IS NIGERIAN GROWTH PUBLIC SPENDING-SPURRED?

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ABSTRACT

This study, using the Ram framework investigates the effect of government expenditure on the economic growth of Nigeria with a data span of 36 years (1981 to 2016) employing the Autoregressive Distributed Lag (ARDL) Model. It is discovered that government expenditure on human capital development (Education and Health) affects economic growth significantly more especially in the long run; government consumption expenditure and private sector investment have been less significant to growth, while government capital/investment expenditure spurs growth not in the short but in the long run. It is recommended that although government expenditure is important to foster growth, government should focus more on investment expenditure.

Contribution/ Originality: This study contributes to the existing literature investigating government expenditure growth effect, particularly in Nigeria. It is different from other studies by combining a longer data span covering recent government activities with an ARDL modelling technique in a Ram government expenditure framework. This study is innovative by this combination.

1. INTRODUCTION

Government expenditure is an important component of aggregate demand. It is a fiscal tool often employed by government in driving the economy (Keynes, 1936; Ram, 1986; Barro, 1990; Lin, 1994; Kneller *et al.*, 1998; Folster and Henrekson, 1999; Josaphat and Oliver, 2000; Okoro, 2013; Kolawole, 2016). As necessary as government expenditure poses, attaining the goal of government spending of advancing the economy depends on whether it is productive or unproductive. Generally, productive government spending would have positive effects on the economy, while unproductive expenditure would be detrimental (Oziengbe, 2013). This categorization, where some spending can be identified as productive and retained may be equivocal considering different economies, since what is good for the goose may not necessarily be good for the gander.

The magnitude of government spending and its effect on the Nigerian economic growth in Nigeria is an issue of great interest. Nigerian government spending on the provisions of public goods and services has been on the

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increase since the 1970's. This spending might have generated little economic growth since a large number of Nigerians still live below the poverty line. According to the World Bank (2016) and UNDP (2016) reports, 53% of the country was classified as poor in 2010 and 62% in 2016. Macroeconomic indicators like import obligations, interest rate, exchange rate, indebtedness, inflation rate and national savings reveal that Nigeria has not fared well in the last three decades. Nigeria is just recovering from a period of recession, despite annual increases in government spending. Could it be that government spending has no effect on growth? This study explores the possible effects of government expenditure on economic growth in Nigeria from 1980 to 2016. The study differs in its approach by employing the Auto Regressive Distributed Lag Model of Pesaran et al. (2001) while adopting the theoretical framework of Ram (1986); Josaphat and Oliver (2000); Maku (2009).

2. LITERATURE REVIEW

The interdependence between public expenditure and economic growth has been panoptically treated in theoretical and empirical literature. The theoretical foundation of this interplay can be traced back to the time of Wagner (1883) to Keynes (1936); Peacock and Wiseman (1961) and later to Musgrave (1969) Conspicuously, two schools of thought arose on the direction of cause and effect, between public expenditure and economic growth. Wagner (1883) submitted that public expenditure is a consequence of economic growth, meaning that it is economic growth that spurs increased government expenditure. The law of increasing state activity or the law of expanding state roles or Wagner's law, states that as an economy develops, shown in its high rate of industrialization and per capita income growth, the portion of government spending in the gross national product tends to rise accordingly (see, Oziengbe (2013)). Keynes (1936) on the other hand posited that government spending is an instrument used by the government to backtrack economic downswing by borrowing from the private sector and then repaying through various expenditure programmes, therefore, economic growth is an outcome of public expenditure (Mutiu and Olusijibomi, 2013). According to Mitchell (2005) Keynesian theory suggested that government expenditure (especially through deficit financing) could provide quick solution to help combat recession or depression; they however advised that policy makers should be ready to immediately reduce government spending once the economy recovers, to preclude inflation.

Meanwhile, scholars are in dissonance on whether increasing government spending spurs economic growth. Others have contended that increased government expenditure may influence economic performance negatively. They claim that while trying to finance increased spending, government may have to raise taxes or borrow or do both. The higher income tax will reduce consumption and production as well as savings and may be a disincentive to willingness to work Hayek (1989) & Turnovsky (1994). Hayek, tore apart the Keynesian economic paradigm for what he referred to as "their fundamentally collectivist approach". He argued that such theories advocate centralized planning; it may conduce wrong investment of capital which may also generate business cycle problems. Additionally, increased government borrowing necessary to finance its expenditure may 'crowd-out' the private sector and thus reduce private investments.

