

RELATIONSHIP BETWEEN STOCK MARKET INDICATORS AND GROSS CAPITAL FORMATION IN NIGERIA (1985-2018): A LONG-RUN ANALYSIS

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ABSTRACT

This study investigates the impact of stock market indicators on gross capital formation in Nigeria for the period 1985-2018. In this study, three cointegrating regression models, namely, Fully Modified Ordinary Least Squares (FMOLS), Canonical Cointegrating Regression (CCR) and Dynamic Ordinary Least Squares (DOLS) techniques are employed in the analysis of annual time series data obtained from Central Bank of Nigeria's statistical bulletin and World Development Indicators. Findings suggest that there is a long run relationship between stock market indicators and gross capital formation in Nigeria. It was also found that all-share index and broad money supply have positive significant impact on gross capital formation while trading volume and credit to private sector have negative but significant impact on gross capital formation in Nigeria. It can therefore be concluded that that all-share index, trading volume, broad money supply and credit to private sector are determinants of gross capital formation in Nigeria. This study recommends that Nigerian government should proactively implement policies and programmes to develop the capital market and improve liquidity in the economy.

Keywords: Stock Market Indicators, Gross Capital Formation, Cointegrating Regression Models.

1. INTRODUCTION

Financial markets are the lifeblood of the global economy where changes in one part of the world spread and affect every country, company and individual. By this, the markets are associated with the other segments of the world economy (Mihajlovic, 2016). One of these segments is the real sector of the economy. Stock market's link with the real sector, is for instance, via intermediation of loanable funds made available for real sector investment in the economy.

The capital market, a segment of financial markets, is established to channel long-term investible funds for financing long-term strategic projects. Thus, the market occupies an important position in the transformation of an economy (Adeleye, 2018). A well-developed stock market has been regarded as the hub of long-term funds which form a lion share of a nation's investment capital. These funds when transmitted from the surplus economic units (savers) to the deficit units for the purpose of investment, are expected to contribute to the total stock of capital of an economy. The stock of capital termed gross capital formation entails gross fixed capital, changes in inventories and net acquisitions and depreciation.

Despite the perceived role of stock market in the mobilization of long-term funds; lack of capital is still considered a serious problem of business enterprises. What could be the cause of the perceived gap between stock market and gross capital formation as well as business capital formation? A cursory look at gross capital formation in Nigeria over the study period (1985-2018), generally reveals that gross capital formation contributes an average of 31.84% to the gross domestic product (GDP) of Nigeria, while with its minimum contribution stands at 14.90% and a maximum contribution to GDP of 54.95% (Central Bank of Nigeria [CBN], 2018).

The stock market indicators in Nigeria in the period under review, show a general healthy performance. Specifically, all-share index (ASI) rose from as low as 1407.4 in 1985 to 446233.34 in 2018. The Stock Market Capitalization (SMC) also hikes from 6.60 in 1985 to 21904.04 in 2018. The market value of shares traded (MVST) in the Nigerian stock market stood at ₦316.60million in 1985 while in 2018 it became ₦1,284,976.28million. The number of transactions (volume of securities traded) (NOST) in 1985 stood at 23,571 units but rose to 1,039,333 units in 2018 (CBN, 2018). This implies that the rise in ASI, SMC, MVST, and NOST show

evidence of direction of the market, in terms of its size, high volume of activity, turnover and liquidity.

Empirical findings suggest that capital formation has positive and significant impact on economic growth in Nigeria (Shuaib & Ndidi, 2015; Ugochukwu & Uruakpa, 2013). Gross capital formation, therefore, contributes to the GDP of the economy. For instance, it contributes an average of roughly 31% to Nigeria's GDP between 1985 and 2018. Financial sector development may contribute to economic growth by facilitating capital accumulation and improving productivity (Lu, Fausten & Smyth, 2007) but to what extent does the stock market contribute to gross capital formation in Nigeria?

