Capital Expenditure at Disaggregated level and Economic Growth in Nigeria: An Empirical Analysis

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Abstract: *The main objective of this paper is to examine the partial and joint effects of disaggregated capital expenditures on economic growth in Nigeria. The study is perceived on the causal effect between government expenditure and economic growth. Annual time-series data coverage 1981-2013 for capital expenditure on education, health, agriculture and road construction were analyzed using <u>ordinary least square multiple regression model</u> to predict economic growth. The Data were obtained from the Central Bank of Nigeria Statistical Bulletin. <u>Cointegration and VECMs</u> were applied in estimating the data to test the long-run and short-run effect of the variables on the economic growth. <u>Granger-causality</u> tests were conducted to ascertain the cause-effect of the variables. Results indicate there exists long-run positive relationship between economic growth and capital expenditure on education and road; while there is long-run negative relationship between economic growth and capital expenditures on agriculture and health. Results also indicate there is unidirectional causal effect running from economic growth to capital expenditure on agriculture and road construction; while at the same time a unidirectional causal effect runs from capital expenditures on education and health to economic growth. The adjusted R^2 is 33% indicating that greater proportion of the issues in economic growth is not explained by capital expenditure in Nigeria. Recommendation is that government should review its monitoring mechanism to ensure adequate and prudent management of funds.*

Keywords: Capital expenditure, economic growth, multiple regression model and Nigeria.

1. Introduction

The issue of the relationship between government expenditure and economic growth has been discussed extensively. Oyinlola and Akinnibosun (2013) have carefully traced back theoretical foundation of this relationship to the days of such scholars like Wagner (1883) and Keynes (1936). While Wagner (1883) suggests that economic growth leads to government expenditure, Keynes (1936) posited that economic growth is caused by government expenditures. Generally, most governments all over the world embark on public expenditure to stimulate the economy. They believe the economy cannot grow unless with government intervention and government expenditures are instrument for controlling the economy. Scholars have argued that public expenditures on socio-economic and physical infrastructure enhance economic growth. Okoro (2013), for instance, has argued that government expenditure on education and health increases the productivity of labour and by extension increases the growth of national output. Again, expenditures on infrastructure like roads, communications, and power reduce production costs which in turn increase private sector investment and profitability, and by extension enhance economic growth (Okoro, 2013).

Adam Smith in his *Wealth of Nation* posited that government should restrict its spending on defense, maintenance of peace and order and public development work; any other things beyond these are calculated to be unjust and waste. Without government intervention in the provision of infrastructure the economy would be experiencing negative growth. Therefore, government expenditures are vital instruments for stimulating the economic growth of a nation.

Although public expenditure has growth enhancing potential, there are certain government expenditures that are growth retarding. Maku (2000) argues that certain government expenditure items such as transport, electricity, telecommunications, water, health and education can retard economic growth. Case studies indicate that public expenditure drives tend to be financed by borrowing or taxing the citizens. By so doing resources which would have been used for productive purposes are diverted to unproductive sector (unproductive in the sense that government officials tend to misuse the funds). In this way the spending on these items could retard instead of enhancing growth.

Many scholars continue argue that spending on social and community services do not contribute to the growth of the economy; they favour spending on economic services. Again, there are diverse views regarding the effect of capital expenditure on economic services on economic growth, and capital expenditure on social and community services on economic growth. Some scholars are in favour of capital expenditure on economic services drives' tendency to enhance economic growth, while some others favour capital expenditure on social and community services drives as growth-booster of the economy. Many government policy makers believe that social and community services, especially human capital in the form of education and health, contribute a lot to economic development and growth. Consequently, for many countries in which this is perceived, there has been increased investment on human capital.

Despite the huge investment, however, quality of education and health care services are far below the world standard in many of these countries, especially developing countries.

The specific objective is therefore to investigate the extent to which the level and composition of capital expenditure affect economic growth in Nigeria. The following research questions are posited:-

1. To what extend does capital expenditure affect economic growth?
2. How does the composition of capital expenditure affect economic growth?
3. What is the causal effect between the composition of capital expenditure and economic growth?

The following hypotheses will be tested to validate our findings, namely;
1. Capital expenditure on agriculture does not have significant positive effect on economic growth in Nigeria.
2. Capital expenditure on road does not have significant positive effect on economic growth in Nigeria.
3. Capital expenditure on education does not have significant positive effect on economic growth in Nigeria.
4. Capital expenditure on health does not have significant positive effect on economic growth in Nigeria.

