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IMPACT OF CAPITAL MARKET PERFORMANCE ON ECONOMIC GROWTH: AN ASSESSMENT FROM NIGERIA

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Abstract

This is an investigation of the impact of capital market performance on economic growth in Nigeria from 2010 to 2020. The objectives were to assess the impact of market capitalisation on Real Gross Domestic Product (Real GDP), to determine the influence of the value of trade on Real GDP. Ordinary Least Squares (OLS) method was used for estimation to evaluate the impact of capital market performance on economic growth in Nigeria using secondary quarterly times series data from Q1 2010 to Q4 2020. Data was obtained from Nigeria Stock Exchange (NSE), National Bureau of Statistics (NBS), and Central Bank of Nigeria (CBN). Analysis revealed that there is a positive and significant level relationship between indices of capital market performance and economic growth measured by real gross domestic product in Nigeria and statistically significant at 5%. It concluded that the Capital Market positively and significantly impact economic growth in Nigeria. Further studies need to be carried out using different parameters to verify the consistency of all findings. This research is currently part of limited studies that investigated the influence of capital market performance on economic growth in Nigeria using quarterly time-series data.

Keywords: *Capital Market Performance, Market Capitalisation, Value of Trade, Economic Growth, Real Gross Domestic Product.*

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1. Introduction

Nigerian capital market activities are controlled by the Securities and Exchange Commission of Nigeria (SEC) together with four other self-regulating organisations (SROs), Nigerian Stock Exchange (NSE), Financial Market Dealers Quotation (FMDQ), the National Association of Securities Dealers (NASD) and Nigerian Commodities Exchange (NCX) (SEC, 2015). The marketplace where stocks are traded and may also be referred to as a stock market i.e., capital

market, provides an avenue for savings to be mobilised and used as long-term investments (Grbic, 2020).

The Nigeria Stock Exchange (NSE) is developing the financial markets, it was founded in 1960 and regulated by the SEC of Nigeria; It offers Market data solutions, listing, and trading services, licensing services, and other services (NSE, 2020). Equities in the stock market are listed according to 11 sectors which are; corporations, customer goods, commercial services, healthcare, information, and communication technology (ICT), manufacturing goods, natural resources, building and real estate, oil, and gas, Service industries, Agronomy (NSE, 2020).

Economic growth is generally an increase of citizens' income within an economy or nation, usually constituting the working class according to their skills and level of education. It can be viewed as improvement in provision of commodities and services within a span of period, and it is assessed with Real GDP traditionally used by many economies. Real GDP is measured by setting aside inflationary effects (Ibrahim and Mohammed, 2020). An important aspect of the capital market is the specialised financial market role it plays in promoting economic growth by facilitating savings and investments from economic agents; hence, its contribution to sustainable economic growth (Vincent et al., 2021).

The main purpose of this study is to research how capital market results influences economic growth within Nigeria using independent variable proxies like market capitalisation, value of trade, and Real GDP was considered as a determinant for the dependent variable of economic growth. Gross fixed capital formation was also used as a control variable for the study. The objectives are to assess the impact of market capitalisation on Real GDP and to determine the influence of the value of trade on Real GDP. These led to the development of two hypotheses; $H0_1$: Market capitalisation has no significant impact on Real GDP in Nigeria and $H0_2$: Value of trade has no significant impact on Real GDP in Nigeria.

Other sections of the study are organised by the following parts: The literature review section, methodology section which explains the research philosophy and research design. It is followed by the findings and discussions section which explains findings of the study. The paper is concluded, recommendations, and limitations are listed to guide future research.

2. Literature Review

2.1. Economic growth

Economic growth may have two views, the first being the total increase in income of individuals within a country or the potential growth of income of persons that form the working group in a country according to the type and level of education of the population (Kingsley and Toyosi, 2018). It also refers to production increase over a period usually specified, hence, many countries target positive economic growth on quarter-by-quarter origin using the Real GDP i.e., GDP measured by removing the effects of inflation (Ibrahim and Mohammed, 2020).

The economic growth of economies is usually calculated to know the pace of growth or growth rates, and Real GDP is used for this purpose (Grbic, 2020). The measurement of economic growth is concerning an increase in the percentage of Real GDP or inflation-adjusted terms to net out inflationary effects on prices of goods and services (Okonkwo et al., 2015). Economies measure growth rates to determine their pace of growth by using Real GDP (Grbic, 2020). Hence, the use of Real GDP for measuring economic advancement in this study is due to its strength against the use of Nominal GDP.

2.2. Capital market performance

The capital market is an assembly of financial institutions involved in the provision of medium to long-term loans. It is a place where long-term financial instruments such as government securities, corporate bonds, corporate shares, and mortgage loans are made available to investors (Nwamuo, 2018).

That is, it's a market for sourcing and utilisation of long-term finance for developmental activities (Anyanwu, 1998). A capital market is a place where financing services are provided. Capital market delivers economies with various types of capital such as fixed, working capital, financing of short and long-term loans to federal, state, and local governments of nations. The Capital market is also seen as a market designed to finance long-term investments by businesses, governments, and households (Rose and Marquis, 2009). Mishkin (2007) defined capital market as the market in which long-term debt (generally those with an original maturity of one year or greater) and equity instruments are traded.

