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Disaggregated Capital Expenditure and Economic Growth; Evidence from Nigeria

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Abstract
This study examined the effect of federal government disaggregated capital expenditure on economic growth. Data were sourced from Central Bank of Nigeria Statistical Bulletin.1986-2019. Real gross domestic product was modeled as the function of Federal Government capital expenditure on Agriculture, Federal Government Recurrent on Works, Housing and Road Construction, Federal Government Recurrent on Transport and Communication, Federal Government Recurrent Expenditures on Education, Federal Government Recurrent Expenditures on Health and Federal Government Recurrent Expenditures on Defense. The study adopted the ADF Unit Root test, ARDL Bounds Cointegration Test and Autoregressive Distributed Lags (ARDL) was applied for the coefficient estimations. The study found that 99.8% variation in real gross domestic product was traced to capital expenditures as modeled. The long run estimation results revealed that while CAGR, WHR are positive, CTRC, CEDU, CHLT and CDFE showed negative relationship with RGDP. From the finding, we conclude that capital expenditures determine the variation in real gross domestic product in Nigeria. The study recommends that the extent of Capital expenditure on TRC should be sustained based on their positive impacts on national real income. There is need to sustain and increase Capital expenditures on EDU found to contribute positively to RGDP but not significant enough. While Capital expenditure on HLT needs to be sustained, its capital expenditure should be increased to boost the economy and Both

Recurrent and Capital expenditures on DFE are found to be contributing positively to the economy and should be sustained.

Keywords: Disaggregated, Capital Expenditure, Economic Growth, Nigeria

INTRODUCTION

Government has the responsibility to provide security, maintain peace and order provide good roads, bridges, water supply, and other social and economic infrastructure for the common benefit of the people. Government also provides for education, hospitals and health care systems, sanitation, electricity, transportation and infrastructure for communication. Government spends the greater percentage of its revenues annually to discharge its responsibilities and satisfy the needs of its citizens. To do this effectively, the annual budget guides the departments and agencies in capturing all the necessary expenditure and revenue headings for appropriate budgetary provisions each fiscal year. According to Soyode and Kajola (2006), annual budget is a financial statement which outlines the estimated government receipts and expenditures for the forthcoming fiscal year, thus, it is a financial forecast statement that links revenue and expenditure of the government for a given year. Depending on the feasibility of these estimates, budgets are of three types: balanced budget, surplus budget and unbalanced or deficit budget.

To understand the budgetary system and recurrent and capital expenditure pattern of pre-colonial Nigeria, it is important to review the political set up of the period which influenced such budgets and expenditure. Government expenditure can be for the acquisition of goods and services for current use to directly satisfy individual or collective needs of the members of the community or it can be for acquisition of goods and services intended to create future benefits such as infrastructural investment (Baro & Grilli, 1994). The expenditures can as well represent transfers of money, such as social salaries and cost of administration. Therefore, Government expenditure (like the expenditure of the private sector firms) can be classified into current expenditure and capital expenditure. By contrast, capital expenditure is spending on assets. It is the purchase of items that will last for a long time and will be used several times in the provision of goods or services. In the case of the government, examples would be the construction of a new hospital, the purchase of new vehicles, aircrafts, ships, trains, computer equipment or networks, provision of new buildings, construction of new roads, airports, seaports and bridges.

Several studies have shown that there exist positive relationships between revenue/capital expenditure and economic growth (Weolebo, 2018, Imoughele & Ismaila, 2013, Chilonda, 2013, Tsadiku, 2012, Bakare & Sanmi, 2011, Okwu & Obiwuru, 2017). Others revealed negative results (Tsadiku, 2012, Loto, 2012, Warren, 2012, Ifionu & Ntegah, 2013, Chilonda, 2013). In Nigeria, with the humongous amount being budgeted annually, it is expected that there should be a comparable achievement in terms of economic growth in Nigeria. In spite of the annual budget is increasing every year, the human development index and other economic indices are continuously showing negative trends (Oluba & Martins, 2008). This study focused on the effect of disaggregated capital expenditure on Nigeria economic growth.

LITERATURE REVIEW

Government Expenditure

The term public expenditure refers to the expenses incurred in the public sector. It is defined as the total government spending for the provision of goods and services (Bhatia, 2006).The idea regarding the need and the effect of public expenditure has varied over time. The earlier approach was closely linked with the philosophy of laissez-faire according to which, the best government was the one which governed the least. It was argued that everyone was the best judge of his own interests and that the government could not be expected to take any decision which was basically superior to the private one. The only sphere where the government could legitimately operate was the preservation of the society and undertaking those activities which were needed by the economy but were commercially unprofitable. Government expenditure is divided into two categories, that is, capital and recurrent expenditure, capital spending is an expenditure made by government for the acquisition of structures for further production and consumption in an economy. That is money spent by government on acquiring permanent infrastructural facilities that are essential to the economic growth and development (Nsebot, 2004). On the other hand recurrent expenditure refers to spending on current consumption such as salaries, wages and overhead cost.

Capital expenditure

Capital expenditure is spending on assets (Ogogio,1995). It is the purchase of items that will last and will be used time and again in the provision of goods or services. In the case of the government, examples would be the building of a new hospital, the purchase of new computer equipment or networks, building new roads, seaports, airports, bridges, hospitals, universities and so on (Njoku, 2009). In this Thesis, government capital expenditure will be proxied by the capital expenditure on education, agriculture, works and housing, health and transport/communication. This indicates a reflection of government capital expenditure that goes into enhancing economic growth in Nigeria.

Capital expenditure is incurred when a business spends money either to buy fixed assets or add to the value of an existing fixed asset with a useful life extending beyond the taxable year (McConnell & Muscarella, 1985). In the corporate world, it refers to the funds used by a company to acquire or upgrade physical assets such as property, industrial buildings or equipment. It is generally expected that capital expenditure will create future economic benefits that will span out for more than one financial or tax year.

There are two types of capital investments. The first relates to expenditure to acquire or construct new fixed assets. This category is aimed at increasing the scope of an organisation's operations. The second category relates to expenditure incurred to maintain existing assets and therefore, maintain the current scope of the organisation's operations and is often referred to as sustaining capital expenditure (Okoro, 2013). Okoro (2013) explained that any capital expenditure acquisition needs to equate to a feasible and profitable Return on Investment for

investors to consider it a worthwhile expense for an organisation. He further stated that in the case where a capital expenditure constitutes a major financial decision for a company, the expenditure must be formalized at an annual shareholders meeting or a meeting of the board of directors. In seeking for this approval, management must articulate how the proposed capital expenditure is aligned to the organization's strategic objectives. It must further demonstrate the future economic benefit that is expected to be derived from the proposed capital expenditure. This same procedure is followed in a government set up.

Agriculture

Agricultural activities include food production, forestry, fishery and livestock activities among others. According to Njidda (2020), COFOG classifies the components of agricultural expenditure into administration of agricultural affairs and services; conservation, reclamation or expansion of arable land; agrarian reform and land settlement; supervision and regulation of the agricultural industry; construction or operation of flood control, irrigation and drainage systems, including grants, loans or subsidies for such works; operation or support of programs or schemes to stabilize or improve farm prices and farm incomes; operation or support of extension services or veterinary services to farmers, pest control services, crop inspection services and crop grading services; production and dissemination of general information, technical documentation and statistics on agricultural affairs and services; compensation, grants, loans or subsidies to farmers in connection with agricultural activities, including payments for restricting or encouraging output of a particular crop or for allowing land to remain uncultivated.

Forestry is classified under agriculture and involves the administration of forestry affairs and services; conservation, extension and rationalized exploitation of forest reserves; supervision and regulation of forest operations and issuance of tree-felling licenses; operation or support of reforestation work, pest and disease control, forest fire-fighting and fire prevention services and extension services to forest operators; production and dissemination of general information, technical documentation and statistics on forestry affairs and services; grants, loans or subsidies to support commercial forest activities. In the case of fishery, the COSG classification covers both commercial fishing and hunting, and fishing and hunting for sport. It includes all manner of fishing and hunting activities, such as deep-sea fishing, wildlife hunting as well as other operations or support of fish hatcheries, extension services, stocking or culling activities, etc; production and dissemination of general information, technical documentation and statistics on fishing and hunting affairs and services; grants, loans or subsidies to support commercial fishing and hunting activities, including the construction or operation of fish hatcheries. However, COFOG classification excludes control of offshore and ocean fishing; administration, operation or support of natural parks and reserves.

