

Short Run and Long Run Analyses of Government Capital Expenditure on the Nigerian Economic Growth: 2007 – 2022

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Abstract

This study empirically examined the short run and long run analyses of government capital expenditure on the Nigerian economic growth for the period of the years, 2007 to 2022. The diagnostic test and the inferential analyses for the data were performed, using the single time series econometric techniques in consideration of *ex-post facto* research design. The stand-in variables were capital expenditure and gross domestic product, as data for the analyses were obtained from the statistical bulletin of the Central Bank of Nigeria. Based on the data analysed, the study revealed evidence of positive but insignificant statistical relationship between the Nigerian gross domestic product and capital expenditures, during the short run and long run bases. This inferred that the changes in economic growth of Nigeria, during the considered period were due to the extent of capital expenditures by the Nigerian government. The study strongly advocates for government at all levels, to focus more on capital expenditures, in order to stimulate economic growth and as well, government at all levels should as a matter of consideration, rotate the capital seat of power amongst the states, cities and local wards in the country to enhance the gradual spread of development across the country.

Keywords: Capital expenditures, economic growth, long run, Nigerian, short run.

INTRODUCTION

Government expenditures are basically of capital expenditures, which are for infrastructural development and recurrent expenditures, meant for salaries, wages and administrative activities. Basically, capital expenditures are total sum of budgeted funds, which are invested by the government for infrastructural development to propel economic growth. The sources of government funds for capital expenditures are based on internal (taxes, loans, and so on) and external (exports, foreign aid, loans, and so on) sources of revenue. Foreign loans that are

obtained to finance capital projects are referred to as reproductive debt, such as loans for building health centres, for building educational facilities, for roads and bridges constructions, and so on. On the other hand, loans obtained to finance non-capital expenditures are dead weight debts which are liability inclined. The reasons for government borrowings from foreign sources had traditionally been to address the shortfall in domestic resources, response for unforeseen circumstances, and to address market deficiencies in providing the necessary goods and services to hasten-up the growth of the economy. Consequently, the increase in gross domestic product of a nation, which is based on the measurement of the national income is referred to as economic growth (Adepoju, Salau & Obayelu, 2007; Ogenyi, 2012; Sulaiman & Azeez, 2012; Danladi, Akomolafe, Olarinde, & Anyadiegwu, 2015).

The search for literature as considered by this study on capital expenditures and economic growth in Nigeria had resulted in various competing viewpoints in literature. Some of these authors, such as Nurudeen and Usman (2010), revealed a negative and significant influence of capital expenditure on the Nigerian economy; Muritala and Taiwo (2011) found that, the growth rate of real GDP was positively and significantly influenced by capital expenditure; Nworji, Okwu, Obiwuru and Nworji (2012) revealed that capital expenditure on economic services, negatively and insignificantly affect the growth of the economy; Nwaeze, Njoku and Nwaeze (2014) indicate that, capital expenditure had an insignificantly positive impact on the growth of the Nigerian economy; Danladi, Akomolafe, Olarinde and Anyadiegwu (2015), portrayed positive and insignificant influence of total capital expenditure on the Nigeria economy; Usman and Agbede (2015), revealed long run positive and significant linear connection amid capital expenditure and economic growth, while a short run analysis showed negative and significant linear relationship amid capital expenditure and economic growth; Gukat and Ogboru (2017), revealed positive and insignificant influence of capital expenditure on the Nigerian economic growth; Saidu and Ibrahim (2019) results, indicated negative and significant relationship between capital expenditure and economic growth; and Aluthge, Jibir and Abdu (2021) asserted that, capital expenditure has positive and significant impact on economic growth at both the short term and long term bases. In view of the foregoing, the results of these literature showcased that, the growth of the Nigerian economy as influenced by government capital expenditures have been divergent in viewpoints in terms of results obtained. Consequently, this study sought to empirically examine the long run and short run equilibrium position of government capital expenditure on the Nigerian economic growth. This research hypothesized no short run and long run equilibrium connection amid government capital expenditure and the growth of the Nigerian economy.

