Does government spending spur economic growth in Nigeria?

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DOES GOVERNMENT SPENDING SPUR ECONOMIC GROWTH IN NIGERIA?

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Abstract

This study examines the link between government spending and economic growth in Nigeria over the last three decades (1977-2006) using time series data to analyze the Ram (1986) model. Three variants of Ram (1986) model were developed-regressing Real GDP on Private investment, Human capital investment, Government investment and Consumption spending at absolute levels, regressing it as a share of real output and regressing the growth rate real output to the explanatory variable as share of real GDP.

Result showed that private and public investments have insignificant effect on economic growth during the review period the review period. An attempt to test for presence of stationary using Augmented Dickey Fuller (ADF) unit root test reveals that all variables incorporated in the model were non-stationary at their levels. In an attempt to establish long-run relationship between public expenditure and economic growth, the result reveals that the variables are cointegrated at 5% and 10% critical level. With the use of error correction model to detect short run behaviour of the variables, the result shows that for any distortion in the short-run, the error term restore the relationship back to its original equilibrium by a unit. A number of suggestions were however made on how government spending should be channel in order to influence economic growth significantly and positively in Nigeria.

Key words: Government spending, public infrastructure, economic growth, human capital investment, Government investment.

Jel Classification: E2, H50, H 51, H 52, H54

Section I

Background of the study

The recent revival of interest in growth theory has also revived interest among researchers in verifying and understanding the linkages between government spending and economic growth in the world.

Over the past decades, the public sector spending has been increasing in geometric term through government various activities and interactions with its Ministries, Departments and Agencies (MDA's), (Niloy et al. 2003).

The general view is that public expenditure either recurrent or capital expenditure, notably on social and economic infrastructure can be growth-enhancing although the financing of such expenditure to provide essential infrastructural facilities-including transport, electricity, telecommunications, water and sanitation, waste disposal, education and health-can be growth-retarding (for example, the negative effect associated with taxation and excessive debt)

The size and structure of public expenditure will determine the pattern and form of growth in output of the economy. The structure of Nigerian public expenditure can broadly be categorized into capital and recurrent expenditure. The recurrent expenditure are government expenses on administration such as wages, salaries, interest on loans, maintenance etc., whereas expenses on capital projects like roads, airports, education, telecommunication, electricity generation etc., are referred to as capital expenditure. On of the main purpose of government spending is to provide infrastructural facilities and the maintenance of these facilities requires a substantial amount of spending. The relationship between government spending on public infrastructure and economic growth is especially important analysis in developing countries, most of which have experienced increasing levels of public expenditure overtime (World Development Report, 1994). Expenditure on infrastructure investment and productive activities (in State-Owned Enterprises) ought to contribute positively to growth, whereas government consumption spending is anticipated to be growth-retarding (Josaphat and Oliver, 2000).

However, economies in transition do spend heavily on physical infrastructure to improve economic welfare of the people and facilitate production of goods and services across all sectors of the economy so as to stimulate rapid growth in aggregate output. Empirical studies have found that there exists positive correlation between industrialization and public infrastructural facilities. Manufacturing industries do consider infrastructure services or facilities before locating their production base in order to gain large economies of scale and reduce cost of production. Also, to increase total industrial output at a cheaper price in the economy.

Following the World Bank's Development Report (1994), developing countries invest $200billion a year in new infrastructure-4percent of their national output and a fifth of their total investment. The result has been a dramatic increase in infrastructure services-for

transport, power, water, sanitation, telecommunications, and irrigation. The provision of infrastructure services to meet the demands of business, households, and other users is on of the major challenges of economic development in developing countries like Nigeria.

The objective of the study is to investigate the link between government spending on and economic growth in Nigeria. The remaining part of this study is divided into four sections. Section II deals with literature, theoretical and empirical review. Section III highlights the methodological issues, section IV presents and analyses the result while section V concludes and proffer policy recommendations.

Section II

Literature, Theoretical and Empirical Review

2.0 Literature Review

2.1 Government Spending and Economic Growth

In a developed country, through economic stabilization, stimulation of investment activity and so on, public expenditure maintains a rate of growth which is a smooth one. In an underdeveloped country, public expenditure has an active role to play in reducing regional disparities, developing social overheads, creation of infrastructure of economic growth in the form of transport and communication facilities, education and training ,growth of capital goods industries, basic and key industries, research and development and so on (Bhatia, 2002). Public expenditure on infrastructural facilities has a great role to play in the form of stimulating the economy.

The mechanism in which government spending on public infrastructure is expected to affect the pace of economic growth depend largely upon the precise form and size of total public expenditure allocated to economic and social development projects in the economy. When public expenditure is incurred, by itself it may be directed to particular investments or may be able to bring about re-allocation of the investible resources in the private sector of the economy. This effect, therefore, is basically in the nature of re-allocation of resources from less to more desirable lines of investment. An important way in which public expenditure can accelerate the pace of economic growth is by narrowing down the difference between social and private marginal productivity of certain investments. Here, public expenditure on social and economic infrastructural like education, health, transport, communication, water disposal, electricity, water and sanitation etc., can contribute to the performance of the economy in the following ways:

- Promotion of infant industries in the economy.
- Reduction in the unemployment rate.
- Stabilization of the general prices in the economy.

- Reduction in the poverty rate and increase the standard of living of the people.
- Promotes economic growth by attracting foreign investment.
- Promotes higher productivity.

