hinder efficiency and at the same time retards economic growth. The arguments in favour of this view tilted to many overlapping layers of fiscal and monetary policies of government which distorts economic incentives and lowers the productivity of the system. Given the diversified points of view on the role of government in promoting economic growth, the relationship between government size and economic growth, however, produced mixed results.

Government spending in most cases is expressed as a function of revenue inflow. The stock of revenue available to the government determines how much to spend, what to spend and how to finance its spending. In connection with this, there should be a stable and sustainable policy that would ensure that government spending decisions fits appropriately into revenue inflows. The expenditure and revenue decisions are captured under fiscal policy. There are three ways in which government spending could be financed. These include: income from property, tax inflow and borrowing. In Nigeria for example, there are three layers of government (Central, State and Local), each level of government has powers (enshrined in the constitution) in regards to expenditure and revenue decisions. It therefore implies that the constitution sets limit to the expenditure government undertakes. Government spending comprises outlays of the national, state, local authorities, and extra-budgetary spending. Black et al(2008) observed that the structure of government spending composition affects the general government resources. The growth in the size of spending (in all the layers of government) should correspond with the general growth in the revenue base. Using this fact as a reference point of analysis to Nigeria, the average growth of real per capita expenditure increased from 13% to 17% during 1960-1969 and 1970-1979. It declined continuously from 4% to negative 30% during 1990-1999 and 2010-2012. However, real per capita GDP during the same period increased from 3% to 8% during 1960-1969 and 1970-1979 respectively. It declined briefly to 2% in 1990-1999 and later increased to 5% during 2000-2009 before it finally declined to negative 34%. Per capita government expenditure however stood at 18% during 1960-1969. It increased to 35% during 1970-1979 and declined marginally to 33% during 1990-1999. It continuously declined from 13% to negative 22% during 2000-2009 and 2010-2012 respectively (see table 1).

Table 1: Average Growth of Real Per Capita Expenditure, Real Per Capita GDP and Per Capita Government Expenditure (%), 1960-2012

Year	1960-1969	1970-1979	1980-1989	1990-1999	2000-2009	2010-2012
Real Per Capita Expenditure	0.13	0.17	-0.03	0.04	0.00	-0.30
Real Per Capita GDP	0.03	0.08	-0.02	0.02	0.05	-0.34
Per Capita Government Expenditure	0.18	0.35	0.15	0.33	0.13	-0.22

Source: Computed from Central Bank of Nigeria, Statistical Bulletin,2012 and World Development Indicator (WDI) Database.

There are two conflicting schools of thought which explain the relationship between government spending and economic growth. The arguments of the first school is in line with Adolf Wagner (1883) which suggested that government spending grows faster than the revenue inflow from economic activities. Government expenditure can therefore be seen as an endogenous variable rather than a cause of growth in national income. Adolf Wagner observed that government spending plays no significant role in generating economic growth, rather, the causality direction runs from economic growth to government spending. The second school of thought was mirrored around John Maynard Keynes (1936) who argued that government spending constitute an exogenous variable required in the process of economic growth. In Keynes proposition, government spending decisions needs to match domestic demands and in the long run promotes economic growth. Therefore, causality runs directly from government spending to economic growth. In Nigeria for example, there is a large volume of studies that have probed extensively on the relationship between public expenditure and economic growth (for example, Essien,1997; Aregbeyen,2006; Babatunde,2008; Ighodaro and Oriakhi,2010). However, these studies reaches no agreement on the composition and direction of government expenditure. It therefore becomes necessary to ascertain the exact direction in which causality runs either from economic growth to government spending or from government spending to economic growth in Nigeria.

The main objective of this study is to examine and also analyze the impact of government expenditure efficacy on economic growth in Nigeria. The rest of the sections in the paper is organised into five parts. Following the introduction is section two, which presents the review of related literature, section three explains the theoretical framework and methodology of the study. Section four focuses on the empirical results and also interprets it while section five contains the summary of findings and policy recommendations.