Empirically, Omoke (2009) found that raising government spending will have a positive effect on the growth of the economy, most especially when injected into development programmes. The study asserts that expenditure on health and education (Human Capital) will assist in raising labour productivity and national output growth. Furthermore, capital investments or expenditures on infrastructure such as roads, communications, power and so on, will cut private sector production costs, increase private sector investment and profitability of firms, thus promoting economic growth. On the other hand, Onakoya et al. (2012) found evidences indicating a weak or nonexistent link between public spending and economic growth in Nigeria. Husnain et al. (2011) concluded that public sector spending is inversely correlated with economic growth due to its inefficiency most especially in developing countries, where great proportion of public spending is associated with non-developmental expenditure

like defense and debts financing. They recommended infrastructural development through rehabilitation of electricity and the establishment of efficient energy project in Nigeria.

Most economists would concur that in some circumstances, lower government spending would spur economic growth and in other circumstances higher levels of government spending may be desirable. If government spending is to be zero, probably there would be very little economic success, because developing infrastructures, enforcing contracts and protecting property, would be very difficult. In other words, some government spending is important for a prosperous operation of the rule of law (Mitchell, 2005).

3. THEORETICAL FRAMEWORK AND METHODOLOGY

3.1. Theoretical Framework

The basis of the empirical model for this study is hinged on Ram (1986) model, as modified by Josaphat and Oliver (2000) and Maku (2009). In the model, we assumed that the Nigerian production function consists of private and public sector production functions represented by P and G with production capital (K) and labour (L) in each sector. Such that total capital $K = K_P + K_G$ and $L = L_P + L_G$. These production functions are presented in equations 1 and 2.

$$P = P(K_P,\ L_p,\ G_p) \tag{1}$$

$$G = G(K_G,\ L_G) \tag{2}$$

Equation 1 expresses private sector's production as a function of private sector capital, private sector labour and government externalities in the form of infrastructure, taxes and other external interventions. Equation 2 presents public sector's production as a function of capital and labour in the sector. The sum of equations 1 and 2, yields equation 3, where Nigerian economic production equals production in the private sector plus that of the public sector.

$$Y = P + G \qquad Therefore, Y = P(K_P,\ L_p,\ G)\ +\ G(K_G,\ L_G) \tag{3}$$

A total differentiation of equation 3 yields equation 4, where marginal products of capital (K) in both private and public sectors are represented by P_K and G_K respectively, while marginal product of labour in the two sectors are also represented by P_L and G_L. Meanwhile, P_G is the marginal externalities effect of the public on the private sector. Equation 4 is deduced from 3.

$$dY = P_K dK_P + G_K dK_G + P_L dL_P + G_L dL_G + P_G dG \tag{4}$$

Realistically, labour in the two sectors have different degree of productivity, we assume constant productivity differential in both sectors represented as δ, as presented in equation 5. Where, if $\delta > 0$, labour productivity in the public sector is higher and when $\delta < 0$, labour productivity in the private sector is higher. $\delta \neq 0$, that is,

$$G_L\big/P_L = (1+\delta) \qquad that\ is \quad G_L = P_L(1+\delta) \tag{5}$$

Exploring this further, substituting equation 5 into 4, yields equation 6 and 6 transforms into 7. Recall that, the total labour force in the economy equals the sum of private and public sector labour force as in 8. Substituting equation 8 into 7, we derive equation 9

$$dY = P_K dK_P + G_K dK_G + P_L dL_P + (1+\delta)P_L dL_G + P_G dG \tag{6}$$

$$dY = P_K dK_P + G_K dK_G + P_L(dL_P + dL_G) + \delta P_L dL_G + P_G dG \tag{7}$$

$$L_G + L_P = L \qquad that\ is,\ \ dL_G + dL_P = dL \tag{8}$$

$$dY = P_K dK_P + G_K dK_G + P_L dL + \delta P_L dL_G + P_G dG \tag{9}$$

Moving forward, a keen look at equation 2 suggests its total differentiation will result into equation 10

$$dG = G_K dK_G + G_L dL_G \qquad = G_K dK_G + (1+\delta)P_L dL_G \tag{10}$$

$$dG - G_K dK_G = (1+\delta)P_L dL_G \quad Therefore \quad \frac{dG}{1+\delta} - \frac{G_K dK_G}{1+\delta} = P_L dL_G$$

