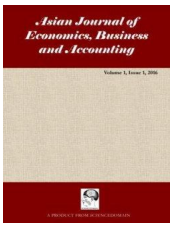

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Effect of Capital Formation on Economic Growth in Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author NGO designed the study, wrote the protocol and wrote the first draft of the manuscript. Author OSI reviewed theoretical and empirical literature, developed the model of the study, did the econometric analysis and interpretation while author ACI supervised the research process and edited the final manuscript. All authors read and approved the final manuscript.

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ABSTRACT

This study examined the effect of capital formation on economic growth in Nigeria. The specific objectives of the study are to: (i) determine if capital formation has any significant impact on economic growth in Nigeria. (ii) determine the direction of significant causal relationship between capital formation and economic growth in Nigeria. The study adopted co integration and vector error correction model in the analysis of the variables specified in the model in addition to VEC granger causality test. The result of the data analyzed showed that; Stable long run relationship exists between the dependent and independent variables as indicated by two (2) co integrating equations. In the VECM, it was found that gross capital formation (GCF) has a positive insignificant impact on real gross domestic product (RGDP) in the short run and the long run. Government capital expenditure (GCE) revealed negative significant correlation with RGDP (real gross domestic product) both in the short and long run; From the causality test, the p value of 0.0004 for RGDP and p-value 0.0016 for GCF is less than 0.05; showing that a bi directional causality runs amid RGDP (real gross domestic product) and gross capital formation (GCF). Another two way causality also among GCF (gross capital formation) and GCE (government capital expenditure) indicated with a p-

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value of 0.0007 and p-value of 0.0000 for GCF. The implication of this study is that gross capital formation has no significant impact on economic growth in Nigeria within the period of study. Based on the findings and policy implications, the study makes the following recommendations; there should be a deliberate collaboration between the government and the private sector towards building enabling environment that promotes capital investment in the economy. There should be conscious effort by both government and private sector to address the issue of corruption in the economy in addition to strengthening public statistical bodies to ensure that all private investments are captured and regulated.

Keywords: Capital formation; capital investment; capital expenditure; economic growth; causality; enabling environment.

1. INTRODUCTION

The rate of growth in Nigeria economy cannot be fully examined without a closer look at the contribution of capital formation to Nigeria's economic growth. This is in the understanding that capital formation has been recognized as an important factor that determines the growth of Nigerian economy [1].

No country has achieved sustained economic growth without substantial investment in capital formation. In a bid to attain economic growth around the world, emphasis has been placed on increased capital formation. Nevertheless, understanding the determinants of the capital formation is a crucial prerequisite in designing a number of policy interventions towards achieving economic growth [2].

Capital formation refers to the proportion of present income saved and invested in order to augment future output and income. It usually results from acquisition of new factory along with machinery, equipment and all productive capital goods.

[3] defines economic growth as a process whereby the real per capita income of a country increase over a long period of time. According to him, economic growth is measured by the increase in the amount of goods and services produced in a country. Economic growth occurs when an economy's productive capacity increases which, in turn is used to produced more goods and services.

There are numbers of theoretical issues and empirical studies that established the relationship between capital formation and economic growth. The neo-classical synthesis, established that for an economic agent, saving plus borrowing must equal asset acquisition. It follows that in a closed economy national saving and domestic investment will always be equal. Thus, a high rate of capital formation lead to a high rate of productivity which brings about growth [4].

Capital formation naturally plays an important role in the economic growth and development process. It has always been seen as potential growth enhancing player. Capital formation determines the national capacity to produce, which in turn, affects economic growth. Deficiency of capital formation has been cited as the most serious constraint to sustainable economic growth [5]. It is therefore not surprising that the analysis of capital formation has become one of the central issues in empirical macroeconomics. One popular theory in the 1970s, for example, was, that of the "Big Push" which suggested that countries needed to jump from one stage of development to another through a virtuous cycle [6] in which large investments in infrastructure and education coupled with private investment would move the economy to a more productive stage, breaking free from economic paradigms appropriate to a lower productivity stage. Growth models like the ones developed by [7,8] predict that increased capital accumulation can result in a permanent increase in growth rates.

The relationship between capital formation of the nation and economic growth has been documented in a number of empirical investigations. The result which has been found in several analyses is that causality exists between capital accumulation and economic growth [2]. [9] stressed that the process of capital formation is cumulative and self-feeding. It involves three inter-related conditions; (a) the existence of real savings and rise in them; (b) the existence of credit and financial institutions to mobilize savings and to direct them to desired channels; and (c) to use these savings for investment in capital goods. Therefore, we can understand that savings is the major determinant

of capital formation [2]. It is widely believed that an increase in the proportion of national income devoted to capital formation is only one avenue for growth. Therefore people are encouraged to save more than to consume more, because a growing economy requires a constant flow of fund for investment in other to assure a supply of capital goods adequate for production of consumer goods and replacement of obsolete equipment [10].

Over the years, the growth rate of capital formation in Nigeria has not been satisfactory. It has always been very low and often negative. In the drive towards rapid economic growth and the Nigerian vision of being one of the twenty biggest economies in the world come 2020, expert opinion is that the economy should be growing at the rate of at least 15 percent per annum [11]. [9] argued that the rate of capital formation is low in less developed countries, the reason being that they lack in those factors which determine capital formation. This brings about capacity under-utilization as resources (human and material) are not adequately mobilized to bring about substantial economic growth. Such growth can only be possible if there is continuous increase in the capital stock of the nation to be brought about by massive public and private investment in the country [10].

From the foregoing, it can be observed that emphasis has been on capital formation as a major determinant of economic growth. However, there is conventional perception that the most pertinent obstacle to economic growth is the shortage of capital.

1.1 Statements of the Problem

In 1986, the Nigerian government pursued a structural adjustment programme (SAP) which shifted emphasis from public sectors to private sectors [2]. The goal was to encourage private domestic savings and private domestic investment for capital formation in order to enhance economic growth [12]. The supposed relationship between capital formation and economic growth is that through financial services such as savings and deposit mobilization, credit creation, it increases the accumulation of capital which in turn is expected to enhance economic growth of the country [13].

However, capital formation in Nigeria has been characterized by fluctuations which may be responsible for lack or inadequate social infrastructure such as roads, power supply and health facilities. 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 [14].