LITERATURE REVIEW

Government Capital Expenditures

Government capital expenditures refer to the budgeted amount of money that are used by the government for financing infrastructural development, to carry out its functions and responsibilities, for the delivery of public goods and services, social welfare, economy management, and so on (Udo, Ekere & Inibeghe, 2022). Capital expenditures are basically long term infrastructure such as roads and bridges, airports, drainage systems, seaports, dams,

electricity, education, health, plants and machineries, and so on (Danaladi *et al.*, 2015; Udo, Ekere, & Inibeghe, 2022). Abdullah (2000) opined that the increase in a nation's budgeted capital expenditures are expected to enhance the productive base of the economy, leading to economic growth. Besides, Usman and Agbede (2016) refer to government capital expenditures as the means of accelerating growth and development of the economy, to attain economic industrialization, and to improve Citizens' living standard of a country. Government capital expenditures play fundamental roles in the performance of nearly all aspects of a country's economic growth and development, assisting both the developed and developing countries to improve income distribution, direct the allocation of resources in desired areas, and influence the composition of national income through public capital expenditures (Aluthge, Jibir & Abdu, 2021). Similarly, Bonmwa and Ishmael (2017) opined that, capital expenditures are investments, which exert a multiplier effects on the economy, thereby resulting to public benefits. Modebe, Okafor, Onwumere and Ibe (2012) categorically stated that, government capital expenditures are basically in two functional areas, such as economic services expenditures, which are investments in communication, agricultural facilities, buildings, transportation facilities, and so on; and community services expenditures, which encompasses educational facilities, health facilities, and so on.

Economic Growth as Gross Domestic Product

Economic growth is considered as the steaming engine that generate long term rise in the overall living standard of a country, which justifies the reasons why every economy aspires to achieve increase in its annual economic growth. Economic growth over time portrays the increase in the market value of goods and services produced. Conventionally, economic growth is measured as the per cent rate of increase in real gross domestic product, in which growth is mainly concerned with quantitative and measurable attributes. Bonmwa and Ishmael (2017) refer to economic growth as the long term rise in a country's capacity, to persistently make available increase in varied economic goods to its citizens, for which the growth capacity is based on technological and ideological advancement. Besides, economic growth denotes the potential rise in gross domestic product, which differs in terms of the measurement of the national product. However, Ogundipe and Oluwatobi (2010) define economic growth as the steady progression by which the productive capacity of an economy is increased over time to bring about the rising level of national output and income. Basically, the sustenance of economic growth is needed by developing economy to break the circle of poverty. Maingi (2017) opined that, economic growth is mainly caused by factors such as consumption expenditure, enhanced political stability, increased rates in school enrolment, and so on, which are associated with higher rate of investment, either by the private or government sectors. Odubuasi, Ifurueze, and Ezeabasili (2020) viewed economic growth as the rise in a nation's productive capacity in goods and services, over a specific period of time. The growth rate of a country's economy can be ascertained through the gross domestic product (GDP), which account for the productive capacity and output of a country.

Review of Theoretical Hypothesis

This study anchors on the Keynesian economic theory, as propounded by John Maynard Keynes in 1936. The theory highlights the idea that, fiscal policy can effectively manage economic activities due to its direct influence on gross domestic product. It surmises that, government expenditures are key instrument of fiscal policy and can be employed to stimulate or restrain economic activities within a nation. The theory stipulates that, in times of economic distress, the need to increase government expenditures will be necessary to boost aggregate demand, to encourage producers, and as well create more employment. In addition, increasing government capital expenditures can be adopted during recessions to stimulate the economy, and subsequently to foster economic resurgence. However, reducing the amount of government capital spending, which could subsequently decrease money supply in the economy would control inflation (Keynes, 1936).

