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Foreign Private Investment, Capital Formation and Economic Growth in Nigeria: a two stage least square approach

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Abstract

Given the likely simultaneity between FPI, Capital Formation and Growth, this work studies the relationship between foreign private investment, capital formation and economic 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. 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.
Key Words: Capital Formation; Foreign Private Investment; Investment; Economic Growth; Credit

1. Introduction

Economic theory shows that economic growth can be realized in two ways- increase in the amount of factors of production; and increase in the efficiency with which those factors are used. Thus, growth is induced by the increases in investment (ie capital accumulation) and the efficiency of investments (De-Gregorio, 1998). In the late 1970s and early 1980s, most developing countries of Africa (including Nigeria) experienced unprecedented and severe economic crisis. These crises manifested in several ways such as persistent macro-economic imbalances, widening savings-investment gap, high rates of domestic inflation, chronic balance of payment problems and huge budget deficit (Akpokodje, 1998).

Although different reasons have been adduced for the slowdown of these economies, Green and Villannueza (1998) attributed the problem to the decline in investment rates in the affected economies. In Nigeria, for example Akpokodje (1998), maintained that domestic investment as a ratio of gross domestic product (GDP) declined from an average of 24.4% during 1973-1981 period to 13.57% during 1982-1996 period. The average investment rate during the 1982-1996 period implied that the country barely replaced its dwindling capital. In the same vein, private investment rate depreciated from 8.6% in 1973-1981 period to 4.2% in 1982- 1996. Due to the fact that investment determines the rate of accumulation of physical capital (otherwise called capital formation), it then becomes a vital factor in the growth of productive capacity of the nation and contributes to growth generally.

It is in the light of this that prominence is being attached to increasing the magnitude of real asset investment in the economy. In particular, central to the less than satisfactory growth registered by countries of sub-Saharan Africa is low level of investment as a result of low domestic savings. Attracting foreign investment is therefore crucial from a number of standpoints and of course, there is never shortage of theoretical arguments (Chete, 1998). First, inflow of foreign investment provides an important source of foreign exchange earnings needed to supplement domestic savings and raise investment levels. Second, import substituting investment would serve to reduce the import bills as investment in export industries will directly increase the country's foreign exchange earnings.

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Some other benefits might also accrue from increased foreign investment. These include the creation or rather expansion of local industries to supply inputs to the newly established plant; a rise in the overall level of domestic demand to boost incomes and through taxation, state revenues; and the transference of labour (human capital), skills and technology. Although United Nations Conference on Trade and Development (UNCTAD)'s World Investment Report 2004 reported that Africa's outlook for Foreign Private Investment (FPI) is promising, the expected surge is yet to manifest. FPI is still concentrated in only a few countries for many reasons, ranging from negative image of the region, to poor infrastructure, corruption and foreign exchange shortages, an unfriendly macroeconomic policy environment, among others.

Nigeria is one of the few countries that have benefited from the FPI inflow to Africa. Nigeria's share of FPI inflow to Africa averaged around 10%, from 24.19% in 1990 to a low level of 5.88% in 2001 up to 11.65% in 2002 (CBN, 2004). UNCTAD (2004) showed Nigeria as the continent's second top FPI recipient after Angola in 2001 and 2002. The nominal FPI inflow ranged from N128.6 million in 1970 to N434.1 million in 1985 and N115.952 billion in 2000. This was an increase in real terms from the decline of the 1980s. FPI forms a small percentage of the nation's gross domestic product (GDP), however, making up 2.47% in 1970, -0.81% in 1980, 6.24% in 1989 and 3.93% in 2002. (CBN, 2006).

External capital inflows could also be non-debts-creating flows (as in official transfers of grant in aids and direct investment flows), debt creating flows (as in official development finance), commercial bank loans and international bank offerings, or could equally be a hybrid, for example, foreign portfolio investments and international equity offerings. Of late, Nigeria has embarked upon several trade liberalization policies so as to free FPI flows into the country (Adegbite and Owuallah, 2007).Many developing countries have over the years relied very much on the inflow of financial resources from outside in various forms, official and private capital flows as well as direct foreign investment, as a means of speeding up their economic development (Olaniyi, 1988; Odozi, 1995; Orji, 1995; Ekpo, 1997; Uremadu, 2006). However, these countries have shown preference for direct foreign investment because they regard direct foreign investment as a means of counteracting the sluggish trend in official and private portolio capital flows.

