

# Analysis of Savings and Private Capital Formation in Nigeria

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## Abstract

The study investigates the relationship between private capital formation and savings in Nigeria between 1982 - 2014. It employs the ordinary least squares technique, cointegration and the error correction mechanism which minimizes the possibility of estimating spurious relations while retaining vital long run information. Research findings show that capital expenditure and inflation rate exhibit negative and insignificant effects on gross fixed private capital formation, with savings having a negative and significant effect. FDI, RGDP and Prime lending rate all revealed to have a positive and significant effect on gross fixed private capital formation with the previous value(s) of gross fixed private capital formation having a positive and significant effect on the present value(s). The study recommends, among other things, the encouragement of savings culture and creation of an enabling environment for investment to thrive.

**Keywords:** Savings, Investment, Growth, Inflation.

## 1. Introduction

In a mixed economy such as Nigeria, the interaction between savings and investment plays an important role in order to achieve the broad macroeconomic objectives of stability and growth. Macroeconomic imbalances have however been persistent, the savings – investment gap have been widening and there has been high rate of inflation, chronic balance of payment problems and huge budget deficits (Akpokoje, 1998). There is a growing concern among researchers and policy makers over the unstable nature of private capital formation and its substantial divergence among countries. This is due to the critical importance of private capital formation for the maintenance of strong and sustainable growth in the world.

Nigeria and other developing nations in Africa are characterized by inadequate capital formation due to the vicious cycle of low productivity, low income and low savings. Per capita incomes are usually low in developing countries and the propensity to consume is very high. Due to this, the desire to save and invest among the majority of Nigerians is very low and this has had negative implications for private capital formation in Nigeria. Inflation and high dependency ratio have also been known to be major causes of low savings among Nigerians. The fact that investment determines the rate of Private Capital Formation (i.e., the rate of private or physical capital accumulation) shows that it is a vital factor in the growth and productivity of a nation (Uremadu, 2004). Also, the global meltdown caused a slowdown in the flow of foreign investment in the Nigerian stock market and this has affected the rate of savings to a greater extent and hence, private capital formation. As well, there is the problem of inadequate basic infrastructure and service. Basic infrastructure like power, transport and communication facilities are either lacking or inadequate in Nigeria and this has had adverse effect on foreign investment which is an important factor of private capital formation.

According to Onuoha (2009), many developed countries have a well formed capital base but this is not the case in developing countries (Nigeria inclusive), where private capital formation figures have varied overtime. As explained by Bakare (2011), in 1986 the government of Nigeria considered the need for improvement in private capital formation and pursued an economic reform that shifted emphasis on private sector. For example, during 1980s, gross fixed private capital formation averaged 21.3 percent of GDP. It decreased to 17.4 percent in 1997 and averaged 21.7 percent of GDP in 2000 then to 26.2 percent in 2002 and declined to 21.3 percent in 2005. The decline in private capital formation can be as a result of macroeconomic imbalances such as deteriorating foreign exchange rate and corruption in public sector. Nigeria has recorded low private capital formation just like other developing countries when compared to developed countries like the United States of America. The growth, investment and savings record in most African countries, relative to other regions of the world has been of concern to economists. This is because the growth rate registered in Nigeria and other African countries is not commensurate with the levels of savings and investment.

Some researchers have had divergent views in trying to explain what actually accounts for the unstable nature of private capital formation among nations: Areskoug (1976) pointed out that private foreign investment performs partially a supplementary, and partially a substitute role in private capital formation in developing countries. Jenkins (1989), through his research found that lower taxes stimulate growth by increasing the incentive to save and invest and hence, increases private capital formation. Uremadu (2004) in his analysis stated that foreign exchange rate leads private capital formation in Nigeria followed by index of energy consumption and service ratio. Akpokoje (2000) discovered that expert earnings fluctuations adversely impinges on investment in the long run and hence, affects private capital formation negatively.