This study will be of immense benefit to mostly the government policy makers in formulating and implementing fiscal policy allocation. It can also help to channel funds to areas that mostly contribute to economic growth, and in investigating the areas where lope-holes are found. The study will equally be valuable as research material to researchers. The rest of the study is organized as follows: Section 2: literature review; Section 3: Research Method Section; 4: Analysis of data and Results; Section 5: Conclusions and Recommendations.

2. Literature Review

Conceptual Framework

For the purpose of measurement, economic growth of a nation may be defined as a sustained increase in its population and product per capita (Kuznets, 1955 in Shearer, no date). In a limited sense, economic growth is an increase of the national income per capita which involves the analysis (in quantitative terms) of the process that generates economic, and social, quantitative and qualitative changes that cause the national economy to cumulatively and durably increase the real national product (Haller, 2012). In a wider sense, it involves the increase of gross domestic product, gross national product and national income, and therefore, of the national wealth including the production capacity expressed in both absolute and relative size per capita, encompassing also the structural modifications of the economy.

Economic growth is the process of increasing the size of national economic and macro-economic indications, especially the GDP per capita, in an ascendant but not necessarily linear direction with positive effect on the economic-social sector. Economic growth is obtained by an efficient use of the available resources and by increasing the capacity of production of a country. It also facilitates the redistribution of incomes between population and society.

Public expenditure is spending made by the government of a country on collective needs and wants such as pension, provision of infrastructure, etc. Before 19th century, public spending was limited as laissez-faire philosophies believed that money that is left in the private hands could bring better returns. About the 20th century, Maynard Keynes argued in favour of the role of public expenditure in determining levels of income and distribution in the economy. Since then government expenditure has shown an increasing trend. Both the level and composition of government expenditure are important determinants of economic growth (Musaba, Chilonda and Matchaya (2013).

Theoretical and Empirical Literature

Among researchers and policy makers as well a widespread controversy abounds about the effect of public expenditure on economic growth. However, it is generally believed that government spending accelerates economic growth. There are certain projects and programmes which are better left for government to finance. Left in the hands of private sector financing such projects and programmes would be abandoned or done haphazardly. Such projects include provision of roads, transport, telecommunication, education, health, defense and maintenance of law and order. Some policy makers strongly believe that public expenditure accelerates economic growth, while some others suggest that public spending retards economic growth.

Theoretically, the relationship between public expenditure and economic growth can be traced back to early writers such as Wagner (1883), Keynes (1936) and Musgrave (1969). Wagner (1883) belief is that public expenditure is a consequence of economic growth. Abu Al-Foul and Al-Khazali (2003) utilized Jordanian data to test whether Wagner's law applies in Jordan. Tools applied are cointegration and vector autoregressive model. It was found that economic growth leads to growth in government expenditure, an indication that Wagner's law applies in Jordan. Wagner's law is that government intervenes in the economy by spending to meet the needs of the growing economy. However, the other school of thought (Keynes, 1936) believes that for the economy to grow there is need for government to spend and such economic growth is a consequence of public expenditure.

However, many writers agree that public spending is an important tool that government uses not only to control but also boost the economy. Even though government expenditure has growth-enhancing potential there are certain public expenditures that are growth-retarding. For instance, Maku (2000) has maintained that certain government expenditure items such as transport, electricity, telecommunications, water, health and education can retard growth. However, whether public spending enhances or retards economic growth, the issue is that there exists some sort of relationship between government expenditure and economic growth as are revealed by empirical literature.

Nworji, Okwu, Obiwuru and Nworji (2012) analyzed the effects of public expenditure on economic growth in Nigeria using ordinary least square multiple regression model. Results of the findings indicated that capital and recurrent expenditures have negative effect on economic services; while capital and recurrent expenditures on social and community services have positive effect on economic growth. The intercept is negative, suggesting that in absence of government expenditure the economy would be experiencing a negative growth. At 5 percent level of significance, government expenditure on economic services has negative and insignificant effect on economic growth. Capital expenditures on economic services have negative and insignificant effect on economic growth. Capital expenditure on transfer has positive but insignificant effect on economic growth. However, capital expenditure on social and community services and recurrent expenditures on social and community services and transfers have significant effect on economic growth.