In the light of the above discussion, it is obvious that the debate on the impact of FPI on economic growth is far from being conclusive. The role of FPI can be positive, negative or insignificant, depending on the economic, institutional and technological conditions in the recipient countries. Also, for our country Nigeria, there is no concord on the impact of foreign private investment on capital formation and the impact of the duo on our domestic economic growth. Following the problems highlighted above and the research questions that follow, this paper therefore seeks to investigate the impact of foreign private investment (FPI) on capital formation in Nigeria and to determine the impact of capital formation and foreign private investment on economic growth in Nigeria. The study will cover the period from 1970-2007.

It is pertinent to note that the impact of FPI on capital formation and economic growth is more contentious in empirical than theoretical studies, hence the need to examine the relationship between FPI, capital formation and growth in different economic dispensations in Nigeria. There is the further problem of endogeneity, which has not been consciously tackled in previous studies in Nigeria. FPI may have a positive impact on capital formation and economic growth leading to an enlarged market size, which in turn attracts further FPI. This study will make conscious effort to address the endogeneity issue.

2. Literature Review

The Harrod –Domar model, developed independently by Harrod, R and Domar E. during the 1940s, which explained the relationship between growth and employment in advanced capitalist countries, has been used extensively in developing countries as a simple way of looking at the relationship between growth and capital requirements. The assumption of the model is that the output of any economic unit, whether a firm, an industry or the whole economy, depends upon the amount of capital investment in that unit. Thus, if we call output Y and capital stock K, then output can be related to capital stock by $Y = \frac{K}{k}$ where k is a constant, called the capital-output ratio. The basic Harrod –Domar relationship for an economy is $g = \frac{S}{k}$ where g, is the view that capital created by investment in plant and equipment is the main determinant of growth and that, it is savings by people and corporations that makes the investment possible (Maclolm, et al., 1987).

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Keynes (1960) had another opinion that the role of capital scheduled was fairly inelastic. The growth of capital through investment must lead to capital saturation. The basic error in Keynesian analysis has been pointed out by many post Keynesian economists viz. the failure to realize that growth in income generated by investment can effectively prevent capital saturation. Investment, as explored in the Harrod-Domar model plays a dual role of creating productive capacity as well as effective demand. When attention has been focused directly on problems of under development in post war era, capital shortage has been singled out by economists as a major cause of underdevelopment.

A leading proponent of the economic approach to the impact of foreign private investment is found in Dunning (1973) and Chete (1998). On the strength of studies by scholars based on international production, they identified three sets of influences on foreign private investment to include the following.

i. Market factors: such as the size and growth of the market measured by the gross national product (GNP) of the recipient country;

ii. Cost factors such as the availability of labour, low labour costs and inflation;

iii. The investment climate as measured by the degree of foreign indebtedness and the state of the balance of payment.

Agarwal (1980) classifies the impacts of foreign private investments using two political factors of political sterilization, in conjunction with a variety of economic factors, such as investment incentives, the size and growth of the recipient's market, its degree of economic development proxied by infrastructure, market distance and economic stability in terms of inflation, growth and balance of payments. In his extensive survey of the literature on the determinants of foreign private investment, he finds evidence with respect to the impact of political instability.

In another study by French and Poterba (1991) they identified the home bias puzzle. They noted the low proportion of foreign portfolio investment compared with the optimal levels suggested by the trade-off between risk and return. Investors seem to totally or partly ignore the benefits associated with the diversification of the sources, as may be achieved through a wider geographical coverage. As emphasized for example by Obstified and Rogoff (2000), a possible explanation for home bias is the existence of various forms of transaction costs for cross border purchases and sales of financial instruments.

