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The Impact of Capital Formation on the Growth of Nigerian Economy

Ugwuegbe S. Ugochukwu[1*], Uruakpa Peter Chinyere[2]
1. Department of Banking and Finance University of Nigeria Enugu Campus
2. Department of Banking and Finance Abia State University Uturu
*. Email: ugossbros@yahoo.com

Abstract
The paper investigated the impact of capital formation on economic growth in Nigeria. The data were collected from Central Bank of Nigeria (CBN) statistical bulletin (2011).To analyze the impact of capital formation, stock market capitalization, inflation rate and interest rate on economic growth, the study employed Ordinary least square (OLS) technique. To test for the properties of time series, phillip-perron test was used to determine the stationarity of the variables and it was discovered that gross fixed capital formation and economic growth are integrated of order zero (I(0), Johasen co integration test was employed to determine the order of integration while erro 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 this result corroborate the findings of Bakare (2011), Orji and Mba (2010). Stock market also showed a positive impact, while both inflation rate and interest rate has a negative impact on economic growth in Nigeria for the period under review but the impact is statistically insignificant. 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.
Key Word: Capital Formation, Economic Growth, Inflation, Interest rate and stock market capitalization.

1.0 Introduction

The rate of growth in Nigeria economy cannot be fully analyzed 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. According to Bakare (2011), 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. Capital formation is equivalent to an increase in physical capital stock of a nation with investment in social and economic infrastructure. Continuing on the matter he noted that Gross fixed capital formation can be classified into gross private domestic investment and gross public domestic investment. The gross public investment includes investment by government and public enterprises while gross private domestic investment is investment by private enterprises. Gross domestic investment is equivalent to gross fixed capital formation plus net changes in the level of inventories. Economic theories have shown that capital formation plays a crucial role in the models of economic growth (Beddies 1999; Gbura and THadjimichael 1996, Gbura, 1997). This view called capital fundamentalism however was supported by the work of Youopoulos and Nugent (1976) as sited in Bakare (2011). Growth models like the ones developed by Romer (1986) and Lucas (1988) predict that increased capital accumulation can result in a permanent increase in growth rates. Capital 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 has been cited as the most serious constraint to sustainable economic growth. Meanwhile, an understanding of the impact of capital formation is a crucial prerequisite in designing a policy intervention towards achieving economic growth. The process of capital formation according to Jhingan, (2006) 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. The government of Nigeria in 1986 considered the need for improvement in capital information and pursued an economic reform that shifted emphasis to private sector. The public sector reforms were expected to ensure that interest rates were positive in real terms and to encourage savings, thereby ensuring that investment funds would be readily available to the real sector. Besides this, the reforms were expected to lead to efficiency and productivity of labor; efficient utilization of economic resources, increase aggregate supply, reduces unemployment and generate low inflation rate. For example, during 1980s, gross fixed capital information average 21.3 percent of GDP in Nigeria. This proportion increased to 23.3 percent of GDP in 1991 and declined 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 capital formation rose from 22.3 percent of GDP in 2000 to 26.2 percent in 2002 and declined drastically to 21.3 percent in 2005 (Bakare 2011). This study which investigates the impact of capital formation on the growth of Nigerian economy is organized as follows: after this introduction section two will present the literature review, section three will be on the research methodology while section four analyzes the empirical result and section five present the necessary policy recommendation.