In tracing the work of Rosto and Musgrave, who put forward development model under the causes for growth in public expenditure. Under this model, they believed public expenditure is a prerequisite of economic development. The public sector initially provides economic infrastructure such as roads, railways, water supply and sanitation. As economic growth take place the balance of public investment shift towards human in providing education, health and welfare services. In this model, the state is assumed to grow like an organism making decision on unbehalf of the citizens. Society demand for infrastructural facilities such as education, health, electricity, transport etc., grow faster than per capita income. In other word, as the economy grows the demand for infrastructural facilities also increase for commensurate development in the economy.

- ✓ Many societies are experiencing a growing population which becomes a major contributory factor in the growth of public expenditure. The sheer scale of state services has to increase to keep pace with population growth, including, for example, more schools, hospitals, and police etc.
- ✓ Most countries have registered increasing urbanization. Existing cities grow and new ones come up. Urbanization implies a much larger per capita expenditure on civic amenities. It necessitates a much larger supply of incidental services like those connected with traffic, roads, schools etc.
- ✓ Implementation of special economic plan necessitates increase in government spending like the implementation of Structural Adjustment Programme (SAP) in 1986 which caused a sharp increase in public expenditure in Nigeria.

2.2 Theoretical Review

Public expenditure theory, traditionally, received only a scanty attention till recently. Partly, this lop-sided interest in the theory of public finance is explained by a general acceptance of the philosophy of laissez-faire and belief in the efficacy of free market mechanism. However, with the advent of welfare economics the role of the state has expanded especially in the area of infrastructural provision and theory of public expenditure is attracting increasing attention. This tendency has been reinforced by the widening interest of economists in the problems of economic growth, planning, regional disparities, distributive justice and the like (Bhatia, 2002).

The theory of public expenditure may be discussed in the context of increasing public expenditure, the range of public expenditure and/or in terms of the division of a given amount of public expenditure into different items like recurrent and capital expenditure. The later of

the two parts may also be conceived in terms of allocation of the economy's resources between providing public goods on the one hand and private goods on the other.

2.2.1 Theory of Increasing Public Expenditure.

There are two important and well-known theories of increasing public expenditure. The first one is connected with Wagner and the other with Wiseman and Peacock.

WAGNER'S LAW OF INCREASING STATE ACTIVITIES

Adolph Wagner (1835-1917) was a German economist who based his Law of Increasing State Activities on historical facts, primarily of Germany. According to Wagner, there are inherent tendencies for the activities of different layers of a government (such as central, state and local governments) to increase both intensively and extensively. There is a functional relationship between the growth of an economy and government activities with the result that the governmental sector grows faster than the economy. From the original version of this theory it is not clear whether Wagner was referring to an increase in

(a) Absolute level of public expenditure;
(b) The ratio of government expenditure to GNP; or
(c) Proportion of public sector in the economy.

Musgrave believes that Wagner was thinking of proportion of public sector in the economy. F.S. Nitti not only supported Wagner's thesis but also concluded with empirical evidence that it was equally applicable to several other governments which differed widely from each-others (F.S. Nitti, 1903). All kinds of governments, irrespective of their levels (say, the central or state government), intentions (peaceful or warlike), and size, etc., had exhibited the same tendency of increasing public expenditure.

WISEMAN-PEACOCK HYPOTHESIS

The second thesis dealing with the growth of public expenditure was put forth by Wiseman and Peacock in their study of public expenditure in UK for the period 1890-1955. The main thesis of the authors is that public expenditure does not increase in a smooth and continuous manner, but in jerks or step like fashion. At times, some social or other disturbance takes place creating a need for increased public expenditure which the existing public revenue cannot meet. While earlier, due to an insufficient pressure for public expenditure, the revenue constraint was dominating and restraining an expansion in public expenditure, now under changed requirements such a restraint gives way.

The public expenditure increases and makes the inadequacy of the present revenue quite clear to every one. The movement from the older level of expenditure and taxation to a new and higher level is the *displacement effect*. The inadequacy of the revenue as compared with the required public expenditure creates an *inspection effect*. The government and the people review the revenue position and the need to find a solution of the important problems that have come up and agree to the required adjustments to finance the increased expenditure.

They attain a new level of tax tolerance. They are now ready to tolerate a greater burden of taxation and as a result the general level of expenditure and revenue goes up. In this way, the public expenditure and revenue get stabilized at a new level till another disturbance occurs to cause a displacement effect. Thus each major disturbance leads to the government assuming a larger proportion of the total national activity. In other words, there is a *concentration effect*. The concentration effect also refers to the apparent tendency for central government economic activity to grow faster than that of the state and local level governments.

2.3 Empirical Review

Numerous studies have been conducted to investigate the relationship between government spending and economic growth. This section provides a brief review of the various empirical models, specifications, findings, and conclusions of existing studies on the topic.

Landau (1983) found that the share of government consumption to GDP reduced economic growth was consistent with the pro-market view that the growth in government constrains overall economic growth. These findings were robust to varying sample periods, weighting by population and mix of both developed and developing countries (104 countries). The conclusions were germane to growth in per capita output and do not necessarily speak to increase in economic welfare. Economic growth was also found to be positively related to total investment in education. In a later study, Landua (1986), extends the analysis to include human and physical capital, political, international conditions as well as a three year lag on government spending in GDP. Government spending was disaggregated to include investment, transfers, education, defense and other government consumption. The results in part mirrored the earlier study in that general government consumption was significant and had a negative influence on growth. Education spending was positive but not significant. It was unclear why lagged variables were included given that the channels through which government influence growth suggest a contemporaneous relationship.