Further, in Ekerete, (2000), Agricultural Expenditure are the costs incurred in providing and maintaining agricultural resources, equipment and facilities needed to ensure adequate food supply in the country. It includes costs of seedlings, fertilizers, implements, machineries, and subsidies of agricultural products, as well as the salaries and maintenance of the Ministry's staff and personnel. The costs also cover expenditure in maintaining and regulating adequate water and food supply, diary products, cash crops and export crops, in sufficient quantity and quality. This expenditure heading is specifically under the Federal Ministry of Agriculture and Water Resources.

Housing

Housing can also be viewed as a complex product that is crucial for national development in terms of both an economy and welfare of the people (Chatterjee, 1981), because it is an important source of national capital formation, employment generation, improvement in health and income generation. Howenstine (1957) argued that better housing might lead to higher productivity, by improving health and reducing absenteeism. He evaluated the concept from an economic point of view, noting that, investments should be made in housing only where they were clearly necessary; as an adjunct to the success of other industrial projects. The author further stated that, even when unemployment rates fall, priority should be given to those workers whose contribution to national productivity could be expected to benefit most from better housing (Howenstine, 1957). This explains why several governments and companies' housing projects sprang up.

A housing policy is a tool that is designed in line with the housing development objectives of a state. It is usually employed in town planning; with the aim of providing solution to housing problems, in a bid to achieve sustainable housing for the people (Colean, 1940). The instrumentality of a housing policy is derived from extant laws and regulations as well as administrative practices in the housing sector of a country. Colean also stressed explained that the housing policy seeks to address fundamental issues, such as those involving land ownership, housing finance, housing construction and delivery. Above all, the housing policy requires a strategy for the enforcement of the purpose of the intended programmes of action such as to the provision of mass housing, employment of labour and enhancement of output growth (Ibimilua & Ibitoye, 2015).

Electricity

Nigeria has struggled to provide electricity to its large population ever since independence. Akinola explains that the then Nigerian Electric Power Authority (NEPA), through the Niger Dam had maximum capacity to generate 5,900 megawatts of electricity per day which falls far below the average national consumption rate of 10,000 megawatts per day, (Akinola, 2015). He further explained that this compelled NEPA to ration electric power supply over the years (until it was unbundled and privatized between 2013 and 2014). The inability to satisfy the domestic and, to a large extent, industrial needs of electricity is reported to have had debilitating impact on the growth potentials of the Nigerian economy (World Bank, 1991). Even so, he went further, the demand for electricity is projected to increase from 5,746 megawatts in 2005 to nearly 297,900 megawatts by the end of 2030.

Road Construction

In Nigeria, as in most developing countries, road infrastructure investment decisions have usually been made to meet the utilitarian need to move people to urban areas, where the market, jobs and schools are often located, without any other formal plan to link or measure their economic development benefits. Data relevant to the relationship between road transportation infrastructure investment and the benefits associated with such investments are far more difficult to come by in developing countries including Nigeria. One reason, as Ogun (2010) suggested, could be the corruption of government officials. In most developing countries including Nigeria, road

infrastructure investments come from federal or state budgets, as opposed to selling bonds that carry built-in requirements for stringent and streamlined performance measurement. Another reason, Khasnabis, Dhingra, and Safi. (2010) posited, is that private funds are increasingly needed in developing countries to match the need for high capacity road systems.

The United Nations Millennium Development Goals (2015) attempted to map the course of development to alleviate poverty in developing countries (WHO, 2009), and one of the key strategies was investing in road transportation infrastructure. This followed as a result of a generally understood phenomenon that a significant number of the world's poor live in rural areas where roads infrastructure is usually poor or nonexistent (Ogun, 2010). Policies and strategies for investment in road transportation infrastructure must also consider safety in addition to poverty alleviation.

The World Health Organization (2009) estimated that over 1.2 million people are killed annually on roads, with an additional 20-50million suffering nonfatal injuries. Among the top 10 causes of death in the world is road accidents, and this could rise to Number 6 by 2020 (World Health Organization, 2009). Indeed, road accident ranked third in the world in 2021 (WHO, 2021). Traffic accidents tend to be clustered in low and middle income countries, where about 97% of road accidents occur (Osayomi, 2013). Road accidents top some infectious diseases in mortality rates in developing countries, and in Nigeria they are of great concern. The World Health Organization (WHO) recently ranked Nigeria second in the incidence of road traffic accidents in the world, due in large part to unsafe roads. Between 2006 and 2008, there were 16,478 reported cases of traffic fatalities and 79,409 road traffic accidents (Osayomi, 2013).

Transportation and Communication

Awoleye, Okogun Ojuloge and Atoyebi (2012) opined that the information and communication infrastructure has expanded tremendously in Nigeria in the last two decades with the deregulation of the telecommunications sector and introduction of mobile telephones. Before the deregulation policy communication services were provided by government monopolies and the cost of providing such services was one of the highest in the world, due to inefficiency. They maintained that in 1999, out of the 400,000 telephone lines connected, only 50 percent were functioning, and tele-density was 4 lines per 1000 persons, which was a far cry from the International Telecommunications Union (ITU) recommended density of 1 per 100 persons. Again, only 100 out of the 774 local government headquarters had telephone services. However, as at ending of December 2020, the mobile phone subscriber base in Nigeria was one hundred and seventy two million (Google). In the area of postal services, the delivery system was very poor and mail theft became rampant. In order to re-position the country to meet the challenges of modern trends in information and communication, government decided to install an efficient and effective communication system that is affordable to many Nigerians. This was achieved by breaking the monopoly of Nigerian Telecommunications Ltd (NITEL) and Mobile Telecommunications Ltd (MTEL), (Awoleye, Okogun et tal, 2012). In addition, the Nigerian Postal Services Ltd (NIPOST) was restructured and commercialized to enhance efficiency and performance. The telecommunications industry was therefore deregulated to create a level playing field for private

investors that ultimately and dramatically improved the state of telecommunications infrastructure in the country, (Awoleye, Okogun et tal, 2012).

Education

Encyclopedia Britanica defines education as the discipline that is concerned with methods of teaching in schools or school-like environment as opposed to nonformal and informal means of socialization, example, rural development projects and education through parent-child relationship. Thus in Nigeria, while primary education is under the control of the states, the Federal Ministry of Education is responsible for regulating education at post-primary and tertiary levels. At tertiary level, National Universities Commission (NUC), National Commission for Colleges of Education (NCCE) and National Board for Technical Education (NBTE) are the agencies through which the Federal Ministry of Education controls and regulates education. This is beside the one hundred and four Federal Government colleges, forty three federal universities, seventeen polytechnics and twenty one colleges of education owned and run by the Federal Government and which are either under the direct supervision of the Ministry, or through NUC, NCCE and NBTE. While NUC regulates the universities, NBTE regulates the polytechnics and NCCE regulates colleges of education. Expenditure on education covers all capital and recurrent expenses to sustain the above institutions and agencies and provide qualitative education expected to produce highly skilled manpower that will drive the economy.

Health

Wikipedia defines health as a state of mental, physical and social wellbeing in which disease and infirmity is absent. Federal Ministry of Health is responsible for ensuring the regulation of health activities for the country, in addition to providing and maintaining health facilities intended to serve the country, or the federal government staff. Health expenditure includes all capital and recurrent expenditure needed to keep the Ministry of Health functioning in order to maintain the health of the nation and provide her with healthy workforce that manages all aspects of the economy (Laudau, 1983).

Edo and Ikelegbe (2014) stated that the health care system in Nigeria over the years deteriorated to such an extent that experienced Nigerian health experts migrated to other countries in search of better conditions of service. Consequently there was high infant and maternal mortality, as well as the prevalence of diseases in epidemic proportions and life expectancy has been dangling between 53 to 54 years between 2010 to 2019.The government has been trying to address the situation by massive immunization against all vaccine preventable diseases, ensuring universal access to primary health care, eradication and prevention of epidemic diseases such as ebola, lassa fever and presently, covid 19, resuscitating the secondary health care system, and stepping up enlightenment campaign on HIV/AIDS and covid 19 pandemic.. The primary health care program is the cornerstone of the health policy which was expected to raise life expectancy to 60 years by 2020,.However, this is 2021, and life expectancy still remains 54.8 years, slightly increasing by .005% of the 2019 figure (United Nations, 2020). Except the declaration of Nigeria polio-free in August 2020 by the World Health Organisation (www.jica.go.jp), none of the other targets has been achieved almost fifteen years after their setting.