Substituting equation 10 into 9 and dividing through by Y, we obtain equation 11.

$$dY = P_K dK_P + G_K dK_G + P_L dL + \delta\left[\frac{dG - G_K dK_G}{1+\delta}\right] + P_G dG$$

$$dY = P_K dK_P + P_L dL + G_K dK_G \ - \ \frac{\delta G_K dK_G}{1+\delta} + \frac{\delta dG}{1+\delta} + P_G dG$$

$$dY = P_K dK_P + P_L dL + G_K dK_G \left[1 - \frac{\delta}{1+\delta}\right] + dG\left[P_G + \frac{\delta}{1+\delta}\right]$$

$$\frac{dY}{Y} = P_K \frac{I_P}{Y} + G_K\left[1 - \frac{\delta}{1+\delta}\right]\frac{I_G}{Y} \ + P_L \frac{dL}{L} \ + \left[P_G + \frac{\delta}{1+\delta}\right]\frac{dG}{Y} \tag{11}$$

For simplification, equation 11 is rewritten as equation 12,

$$where\ \ \alpha = P_K, \quad \beta = G_K\left[1 - \frac{\delta}{1+\delta}\right],\ \ \varphi = P_L,\ and \quad \eta = \left[P_G + \frac{\delta}{1+\delta}\right]$$

$$\frac{dY}{Y} = \alpha \frac{I_P}{Y} + \beta \frac{I_G}{Y} \ + \varphi \frac{dL}{L} \ + \eta \frac{dG}{Y} \tag{12}$$

Where,

I_P = Private Investment (*PINV*), represented by Gross Private Fixed Capital formation.

I_G = Government Investment (*GINV*) represented by government Capital Expenditure.

$\frac{dL}{L}$ = Human Capital Development Expenditure (HCDE), on Health and Education

dG = Government Consumption Expenditure (*GCE*)

Here we equate $\frac{dL}{L}$ to government human capital development expenditure as employed by Josaphat and Oliver (2000) and Maku (2009).

To establish the econometric model for this study, equation 12 is transformed into 13.

$$Growth\ rate_t = \alpha \frac{PINV}{GDP_t} + \beta \frac{GINV}{GDP_t} \ + \varphi \frac{HCDE}{GDP_t} \ + \eta \frac{GCE}{GDP_t} + \varepsilon_t \tag{13}$$

3.2. Methodology

The relationship between government expenditure and economic growth transverses beyond the short run, it takes time before private and government capital investment take effect on the economy. In order to differentiate between short and long run analysis of these effects, the Autoregressive Distributed Lag Model (ARDL) of Pesaran and Shin (1999) and Pesaran *et al.* (2001) is used in estimating equation (13). This is efficiently suitable for small samples, it permits the combination of series of different orders of integration, *I (0)* or and *I (1)* and plus the possibility of simultaneously estimating both the long and short run relationships.

From equation (13), the ARDL specification is given as;

$$\Delta \ln g_t = \gamma + \sum_{i=1}^{p} \partial_i \Delta \ln g_{t-i} + \sum_{i=0}^{p} \omega_i \Delta \ln PINV_{t-i} + \sum_{i=0}^{q} \phi_i \Delta \ln GINV_{t-i} + \sum_{i=0}^{r} \psi_i \Delta \ln HCDE_{t-i} + \sum_{i=0}^{r} \theta_i \Delta \ln GCE_{t-i}$$
$$+ \delta_1 \ln g_{t-1} + \delta_2 \ln PINV_{t-1} + \delta_3 \ln GINV_{t-1} + \delta_4 \ln HCDE_{t-1} + \delta_5 \ln GCE_{t-1} + \varepsilon_t \quad (14)$$

The parameters of the differenced part of equation 14 are short run parameters, the last part without operators represent the long run parameters. The null hypothesis that $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$, that is, no co-integration, is tested using the Wald F-Statistic. A rejection of this suggests the existence of long run relationship among the variables. An F-statistic above the upper bound suggests co-integration, below the lower bound means no co-integration and in between implies inconclusiveness. After the test for co integration, the long run and short run relationships are estimated.