Akpan (2005) examined relationship between government expenditure and economic growth in Nigeria. The results indicated that there was no significant relationship between economic growth and components of government expenditure. Okoro (2013) examined the impact of government spending on economic growth of Nigeria between 1980 and 2011. Ordinary least square multiple regression analysis was adopted. Results indicated that government expenditure has long-run effect on economic growth. There is uni-direction causal effect running from government expenditure to economic growth. This result confirms Keynes theory that GDP is a function of government expenditure; that is government expenditure leads to economic growth.

Al-Shatti (2014) examined the impact of public expenditure on economic growth in Jordan between 1993 and 2013. The tool of analysis was ordinary least square multiple regression model. The study examined the contribution of each one of the capital and recurrent expenditure on education, health, economic affairs and housing and community utilities in the total expenditure; and then identifies the impact each one of them has on economic growth in Jordan. Results indicated that there is a statistically significant impact of recurrent expenditure on health, economic affairs and housing and community utilities and capital expenditure on health and economic affairs on economic growth. There is no statistical significant impact of recurrent expenditure on education and of the capital expenditure on education, housing and community facilities on economic growth in Jordan. The joint effect of these components of (capital and current) public expenditure on economic growth is statistically significant as indicated by the computed F-statistics and its probability. The study therefore submits that there is an impact of public expenditure on economic growth.

Al-Shatti (2014) exploit on the effect of certain disaggregated government expenditure on economic growth in Jordan disclosed certain empirical literatures which showed different or consistent results with one another. The studies include Abu Al-Foul and Al-Khazali (2008) Bose, et al (2003); Fanand, et al (2004); Kuhar, et al (2005); Loizides and Vamvoukas (2005); Vuale and Suruga (2005); Abu

Tayeh (2009); Alexiou (2009); Al-Zeaud (2009); Boustan (2009); Abu and Abdullah (2010); Nademi and Zoberi (2010); Olopade and Olopade (2010); Abu Tayeh and Mustafa (2011); Dauda (2011); Yildirim, et al (2011); Nworji, et al (2012); Olabisi (2012).

Bose, et al (2003) analyzed the relationship between government expenditure and economic growth in 30 developing countries between 1970s and 1980s. Results of the study indicated that capital expenditure is positively and significantly correlated with economic growth, while current expenditure is insignificant. Again, total expenditures in education are significantly correlated with economic growth. Fanand, et al (2004) in Al-Shatti (2014) utilized data from Uganda to test the effect of selected sectoral spending on agricultural growth (proxy for economic growth). Results indicated that spending on agricultural research and extension substantially improves agricultural output; spending on rural roads had substantial effect on rural poverty reduction; spending on education also has effect on agricultural production; but spending on health did not have significant effect on output nor reduction in rural poverty.

Boustan (2009) in Al-Shatti (2014) revealed that spending on education has effect on economic growth in the US. Abu and Abdullah (2010) in Al-Shatti (2014) using data from Nigeria investigated the relationship between government expenditure and economic growth for the period 1970-2008. Results showed that total capital expenditure on education have negative effect on economic growth. However, government spending on transport, communication and health has positive effect on economic growth. Dauda (2011) utilized Nigerian data to analyze the effect of government expenditure on education on schooling output (proxy for economic growth). It was found that spending on education has positive effect on economic growth. Yildirim, et al (2011) in Al-Shatti (2014) used data from Turkey to investigate the effect of government expenditure on economic growth for the period 1973-2009. The tool used in the analysis was Tota and Yamamoto (1995) causal test to examine the causal relationship between public education expenditure and economic growth. The results showed that there is unidirectional casual relationship from economic growth to educational spending.

Olabisi (2012) examined the relationship between the composition of public expenditure and economic growth in Nigeria between 1960 and 2008. The tool adopted for analyzing the data was vector autoregressive models. The results revealed that expenditure in education does not enhance economic growth, while expenditure on health and agriculture contributed positively to economic growth. Patricia (2013) studied the effects of public expenditure on education on economic growth in Nigeria for 1977-2012. It was found that total expenditure on education has significant and positive effect on economic growth. It was noted that recurrent expenditure on education does not highly correlate with economic growth in Nigeria.