However, Tesar and Werner (1995) point out that such transaction costs are unlikely to be very high since turn over in foreign stocks is larger then for domestic stocks. In contrast, Hasan and Simaam (2000) focus on information asymmetries. They show that home bias in portfolios stocks and foreign private investment can be reconciled with theory in the presence of uncertainty regarding the estimation of returns and risks on foreign stocks and private investments, provided such uncertainty is higher than for domestic stocks and investments. In some countries a further explanation for home bias is the existence of restrictions on the range of instruments which can be held by certain categories of investors, such as quotas of foreign country exposures of investment funds for example.

A very important contribution made toward corporate investment and the user cost of capital relationship has been the paper by Chirinko, et al (1999). While most studies use aggregate data, their study was based on a micro data set of 4095 firms from all sectors of the economy for a time period of 10 years giving more insight into firm investment behaviour. Their estimated user cost of capital elasticity of -0.25 shows that an increase in the user cost of capital will indeed reduce capital formation. Although their results were based on non – structural analysis, this estimate is substantially lower than the value of unity frequently assumed in the applied research literature. This result indicated that price incentives through the effects of taxes have quantitatively smaller impacts on investment than many economists assume. Their concluding remark summarizes most of their findings: "There may be good reasons for supporting these (investment incentive) tax policies and thus for shifting the burden of taxation away from upper –income tax payers. But a substantial increase in the capital stock is not one of them".

For the Nigerian economy, significant scholarly efforts have gone into the role of foreign direct investment. For instance Oyaide (1979) under the umbrella of Nigeria Economic Society provides a good documentation. Also, Anyanwu (1998) identified change in domestic investment, change in domestic output or market size, indigenization policy, and change in openness of the economy as major determinants of FPI. He further noted

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that the abrogation of the indigenization policy in 1995 encouraged FPI inflow into Nigeria and that effort must be made to raise the nation's economic growth so as to be able to attract more FPI.

Adelegan (2000) explored the seemingly unrelated regression model to examine the impact of FPI on economic growth in Nigeria and found out that FPI is pro-consumption and pro-import and negatively related to gross domestic investment. Akinlo (2004) found that foreign capital has a small and not statistically significant effect on economic growth in Nigeria.

3. Methodology

3.1 Theoretical framework

That FPI is positively correlated with economic growth is situated in growth theory that emphasizes the role of improved technology, efficiency and productivity in promoting growth (Lim, 2001). The potential contribution of FPI to growth depends strictly on the circumstances in recipient countries. Certain host country conditions are necessary to facilitate the spillover effects. The effect of FPI on economic growth is analysed in the standard growth accounting framework. To begin with, the capital stock is assumed to consist of two components: domestic and foreign owned capital stock. So,

$$K_\tau = K_{\delta\tau} + K_{\phi\tau}$$

We adopt an augmented Solow production function (Solow, 1956) that makes output a function of stocks of capital, labour, human capital and productivity (see Mankiw et al., 1992). However, we specify domestic and foreign owned capital stock separately in a Cobb–Douglas production function (Cobb and Douglas, 1928).

$$\Psi_{\iota\tau} = A_{\iota\tau} K^{\alpha}_{\delta\iota\tau} K^{\lambda}_{\phi\iota\tau} \Lambda^{\beta}_{\iota\tau} H^{y}_{\iota\tau} \ldots \quad (1)$$

where Y is the flow of output, Kdt , Kft represent the domestic and foreign owned capital stocks, respectively, L is the labour, H is the human skills capital stock, and A is the total factor productivity, which explains the output growth that is not accounted for by the growth in factors of production specified.

Taking logs and differentiating Equation 1 with respect to time, we obtain the familiar growth equation:

$$\Psi\iota\tau = a\iota\tau + \alpha K\delta\iota\tau + \lambda K\phi\iota\tau + \beta\lambda\iota\tau + y\eta\iota\tau \ldots \quad (2)$$

where lower case letters represent the growth rates of output, domestic capital stock, foreign capital stock, and labour and human capital, and α, λ, β and y represent the elasticity of output, domestic capital stock, foreign capital stock, labour and human skill capital, respectively.