For instance, during 1980s, gross fixed capital formation average was 21.3 percent of GDP in Nigeria. This proportion increased to 23.3 percent of GDP in 1991 and declined drastically to 14.2 percent of GDP in 1996. It picked and increased to 17.4 percentage in 1997 and average 21.7 during 1997 to 2000. The gross fixed capital formation rose from 22.3 percent of GDP in 2000 to 26.2 percent in 2002 and declined to 21.3 percent in 2005.The capital formation rate in 2008 was 0.060 which represent 6% of the GDP [15].

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 [12]. The skills of labour are poor and technological backwardness hampering the process of new inventions and innovations [16]. Hence low capital accumulation is the main obstacle faced in achieving the goal of sustained economic growth in Nigeria [2]. Overall, the empirical evidence on the performance of capital formation is mixed. While some studies had positive effects other showed negative effect.

Judging fluctuation trends of GCF to GDP, This study intends to study the relationship existing between the two variables. The study also intends to complement the existing literature by investigating empirically the extent to which capital formation has impacted on economic growth in Nigeria.

1.2 Objectives of the Study

The major objective of the study is to examine the effect of capital formation on economic growth in Nigeria. The specific objective of the study is to:

- Determine if capital formation has any significant impact on economic growth in Nigeria.
- Determine the direction of significant causal relationship between capital formation and economic growth in Nigeria.

This paper is organized into five sections, section one comprises the introductory background of the study. Section two covers the theoretical framework and literature review. Section three gives information about the research methodology. Section four deals with empirical results and discussion. Section five covers the summary of findings, policy implications and policy recommendations.

2. REVIEW OF RELATED LITERATURE

2.1 Conceptual Review

2.1.1 The determinants of capital formation

Capital formation is the main key to economic growth. It reflects effective demand and, on the other hand, it creates productive efficiency for future production. However, the level of impact of capital formation on economic growth depends on the intensity of its determinants. Thus, these determinants could be savings, foreign direct investment (FDI), gross domestic product (GDP), interest rate, population growth [9], money supply, exchange rate [17]. In the opinion of most economists, it is believed that changes in any of these factors, affect capital formation either positively or negatively, which in turn affect the economy as a whole.

2.1.2 Savings

[18], states that if savings rate is high, the economy will have a large capital stock and high level of output. If the savings rate is low, the economy will have a small capital stock and a low level of output. [19] opined that capital accumulation results when some proportion of present income is saved and invested in order to augment future output and income. He states that high savings contribute to higher investment on capital assets and hence, higher GDP. [12], opined that savings contributes to higher investment on capital assets and hence higher GDP. [2] observed that the central idea of traditional development theory is that increasing savings would accelerate growth rate of capital formation. The higher the income per capita, the higher the consumption and savings rates thereby increasing the capital stock.

2.1.3 Foreign direct investment

[20] stressed that foreign direct investment is a significant part of capital formation in the country. Foreign direct investments consist of external resources, including technology, managerial and marketing expertise and capital. All these generate a considerable impact on host nation's production capabilities. At the current level of gross domestic product, the success of government's policies of stimulating the productive base of the economy depends largely on her ability to control adequate amount of foreign direct investments comprising of managerial, capital and technological resources to boost the existing production capabilities. However, some analysts (known as the dependence school) are strongly opposed to pro foreign direct investment perspectives. [17] argued that foreign investments bring to the home country, a package of cheap capital, advanced technology, superior knowledge of foreign market for final products and capital goods, immediate inputs and raw materials. He argued that developing countries need to employ export oriented development strategies in order to meet their foreign exchange and employment requirements and that such orientation is much more likely to succeed if these countries can acquire capital export markets. Such markets he maintained are precisely what multinational companies with their worldwide sourcing and marketing can offer.

[16] argued that developing countries' economic difficulties do not originate in their isolation from advance countries, but that the most powerful obstacle to their development comes from the way they are joined to their international system. He maintained that multinational corporations transfer of technologies to developing countries result in mass unemployment; that it result to monopoly rather than inject new capital resources; displace rather than generate local business and they worsen rather than ameliorate the country's balance of payment. The dependence school rejects the pro foreign direct investment analysts' depiction of the benefits derived from participation in the international economy.

2.1.4 Surplus labour

[21] points out how underdeveloped countries suffer from disguised unemployment on a mass scale. This surplus labour force can be put to work on capital projects like irrigation, drainage, roads, railways, and houses. They can supply simple spare tools by farmers and food by their families and through that way, surplus rural labour force can be a source of capital formation.

[22] on the other hand suggested that economic growth takes place when capital accumulates with withdrawal of surplus labour from rural sector and its employment in the industrial sector. Such workers are paid the subsistence wage which is less than the prevailing market wage rate. This leads to profits which are invested by capitalists for capital formation.

2.1.5 Population growth

[9] argued that as population increases, per capita available income declines as people are required to feed more children with the same income. It means more expenditure on consumption and a further fall in the already low savings and consequently in the level of investment. Furthermore, a rapidly growing population with lower incomes, savings and investment compels the people to use a low level technology which further retards capital formation.

2.1.6 Interest rate

High interest rate discourages investors and low interest rate encourages investors and the existence of high interest rate acts as an obstacle to growth of both private and public investment in an underdeveloped country [9]. In an underdeveloped country, businessmen have little savings out of undistributed profits, they have to borrow from the banks or from the capital market for the purpose of investment and they would borrow only if interest rate is low. A low interest rate policy is a cheap money policy. It makes public borrowing cheap, keeps the cost of servicing public debt low and thus helps in financing economic development. Even from the point of view of foreign investors, the availability of cheaper money for 'complimentary funds' encourages private foreign investment.

2.1.7 Government assets

According to [23] Government assets and their value at the time of assessment are the main factors behind capital formation. Governments begin capital formation by buying land in times of economic stagnation, when property values fall. In such times, they are also liable to seize land. It is then their choice to hold onto the land or to sell it. Favourable government policies aim at fostering investment-friendly environment through provision of basic infrastructural facilities, subsidies, tax concessions, investment allowances and low interest rate, high disposable incomes and business profits also determine capital formation 21.

