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Capital Expenditure and Gross Fixed Capital Formation: An Application of Auto Regression Distributive Lag (ARDL) Model

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Abstract

This study examined the effect of capital expenditure on gross fixed capital formation in Nigeria using the Auto Regression Distributive Lag (ARDL). Gross fixed capital formation was modeled as a function of Capital Expenditure on Administration, Capital Expenditure on Economic Service, Capital Expenditure on Social Service and Capital Expenditure on Transfer Payment. The findings of the study confirm the expectation of the results and other empirical studies and therefore conclude that there is significant short and long-run relationship between public administration expenditure, economic services, social and community services on gross fixed capital formation in Nigeria. From the regression summary, the study concludes that there is significant relationship between capital expenditure and the gross fixed capital formation in Nigeria. The study recommended that public capital expenditure significantly affect the growth of Nigerian gross fixed capital formation positively. That public expenditure should be increase and directed toward the productive sector of the economy. Full implementation will expand the positive impact of public expenditure on the growth of Nigerian gross fixed capital formation positively; we recommend that the capital expenditure should wholly be implemented to avoid scarcity of financial resources in the economy.

Keywords: *Capital Expenditure, Gross Fixed Capital Formation, Auto Regression Distributive Lag (ARDL)*

INTRODUCTION

Capital investments in infrastructure are the key to economic growth because this would help reduce cost of investment and production. The idea of not funding important public projects and privatizing should be discouraged because the economy is not ripe for such harsh policies. Capital formation, in other words, involves the increase of capital assets by efficient utilization of the available materials and human resources of the country (Gbenga & Adeleke, 2013). It is the increase in the stock of both material and human capital by making available a part of society's currently available resources. It results when some proportion of society's present income is saved and invested in order to increase material as well as human capital. The meaning of capital formation is that society does not apply to the needs and desires of immediate consumption but directs a part of it in the making of capital goods, tools and instruments, machines and transport

facilities, plants and equipment, all the various forms of real capital that can so greatly increase the efficiency of productive effort (Owolabi & Ajayi, 2013).

Capital formation in Nigeria has been characterized by fluctuations which may be responsible for lack of inadequate social infrastructure such as roads, power supply and health facilities (Lucky & Uzah, 2016). The speed and the strength of economic growth in Nigeria have not been satisfactory which contributes equally to the decline in capital formation over time (Oloyede, 2001). By implication, the initial optimism expressed about public sector reforms has not been met as Nigeria continues to be confronted with low rate of economic growth. The rate of infrastructure development is very slow in the country which hinders foreign and domestic investment (Bakare, 2011). The skills of labour are poor and technological backwardness hampering the process of new inventions and innovations (Ajao, 2011). Hence, low capital accumulation is the main obstacle faced in achieving the goal of sustained economic growth in Nigeria (Okonkwo, 2010). The above scenario is quite disturbing and is far from being satisfactory and obviously point towards an ailing economy.

Capital formation in Nigeria is measured in monetary term and is referred to as gross fixed capital formation. Gross Fixed Capital Formation (GFCF) is a macroeconomic concept used in official national accounts. Statistically it measures the value of acquisitions of new or existing fixed assets by the business sector, governments and "pure" households (excluding their unincorporated enterprises) less disposals of fixed assets. GFCF is a component of the expenditure on gross domestic product (GDP), and thus shows something about how much of the new value added in the economy is invested rather than consumed. GFCF is called "gross" because the measure does not make any adjustments to deduct the consumption of fixed capital (depreciation of fixed assets) from the investment figures. The determinants of capital formation according to Lucky and Uzah (2017) include government capital expenditure, financial sector development, credit to private sector, commercial banks' lending rate, exchange rate, inflation rate, external debt government revenue, terms of trade and operating surplus

Government capital expenditures are funds used to develop buildings, machinery, equipment, educational and healthcare facilities. It covers the costs incurred by the government to make investments that will yield dividends in the future and to acquire fixed assets. Spending on development or investment has benefits that last for years in the future, and these expenditures are referred to as capital spending. Purchasing fixed and intangible assets, improving an existing asset, fixing an existing asset, and loan repayment are all considered capital expenditures. Repaying a debt is a capital expenditure because it reduces obligation in addition to creating assets. The long-term character of capital investment, which results in the formation of assets, enables the economy to generate income for many years by expanding or upgrading manufacturing facilities and increasing operational effectiveness. Additionally, it raises labor force participation, assesses the state of the economy, and increases the economy's potential for future growth. Government spending continues to be a crucial tool in the development process. At all stages of growth and development, it is crucial to the operation of any economy.

According to statistics made available by CBN (2023), the average amount of government capital expenditure increased from 1981 to 2021. After the pandemic has been entirely contained, one

would reasonably anticipate that responsible governments would exercise greater caution in crucial economic sectors while purposefully paying closer attention to those that were most severely affected by its impacts. Public expenditure, a potent instrument in the toolbox of fiscal policy, can be used to not only reroute production but also to encourage and stimulate production through innovation, which will then lead to expansion in production, which will enhance output and employment. The federal government of Nigeria spent 12,164.1 billion naira in 2021 compared to 10,231.7 billion naira in 2020, an increase of 18.87%. Government deficit spending increased from 6,248.6 billion naira in 2020 to 7,118.7 billion naira in 2021, an increase of 13.9%, but it still does not leave much to be desired (CBN, 2023). Even after the pandemic is over, all economic indicators continue to fall, and markets kept contracting as output plunged. It is clear that the main goals of government spending, such as the provision of public goods and resource redistribution, are still far from being met. This study examined the effect of capital expenditure on capital formation in Nigeria which is lacks citable significance in Nigeria.