2.3. Capital market proxies

Market capitalisation is an indicator for capital market mass and represents the total market worth of domestic stocks (Grbic, 2020). Market capitalisation is also calculated using market share price or price per share multiplied by the total quantity of shares of companies (Ibrahim and Mohammed, 2020). The total market capitalisation is a figure that includes securities, Exchange Traded Funds (ETFs), and bonds, so it is made of equities and debt (Bello et al., 2019; NSE, 2020). Market capitalisation is not only an indicator of market size but market performance as well (Adigwe et al., 2015). Another name for market capitalisation is market value and is used as a measure for capital market size for checking the level of market development with growth (Odo et al., 2017).

The value of transactions is an indicator of liquidity in the capital market, it is the total turnover of domestic stocks (Grbic, 2020). Value of transactions measures the liquidity of the capital market, and it also represents the total value of stocks transacted (Ibrahim and Mohammed, 2020). Liquidity is also seen as the level of ease that shares are exchanged in the capital market i.e., total securities traded (Adigwe et al., 2015). The value of transactions indicator complements market capitalisation because it shows if the market size is utilised by trading, due to the fact an upsurge in the value of dealings promote economic growth (Odo et al., 2017; Emmanuel and Elizabeth, 2020).

2.4. Growth impacting control variable

Gross fixed capital formation is the expenditure on fixed assets like building and machinery that is to replace or add to the stock of existing fixed assets (CBN, 2019). Gross fixed capital formation is an annual figure of fixed investments on capital goods (Lenee and Oki, 2017). Gross fixed capital formation was used as an independent variable (Matadeen and Seetanah, 2015; Taiwo et al., 2016; Emerenimi and Onuigwe, 2018; Ubesie et al., 2020).

2.5. Importance of capital market performance on economic growth in Nigeria

Ensuring capital market performance required the establishment of SEC Nigeria in 1978, and since then have being creating proposals to develop the market for long-standing financing and advancement of economic growth. A recent initiative is the Nigerian Capital Market Master Plan 2015–2025. Three committees were created and members were selected from all stakeholders to achieve the major objective of the Nigerian stock market becoming vibrant

globally (Gwarzo, 2016). It is an indication of importance of capital market performance for economic development in Nigeria at all levels, and this study measures capital market performance using the proxies mentioned earlier.

2.6. Theoretical Review

Efficient market hypothesis

The Efficient Market Hypothesis (EMH) was postulated through Fama (1965) as a framework to be used for examining the efficiency of capital markets; financial markets prices are supposed to mirror all identified information and hence, unbiased so that collective beliefs of investors are represented (Osakwe et al., 2020; Akintola and Cole, 2020). This available information about current stock prices and the value of the firm should not permit investors to receive excess profits above the overall market and this has implications for financial managers and investors, a test of efficiency is if current prices have integrated all available information as at that time (Abina and Maria, 2019; Akintola and Cole, 2020). This naturally leads to more efficient investment activities in the capital market which leads to economic growth; hence, EMH is among theories that are assessing the relationship that occur concerning the capital market and general growth of the economy (Abina and Maria, 2019).

The key assumptions of EMH are that; markets function efficiently, stock prices cannot be manipulated by investors because stock values are already based on fair value, Investors cannot beat the market to earn more, and investments in riskier stocks is the only way an investor can achieve a superior position.

Fama (1970) segregated market proficiency into the weak form, semi-strong form, and strong form. EMH in its weak form is when rates completely suggest information based on a historic sequence of previous prices while the semi-strong form is when values show all freely available information; the strong form emphasises information available to market participants and insiders are reflected on stock prices (Akintola and Cole, 2020).

The critique of EMH was a result of empirical studies that invalidated some of its assertions and observes that; Investors are rational and mindful in making investment decisions and cannot be accurately predicted, although, predictions could be made using other tools (Malkiel, 2003).

The theory relates to this work because efficiency is critical in the financial market which could be operational, allocation or pricing efficiency and any form of inefficiency may lead to drastic changes in the economic growth of Nigeria. This theory explains the link concerning capital market development in terms of information availability that eventually leads to stable economic growth as shown in Ghana by Osei in 2006 that Ghana stock market is efficient in terms of providing information (Alajekwu and Achugbu, 2012).

2.7. Empirical Review

Osakwe et al. (2020) carried out a relative study between Nigeria and South Africa with an objective to relatively evaluate the role of the capital market on the economic growth of both Nigeria and South Africa from 2000 to 2018 using yearly time-series information. The dependent variable was measured using GDP, while the predictor variable was measured with stock market capitalisation. The data was analysed using Ordinary Least Squares (OLS) regression and results showed there is a positive relationship between market capitalisation and economic progression for South Africa but insignificant for Nigeria.

In a study by Erasmus et al. (2021), they sought to investigate the impact of capital market indicators on economic growth in Nigeria using secondary time series data sourced annually from 1989 to 2019. The study variable was measured using Real GDP, the predictor variables are measured using market capitalisation, all share index, and the total value of transactions traded. Analysis was conducted with descriptive statistics and Ordinary Least Squares regression, Johansen co-integration test, and pairwise Granger causality tests. Results revealed market capitalisation having a positive, and significant impact on Real GDP, all share index had a positive, and insignificant impact on Real GDP. The total value of transactions traded had a positive and insignificant impact on Real GDP. Therefore, a bi-directional relationship exists between capital market indicators and economic growth in Nigeria. There is a long-run relationship between capital market performance and economic growth.

Lakshmanasamy (2021) in a similar study analysed the static and dynamic causal relationship between the performance of the capital market and economic growth in India using daily time series data for seventeen years from January 2000 to December 2016. Dependent variable was measured using Real GDP, the explanatory variables are measured using market capitalisation, Sensex, nifty 50, and value of shares traded for the performance of the stock market. The test was conducted using correlogram, cointegration, and causality test using VECM. Analysis

showed the dynamic procedures converge as the projected value of the error correction terms are negative, but statistically insignificant and there is no strong long-run causal relationship between the capital market performance and economic growth in India.