Although a vast empirical literature has shed light on various aspects of Private Capital Formation

(Sunday (2012), Obi, Wafure and Auta (2012), Nasiru and Haruna (2013), Kanu and Ozurumba (2014), Uma, Odionye, Aniagolu and Obiora (2014), Abu-Goodman (2014)), several questions remain somewhat pending with regard to the relevance of savings in raising the rate of Private Capital Formation in Nigeria especially as regards causality in the face of dwindling national revenues. Contributing to the body of literature through investigations on the impact of savings on private capital formation to aid policy intervention is therefore the basis of this work. Thus this research is geared towards discovering if savings spurs capital formation in the Nigerian economy and if so, to determine if this impact reflects in the long-run. The rest of the paper is organized as follows: Section 2 comprises Literature review, section 3 discusses the model specification and methodology, section 4 contains data analysis, and finally section 5 gives discussion of findings and conclusion

## 2. Literature Review

The classical economists, in their theory on savings and investment postulated that savings and investment are equal, assuming that flexible interest rates will always maintain equilibrium. This school of thought holds that free markets regulate themselves, when free of any intervention. This notion is based on the argument that funds from aggregate savings are eventually borrowed and turned into investment expenditures, thereby equalizing savings and investment. Furthermore through this investment, private capital formation is thus formed and acts as an aid to economic development, thus the fact that private capital formation is a very important factor that affects economic growth and development of nations has made it subject to many empirical studies.

In 1976, Feldstein carried out a study on private capital formation in an inflation environment in the United States of America using an Ordinary Least Square methodology and incorporating taxes and inflation in a neo-classical growth model. The study concluded that increased inflation will reduce capital intensity without tax indexing and for a plausible range. Njiforti and Muhammad (2010) studied deficit financing and private sector saving in South Africa adopting the OLS method of estimation and found that deficit financing inversely affected private savings in South Africa.

Uremadu (2004) analyzed the impact of foreign private investment on private capital formation in Nigeria. The paper obtained time series estimates using the Ordinary Least Square (OLS) methodology and discovered that foreign exchange rates leads private capital formation in Nigeria, followed by index of energy consumption and then, debt service ratio. Imobighe and Dania (2006), developing a time series simultaneous equation model and using the Indirect Least Square (ILS) method, undertook an empirical analysis and the impact of some macroeconomic aggregates on private capital formation in Nigeria from 1975 to 2002. It was observed that the most important variable that determines private capital formation is Gross Domestic Product. Their findings also revealed that domestic credit to the economy was significantly related to gross private capital formation having negative impact on capital formation. Akpokoje (2000), using time series data set from 1985-2000 and adopting the OLS methodology, explored the association between export earning and private capital formation in Nigeria. The work discovered that export earnings fluctuations adversely impinges on investment (i.e., the change in capital stock) in the short-run. Adetiloye (2012) estimated the relationship between domestic investment, capital formation and population growth. Adopting the curve estimation regression models, that study discovered that the state of investment in the Nigerian economy has been worrisome for some time now, given its poor performance and insignificant correlation with capital formation.

Iniubong (2012) sought to determine the factors that reduce savings in Nigeria using Ordinary Least Squares econometric framework. Research findings revealed that savings output in Nigeria during the period was necessary factor for economic development and growth. Suleiman (2010) carried out a research on foreign private investment capital formation and poverty reduction in Nigeria. Using data set spanning from 1990-2008 and adopting the Ordinary Least Square methodology, discovered that foreign private investments has a positive relationship with capital formation and contributed immensely to poverty reduction in Nigeria within the period. Akujuobi (2007) examined foreign direct investment and private capital formation in Nigeria for the period 1983-2003 using the recursive modeling technique. The work found that foreign direct investment is a significant positive contributor to the overall capital formation effort.