Defense

Defense comprises all measures adopted by the government at all levels to maintain peace and order within the territorial boundary of the country. It involves maintenance of its internal and external security, and to safe-guard her from all or any external aggression (Wolde-Rufael, 2008). Akpan (2008) explains that in Nigeria, Ministry of Defense overseas the activities of all the areas of the armed forces while Ministry of Interior oversees others, including the police force. In the country's annual budget and for the purposes of this study, the expenditure allocated to defense includes all appropriations to the police, Nigerian Civil Defense Corps, the prisons service, the Immigration service, the Directorate of State Service, the armed forces and other military and paramilitary operations. Recurrent defense expenditure are concerned with salaries and other overheads necessary to run the day to day administration of the concerned ministries while capital defense expenditure are concerned with purchase of military assets, construction of buildings, provision of defense infrastructure, and investments in military and defense hardware equipment.

According to Yilidirim, Sezgin and Ocal, (2005) the security expenditure budget value indicates funds allotted to the maintenance and strengthening of standing military operations. Not all independent nations have the luxury of a large expenditure budget and therefore must rely on affiliations and regional alliances to maintain a capable fighting force. It involves the running expenses of the defense departments and other governmental agencies engaged in defense projects. Internal security has to do with the protection of the domestic territory and citizens by security agencies such as the police, civil defense, legal vigilante, prisons (Oshio, 2009).

Gross Domestic Product and the Production Function

Gross domestic product is generated through the combination of the factors of production that is land, labour, entrepreneurship, technology and capital. Two key production functions which explain how output (goods and services) or Gross Domestic Product is generated are the classical and the neo-classical production functions which are stated as follows:

a) Output = f(land, labour, capital and entrepreneur)
b) Output = f(land, labour, capital and technology)

The first one is called the Classical Production Function while the second one is called the Neo-classical Production Function. Under the Classical Production Function developed during the eras of Ricardo and Adam Smith when agriculture was the prevalent industry and enterprenuership also referred to as management and risk-taking, were the main drivers of the economy. The ability of the enterprenuer to combine the factors of production: land, labour, capital and technology invariably determine the level of output. With industrialization, technology became the new way of improving the level of output in the economy. Thus, technology becomes the fourth production factor under the neo-classical production function. Technology enhances the efficiency of production and the level of output (GDP) even where other production factors are kept constant. Neo-classical Production Function is connected with Solow and Swan (1956).

Gross Domestic Product

There are different types of GDP which are calculated through the application of established intervals. Examples include GDP at current market prices, GDP at constant prices, GDP at factor costs and GDP in real terms (real GDP). For the purpose of the study in question, real gross domestic product will be applied. Economists of various persuasions agree that the best version of GDP for a study of this nature is the real GDP that is GDP at current market price (GDP with built-in inflation) and deflated with an appropriate price index. Real GDP is a deflated GDP at current market price applying consumer price index:

GDP (constant market prices)/Consumer Price Index (or it can be deflated using the deflation rate) X GDP.

According to Orji, Onyeze and Edeh (2014), real Gross Domestic Product is a macroeconomic measure of the value of economic output adjusted for price changes. This adjustment applying the appropriate price index transforms the money-value measure, that is nominal GDP by way of deflation into the real value, that is, real Gross Domestic Product (rGDP). The formula to compute the Real Gross Domestic Product, rGDP, is as follows:

$$R = N/D,$$

Where,

R = real GDP,
N = nominal GDP, and
D = GDP deflator.

The real sector of the economy which contributes immensely to the GDP of Nigeria is essentially involved in the production of goods and services. Its activities cut across agriculture, manufacturing, water resources, science and technology, environment and tourism. Almost 80% of Nigeria's GDP is from oil and gas sector but its performance has been unimpressive over the years, hence the desire to re-position it for more effective performance (Obadan and Edo (2004). The performance of agriculture in particular has been a deplorable one. Its output of cash crops such as cocoa, cotton, rubber, groundnuts, and palm produce dwindled consistently over the last three and half decades, while production of livestock also fell. There was a rapid decline in foodstuff production to the extent that Nigeria became a net importer of food in the last two and half decades. To aggravate the problem, the recent herders-farmers clashes and criminal conduct introduced by the herders, bandits and terrorists from 2010 to date and which has led to political tensions in the country, has worsened the food crises situation (Vanguard, Jan. 2021).

Theoretical Review

The Endogenous Growth Model

The endogenous growth model unlike the neoclassical growth model disagreed that technological progress is exogenous, but they believe that it is endogenous, and went further to concentrate on the factors that can cause technological progress. According to Lucas (1988) and Romer (1990), higher investment in human capital will engender higher growth rate of per capita income (Rolle and Uffie, 2015; Umoru, 2013). Therefore, growth was driven by accumulation of the factor of production, while accumulation in turn was the result of investment in the private sector. This

implied that the only way a government can affect economic growth, at least in the long run, was via its impact on investment in capital (physical and human), and productivity of labour which will increase production, increase taxable capacities and increase revenue generation for further expansion

Adolph Wagner's Theory of Increasing State Activities

The theory explains that increases in public goods are a product of increased demands by organized industrial workers, coming at the costs of growth in the private sector (Wagner, 1958). The government sector tends to grow faster than the economy. Bureau Voting Theory rejected the role of industrialization and urbanization, suggesting that the main driver of public sector expansion is an artificial demand for government services created by self-interested government employees (Niskanen, 1971). The Fiscal illusion theory tries to explain government growth by linking the intricacies of tax systems to the masking of the costs of public goods. Also, tax systems can hide the costs of public goods and therefore stimulate their growth (Goetz, 1977). Empirical support for these theories has varied, causing them to lose some of their impetus.

Musgrave's Theory of Public Expenditure Growth

The Musgrave's theory of public expenditure and growth explained that, at low level of per capita income, the demand for public services tend to be very low, arguing that such income is devoted to satisfying primary needs and it is only when the per capita income starts to rise above these level of low income that the demand for services provided by the public sector such as road construction, health, and transports starts to rise, thereby forcing government to increase expenditure on them. The theory observed that with high per capita income typical in the developed nations, the rate of public spending falls as most basic wants are being satisfied. Therefore the theory suggested in connection to Wagner that as progressive nations become more industrialized, the share of public sector in the national economy grows continually (Musgrave, 1988). Iyoha stated five stages of expenditure growth; "Traditional society, preconditions for take-off, the take-off; the drive to maturity and the eye of high mass consumption." What determines the accepted expenditure-growth depends critically on the assumption of the type of economy, that is, whether it is a free market economy, a mixed economy or a command economy (Iyoha, 2002).

Wiseman-Peacock Hypothesis

Peacock-Wiseman (1961) is another thesis put forth by Peacock and Wiseman in their study of public expenditure in the UK. It explained the reason of increasing public expenditure from the social-political perspective. It argues that Government expenditure will increase as income increases but because the leaders want re-election into political offices, additional infrastructures must be provided in order to convince the electorate that their interests are being catered for by the people voted into power. However, the citizens of the country are less willing to pay tax. The resistance provokes the government to step up its care in the form of increased spending to avoid social crises in the economy. The resistance to pay tax by the people will make the state to have low revenue hence the cost of providing more facilities is borne by the government, making government expenditure to increase rapidly.

Empirical Review

Tsadiku (2012), by employing econometric model to examine the relationship between economic growth and public spending (agriculture and human capital) in Ethiopia, the result indicated that spending on education sector has positive effect on growth whereas health and agricultural sector spending have negative insignificant effect on growth which is similar to the study by Saad and Kakalech, (2009) and Loto (2012). A similar study in Kenya by John and Warren (2012) using ordinary least squares method, the study found that expenditure on education was promoting economic growth though expenditure on economic affairs, transport and communication were also significant. On the other hand, expenditure on agriculture has negative impact on economic growth while expenditure on health and defense were found to be insignificant to growth. The findings of the agriculture sector negatively related to growth because mainly the sector focused on crop farming rather than mechanized farming. Moreover, in Chilonda et al. (2013) the result showed that expenditure on agriculture and defense has significant positive effect on economic growth in the long run. However, expenditure on education, health, social protection and transportation and communication were negatively related to economic growth, which is an opposite result with Saad and Kakalech(2009).