The empirical review of these studies indicates that these studies have been carried out using annual and daily time series data, different combination of independent variables, different economies, time frames or scope, and methods of data analysis. Therefore, this study used quarterly time series data, a different sequence of independent variables and control variable in Nigeria from quarter one 2010 to quarter four 2020 to assess the influence of capital market performance on economic progression in Nigeria using ordinary least squares for more accurate results.

3.Methodology

The study was based on a quantitative research approach used to respond to inquiries about relations amongst measured variables. This is intended to explain, predict, and control phenomena. This approach is sometimes referred to as the traditional, experimental, or positivist approach. The design for the research is the Ex-post facto research design, precisely time series data which is a multiple-source type secondary data was used (Saunders et al., 2009).

Time series data was used to investigate the influence of capital market performance through its proxies on economic progress in Nigeria. The population of study encompasses all listed companies and all listed securities on the Nigerian Stock Market which are 156 and 358 respectively as of Q4 2020. The sample is 11 years of time series data from Q1 2010 to Q4 2020 for market capitalisation, the value of trade for proxies of the independent variable while Real GDP for the same period is the sample for the dependent variable. The control variable was gross fixed capital formation. The 11 years period provided 44 observations that were used for data analysis. Table 1 shows the different sources of data for each variable.

Table 1: Sources of data collected

S/N	Variables	Symbol	Source
1	Real GDP	R_GDP	CBN/NBS
2	Market Capitalisation	MKT_CAP	NSE
3	Value of Trade	VALUE_STOCK	NSE
4	Gross Fixed Capital Formation	GCAP_FORM	CBN

Source: Authors compilation 2022

3.1. Model Specification

Capital market performance is the independent variable for this study with dimensions or proxies in market capitalisation, value of trade, gross fixed capital formation as the control variable. The measurement of economic growth in Nigeria, the dependent variable is represented by Real GDP. Following the conceptual framework established, the model used in investigating the impact of independent variables on the study variable was adopted from the study of Imade (2021), it was modified and is specified as follows:

Functional Relationship

Y = f (Capital Market Performance, Investment)

Y = f (X1 + X2 + X3)

Regression Model

$R\_GDP_t = \alpha o_t + \alpha 1\ MKT\_CAP_t + \alpha 2\ VALUE\_STOCK_t + \alpha 3\ GCAP\_FORM_t + \mu t$

Where:

R_GDP = Real GDP

αo = Regression Constant

α1 – α8 = Coefficient of independent and control variables

MKT_CAP = Market Capitalisation

VALUE_STOCK = Value of Trade (stock)

GCAP_FORM = Gross Fixed Capital Formation

μ = Stochastic Error Term

t = Time Series

The nature of data collected was quantitative; hence, requires a quantitative approach for data analysis. Microsoft Excel was used for recording data, normalising, and cleaning before transferring to E-views software v10 that was used for conducting data estimation and analysis.

4. Results and Discussions

The summaries and basic features or the general behaviour of data which for market capitalisation includes the mean of 18.2, minimum of 7.8 and a maximum of 39.73 values, a standard deviation of 6.64, Kurtosis, Skewness of 0.81, and Jarque-Bera tests for normality are

presented in table 2. One of the variables is negatively skewed while the others are positively skewed. Only market capitalisation was not distributed normally while other variables follow a normal distribution using the Jarque-Bera p values.