LITERATURE REVIEW

Capital Expenditure

Capital expenditure concerns the expenses incurred by government for its own maintenance, the maintenance of the society and the economy at large. Expenditures incurred for helping countries form a part of total capital expenditure. The starting point of the theory of public expenditure is the failure of the market mechanism to respond fully to the true needs of the society. In other words, market mechanism is not able to bridge the gap between private and social goods on the other hand. Furthermore, the public sector considers it relevant to protect the economy from the evils of market mechanism such as labour exploitation, economic and social injustice and the like. The public sector is on expanding the supply of merit goods and forcing the consumption upon the members of the society. Thus, theory of capital expenditure started attracting increasing attention with the advent of welfare economics in which the role of the state was explicitly recognized and in which budgetary operations assumed a significant role. This tendency has been further reinforced by the widening interest of economists in the problems of economic growth, planning regional disparities, distributive justice and the like (Okpara, 2002).

Canon of Public Expenditure

Economists have propounded principles of public expenditure that should govern the expenditure decisions of the government. These principles are necessary for administrative safeguards and helping the economy in their diverse objectives.

Canon of Economy

Just like human wants, which are unlimited and have scarce means of satisfying them, the wants of the economy at large are unlimited and resources for satisfying the needs are scarce. Consequent upon this, the economy of the resources is necessary so that wastage of any sort should not be allowed. The concept of public expenditure is more complex in that it has a wider coverage and requires planning which must be executed timely to avoid loss of benefits. In case of family

planning or delayed execution, rooms may be created for price rising and hence inflation that may exacerbate project costs and lead to loss of benefits (Okpara, 2002).

Canon of Sanction

This principle states that no fund should be used without proper approval or authorization by the authority. Moreso, funds should be used only for the purpose for which they have been sanction. In a democratic set-up, it is the legislature that sanctions the expenditure on demand by the executive authorities. This should he so to avoid unscrupulous and unwanted expenditure and also to check misappropriation of funds Akpan (2005). Detailed authorization are worked out in stages that at each stage, the spending unit has to have the sanction of the appropriate authorities to ride on with the spending. To avoid red-tapism, which might otherwise arise in case of additional funds, certain flexibility is originally granted by the legislature in a number of cases up to a margin. This will help to hasten up the execution of the project since the process of securing additional finance, which could have otherwise constituted a problem, has been eased. Thus, the major concern of canon of sanction is to make sure that funds are approved before committing it to a project and that the approved fund are used only for the purpose by which it is meant. The aim for this is to check misappropriation of fund against unfounded projects. Canon of sanction is important and should be followed up by careful supervision of the work for which the form is approved Oyinlola (1993). In Nigeria, many projects are uncompleted even after disbursing the fund and yet it will be announced over the wireless that the project has been completed. This is too common with the politicians heading the local governments and in some cases, the state governments.

Canon of Benefit

The means of employing scarce resources have alternative uses. Economic agents, therefore, resort to scale of preference and have a priority list. The priority list is drawn from the benefits, which will accrue from sets of projects. Thus the canon of benefit states that the public expenditure should be incurred only if it is beneficial to the society. The benefit of a project that warrants expenditure is judged from its effects on income, wealth distribution, production, employment and so on. If the project can directly or indirectly contributes to there are of the society, the project is viable and could be undertaken. The canon of benefit, therefore, leads the authorities to observe the principles of maximum social advantage. On the contrary, projects or any undertaking, which shall not benefit the society or be a takeoff for the societal benefit, should not deserve government expenditure (Ogiogio, 1995).

Canon of Surplus

This canon provides that the current expenditure of the government should be met out of the government current revenue. Deficit budgeting should he avoided as much as possible. The government should be prudent enough in its spending to avoid over-spending that might otherwise lead it to incurring debt. It could be better for the government to direct efforts at achieving a moderate surplus over the years. Such moderate surpluses will be recalled at the periods of unavoidable deficit4inancing to offset the conceived deficit plan.

Capital Expenditure and Production and Distribution

A developed market economy having enough flexibility may he suffering from a deficiency of effective demand. Public expenditure can add to the effective demand directly and this generates conditions favourable for the market forces to push up production. Such public expenditure is not meant to add to the supply side of the market at the same time. It is just a means of disbursing purchasing power in order to add to effective demand. This technique can only be effective at a less than full employment otherwise money income will increase without a corresponding increase in the real income since real income depends on the use of real resources. The repercussion effects will be inflationary pressures if demand is pushed beyond full employment. It should also he noted that even at less than Ml employment, the inflationary pressure might set, in if.

The government is not selective in its expenditure. This is so because effective demand resulting from public expenditure may not proportionately stimulate increased production because of various rigidities, which the developed economy may suffer. For instance, some industries may not have unutilized excess capacity. When demand goes up, monopolistic practices may he in vogue and there can be strong militant trade unions. Under different technical constraint and other types of rigidities, the economy may not be able to respond fully to increased demand. Consequently, there may be a partial increase in production, which does not match the effective demand and hence can be quite inflationary beyond limit. The situation is a bit different in a developing economy being characterized by a low level of saving and investment. The deficiency of demand in the developing economy may be remedied by stimulating private saving and investment or through direct public saving or investment or both. The developing economies lack social overheads, skilled labour, capital equity and basic industries.

Public expenditure can he directly used to create trade. Also, public expenditure is useful in correcting externalities and regional disparities. In Nigeria, some states are termed educationally disadvantaged States and get lion share of the expenditure on education so as to spring them up. Public expenditure can he used to provide the necessary economic infrastructure for the development of selected economic activities and can he used to give subsidies for increasing their profitability. For instance, public sector investment can he specifically directed towards creation of particular supplies and facilities, which form important and necessary input for other industries. In such a case, shortages and bottlenecks in the way of production are removed.