The study by Kareem, Bakare, Ademoyewa, Ologunla and Arije (2015) indicated a negative relationship between the public sector spending on agriculture, agricultural output and economic growth. The result also showed fluctuation trend in agricultural expenditure over the year. The authors concluded that federal government spending on agriculture has positive effect on economic growth of Nigeria. Hence, the government should be giving much emphasis for increased budget allocation to the agricultural sector. A similar study in Nigeria by Peter and Lyndon (2015) found that agricultural spending has positive impact on economic growth. The authors hence recommended an increased spending on agriculture to improve economic growth. This is necessary given that most of the poor people live in rural areas and their source of income is based on agriculture, besides, the sector can secure food and create job opportunities for the society. A similar study in Nigeria by Barisua and Lezaasi (2010) using OLS method of estimation found that in the short run government spending on education had positive and insignificant impact on economic growth while government expenditure on agriculture has a negative and insignificant relationship with GDP. On the other hand, the study found that government sectoral expenditure on health has a positive and highly significant relationship with GDP.

Odeleye (2012) examined the relationship between education and economic growth in Nigeria using a comparative analytical approach. The findings showed that only recurrent expenditure had significant effect on economic growth. Obi and Obi (2014) employed time series data from 1981to 2012, using the Johansen's co-integration and ordinary least square (OLS) econometric techniques to analyze the relationship between gross domestic product (GDP) and recurrent education expenditure. Findings indicated that though a positive relationship subsists between education expenditure and economic growth, but a long-run relationship does not exist over the period under study.

Oluwatobi and Ogunrinola (2011) studied the impact of government recurrent expenditure on education and it effect on economic growth in Nigeria. The study employed the augmented Solow model and found a positive relationship between recurrent expenditure and growth (real output).Edeme and Nkalu (2016) employing a multiple regression approach, found that recurrent expenditure on education crowds in and crowds out human capital development in Nigeria. Ojewumi and Oladimeji (2016) examined the effect of government funding on the growth of education in Nigeria (1981-2013) using the multiple regression model. The major finding showed that the impact of recurrent expenditure on educational growth was negative. The study therefore recommended that the high level of corruption prevalent in the educational sector should be checked to ensure that funds meant for education in the sector are judiciously appropriated.

Modebe, Okafor, Onwumere and Ibe (2012) used a disaggregated approach to examine the impact of government recurrent expenditure on economic growth in Nigeria from 1987-2010. The study adopted a three-variable multiple regression model. Results revealed that recurrent expenditure had a positive but non-significant impact on economic growth. The study recommended an increase in private sector investment which seems more efficient. Imoughele and Ismaila (2013) examined the effect of public educational expenditure on Nigeria's economic growth using annual time series data (1980 - 2010) and the Johansen co-integration, unit root test as well as error correction model. The empirical results showed that there is a long-run relationship between gross domestic product and educational investment. The study found out that recurrent expenditure had direct and insignificant effect on Nigeria's economic growth. The policy significance of the study was that public investment in education sector is imperative and should be complemented with private investment. Oluwatobi and Ogunrinola (2011) examined the impact of government recurrent expenditures on education and health in Nigeria and its effect on economic growth using the augmented Solow model. The findings revealed a positive relationship between government recurrent expenditure on human capital development and the level of real output. It was recommended that appropriate channeling of the nation's capital expenditure on education and health will promote economic growth. Ohwofasa, Obeh and Atumah (2012) investigated the relationship between government recurrent and capital expenditure on the education sector and economic growth in Nigeria, using the Johansen co-integration technique and error correction model. The co-integration results showed a shot-run negative and long-run positive relationships between the variables. The paper therefore recommended among other things, improvement in government expenditure in educational sector especially on the capital component to boost economic growth in Nigeria. Ifionu and Nteegah (2013) examined the impact of government investments in education on economic growth in Nigeria from 1981-2012. Employing the ordinary least square technique, the paper found that government recurrent expenditure on education had significant implications on economic growth. It recommended an increase in government budgetary allocation to the education sector from the present less than 15% to the United Nations Development Programme /UNESCO recommendation of 26% allocation to the sector, improvement in the welfare of educational staff and regular monitoring of funds and services rendered in the sector to ensure improved standards as possible ways of striving for education growth as well as economic growth in Nigeria.

Omojimite (2011) examined issues dealing with the effectiveness of the Nigerian education sector in meeting the human capital needed for economic development in an era of reforms. The study revealed that the sector lags behind in all the indicators used to assess its effectiveness. The paper recommended major reforms in the sector including increased funding, overhaul of school curricula and introduction of a new incentive structure for school workers. Torruam, Chiawa andAbur (2014) observed that the general view on recurrent and capital expenditure is that it can be growth enhancing. The study used co-integration and error correction technique to check the impact of public expenditure on tertiary education and economic growth in Nigeria. It was concluded that public expenditure on tertiary education has positive impact on economic growth in Nigeria. It was recommended that government and private sectors should partner by mobilizing resources to furnish tertiary institutions and equip them with adequate facilities in order to enhance tertiary education development for sustainable economic growth. Dauda (2009) empirically investigated the relationship between investment in education and economic growth in Nigeria, using annual time series data from 1977 to 2007. The paper employed Johansen co-integration technique and error correction methodology. Empirical results indicated that there was, indeed along-run relationship between investment in education and economic growth and as such, policymakers were advised to enhance educational investment in order to accelerate growth.

An augmented Solow model study by Oluwatobi and Ogunrinola (2011) on the impact of government capital expenditure on education and its effect on economic growth revealed a negative relationship between capital expenditure and growth (real output) in Nigeria. Ohwofasa,Obeh and Atumah (2012) investigated the relationship between government recurrent and capital expenditure on the education sector and economic growth in Nigeria. The study employed time series data spanning 1986 to 2011, using the Johansen co-integration technique and error correction model. The co-integration result showed short-run negative and long-run positive relationships between the variables. On the other hand, capital expenditure on education had a negative impact on economic growth within the period. The paper therefore recommended among other things, improvement in government expenditure in educational sector especially on the capital component to boost economic growth in Nigeria. Modebe, et al (2012) examined the impact of government expenditure on economic growth in Nigeria from 1987-2010 using a three variable multiple regression model and found that capital expenditure exhibited a negative and non-significant impact on economic growth. The study recommended an increase in private sector investment which seems more efficient.

Ifionu and Nteegah (2013) studied the impact of government investments in education on economic growth in Nigeria from 1981-2012 using the OLS technique and found that government capital expenditure on education had significant implications on economic growth. The authors recommended an increase in government budgetary allocation to the education sector up to the United Nation Development Program (UNDP)/UNESCO 26% recommendation, improvement in the welfare of educational staff and regular monitoring of funds and services rendered in the sector. Imoughele and Ismaila (2013) examined the effect of public educational expenditure proxied as recurrent and capital educational expenditure on Nigeria's economic growth using annual time series data from 1980 to 2010. The study employed Johansen co-integration, unit root test and

error correction methodology. The empirical results showed that there is a long run relationship between gross domestic product and educational investment. Also, the study found that capital educational expenditure had direct and insignificant effect on Nigeria's economic growth.

Maku (2009) studied the effect of government spending on economic growth. He employed rail, water and air transport expenditure as well as agriculture, health, housing and road construction as the explanatory variables using time series data from 1990 to 2008. The data was analyzed using co-integration test and vector error correction model. The Johansen co-integration tests revealed that there is no long-run relationship between rail infrastructure expenditure and economic growth. The vector error correction model results indicated that rail infrastructure expenditure adjusted rapidly to changes in total government transport expenditure. Njoku (2005) investigated the effects of transportation infrastructure spending on economic growth in Nigeria over a period of 27 years between 1977 and 2004. The study employed Augmented Dickey Fuller and Phillip Perron unit root tests, Johansen Co-integration and Error Correction Model tests. He found that economic growth (GDP) was not influenced by changes in rail and other transportation expenditure, while works, housing and general administration have positive impact on the GDP. These variables stimulate economic growth in Nigeria both in the short-run and long-run.

Research Gap

A variable gap was observed as none of the previous writers used the main economic drivers of the economy vis Agriculture, Works/Housing/Road Construction, Transportation and mmunication, Education, Health, and Defense for their analysis. These are exactly the variables being used for this investigation. Most importantly, this study adopted at disaggregated approach in its analysis. Most of the previous studies concentrated either on the impact of capital or recurrent expenditure on the studied dependent variable, thereby rendering the results liable to bias. To avoid such bias, both recurrent and capital expenditure are employed for an unbiased analysis and reliable results. Some of the reviewed studies were carried out in other countries outside Nigeria thereby creating a location gap. It is also worthy of note that none of the known previous studies covered the time frame and scope to 2019 but this study did. This study attempted to address all the observed gaps in order to achieve a more balanced research result.