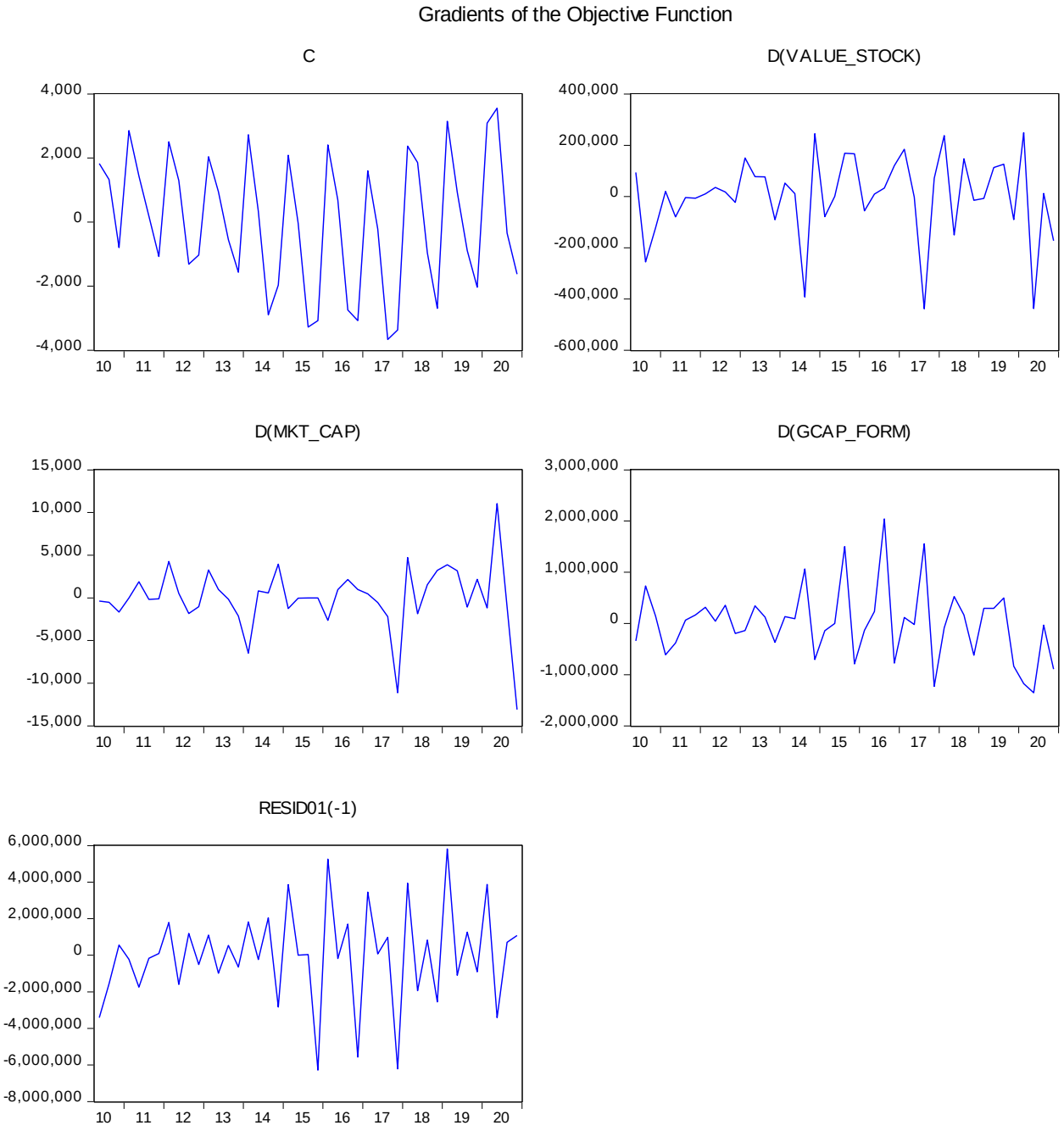
Table 2: Descriptive statistics

	R_GDP	MKT_CAP	VALUE_STOCK	GCAP_FORM
Mean	16530.01	18.20477	231.4384	**2473.310**
Median	16413.36	17.00000	212.9000	**2467.830**
Maximum	19753.16	39.73000	441.4000	**3211.720**
Minimum	12790.37	7.800000	53.00000	**1909.820**
Std. Dev.	1756.408	6.644423	84.11582	**302.4042**
Skewness	-0.111500	0.807302	0.582371	**0.285854**
Kurtosis	2.362634	4.067769	3.103921	**2.499274**
Jarque-Bera	0.835934	6.869638	2.506945	**1.058890**
Probability	0.658384	0.032231	0.285512	**0.588932**
Sum	727320.3	801.0100	10183.29	**108825.6**
Sum Sq. Dev.	1.33E+08	1898.379	304245.2	**3932276.**
Observations	**44**	**44**	**44**	**44**

Source: Authors computation 2022

Figure 1 represents the trend analysis of variables i.e., market capitalisation, the value of trade, and gross fixed capital formation selected for the study. The trend analysis further complements the descriptive statistics.

Figure 1: Trend analysis of Variables



Source: Authors computation 2022

The Augmented Dickey-Fuller (ADF) results in Table 3 is the unit root test. The unit root test was selected due to common usage, and has a robust output. The Value of Stock (VALUE_STOCK) was stationary at level while The Real GDP (R_GDP), Market Capitalisation (MKT_CAP), and Gross Fixed Capital Formation (GCAP_FORM) were all stationary at first difference. The stationarity of each of the variables is presented in Table 3.

Table 3: Augmented Dickey-Fuller Unit Root Test

Variables	Level		1st difference		Order of integration
	t-statistics	p-values	t-statistics	p-values	
R_GDP	-1.940739	0.3109	-57.25011	0.0001	I(1)
MKT_CAP	1.715161	0.9995	-3.514969	0.0123	I(1)
VALUE_STOCK	-3.577798	0.0104	0.0000	0.0000	I(0)
GCAP_FORM	-1.853263	0.3502	-3.006081	0.0431	I(1)

Source: Authors Computation 2022

It means that only the value of stock stationary at level displayed the non-randomisation principle in other words it is distributed independently and identically i.e., the data series were well behaved during the period. The Ordinary Least Squares method has the best results or outcomes due to its minimum variance; it is linear, unbiased, and is a good estimator which makes estimates as close as possible. This indicated the need for a cointegration test to confirm the long-run relationship or convergence.

As a result of the short-run test a long-run convergence cointegration test was carried out to confirm long-run convergence or otherwise. Results showed there was long-run convergence. In the long run, there was a 75% discrepancy or disequilibrium; however, this will be reduced every quarter due to the quarterly data used meaning that any disequilibrium or shock will be responded to or resolved within two quarters (see appendix for result output).

$H0_1$: Market capitalisation has no significant impact on Real GDP in Nigeria.

The first variable with a null hypothesis - $H0_1$: Market capitalisation has no significant impact on Real GDP in Nigeria." In the short run, the variable market capitalisation has a positive coefficient of 164.5275. This implies that market capitalisation has a positive impact on the Real GDP as a measure of economic performance; thus, suggesting that, with a percentage increase in the market capitalisation, the Real GDP will see about a 164.5 percent increase, all things being equal. This result is statistically significant at one percent. Hence, the null hypothesis "Market capitalisation has no significant impact on Real GDP in Nigeria" is hereby

rejected. We, therefore, conclude that the relationship seen concerning market capitalisation and the Real GDP in the short-run can be generalisable. Result is consistent in the long run with a reported coefficient of 2.273247, which is statistically significant at five percent. This implies that in the long-term, as market capitalisation rises by 1% , Real GDP will experience a rise by 2.3 per cent.