Review of Related Literature

Literatures are inundated on the impact of government expenditure on economic growth. The effects of government expenditure on economic outcomes has given rise to a number of empirical literature. Ansari et al. (1977) analyzed the effects of government expenditure on gross national product for three African countries namely, Ghana, Kenya and South Africa. The study used annual time series data for the sampled countries [Ghana (1963-88), Kenya (1964-89) and South Africa (1957-90)]. Findings from the study shows mixed results. First, it was discovered that the data obtained from these countries did not support Keynesian proposition that government expenditure drives economic growth. From the data analyzed, only Ghana showed evidence of government expenditure being influenced by national income. This implies that Ghana's data finds support with Wagner's hypothesis which emphasized significant role of government expenditure as an endogenous factor of economic development. In line with this submission, Black et.al.(2003) and Dockel and Seeber(1978) partially confirmed the relevance of Wagner's law for South Africa. There appears to be a regularity in the findings of these studies which emphasised high income elasticities for most categories of government spending in relation to economic growth. This implies that government expenditures 'increase more than proportionally with economic growth'.

Wu et al.(2010) observed that Wagner's law works perfectly in developed countries compared to the developing economies. However, some branch of studies have also suggested that government spending could influence economic growth positively (if they are directed to promote public infrastructure) and negatively (if they are consumed by government in the form investment in growth retarding projects). There are no consensus among the existing studies on the exact relationship between government expenditure and economic growth. This stance could be as a result of the differences in model specification, type of econometric technique used, proxies used for government spending and measurement. Alm and Embay (2010) study on the relationship between government spending and real per capita income for South Africa over the period 1960-2007 indicated that government spending is not only being influenced by per capita income and the cost incurred in financing government size but also by fiscal illusion (caused by the gap created by the differences between revenue and expenditure) and external shocks (caused by oil price fluctuations).

Plethora of studies have documented the existence and non existence of Wagner's Law in Nigeria (see for example, Essien, 1997; Babatunde,2008; Aregbeyen, 2006; Ighodaro and Oriakhi,2010). Ighodaro and Oriakhi (2010) employed cointegration technique to analyze the long run relationship between government expenditure and economic growth. Essien

(1997) used the two step procedure of Engle and Granger cointegration approach to determine the relationship between government expenditure and economic growth while Babatunde (2008) employed bound testing technique to achieve the same result. Evidence which emerged from these studies showed that Wagner's Law does not hold in Nigeria except for Aregbeyen (2006) study which gave a contradictory result confirming the existence of Wagner's Law.

The broad objective of every economy is how to attain economic growth and sustain it. However, there is no unanimity of opinion about the best way to accomplish this goal. Different shades of opinion have been proposed by many economists and policy makers in regards to the way of formalizing a reasonable level of growth. Some advocate the need to increase capital investment and infrastructural facilities, while others favours investment in policies that would enhance research and development and as well as create technological changes in productive resources. In Nigeria, government expenditure is very critical in the process of economic growth. It raises the income of communities and as well promote infrastructure projects and other initiatives aimed at creating employment opportunities.

Theoretical Framework and Methodology

There are quite a number of economic growth theories ranging from the classical, neoclassical and endogenous theories. These theories were propounded to identify and explain various variables influencing economic growth. The classical theorists laid much emphasis on capital as major determinant of growth, neoclassical extended the Harrod-Domar classical formulation by including labour and technology into the growth equation (Solow, 1956). Endogenous growth models succeeded neoclassical growth model. The Solow neoclassical growth model provided the theoretical framework for this study. The model permits the inclusion of a wider range of policy variables including government expenditure size and gross fixed capital formation. The model also provides both theoretical foundation and analytical tool for analysis of impact of government size on growth in Nigeria. We specify an augmented version of the model with the following functional form:

$$Y_t = f(AK_t L_t G_t) \quad (1)$$

Re-writing equation (1) in per capita form and at the same time dividing through by L_t gives

$$y_t = (AK_t g_t) \quad (2)$$

The Cobb-Douglas specification of equation (2) gives :

$$y_t = Ak_t^\alpha g_t^\beta, \quad \alpha + \beta = 1 \quad (3)$$

Note that y_t is per capita output at time t, k_t is per capita private capital at time t and g_t is per capita public capital at time t.