METHODOLOGY

This research methodology embraces the *ex-post facto* research design in analyzing the effects of Federal Government's capital expenditure on the real gross domestic product of Nigeria. For this investigation, the data from the National Bureau of Statistics and the Central Bank of Nigeria's Annual Statistical Bulletins will be the sources of the data to be applied for the study. The data used for the analysis cover the period 1986-2019. The period marked a new phase in the policy matrix of Nigeria as well as the period when the structural adjustment programme (SAP) was introduced in Nigeria. SAP was the vehicle used by the regulatory authorities to implement the new financial liberalization policy of the country.

Model Specifications

$RGDP = (CAGR, CWHR, CTRC, CEDU, CHLT, CDFE)$ (3a)

$RGDP = co + c_1LCAGR + c_2LCWHR + c_3LCTRC + c_4LCEDU + c_5LCHLT + c_6LCDFE + ut_3$ (3b)

RGDP = Real Gross Domestic Product
AGR = Capital Expenditures on Agriculture
WHR = Capital Expenditures on Works, Housing and Road Construction
TRC = Capital Expenditures on Transport and Communication
EDU = Capital Expenditures on Education
HLT = Capital Expenditures on Health
DFE = Capital Expenditures on Defense
ao, bo, co, do, eo, fo, go, ho, io = Regression constant or the Intercept
a_1-a_6; b_1-b_6; c_1-c_6, d_1-c_6; d_1-d_2; e_1-e_2; f_1-f_2; g_1-g_2; i_1-i_2 *= Regression parameters or slope coefficients*
ut_1-ut_7 *= stochastic error*

A priori Expectation

It is the presumption of the Study that expenditure on Agriculture; Works/Housing/Road Construction; Transport and Communication; Education; Health and Defense would contribute significantly to the growth of the Nigeria Economy, which goes in addendum with the alternative hypothesis that was proposed in Chapter one of this study. In order to achieve the objective of the study, the linear regression model is adopted to estimate the impact of government expenditure on real gross domestic product. It is stated as follows:

A-priori expectations: a_1-a_6; b_1-b_6; c_1-c_6, d_1-c_6; d_1-d_2; e_1-e_2; f_1-f_2; g_1-g_2; i_1-i_2 > 0

Estimation and Validation

The ordinary least square (OLS) estimation technique used in the study is only valid as an efficient estimator based on the Gauss-market theory which states that OLS is the best linear estimator (BLUE) of all the unbiased and linear estimators. The Ordinary Least Square (OLS) estimation method would also be employed in obtaining the numerical estimates of the coefficients in the model using E-View 7.0 Output Statistical Software.

Method of Data Analysis

The data met the requirements for the study and so the study proceeded to investigate the relationship between the independent variables and the dependent variable applying the E-view technique. Some diagnostic tests were also conducted on the time series data to attest to their stationarity by applying the ADF technique. Unit root exists in most macroeconomic time series data as posited by Nelson and Plosser, (1982). Ugbaje and Ugbaje (2014), postulated that Time Series data with unit root produce spurious results which may lead to inconsistency in parameter estimates. However, Time series data becomes stationary if it is detrended, to make it become

predictable for forecasting. Finally the Autoregressive Distributed Lags (ARDL) was applied for the coefficient estimations.

The long-run relationship between two variables Y and X will be explained using the ARDL approach. This approach involves first estimating the conditional Error Correction Model (ECM) of the following specification as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \sum_{t=1}^{p} \alpha_1 \Delta Y_{t-i} + \sum_{k=0}^{p} \alpha_m \Delta X_{t-i} + \delta_m X_{t-1} + \varepsilon_t ; t = 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Where Yt is the dependent variable, Xt is the vector of observations of included explanatory variables in equation (4), Δ is the first difference operator, m is the number of regressors and εt is the error term.

The test of the null hypothesis of no co-integration shall be the second step. This shall be done by restricting the coefficients of the lagged level variables equal to zero $H_0 = \partial_1 = 0 = \partial_m = 0$ against the alternative hypothesis that $H_1 = \partial_1 = 0 = \partial_m \neq 0$ using an F-test by estimating equation (1) by OLS. The asymptotic distribution of the F-statistic follows a non-standard distribution under the null of no co-integration as reported by Pesaran, Shin & Smith (2001), provides two stochastic simulations; the lower and the upper critical values. The lower and upper critical values assume that all variables are I(0) and I (1) respectively. If the estimated F-statistic appears larger than the upper bound of critical value, then the null hypothesis of no co-integration is rejected, which suggests that the variables included in the model are cointegrated. If the estimated F-statistic is smaller than the lower bound of critical value, then the decision of the null hypothesis is accepted. Again, if the F-statistic falls between the lower and upper critical value, the decision is inconclusive regarding the null hypothesis of no co-integration (Hoque, Mia &Alam, 2019). The second step is to estimate the elasticity of the long run relationship and determine their values.

Descriptive Statistics

Descriptive statistics are introductory statements which describes, summarizes and arrange the time series data in a manner that it could be easily understood at a glance. Quantitative measures such as the mode, mean, median, maximum, minimum, standard deviation, skewness, kurtosis, Jarque Bera statistics and probability, sum and sum square deviation and number of observations are applied in the descriptive statistics. Median is the middle value (or average of the two middle values) of the series when the values are arranged from the smallest to the largest. The median is a robust measure of the centre of the distribution which is less sensitive to outliers than the mean. Standard deviation is a measure of dispersion or spread in the series. A standard deviation greater than one (1) invalidates the assumption of normality considered crucial for OLS regression analysis. Skewness is a measure of asymmetry of the distribution of the series around its mean. Kurtosis measures the peakiness or flatness of the distribution of the series. If the kurtosis exceeds 3, the distribution is peaked (leptokurtic) relative to the normal but if the kurtosis is less than 3, the distribution is flat (platykurtic) relative to the normal. Data that come from normal distribution

should have a skew equal to zero (0) and kurtosis equal to three (3). Jacque-Bera is a test statistic for testing whether the series is normally distributed. The null hypothesis is that the variable is normally distributed.

Stationarity Test

The statistical analysis of time series data in some respect differ from that of cross- sectional data, especially due to the effect of time and other variables on the time series data. Stationarity test has to be carried out on the data first to determine whether or not the time series data were stationary. Multiple regression analysis with non-stationarity data could yield spurious regression results. If a time series data are it means time series data and the auto covariance at various lags remain constant over time. No matter at what point we measure them they remain time-invariant. Stationary test therefore checks for the stationarity of the variables used in the models. If a variable is integrated of order zero. i.e 1(0), then it is stationaryat level. Thus, test for stationarity is also called test for integration. It is also called unit root test. Stationarity denotes the non-existence of unit root (Omotor & Gbosi, 2007). Various methods are available for testing the stationarity condition of series. The most widely used are: (1) dickey-Fuller (DF) test; (2) Augmented Dickey-Fuller (ADF) test; and (3) Philip Perron (PP) test. The ADF test which is very widely used will be applied for this study.

Augmented Dickey Fuller (ADF) Test

The ADF technique tests the null variables of the model for non stationarity or for the presence of unit root.

Ho: The time series is non-stationary (i.e there is unit root).

Decision Rule

$t\text{-}ADF_{(absolute\ value)} > t\text{-}ADF_{(critical\ value)}$:Reject H_o

Note that each variable will have its own ADF test value. If the variables are stationary at level, then they are integrated of order zero i.e 1(0). Note that the appropriate degree of freedom is used. If the variables are stationary at level, it means that even in the short run they move together. The unit root problem earlier mentioned can be explained using the model:

$Y_i = Y_{t-1} + \mu_1$…… …….(a)

Where Y_t is the variable in question; μ_1 is stochastic error term.

Equation (a) is termed first order regression because we regress the value Y at time "t" on its value at time (t-l). If the coefficient of Yt-l is equal to l, then we have a unit root problem (non-stationary situation). This means that if the regression

$Y_t = L\ Y_{t-l} + \mu_1$…… …….(b)

is solved and L (lag time) is found to be equal to l then the variables Y_t has a unit root (random work in time s cxeries econometrics).