Bakare (2011) undertook a study on private capital formation and growth, applying the Harod-Damor model. The relationship between Private Capital and economic growth was examined using OLS multiple regression analytical method and findings revealed a significant relationship between Private Capital formation and economic growth. His results supported the Harod-Damar model which proved that the more economy is able to save and invest out a giving GDP, the greater will be the growth that GDP. He found that the speed and strength of economic growth in Nigeria have not been satisfactory due to the decline in Private Capital formation.

Sunday (2012) investigated whether the impact of interest rates on savings and investment in Nigeria using ordinary least squares. Aggregate savings was found to have a positive significant impact on Aggregate investment in Nigeria. This was confirmed by a positive Aggregate savings coefficient and a significant t-value. Also there was a positive correlation between Aggregate savings and Aggregate investment thus an increase in Aggregate savings will lead to an increase in Aggregate investment in Nigeria.

Obi, Wafure and Auta (2012) probed the relationship among savings, investment and growth rate in Nigeria using cointegration and Error Correction Model (ECM) approach. Specifically, savings and investment models are estimated. The econometric analysis showed that investment-GDP ratio lagged by one year, real growth rate of GDP lagged by one year, gross domestic savings lagged by one year and cost of capital lagged by two years are significant determinants of investment. Similarly, real growth rate of GDP, gross domestic investment-GDP ratio lagged by one year and economic liberalization were also found to be significant determinants of savings. The study identified a robust relationship among savings, investment and growth.

Nasiru and Haruna (2013) explored the relationship between savings and investment in Nigeria during the period 1980-2011. The study employed Autoregressive Distributed Lag (ARDL) Bounds testing approach to test for long run relationship. The short-run dynamics are also captured from error correction model. The result of the Bounds test suggested that there is a long run relationship between savings and investment.

Kanu and Ozurumba (2014) assessed the impact of capital formation on the economic growth of Nigeria using multiple regressions technique. It was ascertained that in the short run, gross fixed capital formation had no significant impact on economic growth; while in the long run, the VAR model estimate indicates that gross fixed capital formation, total exports and the lagged values of GDP had positive long run relationships with economic growth in Nigeria. It was equally ascertained that there exists an inverse relationship between imports, Total National Savings and economic growth; while GDP was seen to have a unidirectional causal relationship with export, Gross fixed capital formation, Import and total national saving.

Uma, Odionye, Aniagolu and Obiora (2014) examined the influence of investment and saving in the Nigerian economy using time series data. Vector error correction model was employed in the data analysis. Impulse response function was used to trace the transmission of periodic shocks between gross domestic product and savings, investment and foreign direct investment while Cholesky forecast error variances decomposition was used to forecast error variance decomposition between gross domestic product and savings, domestic investment and foreign direct investment. The results revealed, among others that the response of GDP to savings is oscillatory implying that there is no definite pattern of response of GDP to savings in Nigeria; FDI and savings seem to be the driving force behind GDP variance in Nigeria, and savings and domestic investment have long run positive and significant impact on the Nigerian economy while, FDI had negative but insignificant impact on the economy.

Abu-Goodman (2014) investigated the causal relationship between saving rates of Nigeria and real GDP growth especially over the period of 1980-2012 that includes the recent financial crisis. The study implemented the Johansen co-integration estimation as well as Granger Causality analysis. Also in the analysis, the hypothesis of existence of any long-run equilibrium relationship between savings - investment function was tested by using Johansen co-integration method for Nigerian economy during economic crisis. The short-run dynamics were also captured from the vector error correction model. The estimates of the Johansen co-integration model suggest that there is a long run relationship between savings and investment, while the Granger causality test result drew a conclusion that there is a unidirectional causal relationship from investment towards savings in Nigeria, where savings turns into consumption especially for imported commodities.

### 3. Methodology

#### 3.1 Model Specification

This specification of the model that will be used in this study is related on the information relevant to the study. The expression of the relationship between economic variables employed in this study is very essential.

The study in economic theory stated that savings and investment are equal and secondly, via investment; capital is formed:

$$\text{Thus, } I = \text{GFPCF} = F(S) \text{ ----- (1)}$$

Therefore one functional model will be used to capture the aim of this study.

