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# Equity Market Performance and Economic Growth in Nigeria: An Application of Vector Error Correction Model

Dr. Ugwu Okereke John<sup>1</sup>, Prof. Festus Ogiji<sup>2</sup>, Dr. Eze Onyekachi Richard<sup>3</sup>

<sup>1</sup> Dept. of Banking and Finance, Ebonyi State University, Abakaliki-Nigeria

<sup>2</sup> Dept. of Banking and Finance, Ebonyi State University, Abakaliki-Nigeria

<sup>3</sup> Dept. of Banking and Finance, Ebonyi State University, Abakaliki-Nigeria. +2348036185506

## Abstract

Equity market has been seen as a vehicle for promoting economic growth by mobilizing long term funds for productive investment, but theoretical postulations differ over this role. The understanding of this role is of strong policy relevance in Nigeria. This paper therefore attempts to establish the existence of long-run relationship between economic growth and equity market performance with the view to improving policy formulation that will promote growth through capital market in Nigeria. Using data from Q1:1998 to Q4:2018, the Johansen and Juselius (1990) multivariate cointegration results establish long-run relationship between economic growth and each of equity market capitalization and turnover ratio. The test result could not find cointegration between economic growth and number of securities traded. The VEC Granger Causality/Block Exogeneity Wald test results establish a uni-directional relationship running from market capitalization and turnover ratio to economic growth, while bi-directional relationship exist between economic growth and number of securities traded. The parsimonious VECM for economic growth and equity market capitalization (model 1) shows that market capitalization and turnover impact on economic growth positively. The paper recommends that market capitalization as measure of equity market performance should be considered by policy makers as a veritable policy instrument for enhancing economic growth in Nigeria.

**Keywords:** Equity Market, Economic Growth, Cointegration, VECM

**JEL Classification:** C30, E010, G120

## 1. Introduction

The Capital market is seen as a vehicle for promoting economic growth by mobilizing long term funds from the surplus units and making it available for businesses in the productive sector of the economy. This market is generally made up of *equity market* (market for buying and selling of shares) and bond market (market for the issuance of debt securities). In most countries, equity market is the most significant segment of capital market; and also more liquid and volatile than the bond segment.

Theoretical postulations vary over equity market linkages with economic growth. Kyle (1984); Levine (1991); Obstfeld (1994); Holmstrom and Tirole (1993); Greenwood and Smith (1996); and Bencivenga, Smith, and Starr (1996); prove that equity market is significant for economic growth. However, Stiglitz (1985, 1993); Mayer (1988); Morck, Shleifer, and Vishny (1990a,b) and Devereux and Smith (1994) postulate that equity market is of little or no relevance to growth. In the mist of these conflicting theoretical prepositions, it becomes critical to investigate empirically the stance of this argument in the Nigerian context even though theories seem to favour positive relationship between capital market performance and economic growth in general terms.

In Nigeria, development in the market has been mixed over time. All Share Index (ASI) and Market Capitalization (MC) grew from 163.8 index points and N7.1 billion in 1986 to 31,450.8 index points and N6,957.5 billion in December 2008, respectively. The ASI decreased to 28,078.8 index points in December 2012 (CBN, 2012), reflecting the after effect of 2008/2009 global financial crisis. On the other hand, economic growth, measured in terms of gross domestic product (GDP) growth between 1986 and 2012 has been mixed.

To the knowledge of this study, none of the few available literature in Nigeria on the subject since the 2007/2009 global financial crisis (See Nyong, 1997 and Adenuga, 2010) accommodated the effect of the crisis while modeling long term relationship between economic growth and capital market performance. This is a huge gap considering the perceived effect of the crisis on the economy through the financial sector.

Thus, this study seeks to achieve the following objectives: (1) To examine the directional causality between equity market performance indicators and economic growth in Nigeria; (2) To establish the existence of short-run and long-run relationship between equity market and economic growth in Nigeria.