Review of Related Empirical Studies

Muritala and Taiwo (2012) empirically examined the effects of government spending on the growth rate of real GDP in Nigeria for the period of the years, 1970 to 2008. The ordinary least square technique was adopted as the econometric tool for data analyses on recurrent expenditure, capital expenditure and real gross domestic product, which consequently established a long term positive relationship with capital expenditure. Nwaeze, Njoku and Nwaeze (2014) sought to examine the nature and impact of federal government expenditure on the Nigerian economic growth for the period of the years, 1992 to 2011. The data for total capital expenditure, total recurrent expenditure and gross domestic product as a stand-in variable for economic growth were analyzed, using the ordinary least square technique. Consequently, positive and insignificant effect was observed on economic growth as a result of government expenditures. Danladi, Akomolafe, Olarinde and Anyadiegwu (2015) applied the Johansen co-integration and the Granger causality test to verify the link amid economic growth and government spending for the period of the years, 1980 to 2013. The empirical results showed significant positive correlation between capital spending, recurrent spending and the Nigerian economic growth. Furthermore, capital spending and recurrent spending granger causes the growth rate in the Nigerian economy. Nworji, Okwu, Obiwuru and Nworji (2015) studied the impact of public spending on the Nigerian economy for the period of the years, 1970 to 2009. The analytical econometric tool adopted was the ordinary least square multiple regression. The stand-in variables were capital expenditure, recurrent expenditure and the gross domestic product. The outcome of the research, portrayed insignificant and negative relationship between capital spending on economic services and economic growth. While capital spending on transfers were insignificant with positive consequences on the Nigerian economic growth. Ebong, Ogwumike, Udongaro and Ayodele (2016) assessed the impact of government capital expenditures on economic growth in Nigeria during the period of the years, 1970 to 2012. The variables adopted for the study were agricultural capital expenditure, educational capital expenditure, capital expenditure on health, infrastructural capital expenditure and gross domestic product. The econometric tools employed for the study were Johansen co-integration technique, the error correction model and the ordinary least square. The results claimed that Agricultural capital expenditure, insignificantly influenced the growth

of the economy in short run, as well as in long run bases. Furthermore, capital spending on education, positively and significantly influenced the growth rate of the economy in short term and long term bases. Additionally, capital spending on health in the short and long run bases, negatively and insignificantly influenced the Nigeria economic growth. However, infrastructural capital expenditure in the short and long run bases, significantly and positively affect economic growth. Usman and Agbede (2016) looked at the correlation amid the growth rate of the Nigerian economy and government spending from 1970 to 2010, using the error correction model and the Johansen co-integration technique. The results for the long run analyses showed evidence of significant positive correlation amid capital spending and economic growth; While significant negative relationship exist between capital spending economic growth in the short run. Bonmwa and Ishmael (2017) considered the impact of government expenditures on the Nigerian economic growth for the period of the years, 1981 to 2016. The stand-in variables were capital expenditure, recurrent expenditure and real gross domestic product, which were tested using separate models. The Johansen co-integration technique, as well as the error correction model were adopted for empirical analyses of the data. The results for model 1 indicated that the coefficients of social and economic services were negative, while administration was positive and significant. Model 2 results portrayed negative and insignificant coefficients for administration and social services, while economic services were positively insignificant. However, the research inferred that government spending during the period of the study did not explain any meaningful economic growth. Saidu and Ibrahim (2019) empirically considered the effect of capital expenditure on the growth of the Nigerian economy for the period of the years, 1981 to 2017, adopting the Engel-Granger 2-step error correction technique. The variables considered were inflation rate, capital spending, exchange rate and gross domestic product. The results portrayed that economic growth was adversely influenced by capital expenditure, due to the gap amid the payment and utilization of funds. Odubuasi, Ifurueze and Ezeabasili (2020) evaluated the effect of government expenditures on economic growth in Nigeria, using time series data of 15 years for the period of the years, 2004 to 2018. The stand-in variables were capital expenditure, recurrent expenditure and real gross domestic product. The econometric tools adopted for analyses were the error correction model, autoregressive distributed lagged technique, the Johansen co-integration procedure and the Granger causality test. The study revealed that government capital expenditures on education have negative and insignificant effect on economic growth, while government capital expenditure on highway has positive and significant effect on economic growth in Nigeria. Aluthge, Jibir, and Abdu (2021) investigated the period of the years, 1970 to 2019, considering the significant change on economic growth as a result of government spending in Nigeria. The stand-in variables for government expenditures were capital spending and recurrent spending, while gross domestic product stood-in for economic growth, for which the autoregressive distributed lag model was adopted for analyses. In ensuring robustness in the test results, structural breaks were accounted for in the unit root test as well as the co-integration analyses. The outcomes of the analyses for short term and long term bases showed positive and meaningful influence of capital expenditure on economic growth.