$H0_2$: Value of trade (stock) has no significant impact on Real GDP in Nigeria.

The second variable with a null hypothesis - $H0_2$: Value of trade (stock) has no significant impact on Real GDP in Nigeria." In the short run, the variable value of trade (stock) has a negative coefficient of -1.582022. This implies that the value of trade (stock) potentially impacts the Real GDP as a measure of economic performance; thus, suggesting that, with a percentage increase in the value of trade (stock), the Real GDP will see about a -1.58 per cent decrease, all things being equal. This result is statistically insignificant. Therefore, the null hypothesis "Value of trade (stock) has no significant impact on Real GDP in Nigeria." has failed to reject. One would therefore conclude that the relationship observed between the value of trade (stock) and the Real GDP can be generalisable. The results are consistent in the long run with a reported negative coefficient of -2.834051, which is statistically insignificant. This implies that in the long-term, as the value of trade (stock) increases by one per cent, the Real GDP will experience a decrease by 2.83 per cent, all things being equal (see appendix for output).

Granger Causality Test

The test of Granger causality is used for testing the long-run relationship of variables in the model (Granger, 1986; Granger, 1988). The direction of the relationship amongst two variables X and Y can be tested using the granger causality test. It can be that the variables do not help to predict one another, they predict one another i.e., bidirectional Granger causality, the variables may be unidirectional i.e., X predicts Y and not Y predicting X, and finally, Y predicting X and not vice versa. The granger causality test is suitable to assess short-run relationships among the study variables using a 2-lag model. The Granger causality test shows a unidirectional relationship between market capitalisation and Real GDP, while a bidirectional relationship exists between Gross Capital formation and Real GDP.

Table 4: Pairwise Granger Causality Tests

Date: 01/19/22 Time: 10:09
Sample: 2010Q1 2020Q4
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
MKT_CAP does not Granger Cause R_GDP	42	14.6485	2.E-05
R_GDP does not Granger Cause MKT_CAP		1.10928	0.3405
VALUE_STOCK does not Granger Cause R_GDP	42	2.76015	0.0763
R_GDP does not Granger Cause VALUE_STOCK		1.97149	0.1536
GCAP_FORM does not Granger Cause R_GDP	42	8.88688	0.0007
R_GDP does not Granger Cause GCAP_FORM		3.84644	0.0304
VALUE_STOCK does not Granger Cause MKT_CAP	42	3.49970	0.0405
MKT_CAP does not Granger Cause VALUE_STOCK		2.06630	0.1410
GCAP_FORM does not Granger Cause MKT_CAP	42	1.49073	0.2384
MKT_CAP does not Granger Cause GCAP_FORM		5.62077	0.0074
GCAP_FORM does not Granger Cause VALUE_STOCK	42	1.88753	0.1657
VALUE_STOCK does not Granger Cause GCAP_FORM		1.47806	0.2412

Source: Authors Computation 2022

Table 5: Diagnostic Test

R-Square	0.443856
Adjusted R-square	0.385315
Serial Correlation	14.57359 (0.0000)
Heteroscedasticity Test	5.927922 (0.0008)

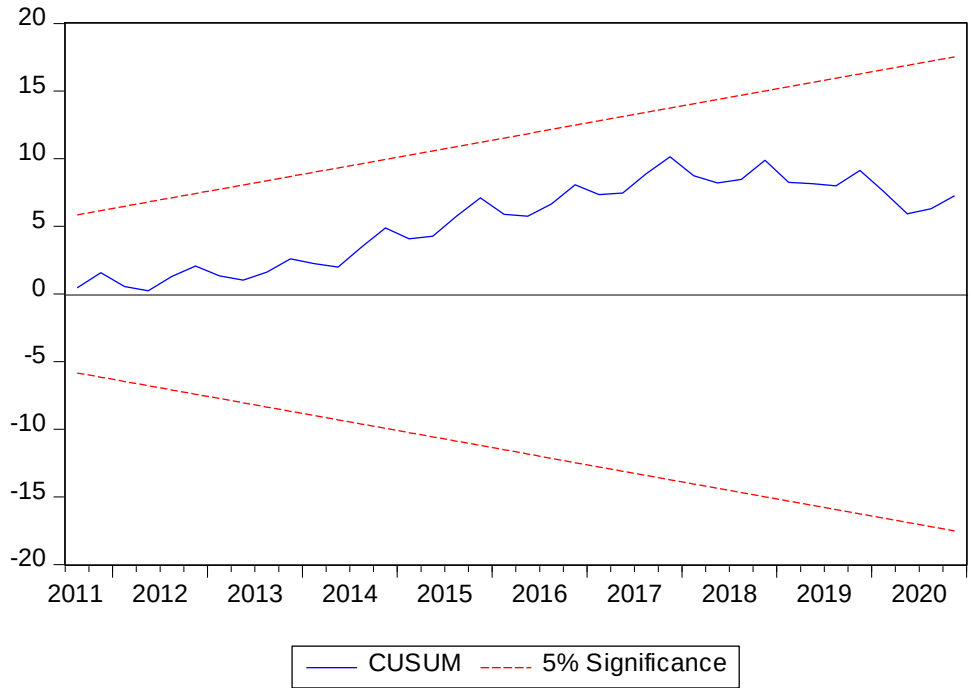
Source: Authors Computation 2022

The diagnostic tests are to determine the degree of dependability of the model used in the study. The tests indicated the model to be standard without signs of serial correlation, and heteroscedasticity. The regression analysis results have a relatively low value of 39% of adjusted R-Square. Adjusted R-Square explains any observed variation in the regressed variable due to the regressors. It means that explanatory variables of capital market performance could not explain the majority of variance in economic growth. Hence, a high likelihood that the adopted regression model may not have added some crucial proxies or dimensions of capital market performance to explain economic growth.