Ram (1986) marked a rigorous attempt to incorporate a theoretical basis for tracing the impacts of government expenditure to growth through the use of production functions specified for both public and private sectors. The data spanned 115 countries to derive broad generalizations for the market economics investigated. He found government expenditure to have significant positive externality effects on growth particular in the developing countries (LDC) sample, but total government spending had a negative effect on growth. Lin (1994) used a sample of 62 countries (1960-85) and found that non-productive spending had no effect in growth in the advanced countries but a positive impact in LDCs.

Other studies have investigated the impact of particular (functional) categories of public expenditure. For example, Deverajan et al (1993), using a sample of 14 OECD countries, found that spending on health, transport and communication have positive impacts (spending on education and defence did not have a positive impact). In the majority of studies, total government spending appears to have negative effect on growth (Romer, 1990; Alexander;

1990; Folster and Henrekson; 1999).

Seymour *et al*. (1997), used a disaggregated approach to examine the impact of government expenditure on economic growth in the OECS. Their work is similar to Cashin (1995) but it opens new grounds by focusing on the short to medium term impact of fiscal policy and incorporates the distortionary effects of government activities using four regression models and a fixed effect model or least square dummy variable (LSDV) model. They found that all the regressors had the correct signs including capital which along with housing, roads, education were insignificant. The non-linear term for education was highly significant and positive corroborate the endogenous growth literature contention that human capital yields increasing returns to scale and nonlinearity in production. The nonlinear term of health was found significant also but was negative implying that health expenditure can be distortionary.

Josaphat *et al.* (2000), investigated the impact of government spending on economic growth in Tanzania (1965-1996) using time series data for 32years. They formulated a simple growth accounting model, adapting Ram (1986) in which total government expenditure is disaggregated into expenditure on (physical) investment, consumption spending and human capital investment. It was found that increased productive expenditure (physical investment) have a negative impact on growth and consumption expenditure relates positively to growth, and which in particular appears to be associated with increased private consumption. The results revealed that expenditure on human capital investment was insignificant in their regression and confirm the view that public investment in Tanzania has not been productive, as at when the research was conducted.

Nitoy *et al*. (2003) employed the same disaggregated approach as followed by Josaphat *et al.* (2000). They examined the growth effects of government expenditure for a panel of thirty developing countries (including Nigeria) over the decades of the 1970s and 1980s, with a particular focus on sectoral expenditures. The primary research results showed that the share of government capital expenditure in GDP is positively and significantly correlated with economic growth, but current expenditure is insignificant. The result at sectoral level revealed that government investment and total expenditures on education are the only outlays that remain significantly associated with growth throughout the analysis. Although public investments and expenditures in other sectors (transport and communication, defense) was found initially to have significant associations with growth, but do not survive when government budget constraint and other sectoral expenditures were incorporated into the analysis. Also private investment share of GDP was found to be associated with economic growth in a significant and positive manner.

Junko and Vitali (IMF, 2008) investigate the impact of government expenditure on economic growth in Azerbaijan because of the temporarily oil production boom (2005-07), which caused expectationally large expenditure increase aimed at improving infrastructure and raising incomes. Azerbaijan's total expenditure increased by a cumulative 160 percent in

nominal value from 2005 to 2007 or from 41 percent of non-oil GDP to 74 percent. In their research reference were made to Nigeria and Saudi Arabia (1970-89) who have also experienced oil boom and increased government expenditure over the years. The study simulated the neo-classical growth model tailored to the Azeri conditions. Their analysis suggested that the evaluated fiscal scenario poses significant risks to growth sustainability and historical experience indicates that the initial growth performance largely depends on the efficiency of scale-up expenditure. The study also sheds light on the risks associated with a sudden scaling-down of expenditure, including the political difficulties to undertake an orderly expenditure reduction strategy without undermining economic growth and the crowding-out effects of large government domestic borrowing.

Section III

Methodological Issues

3.1 Theoretical Model.

In order to capture the precise relationship between government spending and economic growth, an empirical model that incorporates the effect of government consumption and investment spending, and private investment on real gross domestic product in Nigeria is specified.

We follow the model of Ram (1986), which forms a basis of our empirical model of government expenditure and growth. Denoting the private sector D and public sector G, with capital (K) and labour (L) allocated between both such that $K = K_D + K_G$, and $L = L_D + L_G$. To capture externalities associated with the public sector, G enter the production function of the private sector D:

$$D = D(K_D, L_D, G) \quad (1)$$

$$G = G(K_G, L_G) \quad (2)$$

We assume a constant productivity differential between labour in both sectors:

$$G_L / D_L = 1 + \partial \quad (3)$$

Where $\partial > 0$ implies lower productivity in the public sector (the reverse would be the case if $\partial < 0$ and we assume $\partial \neq 0$

Totally differentiating (1) and (2) given that national income Y = D + G, gives

$$dY = D_K dK_D + G_K dK_G + D_L dL_D + D_G dG \quad (4)$$

Where Dk and Gk are marginal products of factor K in sector D and G respectively, similarly, D_L and G_L. Further, D_G is the marginal externality effect of public on private sector. From (3) we can

write:

$G_L = (1+\partial)D_L$ (5)

Josaphat et al. (2000) diverge slightly from Ram (1986) because, they avail of the identity $L = L_D + L_G$, we will treat capital as distinct in each sector. Substituting (5) into (4) and rearranging:

$dY = D_K dK_D + G_K dK_G + D_L (dL_D + dL_G) + D_L dL_G + D_G dG$ (6)

Using (5) we can write:

$dG = G_K dK_G + (1+\partial) D_L dL_G$

which implies:

$$\frac{dG}{1+\partial} - \frac{G_K}{1+\partial} dK_G = D_L dL_G \quad (7)$$

Substituting (7) into (6) and collecting terms:

$$dY = D_K dK_D + \left(1 - \frac{\partial}{1+\partial}\right) G_K dK_G + D_L dL + \left[D_G + \frac{\partial}{1+\partial}\right] dG \quad (8)$$

We assume the existence of a linear relationship between the marginal product of labour in each sector and the average output per unit labour in the economy, i.e. $D_L = \left(Y/L\right)$

Letting $dK_D = I_p$ (private sector investment), and $dK_G = I_G$ (public sector physical investment), we can substitute into (8), dividing through by Y:

$$\frac{dY}{Y} = \frac{I_P}{Y} + \frac{I_G}{Y} + \frac{dL}{L} + \left(D_G + \frac{\partial}{1+\partial}\right)\left(dG/G\right)\left(G/Y\right) \quad (9)$$

Where $\partial = D_K, and \left(1 - \frac{\partial}{1+\partial}\right) = G_K$

Equation (9) corresponds to Ram (1986) equation (7) except we keep I_P and I_G distinct. Thus, equation (9) forms our basic model for regression estimation. For ease of comparison with other studied, we will estimate (9) with (G/Y) as the variable rather than (dG/G) (G/Y).

We do not have time series data on (dL/L) and use public investment in human capital (H_g) as a proxy. We wish to investigate if Hg has an independent impact on growth, as growth theory predicts (Romer, 1990; Barro, 1990; Easterly and Rebelo, 1993). The Hg incorporates government spending on social infrastructures like health and education.

We will estimate (9) as:

$$g = b_0 + b_1\left(\frac{I_p}{Y}\right) + b_2\left(\frac{I_g}{Y}\right) + b_3\left(\frac{H_g}{Y}\right) + b_4\left(\frac{C_g}{Y}\right) + U \quad (10)$$

Where: C_g = Government consumption spending
I_g = Government investment spending
H_g = Government human capital investment spending
I_p = Private investment
g = dY/Y or Y, measured as ($\ln Y_t - \ln Y_{t-1}$)
u = error term

We use time series data on Nigeria for a 30 year period (1977 – 2006). Private investment (I_p) is proxied by private capital formation, while government investment spending (I_g) is proxied by government total capital/development expenditure. Government consumption expenditure (C_g) is measured by government recurrent expenditure less expenditure on health and education. Expenditure on human capital (H_g) is thus measured by the total of health and education spending (current and capital). All variables are measured in real terms.

3.2 Apriori Expectation

The "a priori" expectation provides expected signs and significance of the value of the co-efficient of the model parameters to be estimated in light of economic theory and empirical evidence.

Public expenditure on infrastructure investment and productive activities-like electricity, telecommunication, health, education, transport, water, sanitation and irrigation are expected to contribute positively to economic growth, whereas government consumption spending is anticipated to be growth retarding. Therefore, public expenditure on social and economic infrastructure is theoretically expected to have positive impact on economic growth. Also, private investment is expected to have positive impact on economic growth. This can be represented mathematically as follows:

$$\frac{dY}{dI_P} > 0, \frac{dY}{dI_G} > 0, \frac{dY}{dH_G} > 0, and \frac{dY}{dC_G} < 0$$

3.3 Sources of Data and Estimation Procedure

Base on the nature of the study, data collection will be based on secondary data. The study will source data from Statistics Bulletin of the Central Bank of Nigeria (CBN) and Annual Abstract of Statistic of the National Bureau of Statistic (NBS).

The Classical Least Square (CLS) method is used to analyse the data and investigate the relationship between government spending on public infrastructure and economic growth in Nigeria. Regression model is adopted to know the precise effect of government expenditure on economic growth in Nigeria and for estimation simplicity. Also, co-efficient of determination (R^2), T-statistic, F-statistic, and Durbin Watson test are used to evaluate the significance of the estimated parameters of the regression model. The study also attempt to test for the time

series characteristics using Augmented Dickey Fuller (ADF) Unit Root Test and Augmented Engle-Granger Cointegration test.

