

Economic Analysis of Domestic Sector Credit and Domestic Investment

Nexus: Evidence from Nigeria

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Abstract

Domestic investment has continued to face severe challenges in the Nigerian economy following inadequate access to credit and unfavourable investment climate in Nigeria. This has affected the significant contributions of the private sector to national development. As a result of these challenges, this study examined the impact of private sector credit on domestic investment in Nigeria from the period of 1985 to 2020, using both the Ordinary Least Square, the Granger causality test and the vector error correction model approaches on the variables of credit to the private sector, domestic investment, aggregate saving, exchange rate and inflation as both explanatory and control variables to this study. The results show among others that exchange rate, inflation and foreign direct investment had a negative relationship with domestic investment, while domestic credit, GDP growth rate, broad money supply, aggregate saving and total government revenue had a positive relationship with domestic investment. The policy implications of these results were extensively discussed in line with the objectives of this study. From the empirical findings, the study therefore recommended inter-alia the urgency of the government to improve on the structural reforms and in particular the banking sector reforms as well as to improve on the stability of the macroeconomic variables for sustainable domestic investment.

Key Words: Domestic investment, domestic sector credit, granger causality, investment theories, Nigeria

Introduction

The term investment refers to investment by domestic entrepreneurs including national governments. Critical to the development of economies all over the world is domestic investment. Harnessing domestic investment has been found to be one of

the veritable transmission channels of driving sustainable economic growth (Ajide, 2013).

Domestic investment through capital formation is not just paramount but serves as a prerequisite for the geometric acceleration of growth and development of every economy as it provides domestic resources that can be used to fund the investment efforts of the economy. Capital formation is analogous to an increase in physical capital stock of a nation with investment in social and economic infrastructure. Gross fixed capital formation can be classified into gross private domestic investment and gross public investment. Capital formation perhaps leads to production of tangible (i.e., plants, tools & machinery) and intangible goods (i.e., qualitative & high standard of education, health scientific tradition & research) in a country.

Private investment declined from 12.3% of GDP in 1991 to 8.3% of GDP in 1992. This may partly be due to decreased public investment, which declined over the same period. Private investment then increased to 12.5% in 1993 and to 16.0 % in 1994. Thereafter, it declined continuously to 8.9% in 1996. The ratio increased again to 13.0% in 1999 before declining continuously to its lowest level (within the period) of 10.7% in 2000. Since 2001, there has been a substantial recovery. Between 2001 and 2005, the ratio averaged 13.0%; and peaked at 16.2% in 2002 but declined again to 12.0% in 2005. Since then there has been a gradual increase in the ratio of domestic investment. The perceptible slide in the ratio of private sector investment to Gross domestic product (GDP) despite the emphasis on the private sector following the initiation of public sector reform is all the more worrying.

Credit to the private sector refers to financial resources, provided by the private sector such as loan and advances, purchase of non-equity securities, trade credits and other accounts receivable, which establish a claim for repayment. Consequent upon this, credit can be viewed from two angles; vis-à-vis trade or commercial credit and

banking system credit. According to Olowofeso, Adeleke and udoji (2015), trade credit refers to transactions which involve the supplier handing over goods or performing a service without receiving immediate payment. Statistically, the claims on the private sector in 2007 stood at 4,784.24, 7,444.67 in 2008 and in 2018 it was at 13, 226.99(CBN, 2020). The aim of this paper is on the banking system credit, which has to do with credit to the private sector by institutions, such as deposit money banks, non-interest rate banks and merchant banks.

The broad objective of this paper is to re-examine the impact of domestic credit on domestic investment in Nigeria from 1981/86 to 2021. Specifically,

- To analyze the impact of private sector credit, exchange rate and foreign direct investment in Nigeria.
- To determine the direction of the Granger causality between private sector credit, exchange rate and foreign direct investment in Nigeria.
- To investigate the dynamic relationship between private sector credit, exchange rate and foreign direct investment in Nigeria.