CUSUM test

The stability test is needed to test the stability of the model used to guarantee dependency, and trustworthiness of the results. Analyses are carried out to define the appropriateness and stability of the model used. The author resolved to use the Cumulative sum of recursive residuals (CUSUM) test. The test statistic based on the CUSUM of recursive residuals was introduced in Brown et al. (1975) and adapted herein. In a simulation study, Ploberger and Kramer (1992) show CUSUM Analysis has better influence to detect parameter instability following early in the sample than analysis based on OLS residuals. CUSUM analyses are presented to show the stability of models. The model indicates seamless firmness with no specification errors because all charted lines are within the region of stability. A shift from this area of stability means an error in model description but the result has indicated otherwise. Therefore, it could be trusted for further reference as represented in Figure 2.

Figure 2: CUSUM Graph



Source: Authors computation 2022

5. Conclusion and Recommendations

This study investigates the influence of capital market performance on economic growth in Nigeria. The dependent variable for this study was the Real GDP while the regressor variables selected were market capitalisation and value of trade. The control variable used was Gross fixed capital formation. The objectives were to assess the impact of market capitalisation on Real GDP and to determine the influence of the value of trade (stock) on Real GDP.

To achieve this, quantitative approach and methods were utilised to gather secondary data i.e., quarterly time-series data for the study. Analysis revealed market capitalisation has a positive and significant impact on economic growth in Nigeria and is statistically significant at five per cent. The significance of the study results serves as an avenue for capital market operators, academics, and practitioners to gather current insights to facilitate future research, formulation, and implementation of economic or financial policies that will enhance capital market efficiency and economic growth in Nigeria.

The limitations of this study are the unavailability of quarterly secondary time series data in Nigeria which led to the use of few variables, another limitation is the nature of secondary data that is usually not stationary, and this led to the use of ADF unit root test to test for the stationarity of data. It is expected that further studies will be conducted in this area using a larger observation of different data sets e.g., quarterly time-series data along with other combination of variables using more sophisticated analysis. The use of more variables will explain the influences of capital market performance on economic growth in Nigeria. Future studies may adopt qualitative analysis for the subject to gain more insights into the phenomenon for comparison of results. Nigeria has been assessing and trying to improve capital market performance for the purpose of achieving economic growth and development but the economic cycle is becoming more difficult to control or forecast due to recent events that caused economic shocks and recessions. Hence, the need for a continuous assessment of its capital market and its impact on economic growth.

The study recommended that Government should encourage financing of companies through initial public offer of shares to improve market capitalisation, different levels of government to raise financing of long-term projects from capital market to improve the value of transactions or trade.

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APPENDIX A: ADF Unit root tests

STATIONARITY test results:

At Level

Null Hypothesis: R_GDP has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.940739	0.3109
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(R_GDP)

Method: Least Squares

Date: 01/19/22 Time: 13:53

Sample (adjusted): 2011Q2 2020Q4

Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
R_GDP(-1)	-0.080715	0.041590	-1.940739	0.0609
D(R_GDP(-1))	-0.185877	0.101943	-1.823338	0.0773
D(R_GDP(-2))	-0.275609	0.101676	-2.710673	0.0106
D(R_GDP(-3))	-0.295479	0.109544	-2.697346	0.0109
D(R_GDP(-4))	0.733839	0.120205	6.104894	0.0000
C	1429.764	716.3766	1.995827	0.0543

R-squared	0.970572	Mean dependent var	157.2092
Adjusted R-squared	0.966113	S.D. dependent var	1457.457
S.E. of regression	268.2950	Akaike info criterion	14.16269
Sum squared resid	2375414.	Schwarz criterion	14.41862
Log likelihood	-270.1725	Hannan-Quinn criter.	14.25452
F-statistic	217.6746	Durbin-Watson stat	1.873034
Prob(F-statistic)	0.000000		

Null Hypothesis: MKT_CAP has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.715161	0.9995
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(MKT_CAP)

Method: Least Squares

Date: 01/19/22 Time: 13:56

Sample (adjusted): 2010Q2 2020Q4

Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MKT_CAP(-1)	0.081860	0.047727	1.715161	0.0939
C	-0.720655	0.888495	-0.811096	0.4220

R-squared	0.066947	Mean dependent var	0.728605
Adjusted R-squared	0.044190	S.D. dependent var	1.842365
S.E. of regression	1.801198	Akaike info criterion	4.060176
Sum squared resid	133.0169	Schwarz criterion	4.142092
Log likelihood	-85.29379	Hannan-Quinn criter.	4.090384
F-statistic	2.941777	Durbin-Watson stat	1.393602
Prob(F-statistic)	0.093866		

Null Hypothesis: VALUE_STOCK has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.577798	0.0104
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	

	10% level	-2.603944

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(VALUE_STOCK)

Method: Least Squares

Date: 01/19/22 Time: 13:58

Sample (adjusted): 2010Q2 2020Q4

Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
VALUE_STOCK(-1)	-0.474937	0.132746	-3.577798	0.0009
C	111.1550	32.59729	3.409946	0.0015