3.3. Data Description

A data span of 36 years (1981 -2016) is employed, distinct from the past studies conducted on Nigerian economy, the Autoregressive Distributed Lag Model is combined with the Ram (1986) model of government-growth relationship for a period of 36 years extending into the current government spending activities. The data was obtained from the Central Bank of Nigeria (2017).

4. EMPIRICAL RESULTS

4.1. Graphical Presentation and Descriptive Statistics

The choice of empirical model is not autonomous of data properties. Estimations without proper screening of data may result in spurious conclusions. Figure 1 represents the interplay between government capital expenditure, private investment expenditure and the Nigerian economic growth. A keen look reveals the swings in the variables. Private investment expenditure seems to spike more like economic growth, while government capital expenditure appears relatively stable from 2002 to 2015, with a rise in 2016. The boom in oil production accruals around 2004 provided a boost to economic growth and propelled the attainment of its highest point of 33%. Government capital expenditure has continuously been below private investment expenditure except between years 1996 and 2000, when government spent more on investment than the private sector. It must be noted however, that graphical correlation or otherwise may not translate into variable interdependence. Rather, it presents useful information regarding quick deciphering of phenomenon and help in making guided choices of models for estimation. Table 1, also complements the information presented in figure 1 by indicating the statistical properties of the variables.
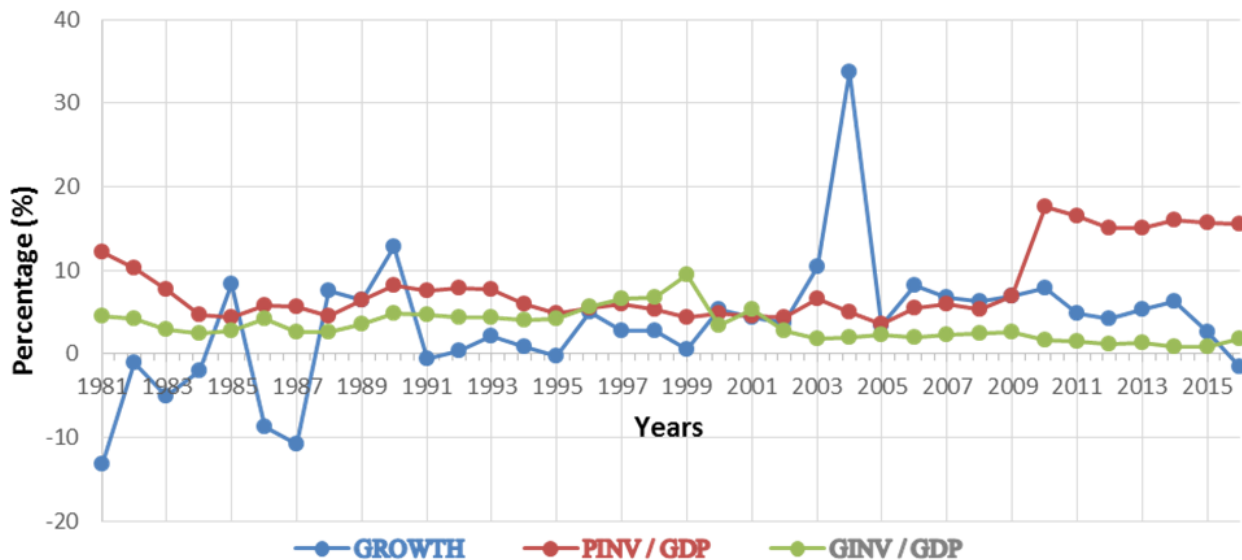
Figure-1. Interplay between Government and Private Investment (% of GDP) & Growth
Source: Author's Computations, (2017)

In table 1, the average growth rate for the period under consideration is about 3.5%. Private and government capital expenditures as proportions of GDP averaged 8% and 3.4% respectively. That is, on the average, the proportion of GDP corresponding to private investment is above that of government capital expenditure as a proportion of GDP. On the average, only 0.55% of the GDP corresponds to human capital development expenditure while government consumption expenditure was about 6% of GDP on the average.