In a world of perfect competition and constant returns to scale, these elasticity coefficients can be interpreted as respective factor shares in total output. Equation 2 is a fundamental growth accounting equation, which decomposes the growth rate of output into growth rate of total factor productivity plus a weighted sum of the growth rates of capital stocks, human capital stock and the growth rate of labour. Theoretically, α, β and λ are expected to be positive while the sign of y would depend on the relative strength of competition and linkage effects and other externalities that FPI generates in the development process.

Following the established practice in the literature, Kd and Kf are proxied by domestic investment to GDP ratio (Id) and FPI to GDP ratio (If), respectively in view of problems associated with measurement of capital stock. The use of rate of investment is hinged on the assumption of a steady state situation or a linearization around a steady state.

The final form of Equation 2 therefore is

$$\Psi\iota\tau = a\iota\tau + \alpha\, Id\, \iota\tau + \lambda\, If\, \iota\tau + yh\iota\tau + \varepsilon\iota\tau \ldots \quad (3)$$

where εiτ is an error term.

Equation 3 therefore is the basis for our empirical model estimation.

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3.2 *Analytical Issues and Model Building*

Here, we briefly elucidate the analytical framework underlying the macroeconomic determinants of capital formation in a developing country like Nigeria drawing heavily from (Agarwal, 1980 and Uremadu, 2007).

i. *Gross Fixed Capital Formation (GFCF)*

It is defined as an addition to stock of capital assets set aside for future productive endeavours in real sector which will lead to more growth in physical capital assets of the country. Capital formation derives from savings accumulation. It has a positive impact on private savings accumulation in the sense that increase in capital formation will lead to more savings. When savings accumulate it will lead to an increase in gross domestic investment (GDI) and income generated as a result of the investment projects made will, in turn, lead to GDP growth (Uremadu, 2006).

ii. *Foreign Private Investment (FPI)*

There is a growing consensus that an increase in foreign private investment would complement domestic savings to meet investment needs in a particular LDC country (Olaniyi, 1988 and Uremadu, 2006). Thus, a high inflow of FPI would lead to rise in gross domestic investment, which will in turn lead to growth.

iii. *Gross National Savings (GNS)*

Drawing inferentially from (ii) above, increase in gross domestic saving would lead to increases in gross domestic investment, thereby engendering growth in the real sector.

iv. *Domestic Inflation Rate (INFR)*

A high rate of inflation is an indication that government lacks the ability to manage the economy (Fisher, 1993). Hence, high rates of inflation are expected to lead to a contraction of private investment.

v. *Interest Rate on Lending (INTR)*

A maximum lending rate (MLR) would raise the cost of capital and therefore dampen foreign private investment especially those requiring some infusion of domestic capital (Chete, 1998).

vi. *Foreign Exchange Rate (EXR)*

Obadan (1994) traces the importance of exchange rate on inflow of foreign private investment and notes that its importance as the centerpiece of the investment environment derives from the argument that a sustained exchanges rate misalignment in terms of over – valuation or under – valuation, is a major source of macroeconomic disequilibria in developing countries. Consequently, an over –valued exchange rate or highly distorted foreign exchange rate will discourage exports and negatively affect foreign private investment environment.

vii. *Financial Intermediation Proxied By Total Banking System Credit To The Economy (BSTC).*

Mckinnon (1973) and Shaw (1973) argue that financial deepening increases the rate of domestic savings, and this lowers the cost of borrowing and also stimulates investments. However, Orji (2009) finds that on disaggregated basis, banking system credit contributes more to the private sector than the public sector.

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3.3 Model 1

Our model emanates from the foregoing analytical considerations of the study. The gross fixed capital formation (GFCF) equation to be estimated is specified as follows:

$$GFCF = \partial_0 + \partial_1 FPI + \partial_2 GNS + \partial_3 INFR + \partial_4 INTR + \partial_5 EXR + \partial_6 BSTC + \mu \quad \ldots (1)$$

where:

∂_i = parameters to be estimated

μ = Error Term

Other variables remain as defined in the analytical framework.