Public Capital Expenditure and Economic Stabilization and Growth

Stabilization policy aims at controlling cyclical fluctuations, achieving and maintaining full employment consistent with economic growth arid stabilizing the price level so as to avoid secular stagnation and inflation Gbosi (2007). Fiscal policy is one of the math instruments of stabilization and all variants of fiscal policy involve government expenditure. Public expenditures can be compensatory or pump- priming. Compensatory public expenditure is resorted to for the purpose of compensating the decline in private investment. Any shrinkage in private investment expenditure is offset by public expenditures on public works and relief measures. Public works are durable goods and primary fixed structures provided by government. They include roads, airports, railroads, post offices, canals, dams, sewage systems, schools and hospitals, etc. Relief measures

are the social security payment like relief payment, subsidies, unemployment benefits, insurance, pensions, etc. When private investment shows signs of decline and there is likelihood of recession, the government immediately takes up public works programme and increases its expenditure on relief measures, invariably, this stimulates employment and leads to the rise in aggregate demand, output and income in the multiplier sequence.

Conversely, expenditure on public works and relief measures may be gradually reduced as the economy shows sign of recovery. In case of inflationary pressures, they may be completely stopped. Pump- priming is a variant of public expenditure. It involves the public expenditure in modest and temporary basis to 'prime the pump' of economic activity which will, sooner or later, operate on its own motive power and bring the economy to the path of steady economic growth without further public spending. Public expenditure can be used to provide subsidies for that investment, which are commercially non-viable but are very helpful for economic growth

Reasons for the Growth of Public Capital Expenditure

Technical Change

Technological change may significantly affect the share of social goods in an efficient product mix. These changes in technology may be such that they increase or decrease the relative importance of goods whose benefits are largely external, and which must, therefore, be provided by government Ezirim (2005).

Relative Cost of Public Services

As the rate of inflation in the price of inputs or goods purchased by the public sector increases, the nominal expenditure of the government also increases. In other words, if the cost of public services rises, a greater level of the expenditure will be needed to maintain services in real terms. Changes in the ability of government to finance will also affect the growth of public expenditure. A government is more readily yielding to an increase in the demand for public services when its capacity to finance services rise than when is low.

Population Change

Population changes may also be a major determinant of public expenditure share. Changes in the rate of population growth generate changes in age distribution, and this trend is reflected in expenditures for education as well as care for the aged. That is to say that more schools, hospitals and such other similar services have to be provided to meet the extra needs of the growing population.

Demonstration Effect

The demonstration effect of welfare services provided may raise the level of expenditure relative to gross domestic product (GDP). For instance, if Nigeria introduces insurance (e.g., the National Health Insurance) scheme for all its workers, the government of Senegal may be pressurized to taking the measure, consequently increasing the Senegalese government expenditure relative to income. The granting of independence to some African and Asian countries was relative to their

income. Not only did the attainment of independence came with a high level of consumption expenditure but also heralded a new mood in the political awareness, which increased the demand for public services.

Displacement Hypothesis

Finally, one of the strongest causes of the rising expenditure output ratio is the displacement hypothesis propounded by Jack Wiseman and Allan Peacock. According to this hypothesis, expenditures are related to revenue, which in turn, is a function of national crisis. They maintained that public expenditure does not increase in a smooth and continuous manner, but in jerks and step-like fashion. At times, some social or other forms of disturbance take place, which at once shoes the need for-increased public expenditure, which the existing public revenue cannot meet. The government and the people immediately review the revenue position and the need to find a solution of the required adjustments to finance increased expenditure. Through this agreement, a new level of tax tolerance is attained. This movement from the older level of expenditure and taxation to a new and higher level is the displacement effect (Ezirim, 2005).

Capital Formation

Capital formation is defined as the process of building investable assets of value, the increase in wealth or the creation of further wealth. Capital formation is not savings though savings may be a process of capital accumulation because accumulation deals with the increase in stock of real investments and not all savings are necessarily invested. The increase in investment through non-financial assets has been held to increase value to the economy and the increase in the gross domestic product through further increase in employment (Adekunle & Aderemi 2012; Akani, Lucky & Anyamaobi, 2016). The Central Bank of Nigeria (2007) defines capital formation as the total change in the value of fixed assets in the economy in addition to fixed assets either for replacing or adding to the stocks, it refers to the increase in the fixed capital stocks of the capital formed.

Capital formation is a complex process of channeling domestic generated or externally mobilized resources into private use. The intensity and the growth of capital formation is driven financial intermediaries as well as the institutional, political and social environment of the country. The relationship between financial intermediation and capital formation has been thoroughly analyzed in the theoretical and empirical literature. The conventional wisdom of the classical economists about these links is that monetary financial intermediation is a major determinant of long-term economic growth, which in turn is related to the conjecture that in the long run there must exist an expected positive return on the capital formation (Ahmed & Miller, 2000).

Wagner's Law of Increasing State Activities

The Adolf Wagner's law of ever-increasing state activity is a dominant theory of fiscal spending behaviour in public finance that examined the cause of growth in government expenditure over time. The German economist, Adolf Wagner (1893) advocates the "law of rising public expenditure" on the basis of empirical findings and came up with the proposition that there is a long run tendency for government activities to grow relative to the growth in national income.

According to him, government expenditure must increase at a rate faster than national output. According to Wagner, the operations of different tiers of government, such as the federal and state governments, have an intrinsic propensity to expand and intensify. As time passes, successive levels of government take on additional responsibilities. This implies that the scope of public-sector operations has been broadened. Extensive growth in government services may be defined as the process of introducing new operations. Intensive expansion in public activity, on the other hand, refers to governments' inclination to fulfill both existing and new tasks more effectively and thoroughly (Jaén-Garca, 2018). Wagner explains three reasons why state engagement in the economy is increasing:

a) Increasing the complexity of legal relation and communications; increased urbanization and population density; substitution for the public service for a portion of private sector activities;

b) Increasing demand for education, leisure, more equal distribution of revenue and more public services;

c) State neutralization of private monopolies and, in some cases, the creation of monopolies by the state itself (Jaén-García, 2018).