Expressing equation (3) in log form and linearising the function gives:

$$\ln y_t = \ln A + \alpha \ln k_t + \beta \ln g_t \quad (4)$$

Data and Model Specification

The data used in the study covered the period between 1981 to 2013. This study rely on time series data to explain the relationship between government expenditure and economic growth in Nigeria. The data for economic growth is proxied by Gross Domestic Product (GRDP), Government Expenditure (GOVEXP) and Gross Fixed Capital Formation (GFCF) were obtained from the publications of the Central Bank of Nigeria (CBN) *Statistical Bulletin*, and National Bureau of Statistics, Annual Abstract. Adapting equation (4), the empirical model for this study can be written as:

$$GRDP_t = f(GOVEXP_t) \quad (5)$$

$$GRDP_t = f(GOVEXP_t, GFCF_t) \quad (6)$$

Equations (5) and (6) estimate the relationship between government expenditure, gross fixed capital formation and economic growth.

where:

GRDP = Gross Domestic product at current basic prices.

GOVEXP = Government Expenditure.

GFCF = Gross Fixed Capital Formation.

Expressing (5) and (6) in equation form gives:

$$GRDP_t = \psi_0 + \psi_1 GOVEXP_t + \varepsilon_t \quad (7)$$

$$GRDP_t = \vartheta_0 + \vartheta_1 GOVEXP_t + \vartheta_2 GFCF_t + \varepsilon_t \quad (8)$$

Note that:

$\psi_0, \psi_1, \vartheta_0, \vartheta_1$ and ϑ_2 are coefficients of variables, while ε_t is error or stochastic term.

Analytical techniques

A number of statistical tests were conducted on the reliability of the data used to analyze the impact of government spending on economic growth. First, the data were subjected to stationarity tests using the Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) statistics. Second, Johansen and Engle-Granger cointegration tests was employed to ascertain the long run relationship among the variables used in the model specified. Third, an error correction model (ECM) was employed to analyze the disequilibrium error among the cointegrating variables. Lastly, we also conduct causality tests using Granger causality test.

As a preliminary step to analysing the result, i carried out the unit root test using the Augmented Dickey Fuller (ADF) and Phillips Perron tests, since research has shown that regression coefficients with non-stationary

variables may lead to spurious and misleading conclusion. When all or some of the variables are not stationary, it is important therefore to carry out appropriate transformation (differencing) to make them stationary. The ADF test is given by the equation below:

$$\Delta Y_t = \psi_0 + \gamma Y_{t-1} + \psi_2 t + \sum_{i=1}^p \vartheta_i \Delta Y_{t-1} + \mu_t \tag{9}$$

It should however be noted that when using the ADF test for variable stationarity, there is need to ensure that the error terms are not correlated and does not have constant variance. Alternatively, Phillips-Perron test could be used as it takes into consideration simplistic assumption concerning the distribution of errors. The following equation is the test regression for the Philips-Perron (PP) statistic:

$$\Delta Y_{t-1} = \Omega_0 + \gamma Y_{t-1} + \varepsilon_t \tag{10}$$

In order to ascertain the long run relationship of the variables in our model, we therefore pursue the process of cointegration and the ECM. When two variables in a specification are cointegrated, the ECM brings together both the short run and long run effects in estimation. The ECM model is given by the following equation:

$$\Delta GRDP_t = \alpha + \sum_{i=1}^{n-1} \alpha_i \Delta GRDP_{t-1} + \sum_{i=0}^{m-1} \gamma_i \Delta GOVEXP_{t-1} - \beta e_{t-1} + \varepsilon_t \tag{11}$$

Note that β is error correction coefficient and ε_t is the equilibrium error. β reports the number of errors corrected. The term $GRDP_t$ and $GOVEXP_t$ in the ECM reveals the long run coefficients of the two variables. Equation 7 gives the long run representation of the model and it allows us to bring together both the long run and short run phenomenon in our estimation.

The Granger causality test showing the stationarity of both $GRDP_t$ and $GOVEXP_t$ involves the estimation of VAR model as expressed below:

$$GRDP_t = \psi + \sum_{i=1}^n \gamma_i GOVEXP_{t-1} + \sum_{j=1}^m \gamma_j GRDP_{t-j} + \varepsilon_{1t} \tag{12}$$

$$GOVEXP_t = \varpi + \sum_{i=1}^n \theta_i GOVEXP_{t-1} + \sum_{j=1}^m \xi_j GRDP_{t-j} + \varepsilon_{2t} \tag{13}$$

From equations 12 and 13, we estimate the VAR model with the intention of checking for the relevant significant coefficients.

Empirical Result and Interpretation

Unit root Test Result

The results of the unit root tests are presented in Table 2.