Assuming that the variables in equation (1) are not well behaved, we rewrite it as:

$$\Delta GFCF = \partial_0 + \partial_1 (FPIt\text{-}i) + \partial_2 (\Delta GNSt\text{-}i) + \partial_3 (\Delta INFRt\text{-}i) + \partial_4 (\Delta INTRt - i) + \partial_5 (\Delta EXRt - i) + \partial_6 (\Delta BSTCt - i) + \mu \quad \ldots.(2)$$

where:

Δ = Difference operator

∂_i = parameter to be estimated

t-i = Unknown lags to be estimated

μ = Error term

Model 2

Model 2 shall be used to capture the second objective. Thus, we specify the model as:

GDP = F (GFCF, FPI, GNS, INTR)…. (3)

where:

GDP = Gross Domestic Product (Proxy for economic growth in Nigeria) at current market prices.

GFCF= Gross Fixed Capital Formation. It is a mirror of gross domestic investment in Nigeria

FPI = Foreign Private Investment. FPI is a mirror of foreign direct investment in Nigeria. Positive impact is expected.

GNS = Gross National Savings. GNS is the total institutional savings mobilized by both private and public sector financial institutions in the country. Positive impact is expected.

INTR = Interest rate or maximum lending rate. Negative impact is expected.

To make equation (3) fit for computation, we present it as;

$$GDP = \beta_o + \beta_1 GFCF + \beta_2 FPI + \beta_3 GNS + \beta_4 INTR + \mu_t \quad \ldots(4)$$

To enable us measure the rate of growth of GDP, equation (4) transforms to a semi-log (log-lin) model (see Gujarati, 2007:182). This will also ensure numerical accuracy. Equation (4) transforms into a semi log model as follows:

$$\ln GDPt = \beta_o + \beta_1 GFCF + \beta_2 FPI + \beta_3 GNS + \beta_4 INTR + \mu_t \quad \ldots(5)$$

Equation (5) is the general model specification for objective (2). In the model the right hand side variables are likely to be endogenous and as a result are correlated with the error term making OLS estimations imprecise. We shall therefore employ 2SLS and use the lag of the variables as the instruments.

3.4 3.4Justification of the Models

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The two models for this study were carefully chosen to capture all the objectives of the study. The major characteristics of an econometric analysis are incorporated in the model specifications in a systematic manner. Given the likely simultaneity between FPI and growth, the two-stage least squares (2SLS) method of estimation will be used to tackle the problem of endogeneity.