The criticism of Wagner's law was based on the argument that Wagner was contemplating long run tendency rather instead of short run variations in government spending. That since his study was relied on chronological knowledge, the exact quantitative association between the magnitude of rise in state outlay and the duration taken was not determined logically (Eze, 2016). According to Dutt and Ghosh (1997), Wagner did not present any mathematical form in order to examine his hypothesis and he also was not explicit in the formulation of his hypothesis. Another criticism of the Wagner's theory is that it did not contain a well-articulated theory of public choice (Bird, 1971). In spite of all the criticism of Wagner's Law, it will continue to play an important role in the study of fiscal policy (public expenditure behaviours). According to Wagner's Law, there is a functional relation between the growth of an economy and the government fiscal activities with the result that the government sector grows faster than the economy.

Fiscal Policy in Keynesian Theory

1n 1936, Keynes published his book the general theory of employment, money and interest rate". He attacked the classical thinking regarding the neutral role of government and balanced budget. According to Keynes, monetary policy is powerless during recession because it depends on reducing the interest rate which is already very low. Also, the price adjustment mechanism is powered by income adjustment mechanism. During recessions, the individual's income falls so, they will tend to decrease their both consumption and saving and the same for businesses. They will tend to decrease investment and production. As a result, the price adjustment mechanism will take the economy to more recession rather than to full employment.

Keynes provides a solution for government to pull the economy out of recession. He believes that government can implement some policies that can positively affect the economy. In other words, Keynes believes that government should have bigger role in the economy. The economy cannot be left to the price adjustment mechanism which is powerless in his point of view. He states that

waiting for eventual recovery is fruitless because in the long run we all dead. The key concept of Keynesian analysis is aggregate demand which is affected by public and economic decision in both private and public level.

Fiscal Policy in the Neoclassical Theory

In the neoclassical models, prices and wages are flexible, workers can adapt their expectations at the level where real prices equal to expected prices, there is a perfect competition and full employment in the market and the supply curve has a negative slope in the short run. The main implication from the aforementioned assumptions is that we cannot rely on fiscal policy for the stabilization of the economy. According to Lucas (1975), there is no effect of fully anticipated fiscal policy either in the short run or in the long run, however, an unanticipated fiscal policy resulting from surprise of the government or imperfect information can affect the short-term growth. In other words, the fluctuations of the output occur as a result of supply side shocks and not because of aggregate demand shocks. Perotti (2007) suggests that fiscal expansion has a negative wealth effect on individuals because they reduce their private consumption and increase the labor supply in order to counterbalance the negative impact on their permanent income.

Neo-Classical Theory of Fiscal Policy

The position of the Keynesian school of thought on the possible effects of fiscal deficits on economic activities was dully challenged by the neoclassical school of thought. This challenge was on the premise that the Keynesian school ignores the significance of how fiscal deficits are financed and the effect of this policy variable on macroeconomic performance. That is, the neoclassical school postulated that the manner, in which deficits are financed, is capable of influencing the level of consumption and investment, and by extension affect economic growth. However, one of the labels attached to the neoclassical argument was the Ricardian equivalence. The Ricardian equivalence states that consumers foresee tax cut today, paid for, by deficit and borrowing would lead to a tax increase in the future. In anticipation of the future tax increase, consumers save rather than spend the income from tax cut. If the Ricardian equivalence holds, therefore, then reduction of fiscal deficit will not affect the level of consumption or balance of payments in the economy and the basis for deficit reduction as part of stabilization programmes, is no longer in existence (Tchokote, 2001).

Rational Expectations View of Fiscal Policy

When agents form rational expectations, permanent changes in fiscal policy modify their expected permanent income, while transitory fiscal changes do not affect it at all. Since agents bring forward the long-term effects of fiscal policy to the present, short-term effects become relevant (Briotti, 2005). In particular, if agents expect that an initial increase in interest rates and/or an appreciation of the exchange rate, following fiscal expansion, will continue or even become larger, crowding-out effects will be augmented and the fiscal multiplier may become negative (Krugman & Obstfeld, 1997). Under such circumstances, a weak Keynesian effect is dependent on the effects of policy measures being permanent, with the transmission to aggregate demand being through the permanent income hypothesis.

Ricardian Equivalence View of Fiscal Policy

The Ricardian Equivalence implies the irrelevance of the government's financing decisions vis-à-vis taxes and debt (Barro, 1974). The key issue is that the economy is influenced only by the quantity of government expenditure (purchases in the basic model) and not by whether such expenditure is financed by higher taxes or debt. The Ricardian Equivalence view states that fiscal expansion prompts expectations of future fiscal contractions, in order to repay for the initial loosening (Briotti, 2005). The reduction in government saving brought about by an initial tax cut will therefore be fully offset by higher private saving and bequests, adopted by households and firms as precautionary behaviour. Consequently, changes in aggregate private demand will reduce or even bring to zero the multiplier effects of the fiscal expansion on the economy.

The link between fiscal policy and consumption is based on the permanent income hypothesis. Since, under the assumptions that give rise to Ricardian Equivalence, permanent income and aggregate demand are not affected by inter-temporal changes of fiscal policy, the fiscal multiplier is zero. However, it should be emphasized that for the Ricardian Equivalence property to be met, a number of crucial assumptions must be satisfied, e.g. perfect capital markets and the absence of liquidity constraints, perfect foresight, altruistic and forward-looking agents, and lump-sum taxes (Briotti, 2005). The robustness of Ricardian Equivalence can therefore be questioned on the basis of the reality of the underlying assumptions (Briotti, 2005). The introduction, in turn, of alternative assumptions, such as myopic agents, a finite life, liquidity-constrained consumers, imperfect capital markets and distortionary taxation, makes a positive multiplier once again likely.