Safdari, Mehrizi and Elahi (2013) investigated the effect of health expenditure on economic growth in Iran. The tool adopted was vector autoregressive (VAR) model. Result indicated that health expenditure has positive effect on

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economic growth in Iran. Musaba, Chilonda and Matchaya (2013) examined the impact of government sectoral expenditure on economic growth. The study adopted cointegration and error correction models in the analysis of data. Vector error correction model (VECM) showed no significant relationship between government sectoral expenditure and economic growth in the short-run. Long-run results indicated that expenditures on agriculture and defense have significant and positive impact on economic growth in Malawi. Expenditure on education, health and social protection and transport and communication were significantly but negatively related to economic growth.

Oyinlola and Akinnibosun (2013) examined the relationship between public expenditure and economic growth in Nigeria for the period 1992-2009. Gregory-Hansen structural breaks cointegration technique was adopted in analyzing the data. Results showed that economic growth does not translate to growth in recurrent expenditure, administrative expenses and transfer expenditures. Results also showed that economic growth leads to growth in capital expenditure as well as social and community services in Nigeria. This study revealed the relevance of Wagner's (1883) law that economic growth brings about public expenditure by the government.

Acaroglu and Ada (2014) examined the relationship between human capital (i.e. education and health) and economic growth in 15 MENA countries for the period 1990-2011. The model adopted was that of Knowles and Owen's (1995) which is based on Mankiw, et at (1992) augmented Solow model. Human capital consists of health and education. The results showed that public expenditure on human capital, neither in terms of health nor education, does not have any significant effect on economic growth. However, the results suggest that if the quality of health is improved the GDP per capital would equally increase. Acaroglu and Ada (2014) disclosed a number of empirical studies relating to effects of government expenditure on economic growth. Many of these works show results that were in tandem or inconsistent with one another. Among these studies are: Webber (2002); Huang, et al (2009, 2010); Colantonio, et al (2010); Azam and Ahmed (2010); Halder and Mallik (2010) and Jajri and Ismail (2012). The studies focused on the effect of human capital (comprising of educational and health care spending) on economic growth.

Qadri and Waheed (2011) examined the effect of human capital on economic growth in Pakistan. It was found that education and health expenditures have significant effect on economic growth. Abas, (2001) in Qadri and Waheed (2011) revealed that increase in human capital variables (education and health) in any economy attracts investment in physical capital which in turn increases output. Education affects output through various channels. The knowledge gained from education increases the capacity to produce more in relatively smaller time. Increased level of education, no doubt, leads to better health. Education provides one with awareness of the benefit of healthy living. A healthy person has a better and greater productive capacity. Akbari, Moayedfar and Jouzaryan (2012) examined the short-run and long-run effects of human capital on the economic growth in Iran for the period 1959-2007. The study adopted

autoregressive distribution lag (ARDL) model. Results showed that human capital has positive and significant effect on economic growth in Iran.

Beskaya, et al (2010) cited in Akbari, et al (2012) analyzed the impact of education on economic growth in Turkey for the period 1923-2007 using (ARDL) model. They found that there is cointegration between education and real income and there is bilateral Granger-causality between education and economic growth. Halder and Mallik (2010) examined the time series behaviour of investment in physical capital and human capital for the period 1960-2006 on economic growth in India. The tool adopted was cointegration frame-work to test the long-run effect. The result indicated that physical capital expenditure has no long-run and short-run effect on the growth of the economy. However, human capital expenditure has significant long-run effect on economic growth measured in terms of GNP per capital. The theoretical framework adopted by the study was endogenous growth theory of Lucas (1988). The theory is an extension of Solow (1956) neoclassical growth model.

Oyinbo, Zakari and Rekwot (2013) investigated the link between agricultural budgetary allocation and economic growth in Nigeria for the period 1980-2010. The results of the study indicated that the relationship between agriculture expenditure and economic growth is positive but not significant in the long-run. However, the relationship is positive and significant in the short-run. The study adopted cointegration and vector error correlation model.

Oyinbo, et al (2013) noted the inconsistent results among scholars. Notably among these studies are: Nasiru (2012); Usman, Mobolaji, Kilishi, Yaru and Yakubu (2011); Maku (2009) and Loto (2011). Nasiru (2012) examined the relationship between government expenditure and economic growth using Granger-causality test on Nigerian dataset. It was found that government capital expenditure causes economic growth, but no observable causal relationship between recurrent expenditure and economic growth. Usman, Mobolaji, et al (2011) examined the effect of public expenditure on economic growth in Nigeria using dataset for 1970-2008. The results of the study indicated that total capital expenditure; total recurrent expenditure; expenditure on transport and communication; expenditure on education and health are statistically significantly correlated with economic growth. Expenditures on defense and agriculture are not significantly correlated with economic growth.