Hence, the functional form of the model is re-specified thus:

$$\text{GFPCF} = F(S) \text{ ----- (2)}$$

But J.M Keynes in his theory on income and employment stated that the ability to save of individuals and nations at large is determined by the prevailing rate of inflation, the prime lending rate (interest rate), the real Gross Domestic product and other factors such as the capital Expenditure and foreign direct investment.

Based on this theory and studies like Sunday (2012), Obi, Wafure and Auta (2012), Nasiru and Haruna (2013), Kanu and Ozurumba (2014), Uma, Odionye, Aniagolu and Obiora (2014), Abu-Goodman (2014), the functional form of the model is derived thus:

$$\text{GFPCF} = F(S_t, \text{INF}_t, \text{PLR}_t, \text{RGDP}_t, \text{CAP}_t, \text{FDI}_t) \text{ ----- (3)}$$

The mathematical form of the above equation 4 is specified as:

$$\text{GFPCF} = \beta_0 + \beta_1 S_t + \beta_2 \text{INF}_t + \beta_3 \text{PLR}_t + \beta_4 \text{RGDP}_t + \beta_5 \text{CAP}_t + \beta_6 \text{FDI}_t \text{ ----- (4)}$$

The log form of equation 4 is specified thus:

$$\text{LnGFPCF} = \beta_0 + \beta_1 \text{Ln}S_t + \beta_2 \text{Ln} \text{INF}_t + \beta_3 \text{Ln} \text{PLR}_t + \beta_4 \text{Ln} \text{RGDP}_t + \beta_5 \text{Ln} \text{CAP}_t + \beta_6$$

$$\text{LnFDI}_t + e \text{ -----(5)}$$

**Where:**

LnGFPCF = Log of Gross fixed private capital formation, LnS = Savings, INF = Inflation rate, PLR = Prime lending rate of Deposit money banks, RGDP = Real GDP, LnFDI = Log of foreign direct Investment, LnCAP = Log of capital expenditure,  $\mu$  = the stochastic error term, t = Time (measured annually), e = error term,  $B_0$  = Intercept term,  $\beta_1 - \beta_6$  = Slope coefficients.

**3.2 Estimation Procedure**

The Ordinary least squares (OLS) method will be used for this analysis under the assumption that there is no connection between dependent variable and error term. This can be depicted symbolically as:

$$\text{COV}(X_i, U) = 0$$

The analysis will be run using E-Views 7.1 econometric software. The model will however be interpreted on the basis of the results obtained from the estimation. The estimation of the model will follow the methodology of econometric research. Statistical and econometric procedure, single equation technique was chosen for effective and efficient analysis of data. Among the single equation techniques, the OLS method was chosen because it possesses the property of BLUE (Best linear Unbiased Estimates).

**3.2.1 Stationarity Test**

This test is very important since the data employed in this research are time series data. Stationarity means that the mean variance of a stochastic process are constant over – time and the value of the convenience between the two time periods depends only on the distance or gap between the two time periods and not on the actual time at which the covariance is computed (Gujarati and Sangeetha, 2007). This is very important since it helps to avoid spurious regression.

**3.2.2 Causality Test**

Although regression analysis deals with the dependence of one variable, it dependence of one variable on other variables it does not necessarily imply causation. In other words, the existence of a relationship between variables does not prove causality or the direction of influence (Gujarati and Sangeetha, 2007). The Granger causality test will be used to test for the causality between savings and private capital formation.

**3.2.3 Co – integration and Error Correction**

In econometric terms, two variables (or more) are said to be co – integrated if they have long – term or equilibrium relationship between them. The aim of the cointegration analysis is to thus establish long run equilibrium relationship between variables. When the cointegration of these variables is confirmed, it portends that a non-spurious long run relationship exist. When this is combined with the error correction model (ECM), consistent estimates of both long run and short run elasticities is evident.