Demand-Side Effects of Fiscal Policy

Under excess capacity and price rigidity, the fiscal multipliers of Keynesian theory are greater than one and the balanced budget multiplier will be precisely one. (The balanced budget multiplier occurs when an increase in expenditure is matched by an increase in taxes.) The size of the multiplier rises with consumption responsiveness to current income, i.e. the marginal propensity to consume. For that reason, a tax cut multiplier is generally assumed to be smaller than that for a spending multiplier (Hemming, Kell & Mahfouz, 2002).

However, in reality, we do not expect fiscal multipliers to have their simple Keynesian multiplier effects. Fiscal multipliers are affected by what are referred to as "crowding out" and "crowding in effects. The term crowding out refers to the displacement of private economic activity by public investment initiatives (Buiter 1977). The efficiency of fiscal and monetary policy can be measured by the degree of crowding out. The smaller the fiscal multiplier effect of these policies on the aggregate output, the greater is the degree of crowding out, and vice versa. Since Adam Smith's systematization of the existing knowledge of economic theory in 1776, these offsetting effects have been attractive to economists. For example, Smith (1776) mentions such effects as perversions of the productive resources of the economy. Keynes (1936) refers to the adverse reactions to public investment, the congestion and the diversion of resources from the normal channels of economic activities. Meanwhile, the counteracting effects of public works were mentioned by (Kahn, 1931).

Empirical Review

Uremadu (2008) explored the possible determinants of capital formation in Nigeria for the period 1980- 2004. Empirical results showed a positive influence of cumulative foreign private investment (CFPI), Index of energy consumption (INDEXEC) and total banking system credit to the domestic economy (BSTCr), and a negative influence of gross national savings (GNS), domestic inflation rate (INFR), maximum lending rate(MLR),foreign exchange rate(EXCHR) and debt service ratio(DSR) on capital formation. It was discovered that foreign exchange rate leads to capital formation in Nigeria, followed by index of energy consumption and then debt service ratio. Akujuobi (2008) writing on the topic "Foreign Direct Investments and Capital Formation in Nigeria, posit that, FDI, is a significant positive contributor to the overall capital formation efforts in Nigeria. Donwa and Odia (2009), considered the impact of globalization on the gross fixed capital formation in Nigeria from 1980 to 2006.Using the ordinary least square, it was found that globalization proxied by trade openness was negatively and insignificantly related to gross fixed capital formation. In other words, globalization has not helped in assisting fixed capital formation. Foreign Direct Investment and Gross Domestic Product were positive and significant while exchange rate had a negative impact on GFCF. Interest rate had positive and insignificant relationship with GFCF.

Aiyedogbon (2011) explored the relationship between military expenditure and capital formation in Nigeria. Findings of the study revealed that military expenditure (Milex) and lending rate have negative impact on gross capital formation (GCF) in Nigeria in both the short- and long-run. The GDP is positively significant in the long run while it is positive and insignificant in the short run. Ezekwesili (2012) was of the opinion that Nigeria's poor capital formation comes from low education development of the people. She reiterated that, the resurgence of entrepreneurial spirit based on hard work and sound education are the panacea or critical factors to changing Nigeria. Orji and Mba (2012) studied the relationship between foreign private investment, capital formation and economic growth in Nigeria using a two-stage least squares (2SLS) method of estimation. The study finds that the long run impact of capital formation and foreign private investment on economic growth is larger than their short-run impact. The last is yet to be heard on the concept of gross fixed capital formation in Nigeria. The above studies only served as reference material for future and further works.

Lucky and Uzah (2016) examined factors that determine Nigerian capital formation. The objective was to test Jhingan's propositions for sources of capital formation in Nigeria. Time series data were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin. Nigerian Gross Fixed Capital Formation (GFCG/GDP) was modeled as the function of Broad Supply (M2/GDP), Credit to Private Sector (CPS/GDP), Gross National Savings (GNS/GDP), Commercial Banks Lending Rate, Exchange Rate (EXR), Inflation Rate (INFR), External Debt (EXTD/GDP), Public Expenditure (PEX/GDP), Government Revenue (GR/GDP), Terms of trade (TT/GDP) and Operating Surplus (OPS/GDP). Cointegration Test, Augmented Dickey Fuller Unit Root Test, Granger Causality Test and Vector Error Correction Model were used to test the dynamic relationship between the variables. Findings proved that M2/GDP, GNS/GDP, EXR, EXTD/GDP, TT/GDP have negative and insignificant effect on capital formation while CPS/GDP, LR, INFR, PEX/GDP, GR/GDP and OPS/GDP have positive and insignificant effect. The model summary

revealed 86.0% explained variation and f-statistics 12.38458 probability of 0.000004. The study concludes that the variables have significant impact on Nigerian Gross Fixed Capital Formation and confirm the Jhingan's proposition.