Loto (2011) examined the impact of government sectoral expenditure on economic growth in Nigeria. The results of the study showed that expenditure on education was negatively and significantly related to economic growth; expenditure on agriculture was negatively related to economic growth; but expenditure on health was positively related to economic growth. The study adopted cointegration and vector error correlation models. Niloy, Emranu and Osborn (2003) cited in Oyinlola and Akinnibosun (2013) investigated the impact of public expenditure on economic growth for 30 developing countries. The results indicated that government capital expenditure has significant positive link with economic growth, but government current expenditure was insignificant in explaining economic

growth. However, expenditure in education had significant effect on economic growth. Devarajan, et al (2006) examined the relationship between the composition of government expenditure and economic growth for a number of developing countries. The study found that capital expenditure has significant negative relationship with economic growth; but recurrent expenditure is positively related to economic growth.

Adeniyi and Bashir (2011) in Oyinlola and Akinnibosun (2013) found that government expenditure on agriculture, education, defense and internal security services are significant factors that influence economic growth in Nigeria. Adewara and Oloni (2012) used vector autoregressive models to examine the relationship between the composition of public expenditure and economic growth in Nigeria between 1960 and 2008. They found that expenditure on education does not enhance economic growth; and expenditure on health and agriculture contributed positively to economic growth. Nurudeen and Usman (2010) in Oyinlola and Akinnibosun (2013) found that total capital expenditure; total recurrent expenditure on education have negative effects on economic growth in Nigeria; but expenditure on transport and communication and health have positive effect on economic growth in Nigeria.

Udoh (2011) analyzed Nigerian data on public expenditure and economic growth for the period 1970-2008 using bounds test and autoregressive distribution lag model and vector error correlation model. The results indicate that public expenditure has positive effects on the growth of agricultural output. Nketia-Amphonsah (2009) utilized Ghanaian data on aggregated government expenditure and disaggregated government expenditure in order to determine how public expenditure influence economic growth. The results indicated that total government expenditure retard economic growth, while government expenditure on health and infrastructure enhanced economic growth and expenditure on education had no significant effects on economic growth in the short-run in Ghana. Kweka and Morrissey (2000) found that public investment in human capital has significant effects on economic growth in Tanzania.

Egbetunde and Fasanya (2013) analyzed the impact of public expenditure on economic growth in Nigeria for 1970-2010. The main tool used in the analysis was bound testing (ARDL) approach which examined both the long-run and short-run relationships between public expenditure and economic growth. The results of the study revealed that total public expenditure has negative effect on economic growth while recurrent expenditure has little significant positive effect on economic growth. Komain and Brahmasrene (2007) cited in Egbetunde and Fasanya (2013) examined the relationship between government expenditure and economic growth in Thailand. The study employed Granger-causality test. The results showed that there was unidirectional causal relationship with direction running from government expenditure to economic growth. It also showed that government expenditure has positive effect on economic growth in Thailand. However, government expenditure and economic growth are not cointegrated. Wang (2011) cited in

Safdari, et al (2013) used international total health care expenditure data of 31 countries from 1986-2007 to examine the causality between health care expenditure and economic growth. Tools used were panel and quartile regression analysis. The results of the study showed that health expenditure growth enhances economic growth; but economic growth reduces health care expenditure growth.

3. Research Methodology

Design and Sources of Data: The ex-post facto design was adopted wherein the data were sourced from official publication that the researcher cannot manipulate. The data coverage was from 1981 to 2013. The data were sourced from the publications of the Central Bank of Nigeria, such as the Statistical Bulletin, the CBN's annual report and the Bullion (various issues).