R-squared	0.237927	Mean dependent var	1.562791
Adjusted R-squared	0.219340	S.D. dependent var	82.74891
S.E. of regression	73.11277	Akaike info criterion	11.46728
Sum squared resid	219164.5	Schwarz criterion	11.54919
Log likelihood	-244.5465	Hannan-Quinn criter.	11.49749
F-statistic	12.80064	Durbin-Watson stat	2.052214
Prob(F-statistic)	0.000907		

Null Hypothesis: GCAP_FORM has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.853263	0.3502

Test critical values:	1% level	-3.610453
	5% level	-2.938987
	10% level	-2.607932

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GCAP_FORM)

Method: Least Squares

Date: 01/19/22 Time: 14:01

Sample (adjusted): 2011Q2 2020Q4

Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GCAP_FORM(-1)	-0.292661	0.157917	-1.853263	0.0728
D(GCAP_FORM(-1))	-0.263695	0.199748	-1.320137	0.1959
D(GCAP_FORM(-2))	-0.094758	0.196247	-0.482853	0.6324
D(GCAP_FORM(-3))	-0.100542	0.195187	-0.515107	0.6099
D(GCAP_FORM(-4))	0.422077	0.171597	2.459697	0.0193
C	737.2719	391.8616	1.881460	0.0688

R-squared	0.540219	Mean dependent var	19.76513
Adjusted R-squared	0.470556	S.D. dependent var	308.4879
S.E. of regression	224.4648	Akaike info criterion	13.80595
Sum squared resid	1662686.	Schwarz criterion	14.06189
Log likelihood	-263.2161	Hannan-Quinn criter.	13.89778
F-statistic	7.754673	Durbin-Watson stat	1.925478
Prob(F-statistic)	0.000065		

At 1st difference

Null Hypothesis: D(R_GDP,1) has a unit root

Exogenous: Constant

Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-57.25011	0.0001
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(R_GDP,2)

Method: Least Squares

Date: 01/19/22 Time: 13:55

Sample (adjusted): 2011Q2 2020Q4

Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(R_GDP(-1),2)	-4.000318	0.069874	-57.25011	0.0000
D(R_GDP(-1),3)	2.037798	0.047085	43.27953	0.0000
D(R_GDP(-2),3)	1.033975	0.030802	33.56841	0.0000
C	-25.77999	46.08262	-0.559430	0.5794

R-squared	0.992994	Mean dependent var	37.99103
Adjusted R-squared	0.992394	S.D. dependent var	3293.881
S.E. of regression	287.2731	Akaike info criterion	14.25566
Sum squared resid	2888405.	Schwarz criterion	14.42628

Log likelihood	-273.9853	Hannan-Quinn criter.	14.31688
F-statistic	1653.617	Durbin-Watson stat	2.079256
Prob(F-statistic)	0.000000		

Null Hypothesis: D(MKT_CAP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.514969	0.0123
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(MKT_CAP,2)

Method: Least Squares

Date: 01/19/22 Time: 13:57

Sample (adjusted): 2010Q3 2020Q4

Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MKT_CAP(-1))	-0.684331	0.194690	-3.514969	0.0011
C	0.575743	0.301292	1.910914	0.0632

R-squared	0.235985	Mean dependent var	0.196429
Adjusted R-squared	0.216885	S.D. dependent var	2.060091

S.E. of regression	1.823053	Akaike info criterion	4.085350
Sum squared resid	132.9408	Schwarz criterion	4.168096
Log likelihood	-83.79234	Hannan-Quinn criter.	4.115679
F-statistic	12.35501	Durbin-Watson stat	1.700896
Prob(F-statistic)	0.001109		

Null Hypothesis: D(GCAP_FORM) has a unit root

Exogenous: Constant

Lag Length: 3 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.006081	0.0431
Test critical values:	1% level	-3.610453	
	5% level	-2.938987	
	10% level	-2.607932	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GCAP_FORM,2)

Method: Least Squares

Date: 01/19/22 Time: 14:02

Sample (adjusted): 2011Q2 2020Q4

Included observations: 39 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GCAP_FORM(-1))	-1.624591	0.540435	-3.006081	0.0049
D(GCAP_FORM(-1),2)	0.133104	0.441201	0.301686	0.7647
D(GCAP_FORM(-2),2)	-0.126601	0.326776	-0.387426	0.7009

D(GCAP_FORM(-3),2)	-0.355139	0.173655	-2.045083	0.0486
C	14.18746	37.66937	0.376631	0.7088

R-squared	0.827747	Mean dependent var	19.51769
Adjusted R-squared	0.807482	S.D. dependent var	529.5785
S.E. of regression	232.3623	Akaike info criterion	13.85368
Sum squared resid	1835736.	Schwarz criterion	14.06696
Log likelihood	-265.1468	Hannan-Quinn criter.	13.93020
F-statistic	40.84611	Durbin-Watson stat	1.878553
Prob(F-statistic)	0.000000		

Estimation

Dependent Variable: R_GDP

Method: Least Squares

Date: 01/19/22 Time: 14:18

Sample: 2010Q1 2020Q4

Included observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10931.94	1625.261	6.726270	0.0000
MKT_CAP	164.5275	35.68547	4.610491	0.0000
VALUE_STOCK	-1.582022	2.442618	-0.647675	0.5209
GCAP_FORM	1.200424	0.762766	1.573777	0.1234

R-squared	0.536092	Mean dependent var	16530.01
Adjusted R-squared	0.501299	S.D. dependent var	1756.408
S.E. of regression	1240.353	Akaike info criterion	17.17069
Sum squared resid	61539054	Schwarz criterion	17.33289
Log likelihood	-373.7551	Hannan-Quinn criter.	17.23084