If a time series has a unit root, the first difference of such time series are usually stationary. Therefore to solve the problem, take the first difference of the time series. The first difference operation is shown in the following model.

$\Delta Y_i = (L\text{-}l)\ Y_{t-l} + \mu_t$…… ……...(c)

$\_\_Y_{t-l}+\mu_t$…… ….....(d) .

(Note: = l-l=0; Where L = l; ^Yt= Yt – Y_{t-l})

Integrated of order 1 or1 (1)

If the original (random walk) series is differenced once and the differenced series becomes stationary, the original series is said to be integrated of order 1(1)

Integrated of Order 2 or 1(2)

If the original series is differenced twice before it becomes stationary (i.e. the first difference of the first difference), then the original series is integrated or order 2 or 1 (2). Therefore if a time series has to be differenced Q times before becoming stationary it said to be integrated of order Q or 1(q).

We shall test the stationarity of our data using the ADF test

(vi) Co-integration test k (the Johansen's test)

It has already be warned that the regression of a non-stationary time series on another non stationary time series may yield a spurious regression. The important contribution of the concept of unit root, co-integration, etc. is to force us to find if the regression residual are stationary. Thus, a test for co-integration enables us to avoid spurious regression situation. if there are k regressors in a regression model, there will be k co-integrating parameters. Specifically, co-integration means that despite being individual non stationary, a linear combination of two or more time series can be stationary. Thus co-integration of two (or more) time series suggests that there is a long- run or equilibrium relationship between them (Gujarati, 2003). There is a difference between test for unit root and test for co-integration. The former is performed on univariate (i. e single) time series, while the deals with relationships among a group of variables where (unconditionally) each has a unit root. A number of methods exist for testing co-integration. In this study, we shall use the Johansen's method. If variables are co-integrated, it means that in the long-run the series will move closely together and their short-run disturbances or difference between then will be constant (Omortor & Gbosi 2007). The Johansen's co-integration test was developed in (1995). We shall apply this test in this study.

Reliability/Diagnostic Tests

In compliance with the **Classical Linear Regression Model Assumptions (CLRMA),** the following Reliability tests are conducted, namely, Normality test, Heteroscedasticity test, multicollinearity test, and stability test.

Residual Normality test

The residual normality test is a multivariate extension of the Jarque-Bera Normality test. The essence of this test is to check if the error term follows the normal distribution. A multivariate extension of the JarqueBera test of normality was used. Jarque-Bera compares the shape of a given distribution (skewness and kurtosis) to that of a normal distribution. Acceptable values of

skewness (a measure of the shape of the distribution) falls between -3 and +3 while kurtosis (a measure of the peak and flatness of the distribution) is appropriate from a range of -10 to +10. In general, a large Jarque-Bera values indicates that entire dataset is not normally distributed. For instance, a result of 1 (one) means that null hypothesis has been rejected at 5% significance level and that errors term series do not come from normal distribution. Jarque-Bera hypothesis is as follows:

H0: the error term does not follow a normal distribution

H1 the error term follows a normal distribution

Decision Rule; If the probability of Jarque-Bera is less than 5%, we reject the null hypothesis, and conclude that the error term does not follow a normal distribution otherwise accept and conclude that the error terms are normally distributed.

Heteroscedasticity

White heteroscedasticity (no cross terms) was conducted to verify whether the variance of the error term is a constant variance (or homoscedastic). The hypothesis is

H0: Homoscedasticity

H1: Heteroscedasticity

Decision, reject the null hypothesis if the probability is less than 5% level of significance.

Autocorrelation

Autocorrelation test is used to check if in a regression model disturbance term relating to any observation is influenced by the disturbance term relating to any other observation or whether they are time-dependent.

In this study, Breusch-Godfrey Serial Correlation LM test was conducted in fulfilment of the condition of Classical Linear Regression Model assumption in consonant with econometrics modelling. The decision rule here is that if the probability of Chi-Square calculated is less than the 5% level of significance, were reject the null hypothesis and if otherwise, we accept. While in the Durbin Watson statistic, we accept absence of autocorrelation if it falls into the threshold of 1.6 to 2.4.

Stability test

In an attempt to ensure that the ARDL model is well fitted, the study employs Cumulative Sum of Recursive Residuals (CUSUM) test developed by Durbin, Brown, and Evans (1975). The test decision is that, if the plotted CUSUM statistics lies within 5% significance level, the co-efficient estimates are accepted. This shows that the model is stable and not spurious.

Impulse Response

Impulse Response Test was developed by Davis and Hertlein (1987). This test method was traditionally used for the integrity assessment of pile foundations. In this study, the essence of

impulse-response test is to determine how economy reacts over time to exogenous impulse which economists usually refer to as shocks and is often modeled in the context of a vector auto regression. In the context of this study, impulse-response test is used to determine the impact of different shocks to broad money supply components in the period under review.

Multicollinearity test

Multicollinearity test is carried out here to test the assumption that no independent variable is a linear function of one or more independent variable is not violated. Multicollinearity occurs whenever an independent or predictor variable in a regression model is highly correlated with one or more of the other independent variables in a multiple regression equation. Multicollinearity is a problem because it undermines the statistical significance of an independent variable. The stronger the correlation, the more difficult for the model to estimate the relationship between the dependent variable and the independent variable independently because the independent variables tend to change in unison or combined. Multicollinearity makes it hard to interpret the regression coefficient and it reduces the explanatory power of the model to identify independent variables that are statically significant. Correlation matrix table is used to carry out the test. According to Gujarati (2003), if the pair-wise correlation coefficient between two explanatory variables is in excess of 0.95, then multicollinearity is present.

T-Test

This is a test of significance of the regression coefficients (Gujarati, 2003).

Generally speaking, the test-of-significance is a test of statistical hypothesis. A test of significance is a procedure which uses sample results to verify the truth or falsity of a null hypothesis (Ho). T-Test assumes that Ho: $\beta_1 = 0$ (i.e statistically insignificant). Where β_1 = the coefficient of the model.

The T-Test tests if the coefficients of the variables of the model are significant.

Decision Rule

The decision rule for the T-test of significance is:

$T_{calculated} > t_{(critical\ value)}$: Reject Ho (if otherwise accept H_1)

Note: df=n-k where n=No. of observations

K=No. of parameter estimates

ta/2 =t 0.025

F-test:

F-test tests the overall significance of the models. The F-test determines the overall significance of an estimated model. i.e. it test the goodness of fit of the model (Patterson and Okafor, 2007).

Thus, the f-statistic tests how the overall model fits the relationship between the variables. According to Gujarati (2003), the F-statistic tests the overall significance of a multiple regression.

Decision rule:

Given the k- variable regression model:

$Yi= \beta_1 + \beta_2 X_{2i}+ \beta_3 x_{3i+.....+} \beta_k \ x_{ki} + \mu_1$

To test the hypothesis:

Ho: $\beta_2= \beta_3=....= \beta_k=0$

(i.e all slope coefficients are simultaneously zero) versus

Hi: not all slope coefficients are simultaneously zero

(Such that if

$F_{cal}>F_{a(k-l, n-k)}$: Reject Ho (otherwise accept H_1)

Where:

$Fa_{(k-l, n-k)}$= critical f value at the level of significance and (k-l) numerator degree of freedom (DF) and (n-k) denominator DF. Alternatively, if the p value of F-cal is sufficiently low, Ho can be rejected.

It should be noted that k is the number of variables (both y and x variables) in the regression. If Ho is accepted it means that the model is not satisfactory or no well specified or not a good fit. On the other hand, if Hi is accepted (i.e. Ho is rejected) it means that the overall significance of the model is good enough. Note that F statistic can be computed thus:

$F = \underline{ESS/df}= \underline{ESS/(kl)}$

RSS/df RSS/ n-k)

Where: ESS=Explained sum of squares; RSS=Residual sum of squares K-l = numerator df; n-k = denominator df; k =No. of variables in the regression.

R^2 (Coefficient of Determination)

R^2 is the multiple coefficient of determination (Gujarati 2003). It is conceptually akin to r^2 (the same coefficient of determination used for only the two-variable model. R^2 is used where the variables –both Y and X – are more than two. R^2 gives the proportion or percentage of the total variation in the dependent variable y that is accounted for by the single explanatory variable x). Similarly, R^2 gives the proportion of the variation in y explained by the variables X_2 X_3etc jointly. The higher the R^2 values the better. It lies between 0 and l. If it is l, the fitted regression line

explains any of the variation in Y. If it is 0, the model does not explain any of the variation in Y. The fit of the model is "better" the closer R^2 is to l.