Model Specification: The study adopts Nworji, et al (2012) and Al-Shatti (2014) models with modifications. The models are based on Keynesian macroeconomic framework. The hypotheses are deigned to capture each of the variables in the study. The model is implicitly expressed in the following equations:

$$GDP = f(CER, CEA, CEE, CEH)\ldots \ldots \ldots \ldots Eq.1$$

Explicitly, the model is expressed as follows:

$$GDP = \lambda_0 + \lambda_1 CER + \lambda_2 CEA + \lambda_3 CEE + \lambda_4 CEH + \pi \ldots Eq.1A$$

Where, λ_0 = intercept of the regression line which depicts any level of economic growth at zero government expenditure level. It is constant term. $\lambda_1, \lambda_2 \ldots \lambda_4$ are the slope of the coefficients of the components of government expenditure that measure the effects of the respective components of capital expenditure on economic growth. π = stochastic variable to accommodate the influence of other determinants of economic growth not included in the model.

The 'a priori' expectation is that $\lambda_1, \lambda_2 \ldots \lambda_4$ have positive sign and greater than zero. Thus, each component of expenditure is expected to correlate positively with gross domestic products, proxy to economic growth. The estimates of the model coefficients are tested for partial and joint significance of their effects on the GDP at 5% level of significance. Again to enhance the insight into the extent to which the various government expenditure components explain economic growth for the period 1981-2014 we adopt the following statistics, namely; R-square and adjusted R-square. They act as explanatory power of the model that measure the goodness of fit. Note that the data coverage is 1981-2013. Data were collected from the following variables as specified in the model the notes of which are explained below:
GDP = Gross Domestic Products; CER = Capital Expenditure on Road; CEA = Capital Expenditure on Agriculture; CEE = Capital Expenditure on Education; CEH = Capital Expenditure on Health.

Analytical Techniques: The above equations were estimated using the Ordinary Least Square (OLS) multiple regression method; and in doing this, some tests were carried

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out. The tests include unit root test, cointegration and error correction model analysis. Other diagnostic tools of analysis like the statistical tests for significance (t-test and F-tests) and Durbin Watson test were used to interpret the results. Granger-causality tests were also conducted in order to ascertain the partial and joint effects of aggregated and disaggregated public spending on economic growth. The software application utilised was E-views 5.1.

4. Results of Data Analysis and Interpretation

Augmented Dickey-Fuller (ADF) Test for Unit Root: The ADF test was done with the following hypothesis:

- Null hypothesis (H_0): Variable contains unit root and hence is non-stationary.
- Alternative hypothesis (H_1): Variable does not contain unit root and hence is stationary

The decision rule is that: If the calculated ADF Test statistic is greater than the MacKinnon critical values, reject the null hypothesis of non-stationarity and accept the alternative of stationarity, otherwise accept the null hypothesis of non-stationarity. The results for the Augmented Dickey-Fuller Test for Unit Root are summarized as follows:

Table 1: Unit Root Test Results

Variables		Level	First Difference	Second Difference	Order of Integration	Meaning
GDP		2.975338	-2.166060	-6.238080*	1(2)	Stationary at second difference
CE		0.463538	-3.592694*	-	1(1)	Stationary at first difference
CER		0.215112	-4.332693*	-	1(1)	Stationary at first difference
CEA		-0.029981	-7.332749*	-	1(1)	Stationary at first difference
CEE		-0.205861	-4.042049*	-	1(1)	Stationary at first difference
CEH		0.335953	-4.088916*	-	1(1)	Stationary at first difference
Critical Values	1%	-3.6576	-3.6661	-3.6752		
	5%	-2.9591	-2.9627	-2.9665		
	10%	-2.6181	-2.6200	-2.6220		

*, **, *** *denotes significance at 1%, 5% and 10% respectively.*
MacKinnon critical values for rejection of hypothesis of a unit root. Sig. if ADF> Critical value at 5%.
Source: Output data

From Table 1, the empirical result of the unit root test for stationary of time series property of variables is shown. The criterion is that the Augmented Dickey Fuller results must be strictly greater than the critical value at certain level of significance to confirm the presence of stationarity pattern of variables. The unit root values for the variables under study reveal that the variables CE, CER, CEA, CEE, CEH have no unit root (that is, they are stationary) at order 1 (that is first difference); and GDP has no unit root at order 2 (that is second difference). This is because the ADF values of the variables are all greater than the critical value at 5% (see Table 1 above). We therefore test for cointegration using Johansen approach at 1% level of significance.

Cointegration Tests: The purpose of the cointegration test is to determine whether a group of non-stationary time series is co-integrated or not. Thus, in this study, Johansen (1988) cointegration analysis was performed to investigate long-term relationship between government expenditure and economic growth in Nigeria at various categories. The analysis was performed under the assumption of linear deterministic trend in the data with a sample of 33-year annual time series.