Section IV Presentation and interpretation of Result

4.1 REGRESSION: ABSOLUTE

Econometric Method: OLS
Period of study: 1977 – 2006
Observation: 30
Dependent variable: Real GDP (Y)

Variable	Co-efficient	Std. Error	T-statistic	Prob.
Constant	195248.5	24239.163	8.055	0.000
PRI INVT (I_P)	0.924	0.589	1.569	0.129
GOV INVT (I_P)	0.134	0.260	0.514	0.612
HUM INVT (H_g)	-1.474	1.208	-1.221	0.234
GOVCOM(C_g)	0.306	0.213	1.435	0.164

$R^2 = 0.676$ Adjusted $R^2 = 0.624$

F = calculated = 13.025 F-tab = $F_{0.05,4,25} = 2.76$

Durbin-Watson = 0.523

The specified model is

$$Y = b_0 + b_1 I_P + b_2 I_g + b_3 H_g + b_4 C_g + U$$

Using the absolute values of all the variables, the estimated model is:

$$Y = 195248.5 + 0.924\, I_P + 0.134\, I_g - 1.474 H_g + 0.306 C_g$$

The estimated model shows that there exist positive relationship between Real GDP and the explanatory variables – private investment, government investment spending and government consumption spending. This is in conformity with the theoretical expectation excluding government consumption spending which is expected to be growth retarding. Also, human capital investment is found to have negative relationship with real GDP but it is not in conformity with the a priori.

From the estimated regression it can be deduced that a unit change in private investment (I_P), government investment spending (I_g) and government consumption spending (C_g) will enhance real GDP by values of 0.924, 0.134 and 0.306 respectively. Likewise, one present change in human capital investment will retard growth by 1.474.The t-statistic is used

to test for individual significance of the estimated parameters (b_1, b_2, b_3 and b_4). The result reveals that all the parameters are not significant, because their t-calculated is less than t-tabulated (2.04). Then, the null hypothesis is accepted.

The F-statistic is used to test for simultaneous significance of all the estimated parameters and the result showed that they are all simultaneously significant. It's because the F-calculated (13.025) is greater than F-tabulated (2.74).

The Durbin–Watson test shows that there is presence of positive serial correlation in the residuals, because the d-value (0.523) is greater than zero but less than two.

4.2 REGRESSION: LAGGED AT FIRST DIFFERENCE

Econometric Method: OLS
Period of study: 1977 – 2006
Observation: 30
Dependent variable: LAG RGDP ($dY = Y_t - Y_{t-1}$)

Variable	Co-efficient	Std. Error	T-statistic	Prob.
Constant	20511.268	15341.812	1.337	0.193
PRINVT (I_p/Y)	-20.360	56277.263	0.000	1.000
GOV. INVT (I_g/Y)	-28864.1	52818.007	-0.546	0.590
HUCAP (H_g/Y)	26178.956	309676.3	0.085	0.933
GOV.COM (C_g/Y)	13471.091	66611.374	0.202	0.841
$R^2 = 0.017$		Adjusted $R^2 = -0.141$		
F-calculated = 0.106		F-tab = $F_{0.05,4,25} = 2.76$		
Durbin Watson = 2.517				

The specified model is:

$$dY = b_0 + b_1\left(\frac{I_p}{Y}\right) + b_2\left(\frac{I_g}{Y}\right) + b_3\left(\frac{H_g}{Y}\right) + b_4\left(\frac{C_g}{Y}\right) + u$$

Using the proportional values of the explanatory variables to Real GDP (Y), the estimated model is:

$$dY = 20511.268 - 20.360\left(\frac{I_p}{Y}\right) - 288564.1\left(\frac{I_g}{Y}\right) + 26178.956\left(\frac{H_g}{Y}\right) + 13471.091\left(\frac{C_g}{Y}\right)$$

The estimated regression model shows that private investment and government investment spending have a negative relationship with real GDP, which is not in line with the a priori expectation. The human capital investment and government consumption spending have positive impact on economic growth which conforms to the theoretical basis excluding government consumption spending that is expected to be growth retarding.

The estimated regression model reveals that a percentage increase in private investment and government investment as a share of real output will retard economic growth by values of 20.360 and 28,864.1 respectively. Likewise, a percentage change in human capital

investment and government consumption spending as a share of real output will enhance economic growth by values of 26,178.956 and 13,471.091 respectively.

The result of the t-statistic reveals that the individual estimated parameters are not significant and they are statistically assumed to be zero because their t-calculated is less than t-tabulated (2.04). Therefore, the null hypothesis is accepted for each of the estimated parameter (b_1, b_2, b_3 and b_4) of the explanatory variables.

Also, the result of the F-statistic reveals that the estimated parameters are not simultaneously statistically significant because the F-calculated (0.106) is less than F-tabulated (2.76).

The co-efficient of determination (R^2) shows that the data which are in share of real GDP (Y) does not fit the model because 1.7% of the total variation in the first difference of real GDP is only explained by variation in private investment, government investment spending, human capital investment and government consumption spending (all as share of real GDP (Y)).

The Durbin-Watson test shows that there is presence of negative serial correlation in the residuals, because the d-value (2.517) is greater than two.

4.3 **REGRESSION: GROWTH RATE**

Econometric Method: OLS
Period of study: 1977 – 2006
Observation: 30
Dependent variable: Growth rate of Real GDP (g = *d*Y/Y)

Variable	Co-efficient	Std. Error	T-statistic	Prob.
Constant	0.22 5	0.138	1.628	0.116
PRIINVT (I_p/Y)	-0.036	0.506	-0.71	0.944
GOV. INVT (I_g/Y)	-0.238	0.475	-0.500	0.621
HUCAP (H_g/Y)	0.275	2.785	0.099	0.922
GOV.COM(C_g/Y)	-0.033	0.599	-0.056	0.956
R^2 = 0.029		Adjusted R^2 = - 0.127		
F-calculated = 0.184		F-tab = $F_{0.05.4,25}$ = 2.76		
Durbin Watson = 2.088				