2.1 Literature Review

Capital accumulation or formation refers to the process of amassing or stocking of assets of value, the increase in wealth or the creation of further wealth. Capital formation can be differentiated from savings because accumulation deals with the increase in stock of needed real investments and not all savings are necessarily invested. Recent literature has confused investment with capital formation. Investment can be in financial assets, human (capital) development, real assets that can be productive or unproductive. 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 and Aderemi 2012). 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. Governments by their autonomous investment influence the direction of other investment by crowding in other investment as desired. The relationship between capital formation of the nation and economic growth has been studied by a number of authors with different findings. This section will present the empirical result of several writers in this study area. Keynes (1936) was the first to call attention to the existence of an independent investment decision in the economy. He observed that investment depends on the prospective marginal efficiency of capital relative to some interest rate that reflects the opportunity cost of the invested funds. After Keynes, the evolution of investment theory was linked to simple growth models. These models gave rise to the accelerator theory, which makes investment a linear proportion of changes in output. The flexible accelerator model is a more general form of the accelerator model. Other investment theories include the neoclassical model developed by Jorgenson (1967) and Jorgenson and Hall (1971) and the "Q" theory associated with Tobin (1969). The notion of irreversibility in investment has also been given considerable attention in the investment literature (see Pindyck, 1988; Bertola and Caballero, 1990). Moreover, the financial intermediation theory associated with McKinnon (1973) focuses on the role of financial deepening and high interest rates in stimulating growth in developing countries. (Akpokodje 2000). In a study conducted by Azam and Daubreé, (1997), they concluded that private investment has been the ―strongest and the most significant contributor to growth in Kenya. They highlighted the predominant role of insufficient private investment and its failure to match the progress of human capital accumulation as an important factor in slowing growth in Kenya during this period. Private investment lagged behind accumulation of human capital, slowed by excessive competition from public investment in a context of financial repression. There are some evidences that the efficiency of capital use worsened over time, especially in the public sector activities, thereby reducing the growth effects of investment. In some developing countries, there is massive under-utilization and unemployment of educated labour, so that its social productivity may be minimal at the margin. The findings could also be attributed to measurement errors and possible non-linearities in the data, especially when micro evidence suggests high returns to education. Recent empirical studies by Hernandez-Cata (2000), Ndikumana (2000), Ben-David (1998), Collier and Gunning (1999), Ghura and Hadji michael (1996), Khan and Reinhart (1990), conducted in Africa, Asia and Latin America have established, beyond doubt, the critical linkage between capital formation and the rate of growth. Throughout the 1990s, the ratio of total gross domestic investment (GDI) to gross domestic product (GDP) in Asia, which experienced a high average rate of growth compared with the rest of the world, was about 27 percent, while in Latin America and sub-Saharan Africa the corresponding ratios were 20 percent and 17 percent, respectively. Econometric evidence (Beddies 1999, Ghura and Hadji michael 1996, Ghura 1997) indicates that private capital formation has a stronger, more favorable effect on growth rather than government capital formation probably because private capital formation is more efficient and less closely associated with corruption.

According to Adekunle and Aderemi (2012), real domestic investment is expenditure made to increase the total capital stock in the economy. This is done by acquiring further capital-producing assets and assets that can generate income within the domestic economy. Physical assets particularly add to the total capital stock. Boosting economic development requires higher rates of economic growth than savings can provide. Part of the finance for investment is provided by the corporate sector, bank loans and households' savings make up the other part. With this, savings is no longer a constraint to investment demand. While short term investments are highly encouraged by external sources of fund, long-term investments are more domestically driven. This is one of the reasons why aid is less effective in the long run. With lower rates of interest, asset values tend to be on the upward swing which invariably represents the discounted value of such assets thereby increasing the rate of

acquisition and investment in such assets increases aggregate demand. Investment therefore is not constrained by aggregate savings but more by domestic interest rates. Therefore, the new equation of investment is Investment = (Savings) + (newly created money available to Deposit Money Banks). Attempts at reducing expenditure have affected investment rates and had led to poor and sluggish growth and eventually affecting savings performance (Khan and Villanueva, 1991).

Ajao (2011) in his study concludes that long-term capital formation in Nigeria were not majorly sourced from the capital market as the above result shows the marginal contribution of Market Capitalization and New Issues to Gross Fixed Capital Formation. Though, it is unarguable that when investors take position for profit, it can affect the level of wealth which can then be used to build private capital. This result is in line with the findings of Sarkar (2006) where he concludes that there exist no meaningful relationship between stock market capitalization and gross fixed capital formation. Orji and Mba (2011) in their study looked at relationship between FPI, Capital Formation and Growth, in Nigeria using the 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. 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. In their result, the two stage least squares estimates are very close to the OLS estimates suggesting that OLS estimates are consistent and unbiased. Hence, endogeneity was not a problem in the estimated models. There is therefore no simultaneity between GDP growth and capital formation model. These findings therefore have some policy implications as discussed in the work.