Lucky and Elfreda (2024) examined the effect of cost of governance on deficit financing in Nigeria using the Auto Regression Distributive Lag (ARDL). Deficit financing was modeled as the function of Cost of general administration, cost of defence, cost of internal security and cost on national assembly. The study found that cost of general administration added 4.3 percent, cost of internal security added 7.8 percent, cost of defence added 2.1 percent while cost of national assembly added 22.2 percent at lag 1. From the above, the study concludes that cost of national assembly added the largest to deficit financing in Nigeria. The study recommends policies to reduce the cost of governance in order to manage the increasing rate of deficit financing in Nigeria. Kanu, and Nwaimo (2015) explored the relationship between capital expenditures and gross fixed capital formation in Nigeria. The study made use of secondary data covering the period 1981 to 2011. A least square regression analysis was carried out on a time series data, and to avert the emergence of spurious results, unit root tests were conducted. Other econometric tools of co-integration, Vector Auto Regression technique as well as Granger causality tests were deployed to ascertain the order of co integration and the level of relationships existing between the dependent and independent variables. Findings of study reveal that while Capital Expenditures (CAPEX) maintained a negative significant relationship with Gross Fixed Capital Formation (GFCF) in Nigeria at both 1% and 5% Alpha levels; Imports and National Savings had a positive significant relationship with GFCF at both the short and long runs. It was equally observed that the lagged value of GFCF had no significant impact on GFCF in the preceding year. Outcome of study did not come as a surprise, seeing that a functional classification of Nigeria's expenditure profile for the period under review reveals that; outlays on capital expenditure accounted for only about 32% of total expenditures, while the remaining balance of 68 % went to recurrent expenditures. That is certainly not good enough for a nation that is aspiring to grow. No nation has ever treaded the path of growth with this burgeoning level of recurrent expenditures. This, calls for caution and a national rethink! This paper concludes that for sustainable gross fixed capital formation to be achieved, the federal government of Nigeria should cut down on her recurrent expenditure profile in favor of an increased CAPEX. Our macroeconomic projections should guide the overall level of expenditures. There is need for a policy shift from our present protective-sectors - dominance to productive- sectors –dominance. Again, efforts must be made to mobilize the desired level of gross national savings that could attract foreign direct investments. Lastly, government is also advised to work on her potentially exportable goods and services that are needed elsewhere in the larger world and to reduce the level of inflationary trends.

METHODOLOGY

The study was carried out through a time series research aimed at establishing the relationship between various components of capital expenditure and the gross fixed capital formation. The study adopted quasi-experimental study for a research design. According to Sekaran (2003) quasi-experimental study is undertaken in order to ascertain and describe characteristics of the variables of interest in a situation. Quasi-experimental research is as a formal, objective, systematic process

to describe and test relationships and examine cause and affect relationships among variables. Thus annual capital expenditure reports were used to determine the variables for twenty four years. The secondary data were obtained from the yearly Central Bank of Nigeria reports which include components of capital expenditure such as capital expenditure on administration, social service, community and economic service and transfer payment and gross fixed capital formation. Data analysis is the process which starts immediately after data collection and ends at the point of interpretation and processing (Mugenda & Mugenda, 2003). Data analysis was carried out as regression. Regression analysis was used to come up with the model expressing the relationship between capital expenditure and gross fixed capital formation

Model Specification

The Multiple Regression equation for this study was computed as follows:

$Y = f(CEXA, CEXCE, CEXSS, CEXTP)$ (1)

$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$

Where:

Y = Dependent Variable proxy by gross fixed capital formation to Gross Domestic Product.

$CEXA(X_1)$ = Capital Expenditure on Administration

$CEXCE(X_2)$ = Capital Expenditure on Economic Service

$CEXSS(X_3)$ = Capital Expenditure on Social Service

$CEXTP(X_4)$ = Capital Expenditure on Transfer Payment

ε = Error Term

α = Regression Intercept

The multiple regression function above was used to investigate the effect of each of the independent variable on the dependent variable at the same time and of the same set of analysis. The change in value of β was the degree of effects on Y (growth of industrial sector) and the positive (or negative) sign of the value was to imply the direction of effects, the higher the value β for a particular variable, the higher the effects of that variable on the dependent variable Y.

Stationarity (Unit Root) Tests

The study investigates the stationarity properties of the time series data using the Augmented Dickey Fuller (ADF) test. According to Nelson and Plosser (1982) and Chowdhury (1994) there exists a unit root in most macroeconomic time series. While dealing with time series, it is necessary to analyze whether the series are stationary or not. Since regression of non-stationary series on other non-stationary series leads to what is known as spurious or nonsense regression causing inconsistency of parameter estimate. If a time series is non-stationary, we can study its behaviour only for the time period under consideration, and cannot generalize it to other time periods, and hence remain of little practical value if we intend to forecast (Gujarati, 2003). It should be noted that a time series is a set of observations on the values that a variable takes at different times (daily weekly, monthly quarterly, annually). Stationary test therefore checks for the stationarity of the variables used in the models. If stationary at level, then it is integrated of order zero i.e. 1(0). 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. We shall therefore subject all the variables to unit root test using the augmented Dickey Fuller (ADF) test specified in Gujarati (2004) as follows.

$$\Delta y_t = \beta_1 + \beta_2 + \delta y_{t-1} + \alpha i \sum_{i-1}^{m} \Delta y_{t-1} + Et \quad (3)$$

Where:

Δy_t = change time t

Δy_{t-1} = the lagged value of the dependent variables

Σ_t = white noise error term

If in the above $\delta = 0$, then we conclude that there is a unit root. Otherwise there is no unit root, meaning that it is stationary. The choice of lag will be determined by Akaike information criteria.

Co-integration Test (The Johansen' Test)

It has already been warned that the regression of a non-stationary time series on another non stationary time series may lead to a spurious regression. The important contribution of the concept of unit root and co-integration is to find out if the regression residual are stationary. Thus, a test for co-integration enables us to avoid spurious regression situation. This study will employ the Johansen Multivariate Co-Integration Test to ascertain if there is the existence of a long run equilibrium relationship among time series variables.