The specified model is

$$g = b_0 + b_1\left(\frac{I_p}{Y}\right) + b_2\left(\frac{I_g}{Y}\right) + b_3\left(\frac{H_g}{Y}\right) + b_4\left(\frac{C_g}{Y}\right) + u$$

Regressing the growth rate first lagged real GDP to private investment (I_p/Y), government investment (I_g/Y), Human capital investment (H_g/Y) and government consumption spending (C_g/Y), the estimated model is

$$g = 0.225 - 0.036\left(\frac{I_p}{Y}\right) - 0.238\left(\frac{I_g}{Y}\right) + 0.275\left(\frac{H_g}{Y}\right) - 0.033\left(\frac{C_g}{Y}\right)$$

The estimated model shows that private investment, government investment spending and government consumption spending have negative relationship with the growth rate of real GDP, in which there relationship is not in conformity to theoretical expectation excluding government consumption spending (which conforms). Also, there is positive relationship between human capital investment and growth rate of real GDP and this conforms to theoretical expectation.

The estimated reveal that a unit changes unit change in private investment, government investment spending and government consumption spending as share of real output will have a negative influence on the growth rate of real GDP by values of 0.036, 0.238, and 0.033 respectively. Also, a percentage change in human capital investment as share of real output will enhance the growth rate of real GDP in the economy by a value of 0.275.

The t-statistic results reveal that the individual estimated parameters (b_1, b_2, b_3, and b_4) are not statistically significant because their t-calculated is less than t-tabulated (2.04). Therefore, the null hypothesis is accepted for each of the explanatory variables. This implies that they have no significant effect on the growth rate of real GDP.

The test for simultaneous significance of all the estimated parameters, as measured by F-statistic reveals that they are not simultaneously statistically significant, because the F-calculated (0.184) is lesser than the F-tabulated (2.76). Then, the null hypothesis is accepted for all the estimated parameters. This implies that public expenditure has no significant impact on the growth rate of real output in Nigeria.

The co-efficient of determination (R^2) shows that the data which are measured as share of real GDP does not fit the specified model because 2.9% of the total variation in the growth rate of real GDP is explained by variation in private investment, government investment spending, human capital investment and government consumption spending.

The Durbin-Watson test reveals that there is presence of negative serial correlation in the residuals of the model because the d-value (2.088) is greater than two.

4.4 **UNIT ROOT TEST ANALYSIS**

An attempt was made to investigate the time series characteristics of the variables (Ip, Ig, Hg, Cg and rdgp) of the model in this study. A variable is stationary when it has no unit root which is denoted in literature as I(0). A non-stationary variable can have one or more unit roots and denoted as I(d), d is the number of unit roots that the variables possesses and, by implication, the number of unit roots that the variable must be differenced in order to make it stationary. Similarly, if a time series has to be differenced twice (i.e. take the first difference of the first differences) to make it stationary, we call such a time **integrated of order 2.**

	Tau-ADF in level			Tau-ADF in first difference				
Variable	None	Intercept	Trend & Intercept	None	Intercept	Trend & Intercept	Num of Lag	Order of Integration
Ip	6.318438*	5.158303*	3.279577*	0.94995	0.449987	-0.525467	0	**I(2)**
Ig	0.412363	-0.383381	-2.565201	-7.564516	-8.029247	-8.434491	0	**I(1)**
Hg	3.569800*	2.709972	0.771951	-3.777578	-4.414288	-6.026676	0	**I(1)**
Cg	3.972792*	2.705643	0.070912	-3.397149	-4.11163	-5.979626	0	**I(1)**
RGDP	1.222242	-0.42745	-2.881367	-6.152189	-6.811586	-6.751653	0	**I(1)**
1% CV	-2.6453	-3.6752	-4.3082	-2.6486	-3.6852	-4.3226		
5% CV	-1.953	-2.5731	-3.5731	-1.9535	-2.9705	-3.5796		
10% CV	-1.6218	-2.622	-3.2203	-1.6221	-2.6242	-3.2239		

	Tau-ADF in second difference				
Variable	None	Intercept	Trend & Intercept	Num of Lag	Order of Integration
Ip	-6.05287	-6.329094	-7.109719	0	**I(2)**
1% Critical value	-2.6522	-3.6959	-4.3382		
5% Critical value	-1.954	-2.975	-3.5867		
10%Criticalvalue	-1.6223	-2.6265	-3.2279		

Note: * means the time series is explosive

As depicted in Table 1, all the variables are stationary at the first difference for each of the forms of estimation (i.e. none, intercept, and both trend and intercept), excluding private investment which is stationary at second difference for all the three forms of a random walk model. This implies government investment spending (I_g), human capital investment (H_g), government consumption spending (C_g) and real GDP (rgdp) are integrated of order one i.e. **I(1).** But, the time series for private investment (I_p) is integrated of order two i.e**. I(2).**

4.5 COINTERATION TEST: LONG-RUN ANALYSIS

UNIT ROOT TEST FOR RESIDUAL FROM THE ESTIMATED REGRESSION AT LEVEL

We have assumed that all the variables are of the same order of integration i.e. I(2), we

then run an OLS regression of the variables on levels and test for cointegration by testing that the residual is I(1). This is the long run dynamic.