2.2 Theoretical Review

2.2.1 Harrod-Domar economic growth model

This theory was named after two famous economists, Sir Roy Harrod of England and Professor Evesey of United State of America who independently formulated the model in the early 1950's. This basic model assumes that it is a closed economy and that there is no government, no depreciation of existing capital so that all investment is net investment, and all investment (I) comes from savings (S). The model describes the economic mechanism by which more investment leads to more growth. For a country to develop and grow, it must divert part of its resources from current consumption needs and invest them in capital formation. Diversion of resources from current consumption is called saving. While saving is not the only determinants of growth, the Harrod-Domar model suggests that it is an important ingredient for growth. Its argument is that every economy must save a certain proportion of its national income if only to replace worn-out of capital goods. The model shows mathematically that growth is directly related to saving and indirectly related to capital output ratio. Suppose we define national income as Y, growth as G, capital output ratio as K, saving as S, and investment as I, and average saving ratio as s, and incremental capital output ratio as k, then we can construct the following simple model of economic growth.

$$S=Y \quad (1)$$

Saving (S) is some proportion of national income (Y)

$$I = \Delta k \quad (2)$$

Investment (I) is defined as the change in capital stock (K)

$$G = \Delta Y/Y \quad (3)$$

Growth is defined as change in national income (ΔY) divided by the value of the national income. But since the total stock, K, bears a direct relationship to total national income, or output Y, as expressed by the capital/output ratio k, then it follows that

$$K/Y=k \quad (4)$$

$$\text{Or } \Delta K/\Delta Y = K \quad (5)$$

Finally, since total national saving (S) must equal total investment (I), we can write this equality as;

$$S=I \quad (6)$$

But from Equation (1) above we know that S=Y and from Equations (2) and (3) we know that I=ΔK =kΔY. It therefore follows that we can write the identity of saving equaling investment shown by Equation (6) as

$$S=Y= k\Delta Y= \Delta k= I \quad (7)$$

$$\text{Or simple as } S.y = K\Delta y \quad (8)$$

$$\Delta Y/Y =G =s/K \quad (9)$$

The simplified version of the famous Harrod – Domar equation in the theory of economic growth implies that the rate of growth of GNP (Δy/y) is determined jointly by the national saving ratio, S, and national capital/output ratio, k. More specifically, it says that the growth rate of national income will directly or positively be related to saving ratio (the more an economy is able to save-and invest-out of given GNP, the greater will be the growth of that GNP) and inversely or negatively; relate to the economy's capital/output ratio (the higher the K, the lower will be the rate of GNP growth). In order to grow, an economy must save and, therefore invest, a certain proportion of their GNP. The more an economy can save, the more it can grow for any level of the rate of growth depends on how productive the investment is [12].

2.2.2 The Solow Neo-classical model of economic growth

In the 1950s, MIT economist Robert Solow presented a new model of economic growth that addressed limitations in the Harrod-Domar model. Following the seminal contributions of [24] and [25], the neoclassical model became the dominant approach to the analysis of growth. Between 1956 and 1970 economists redefined 'old growth theory known as the Solow neoclassical model of economic growth. Building on a neoclassical production function framework, the Solow model highlights the impact of capital, population growth and technological progress, on growth in a closed economy setting without a government sector. The key assumptions of the Solow model are:

It is assumed that the economy consists of one sector producing one type of commodity that can be used for either investment or consumption purposes.

The economy is closed to international transactions and the government sector is ignored.

All output that is saved is invested; that is, in the Solow model the absence of a separate investment function implies that Keynesian difficulties are eliminated since ex ante saving and ex ante investment are always equivalent.

Since the model is concerned with the long run there are no Keynesian stability problems; that is, the assumptions of full price flexibility and monetary neutrality apply and the economy is always producing its potential (natural) level of total output.

Solow abandons the Harrod–Domar assumptions of a fixed capital–output ratio (K/Y) and fixed capital–labour ratio (K/L).

The rate of technological progress, population growth and the depreciation rate of the capital stock are all determined exogenously.

The Solow growth model is built around the neoclassical aggregate production function and focuses on the proximate causes of growth:

$$Y_t = f(K_t, A_tL_t) \quad (10)$$

where Y is real output, K is capital, L is the labour input and A is a measure of technology (that is, the way that inputs to the production function can be transformed into output) which is exogenous and taken simply to depend on time. Sometimes, A is called 'total factor productivity'.

It is worthy to point out two major things that are vital;

Time(t) does not enter the production function directly except through capital(K), labour(L) and technology(A).

A and L enter multiplicatively into the model. AL is called "effectiveness of labour" and technological progress that enters in this way is called "labour augmenting" or "Harrod Neutral". Technology is "capital augmenting" if technology enters as

$$Y = f(AK, L) \quad (11)$$

and "Hicks Neutral" when

$$Y = Af(K, L) \quad (12)$$

In the neoclassical theory of growth, technology is assumed to be a public good. Applied to the world economy this means that every country is assumed to share the same stock of knowledge which is freely available; that is, all countries have access to the same production function.

The model assuming a situation where there is no technological progress. Making this assumption of a given state of technology will allow the economy to concentrate on the relationship between output per worker and capital per worker. Therefore rewritten as:

$$Y = F(K, L) \quad (13)$$

The aggregate production function given above is assumed to be 'well behaved'; that is, it satisfies the following three conditions.

First, for all values of $K > 0$ and $L > 0$, $F(\cdot)$ exhibits positive but diminishing marginal returns with respect to both capital and labour; that is, $\delta F/\delta K > 0$, $\delta^2 F/\delta K^2 < 0$, $\delta F/\delta L > 0$, and $\delta^2 F/\delta L^2 < 0$.

Second, the production function exhibits constant returns to scale such that $F(\lambda K, \lambda L) = \lambda Y$; that is, raising inputs by λ will also increase aggregate output by λ. Letting $\lambda = 1/L$ yields $Y/L = F(K/L)$. This assumption allows the model to be written down in intensive, where y = output per worker (Y/L) and k = capital per worker (K/L):

$$y = f(k) \quad (14)$$

where $f'(k) > 0$, and $f''(k) < 0$ for all k

The above equation states that output per worker is a positive function of the capital–labour ratio and exhibits diminishing returns. The key assumption of constant returns to scale implies that the economy is sufficiently large that any Smithian gains from further division of labour and specialization have already been exhausted, so that the size of the economy, in terms of the labour force, has no influence on output per worker.