3.5 Estimation Procedure

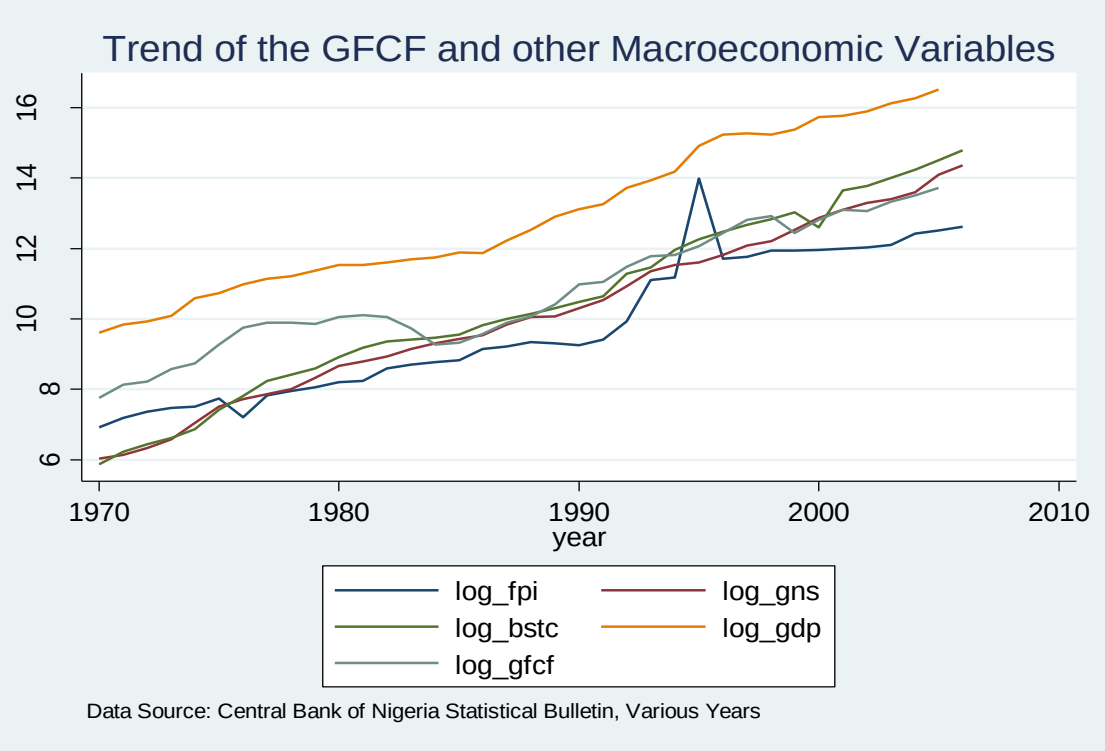
The estimation commences with a unit root test to confirm the stationarity states of the variables that entered the model. In order to test for stationarity, the Augmented – Dickey Fuller (ADF) test will be used. The first step is to test for stationarity at level, without constant and trend. If the variables 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 first differencing, then the variables are integrated of order one i.e I (1). After that co-integrating regression will be obtained from the normalized coefficients of the model generated from the co-integrating vector. In all, the diagnostic tests of the stochastic properties of the models will be carried out. The estimation techniques to be employed in the analysis are Ordinary Least Squares (OLS) as the basic technique and the Instrumental Variables (IV)/2SLS estimations for possible endogeneity problem. In the presence of endogenous regressors, IV estimator is more precise and consistent than OLS estimator because they are unbiased. We shall employ Wu-Hausman Test of endogeneity of the regressors to ascertain whether or not IV regression will be appropriate.

3.6 Data Source

The data for the study will be obtained from the central Bank of Nigeria (CBN) statistical bulletin (Various issues), National Bureau of Statistics (NBS) and CBN annual reports for various years. All data series are annual and span through the period, 1970 – 2007.

4. Presentation and Interpretation of Models Results

4.1 Relationship between GFCF and Other Macroeconomic Variables



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As the graphs suggest, we estimated an error correction model for both gross fixed capital formation and output growth in Nigeria.

Before the estimations, we tested the variables for stationarity conditions using the Augmented Dickey Fuller (ADF) test and the results are shown in tables 4.1 and 4.2. In table 4.1, the tests are conducted in levels while in table 4.2 the test is conducted in first differences. The results show that the variables are I (1), that is they are integrated of the first order except inflation rate that appears to be stationary in level. The variables being integrated of the same order may have a linear combination of them that is stationary. Hence, there is likely to be long run equilibrium relationship among the variables.

Table 4.1: Summary of Unit Roots Test Using the ADF on the Levels of the Variables

VARIABLE	**LEVEL**		
	ADF Statistics	**5 % Critical Value**	**Lag**
Log FPI	-3.491	-3.556	0
Log GNS	-3.230	-3.560	1
Log BSTC	-2.766	-3.556	0
Log GFCF	-1.703	-1.950	0
Log GDP	-1.424	-3.560	0
INFR	-3.670	-2.969	0
EXR	-1.200	-3.556	0
INT	-2.788	-3.556	0

Table 4.2: Summary of Unit Roots Test Using the ADF on the First Difference of the Variables

VARIABLE	**FIRST DIFFERENCE**		
	ADF Statistics	**5 % Critical Value**	**Lag**
Log FPI	-8.974	-3.560	0
Log GNS	-5.552	-2.975	1
Log BSTC	-7.918	-2.972	0
Log GFCF	-3.103	-1.951	0
Log GDP	-4.672	-3.564	0
INFR	-7.260	-2.972	0
EXR	-5.451	-3.560	0
INT	-7.896	-3.560	0