Adekunle and Aderemi (2012) examined the relationship between Domestic Investment, Capital Formation and Population Growth in Nigeria he used Secondary data from the Central Bank of Nigerian, for capacity utilization, capital expenditure bank credit and capital formation while growth and investment rates from World Economic Information database were used. Their result shows that the rate of investment does not assist the rate of growth of per capital GDP in Nigeria. The paper tests on the curve estimation regression models confirm that growth is in existence but is found to be insignificant. The linear result indicates the importance of government expenditure, capacity utilization and bank credit in increasing the income of Nigerians. The results also show that there is negative relationship between growth rates of the population and capital formation. With the curve estimation method results, investment rate can engender growth in the economy though slowly, on a linear path.

3.1 METHODOLOGY

This study employed annual series data from Central Bank of Nigeria statistical bulletin (2011). The study will cover the period of 1982 to 2011. In other to achieve the objective of this study, Ordinary Least Square (OLS) technique was used to determine the impact of capital formation on economic growth in Nigeria. The choice of OLS is mainly because it minimizes the error sum of square and has a number of advantages such as unbiaseness, consistency, minimum variance and sufficiency; it is widely used and simply and easy to understand. The model that will analyze the relationship is implicitly stated as follows:

GDP = f(GFCF, INFR, SMC, INTR,)……(1)

The equation 1 is transformed into a linear function thus:

$GDP_t = b_0 + b_1GFCF_t + b_2INFR_t + b_3SMC_t + b_4INTR_t + U_t$ ……(2)

GDP_t = Gross Domestic Product at time t, which is used as a proxy for economic growth.

$GFCF_t$ = Gross Fixed Capital Formation at time t, which measures capital accumulation in Nigeria.

$INFR_t$= Inflation Rate

SMC_t= Stock Market Capitalization (A Proxy for Financial development)

b_0 = the constant or the intercept.

b_1-b_4 = the coefficient of the explanatory variable.

U_t = error term.

It has been agreed that a log- linear form is more likely to find evidence of a deterrent effect than a linear form, Cameron (1994) and Ehrlich (1996). We therefore log-linearized the equation as:

$LogGDP_t = b_0 + b_1LogGFCFt + b_2INFR_t + b_3LogSMC_t + b_4INTR_t + U_t$ ……(3)

3.0 ESTIMATION PROCEDURE

The estimation commences with a unit root test to confirm the stationarity state of the variables that entered the model. In order to test for the stationarity, the Phili-perron test will be adopted. The first step is to test for stationarity at level, without constant and trend. If the variable are not stationary, then the next step is to difference and test for the stationarity of the differenced variables. If the variables are stationary after the first differencing, then the variables are integrated of order one i.e 1(1). After that the co-integration regression will be obtained from the normalized coefficients of the model generated from the co-integrating vector. Based on this the Error Correction Mechanism which determines the speed of adjustment to the equilibrium will be

estimated.

3.1 UNIT ROOT

This involves testing the order of integration of the individual series under consideration. This is necessary because most time series are not stationary. One of the most popular unit root test is the Phillip-Perron (PP) test developed by Phillip (1987) and Phillip and Perron (1988). The PP test regression equations with constant are:

$$\Delta Y_T = \alpha_0 + \alpha_1 Y_{T-1} + \varepsilon_T \ldots \quad (4)$$

Where Δ is the first difference operator ε_T is random error term Y = the variable T= linear time trend α_0= constant. The unit root test is then carried out under the null hypothesis $\alpha = 0$ against the alternative hypothesis of $\alpha < 0$. Once a value for the test statistics is computed we shall compare it with the relevant critical value for the Phillip-Perron Test. If the test statistic is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of $\alpha = 0$ is rejected and no unit root is present. If the variables are non-stationary at level form and integrated of the same order, this implies evidence of co-integration in the model.