Third, as the capital– labour ratio approaches infinity ($k \to \infty$) the marginal product of capital (MPK) approaches zero; as the capital–labour ratio approaches zero the marginal product of capital tends towards infinity ($MPK \to \infty$).

The Fig. 1 graph shows an intensive form of the neoclassical aggregate production function that satisfies the conditions. As the diagram illustrates, for a given technology, any country that increases its capital–labour ratio (more equipment per worker) will have a higher output per worker. However, because of diminishing returns, the impact on output per worker resulting from capital accumulation per worker (capital deepening) will continuously decline. Thus for a given increase in k, the impact on y will be much greater where capital is relatively scarce than in economies where capital is relatively abundant. That is, the accumulation of capital should have a much more dramatic impact on labour productivity in developing countries compared to developed countries.

The slope of the production function measures the marginal product of capital, where $MPK = f(k + 1) - f(k)$. In the Solow model the MPK should be much higher in developing economies compared to developed economies. In an open economy setting with no restrictions on capital mobility, capital flowing from rich to poor countries, attracted by higher potential returns, thereby accelerating the process of capital accumulation [2].

2.3 Empirical Review

Many studies have been undertaken so far in this area of research. A brief mention of these studies and their results is being made in this section.

[12] studied capital formation and economic growth in Nigeria. The study covered 1979 – 2009 which is a period of thirty (30) years. The ordinary least square multiple regression analytical method was used to examine the relationship between capital formation and economic growth. The study tested the stationarity and co integration of Nigeria's time series data and used an error correction mechanism to determine the long-run relationship among the variables examined. Econometric results suggested the need for the government to continue to encourage savings, create conducive investment climate and

improve the infrastructural base of the economy to boost capital formation and promote sustainable growth.

[26] studied the relationship between foreign private investment, capital formation and economic growth in Nigeria using the two-stage least squares (2SLS) method of estimation using a time span of 1970-2007.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. There is thus, a long-run equilibrium relationship among the variables as the error correction term is significant, but the speed of adjustment is small in both models. It conclude that foreign private investment affect economic growth positively but crowds out private capital formation in Nigeria

[2] studied the impact of capital formation on economic growth in Nigeria from 1979-2008. It employ the use of the classical linear regression model (CLRM) through the ordinary least square (OLS) method, the impact of capital formation on the Nigeria's economic growth was examined. The result shows that capital formation, government deficit, money supply is positively related to GDP, inflation is negatively linked to economic growth. The result shows that the level of financial development (as proxied by market capitalization of the Nigeria Stock Exchange) has significant positive impact on capital formation, Foreign Direct Investment (FDI) showed a negative relationship with capital formation. The empirical findings revealed that capital accumulation has a significant positive impact on Nigeria's economic growth.

[22] carried out a research on military spending and gross capital formation in Nigeria. The study covered from 1980-2010. It employed the econometric methodology of vector error correction model and testing the results using stationarity test, co-integration and variance decomposition. It was discovered that military expenditure and lending rate constrained private investment in the short run as well as in the long run while the impact of GDP was significant and positive with GCF in the long run. However, in the short run, its impact was only positive but not significant in explaining GCF in Nigeria in the period under review. Although, the econometric results show that GDP contributes more than any other variables employed in the study in influencing GCF performance in Nigeria, the variance decomposition results show that GCF and MILEX are the most exogenous variables in the model. The study conclude that excessive MILEX has a deleterious impact on the Nigerian economy.

[27] tried to find out the global forces that had led to the decline in the world real interest rate over recent decades and also to find out the key factors that shaped the behaviour of desired world savings and investment. For their analysis, they used the dataset on savings, investment and their determinants from 35 industrialized and emerging economies covering the time period from 1970 to 2004.

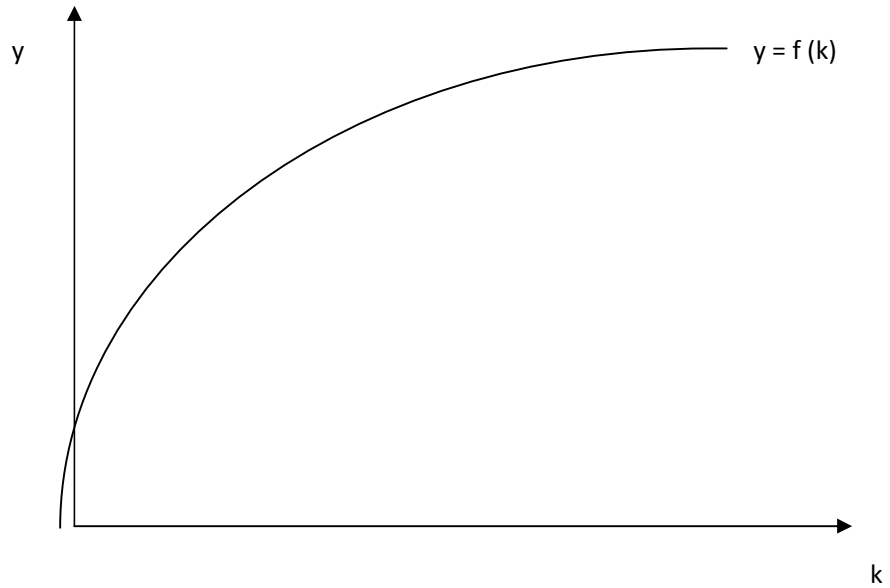

Fig. 1. The neoclassical aggregate production function

[28] examined the impact of foreign direct investment on economic growth in Nigeria from 1986-2004. The study employed the use of ordinary Least Square regression technique. The result shows that FDI has significant impact on economic growth in Nigeria during the period under review.

[29] carried out a research on the short-long run relationship between capital formation and economic growth. The study Covers a long time-period from 1950-51 to 2009 in which annual time series data are used in the analysis. The results showed that capital formation exert influence on economic growth.