The estimates of the model of gross fixed capital formation are shown in table 4.3. The results show that there is long run relationship between gross fixed capital formation and other macroeconomic variables. The results indicate that foreign private investment has significant negative effect on domestic private capital formation in Nigeria. This implies that FPI crowds out domestic investment in the case of Nigeria. This finding is consistent with the hypothesis by Blomstrom and Kokko (1998). The results also indicate that GDP and banking system's credit to the domestic economic have significant positive effect on capital formation in Nigeria. But the magnitude of the impact is larger in the long run than in the short run. For example, the long run elasticity of capital formation with respect to GDP is 1.16, while the short run elasticity is 0.65 almost two times larger. The long run elasticity of capital formation with respect to banking system credit is 0.61, while the short run

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elasticity is 0.49. All other variables such as national savings, and foreign private investment, have larger long run significant negative impact on capital formation in Nigeria. The error correction term is 0.57 and it is statistically significant. This means that about 57 percent of disequilibrium between capital formation and other variables of the model is corrected in each time period. This is not a high speed of adjustment anyway.

Table 4.3: Long Run and Short Run (ECM) Models of Capital Formation in Nigeria

Variable	Longrun	ECM
Log_fpi	-.24854692**	
Log_gdp	1.1584684***	
Log_bstc	.60836588*	
intr	-.01208214	
Log_gns	-.76504794*	
D.log_fpi		-.06482262
D.log_gdp		.65360847**
D.log_bstc		.48644166**
D.intr		-.01094713
D.log_gns		.1000681
L.rhat		-.56780872***
_cons	-.26557097	-.09008093
	Regression Statistics	
r2	.97922113	.50678917
r2_a	.97575799	.40110114
ll	-.31287353	12.343401
Aic	12.625747	-10.686802
Bic	22.126861	.2006345
N	36	35
legend: * p<0.05; ** p<0.01; *** p<0.001		

The estimated model for GDP growth is presented in table 4.4. The results indicate that gross fixed capital formation, foreign private investment, and gross national savings have significant positive effect on output growth in Nigeria. In the short run, only gross fixed capital formation and foreign private investment have significant positive effect on output growth in Nigeria. The effect of interest rate on GDP is not significant both in the short run and in the long run. The error correction term is statistically significant confirming the existence of long equilibrium relationship between GDP and the explanatory variables. The magnitude of speed of adjustment shows that about 49 percent of disequilibrium is corrected in time period. This is also a low speed of adjustment.

Table 4.4: Long Run and Short Run (ECM) Models of GDP Growth in Nigeria

Variable	LongrunGdp	SR_ECM
Log_gfcf	.47355421***	
Log_fpi	.23080897***	
Log_gns	.38043431***	
intr	.00277544	
D.log_gfcf	.3971026***	

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D.log_fpi	**.08816639***	
D.log_gns	**.27219921**	
D.intr	**-.00041782**	
L.ut	**-.48513997****	
_cons	**1.7537416*****	**.05316957**
r2	**.99341919**	**.43616255**
r2_a	**.99257005**	**.3389492**
ll	**12.458151**	**25.370228**
Aic	**-14.916303**	**-38.740456**
Bic	**-6.9987079**	**-29.408368**
N	**36**	**35**
legend: * p<0.05; ** p<0.01; *** p<0.001		

Since GDP and Capital formation are endogenous variables and are used as explanatory variables, the coefficient estimates are likely to be biased. In order to correct such bias we employ the method of two stage least squares to re-estimate the two models using their lags as instruments. If the current value of GDP and capital formation is correlated with the error term., there is no reason to expect their lag values to be correlated with the error term. The two stage least squares estimates are shown in table 4.5. The two stage least squares estimates for GDP model are identical to the OLS estimates. Gross fixed capital formation, foreign private investment and national savings all retain their positive and significant effect on output growth. The estimates do not differ much which implies that OLS estimates are consistent in the GDP model. Also the OLS estimates of the GFCF model do not differ much from that of the two stage least squares after controlling for possible endogeneity bias. Again the OLS estimates for gross fixed capital formation are consistent.