Table-1. Descriptive Statistics

Descriptives	$\dfrac{\%}{GDP}$ Growth	$\dfrac{PINV}{GDP}$ %	$\dfrac{GINV}{GDP}$ %	$\dfrac{HCDE}{GDP}$ %	$\dfrac{GCE}{GDP}$ %
Mean	3.5274	8.0173	3.3619	0.5574	5.7545
Maximum	33.7357	17.5621	9.3837	1.1352	9.6249
Minimum	-13.1278	3.6173	0.8692	0.0485	2.6676
Std. Dev.	7.6102	4.2914	1.8495	0.2895	2.0312
Skewness	1.2211	1.1211	1.1060	0.0949	0.2717
Kurtosis	8.7063	2.7043	4.4347	2.3101	1.8744
Jarque-Bera	57.7906	7.6735	10.4280	0.7679	2.3434
Probability	0.0000	0.0215	0.0054	0.6811	0.3098

Source: Author's Computations, (2017)

The maximum economic growth experienced between 1981 and 2016 of about 33% corresponds to 2004. The maximum government and private expenditure share of GDP of 9% and 18% were attained in 1999 and 2010 respectively. Looking at the series' skewness and kurtosis regarding normal distribution assumptions, it is expected that skewness and kurtosis have asymptotic distributions of $N(0)$ and $N(3)$ respectively (Gujarati, 2003) However, the use of kurtosis and skewness is not enough to justify the normal distribution of a series since the thresholds are not realistically obtainable, a more rewarding statistic is the Jarque Bera statistic. Table 1 indicates that all variables have positive skewness, which means that increases occur more often than decreases. The statistic equally shows that only human capital development and government consumption expenditure are normally distributed. This is of limited concern the normality of the residual of estimation is the most important in the OLS assumptions which will be employed in our estimation.

4.2. Stationarity Test

Some variables are without constant means, they are not stationary, such variables when employed in estimation without proper treatments will result in spurious estimates. Table 2 shows the results of stationarity tests performed on the series, employing the Phillips-Perron (PP) and Augmented Dickey – Fuller (ADF) unit root tests Fuller (1976); Dickey and Fuller (1979) and Phillips and Perron (1988) All variables were $I(1)$, except growth and human capital expenditure that are $I(0)$. Non constancy of mean means estimates today are not the same in the long run. To achieve constancy, the $I(1)$ variables must first be differenced with their long run properties forgone. To avoid this loss of long run properties and contemporaneously estimate both the long and short run relationships, the ARDL of Pesaran and Shin (1999) and Pesaran et al. (2001) was used.

Table-2. Stationary Test of the Variables

| Variables (%) | Level Series | | Δ^1 First Difference | |
	ADF	PP	ADF	PP
Growth	0.0004***	0.0004***	0.0000***	0.0001***
PINV	0.6689	0.6194	0.0001***	0.0002***
GINV	0.5627	0.1718	0.0001***	0.0000***
HCDE	0.0172**	0.0213**	0.0000***	0.0000***
GCE	0.2123	0.1456	0.0000***	0.0000***

Source: Author's Computations, (2017)
Note: All figures are probability values & *, **& *** mean no unit root at 10%, 5% & 1% significant respectively.

4.3. Lag Selection

Although the ARDL model automatically selects the optimum model among several other models using the Akaike Information Criterion, it has become traditional to first determine the lag of the series before estimation. Table 3 presents the choice of lag for the model with all criteria agreeing to a lag of 1. The result of the ARDL co integration test is presented in table 4.

Table-3. Lag Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	–327.2661	89.1734*	718.6320	20.7666	20.9956	20.8425
1	–272.3902	21.5675	113.5733*	18.8993*	20.2735*	19.3548*
2	–255.9578	22.6903	219.5025	19.4348	21.9540	20.2699
3	–233.2674	24.2400	358.8446	19.5792	23.2435	20.7938
4	–198.0092	89.1734*	423.3389	18.9380	23.7475	20.5322

Source: Author's Computations, (2017)
* represents the selected lag length by each criterion.

4.4. Result of the ARDL Bound Test

Only the long run and short run forms of the ARDL model are presented on table 5, this is because, after estimating the ARDL model, a test of co integration among the variables is executed using the Wald F-statistic. That is, testing the hypothesis of no long rum equilibrium. The result on table 4, declares the presence of co-integration with a value of about 8 greater than even the upper bound of 1% (5.06). This means that long run relationship exists among the variables.