The paper is structured as follows: Section one is the introduction, section two consists of the related literature review, while section three highlights on the research method adopted. Sections four and five present the data presentation and analysis; the summary, discussion of the findings of paper and policy recommendations. Also included are the contributions of the study to already body of knowledge and agenda for further research attempts

Empirical Literature Review

This section examines the empirical literature. Rahila, Rehmat and Zakir (2010) examined the long-run relationship between private investment, savings, real interest rate on bank deposits and bank credit to the private sector in Pakistan for the period 1973 to 2007. The authors applied the autoregressive distributed lag model ARDL Bonds test approach, the results show that private investment positively affect savings, real interest rate on bank deposits and bank credit to private sector and public investment in the long-run.

Oyieke (2011) examined the relationship between public investment and it's financing on private sector investment in Kenya from 1964 to 2006. Using an error correction framework and time series data for the fiscal years 1964-2006, the study indicated that agricultural investment has a significant positive effect on private investment while domestic debt has a negative effect. Zardashty (2014) analyzed the impacts of real exchange rate on private sector investment in Iran from 1961-2008 using an EGARCH model. The result showed that the index of real exchange rate has a negative effect on private investment, GDP ratio, and imports of capital commodity. The result equally indicated that inflation has negative effects on private investment to GDP ratio.

Omorokonwa and Ikponmwosa (2014) investigated the dynamic relationship between exchange rate volatility and foreign private investment in Nigeria from 1980 to 2011. Using error correction model (ECM) techniques, the result showed that exchange rate has negative effect on foreign direct investment (FDI) in Nigeria. The result showed a strong positive effect on portfolio in the long-run. Sinevicine (2015) examined relationship between government expenditure and private investment in the case of small open economies using cross-correlations and Granger causality tests on time series data of Bulgaria, Estonia, Latvia, Lithuania and Slovenia from 1996-2012. The results showed that

impact of public spending increase on private investment is very weak except in the case of Bulgaria. The paper also noted that the impact of private investment increase on public spending is very different in analyzed countries.

Ugwu, Okoh and Mbah (2017) investigated the link between bank credit and private sector investment in Nigeria from 1980 to 2014 using Ordinary Least Square (OLS) regression approach. The result showed that the coefficients of bank credit to the private sector, trade openness, exchange rate and total bank saving exhibited positive signs to the dependent variable.

Okorie and Chikwendu (2019) examined the impact of private sector credit on private sector investment in Nigeria using the ARDL approach between the periods 1986-2018. The variables used are private sector credit, real interest rate, external debt and real gross domestic product. The result showed that private sector credit has positive and significant impact on private sector investment in the short-run, but in the long-run, private sector credit has positive and insignificant impact on private sector investment in Nigeria. The paper recommended that public expenditure should be channeled to addressing the poor state of physical infrastructure, particularly road networks, electricity and water supply. Adelegan (2018) examined private domestic investment, domestic credit to the private sector and economic performance in Nigeria from 1970 to 2015 using the vector autoregressive model (VAR) approach. The result showed negative relationship between exchange rate and private domestic investment in Nigeria. The paper recommended that the government should not leave the foreign exchange market to the vagaries of the forces of demand and supply. Gbanga, James and Adeyinka (2019) examined the determinants of private sector credit and its implications on economic growth in Nigeria using the Ordinary Least Squares (OLS). It was shown that there exist

significant relationship between total credit to the private sector and money supply in Nigeria within the reviewed periods. The paper recommended persistent supply of credit to the real sector in order to increase its accessibility to the real sector of the economy.

Dang, Pham and Diem (2020) studied the relationship between monetary policy and private investment in Vietnam Province between the periods 2009-2017 using the system generalized method of moment (GMM) procedure proposed by Arellano and Bover (1995). The paper revealed that private investment is positively affected by respective monetary policies through broad money supply, domestic credit and interest rate channels, yet no credible evidence regarding the exchange rate effect. Pamba (2022) explored the link between public investment and private investment in South Africa, using time series data spanning (1980-2020). The error correction method (ECM) was used in the paper. The paper showed that government consumption expenditure crowds out credit to private sector and foreign direct investment.