Table 2: Cointegration Results for Disaggregated Components of Capital Expenditure Model:- GDP = λ_0 + λ_1CER + λ_2CEA + λ_3CEE + λ_4CEH + π

Sample: 1981 2013				
Series: GDP CER CEA CEE CEH				
Lags interval: 1 to 1				
	Likelihood	5 Percent	1 Percent	Hypothesized
Eigenvalue	Ratio	Critical Value	Critical Value	No. of CE(s)
0.879717	174.6412	68.52	76.07	None **
0.827922	108.9861	47.21	54.46	At most 1 **
0.724818	54.43211	29.68	35.65	At most 2 **
0.275393	14.43208	15.41	20.04	At most 3
0.133614	4.446182	3.76	6.65	At most 4 *
*(**) denotes rejection of the hypothesis at 5%(1%) significance level				
L.R. test indicates 3 cointegrating equation(s) at 5% significance level				

Source: Output data

Table 2 above reveals that there is cointegration among the variables: GDP, CER, CEA, CEE, and CEH. The Likelihood Ratio value is 54.43211 which is greater than critical value of 35.65 at 1% level "at most 2" indicating at least 3 co-integrating equations. This indicates that long-run relationship exists between government expenditure and economic growth in the model. Thus, we concluded that aggregate government expenditure disaggregated into capital expenditure on economic services, and social and community services have long-run relationship with economic growth in Nigeria. Likewise, the disaggregated government capital expenditure components (agriculture, roads, education, and health care expenditures) have long-run relationship with economic growth. This implies that there is a long-run equilibrium relationship between government capital expenditure and economic growth in Nigeria.

Table 3: Normalized Cointegration Vector Results

GDP	CER	CEA	CEE	CEH	C
1.0000	180.2160 (57.6035)	- 515.4073 (30.7518)	584.7959 (115.218)	- 471.1180 (115.945)	- 2860.122

Source: Output Data

The objective of this study is to evaluate the effect of public spending on the economic growth (GDP) of Nigeria. In this

regard, the above cointegration vector results as rewritten in the form of equation below disclosed the signs of the coefficients of the various variables of aggregated and disaggregated components of capital expenditures.

GDP = 180.2160CER - 515.4073CEA + 584.7959CEE - 471.1180CEH - 2860.122C …Eq.1B

Equation.1B showed that capital expenditure on roads and education has positive long-run effect on economic growth, while capital expenditure on agriculture and health has long-run negative effect on economic growth.

Vector Error Correction Model (VECM): As cointegration is proven, an error correction framework is constructed to model dynamic response that indicates the speed of adjustment from the short-run to the long-run equilibrium state. The essence is to affirm the existence of a co-integrating vector among the variables. Then, ECM is employed. This is based on the general-to-specific rule, and the results are presented in Table 4 below.

Table 4: Error Correction Test Results for the Model.

Explanatory variables	Dependent variable: GDP
ECM$_{-1}$	0.093118
	-0.16267
C	1987.748**

	-972.935
CER	31.72887
	-66.4851
CEA	95.46489
	-70.5112
CEE	-136.1307
	-261.805
CEH	-235.7516**
	-65.5056
Adjusted R-squared	0.334777
F-statistic	3.516279

Standard errors in parentheses. ***, **, * denote statistical significance at the 1, 5, 10 percent level

The regression result above defies the '*a priori'* expectations that the independent variables of government expenditure should positively affect economic growth. The ECM is not rightly signed. It shows that distortions in economic growth in Nigeria caused by government capital expenditure patterns are not reversible. The adjusted R^2 is 33% which indicates that greater proportion of the issues in economic growth is not explained by government capital expenditure.