F-statistic	15.40801	Durbin-Watson stat	1.382725
Prob(F-statistic)	0.000001		

ECM thus;

Dependent Variable: D(R_GDP)

Method: Least Squares

Date: 01/19/22 Time: 15:01

Sample (adjusted): 2010Q2 2020Q4

Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	165.2798	185.5890	0.890569	0.3788
D(VALUE_STOCK)	-2.834051	2.241879	-1.264141	0.2139
D(MKT_CAP)	2.273247	105.4713	0.021553	0.0029
D(GCAP_FORM)	0.816577	0.582257	1.402433	0.0109
RESID01(-1)	-0.749450	0.154371	-4.854850	0.0000

R-squared	0.443856	Mean dependent var	161.9253
Adjusted R-squared	0.385315	S.D. dependent var	1420.770
S.E. of regression	1113.910	Akaike info criterion	16.97808
Sum squared resid	47150223	Schwarz criterion	17.18288
Log likelihood	-360.0288	Hannan-Quinn criter.	17.05360
F-statistic	7.581913	Durbin-Watson stat	1.794213
Prob(F-statistic)	0.000136		

Cointegration test Result

Date: 01/19/22 Time: 14:08

Sample (adjusted): 2010Q3 2020Q4

Included observations: 42 after adjustments

Trend assumption: Linear deterministic trend

Series: R_GDP MKT_CAP VALUE_STOCK GCAP_FORM

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.692034	82.19475	47.85613	0.0000
At most 1 *	0.366080	32.72857	29.79707	0.0223
At most 2	0.243840	13.58363	15.49471	0.0951
At most 3	0.042967	1.844544	3.841466	0.1744

Trace test indicates 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 No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.692034	49.46618	27.58434	0.0000
At most 1	0.366080	19.14494	21.13162	0.0927
At most 2	0.243840	11.73909	14.26460	0.1208
At most 3	0.042967	1.844544	3.841466	0.1744

Max-eigenvalue test indicates 1 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 Cointegrating Coefficients (normalized by b'*S11*b=I):

R_GDP	MKT_CAP	VALUE_STOCK	GCAP_FORM
-0.001058	0.129273	0.003427	0.002371
-0.000275	0.255971	0.000689	-0.004668
0.000397	-0.181096	0.015446	-0.001094
-0.000104	-0.103101	-0.001543	-0.001306

Unrestricted Adjustment Coefficients (alpha):

D(R_GDP)	996.4192	98.66904	-118.8656	77.37776
D(MKT_CAP)	-0.182930	0.566399	-0.685318	-0.082027
D(VALUE_STOCK)	-36.38399	-5.197356	-19.34440	8.585612
D(GCAP_FORM)	-66.80157	130.0022	26.41375	21.85665

1 Cointegrating Equation(s): Log likelihood -944.0997

Normalized cointegrating coefficients (standard error in parentheses)

R_GDP	MKT_CAP	VALUE_STOCK	GCAP_FORM
1.000000	-122.1696	-3.238927	-2.240862
	(28.3612)	(1.65685)	(0.56209)

Adjustment coefficients (standard error in parentheses)

D(R_GDP)	-1.054352
	(0.14389)
D(MKT_CAP)	0.000194
	(0.00030)

D(VALUE_STOCK)	0.038499	
	(0.01103)	
D(GCAP_FORM)	0.070686	
	(0.04396)	

2 Cointegrating Equation(s): Log likelihood -934.5273

Normalized cointegrating coefficients (standard error in parentheses)

R_GDP	MKT_CAP	VALUE_STOCK	GCAP_FORM
1.000000	0.000000	-3.349293	-5.143939
		(2.51202)	(0.73568)
0.000000	1.000000	-0.000903	-0.023763
		(0.01464)	(0.00429)

Adjustment coefficients (standard error in parentheses)

D(R_GDP)	-1.081477	154.0662
	(0.14758)	(38.7094)
D(MKT_CAP)	3.79E-05	0.121334
	(0.00030)	(0.07785)
D(VALUE_STOCK)	0.039928	-6.033828
	(0.01136)	(2.97938)
D(GCAP_FORM)	0.034947	24.64116
	(0.03875)	(10.1646)

3 Cointegrating Equation(s): Log likelihood -928.6577

Normalized cointegrating coefficients (standard error in parentheses)

R_GDP	MKT_CAP	VALUE_STOCK	GCAP_FORM
1.000000	0.000000	0.000000	-5.819913
			(0.77629)
0.000000	1.000000	0.000000	-0.023945
			(0.00396)
0.000000	0.000000	1.000000	-0.201826
			(0.07672)

Adjustment coefficients (standard error in parentheses)

D(R_GDP)	-1.128722	175.5922	1.647053
	(0.15533)	(45.2865)	(2.11456)
D(MKT_CAP)	-0.000235	0.245442	-0.010822
	(0.00029)	(0.08353)	(0.00390)
D(VALUE_STOCK)	0.032239	-2.530643	-0.427066
	(0.01149)	(3.34981)	(0.15641)
D(GCAP_FORM)	0.045446	19.85775	0.268666
	(0.04091)	(11.9287)	(0.55699)

Cointegration test of the residual for long run convergence

Unit root

Null Hypothesis: RESID01 has a unit root

Exogenous: Constant

Lag Length: 4 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.304321	0.00001
Test critical values:	1% level	-3.610453	

5% level	-2.938987
10% level	-2.607932

*MacKinnon (1996) one-sided p-values.