The empirical evidence on the responsiveness of domestic credit on domestic investment is mixed. On the one hand, some studies established significant positive domestic credit elasticity on domestic investment in less developed countries. Specifically, Zardashty established a significant negative effect of ex-post domestic credit on domestic investment in Iran. The evidence of Rahila et al.(2010); Onyieke(2011); Omorokonwa and Ikponwosa(2104); Ugwu et al.(2017); Okorie and Chikwendu(2019) Dang et al.(2020) for Nigeria showed significant positive relationship between domestic credit and domestic investment. Lack of empirical evidence in support of the hypothesized positive effect of domestic credit on domestic investment also emerged from the previous studies. For example, Adelegan(2018) on Nigeria failed to establish existence of a positive effect of domestic credit on domestic investment.

In general, empirical literature suggests three value addition aspect of this study. First, cross-country studies dominate the literature in LDCs. Thus, there is a dearth of direct country specific studies on domestic credit and domestic investment nexus. Second, there are differences in methodologies resulting in differences in empirical results, which could be attributed to several factors-data problems, quality of data, lack of sophistication and depth of financial markets- npo true market determination of domestic credit ; direct regulation of financial system and even more significance in diversity of the measures of domestic credit and domestic investment. Third, most previous studies cover the period of economic reforms including banking sector reforms. Granted, outcomes from the effect on the banking sector reform shift in policy regimes and structural changes is yet to be established in the literature

It is on account of the above lapses in the literature that this study claims its value addition. It fills the gap that exists in the literature by focusing in Nigeria using the most recent data and a combination of methodologies that captures the regime policy shifts to analyze the data. These include explicit modeling of the domestic credit and domestic investment hypotheses in the estimation model, investigation of the relative importance of domestic credit in explaining investment and analysis of the Granger causality of domestic credit and domestic investment in Nigeria.

Methodology

Model Specification

Following the theoretical framework the study and adapting Nigeria empirical evidence of Onodiugo *et al* (2014), whose model is specified thus:

$$PINV_t = P_0 + P_1BLA_t + P_2RGDP_t + P_3INT_t + P_4FDI_t + ut \quad 3.2$$

Where PINV = private investment, BLA = Bank loans and advances; GDP = Real gross domestic product; INT = Interest rate; FDI = foreign direct investment and ε_t = Stochastic error term. Equation (3.2) can be adjusted to accommodate our study objectives and variables as follows:

$$DI_t = F(DI_{t-1}, PSC_{t-1}, GDPRATE_{t-1}, AgSAV_{t-1}, EXCH_{t-1}, INFL_{t-1}, M_2/GDP_{t-1}, FDI_{t-1} + TGR_{t-1} + U_t) \quad 3.3$$

Equation 3.3 can be econometrically extended to incorporate its parameter coefficients as follows:

$$DI_t = b_0 + b_1 DI_{t-1} + b_2 PSC_{t-1} + b_3 GDPRATE_{t-1} + b_4 AgSAV_{t-1} + b_5 EXCH_{t-1} + b_6 INFL_{t-1} + b_7 M_2/GDP_{t-1} + b_8 FDI_{t-1} + b_9 TGR_{t-1} + U_t \quad 3.4$$

Where DI_{t-1} = the lag of domestic investment, PSC_{t-1} the lag of private sector credit, $GDPRATE_{t-1}$ = lag of growth rate of the economy; $AgSAV_{t-1}$ = lag of aggregate saving; $EXCH_{t-1}$ = lag of exchange rate; $INFL_{t-1}$ = inflation rate; M_2/GDP = broad money supply; FDI_{t-1} = lag of foreign direct investment and TGR_{t-1} = lag of total government revenue. U_t = the stochastic error term, $b_1 - b_9$ = the parameter coefficients.

Theoretically, it is expected that: $b_2 > 0$; $b_3 > 0$; $b_4 > 0$; $b_5 > 0$; b_6 indeterminate; $b_7 > 0$; $b_8 > 0$; $b_9 > 0$. Again, theoretically the relationship between inflation and domestic investment could be positive for single digit inflation rate and negative for double digit inflation rate like the situation in Nigeria. Model 3.4 is similar to model 3.2, but 3.4 incorporates more additional explanatory and control variables. This is a value addition to the empirical knowledge. Therefore, the inclusion of these variables is justified theoretically and empirically.