(Note that R is the coefficient of multiple correlations, and it measures the degree of association between Y and all the explanatory variables jointly. It is always taken to be positive, but it is of little importance in practice. The more meaningful quantity is R^2). We shall therefore use the R^2 to determine the extent to which variation in economic growth variable is explained by variations in independent variables.

Autoregressive Distributed Lag (ARDL) Approach

This study employed the Autoregressive Distributed Lag(ARDL) bounds test approach proposed by Pesaran, Shin, and Smith(2001) based on unrestricted error correction model. Compared to other co-integration procedures such as Engle and Granger (1987) and Johansen and Juselius (1990), the bounds test approach appears to have gained popularity in recent times for a number of reasons. First, the endogeneity problems and inability to test hypotheses on the limited coefficients in the long run associated with Engle-Granger method are avoided, that is, it has superior statistical properties on small samples as it is relatively more efficient in small sample data sizes evident in most developing countries. Second, the long run and short run parameters of the model are estimated simultaneously. Third, all the variables are assumed to be endogenous. Fourth, it does not require unit root testing usually employed to determine the order of integration of variables. Lastly, whereas all the other methods require that the variables in a time series regression are integrated of order one, *I*(1), only that of Pesaran, Shin, and Smith(2001) could be used regardless of whether the underlying variables are *I*(0), *I*(1) or fractionally integrated.

Unidirectional Causality: This is a case where X granger-causes Y or Y granger-causes X but not the reverse in each case. This means the causality either runs from X to Y (X→Y) or from Y to X (Y→X) but without the reverse occurring in each case.

Feedback (Bilateral) Causality: In this case the causality runs on both sides but on the condition that the coefficients of the set (variables) are statistically and significantly different from zero in both cases, that is, (X↔Y) and (X↔Y).

Independence: This is the case where the coefficients of the set (X and Y) are statistically insignificant in both regressions. In this case, neither X granger-cause Y nor Y granger-cause X. Y and X represents the dependent and independent variables respectively.

ANALYSIS AND DISCUSSION OF FINDINGS

Table 1: Descriptive Statistics (Capital Expenditures)

	CAGR	CWHR	CTRC	CEDU	CHLT	CDFE
Mean	45.94235	78.41088	31.60324	23.59971	25.19882	23.48794
Median	35.51500	34.95500	8.510000	17.27000	10.91500	13.19000
Maximum	172.5000	402.6000	137.6000	94.20000	97.20000	131.0000
Minimum	0.370000	0.070000	0.350000	0.140000	0.070000	0.020000
Std. Dev.	49.60816	98.07513	38.97704	23.81775	29.67767	30.56804
Skewness	0.884890	1.445384	1.167486	0.983931	1.166558	1.848819
Kurtosis	2.768035	5.021122	3.228627	3.544377	3.342516	6.237281
Jarque-Bera	4.513404	17.62543	7.797850	5.905836	7.877732	34.21606
Probability	0.104695	0.000149	0.020264	0.052187	0.019470	0.000000
Sum	1562.040	2665.970	1074.510	802.3900	856.7600	798.5900
Sum Sq. Dev.	81212.01	317418.1	50133.91	18720.42	29065.22	30835.37
Observations	34	34	34	34	34	34

Source: Researcher's Computation with E-Views

In Table 1 the descriptive statistics follow the same trend except for the skewness, kurtosis and JB statistics. It shows the means and standard deviations of CAGR, CWHR, CTRC, CEDU, CHLT and CDFE as: N45.9 (N49.6b), N78.4b (N98.1b), which indicates that they are asymmetrical and also highly spread apart. More so, only CAGR and CEDU are normally distributed. To correct this, the models were specified in log-linear form.

Table 2: Augmented Dickey-Fuller (ADF) Unit Root Test

Variables		**t-statistic**	**Critical value (0.05)**	**Prob.**	**Order Of Integration**
LCAGR	Level	-1.343529	-2.960411	0.5965	
	1st Diff	-6.964092	-2.960411	0.0000	
LCWHR	Level	-1.520702	-2.954021	0.5109	
	1st Diff	-6.385396	-2.960411	0.0000	*I*(1)
LCTRC	Level	-1.028183	-2.954021	0.7315	
	1st Diff	-5.203992	-2.960411	0.0002	*I*(1)

LCEDU	Level	-2.203955	-2.967767	0.2092	*I*(1)
	1st Diff	-8.295922	-2.957110	0.0000	
LCHLT	Level	-1.465532	-2.954021	0.5382	
	1st Diff	-6.397974	-2.957110	0.0000	*I*(1)
LCDFE	Level	-2.759456	-2.954021	0.0755	
	1st Diff	-13.19206	-2.957110	0.0001	*I*(1)
Dependent Variable					
LRGDP	Level	-0.789372	-2.957110	0.8086	*I*(1)
	1st Diff	-3.140870	-2.957110	0.0334	

Source: Researcher's Computation with E-Views

The result in Table 2 indicates that all the variables are stationary at their first differences, except LEDU and LREDU, which are stationary at level. From the results in Table 2 none of the variables employed in the model has unit roots; and as such can be employed for further econometric analysis.

Table 3: ARDL Bounds Cointegration Test

Model Estimated	Test Statistic	Degree of Freedom	Critical value I(0)	Critical value I(1)	Decision
1	3.924513				
2	10.50894				
3	6.699618				
4	6.278465		10%=2.63	3.35	There is co-integration
5	8.829502	6	5% =3.1	3.87	
6	7.400323		1% =4.13	*5*	
7	8.245123				
8	10.236885				
9	9.477702				

Source: Researcher's Computation with E-Views

In table 3 the F-statistics result of 3.92, 10.51, 6.70,6.28, 8.82, 7.40, 8.26, 10.24, and 9.48 are greater than the 5%critical values of 3.1 and 3.87 at the *I*(0) and *I*(1) bounds, respectively. Thus, the null hypothesis of no co-integration is rejected. Therefore, there is co-integration between

government total, recurrent as well as capital expenditures and real GDP (Models 1, II, III) in Nigeria.

Normality and Reliability Tests for Model III

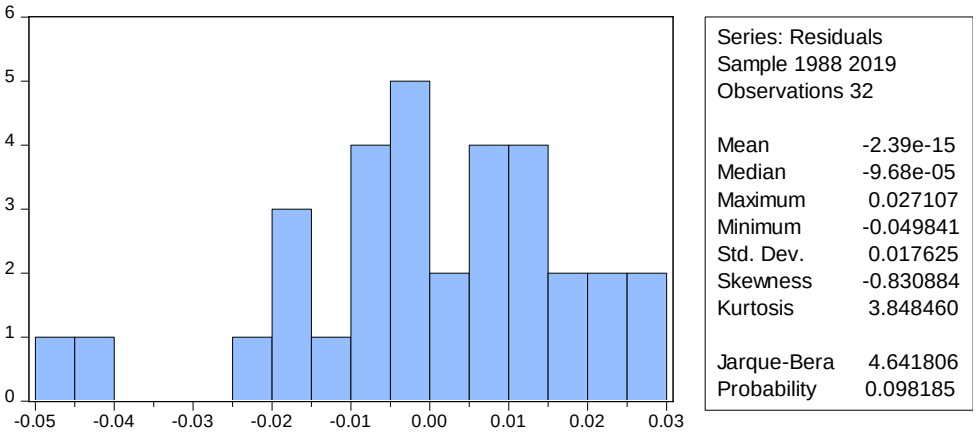

Figure 1: Histogram Normality Test (Model 3)

Source: Researcher's Computation with E-Views

Table 4: Serial Correlation and Heteroskedasticity Tests

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.183242	Prob. F(2,19)	0.3279
Obs*R-squared	3.544218	Prob. Chi-Square(2)	0.1700
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.837874	Prob. F(10,21)	0.5994
Obs*R-squared	9.126314	Prob. Chi-Square(10)	0.5202
Scaled explained SS	5.597758	Prob. Chi-Square(10)	0.8479

Source: Researcher's Computation with E-Views

Table 5: Ramsey RESET Test

	Value	df	Probability
t-statistic	0.520127	20	0.6087
F-statistic	0.270532	(1, 20)	0.6087
F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	0.000129	1	0.000129
Restricted SSR	0.009629	21	0.000459

Source: Researcher's Computation with E-Views

In Figure 5, the Histogram Normality Test indicates skewness and kurtosis of -0.83 and 3.85, respectively. Furthermore, the JB statistic and p-value 0f 4.64 and 0.1, respectively, suggests that the residuals of the model are normally distributed. Similarly, the p-values of the Breusch-Godfrey and Breusch-Pagan-Godfrey F-statistics of 0.3279 and 0.5994, respectively, in Table 4.19 show that the residuals are neither serially correlated nor heteroskedastic. Furthermore, the Cusum and Cusum of Squares Tests in Figures 4 and 5 reveal that the model estimates are stable across the period. More so, the result of the Ramsey Reset test in Table 4.20 revealed F and t-statistics of 0.520 and 0.271, respectively, each with a p-value of 0.6087. Since the p-value is greater than 0.05, we conclude that there are no misspecifications errors in the model, thus suitable for analysis.