3.3 Co-Integration Equation

This involves testing for the presence or otherwise of co-integration between the series of the same order of integration through forming a co-integration equation. The basic idea behind co-integration is that if, in the long run, two or more series moves closely together, even though the series themselves are trended, the different between them is constant. It is possible to regard these series as defining a long run equilibrium relationship, as the different between them is stationary (Hall and Henry 1989). Dickey et. al, (1991), noted that lack of co-integration suggests that such variables have no long run relationship: they wander arbitrary far away from each other. The co-integration equation is stated in equation 6 as:

$$\left[\eta_m \log RPC_t = \alpha_1 + \sum_{i=2}^{p} \alpha_i \eta_m Z_t - \left[\eta_m \log RPC_t - \sum_{i=1}^{n} \beta X_{t-i} + v_{2t}\right]\right] \ldots\ldots\ldots (5)$$

Where

.

$$\left[\eta_m \log RPC_t - \sum_{i=1} \beta X_{t-i}\right]$$

is the linear combination of the non co integrated vectors,
X is a vector of the non co integration variables.

3.4 The Error Correction Model Equation

If co-integration is proven to exist, then the third step requires the construction of error correction mechanism to model dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. However, the greater the co-efficient of the parameter the higher the speed of adjustment of the model from the short-run to the long-run equilibrium. The individual influence of the co integrated variables can only be separated with an error correction mechanism through an error correction model as shown below.

$$\left[\eta_m \log RPC_t = \alpha_1 + \sum_{i=2}^{p} \alpha_i \eta_m Z_t - \left(\lambda ECM_{t-i} + v_{4t}\right)\right] \ldots\ldots\ldots\ldots\ldots (6)$$

Where $-\lambda ecm$ is the error correction mechanism, $-\lambda$ is the magnitude of error corrected each period specified in its a priori form so as to restore $\eta_m Z_t$ to equilibrium. Where Z_t represents the explanatory variables (RDI and FIW).

Also the optimum lag length was determined using the multivariate versions of information criteria of Akaike's Information Criteria (AIC) and Schwarz's Bayesian Information Criteria (SBIC).

4.0 Data Analysis and Discussions.

Unit Roots Test Result

In this study, the Phillip-Perron (PP) unit roots test was employed to test for the time series properties of model variables. The null hypothesis is that the variable under investigation has a unit root against the alternative that it does not. The choice of lag length was based on Akaike and Schwartz-Bayesian information criteria. The decision rule is to reject the null hypothesis if the PP statistic value exceeds the critical value at a chosen level of significance (in absolute term). These results are presented in table I below.

Table 1: Unit Roots Test Result

Variable	PP statistics		PP statistics		
	Level	Critical values	1st difference	Critical values	Lag truncation
GDP	8.353244	1% -3.6752 5% -2.9665 10% -2.6220			3
GFCF	6.260412	1% -3.6752 5% -2.9665 10% -2.6220			3
SMC	-0.156702	1% -3.6752 5% -2.9665 10% -2.6220	-6.006522	1% -3.6752 5% -2.9665 10% -2.6220	3
INFR	-2.726175	1% -3.6752 5% -2.9665 10% -2.6220	-6.787993	1% -3.6752 5% -2.9665 10% -2.6220	
INTR	-2.555763	1% -3.6752 5% -2.9665 10% -2.6220	-7.413073	1% -3.6752 5% -2.9665 10% -2.6220	

The results of table 1 above show that GDP and GFCF are stationary in their level form since their PP values are greater than the critical values at 1%, 5% and 10%, it also reviles that SMC, INFLR, and INTR are non-stationary at their level form but at first differencing. The null hypothesis of no unit root was rejected for GDP and GFCF, while the null hypothesis of no unit root was accepted for SMC, INFLR and INTR. Thus, we conclude that the variables (GDP and GFCF) under investigation are integrated of order zero (I(0)). Since the variable (GDP and GFCF) are integrated of the same order. We therefore, examine their co-integrating relationship using Engle-Granger co-integration procedure.