[5] on stock market and economic growth in Nigeria. To achieve this objective, ordinary least square regression (OLS) was employed using the data from 1971-2010. The result indicated that there is a positive relationship between economic growth and all the stock market development variables used. With 97% R-squared and 95% adjusted R-squared, the result showed that economic growth in Nigeria is adequately explained by the model for the period between 1971 and 2010. By implication 95% of the variation in the growth of economic activities is explained by the independent variables. The result of the study, which established positive links between the stock market and economic growth, suggests the pursuit of policies geared towards rapid development of the stock market. Also, all sectors of the economy should act in a collaborative manner such that the optimum benefits of linkages between the stock market and economic growth can be realized in Nigeria.

[30] studied the effect of export earnings fluctuations on capital formation in Nigeria. The study covered the period from 1972-1995. The study used the standard normalization combined with a moving average approach (reduced form equation). The study concluded that that the current level of export earnings fluctuations adversely impinges on investment.

[31] studied economic growth and human capital development in Nigeria. The study covered a time frame from 1970-2003. The ordinary least squares method (OLS) was adopted as the estimation technique through stepwise regression in order to avoid multicollinearity of explanatory variables. It was found that the parameter estimate is positively signed and the t-statistic for human capital (proxy by RGCF) is statistically significant at 5 per cent level. It indicates that it significantly impact on Nigeria's economic growth. The coefficient of lagged RGDPG is positive and statistically significant at 5 per cent level. The recurrent expenditure on education (RE) is rightly signed and statistically significant at 5 per cent. This empirically shows that investment in human capital accelerates economic growth. Considering PRYE, the result validates the expected positive relationship between this variable and RGDPG. And its coefficient is statistically different from zero at 5 per cent. This result points that human capital formation has a significant impact on economic growth.

[32] examined the relationship among savings, gross capital formation and economic growth in the Nigeria economy, between 1975 and 2008. The study adopted co-integration and vector error correction model VECM as the estimating technique with special reference to VAR causality test. The result of unit root i.e. stationary test showed that the gross domestic product GDP which is a proxy for growth, savings which is a proxy for gross national savings GNS are both integrated of order two i.e. 1 (2) while capital formation which gross capital formation GCF served as its proxy is integrated of order 1 (1) The findings revealed the existence of long run relationship among the three variables as shown from the co-integration regressions which were characterized by high R square, positive coefficient from all parameter estimates and significant of F values from all the three equations. The vector error correction model, apart from corroborating the strong linkage among the three variables, also showed that GDP has stronger influence on both GNS and GCF than the influence of GNS and GCF have on GDP. Also causality test confirmed the existence of the symbiotic relationship among them since GDP and GCF, GDP and GNS, and GNS and GCF all exhibit bidirectional causality. If the findings of this research work are transformed into policy implementation i.e. proper harmonization of policies on economic variables, development of the real sector of economy, acceleration of the growth of capital formation, grass root mobilization of savings from the surplus sector to deficit sector, it will lead to a sustained long run economic growth.

[21] studied 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 proxy by openness was negatively and insignificantly related to gross

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, therefore globalization has no significant impact on gross fixed capital formation in Nigeria.

[1] investigated the impact of capital formation on economic growth in Nigeria from 1982-2011. The data were collected from [15]. The study employed Ordinary least square (OLS) technique. Phillip-perron test was used to determine the stationarity of the variables, Johasen co-integration test was employed to determine the order of integration while error correction model was employed to determine the speed of adjustment to equilibrium. The empirical findings suggest that capital formation has positive and significant impact on economic growth in Nigeria for the period under review. The result further shows a long run relationship between capital formation and economic growth in Nigeria for the period under review. Therefore emphasis should be place on accumulating capital in Nigeria as this will accelerate growth and development in Nigerian economy. The Nigerian stock market should be deepened more to enhance their contribution to the growth of the domestic economy.

[16] analyzed the stock market development, capital formation and economic growth in Nigeria. The study examines the impact of stock market development on capital formation and growth in Nigeria. The main objective is to determine the relationship between gross fixed capital formations and other independent variables like market capitalization, new issues of instruments, gross domestic product and industrial production index that determine capital formation. Time series data obtained from Central Bank of Nigeria (CBN) and Nigerian Stock exchange (NSE) for the period 1981 to 2009 were analyzed using Ordinary Least Square (OLS) analysis. The result of the regression analysis shows that a positive and significant relationship exists between gross fixed capital formation and gross domestic product as well as industrial production index. However, there is an inverse relationship between gross fixed capital formation and market capitalization as well as new issues of instruments; this indicates that the Nigerian Stock Market in its many years of existence has contributed marginally to long-term capital formation in Nigeria.

[12] in the study focused on financial sector liberalization and economic growth in Nigeria. The ordinary least square multiple regression analytical method was used to examine the relationship between financial sector liberalization and economic growth. Some statistical tools were employed to explore the relationship between these variables. The analysis started with the test of stationarity and co-integration of Nigeria time series data. Thereafter an error correction mechanism was used to determine the long-run relationship among the variables examined. The empirical study found that the data were stationary and co integrated and showed that there is a long run significant relationship between financial sector liberalization and economic growth in Nigeria. The multiple regression results showed a significant and negative relationship between financial sector liberalization and economic growth in Nigeria. These results were robust to a number of econometric specifications. The econometric results and conclusion support the need for the government to develop the financial sector towards greater effectiveness and efficiency. In complement of the above, there is the need to revisit the structural adjustment program with a view to enhancing efficiency by altering the structure.

[33] on human capital formation and economic growth in Nigeria growth for the period of 1985-2009. Multiple regression model was used to evaluate the relationship between human capital development and economic in Nigeria. The study shows that human capital development is beneficial and remains an essential tool of economic growth in Nigeria. The primary, secondary and tertiary school enrolments, total government expenditure on health and on education were significantly related to economic growth in Nigeria

3. METHODOLOGY

3.1 Model Specification

Specifically, this study adopted the popular Harold- Domar growth model and followed a multiple regression approach, thus the growth equation.

$$\Delta Y/Y = G = s/K \quad (15)$$

Where

ΔY represents the rate of change of national income or rate of GNP

Y = national income
G = growth of GNP
S = national savings ratio
K = national capital/output ratio

In this study, RGDP is the dependent variable and is used as substitute of national income, while gross capital formation (GCF) represent national capital/ output ratio, government capital expenditure (GCE) are independent variables.