The unit root test for the residual is carried out as follows:

The specified model is

$$Y = b_0 + b_1 I_p + b_2 I_g + b_3 H_g + b_4 C_g + u$$

The residual series is generated from the estimated model as shown below:

$$Y = 195248.5 + 0.924 I_p + 0.134 I_g - 1.474 H_g + 0.306 C_g$$
$$U_t = Y - (195248.5 + 0.924 I_p + 0.134 I_g - 1.474 H_g + 0.306 C_g)$$

The ADF is used to test whether the residual is stationary or non-stationary. Since the estimated U_t are based on the estimated cointegrating parameters b_1, b_2, b_3 and b_4, the ADF critical significance values are not quite appropriate. **Engle and Granger** have calculated these values. Therefore, the ADF test in the present context is known as **Augmented Engle-Granger (AEG)** test. The result from the analysis revealed that the residual (U) is stationary at 5% and 10% critical level since the *tau* value -2.170693 is more negative than the critical values, the null hypothesis of no cointegration is rejected. In conclusion, the residuals from the regression of RGDP on I_p, I_g, H_g, and C_g as specified below

$$Y = b_0 + b_1 I_p + b_2 I_g + b_3 H_g + b_4 C_g + u$$

are integrated of order zero i.e. I(0); that is , they are stationary.

Hence,

$$Y = 195248.5 + 0.924 I_p + 0.134 I_g - 1.474 H_g + 0.306 C_g$$

is a **cointegrating regression** and this regression is not spurious, even though individually the incorporated variables in the model are non-stationary at levels but all are stationary at first difference excluding private investment that is stationary at second difference.

Therefore,

$$Y = 195248.5 + 0.924 I_p + 0.134 I_g - 1.474 H_g + 0.306 C_g$$

shows the **static** or **long-run** function of the relationship between public expenditure and economic growth in Nigeria.

4.6 ERROR CORRECTION MECHANISM (ECM): SHORT-RUN ANALYSIS

We just showed that RGDP, I_p, I_g, H_g, and C_g are cointegrated at 5% and 10% critical levels; that is, there is long-run relationship among them. In the short run there may be disequilibrium in which the

$$U_t = Y - (95248.5 + 0.924 I_p + 0.134 I_g - 1.474 H_g + 0.306 C_g)$$

is the “equilibrium error.” Therefore, the error term is used to show the short run behaviour of Real GDP to its long-run values.

We specify ECM equation for this study as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta I_{p(t)} + \alpha_2 \Delta I_{g(t)} + \alpha_3 \Delta H_{g(t)} + \alpha_4 \Delta C_{g(t)} + \alpha_5 u_{t-1} + \varepsilon_t$$

where Δ denotes the first difference operator, ε_t is a random error term, and $u_{t-1} = (Y - b_0 - b_1 I_{p(t-1)} - b_2 I_{g(t-1)} - b_3 H_{g(t-1)} - b_4 C_{g(t-1)})$, that is, the one-period lagged value of the error from the cointegrating regression.

The ECM equation above states that ΔRGDP depends on change in the explanatory variables and also on equilibrium error term that determines the short run behaviour of the model.

The ECM equation is estimated through the use of **SPSS 15.0** and the result extracted from the SPSS Output is given as:

Short run Regression Analysis: ECM

The estimated regression equation is

$$\Delta Y_t = 0.004 + 0.924 \Delta I_{p(t)} + 0.134 \Delta I_{g(t)} - 1.474 \Delta H_{g(t)} + 0.306 \Delta C_{g(t)} + 1.000 u_{t-1}$$

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.004	.096		.044	.965
	LAG.PRINVT	.924	.000	.565	284202.8	.000
	LAG.GOVINV	.134	.000	.209	130423.5	.000
	LAG.HUMINV	-1.474	.000	-.633	-312119	.000
	LAG.GOVCON	.306	.000	.383	243601.9	.000
	LAG.U	1.000	.000	1.208	709111.6	.000

a. Dependent Variable: LAG.GDP

Since u_{t-1} is positive (i.e., RGDP is above its equilibrium value), $\alpha_5 u_{t-1}$ will need to negative which will cause $\Delta RGDP_t$ to be negative. Therefore, leading $RGDP_t$ to fall in period t. Thus, the absolute value of α_5 (1.000) decides how quickly the equilibrium is restored i.e. u_{t-1} is the mechanism that adjusts to the long run equilibrium by a unit of any distortion that may occur in the short run.

The estimated ECM equation above shows that the short run changes in I_p, I_g and C_g have positive and significant impact on the short run changes in RGDP. Likewise, the short run

changes in H_g have negative and significant impact on the short run changes in RGDP. Therefore, the estimated parameters $\alpha_1, \alpha_2, \alpha_3,$ and α_4 are the short run marginal effect on Real GDP (*Y*).

Section V

Conclusion and Recommendation

5.1 Summary of Findings

The empirical analysis of the study follows the model of Ram (1986). Three variants of Ram (1986) model were developed and estimated, using the statistical package for social science (SPSS) version 15.0.

The first model was estimated based on the absolute values of the variables incorporated in the model. The result showed that private investment, government investment spending and consumption spending have positive but insignificant effect on economic growth in Nigeria during the review period. Also, human capital investment was found to have negative and insignificant effect on real output. Therefore, the null hypothesis is accepted which implies that government spending has no significant effect on real gross domestic product.