METHODOLOGY

The *ex-post facto* research design attempts to verify the cause and to effect the relationship amid the dependent and independent variables for this study, applying the single time series econometric technique using the e-views software for diagnostic and inferential tests for analyses. The tests executed were the descriptive statistics, the augmented Dickey-Fuller unit root test, the Johansen co-integration test, the error correction model and the ordinary least square test. The descriptive statistic explains the basic features of the data, which is a test for data normality; The augmented Dickey Fuller unit root, helps to ascertain the stationarity of the data set; The Johansen co-integration technique, helps to ascertain the long run equilibrium correlation; While the error correction model examines the short run dynamic; As the ordinary least square examines the relationship between the data of the variables. Data for the variables were obtained from the Central Bank of Nigeria statistical bulletin, covering 16 years period from 2007 to 2022. This study considered the year 2007 as its base year, as it marks the beginning of the global financial crisis (Liang, 2012). The test of hypothesis was at 5% level of significance using p-value statistic, which denotes to reject the null hypothesis if $p < 0.05$, otherwise accept the null hypothesis if $p > 0.05$.

Specification of Empirical Model

Model specification illustrates the mathematical and economic relationship that exist between the dependent (GDP) and the independent variable (CAPEXP). The linear regression model to test the Null hypothesis was adopted from the work of Izekor and Aigbovo (2018), as specified thus; $LFORES_t = \beta_0 + \beta_1 LEXRATE_t + e_t$. Hence, our study is specified as:

$$GDP_t = F(CapExp)_t \dots\dots\dots 1$$

The model was converted into a log-linear model to achieve several objectives, such as to stabilize data variance, to decrease coefficient values, and to eliminate spurious relationships and autocorrelation (Gujarati, 2003). The specified econometric model in log linear form is as shown in equation 2:

$$LGDP = \beta_0 + \beta_1 LCapExp + U_t \dots\dots\dots 2$$

Where:

β_0 = constant coefficient

β_1 = coefficient of the independent variables.

$LGDP_t$ = log of gross domestic product as a stand-in for the Nigerian economic growth

$LCAPEXP_t$ = log of capital expenditure

U_t = error term with zero mean indicates adjustment on $LGDP_t$

The *a-priori* anticipation for the coefficients in the models is $\beta_1 > 0$

DATA ANALYSES AND INTERPRETATION OF RESULTS

Table 1: Test Results for Descriptive Statistics

	GDP	C	CAPEXP
Mean	98862.35	1.000000	1337.394
Median	91594.29	1.000000	1034.650
Maximum	199336.0	1.000000	3133.800
Minimum	34318.67	1.000000	653.6000
Std. Dev.	49600.50	0.000000	727.7241
Skewness	0.503084	NA	1.290688
Kurtosis	2.253006	NA	3.516004
Jarque-Bera	1.046916	NA	4.619841
Probability	0.592468	NA	0.099269
Sum	1581798.	16.00000	21398.30
Sum Sq. Dev.	3.69E+10	0.000000	7943735.
Observations	16	16	16

Source: Authors' Computation (2024), by means of Eviews7 software

The probability values of 0.592468 and 0.099269 represent p-values > 0.05, which specify insignificant values at 5% level, with corresponding Jarque-Bera statistic of 1.046916 and 4.619841 respectively for GDP and CAPEXP in Table 1. The outcomes of the probability values for the corresponding Jarque-Bera statistic ascertain normality in data distribution.