Estimation Technique and Procedure

The study utilized a combination of approaches, the Ordinary Least Square-to examine the impact of the independent/control variables on the dependent variable. The Granger causality method to determine the direction of the causal impact and the vector error correction model to empirical validate the speed of adjustment of the impact. Procedurally, we use the Andrew and Zivot unit root test for regime shift. This is always complemented with the Augmented Dickey Fuller test (ADF), specified as follows:

$$DU_t = BU_{t-1} + \sum_{i=1}^k DU_{t-i} + \epsilon_t \quad 3.5$$

To establish whether long-run relationship exists among the variables or not, co integration tests were conducted by using the multivariate procedure developed by Johansen (1988) and Johansen and Juselius (1990) for both the Trace statistics and maximum eigenvalues.

Dataset

The data set for the model and sources are provided in the Table 3.1

Variables	Description and measures	Sources
Domestic Investment	The dependent variable measured in relation to GDP	Central Bank of Nigeria Bulletin (2020)
Credit to the private sector	Financial resources provided by the deposit money banks in Nigeria. Explanatory variable	CBN Statistical
GDP growth rate	It measures how fast the economy is growing. This is a control variable	CBN Statistical Bulletin (2020)
Aggregate saving	The difference between total income and current consumption	CBN Statistical Bulletin (2020)
Exchange Rate	Ratio of currency prices between two countries	CBN Statistical Bulletin (2020)
Inflation Rate	This measures the consumer price basket	CBN Statistical Bulletin (2020)

Broad Money Supply	Narrow money plus other convertible assets	CBN Statistical Bulletin (2020)
Foreign Direct Investment	Inflows of investment. Measured in relation to GDP	CBN (2020) & National Bureau of Statistics (2021)
Total Government Revenue	Oil + non-oil revenue to the government	CBN (2020) & NBS (2021)

Results and Analysis

Summary of Descriptive Statistics

The result presentation commences with the examination of the statistical properties of the estimated variables in terms of their measures of central tendency and measures of dispersion. The descriptive statistics of domestic-credit/private sector credit, exchange rate, growth rate, capital formation, inflation, and broad money supply, aggregate saving and total revenue are presented in Table 4.1.

Table 1: Summary of Descriptive Statistics

Variables	Obs.	Mean	Std. Dev	Min	Max	Kurtosis
DCRE	29	8.938	3.598	4.957	19.625	5.270
EXCH	29	74.014	61.713	0.893	157.49	1.216
FDI	29	3.462	2.236	0.932	10.83	6.061
GDPRATE	29	5.3508	3.809	-0.693	15.32	2.98
INFL	29	3.520	1.414	5.382	72.835	3.5735
M ₂ /GDP	29	21.1289	1.645	2.320	2.060	4.479
SAVINGS	29	3.250	0.145	19.285	64.35	2.039
TGREV	29	40.00	1.047	12.595	11116.85	2.782
GFCF	29	3.520	1.870	1.230	7.210	1.962

Note: DCRE = Private sector credit; EXCH = Exchange rate; FDI = Foreign direct investment; GDPRATE = Growth rate; INFL = Inflation rate; M₂ = Broad money supply; SAVINGS = National aggregate savings; TGREV = Total government revenue.

From the descriptive statistics displayed in the table above, exchange rate has the highest means value followed by total government revenue and broad money supply in that order. Again, the exchange rate has the highest standard deviation of 61 percent. The standard deviation measures the dispersion or spread of the values. The kurtosis of the variables showed that inflation is the only variable that is normally distributed while domestic credit, our major explanatory variable, foreign direct investment and broad money supply are leptokurtic relative to the normal distribution. Exchange rate, GDP growth rate, savings and gross fixed capital formation are platykurtic relative to the normal distribution.