Expressing equation 15 to accommodate the variables of this study in structural form, we have

$$RGDP = f (GCF, GCE,) ... \quad (16)$$

The functional equation above is stated in a linear form as;

$$RGDP_t = \beta o + \beta_1 GCF_{t-1} + \beta_2 GCE_{t-1} + u_{t-1} \quad (17)$$

where;

RGDP connotes real gross domestic product a measure of economic growth, GCF refers to gross capital formation, GCE is government capital expenditure, U_t is the white noise random element and $\beta o - \beta_2$ are parameter

3.2 Estimation Procedure

- To determine the suitability of the time series data employed we ran the unit root test.
- The data was discovered to be all stationary at first difference.
- The researcher investigated for the presence of cointegration equation.
- With the presence of cointegrating equation established, we developed vector error correction model.
- With the developed VEC model, we employed system equation estimation method to evaluate the model to establish the effect of the independent variables on the dependent variables.
- And finally investigating the direction of causal relationship between the dependent and independent variables using the VEC causality estimation procedure.

4. RESULTS AND DISCUSSION

4.1 Unit Root Test Results

After collecting data with the aid of important tools and method, the next essential step is to present the result, analyze and interpret the result with aim of getting the empirical solution to the problem identified in the research work. So Data analysis means operating on the data to get the pattern and trends in data sets. Data analysis is a very vital step and it is the heart of every research work. Therefore the results for the data analysis are presented here.

4.1.1 Unit root test

The Augmented Dickey-Fuller (ADF) statistic was employed to test for the existence of unit roots in the data using trend and intercept. The test results are presented Table 1.

4.1.2 Co-integration test

Johansen co-integration test was used to test for the presence of co-integration between the series of the same order of integration. Johansen co-integration test for the series; RGDP and the explanatory variables; GCF and GCE are summarized under Table 3. Based on the lag length criteria, the model with lag 2 was chosen with the linear deterministic test assumption.

In Johansen co integration, the trace statistic is used to determine the presence of co-integration among the variables. As observed under unrestricted co-integration rank test, the trace statistics indicated two co-integrating equations.

4.1.3 Vector error correction model result

The essence of this estimation procedure is to ascertain the speed of adjustment since the deviation from the long run equilibrium is corrected through the short run adjustments. Having established that there is co-integration equation among the variables, the study confirms the reason to estimate the vector error correction model (VECM). The result for the VECM is stated in Table 4.

The presence of long run equilibrium relationship among the variables as found from the Johansen co integration led to the application of VECM. With this approach, both the long run equilibrium and short run dynamic relationships associated with variables under study is established. From the table above, the ECT has the expected negative sign with the coefficient of -0.026149, which is fractional and p value of 0.0001 indicating statistical significance.

The R- square is 0.506339 showing that 50.6 percent variation in the dependent variable is explained by the explanatory variables as 49.4 percent difference being explained by variables

not captured by this model which is represented by error term (et).

The F – statistics of 3.663145 with p value of 0.007 which is less than 0.05 shows that there is statistical significant influence of explanatory variables on the dependent variables. This entails that all the independent variables jointly impact on economic growth in Nigeria. The DW as indicated in the above table has the value of 2.3 indicating nonexistence of auto correlation among residuals.

4.1.4 Test of research hypotheses

In order to determine the probability that a given hypothesis is true or false Statistics are employed. Hypotheses are of two types namely null and alternative hypothesis. So in testing the first hypothesis, p-value of the t-statistics in VECM are employed, while the p-value in the VEC granger causality Test is used for the second hypothesis.

4.1.5 Hypothesis one

Capital formation has no significant impact on economic growth in Nigeria.

Decision rule: if the p-value of the t-statistics in VECM is less than 5% critical value the null hypothesis is rejected.

Table 1. Augmented Dickey Fuller unit root test

Series	ADF test statistic	5%crit.val	Prob.Val	Order	Remarks
GCF	-2.022541	-3.544284	0.5691	0(0)	Not Stationary
RGDP	-1.428954	-3.544284	0.8344	0(0)	Not Stationary
GCE	-3.159253	-3.544284	0.1091	0(0)	Not Stationary

Sources: Researcher's compilation from E-view version 9

Table 2. Augmented Dickey Fuller unit root test

Trend and Intercept @ 1st Difference

Series	ADF test statistic	5%crit.val	Prob. Val	Order	Remarks
GCF	-6.668529	-3.548490	0.0000	1(1)	Stationary
RGDP	-10.77980	-3.548490	0.0000	1(1)	Stationary
GCE	-6.368378	-3.548490	0.0000	1(1)	Stationary

Sources: Researcher's compilation from E-view version 9

Table 3. Co integration test

Unrestricted Co integration Rank (Trace) Test

Hypothesized no. of CE(s)	Eigenvalue	Trace statistics	0.05 crit.val	Prob.*
None*	0.603378	50.54809	29.79707	0.0001
At most 1*	0.437395	20.03061	15.49471	0.0097
At most 2	0.031310	1.049738	3.841466	0.3056

*Trace test indicates 2 co integrating equations at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, ** Mackinnon – Haug – Michel (1999) P – value*

Table 4. VECM test

Error correction	Coefficient	Std. Error	T - statistics	P – values
ECT = C(1)	-0.026149	0.005702	-4.585588	0.0001
D(RGDP(-1)) = C(2)	-0.499698	0.206049	-2.425149	0.0229
D(GCF(-1)) = C(4)	0.003943	0.002198	1.794385	0.0849
D(GCE(-1)) = C(6)	-0.090492	0.025561	-3.540186	0.0016
C = C (8)	27.07672	5.901321	4.588246	0.0001

R-square = 0.506339, F stat = 3.66, Prob(F stat) = 0.007, DW = 2.388

Table 5. Granger causality

VEC Granger Causality/Block Exogeneity Wald Tests Date: 06/07/17 Time: 10:44 Sample: 1984 2015 Included observations: 29			
Dependent variable: D(RGDP)			
Excluded	**Chi-sq**	**Df**	**Prob.**
D(GCF)	12.81526	2	0.0016
D(GCE)	13.40221	2	0.0012
All	17.74118	4	0.0014
Dependent variable: D(GCF)			
Excluded	**Chi-sq**	**Df**	**Prob.**
D(RGDP)	15.74294	2	0.0004
D(GCE)	14.46911	2	0.0007
All	25.09290	4	0.0000
Dependent variable: D(GCE)			
Excluded	**Chi-sq**	**Df**	**Prob.**
D(RGDP)	7.809917	2	0.0201
D(GCF)	28.20695	2	0.0000
All	28.59747	4	0.0000

From the VECM result presented in table 4 , the p value of gross capital formation (GCF) is 0.0849 which is greater than 0.05. The study therefore, accepts the null hypothesis and concludes that gross capital formation has no significant impact on Nigerian economic growth within the period of the study.