This study aims to provide empirically-based answer to the above question. Specifically, it aims to investigate the impact of stock market indicators, namely all-share index, stock market capitalization, volume of shares traded and market value of shares traded, on gross capital formation in Nigeria between 1985 and 2018. This study is one of the few studies that employ three cointegrating regression techniques, namely, Fully Modified Ordinary Least Squares (FMOLS), Canonical Cointegrating Regression (CCR) and Dynamic Least Squares (DOLS) in the analysis of long-run relationship between stock market and gross capital formation in Nigeria. In the same vein, this study focuses on gross capital formation unlike most previous studies that examined merely capital formation generally (Adeleye, 2018; Shihab, 2014).

This study is organized as follows. After this introduction, section two reports the literature review on gross capital formation and stock market indicators while section three presents the research methodology. In section four, the empirical results are presented and discussed. Finally, section five concludes the paper and presents some policy recommendations.

2. LITERATURE REVIEW

According to Bakare (2011), capital formation is the proportion of present income not consumed but saved and invested in order to augment future output and income (Ugochukwu & Uruakpa, 2013). It also refers to an increase in physical capital stock of a nation with investment in social and economic infrastructure (Ugochukwu & Uruakpa, 2013). Onaeze (2016) conceptualises capital formation as the net additions to the (physical) capital stock in an accounting period, or to the value of the amount

of increase of the capital stock. Therefore, capital formation refers to the addition to the capital goods of a nation. In other words, it is an addition to stock of capital assets and resources geared towards further production of goods in real sector with the ultimate aim of boosting physical capital assets in an economy. The totality of capital stock of a nation existing at a particular point in time is therefore be regarded as gross capital formation.

Capital market is a financial market for trading long term loanable funds in the form of securities such as shares, stocks, loan stock, bonds and derivative securities. Its operational and performance indicators identified in the literatures include market capitalization, all-share index, volume of transactions, new issues, value of transactions, number of listed companies, etc. Market capitalization as a measure of market size and its growth, simply refers to total value of all equity securities listed on stock market. New issues can be described as the total amount of new (fresh) securities raised in a capital market.

Theoretically, financial intermediation theory states that capital market should provide a mechanism for mobilization and transfer of savings from the fund-owners to investments that promise better and higher returns (Gorton and Winton, 2002, cited in Ngerebo-A and Torbira (2014)). Financial intermediation basically refers to that process of channelization of loanable funds from the surplus economic units to the deficit economic units for the purpose of investment both in the real and financial sectors of the economy. Ngerebo-A and Torbira (2014) argue that the investment fund when used in the economic system will yield return. They opine further that the arrangement enhances productive activities and positively influences aggregate capital formation in the economy.

Empirically, the assertion that the stock market, an integral part of the financial market, is an economic institution, which promotes efficiency in capital formation and allocation (Onaeze, 2016), has been investigated by various scholars. For instance, Onaeze (2016) examines the role of stock market on capital formation in Nigeria employing the Autoregressive Distributed Lag model (ARDL) and Generalized Autoregressive Conditional Heteroscedasticity (GARCH) method. The study shows that stock market capitalization and total value of shares traded have

significant positive effect on gross capital formation in the short-run and long-run period in Nigeria.

In another study, Ngerebo-A and Torbira (2014) determine the relationship between capital market performance indicators and gross fixed capital formation in Nigeria. From the Granger causality and Vector Error Correction Model (VECM) analysis, the authors found evidence of a positive and significant long run relationship between capital market activities and gross fixed capital formation in Nigeria with a unidirectional causality flowing from the latter to market capitalization.

Moreover, Lu, Fausten and Smyth (2007) applied cointegration and Granger-causality tests situated within vector autoregression (VAR) framework; to the study of the relationship between financial development, capital accumulation and productivity in China. The study shows among others, that financial development contributes to economic growth primarily by facilitating capital accumulation in the country.

From the OLS analysis of the role of financial institutions on the levels of investment in Jordan, Shihab (2014) confirmed the positive role of the banking sector and the stock market in influencing the levels of investment in country. In another study, Odili and Ede (2015) applied OLS and error correction mechanism (ECM) to the study of relationship between stock market, all-share index and gross fixed capital formation in Nigeria. The result revealed that all-share index has significant effect on gross fixed capital formation in the country.