Results from Co-Integration Test

Given the unit root properties of the variables, we proceed to implement the Engle-Granger co-integration procedure. The variables (GDP and GFCF) have the same order (I ~ (0)) of integration; we estimate their linear combination at their level form with intercept term and obtain their residual which is then subjected to co integration test as shown in Table 2:

Table 2: Co-Integration Tests

	t-pp	Lag	5%Critical val	1% Critical val
Residual	22.70709	1	15.41	20.04

From the table, since the residual t-pp of 22.70709 at lag length 1 is greater than the 5% and 1% critical values of 15.41 and 20.04, it means that the residual is stationary at level form and hence there is linear relationship among the variables. This implies that there is a robust long run equilibrium relationship between capital formation and economic growth in Nigeria. Consequently, we adopt the Error Correction Model which was specified in case, co-integration was established among the variables.

Table 3: Multiple Regression Result.

Dependable Variable: LOG(GDP)

Variable	Coefficient	Std. Error	t- Statistic	Prob.
Constant	1.546309	0.174426	8.865147	0.0000
LOG(GFCF)	1.120822	0.032482	34.50605	0.0000
D(INFLR)	-0.000521	0.003567	-0.145976	0.8852
DLOG(SMC)	0.211181	0.208973	1.010568	0.3223
D(INTR)	-0.017704	0.012049	-1.469302	0.1547
F-Statistic	319.1087			0.0000
ECM	-294.0107			25.6243

R-square 0.982, **Adjusted R-square** 0.978, **DW** 0.805

The estimated model can be shown as:

$$\mathbf{LogGDP_t = 1.546309 + 1.120822LogGFCF_t - 0.000521INFR_t + 0.211181LogSMC_t - 0.017704INTR_t \ldots (7)}$$

From the result in table 3 and in equation 7, the estimated model shows that capital formation has positive impact on economic growth in Nigeria for the period under review. This indicates that an increase in capita formation will lead to increase in economic growth in Nigeria. This result corroborated the findings of Bakare (2011), Orji and Mba (2010). Specifically, a one percent increase in capital formation will increase economic

growth by about 112%. Interestingly, the t- statistic reveals that the variable is highly significant at 5% level of significance since the probability value is less than 0.05 (p- value < 0.05). This suggests that capital formation has a positive and significant impact on economic growth in Nigeria. The coefficient of stock market capitalization (SMC) shows that it has a positive impact on economic growth in Nigeria. This implies that a 1% increase in (SMC) will increase economic growth by 21.11 percentage point. The result also shows that interest rate and inflation rate has a negative impact on economic growth. Which means that a 1% increase in inflation rate and interest rate will decrease economic growth by 0.05% and 1.77% respectively. However, the t- statistic shows that SMC, inflation rate and interest rate has no significant impact on economic growth in Nigeria. The decision is made based on the probability level of SMC, inflation rate and interest rate which is greater than 0.05 (p- value > 0.05). The results show that the error correction term (ECM) for the estimated model is statistically significant and negative. Thus, it will rightly act to correct any deviations from long-run equilibrium. Specifically, if actual equilibrium value is too high, the ECM will reduce it, while if it is too low, the ECM will raise it. The coefficient of -294.0107 denotes that the speed of adjustment for any past deviation from the long equilibrium will be very high since the coefficient has a very high value. Thus, it will take a very short time (less than two years) for any disequilibrium in the model to be corrected. The coefficient of determination and its adjusted are 0.982 and 0.978 respectively implying that there exists goodness of fit in the model. This means that about 98.2% of the variation in economic growth is accounted for by variation in capital formation, stock market capitalization, inflation rate and interest rate. The overall regression is significant at 5% level of significance implying that the joint effects of all the included variables were significant. The Durbin Watson statistic of 0.805 shows evidence of first order serial autocorrelation in the model given that it is approximately less than 2.

5.0 CONCLUTION

This paper investigated the impact of capital formation on economic growth in Nigeria between the period 1982 and 2011. The estimated results point that both capital formation and stock market capitalization has a positive effect on economic growth in Nigeria. This result is in line with the findings of Bakare (2011), Orji and Mba (2010). Inflation rate and interest rate has a negative impact on economic growth in Nigeria. The result further shows a long run relationship between economic growth and capital formation in Nigeria. Therefore effort should be directed at increasing the level of capital formation in Nigeria since it has the potential to drive the economy to the next level.

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