Table 6: ARDL Short Run

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LRGDP(-1)	0.908984	0.021380	42.51480	0.0000
LCAGR	0.048490	0.013324	3.639391	0.0015
LCWHR	0.002859	0.004910	0.582263	0.5666
LCTRC	-0.013682	0.009810	-1.394748	0.1777
LCTRC(-1)	0.010253	0.008593	1.193237	0.2461
LCEDU	-0.022566	0.012184	-1.852125	0.0781
LCEDU(-1)	-0.019133	0.013344	-1.433782	0.1664
LCEDU(-2)	0.039731	0.008930	4.449015	0.0002
LCHLT	-0.006459	0.014031	-0.460291	0.6500
LCDFE	-0.013713	0.011613	-1.180785	0.2509
C	2.267296	0.555684	4.080188	0.0005
R-squared	0.998845	Mean dependent var		31.16712
Adjusted R-squared	0.998296	S.D. dependent var		0.518705
S.E. of regression	0.021414	Akaike info criterion		-4.583290
Sum squared resid	0.009629	Schwarz criterion		-4.079443
Log likelihood	84.33264	Hannan-Quinn criter.		-4.416279
F-statistic	1816.851	Durbin-Watson stat		1.951868
Prob(F-statistic)	0.000000			

Source: Researcher's Computation with E-Views

From the result in Table 6, total government recurrent expenditures determine 99.8% of the variations in RGDP. The F-statistic of 1816.9 and p-value of 0.000 indicates that the model has a very high goodness of fit. However, the t-statistics indicates that only CAGR and the two-period lag of CEDU have significant impacts on RGDP. Also, only CAGR and CWHR have positive impact on RGDP.

Table 7: ARDL Long Run Test

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LCAGR	0.532766	0.201161	2.648452	0.0150
LCWHR	0.031412	0.051613	0.608615	0.5493
LCTRC	-0.037674	0.109487	-0.344095	0.7342
LCEDU	-0.021617	0.197682	-0.109354	0.9140
LCHLT	-0.070961	0.155645	-0.455916	0.6531
LCDFE	-0.150666	0.135122	-1.115035	0.2774

EC = LRGDP - (0.5328*LCAGR + 0.0314*LCWHR - 0.0377*LCTRC -0.0216*LCEDU - 0.0710*LCHLT - 0.1507*LCDFE + 10.2727)

Source: Researcher's Computation with E-Views

Estimated Coefficients:

RGDP = 10.2727 + 0.5328LCAGR + 0.031412LCWHR - 0.037674LCTRC – 0.021617LCEDU – 0.070961LCHLT – 0.150666LCDFE + μ

Table 4.22 shows that only CAGR has significant impact on RGDP in the long run. Furthermore, all other variables have negative influences on RGDP except LCAGR and CWHR, which are positive.

Table 8: ARDL Error Correction Regression (Model 3)

ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.267296	0.284771	7.961819	0.0000
D(LCTRC)	-0.013682	0.006236	-2.194176	0.0396
D(LCEDU)	-0.022566	0.007209	-3.130047	0.0051
D(LCEDU(-1))	-0.039731	0.006553	-6.062928	0.0000
CointEq(-1)*	-0.091016	0.011721	-7.765086	0.0000
R-squared	0.756799	Mean dependent var		0.048207
Adjusted R-squared	0.720769	S.D. dependent var		0.035739
S.E. of regression	0.018885	Akaike info criterion		-4.958290
Sum squared resid	0.009629	Schwarz criterion		-4.729269
Log likelihood	84.33264	Hannan-Quinn criter.		-4.882376
F-statistic	21.00478	Durbin-Watson stat		1.951868
Prob(F-statistic)	0.000000			

Source: Researcher's Computation with E-Views

The result in Table 8 reveals that the model adjusts itself backwards with a speed of 9.1% to attain its long run disequilibrium annually. However, only CTRC and CEDU are significant,

Discussion of Findings

To evaluate the impacts of Federal Government's capital expenditures on Agriculture; Works, Housing and Road Construction; Transport and Communication; Education; Health and Defense on the real gross domestic product of Nigeria. The long run estimation results revealed that while CAGR, WHR are positive, CTRC, CEDU, CHLT and CDFE showed negative relationship with RGDP. The findings of CAGR and WHR are in tandem with the findings of Chandio (2016) indicated that public capital expenditure on agriculture has positive and significant impact on economic growth. Furthermore, a study by Tochukwu and Obiwuru (2017) showed that growth of the housing sector has a positive impact on output expansion. On the contrary, Mansell (1999) saw the huge investment on telecommunications as diverting resources from other sectors of the economy that could have greater growth impact, hence negative to economic growth. Taylo (1980) found out that increases in defence spending had a negative impact on economic growth on all developing countries. The observed constraint arising from capital expenditure on defence may be the cause of growing incidents of unabated politically and religiously motivated crises in almost all regions of the country; most of which can be attributed to the dearth of sophisticated technological ammunition to combat crimes, terrorism and insurgency adversely impacted on economic growth and poverty alleviation in the country.

CONCLUSION AND RECOMMENDATIONS

Conclusion

1. WHR, TRC, HLT have positive impacts while AGR, EDU, and DFE showed negative impacts on RGDP. None of the independent variables is significant.

2. REDU, RHLT revealed positive impacts while RAGR, RWHR, RTRC and RDFE exhibited negative impacts on RGDP. All the independent variables established significant impact on RGDP except DFE

3. CAGR, CWHR are positive while CTRC, CEDU, CHLT and CDFE showed negative impact on RGDP. Only AGR showed significant impact on RGDP.

4. RAGR is negative, CAGR is positive and none is significant to RGDP.

5. RWHR and CWHR are all positive and significant to RGDP

6. RTRC and CTRC are all positive and significant to RGDP

7. REDU and CEDU are all positive but none is significant to RGDP

8. CHLT is positive, RHLT is negative but none is significant to RGDP.

9. Both RDFE and CDFE are positive but none is significant to RGDP

10. A comparative analysis of THE aggregate and disaggregate test results revealed that aggregate AGR uni-directionally granger-cause RGDP; RGDP uni-directionally granger-cause CWHR; TRC and RGDP are neutral as no granger causality was established among the variables; only CEDU uni-directionally granger-cause RGDP; only CHLT has shown a uni-directional grange causality with RGDP; on the aggregate DFE granger-caused RGDP ,

Conclusion

The study has proved that output to public expenditure function conforms to Keynesian Multiplier theory that increase in private-public expenditures raises total Gross Domestic Product and incorporated ideas of other well-known theories. Pairwise Granger Causality in corroborating these theories, revealed that all the exogenous factors of money supply act as growth-drivers. The study has further established that a disaggregated FGN expenditure provides a more robust analysis of their impacts on Nigeria's economic growth.

Recommendations

i. The extent of Capital expenditure on TRC should be sustained based on their positive impacts on national real income.
ii. There is need to sustain and increase Capital expenditures on EDU found to contribute positively to RGDP but not significant enough.
iii. While Capital expenditure on HLT needs to be sustained, its capital expenditure should be increased to boost the economy.
iv. Both Recurrent and Capital expenditures on DFE are found to be contributing positively to the economy and should be sustained.
v. Federal government aggregate expenditures on AGR and DFE should be sustained and improved upon as they are found to be growth-drivers to the real economy. However, the observed growth-constraints among variables in this sub-head should be addressed. Furthermore, the rest variables observed to retard economic growth should be addressed for an improved economy and forestall waste of national income.

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