Following this introduction is section two, which examines the existing theoretical and empirical literature, including equity market performance indicators. Section three describes the data used, source, econometric methodology and the model. Section four covers the empirical investigations and analysis of results, while section five concludes the paper with policy implication of findings.

## **2. Theoretical and Empirical Literature**

### **2.1. Theoretical Literature**

The traditional belief that stock market contain useful information about the future path of economic growth was given a boost by Irving Fisher's (1907) formalization of the asset market and real economic growth, which further elucidated the theoretical connection between equity market performance and economic growth. Deducing from Fisher's work, the price of stock is given as the discounted value of expected cash flows while the magnitude of these cash flows is a function of the strength of the economy. Since Fisher's theoretical formalization, other renowned economists have postulated that equity market has link with economic growth through the role it plays in the mobilization and allocation of resources to the productive sectors of the economy. Ajit (1993) argued that, in principle, a well-functioning stock market may help the development process of an economy through growth of savings, efficient allocation of investment resources and better utilization of the existing resources. Greenwood and Smith (1996) argue that large stock market tends to reduce the associated cost of fund mobilization and thereby enhancing investment in the productive sectors with the state of the art technologies.

Notwithstanding the growing theoretical supports for the positive relationship between equity market and economic growth, opposing views have been put forward by fewer economists like Stiglitz (1985, 1993), Shleifer and Summers (1988), Mayer (1988), Morck, Shleifer, and Vishny (1990a,b), Bencivenga and Smith (1991), Obstfeld (1994) and Devereux and Smith (1994). In summary, the projected arguments are: firstly, greater liquidity may reduce savings rate to the extent of slowing down economic growth; secondly, diversifying risk through internationally integrated stock market could lower the propensity to save, reduce economic growth thereby reducing living standard; thirdly, quick information about stock market that is revealed through price will reduce motivations to spend private resources to seek relevant information. Moreover, since managers have

more relevant information about firms than outsiders, then they could misprice share/equity in the market and issue new equity. Such behaviour is inimical to economic growth as investors will be discouraged with the high prices of new issues; fourthly, there is the belief that efficient stock market enhances diffusion of ownership which impedes effective corporate governance.

## 2.2. Empirical Literature

The resolve of available empirical studies on stock market-growth nexus is not significantly different from theoretical postulations as there has not been consensus of results among authors on the subject matter. Table 1a presents a summarized survey of literature on the subject, with focused on foreign countries.

Table 1a: Related Literature on the Economic Growth and Capital Market Performance

Author	Objective	Data Frequency/Coverage	Market Performance Indicator	Control Variables	Estimation Technique	Findings
Atje and Jovanovic (1993)	To establish if stock-market development affects the level and/or the growth rate of economic activity for 40 countries.	Annual data:1980 to 1988	GDP, GDP growth rate and Market Cap	None	Single Equation Model (SEM), Ordinary Least Square (OLS)	It finds a substantial positive effect on the level and the growth rate of economic activity.
Levine and Zervos (1996)	To empirically evaluates the relationship between stock market development and long-term growth for 41 countries.	Annual data:1973 to 1993	Single composite index	Political instability, investment in human capital, macroeconomic conditions	Two stage least square regressions	Strong connection exists between stock market development and economic growth in the long run.
Bekaert and Harvey (1997)	Explores the links between financial markets and economic growth for 18 countries	Annual data:1986 to 1992	Number of stock, market cap, total stock value, turnover ratio, market cap to gdp ratio and total stock value to gdp ratio.	None	Rank Correlation	Stock market development is positively associated with economic growth.
Mohtadi and Agarwal (2001)	To assess the relationship between stock market development and economic growth for 21 emerging markets.	Annual data:1977 to 1997	Market cap to gdp ratio, value of share to gdp ratio	Foreign direct investment, secondary school enrollment and domestic investment	Dynamic panel model	Strong positive relationship exists between stock market development indicators and economic growth.
Brasoveanu et al (2008)	Explains the relationship between market development (size and liquidity of the capital market) and economic growth in Romania.	Quarterly data: 2000 to 2006	Market size and liquidity.	None	Regression function and VAR models	Capital market development is positively correlated with economic growth with stronger feedback effect from economic growth to capital market.