Unit Root with Statistical Break

Most traditional unit root tests have failure to allow for existing breaks, leading to a bias that reduces the ability to reject a false unit root test null hypothesis. Again, to accommodate the regime shift as ignored by the previous studies on domestic credit and domestic investment, our study undertook an examination of the stationarity process of the unit root test using the Andrew and Zivot break point unit root test as presented in Table 4.2

Table 2: Unit Root with Statistical Breaks

Variables	Break year	At level	1 st Diff.	Critical value	Remark
DCRE	2008	-5.34	-5.733	1% = -5.34	I(1)*
EXCH	1999	-5.34	-9.458	5% = -4.93	I(1)*
FDI	1993	-5.34	-5.189	10% = -4.58	I(1)*
GDPRATE	2001	-5.34	-5.849		I(1)*
GCFC	2005	-5.34	-2.72		I(1)*
INFL	2000	-5.34	-5.008		I(1)*
M2	1995	-5.34	-0.129		I(1)*
SAVINGS	1994	-5.34	-5.962		I(1)*
TGREV	2000	-5.34	-3.473		I(1)*

Source: EVIEW 10.0

Note: 1) * & ** implies significant at 1% and 5% respectively, 2) the attached year(s) are the break year

From the unit root test results, the break year are 2008, 1999, 1993, 2001, 2005, 1995, 1994, and 2000. These years are symbolic in the economic history of the Nigerian economy. In 2008, for example, there were global financial crisis. The crisis affected the Nigerian banks by causing interbank lending to freeze, and credit to consumer and businesses to dry up. In 1999, the objective of monetary policy in was to reduce excess liquidity in the banking system; achieve single digit inflation; reduce market based interest and exchange rates system; stable financial sector; non-inflationary growth and favourable balance of payment position. Again, there was an enthronement of democracy in Nigeria in 1999; this year was a watershed in the economic history of Nigeria as it affected economic indices including domestic credit and domestic investment. There was a change in the helm of affairs in Nigeria in 1993, the much maligned Structural Adjustment Programme (SAP) was set aside and Nigeria returned to fiat fixing of the naira. Fiat determination of the naira represents the hallmark of Nigerian station. With this development and the pariah status of the brutal military regimes, the recovering economy slipped into the doldrums starting 1993 as evidenced in the structural break year. This must have affected foreign direct investment as shown in Table 4.2. In 2001 as shown in the unit root test (Zivot & Andrews), GDP rate in Nigeria got improved. In that year, GDP grew by 6.7% compared to 2000; after year the democratic experience. The GDP figure in 2001 was \$73, 128 million, making the country the 46th in the ranking of GDP of the 195 countries (country economy. com).

In 2005, the Paris Club and Nigeria agreed on a US\$18 billion debt relief package. This debt relief must have affected public investment. Before 2005, owing to Nigeria's huge debt burden, resources which could have been through the mechanism of investment were diverted to servicing external debts. Inflation had a structural break in 2000. The financial system in that year continued to face the problems of excess liquidity. This could

have caused the break point in 2000. The growth in money supply has been attributed to the increased government revenue, the bulk of which were from oil exports and rentals, which were used to finance expenditure along with borrowed funds (Musa, Usman & Zoramawa, 2014). Other factor identified as contributory to the growth of money supply in Nigeria especially since 2005 following the recapitalization exercise in the banking sector include increased credit to the private sector and increase in net foreign assets (West African Monetary Agency, 2009). As shown in Table 4.2, broad money had a structural break in 1995. In 1994, aggregate savings had a structural break. Between 1994 and 2000, about 33 banks folded in Nigeria. Most of these banks went into liquidation because of fraud, weak corporate governance, undercapilization and the country's economic crises (Obaynuyi, 2013). The fiscal policy thrust of 2000 included low income tax regimes, generous tax incentives and relieves. These incentives, tax regimes and relives must have brought about the break points in government revenue in 2000 as shown in Table 4.2. From the unit root test result, there is evidence of stationarity for the variables at both the levels and first difference.