Table-4. Result of the ARDL Bound Test

Test Statistic	Value	K
F-statistic	*7.982224****	*4*
Critical Value Bounds	*Lower Bound*	*Upper Bound*
Significance	*I(0) Bound*	*I(1) Bound*
10%	*2.45*	*3.52*
5%	*2.86*	*4.01*
2.5%	*3.25*	*4.49*
1%	*3.74*	*5.06*

Source: Author's Computations, (2017)
*** means cointegration at 10%, 5% and 1% significance levels.

4.5. Short and Long Run Contemporaneous Estimates

The effect of capital expenditure both from private and government sectors is non-instantaneous. Unlike recurrent expenditure injected directly into the economy, capital investments such as infrastructure and business capitals undergo some circles before their effects are felt. As shown in table 5, both government and private investment expenditures are not significant on economic growth in short run. On the contrary, in the long run government capital expenditure is significant at 10%. Although investment on human capital development (Education and Health) remains significant both in the long and short run, government consumption expenditure has not influenced growth significantly. In the short run, government spending on human capital development represented a leakage in resources available, its negative significant effect can be felt in the short run estimate, but as time passes, its effect becomes largely positive and highly significant even at 1% under the long run estimates. Meanwhile, Private investment seems to have been redundant in its influence on economic growth in Nigeria implying that the Nigerian government has a lot do to attain a private sector led economy.

Table-5. Short and Long Run Contemporaneous Estimates

Short Run Estimates				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Δ(PINV)	-0.5629	0.3655	-1.5398	0.1372
Δ(GINV)	0.5566	0.9577	0.5812	0.5667
Δ(HCDE)	7.6889	4.7239	1.6276	0.1172
Δ(HCDE (-1))	-11.9264	5.1451	-2.3179	0.0297**
Δ(GCE)	1.4523	0.9222	1.5749	0.1289
Δ(GCE (-1))	-1.7208	0.9243	-1.8617	0.0755
CointEq (-1)	-1.0757	0.1800	-5.9756	0.0000***
Long Run Estimates				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.4885	4.9807	0.4996	0.6221
PINV	-0.5233	0.3514	-1.4890	0.1501
GINV	-1.4105	0.7888	-1.7881	0.0869*
HCDE	17.3202	4.5752	3.7856	0.0010***
GCE	0.1362	0.6836	0.1993	0.8437

Source: Author's Computations, (2017)
ARDL Cointegrating and Long Run Form; Dependent Variable: Growth; Selected Model: ARDL (1, 0, 1, 2, 2), *, **& *** mean no unit root at 10%, 5% & 10% significant respectively

4.6. Diagnostic Test of the ARDL

In table 6, the results of the long run and short run parameters need to be verified based on OLS assumptions of the error term, estimates can be unreliable when sufficient OLS residual assumptions are not satisfied. Table 6 presents the results of serial correlation, heteroscedasticity and normality tests on the residual of the ARDL model. The result shows an acceptance of all null hypotheses. That is, no serial correlation, there is homoscedasticity and the residual is normally distributed.

Table-6. Diagnostic Tests of the ARDL Regression Result

Tests	Probability Values	
		Prob. Value
Breusch-Godfrey Serial Correlation LM Test	0.4252***	
ARCH: Heteroscedasticity Test	0.6669***	
Normality Test	0.1109***	

Source: Author's Computations, (2017)
*** denotes acceptance of null hypothesis

5. CONCLUSION AND RECOMMENDATIONS

An investigation into the effects of government expenditure (proportion of GDP) on economic growth is the focus of this study. The study employed a data span of 36 years using the Ram (1986) and the Autoregressive Distributed Lag Model. The study revealed that government expenditure on human capital development (Education and Health) affects economic growth significantly, especially in the long run. Government consumption expenditure and private sector investment are less significant to growth, private investment expenditure is large, but its effectuality might have been hindered by poor infrastructure, epileptic power supply among others. Meanwhile, expectedly, government capital/investment expenditure spurs growth not in the short but in the long run. This study recommends that although government expenditure is important to foster growth both theory and empirical evidence suggests that government must focus more on investment expenditure contrary to the observed large percentage of government spending on consumption/recurrent expenditure. Also, expenditure on developing human capital is emphasized upon by the estimates obtained, government must raise its attention towards population capacity development; this will assist production plans, attaining GDP targets and economic development.

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