Source: Authors' Compilations with focus on studies done outside Nigeria

The available literatures in Nigeria reviewed in this study such as Osunibi T. S. and Econs Dept, 2001; Donwa and Odia, 2010; and Owolabi and Ajayi 2013 employed relatively less robust analytical technique with a very short sample period. Only Nyong, 1996; Adenuga, (2010) and Usman and Abdulmumini (2013) employed a more advanced analytical methodology while establishing long-run relationship between stock market development and economic growth. However, none of them accounted for the effect of the 2008/2009 financial crisis in their models. Table 1b gives a succinct report of these studies.

Table 1b: Literature on the Economic Growth and Capital Market Performance in Nigeria

Author	Objective	Data Frequency/ Coverage	Market Performance Indicator	Control Variables	Estimation Technique	Findings
Nyong (1997)	To determine Equity Market development relationship with long-run economic growth in Nigeria.	Annual data: 1970 to 1994	Aggregate index of equity market development	Broad money supply to gdp ratio	Single Equation Model (SEM), Ordinary Least Square (OLS)	Equity market development is negatively and significantly correlated with long-run growth. Bi-directional causality established.
Adenuga (2010)	Explores the hypothesis that stock market development promotes economic growth in Nigeria.	Quarterly data: 1990:1 to 2009:4	Market cap ratio, total value of shares traded ratio and turnover ratio	inflation, investment ratio, Savings Ratio, foreign direct investment to GDP ratio and private sector credit to GDP ratio	Vector Error Correction Model (VECM)	Validates the hypothesis that the stock market promotes economic growth in Nigeria.
Usman A. U. and Abdulmu mini B. A. (2013)	To investigate the impact of stock exchange market on economic growth in Nigeria.	Quarterly data: 1981 to 2010	Market Cap and Value traded	None	Johansen Cointegration test approach and Granger Causality test	Existence of positive long run relationship between Market indicators and economic growth. Bi-directional relationship exists.
Ovat (2012)	To ascertain whether or not there exists a long-run relationship among Stock market and economic growth variables in Nigeria.	Annual: 1980 to 2009	Market Cap and turnover ratio	None	Granger Causality and Johansen (1988) co-integration test	Two-way causation between market turnover and economic growth with stronger effect from market liquidity. Market size have little or no effect on growth.
Osunibi T. S. and Econs Dept (2001)	To examine whether stock market promotes economic growth in Nigeria.	Annual: 1980 to 2000	Market cap, new issues, and stock value traded ratio	Per capita income, political stability, gross capital formation, lagged growth rate GDP and SAP dummy	Single Equation Model (SEM), Ordinary Least Square (OLS)	Positive links between the stock market and economic growth was established.
Donwa and Odia (2010)	To analyze the impact of the Nigerian capital market on her socio-economic development.	Annual: 1981 to 2008	Market cap, new issues, volume of transaction and total listed equities and Government stock.	None	Single Equation Model (SEM), Ordinary Least Square (OLS)	Capital market indices have no significant impact on the GDP in Nigeria.
Owolabi and Ajayi (2013)	To examine whether or not stock market promotes economic growth in Nigeria	Annual: 1971 to 2010	Capital market index	Gross capital formation, foreign direct investment and debt overhang.	Single Equation Model (SEM), Ordinary Least Square (OLS)	Positive relationship exists between economic growth and stock market development variables.

Source: Author's compilation with focus on studies done in Nigeria

## 2.3. Nigerian Equity Market Performance Indicators

### 2.3.1. All Share Index (ASI)

A stock market index shows the price movement of quoted stocks and also summaries measure of the behavior of the stock market as it indicates changes in the aggregate market value or the value of some selected stocks. All-share index is an indicator designed to show the investors the relationship between stock prices of other economic and financial variables such as money supply, industrial production, consumer price index, corporate profits, lending and deposit rates.