4.3 Co integration Test

To ascertain a long-run relationship among the variables in the presence of the maximum Eigenvalues and trace statistics, the Johansen cointegration techniques was applied. The results are presented in Table 4.3.

Table 3: Johasen Cointegration Test

Unrestricted Co integration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Staristic	Critical value	Prob **
None *	0.859376	55.01242	15.49471	0.0000
At most 1 *	0.142898	4.009162	3.841466	0.0452

Trace test indicate 2 cointegrating eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level. ** Mackinnon – Haug – Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical value	Prob **
None *	0.859376	51.00326	14.26460	0.0000
At most 1*	0.142898	4.009162	3.841466	0.0452

Note: Max – eigenvalue test indicates 2 Cointegratingeqn(s) at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, ** Mackmnon – Haugh – Michelis (1999) p-values.

From the results as presented in Table 4.3, both the trace statistics and maximum eigenvalues showed traces of cointegrating – long-run relationship at the 5% level of significance. In order words, there exists a long-run relationship between investment and the covariates of credit to the private sector, growth rate, aggregate saving, exchange rate, inflation rate, broad money supply, foreign direct investment and total government revenue within the reviewing period. The Ordinary Least Square (OLS) are presented in Table 4.4. This results show the relationship between the variables.

Table 4: Regression Results

Dependent variable: GFCF				
Variable	Coefficient	Std. Error	F-statistic	Prob.
C	-5.970	1.020	-0.5877	0.5633
DCRE	1.630	5.410	3.0131	0.0069
EXCH	-42186	460328	-0.9164	0.3704
FDI	-6.590	7.690	-0.857	0.4014
GDPRATE	7.670	3.440	2.2308	0.0373
INFL	-4.8275	9.45812	-0.51041	0.6153
M2	0.000531	0.00056	0.952680	0.3521
NSAVINGS	3.810	1.590	2.3929	0.0266
TGREV	4003113	1104340	3.624891	0.0017

R-squared 0.9313

R ² – squared	0.9038		
S.E of regression	5.800	S.D. dependent var	1.870
F-statistic	33.89	Akaikeinfo criterion	48.050
Prob (F-statistic)	0.000	Durbin Watson	1.47

Source: EVIEW 10.0

From the results as presented in the Table, private sector credit (DCRE) impacted positively on domestic investment (GECF) such that 1 percentage point change would bring about 16.3 percent increase in public investment. This result in line with that obtained by Oyimadu *et al* (2016). Exchange rate (real exchange) was also found to impact positively on capital formation in Nigeria. Hence, a percentage change in exchange rate leads to 24.90 percentages in gross fixed capital formation. This result is in line with the findings of Akintola *et al* (2020). The management of scarce foreign exchange has over the year been a significant component of national economic management. Foreign direct investment has a positive estimate with gross fixed capital formation in Nigeria. From the results, a percentage point increase in foreign direct investment will lead to a 97% increase in capital formation in Nigeria. Majority of the empirical studies tend to suggest that the inflow of FDI exerts a positive effect on the domestic capital formation in the host countries (Van Loo, 1977; Ulussever, 2004; Ozawa, 1992; Borensztein *et al.*, 1998).

The coefficient of economic growth rate revealed a negative and insignificant relationship with gross fixed capital formation. To increase capital accumulation, it is necessary to increase savings ratios, maintain good banking system and system of loans, avoid corruption, good infrastructure to make investment more worthwhile (CBN, 2016). Although, foreign direct investment has been growing steadily except with the recent economic recession induced by COVID-19, FDI saw a substantial reduction by about 28%

within 2014-2016 (CBN, 2016). The negative but insignificant coefficient of economic growth may be as a result of decline in foreign direct investment and again on the decline of gross fixed capital formation.

The coefficient of inflation was appropriately signed in line with the economic theory. The negative sign of the variable inflation may imply double digit inflationary rate. Broad money supply also revealed a negative relationship with gross fixed capital formation within the reviewing period. This is in contrast to the findings of Gnahe and Huang (2020). They monetarist believe that an increase in money supply will lead to an increase in the nominal demand, and where there is the excess capacity, they believe that the output will be increased. In the long-run, the monetarist position explains the increase explains the increase in the money supply will be inflationary without any impact on employment, investment and aggregate demand.