Furthermore, Ali, Rehman and Nasir (2016) investigate the relationship between stock market capitalization and economic growth in Saudi Arabia via Granger causality test and VAR model. The study reveals among others, that stock market capitalization and capital formation cause economic growth in Saudi Arabia and stock market capitalization also causes capital formation in the economy.

Emeka, Idenyi and Nweze (2017) evaluate the link among domestic investment, capital formation and economic growth in Nigeria using ECM and granger causality test. The author found evidence of a long run significant relationship among the variables, with both domestic investment and gross fixed capital formation granger-causing economic growth in Nigeria.

In another study based on OLS, ECM and granger causality, Nera and Eze (2017) explore the causal relationship between stock market development and gross capital formation in Nigeria. The study indicates that stock market index and market capitalization have positive significant impact on gross capital formation unlike number of deals and value of deals that exert negative but non-significant influence on gross capital formation. Furthermore, the study found that gross capital formation significantly granger causes both market capitalization and stock market index.

In summary, from the empirical works reviewed, except empirics like Nera and Eze (2017) and Onaeze (2016), most other studies, measure capital formation using gross fixed capital formation as proxy. This current study, however, considers capital formation holistically using gross capital formation. Methodologically, unlike most studies that employ techniques such as OLS, ARDL and ECM, this study applies three cointegrating regression techniques, namely, FMOLS, CCR and CCR, to evaluate the long-run relationship between stock market indicators and gross capital formation in Nigeria.

3. METHODOLOGY

Research Design

This study adopts a time series approach cum ex-post facto research design. Secondary data, which are historical in nature are used in the investigation of the relationship between stock market indicators and gross capital formation in Nigeria. It is a time series study because the same unit of analysis is studied over some period of time, covering 34 years, from 1985-2018.

Data Description

Annual time series data are obtained from the CBN's statistical bulletin (2018) and world development indicators (WDI). Gross capital formation (GCF) obtained from WDI is measured as gross capital formation at current Local Currency Unit (LCU). In line with the studies of Nera and Eze (2017) and Onaeze (2016), GCF is used here as the proxy for capital formation, which serves as the dependent variable in the regression models of this study. All other variables, which constitute the explanatory variables, are sourced from CBN's statistical. All-share index (ASI) is the proxy for stock market returns and overall movement of the market. Stock Market Capitalization (SMC), which is the total value of shares listed on the stock market,

is the proxy for stock market size. Number of securities traded (NOST), otherwise called trading volume, is a proxy for stock market turnover, a measure of market liquidity. Market Value of Securities Traded (MVST) is the market value of shares traded in the stock market. It is another proxy for market liquidity. In addition to the four stock market indicators, broad money supply (M2) and Credit to Private Sector (CPS) are included in the model as control explanatory variables to measure of money supply and private sector credit respectively.

Estimation Procedure

The augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit-root tests are employed as tests of stationarity of the variables while the Johansen cointegration test is used to investigate cointegration among the I(1) time series. Thereafter, three cointegrating regression models of the Fully Modified Ordinary Least Squares (FMOLS), Canonical Cointegrating Regression (CCR) and Dynamic Least Squares (DOLS) are used to determine the long-run relationship between stock market indicators and gross capital formation in Nigeria. Finally, variance decomposition and impulse response function of the relationship between capital formation and stock market indicators, were examined.

Model Specification

This study is in line with similar studies like Onaeze (2016) also adapts Nera and Eze (2017)'s model of the relationship between stock market development and gross capital formation in Nigeria. In their study, Nera and Eze regressed gross capital formation against four stock market variables, namely, market capitalization, stock market index, number of deals and value of stocks traded. In this current study, two additional regressors are added to Nera and Eze's model and estimated via three cointegrating regression models (FMOLS, DOLS and CCR) as against the OLS, ECM and granger causality technique applied by Nera and Eze.