### 2.3.2. Market Capitalization (MC)

This indicator measures the amount of wealth held in securities and it is an indication of the financial base of the market. Market Capitalization is a function of market price and volume of paid-up capital of listed companies. The sum total of market capitalization for all listed equities on an Exchange gives the aggregate equity market capitalization of a stock market.

### **2.3.3. Total New Issues**

New Issues are securities raised in the primary market for the first time. They are equities and or bond offered to the public for the first time. It may be an initial public offer (IPO) or a security issued by an established firm which may have floated several such issues in the past.

### **2.3.4. Listed Securities**

These are investment instruments (such as stock/shares, bonds) that are officially listed (quoted) on a stock exchange for public trading. Unlisted securities are traded in over the counter market or alternative investment market. The highest listings of 217 equities were recorded in Q4 2010 while the least was 186 in Q4 1986.

### **2.3.5. Value of Transactions**

Value traded for every stock listed on the exchange is a product of the price of the stock and the volume of the stock traded for that day. The addition of the values of every stock that was traded on a particular day is the total amount investors commit to the market for a particular day, week, month and annual.

### **2.3.6. Volume of Transactions**

The number of shares of a company traded on the floor of the Exchange during a particular session is the volume traded. The volume traded is dependent on the willingness of the holder of a stock to sell and the readiness of other investors to buy which is the offer and bid.

### **2.3.7. Number of deals**

Number of deals determines number of transactions in a particular trading period. Movement in number of deals revealed bears in the stock market during the last quarters of 2004.

### **2.3.8. Turnover ratio**

The stock turnover gives the aggregate value of stock traded with the total market capitalization for a particular period. This is another method of assessing how active or how liquid a stock market is. The portfolio investors and indeed other investors consider how fast or how easy investors can buy and sell securities when the need arises before taking a decision to invest in a stock market

## **3. Methodological Framework**

### **3.1. Stock Market Variables, Economic Growth Indicators and Other Growth Determinants**

The stock market variables considered in this study are all-share-index (ASI), market capitalization (MCAP), total value of shares traded (VAL), total volume of shares (VOL), number of deals (DEALS), number of securities (SEC) and turnover ratio (TOVER). Theoretical and empirical literatures on the relationship between these variables and economic growth have been extensively discussed.

Apart from the activities of the equity market, studies have found other determinants of economic growth in Nigeria to include money supply, government expenditure, trade openness, foreign direct investment, financial deepening, capital formation (see Ogunmuyiwa and Ekone, (2010); Machi, (2011) and Ayanwale (2007). To this effect and based on Nigeria peculiarities, this study considered government expenditure, external reserve, consumer price index, broad money supply and private sector credit by domestic money banks as control variables.

### 3.2. Data and Model

The data used in this study spanned from 1998:Q1 to 2018:Q4. The study is restricted to 80 data points because most of the variables used, especially the initial control variables were not available on quarterly basis before 1998. Data on stock market variables were obtained from the Nigeria Stock Exchange, while the economic growth indicator (GDP) and its other determinants (control variables) were obtained from the Central Bank of Nigeria. The data are converted into natural logarithm except the dummy and the output explained in terms of elasticity. Transforming the data into log form helps to avoid heteroscedasticity problem.

The growth model for our study which captures the effect of the global financial crisis in Nigeria is specified below.

$$\ln gdp_t = \beta_0 + \beta_1 \ln X^e + \beta_2 \ln gexp + \beta_3 \ln m2 + \beta_4 \ln psc + \beta_5 \ln res + \beta_6 \ln cpi + \beta_7 \text{dummy} + \varepsilon_t \quad .. (1)$$

Where  $X^e$  is a list of equity market variables that enter the equation 1 at a time after satisfying the stationarity condition. The number of I(1) equity market variables determines number of equations coming from equation one. The a-priori expectations of the explanatory variables are stated as  $\beta_i > 0, \beta_j < 0$  given that  $i = 1,2,3,4,5$  and  $j = 6,7$ . Ln implies that the variables, apart from the dummy are in logarithm form.