**4. Data Analysis**

The result of the regression carried out on the model will be presented in this section. The regression data obtained from the central bank of Nigeria statistical bulletin was subjected to various tests in order to ascertain whether the parameters estimated are theoretically meaningful and statistically adequate.

**4.1 Unit Root Tests**

Since the data employed in the research are time series data, this test is therefore necessary. Hence, the unit root test for stationary was applied using the augmented Dickey – fuller (ADF) test. The result of the unit root test including the order of integration and assessment of the independent variables are presented below:

**Table 4.1: Unit root test results**

Variables	ADF State	5% Critical	Order of Integration	Assessment
LGFPFCF	-3.55	-2.96	I(1)	Stationary
LS	-4.01	-2.96	I(1)	Stationary
INF	-3.33	-2.96	I(0)	Stationary
PLR	-5.17	-2.96	I(1)	Stationary
LCAP	-3.55	-2.96	I(1)	Stationary
LFDI	-4.79	-2.96	I(1)	Stationary
RGDP	-5.94	-2.96	I(0)	Stationary

*Source: Author’s Computation from Eviews 8.*

The results depicts that all the variables are stationary at different levels. Thus are not integrated of the same level, thereby removing the possibility of spurious results.

**Co-integration Test**

To establish a long-run relationship position of the variables the proceeds to computing the co-integration test using the Johansen cointegration technique.

The cointegration table is presented below:  
**Series: CAP, FDI, GFPCF, INF, S, RGDP, PLR**  
**Table 4.2: Cointegration table**

Eigen value	Likelihood Ratio	5% critical value	1% critical value	Decision
<b>0.862764</b>	230.3459	124.24	133.57	Reject
<b>0.846295</b>	168.7783	94.15	103.18	Reject
<b>0.731974</b>	110.7241	68.52	76.07	Reject
<b>0.692980</b>	69.90727	47.21	54.46	Reject
<b>0.486419</b>	33.30112	29.68	35.65	Reject at 5% but not 1%
<b>0.269636</b>	12.64435	15.41	20.04	Accept
<b>0.089416</b>	2.903750	3.76	6.65	Accept

*Source: Author's Computation from Eviews 8.*

From table 4.2 above, we will observe that four of the regressor cointegrates at both 5% and 1% level of significance. Five of the regressors cointegrates at 5% level of significance only. One regressor cointegrated only at 5% but not at 1% and two regressors does not cointegrate.

**Table 4.3: OLS Results**

DEPENDENT VARIABLE: LOG (GFPCF)				
EXPLANATORY VARIABLES	COEFFICIENTS	STANDARD ERRORS	T-STATISTICS	PROBABILITIES
Constant	124.4023	19.64812	6.331512	0.0000
LCAP	0.001797	0.037938	0.047375	0.9626
LFDI	0.000576	0.000402	1.431305	0.1643
INF	-0.258650	0.307774	-0.840388	0.4084
LS	2.33E-05	5.16E-06	4.527261	0.0001
RGDP	-0.000204	6.89E-05	-2.960307	0.0065
PLR	-1.783579	1.022697	-1.743996	0.0930
STATISTICS	VALUES		PROBABILITIES	
R <sup>2</sup>	0.65			
ADJUSTED R <sup>2</sup>	0.57			
F-STATISTIC	7.98		0.0000	
D-STATISTIC	0.87			

*Source: Author's Computation from Eviews 8.*

From the regression results in table 4.3 above, it is evident that most of the variables were insignificant and do not confirm to economic a prior expectations. To account for this, the Error Correction Mechanism was adopted. Again, the dependent variable, Gross fixed private capital formation; (GFPCF) was lagged by one year. The reason behind the lagging of the variable is that capital formed this year is dependent on capital formed in the previous year hence we need to accommodate for the past value of the variable. As a result of the above, the model earlier specified is thus re – specified as an autoregressive model.