4.1.6 Hypothesis two

There is no significant causal relationship existing between capital formation and economic growth in Nigeria.

Decision Rule: Hypothesis of no causality is rejected if the p value is less than 0.005. From the causality test result, the p value of 0.0004 for RGDP and 0.0016 for GCF are less than 0.05; therefore, the study rejects the null hypothesis and concludes that bi directional causality runs among RGDP and gross capital formation (GCF).

5. DISCUSSION OF RESULTS

At this point, we analyzed the various test conducted in the cause of testing the hypotheses of the study starting from the pre test that determined the stability of the variables. We conducted the unit root test to ensure stationarity of specified variables using the ADF technique. Both the dependent and independent variables were not stationary at levels in ADF. However, at the 1st difference, every variable turn out to be stationary. Considering the time series using Augmented Dickey Fuller at trend and intercept, all their calculated statistics were > critical values at 5% levels of significance. The result shows that the time series are integrated of the same order 1(1), with the application of ADF. Thus, a linear combination of series integrated of the same order are said to be co integrated. The number of times a series undergoes differencing to attain stationarity proves the level of integration in such estimation.

Johansen cointegration analysis is summarized in Table 3 and model with lag 2 was chosen with the linear deterministic test assumption. In other to find out the long run equilibrium point of real GDP (dependent variable), GCF and GCE (independent variables), Johansen cointegration test was conducted with result showing two (2) co integrating equations as indicated in Table 3 above. The result therefore, indicated the existence of a long run equilibrium relationship among the variables. This result agrees with the findings of [32] and [1] who reported long run relationship between gross capital formation and economic growth in Nigeria.

With the proof of co integration among the variables adopted for estimation, vector error correction mechanism (VECM) presents the only option for predicting the dynamic behavior of real GDP in response to GCF and GCE. The ECT attained the rule of thumb or bore signs of negative sign with the coefficient of -0.026149; this implies that gross capital formation by the

above coefficient adjust annually to economic growth for equilibrium to be restored in the long run. This result is supported by the ECT p value of 0.0001 indicating statistical significance.

The R- square is 0.506339 showing that 50.6 percent variation in the dependent variable is explained by the explanatory variables as 49.4 percent difference being explained by variables not captured by this model which is represented by error term (et)

The F – statistics of 3.663145 with p value of 0.007408 which is less than 0.05 shows that there is statistical significant influence of explanatory variables on the dependent variables. This entails that all the independent variables jointly impact on economic growth in Nigeria. The DW as indicated in the above table has the value of 2.3 indicating nonexistence of auto correlation among residuals.

From the results of VECM in the short run, it is revealed that gross capital formation has insignificant positive relationship with economic growth in Nigeria within the period of the study having a coefficient of 0.003943 and pval of 0.0849, indicating that capital formation has not contributed significantly to the growth of the Nigerian economy as postulated by the Harold-Domar model of economic growth, this result agrees with [34] which found no significant relationship between economic growth and capital formation in Nigeria. Government capital expenditure was found to have a significant negative relationship with economic growth in Nigeria with the coefficient of -0.090492 and pval of 0.0016.

However, in the long run as revealed by the upper chamber of the VECM, gross capital formation have a positive insignificant relationship with economic growth as indicated by a t-statistics of 0.23562 and co-efficient of 0.008398 and government capital expenditure indicated a significant negative relationship with economic growth confirmed by its negative co-efficient of -3.826294 and t-statistics of -5.70675.This shows that gross capital formation has not contributed significantly to the growth of the Nigerian economy in the long run, just as the capital expenditure is seen to be harmful to economic growth within the study period.

From the causality result, the p value of 0.0004 for RGDP and 0.0016 for GCF are less than 0.05; showing that a bi directional causality runs among RGDP and gross capital formation (GCF). Granger causality result also reveal a bi directional causality running from government capital expenditure (GCE) and RGDP as supported by the p value of 0.0012 & 0.0201 and another two way causality also among GCF (gross capital formation) and GCE (government capital expenditure) indicated with a p-value of 0.0007 & 0.0000. This means that increase in gross domestic product contributes to rise in gross capital formation of Nigeria within the period of the study.

6. IMPLICATIONS OF RESULT

The result of co integration test as indicated by the trace statistics of the Johansen co integration equations in Table 3 shows the existence of long run equilibrium relationship between gross capital formation and growth in Nigerian economy. This implies that the result of this estimation can be relied upon in taking long run policy decisions in the economy. It also means that gross capital formation and economic growth policies if pursued vigorously can be beneficial to Nigerian economy in the long run.

As reported above in the short term, from the results of VECM, it is revealed that gross capital formation has insignificant positive relationship with economic growth in Nigeria within the period of the study, indicating that capital formation has not contributed significantly to the growth of the Nigerian economy as postulated by the Harold-Domar model of economic growth. Several reasons has been adduced to explain the positive insignificant or negative contribution of gross capital formation to the growth of the Nigerian economy in both short and longrun periods. [34] suggested that while it is easy to capture public capital investments in the economy, it is usually difficult to collate information on private investment due to the inefficiencies associated with public institutions responsible for data collection and the negative and sharp practices by Nigerian business men who deliberately falsify records so as to evade taxes. They further attributed the poor outcome of gross capital formation in the economy to endemic corruption in the public sector leading to over inflation of capital investments. However, it is the opinion of this study that capital formation needs to contribute to economic growth if effort is made to address the issues of corruption in the economy in addition to strengthening public statistical bodies to ensure that all private

investments are captured and regulated. The negative outcome of government capital expenditure as it relates to the economy in this study further confirms that our public expenditure programme need to be addressed as its outcome still runs contrary to appriori expectation. The Keynesian economic model presupposes that government capital spending contributes to the growth of any economy, which has not been the case in Nigeria within the period of this study.