Gross capital formation = function of (stock market indicators) (1)

$$GCF = f(ASI + SMC + MVST + NOST + M2 + CPS) \quad (2)$$

The econometric version of equation (2), in logarithm form is specified in equation (3) below.

$$\begin{aligned} LOG(GCF)_t = & \beta_0 + \beta_1 LOG(ASI)_t + \beta_2 LOG(SMC)_t + \beta_3 LOG(MVST)_t \\ & + \beta_4 LOG(NOST)_t + \beta_5 LOG(M2)_t + \beta_6 LOG(CPS)_t + \varepsilon_t \quad (3) \end{aligned}$$

Where:

ASI= All-share index;

SMC= Stock market capitalization;

MVST=Market value of shares traded;

NOST=Number of shares traded;

$\beta_0, \beta_1 - \beta_6$ are the model parameters;

ε is stochastic error term;

t is time in years, 1985-2018.

A priori: $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\beta_6 > 0$.

4. RESULTS AND DISCUSSION

This section reports and discusses results of the various econometric analyses of the study. The analyses are unit root test (presented in Table 1), cointegration test (in Table 2), and three regression results (reported in Table 3) as well as the variance decomposition output (in Table 4) and impulse response function (depicted in Figure 1).

Unit Root Test

Although, time series regression assumes stationarity of the data, but in reality, this assumption may not hold. To avoid, spurious regression occasioned by regression of non-stationary variable on another non-stationary variable, each variable in this study, is investigated in terms of their stationarity via the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit-root testing. The results as reported in Table 1 show that all the variables are not stationary but attained induced-stationarity after first difference. Thus, all the series are integrated of the order one, $I(1)$.

Table 1
Unit root tests

Variables	5% Critical Values	ADF statistics	PP statistics	Order of Integration I(d)
LGCF	-2.9571	-4.2081*	-4.2688*	I(1)
LASI	-2.9571	-3.8941*	-3.9521*	I(1)
LSMC	-2.9571	-4.4051*	-4.3587*	I(1)
LMVST	-2.9571	-4.9255*	-4.9040*	I(1)
LVOST	-2.9571	-4.8233*	-4.8372*	I(1)
LM2	-2.9571	-3.7073*	-3.6981*	I(1)
LCPS	-2.9571	-4.0486*	-4.0038*	I(1)

Source: Authors' analysis.

Note: * denotes rejection of the hypothesis of unit root at 5% level of significance, since the ADF and PP >5% critical values.

Cointegration Test

Examining the variables for any evidence of long-run co-movement among them becomes imperative since the variables are not stationary in levels. The Johansen cointegration tests (reported in Table 2) is applied since all the variables are I(1) series. Trace test indicates 4 cointegrating equations while max-eigenvalue test indicates 3 cointegrating equations both at the 0.05 level. This implies the existence of cointegration among the variables. This suggests that there is a long-run relationship between stock market indicators and capital formation in Nigeria over the study period. This finding is in consonance with theoretical expectation and similar evidence provided by studies like Nera and Eze (2017), Ngerebo-A and Torbira (2014) and Onaeze (2016).

Table 2
Johansen cointegration test

No. of CE(s)	Eigenvalue	Trace Stat.	0.05 Critical Value	Max-Eigen Stat.	0.05 Critical Value
None	0.8761	194.6899*	125.6154	66.8394*	46.2314
At most 1	0.7436	127.8505*	95.7536	43.5544*	40.0775
At most 2	0.6647	84.2960*	69.8188	34.9698*	33.8768
At most 3	0.5403	49.3262*	47.8561	24.8747	27.5843
At most 4	0.3173	24.4515	29.7970	12.2189	21.1316

At most 5	0.2383	12.2325	15.4947	8.7116	14.2646
At most 6	0.1041	3.5208	3.8414	3.5208	3.8414

Source: Authors' estimation.

Note: * denotes rejection of null hypothesis of no cointegration at the 0.05 level.

Cointegrating Regression Estimates

The evidence of a long run relationship among the variables (as reported in Table 2) suggests that the variables have long term implications. It is therefore safe to estimate the long-run model of the relationship between stock market and gross capital formation. To achieve this, three cointegrating regression, Fully Modified Ordinary Least Squares (FMOLS), Canonical Cointegrating Regression (CCR) and Dynamic Least Squares (DOLS) are used.