Aggregate saving revealed a positive relationship with gross capital formation. This result is in contrast to the results obtained by Ekesiobi *et al.* (2016). This implies that the higher the aggregate savings, the higher the level of investment, all things being equal, as assumed in the literature. The coefficient of total government revenue (oil + non-oil) was also found to be positively related to gross capital formation. Hence, a percentage increase in total revenue if utilized meaningfully will contribute to about 78 percent increase in investment.

The R^2 (the square of the multiple correlation coefficient / coefficient of determination) show a value of 0.9038, implying that the variables included as explanatory and control variables accounted for 90.4% of the total variation in the dependent variable. The R-Bar squared accounted for 0.9580, which explains the best predictive value of the equation. The F-statistics at 35.89 shows the significant linear relationship between the independent

variables together with the dependent variables. The standard error of regression (S.e.e) showed a value of 5800 meaning that the overall goodness-of-fit and more importantly of reliability in prediction. The D-W or the d-statistic has a value of 1.47 which may show a trace of heteroscedasticity. However, the diagnostic check will be used to overcome this challenge and make the result valid for policy analysis.

Granger Causality

Granger causality is a statistical test that is based on prediction. According to Granger causality, if a signal X_1 "Granger-causes (or 'G-causes') a signal X_2 , then past values of X_1 should contain information that helps to predict X_2 above and beyond the information contained in past values of X_2 alone. In this study, the interest is on domestic-credit and the associated variables. The result is presented in Table 4.5

Table 5: Granger Causality Test Results

No. of Lags	Null Hypothesis	Obs.	F-statistic	Prob.
1	EXCH does not Granger cause DCRE DCRE does not Granger cause EXCH	27	4.79834 0.64087	0.0186 0.5364
	FDI does not Granger cause DCRE DCRE does not Granger cause FDI	33	0.50191 1.57302	0.6106 0.2246
	GDPRATE does not Granger cause DCRE DCRE does not Granger cause GDPRATE	34 34	0.31458 0.38993 5.16143 1.30029	0.7326 0.6811 0.0121 0.2879
	GFCF does not Granger cause DCRE DCRE does not Granger cause GFCF	34	0.51998 0.85613	0.6088 0.4353
	INFL does not Granger cause DCRE DCRE does not Granger cause INFL	34	1.84397	0.1763

	M2 does not Granger cause DCRE		0.88861	0.4221
	DCRE does not Granger cause M2	34	0.74559	0.4833
			1.66286	0.2072
	NSAVINGS does not Granger cause DCRE	33	6.54500	0.0047
	DCRE does not Granger cause NSAVINGS		5.68487	0.00085
	TGREV does not Granger cause DCRE			
	DCRE does not Granger cause TGREV			

Source: EVIEW 10.0 version.

The probability values of F-statistics presented in Table 4.5 are given on the right side. If these probabilities are less than any α level, then the hypothesis would be rejected at that level. From the result presented in the table, gross fixed capital formation was shown to be bidirectional in causality, i.e $GFCF \Leftrightarrow DRCE$, while the other variables show a unidirectional causality. From the result, we can safely conclude that there is a bidirectional relationship between gross fixed capital formation and private sector credit in Nigeria.

Model Diagnostic Test

The reliability of the model has been demonstrated by applying a series of diagnostic tests to meet the requirements for the quality of residual. Table 4.7 provides the model diagnostic test.