This stated as:

$$\text{LnGFPCF} = \beta_0 + \beta_1\text{LSt} + \beta_2\text{INF} + \beta_3\text{PLR} + \beta_4\text{RGDPt} + \beta_5\text{LnCAPt} + \beta_6\text{LnFDIt} + \beta_7\text{LnGFPCF}_{t-1} + e \text{ -----(6)}$$

The regression results of the model after the error correction is given below:

**Table 4.4: Autoregressive ECM**

DEPENDENT VARIABLE: LOG (GFPCF)				
EXPLANATORY VARIABLES	COEFFICIENTS	STANDARD ERRORS	T-STATISTICS	PROBABILITIES
Constant	-49.11473	22.21573	-2.210808	0.0373
L(CAP)	-0.008035	0.020379	-0.394250	0.6970
L(FDI)	0.000476	0.000211	2.255985	0.0339
INF	-0.0215435	0.155726	-1.383422	0.1780
S	-9.95E – 06	4.60E – 06	-2.161775	0.0413
RGDP	0.000120	5.50E – 05	2.176528	0.0400
PLR	1.130535	0.605818	1.866130	0.0748
GFPCF(-1)	0.988218	0.114306	8.645394	0.0000
ECM(-1)	-0.000154	5.25E – 05	-2.925563	0.0076
STATISTICS	VALUES		PROBABILITIES	
R <sup>2</sup>	0.91			
ADJUSTED R <sup>2</sup>	0.88			
F-STATISTIC	30.0		0.0000	
D-STATISTIC	1.79			

*Source: Author's Computation from Eviews 8.*

From the above table 4.4, it can be deduced that the errors have been corrected as FDI, S, RGDP, GFPCF(-1) and ECM are statistically significant as is shown by their t-statistic values.

### Causality Test

The existence of relationship between variable does not prove causality or the direction of influence. As a result, the Granger causality test was to test for the causality between savings and investment. Since we are interested in the causality between savings and investment, other results of the causality test will not be interpreted.

The hypotheses to be tested are:

**H<sub>01</sub>:**  $S \rightarrow GFPCF$  (Savings does not Granger-cause GFPCF)

**H<sub>02</sub>:**  $GFPCF \rightarrow S$  (GFPCF does not Granger-cause S)

The variable GFPCF was used in place of investment since from equation 1,  $GFPCF = I$

At 5% level of significance.

### Decision Rule

Reject  $H_{01}$  if  $F\text{-stat} > F\text{-tab}$  or if the probability of Granger causality  $< 5\%$  level of significance. Accept if otherwise.

The results of the Granger causality test are presented below:

**Table 4.5: Granger causality test**

Direction of causality	F-value	Probability	Decision
$S \rightarrow GFPCF$	11.79	0.00	Reject
$GFPCF \rightarrow S$	0.01	0.98	Accept

*Source: Author's Computation from Eviews 8.*

Since  $F\text{-stat}$  of 11.79  $>$   $F\text{-tab}$  2.47, from table 4.5, we conclude that savings causes or determines investment.

### 5. Findings and Conclusion

From the various analyses and results in this study, the following conclusions are drawn from the findings; Savings determines private capital formation in Nigeria; a long run relationship exists between savings and private capital formation in Nigeria; Savings causes private capital formation in Nigeria. From the above, it is evident that savings play a major role in private capital formation both in Nigeria. Consequently, the study recommends adequate provision of public goods by the government and significant investment on critical infrastructure as well as improved attitude towards project implementation in the country. This will help guarantee timely completion of projects in the country to pave the way for crowding-in private investment. Also given that savings exert a negative and significant effect on private capital formation in Nigeria, an improvement can be done through working towards increased per capita income which will increase the disposable incomes of the Nigerian citizens and as such, improve their saving culture. This can be achieved through progressive taxation as an income redistribution tool and massive job creation. With a committed adoption and hitch-free implementation of these policy prescriptions, the economy is expected to be better-off.

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