RESULTS AND DISCUSSION

Table 1: Unit Root Test

Variable	ADF Statistic	Critical value @ 1%	Critical value @ 5%	Critical value @ 10%	Order of integration
GFCF	-0.2370	-3.8867	-3.0521	-2.6665	1(0)
CEXA	-5.2347	-3.6998	-2.9762	-2.6274	1(1)
CEXCE	-5.6149	-3.7240	-2.9862	-2.6326	1(1)
CEXSS	-5.7037	-3.7378	-2.9918	-2.6355	1(1)
CEXTP	-7.6650	-3.6891	-2.9718	-2.6251	1(1)

Source: Extract from E-view 9.0

From the unit root test in table 1, it can be seen that the order of integration conforms to that of the requirement of the ARDL model. Foreign equity and bond investment are integrated of order one, it means that these variables are stationary at first difference. While gross fixed capital formation is integrated of order zero, *I*(0), it means that these variables are stationary at level difference. As a result of these we proceed to test for co-integration test (ARDL bound test)

Table 2: Co-integration Test-ARDL Bounds Test

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	6.775984	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

			Finite Sample: n=35	
Actual Sample Size	29			
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532
			Finite Sample: n=30	
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

Source: Extract from E-view 9.0

The bounds test was applied because Johansen co-integration is at a disadvantage in determining the long-run relationship between public expenditure and gross fixed capital formation. This is because the bounds test allows for a mixture of I (1) and I (0) variables as regressors, that is, the order of integration. Table 2 shows the results of the bounds co-integration test, demonstrating that the null hypothesis against its alternative is easily rejected at the 1% significance level. The computed F-statistic of 6.775984 is greater than all the lower and upper critical bound values at 10%, 5%, 2.5% and 1%, respectively. Therefore, the null hypothesis is rejected while the alternate hypothesis is accepted. Hence, there exists a long-run equilibrium relationship.

Table 3: ARDL Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GFCF(-1)	1.636949	0.305841	5.352285	0.0017
GFCF (-2)	-0.791538	0.461042	-1.716847	0.1368
GFCF (-3)	0.734748	0.347488	2.114458	0.0789
GFCF (-4)	-0.480584	0.462710	-1.038630	0.3390
CEXA	-0.202553	0.092183	-2.197295	0.0704
CEXA (-1)	-0.006656	0.083210	-0.079988	0.9388
CEXA (-2)	0.304273	0.076658	3.969210	0.0074
CEXA (-3)	-0.211778	0.069995	-3.025637	0.0232
CEXCE	0.400116	0.268457	1.490426	0.1867
CEXCE (-1)	-0.099926	0.278990	-0.358170	0.7325
CEXCE (-2)	0.669492	0.238222	2.810365	0.0307
CEXCE (-3)	0.081781	0.322461	0.253614	0.8083
CEXCE (-4)	-0.667964	0.294073	-2.271424	0.0635
CEXSS	0.209592	0.141429	1.481963	0.1889
CEXSS (-1)	0.272457	0.094631	2.879154	0.0281
CEXSS (-2)	0.138462	0.115573	1.198052	0.2761
CEXSS (-3)	0.034742	0.099623	0.348737	0.7392
CEXSS (-4)	0.323725	0.121347	2.667757	0.0371
CEXTP	-0.086061	0.074591	-1.153777	0.2925
CEXTP (-1)	-0.003909	0.104814	-0.037296	0.9715
CEXTP (-2)	0.214179	0.075659	2.830851	0.0299
CEXTP (-3)	0.103689	0.073104	1.418379	0.2059

C	-46.15178	39.58415	-1.165916	0.2879
R-squared	0.990011	Mean dependent var		25.69655
Adjusted R-squared	0.953387	S.D. dependent var		9.112192
S.E. of regression	1.967327	Akaike info criterion		4.201899
Sum squared resid	23.22226	Schwarz criterion		5.286306
Log likelihood	-37.92754	Hannan-Quinn criter.		4.541522
F-statistic	27.03137	Durbin-Watson stat		1.654963
Prob(F-statistic)	0.000264			

Source: Extract from E-view 9.0

Table 3 shows the ARDL regression results for the estimated model. The result revealed that the model is free from auto-correlation and Heteroscedasticity problems. The R-squared indicated that the change in the gross fixed capital formation is from changes in capital expenditure variables. Also, 95.37% change in the gross fixed capital formation is attributable to the changes in the capital expenditure within the periods of this study.

Table 4: ARDL Long Run Form and Bounds Test

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-46.15178	39.58415	-1.165916	0.2879
GFCF(-1)*	0.099575	0.423929	0.234887	0.8221
CEXA (-1)	-0.116714	0.077373	-1.508449	0.1822
CEXCE (-1)	0.383498	0.606677	0.632128	0.5506
CEXSS (-1)	0.978979	0.307697	3.181638	0.0190
CEXTP (-1)	0.227898	0.122397	1.861957	0.1119
D(GFCF (-1))	0.537374	0.665781	0.807134	0.4504
D(GFCF (-2))	-0.254164	0.373066	-0.681283	0.5211
D(GFCF (-3))	0.480584	0.462710	1.038630	0.3390
D(CEXA)	-0.202553	0.092183	-2.197295	0.0704
D(CEXA (-1))	-0.092495	0.069331	-1.334113	0.2306
D(CEXA (-2))	0.211778	0.069995	3.025637	0.0232
D(CEXCE)	0.400116	0.268457	1.490426	0.1867
D(CEXCE (-1))	-0.083308	0.614803	-0.135503	0.8966
D(CEXCE (-2))	0.586184	0.559908	1.046929	0.3355
D(CEXCE (-3))	0.667964	0.294073	2.271424	0.0635
D(CEXSS)	0.209592	0.141429	1.481963	0.1889
D(CEXSS (-1))	-0.496930	0.226918	-2.189908	0.0711
D(CEXSS (-2))	-0.358467	0.167353	-2.141989	0.0759
D(CEXSS (-3))	-0.323725	0.121347	-2.667757	0.0371
D(CEXTP)	-0.086061	0.074591	-1.153777	0.2925
D(CEXTP (-1))	-0.317868	0.095602	-3.324921	0.0159
D(CEXTP (-2))	-0.103689	0.073104	-1.418379	0.2059

Levels Equation

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEXA	1.172118	4.418919	0.265250	0.7997
CEXCE	-3.851337	10.51755	-0.366182	0.7268
CEXSS	-9.831550	41.59196	-0.236381	0.8210
CEXTP	-2.288704	10.48930	-0.218194	0.8345
C	463.4865	1596.602	0.290296	0.7814