The results of the models as shown in Table 3 indicates that both FMOLS (in Panel A) and CCR (in Panel B) agree in their results that show that all-share index (ASI), Number of Shared Traded (NOST), broad Money Supply(M2) and Credit to Private Sector (CPS) are determinants of gross capital formation in Nigeria in the period of investigation. However, Stock Market Capitalization (SMC) and Market Value of Shares Traded (MVST) do not exert significant influence on gross capital formation in Nigeria. Specifically, both regression results indicate that all-share index and money supply positively and significantly impacted gross capital formation. This finding is in consonance with theoretical expectation and partly with the findings of Nera and Eze (2017) who indicate that stock market index are positively and significantly associated with gross capital formation in Nigeria.

Moreover, the results of FMOLS and CCR reported that number of shares traded and credit to private sector have negative but statistically significant impact on gross capital formation in Nigeria. This finding is in contrast with Onaeze (2016) who reported evidence of stock market capitalization and total value of shares traded impacting positively on gross capital formation in Nigeria.

Furthermore, the DOLS regression results in Table 3 (Panel C) show evidence of a significant positive relationship of gross capital formation with all-share index, stock market capitalization and broad money supply. This result aligns with Nera and Eze (2017)'s which show that stock market index and market capitalization have positive significant impact on gross capital formation in Nigeria.

However, DOLS estimates reveal that market value of shared traded, number of shares traded and credit to private sector have negative and significant impact on gross capital formation in Nigeria. This finding is in contrast with a *priori* expectation but supports the findings of Nera and Eze (2017), except for credit to private variable excluded from their model.

It can be inferred from the three regression results, therefore, that all-share index, number of shared traded, money supply, credit to private sector, stock market capitalization are determinants of gross capital formation in Nigeria in the period of investigation.

Table 3
Cointegrating regression results

Dependent Variable: LGCF	A	B	C
Variables (in log. Form):	FMOLS Coefficient	CCR Coefficient	DOLS Coefficient
ASI	0.2947(0.0000)***	0.2708(0.0000)***	0.3005(0.0001)***
SMC	0.0736(0.3593)	0.1168(0.2628)	0.5359(0.0000)***
MVST	0.0487(0.1610)	0.0517(0.2145)	-0.0405(0.1132)
NOST	-0.2106(0.0000)***	-0.2392(0.0001)***	-0.2329(0.0001)***
M2	0.8378(0.0000)***	0.9727(0.0001)***	0.7659(0.0003)***
CPS	-0.3332(0.0286)**	-0.4745(0.0324)**	-0.6854(0.0006)***
R-squared (R ²)	0.9944	0.9941	0.9998
Adjusted R ²	0.9931	0.9928	0.9992

Source: Authors' analysis.

Note: ***, **, and * signify statistically significant at 1%, 5% and 10% level respectively; Values in parentheses are the probability values.

Variance Decomposition Output

The variance decomposition output of gross capital formation in Nigeria (reported in Table 4) shows that in the ninth year, gross capital formation (GCF) contributes 81.23% to variation in itself. In the same period, all-share index (ASI), money supply (M2) and number of shares traded (NOST) imparts 9.6%, 3.5% and 3.4% respectively to changes in gross capital formation in Nigeria. In the same vein, 1.2% variation in gross capital formation is accounted for by changes in market value of shares traded while stock market capitalization (SMC) and Credit to Private Sector (CPS) contribute about 0.5% and 0.6% respectively to the variation in gross capital formation in Nigeria. Generally, all the variables contribute positively to the changes/variation in gross capital formation.