Table 2: Augmented Dickey Fuller Unit Root Test Result for Stationarity

Variables	At level	Prob.	At first difference	Prob.	Order of integration	Remark
LGDP	-1.333847	0.5850	-3.324798	0.0335	I(1)	stationary
LCAPEXP	-0.483699	0.8692	-4.322320	0.0057	I(1)	stationary

Source: Authors' computation (2024), by means of Eviews7 software

The variables at first difference shows stationarity with probability values, less than 0.05 level of significance in Table 2, as well indicating at first difference, order of integration, I(1). Furthermore, the variables at 5% level of significance are devoid of unit root problem. Therefore, the Johansen co-integration test can be regressed to establish the long run correlation amid LCAPEXP and LGDP.

Table 3: Johansen Co-integration Test Results for LCAPEXP and LGDP

Hypothesized No. of CE(s)	Eigenvalue	Trace/ Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.309220	5.179075	3.841466	0.0229

Trace and Max-eigenvalue tests, indicating 1 cointegrating eqn(s) at the 0.05 level, which signifies the hypothesis rejection

Source: Authors' computation (2024), by means of Eviews7 software

One co-integrating equation was portrayed by the Trace and Max-Eigen statistic test, with probability value less than 5% in Table 3. This outcome showed that there is co-integration between LCAPEXP and LGDP, which indicates a long-run equilibrium connection amid the variables.

Table 4: Result of the Error Correction Model (ECM)

Dependent Variable: DLGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.113610	0.011075	10.25812	0.0000
DLCAPEXP	0.037275	0.039099	0.953328	0.3592
ECM(-1)	-0.066079	0.029984	-2.203806	0.0478
R-squared	0.289406	Mean dependent var		0.117287
Adjusted R-squared	0.170974	S.D. dependent var		0.044372
S.E. of regression	0.040401	Akaike info criterion		-3.403077
Sum squared resid	0.019587	Schwarz criterion		-3.261467
Log likelihood	28.52308	Hannan-Quinn criter.		-3.404585
F-statistic	2.443640	Durbin-Watson stat		2.465873
Prob(F-statistic)	0.128745			

Source: Authors' Computation (2024), by means of Eviews7 software

The ECM outcomes in Table 4 conform with the requisite criteria for a short run relationship with a coefficient of less than -1, which is -0.066079 and a significant probability value of 0.0478, less than 5% level of significance. However, the coefficient of -0.066079 indicates that the contemporaneous adjustment to long run equilibrium after a temporary disequilibrium is about 6%, which portrays that a short-run disequilibrium procedure can be adjusted to a long-run equilibrium. Hence, there is short run equilibrium correlation amid LCAPEXP and LGDP.

Table 5: Ordinary Least Square Result for LGDP and LCAPEXP with Autocorrelation

Dependent Variable: LGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.548310	1.502859	3.691837	0.0024
LCAPEXP	0.822302	0.211693	3.884406	0.0017
R-squared	0.518712	Mean dependent var		11.37398
Adjusted R-squared	0.484334	S.D. dependent var		0.537374
S.E. of regression	0.385888	Akaike info criterion		1.049928
Sum squared resid	2.084731	Schwarz criterion		1.146502
Log likelihood	-6.399423	Hannan-Quinn criter.		1.054873
F-statistic	15.08861	Durbin-Watson stat		0.415724
Prob(F-statistic)	0.001652			

Source: Authors' Computation (2024), by means of Eviews7 software

The ordinary least square outcomes in Table 5 indicate the presence of autocorrelation, such that 0.415724 which represents the Durbin Watson statistic cannot be approximated to 2. This specifies that the results of the ordinary least square are spurious, and it is not proper for conclusive analyses. Consequently, the Cochrane-Orcutt Iterative procedure, AR (1) was adopted to remove the existence of autocorrelation.