Table 4.5: Two Stage Least Squares Estimate of GDP and GFCF

Variable	**TSLSGDP**	**TSLSGFCF**
Log_gfcf	.4251266***	
Log_fpi	.22941388***	-.26410349**
Log_gns	.42774158***	-.7902798**
intr	.00012352	-.01040892
Log_gdp		1.2611793***
Log_bstc	.54577254*	
_cons	1.8360028***	-.55439059
r2	.99341001	.97816165
r2_a	.99253135	.97439642
Ll		
Aic	.	.
Bic	.	.
N	35	35
legend:	*	p<0.05; ** p<0.01; ***

	p<0.001

Table 4.5 shows the summary statistics of the model variables. As can be seen there are 37 observations for each variable on annual basis. The variables are presented in logarithmic form, hence the variability reduces. Putting them in logarithms helps to reduce the possibility of conditional heteroscedasticity in the model results. Exchange rate with a standard deviation of 48.0 appears more volatile than inflation rate with a standard deviation of 19.2. Interest rate is less volatile than inflation and exchange rate. Inflation rate reached a maximum of about 76.76 around 1995 and there as a tranquil period when the rate of inflation was as low as 0.22 percent.

Table 4.6: Summary Statistics of the Variables Used in the Models

Variable	Obs	Mean	Std. Dev.	Min	Max
log_fpi	37	9.766469	2.001988	6.91095	13.99231
log_gns	37	10.13186	2.406994	6.020538	14.36919
log_bstc	37	10.41411	2.564022	5.862779	14.79038
log_gdp	36	12.93282	2.140171	9.611463	16.5165
log_gfcf	36	10.77527	1.71729	7.760467	13.71774
Exr	37	30.99351	47.91707	.55	133.5
Intr	37	11.12486	5.568601	3.5	26
Infr	37	20.55108	19.24833	.22	76.76

5 **Summary of Findings**

This work has examined foreign private investment, capital formation and economic growth in Nigeria. One objective is to determine how foreign private investment affects capital formation in the domestic economy and the other objective is to estimate the impact of capital formation and foreign private investment on economic growth in Nigeria. In order to achieve these objectives, we estimated the model of capital formation and economic growth for Nigeria. We found, though not surprisingly, that foreign private investment has a negative impact on capital formation in Nigeria. We also found that both foreign private investment and capital formation, in addition to other factors, significantly determine economic growth in Nigeria. We also found 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. We estimated two stage least squares counterpart of the models in order to check for endogeneity bias. 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:

First, policies that enhance capital formation and FPI inflow do increase economic growth. Second, banking systems credit to domestic economy enhances capital formation and economic growth.

5.1 Policy Recommendations

The following recommendations are the implications of our findings and if applied would improve not only capital formation but economic growth as well.

Government should create a conducive environment for foreign investment to come in. Over the years the federal government has been emphasizing that it would make the economy conducive for foreign investment to come in. But the environment has not been so inviting for investment because of high taxes and inconsistent policies.

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Private savings should be encouraged in order to speed up the process of capital accumulation and economic growth. This can be done by fine tuning monetary policy to make interest rate attractive for both savings mobilization and investment. This can be achieved by making sure that neither the interest rate nor the spread is too high.

Improving the rate of capital accumulation could be achieved if public savings is also positive. Government should invest in productive sector of the economy and minimize expenditure on things that do not add to the productive capacity of the economy (Mba, 2010). Capital investments in infrastructure are the key to economic growth because this would help reduce cost of investment and production. The idea of not funding important public projects and privatizing should be discouraged because the economy is not ripe for such harsh policies.

6 Conclusion

The important conclusion from this study is that foreign private investment affect economic growth positively but crowds out private capital formation in Nigeria. This is consistent with most of the findings in the empirical literature. That foreign private investment crowds out domestic investment is not surprising because the technology of foreign firms enables them to productive at highly competitive rates thereby driving high cost inefficient domestic firms out of business. For example, MTEL has already gone out of business because it has not been able to measure up to the expectations of mobile telecommunication in the Nigerian market. More future research is needed to study how the technology of foreign investment and multinational corporations makes domestic firms efficient or inefficient and to ascertain the external effectives on the productivity and performance of domestic firms.

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