Table 4
Variance Decomposition of Gross Capital Formation (LGCF)

Period	S.E.	LGCF	LASI	LSMC	LMVST	LNOST	LM2	LCPS
1	0.1242	100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	0.1954	93.5099	3.3926	0.0679	0.3322	1.3948	0.6190	0.6833
3	0.2531	85.2493	7.0805	0.0518	0.4742	4.0774	2.1908	0.8757
4	0.3237	82.8063	7.8698	0.1434	1.1663	4.3796	2.8278	0.8066
5	0.3922	82.3353	8.2576	0.4485	1.2554	3.9499	3.0628	0.6901
6	0.4510	81.8399	8.9667	0.4881	1.2083	3.6616	3.2014	0.6336
7	0.5050	81.5204	9.3847	0.4429	1.1961	3.5373	3.2971	0.6210
8	0.5560	81.3532	9.5225	0.4395	1.2083	3.4695	3.4052	0.6015
9	0.6032	81.2354	9.6475	0.4606	1.2111	3.3800	3.4899	0.5752
10	0.6472	81.1560	9.7901	0.4613	1.2011	3.2952	3.5375	0.5585

Source: Authors' analysis.

Impulse Response Function

The impulse response function of gross capital formation depicted in Figure 1 shows that gross capital formation responds positively to shocks in itself. It also reacts positively to shocks in all-share index and money supply. The shocks in stock market

capitalization, market value of shares traded and credit to private sector have negative implications on gross capital formation in Nigeria in the period under review.

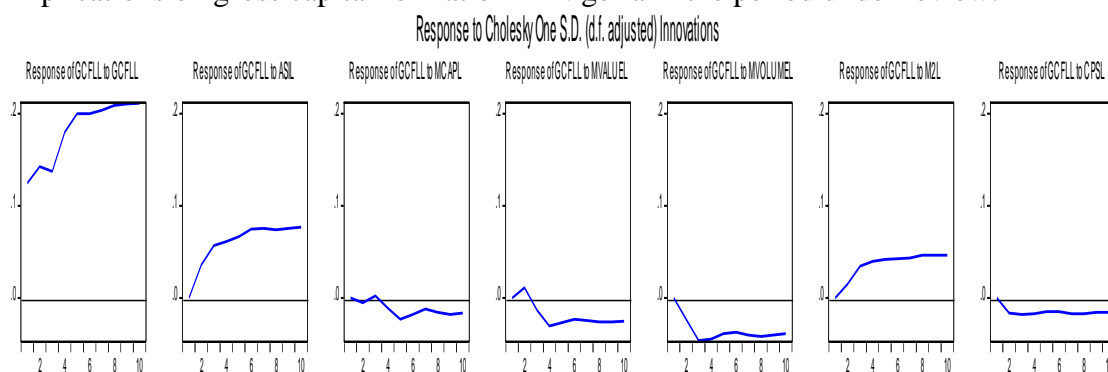


Figure 1: Impulse response function

Source: Authors' design.

5. CONCLUSION

This study examines the relationship between stock market indicators and gross capital formation in Nigeria between 1985 and 2018, using three cointegrating regression models, namely Fully Modified Ordinary Least Squares (FMOLS), Canonical Cointegrating Regression (CCR) and Dynamic Least Squares (DOLS). Findings reveal the existence of a long run relationship between stock market indicators and gross capital formation in Nigeria. The regression results, generally show that all-share index, stock market capitalization, number of shares traded (trading volume), money supply and credit to private sector, are determinants of gross capital formation in Nigeria in the period of study (1985-2018).

It is therefore recommended that Government of Nigeria should proactively implement policies and programmes to develop the capital market and improve liquidity in the economy of Nigeria. Credit to private sector should be increased by encouraging the banking sector and other financial institutions in their lending operations. The Government through the CBN should inject more liquidity into the Nigerian economy. Capital market policies that will boost the volume of activities in the market and drive stock performance indicators and returns (market index) on the

upward swing should be actively pursued by the government in collaboration with the organized private sector of economy.

In this study only long-run models are examined; short run dynamics was left unexplored. Therefore, future research should explore this. Similarly, other capital market indicators, such as the number of government securities listed and traded, number of new companies listed, etc, should also be examined in terms of their relationship with gross capital formation in Nigeria. This is a Nigerian study, future studies (times series and panel studies) should focus other countries of the world.

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