EC = GFCF - (1.1721* CEXA -3.8513* CEXCE -9.8315* CEXSS -2.2887* CEXTP + 463.4865)

Source: Extract from E-view 9.0

The relationship between capital expenditure on administration and capital formation is negative at lag I. This means that capital expenditure on administration at lag I over this period has contributed negatively to gross fixed capital formation. This from the results indicates that capital expenditure on administration reduced 0.1 percent to gross fixed capital formation. Capital expenditure on community services, social services and transfer has positive effect on gross fixed capital formation. The variables added 0.38, 0.97 and 0.22 percent of gross fixed capital formation. The positive effect of the variables confirmed the expectations of the study and line with public expenditure theories as advocated by the Keynesians' economist. The findings of the study is in line with the findings of Uremadu (2008) Aiyedogbon (2011) that military expenditure (Milex) and lending rate have negative impact on gross capital formation (GCF) in Nigeria in both the short- and long-run. The GDP is positively significant in the long run while it is positive and insignificant in the short run. Ezekwesili (2012) that Nigeria's poor capital formation comes from low education development of the people, the findings of Lucky and Uzah (2016) that M2/GDP, GNS/GDP, EXR, EXTD/GDP, TT/GDP have negative and insignificant effect on capital formation while CPS/GDP, LR, INFR, PEX/GDP, GR/GDP and OPS/GDP have positive and insignificant effect. The model summary revealed 86.0% explained variation and f-statistics 12.38458 probability of 0.000004 and the findings of Kanu, and Nwaimo (2015) that for sustainable gross fixed capital formation to be achieved, the federal government of Nigeria should cut down on her recurrent expenditure profile in favor of an increased CAPEX.

Table 5: ARDL Error Correction Regression

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GFCF(-1))	0.537374	0.125171	4.293114	0.0051
D(GFCF (-2))	-0.254164	0.147162	-1.727108	0.1349
D(GFCF (-3))	0.480584	0.136479	3.521300	0.0125
D(CEXA)	-0.202553	0.046157	-4.388356	0.0046
D(CEXA (-1))	-0.092495	0.042375	-2.182773	0.0718
D(CEXA (-2))	0.211778	0.045583	4.646019	0.0035
D(CEXCE)	0.400116	0.142238	2.813003	0.0306
D(CEXCE (-1))	-0.083308	0.134825	-0.617894	0.5594
D(CEXCE (-2))	0.586184	0.158467	3.699097	0.0101

D(CEXCE (-3))	0.667964	0.124563	5.362454	0.0017
D(CEXSS)	0.209592	0.070669	2.965826	0.0251
D(CEXSS (-1))	-0.496930	0.127353	-3.901981	0.0080
D(CEXSS (-2))	-0.358467	0.099840	-3.590426	0.0115
D(CEXSS (-3))	-0.323725	0.072264	-4.479727	0.0042
D(CEXTP)	-0.086061	0.039138	-2.198919	0.0702
D(CEXTP (-1))	-0.317868	0.058513	-5.432423	0.0016
D(CEXTP (-2))	-0.103689	0.044568	-2.326544	0.0589
CointEq(-1)*	0.889975	0.018020	5.525923	0.0000
R-squared	0.909304	Mean dependent var		-0.422414
Adjusted R-squared	0.769138	S.D. dependent var		3.023983
S.E. of regression	1.452967	Akaike info criterion		3.857072
Sum squared resid	23.22226	Schwarz criterion		4.705738
Log likelihood	-37.92754	Hannan-Quinn criter.		4.122863
Durbin-Watson stat	1.654963			

Source: Extract from E-view 9.0

The short-run results revealed that the ECM (-1) has a high speed of 88.9% for disequilibrium caused by the presence of unit roots to adjust to equilibrium in the following year. The relationship between the previous capital formations is negative while current gross fixed capital formation is positive and significant. The relationship between previous capital expenditure on administration and gross fixed capital formation is negative while current year is positive and significant. The relationship between previous capital expenditure on economic services and gross fixed capital formation is negative while current year is positive and significant. The relationship between previous capital expenditure on social services and gross fixed capital formation is negative in previous and current year is negative and not significant. The relationship between previous capital expenditure on transfer and gross fixed capital formation is negative in previous and current year is negative and not significant.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The study empirically examined the effect of capital expenditure on the gross fixed capital formation in Nigeria. The study used the Auto Regression Distributive Lag (ARDL) Model to determine the effect of the variables in the study. The findings of the study confirm the expectation of the results and other empirical studies and therefore conclude that there is significant short and long-run relationship between public administration expenditure, economic services, social and community services on gross fixed capital formation in Nigeria. From the regression summary, the study concludes that there is significant relationship between capital expenditure and the gross fixed capital formation in Nigeria.

Recommendations

i. The study found that public capital expenditure significantly affect the growth of Nigerian gross fixed capital formation positively, the study therefore recommend that public expenditure should be increase and directed toward the productive sector of the economy.
ii. Full implementation will expand the positive impact of public expenditure on the growth of Nigerian gross fixed capital formation positively; we recommend that the capital expenditure should wholly be implemented to avoid scarcity of financial resources in the economy.
iii. The fiscal responsibility Act 2004 should be implemented to guide the public expenditure to achieve growth of Nigerian gross fixed capital formation positively. Poor policies on government expenditures impact negatively to the growth of Nigerian gross fixed capital formation positively. The study recommend for better policies to manage the expenditure of the government
iv. Economic theories have it that unproductive expenditures do not impact on the growth of Nigerian gross fixed capital formation positively. The study recommends that government should spend on productive ventures.
v. The study recommends for overhaul in policies of revenue and expenditures to enhance the growth of Nigerian gross fixed capital formation positively. Full implementation of the fiscal year budget is a stepping stone for good fiscal policies.

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