Table 2: Result of ADF and PP Unit Root Test

Variables	ADF		PP	
	Level	First Difference	Level	First Difference
GRDP	0.9349*	-4.6142**	-1.3503*	-4.6142**
GOVEXP	-1.3080*	-7.3212**	-2.2290*	-7.3244**
GFCF	-4.0259**	-4.3098**	-3.4712**	-4.2846**

Note : *- Statistically significant at 1% level, **- Statistically significant at 5% level

Source: Author's result using E-view 4.

Table 2 reports the results of the stationarity tests at level as well as at first difference for all the variables. Included in these tests are a constant and trend terms. The optimal lag length of each case for ADF tests is chosen using the Akaike Information Criteria(AIC) after testing for higher order serial correlation residuals. As shown in Table 2, after taking the first difference, each series appeared to have stationarity with the ADF test. However, the result of Phillips Perron(PP) unit root test suggest that the variables are integrated of order one and this implies that the series under study are stationary at first difference. Virtually all the variables considered in our model reject the null hypothesis of non-stationarity ($p < 0.05$; $p < 0.01$). The stationarity test suggest the possibility of long run relationship between the variables.

Cointegration Test Result

When two or more time-series data are not stationary, it is important to test whether there is a linear combination between or among them using cointegration technique. The existence of cointegration among variables gives an indication of long-run relationship. However, the short-run dynamics of the model can be represented by an error correction mechanism. We applied both the Engle-Granger Two-Step procedure and the Johansen Maximum Likelihood Methodology for the cointegration test. Table 3 show the results of the cointegration test using the Engle-Granger Two-Step procedure. The result shows that there is cointegration among the variables used in the model.

Table 3: Result of the Cointegration Test Using the Engle-Granger Methodology

	Dickey Fuller	Augmented Dickey Fuller		Phillips Perron	Conclusion
		One Lag	Two Lags		
Residuals from the Static Long run Model	-5.6953**	-5.4736**	-5.4736**	-6.8593**	Existence of cointegration

Note : ** implies that the residual is stationary at the 5 % level of significance

Table 4 presents the results of the cointegration test, with the use of Johansen methodology. The results were analyzed based on the Trace and the Maximum Eigen-value Statistic. The null hypothesis which states that ‘there is no cointegration among the variables’ is rejected at both the 5% and 1% levels of significance. The Trace Statistic indicates one (1) cointegrating equation at the 5% level of significance, while the Maximum Eigen-value test indicates no cointegrating equations at both the 5% and 1% levels respectively. The cointegration test results are therefore uninformative about the number of cointegrating relations among the variables. However, Pesaran

and Pesaran (1997) observed that both the Trace Statistic and the Maximum-Eigen value Statistic give divergent and conflicting decision about the number of cointegrating vectors in the estimation. We therefore proceeded on the basis that at least, there is cointegration and then focused on the cointegrating relation that explains the Gross Domestic Product. This led to our normalization with respect to the Gross Domestic Product variables.

Table 4: The Result of the Cointegration Test by the Johansen Methods

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 % C.V	1 % C.V	Max-Eigen Statistic	5 % C.V	1 % C.V
None *	0.452628	33.48133	29.68	35.65	18.68142	20.97	25.52
At most 1	0.340671	14.79991	15.41	20.04	12.91251	14.07	18.63
At most 2	0.059067	1.887395	3.76	6.65	1.887395	3.76	6.65

Note :

1. Trace test indicates 1 cointegrating equation(s) at the 5% level.
2. Max-eigenvalue test indicates no cointegration at both 5% and 1% levels
- 3.C.V = Critical Values

The normalized cointegrating equation is given as:

$$GRDP = -0.897 GOVEXP + 0.193 GFCF$$

(0.146) (0.151)