The second variant of Ram (1986) model was developed because of the insignificant nature of the estimated parameters of the first model and also because of the non-conformity of some parameters to theoretical expectation. The estimated model revealed that private investment and government investment spending as share of real output have negative and insignificant effect on lagged real GDP. Also, human capital investment and government consumption spending were found to have positive but insignificant impact on first differenced of real GDP at period t. Therefore, the null hypothesis was accepted, which implies there is no significant contribution of government expenditure as share of real output on economic growth in Nigeria.

The third variant of Ram (1986) model was developed due to the unsatisfactory result of the first and second models. The estimated model showed that only human capital investment as share of real output has positive but insignificant effect on the growth rate of real GDP during the review period. While, others were found to have negative and insignificant effect on the growth rate of real GDP. Therefore, the third model was concluded to be spurious because the estimated parameters were simultaneously insignificant and the computed data does not really fit the model as a result of the 2.9% of the total variation in the growth rate of real GDP that is explained by the explanatory variables incorporated in the model.

We found that Real GDP, private investment, government investment spending, government consumption spending and human capital investment are cointegrated i.e. there exist long run relationship between government expenditure and economic growth in Nigeria. The Error Correction Mechanism (ECM) is used to model the short run analysis and the result shows that for any distortion in the short run the error term restore the relationship back to its

equilibrium by a unit.

A plausible explanation for the results is that our time series is relatively short and the quality of the data is less than ideal. This may be adduced to misappropriation of public funds at all levels that is meant for execution of capital projects. Even though, most of the capital projects are over estimated based on cost of execution and often abandoned before completion.

Our econometric evidence is also in line with the findings of Josaphat et al. (2000). They used time series data on Tanzania for 31-year period (1965-1996). They found Real GDP, Private investment, Human capital investment, Government investment and consumption spending to be non-stationary at levels and the null hypothesis for no cointegration is rejected. Also, Private and Public investments were found to have insignificant impact on growth.

From this research study, it can be concluded that government expenditure and private investment have no significant influence on economic growth in Nigeria based on the research analysis. It also reveals that Real GDP, private investment, human capital investment, government investment and consumption spending have not maintained a uniform pattern since 1977 to 2006 as a result of *persistent random shock* effect on the time series. Therefore, the Federal Government expenditure has not shown any considerable structural shift over the review period. The results also showed that the rate of government expenditure to real GDP has been rising since the Structural Adjustment Programme (SAP) without significant contribution towards economic growth in Nigeria.

5.2 Policy Recommendations

For private investment and various components of government expenditure like human capital investment, government consumption and investment spending to have significant impact on economic growth, the following policy options are recommended:

1. Government should monitor the contract awarding process of capital projects closely, to prevent against over estimation of execution cost. This will bring about significant impact of public investment spending on economic growth.
2. There should be effective channeling of public fund to productive activities, which will have a significant impact on economic growth.
3. There should be joint partnership between the government and the private sector in providing essential infrastructural services that will promote economic growth and development.
4. The government consumption spending should be well coordinated by all arms of government to prevent “crowd out” effect on government investment.
5. There should be high degree of transparency and accountability on government spending at various sectors of the economy in order to prevent channeling of public funds to private accounts of government officials.

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Appendix

YEAR	RGDP	PRI.INVT	GOV.INVT	HUM.INVT	GOV.COM
1977	106,488.00	2531.4	5004.6	962.2	3471.1
1978	100,116.00	2863.2	5200	692.1	2458.9
1979	108,955.00	3153.1	4219.5	1085.8	2730.8
1980	117,334.00	3620.1	10163.4	1852.3	4052.7
1981	98,594.10	3757.9	6567	1233	4183.2
1982	93,594.00	5382.8	6417.2	1421.1	4083.2
1983	83,519.60	5949.5	4885.7	1247	4514.5
1984	66,462.20	6418.3	4100.1	1051.4	4972.1
1985	71,368.10	6804	5464.7	1074.1	6739
1986	257,784.40	9313.6	8526.8	1455.2	6764.9
1987	255,997.00	9993.6	6372.5	889.9	14964.9
1988	275,409.60	11339.2	8340.1	1527.3	18347.1
1989	295,090.80	10899.6	15034.1	2394.4	23947.7
1990	472,648.70	10436.1	24048.6	2952.4	33855.9
1991	328,644.50	12243.5	28340.9	2311.2	36359
1992	337,288.60	20512.7	39763.3	3085.8	51558.5
1993	342,540.50	66787	54501.8	10683.6	73375.9
1994	345,228.50	70714.6	70918.3	13311.6	75974
1995	352,646.20	119391.6	121138.3	17789.6	120142.7
1996	367,218.10	122600.9	158678.3	20203.3	108963.3
1997	377,830.80	128331.9	269651.7	21747	143248.3
1998	388,468.10	152410.9	309015.6	38705.6	159309
1999	393,107.20	154190.4	498037.6	47743.8	417822
2000	412,332.00	157508.6	239450.9	85749.9	405770.4
2001	431,783.10	161441.6	438696.5	104396.1	514921
2002	451,785.60	166631.6	321378.1	172626.4	716533.1
2003	495,007.10	178478.6	241688.6	119121.6	886257.7
2004	527,576.00	249220.6	351259.9	153555.3	927146
2005	561,931.40	324656.7	519510	191720.9	1081103
2006	595,821.61	481239.1	552385.8	270803.7	1093230

Source: CBN Statistical Bulletin of several issues.
NBS Annual Abstract of Statistic