Table 6: Ordinary Least Square Result for LGDP and LCAPEXP after Cochrane-Orcutt Iterative Estimation without Autocorrelation

Dependent Variable: LGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.67176	2.701058	5.431856	0.0002
LCAPEXP	0.018979	0.041476	0.457583	0.6554
AR(1)	0.966872	0.024318	39.76021	0.0000
R-squared	0.993006	Mean dependent var		11.43602
Adjusted R-squared	0.991840	S.D. dependent var		0.493380
S.E. of regression	0.044569	Akaike info criterion		-3.206720
Sum squared resid	0.023836	Schwarz criterion		-3.065110
Log likelihood	27.05040	Hannan-Quinn criter.		-3.208228
F-statistic	851.8355	Durbin-Watson stat		2.128590
Prob(F-statistic)	0.000000			
Inverted AR Roots	.97			

Source: Authors' computation (2024), by means of Eviews7 software

The outcome of Cochrane-ortcutt iterative estimation in Table 6 is valid for analyses, based on the nonexistence of autocorrelation with Durbin Watson statistic of 2.128590, which can be rounded up to 2. The endogenous (dependent) variable indicates high logical variation, given that R-squared and the adjusted R-squared are 99.3% and 99.1% respectively, which specify confirmative high variations between the variables, with high explanatory powers. The results of LCAPEXP showed a positive coefficient of 0.018979 and a positive t-statistic of 0.457583, with a probability value of $0.6554 > 0.05$, which conform to our *a-priori* anticipation.

Test of Hypothesis

This research hypothesized that there are no short term and long term equilibrium connection amid government capital expenditure and the Nigerian economic growth. The summary test of hypothesis in Table 7, portrays the coefficient, t-statistic and p-value at 5% level of significance. Basically with the probability value of $0.6554 > 0.05$, the null hypothesis is accepted, while the alternative hypothesis is rejected.

Table 7: Summary result of the hypothesis

Variables	Coefficients	t- statistic	Prob.	Remarks
LCAPEXP	0.018979	0.457583	0.6554	Accept H_0

Source: Extracted from Table 6

Basically, capital expenditure has insignificant relationship with the Nigerian economic growth.

Discussion of Findings

The short term and long term correlation between capital expenditure and the Nigeria gross domestic product were empirically considered by the study. The Johansen co-integration and the error correction results portrayed short run and long run equilibrium connections amid capital spending and the Nigeria gross domestic product. Besides, the ordinary least square Cochrane-ortcutt iterative result showed evidence of positive and insignificant connection between the Nigeria gross domestic product and capital expenditure. This result conforms with the Keynesian economic theory, inferring that government expenditure could be used to stimulate the economy and subsequently foster economic resurgence. The results implied that the changes in economic growth in Nigeria during the period under study were due to the extent of capital expenditures by the Nigerian government. The outcome conforms to the researchers' *a-priori* anticipation, which agrees with the studies of Nwaeze, Njoku and Nwaeze (2014), that obtained positive and insignificant correlation in empirical findings. On the other hand, the study is in disagreement with the studies of Nworji, Okwu, Obiwuru and Nworji (2012), which showed negative but insignificant results in findings, as well as the studies of Aluthge, Jibir, and Abdu (2021), such that the findings revealed positive but significant correlation amid capital expenditure and the Nigeria's gross domestic product.

CONCLUSION AND RECOMMENDATIONS

Capital expenditure shows positive and insignificant correlation with the Nigeria gross domestic product. This infers that the Nigerian government expenditures on capital projects in the last 16 years have not meaningfully improved economic growth in short term and long term bases.

Policy Implications: The outcome of this research inferred that, the persistent low spending by the government on capital projects would hamper economic growth, which would be detrimental to a sustainable performance of the Nigerian economy. The result has important policy implications, in fostering a sustainable economic growth, which implies that the increase in expenditure on capital projects is a necessary condition for promoting a sustainable economy. However, a moderated increase in expenditure on capital projects is pertinent, as the results from the findings indicates that about 99 percent of the variations in gross domestic product have been explained by capital expenditure. This implies that the downward change in capital expenditure would have significant impact on the performance of the Nigerian economy.

Based on the empirical results obtained, this study recommends that:

1. Government at all levels should focus more on expenditures on capital projects, in order to stimulate the economy.
2. Besides, government at all levels should as a matter of consideration, rotate the capital seat of power amongst states, cities and local wards in the country, to enhance the spread of fast development across the country.

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Izekor & Uhunmwangho. Short run and long run analyses of govt capital expenditure ...

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