Table 6: Model Diagnostic Test

	Test	F-Statistic	Probability
1	Normality Jarque-Bera	1.466173	0.4804
2	Heteroscedasticity	1.466323	0.230905
3	Serial Correlation LM Test	1.446450	0.2615
4	Skewness	0.297654	0.5277

Source: EVIEW 10

From Table 4.7, there were no sign of heteroscedasticity or autocorrelation of residuals was found in the analyzed model. The autocorrelation LM test rejects the null hypothesis that there is no serial correlation. As shown in the figures of 4.1 and 4.2, neither the recursive residuals or CUSUM of squares plot cross the 5 percent critical lines, there it was concluded that the estimated parameters are relatively stable, well specified and robust for policy analysis. Please, see the appendix for the results

Policy Implication

The policy implications of the empirical results have also been noted. First, domestic credit or the private sector credit has positive relationship with capital formation. This implies that government credit policy measure should be strengthened. Second, the exchange rate and foreign direct investment coefficients showed a negative relationship with capital formation. This implies that exchange rate and foreign direct investment policy measures needs optimizing. Thus, GDPRATE coefficient revealed a positive relationship with capital formation. This implies that macroeconomic and social policy measures used in promoting growth rate should be sustained or maintained for efficiency.

Four, aggregate savings, broad money supply and government revenue revealed a positive relationship with capital formation. This means that the existing policy measures to improve on those variables should be maintained. Finally, inflation showed a negative relationship with capital formation. This implies that the government should evolve policy measures to reduce inflation so as to promote investment for growth and welfare.

Conclusion and Policy Recommendations

Conclusion

The conclusion of the study would be derived from the key findings of the study. These findings would be examined side-by-side with the objectives of the study. From the regression results, the coefficient of credit to the private sector is positively related to capital formation. Precious studies have also obtained similar results as shown in the empirical literature. Both the coefficients of real exchange rate and foreign direct investment were found to be negatively related to capital formation too. Some empirical justifications were given for the results. Most importantly, the recent shocks in the economy following the COVID-19 pandemic.

Using the results also, the coefficients of broad money supply, aggregate savings and total government revenue were positively related to capital formation. However, it is to be noted that government policy measures have been initiated to promote the variable from monetary policy rate to medium term expenditure framework. The oil revenue has been on a relatively increase of recent while the statistical reforms have increased the revenue profile of the government.

Policy Recommendations

From the empirical evidences and with recourse to the development in the Nigerian economy. The following policy suggestions are offered:

- i Exchange rate had a negative relationship with capital formation. Therefore, it is recommended that the economy should be immediately diversified so as to enhance external competitiveness which contributes to reduction in exports and recession. This in long-run will influence the real appreciation of the domestic currency.

ii Inflationary was also found to be negative. Hence, contraction monetary policy is required, in that way, the money supply within the economy will be reduced, consumption will fall, prices fall and inflation slows down,

iii Foreign direct investment was found to be negative. This portends that there should be improvement in infrastructure development and stable macroeconomic policy including the registration and easy of doing business in Nigeria.

iv Domestic credit, GDP growth rate, broad money supply, aggregate saving and total government were found to be positive with capital formation. The existing fiscal and monetary policy measures as well as structural reforms should be maintained and improved upon so as to sustain the improvement of these variables for gross fixed capital formation.

The present study has contributed to knowledge in the following ways:

- i. Theoretically, the study utilized the stock adjustment hypothesis theory of investment, thereby reinforcing the relevance of this theory of investment in empirical analysis.
- ii. Empirically, unlike previous Nigeria studies (Vincent *et al.*, 2014; Fawehnmi, 2013; Akpasung & Babalola, 2012) that employed vector autoregressive (VAR) and Granger Causality, this study employed Ordinary Least Square, the Granger causality and the vector error correction model (VECM). The VAR has no policy intuition except the structural VAR. The VECM helps to examine the dynamics of the relationship between the variables of interest.
- iii. The policy measures recommended from the study would serve as policy inputs for promoting domestic credit and gross fixed capital formation. While

most studies focused on interest rate policies, the present study emphasized on the combination of monetary and fiscal policy measures

The findings of the study on gross fixed capital formation and domestic credit has opened up vista for further studies. We therefore, suggest the inclusion of regime shifts in further studies. This becomes necessary due to the fact that both gross fixed capital/infrastructure/investment and domestic credit are policy variables. Furthermore, it becomes empirically plausible to incorporate quality of governance and institutional framework in the analysis of the relationship between gross fixed capital formation and bank credit, using quarterly data.

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