The Short-run Dynamics of the model

The appropriate mechanism for modelling the short run dynamics of the Gross Domestic Product is an error correction mechanism (ECM). From Table 5, we observed that the coefficient of government expenditure (GOVTEXP) is positive and statistically significant while that of the gross fixed capital formation (GFCF) is negative. According to the results, government expenditure influenced gross domestic product positively with a coefficient of 0.4442. At the same time, the coefficient of gross fixed capital formation (-0.0002) negatively influenced gross domestic product. This implies that in the short run, both government expenditure and gross fixed capital formation show evidence indicating significance in explaining the growth of GDP. The result further reveals the government expenditure and gross fixed capital formation drives the growth of GDP. However, the estimated coefficient on the cointegration regression residual ECM(-1) is negative as expected. It shows that the speed of adjustment of the variables back to equilibrium is estimated at 7.68%. Indication from the result show that the coefficient of government expenditure is positive and statistically significant in the long-run. This suggests that increase in government expenditures would correspondingly drive economic growth in the long run. From a statistical point of view, it appears we have a moderately good relationship with approximately 62% (Adjusted R²) of the variation in the dependent variable being explained by the regressors. In summary, there is sufficient evidence to show that in the short-run, government expenditure do

influence economic growth positively while gross fixed capital formation negatively influenced economic growth. However, in the long-run, government expenditure affected economic growth negatively while gross fixed capital formation affected economic growth positively. This implies that in the long run, government expenditure show no evidence indicating any significance in explaining the growth of GDP.

Table 5: The Parsimonious Model

Variable	Coefficient	t-statistics
Constant	0.0084**	3.1821
Δ GOVTEXP	0.4442	3.9840
Δ GFCF	0.0002**	-3.0933
ECM(-1)	-0.0768*	-2.4977

Notes: *,** denote significant at 1%, 5% respectively. Dependent Variable is Δ GRDP. Sample: 1981-2013. Included Observations: 31. R-Squared: 0.67; Adjusted R-Squared: 0.62; Durbin Watson: 1.89.

Source: Computed output from E-view 4.0

Granger Causality Test Results

Table 6 show the result of Granger causality test with two(2) lags. The hypothesis that gross fixed capital formation does not Granger cause gross domestic product is accepted, while the hypothesis which says that gross domestic product does not Granger cause government expenditure and government expenditure does not Granger cause gross domestic product can be rejected. This study have also provided evidence that does not support the causality relationship between government expenditure and gross domestic product (economic growth). Nevertheless, there is sufficient evidence provided in the study that suggest the running of causality from gross fixed capital formation to gross domestic product (economic growth).

Table 6: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Probability
GOVEXP does not Granger Cause GFCF	31	5.95480	0.00743*
GFCF does not Granger Cause GOVEXP		1.68152	0.20570 ^{ns}
GRDP does not Granger Cause GFCF	31	8.60021	0.00136*
GFCF does not Granger Cause GRDP		0.11710	0.88996 ^{ns}
GRDP does not Granger Cause GOVEXP	31	4.08955	0.02856**
GOVEXP does not Granger Cause GRDP		10.1217	0.00056*

Source: Computed output from E-view 4.0

*- Significant at 1% , **- Significant at 5% , ns - Not significant.

$GRDP \Rightarrow GFCF$ (Unidirectional)

$GRDP \Leftrightarrow GOVEXP$ (Bidirectional)

Summary of Results and Policy Recommendations

This study investigated the causality between government expenditure and economic growth in Nigeria during the period 1981 to 2013.

Plethora of studies on government size and economic growth were reviewed. Findings from this study produces mixed results. Some studies favourably disposed to the existence of Wagner's Law while others could not find evidence of Wagner's Law in economic activities. The Solow neoclassical model provided the theoretical framework for the study. A number of statistical tests were conducted on the data. These include the unit root tests, cointegration tests and Error correction model (ECM). We also conduct the causality test using Granger causality test. The unit root test shows that all the variables on our model were stationary at first difference. The Johansen cointegration test based on trace statistic indicates one (1) cointegrating equation at 5% level of significance, while Max-eigen value statistic indicates no cointegrating equation. The cointegration test shows the existence of long run relationship between government expenditure, gross fixed capital formation and economic growth in Nigeria. In the long run, the coefficient of government expenditure influenced economic growth negatively while gross fixed capital formation influenced economic growth positively. However, in the short run, both the government expenditure and gross fixed capital formation positively drives economic growth. The Granger causality test result do not give appropriate direction of causality between government expenditure and economic growth.

This study have also provided evidence that does not support the causality relationship between government expenditure and economic growth in Nigeria. Sufficient evidence have also been provided in the study that suggests the running of causality from gross fixed capital formation to economic growth. The causality test result offers little or no support for Wagner's Law in Nigeria. This study therefore recommends that government expenditure components be directed to growth enhancing project rather than growth retarding ones.

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