Table 5: Pair-wise Granger-causality Tests between GDP and Components of Government Capital Expenditure

Sample: 1981 2013					
Lags: 2					
Null Hypothesis:	Obs	F-Statistic	Probability	Decision	Direction
CER does not Granger Cause GDP	31	6.85673	0.00406	Reject	Causality
GDP does not Granger Cause CER		0.69428	0.50846	Accept	No causality
CEA does not Granger Cause GDP	31	20.0167	5.5E-06	Reject	Causality
GDP does not Granger Cause CEA		7.08664	0.00350	Reject	Causality
CEE does not Granger Cause GDP	31	4.68287	0.01833	Reject	Causality
GDP does not Granger Cause CEE		0.50349	0.61019	Accept	No causality
CEH does not Granger Cause GDP	31	62.8412	1.1E-10	Reject	Causality
GDP does not Granger Cause CEH		5.16544	0.01291	Reject	Causality

Source: Output data

To categorically investigate the impact level of government expenditure on Economic Growth in Nigeria, Granger-causality approach is adopted. The results are shown on Tables 5 above. The criterion is to reject the null hypothesis when the value of the probability of F-statistic is less than the critical value at 5%. The disaggregated causal relationship is reported in Table 5. The table shows the results of Pair-wise Granger-causality tests between GDP and components of government capital expenditures (CER, CEA, CEE, and CEH) on economic growth (GDP). The results indicate that unidirectional causality runs from economic growth (GDP) to capital expenditure on roads (CER). There is bi-directional causal effect between GDP and CEA, between GDP and CEH. Furthermore, another unidirectional causality runs from CEE to GDP; The results show that capital expenditures on economic services represented by roads and agriculture, and on social and community services represented by education and health cause economic growth.

5. Discussion of Findings

It was found that there is long-run equilibrium relationship between capital expenditure and economic growth in Nigeria. Contrary to the *a priori* expectation of this study, capital expenditure on agriculture and capital expenditure on health care have negative effect on economic growth as against our results with capital expenditure on education and capital expenditure on road construction which have positive effect on economic growth. The a priori expectation is that both the level and composition of public capital expenditures have positive effect on the economic growth in Nigeria. The negative signs of capital expenditure on agriculture and capital expenditure on health care, and the positive signs of capital expenditure on education and capital expenditure on road construction are mix-up in terms of Nworji, et al (2012) study which indicated that capital expenditure on social and community services has positive signs, while capital expenditure on economic services has negative signs.

Our findings are also inconsistent with Abu and Abdullah (2010) and Olabisi (2012) studies which indicated that capital expenditure on education have negative effect on

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economic growth, while capital expenditure on health has positive effect in Nigeria. However, our finding that capital expenditure on education has positive effect on economic growth is in line with Dauda (2011). All these discrepancies could be attributed data coverage and perhaps method of data analysis. The contradictory results obtained in all of these are not surprising. Abas (2001) in Qadri and Waheed (2011) suggested that human capital variables (education & health) in any economy attract investment in physical capital which in turn increases output. He explained that education affects output through various channels, namely;

1. The knowledge gained from education increases the capacity to produce more in relatively smaller time.
2. Increased level of education leads to better health.
3. Education provides one with awareness of the benefit of healthy living.
4. A healthy person has a better and greater productive capacity.

In other words, capital expenditures on education and health should affect economic growth positively. The results of our findings are inconsistent with Adewara and Oloni (2012) in terms of capital expenditures on agriculture and capital expenditures on health care. It was discovered that the variables have positive signs in Nigeria.

6. Conclusions and Recommendations

Based on ECM tests, it was found that capital expenditures on agriculture, education and road have no significant effect on economic growth, while capital expenditures on health has significant and negative effect on economic growth. On the whole, government capital expenditure does not significantly affect economic growth in Nigeria. As indicated by adjusted R^2, only about 33% of the variations in economic growth are attributed to capital expenditures. Thus, greater percentage of variations in economic growth is attributed to other factors. Wagner's (1883) Law applies in Nigeria with respect to capital expenditures on economic services, while Keynes (1936) view equally applies with respect to social and community services.

The first case is demonstrated in the Granger-causal test results in which unidirectional causal effect runs from economic growth to capital expenditure on road and capital expenditure on agriculture; while the second case is reflected in unidirectional causal effect with direction running from capital expenditure on education to economic growth and capital expenditure on health to economic growth. Based on the findings, the following recommendations were made, namely; Government should set up appropriate monitoring mechanism to ensure that funds are not misappropriated, and that adequate funds are applied to areas of needs especially agriculture and education which revealed negative signs. The existing agencies like EFCC and ICPC should be overhauled to ensure that proper persons are put in place. There has been public outcry that the officials of these agencies are being checkmated to the extent that they look the other way in the performance of their duty.

For further studies, we recommend the inclusion of my capital expenditure variables in the model.

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