From the causality result, the p value of 0.0004 for RGDP and 0.0016 for GCF are less than 0.05; showing that a bi directional causality runs among RGDP and gross capital formation (GCF). Granger causality result also reveal a bi directional causality running from government capital expenditure (GCE) and RGDP as supported by the p value of 0.0012 & 0.0201 and another two way causality also among GCF (gross capital formation) and GCE (government capital expenditure) indicated with a p-value of 0.0007 & 0.0000. This means that increase in gross domestic product contributes to rise in gross capital formation of Nigeria within the period of the study. The implication of the result is that any policy which encourages the growth of gross capital formation will also by extension influence gross domestic product positively.

7. CONCLUSION

This study investigated the effect of capital formation on the growth of Nigeria economy using the vector error correction model VECM. It was established from the result of the study that capital formation has no significant positive impact on the growth of Nigeria economy within the period investigated, just as the causality test indicates a two way causality between the dependent and the explanatory variables. The implication of this study is that gross capital formation has no significant impact on economic growth in Nigeria within the period of study. Based on the findings and policy implications, the study makes the following recommendations; there should be a deliberate collaboration between the government and the private sector towards building conducive enabling environment that promotes capital investment in the economy. There should be conscious effort by both government and private sector to address the issue of corruption in the economy in addition to strengthening public statistical bodies to ensure that all private investments are captured and regulated.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ugwuegbe SU, Uruakpa PC. The impact of capital Formation on the growth of Nigerian economy. Research Journal of Finance and Accounting. 2013;4(9).
2. Okonkwo A. Impact of capital formation in Nigeria. An Unpublished B.sc Research Project Submitted to the Department of Economics, University of Nigeria Nsukka; 2010.
3. Jhingan ML. Advanced economic theory, 12th Edition New Delhi. Vrinda Publications; 2003.
4. Babalola H. Economic growth and human development. Nsukka University Press; 2003.
5. Owolabo A, Ajayi NO. Econometrics analysis of impact of capital market on economic growth in Nigeria. Asian Economic and Financial Review. 2013;3(1):99-110.
6. Hernandez-Cata E. Raising growth and investment in Sub Saharan Africa: What can be done? Policy Discussion Paper: PDP/00/4, International Monetary Fund, Washington DC; 2000.
7. Romer PM. Endogenous technological change. Journal of Political Economy. 1986;98:S71-S102.
8. Lucas R. On the mechanics of economic development. Journal of Monetary Economics. 1988;22:3-22.
9. Jhingan ML. Economics of development and planning. Delhi. Vrinda Publication Ltd; 2006.
10. Iyoha MA. Intermediate Macro-Economics; Benin City, Mindex Publisher; 2007.
11. Soludo CC. Can Nigeria be the China of Africa? Lecture Delivered at the University of Bennin Founders' Day. 2006;14.
12. Bakare AS. Financial sector liberalization and economic growth in Nigeria: An empirical study. Economics and Finance Review. 2011;1(4):08–16.
13. National Population Commission and ORC Macro. Nigeria Demographic and Health Survey, Calverton, Maryland, USA: National Population Commission and ORC Macro; 2004.
14. Oloyede JA. Fundamentals of investment analysis. Lagos: Lion Press; 2001.

15. Central Bank of Nigeria. Economic Report for the first half of 2008.
16. Ajao MG. Stock market development capital formation and growth in Nigeria. International Journal of Current Research. 2011;33(6):382-388.
17. Anyanwu JC. Monetary economics: Theory, policy and institutions. Onitsha, Hybrid Publishers Ltd; 1993.
18. Mankiw G. Macroeconomics. New York. Harvard University Press; 2000.
19. Todaro MP, Smith SC. Economic development. Singapore. Pearson Education Inc; 2002.
20. Ali F Darrat, Fatima S Al-Shamsi. On the path of integration in the Gulf region. Applied Economics. 2005;37(9).
21. Donwa P, Odia J. An empirical analysis of the impact of the Nigerian capital market on her socio-economic development. Journal of Social Science. 2010;24(2):135-142.
22. Aiyedogbon J, Olu C. Military expenditure and gross capital formation in Nigeria. European Journal of Humanities and Social Sciences. 2011;7(1).
23. Mark MP, Mark RR, Mohammad NH. Human capital investment and the gender division of labour in a Brawn – based economy. American Economic Review. 2012;102(7):3531-60.
24. Solow R. A contribution to the theory of economic growth. Quarterly Journal of Economics. 1956;70:65-94.
25. Swan TW. Economic growth and capital accumulation. Economic Record. 1956;32: 334-361.
26. Orji A. Private domestic savings mobilization, bank credits and economics growth in Nigeria: An unpublished M.Sc Research Project Submitted to the Department of Economics, University of Nigeria, Nsukka; 2009.
27. Desroches B, Francis M. World real interest rates: A global savings and investment perspective. Working Paper No. 2007/16, Bank of Canada, Canada; 2007.
28. Adofu I, Abula M. Domestic debt and Nigerian economy. Current Research Journal of Economic Theory. 2010;2(1): 22-26.
29. Rekha M. Short run and long run relationship between capital formation and economic growth in India. International Journal of Management Technology (IJMT). 2011;9(2).
30. Godwin A. The effect of export earnings fluctuations on capital formation in Nigeria. African Economic Research Paper, 103, Nairobi: African Economic Research Consortium; 2000.
31. Ogujiuba KK, Adeniyi AO. Economic growth and human capital development: A case of Nigeria; 2004.
32. Gbenga W, Akinola AO. Savings, gross capital formation and economic growth nexus in Nigeria. Journal of Economics and Finance. 2013;1(2).
33. Adelaku OJ. Human capital development and economic growth in Nigeria. European Journal of Business and Management. 2011;3(9).
34. Odo SI, Igberi CO, Udude CC, Anoke CI. Public expenditure and economic growth: Evidence from Nigeria and South Africa. International Journal of Research in Management, Economics and Commerce. 2016;6(10):7-28.

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