### 3.3. Unit Root Test

In time series econometric analysis, it is essential to examine the stationarity properties of the variables under consideration with the view to ascertaining their order of integration, because non-stationary series could lead to spurious regression and a misleading estimation result. Augmented Dickey and Fuller (1979) (ADF) and Philip and Perron (1988) (PP) unit root tests technique have often been employed. The guiding principle in model estimation in this study is to achieve a parsimonious model, therefore, the stationarity of the identified variables forms the basis for their inclusion in the vector error correction (VEC) framework.

### 3.4. Vector Error Correction Granger Causality Test

Using VEC Granger Causality/Block Exogeneity Wald test, we establish the direction of causality among the stock market variables and economic growth indicator that have exhibited a common stochastic trend and also to test if the endogenous variable (in this case GDP) should rather be treated as exogenous. In a simple form, we represent the Vector Error Correction Granger Causality regression to test the *null hypothesis that stock market development does not granger cause economic growth* and vice versa using F-statistics:

$$\Delta \varphi_t = \sum_{i=1}^p \alpha_i \Delta \omega_{t-i} + \sum_{i=1}^p \theta_i \Delta X_{t-i} + \mu_{1t} \dots \dots \dots (5)$$

$$H_0: \sum_{i=1}^p \alpha = 0 \text{ against } H_1: \sum_{i=1}^p \alpha \neq 0$$

$$\Delta \omega_t = \sum_{i=1}^p \beta_i \Delta \varphi_{t-i} + \sum_{i=1}^p \vartheta_i \Delta X_{t-i} + \mu_{2t} \dots \dots \dots (6)$$

$$H_0: \sum_{i=1}^p \beta = 0 \text{ against } H_1: \sum_{i=1}^p \beta \neq 0$$

In equation 5,  $\Delta$  is a first difference operator.  $\varphi_t$  represents economic growth indicator at time t,  $\omega_{t-i}$  is the lagged equity market indicator. Also, in equation 6,  $\omega_t$  is stock market development indicator at time t and  $\varphi_{t-i}$  represents the lagged economic growth indicator.  $X_{t-i}$  is a list of control variables.  $\mu_{1t}$  and  $\mu_{2t}$  are error terms and they are uncorrelated.  $\alpha$  and  $\beta$  are parameter estimates. If  $H_0$  is not accepted in both equations, Bi-causality exists. If  $H_0$  is not accepted in equation 5, but accepted in equation 6 then unidirectional causality exist running from equity market to economic growth. If  $H_0$  is accepted in equation 5, but not accepted in equation 6 then unidirectional causality also exists running from economic growth to equity market.

### 3.5. Cointegration Test

The Johansen and Juselius (1990) multivariate cointegration model is applied to determine the long-run relationship between economic growth and equity performance variables in Nigeria. Cointegration test is conducted under a vector autoregressive framework by considering a VAR of order  $p$ :

$$\varphi_t = A_1\varphi_{t-1} + \dots + A_p\varphi_{t-p} + B_1X_{t-1} + \varepsilon_t \dots\dots\dots(7)$$

where  $\varphi_t$  is a  $k$ -vector of non-stationary I(1) variables,  $X_t$  is a  $d$ -vector of deterministic variables, and  $\varepsilon_t$  is a vector of innovations and  $p$  is the lag length, then equation 7 can be modified as:

$$\Delta\varphi_t = \Pi\varphi_{t-1} + \sum_{i=1}^{p-1} \theta_i\Delta\varphi_{t-i} + BX_t + \varepsilon_t \dots\dots\dots (8)$$

Where  $\Pi = \sum_{i=1}^p A_i - I$  and  $\theta_i = -\sum_{j=i+1}^p A_j$

$\theta_i$ ,  $\Pi$  and  $B$  are parameters to be estimated. According to the theorem if coefficient matrix  $\Pi$  has reduced rank  $r < k$ , then there exists  $r \times k$  of  $\alpha$  and  $\beta$  each with rank  $r$  such that  $\Pi = \alpha\beta'$  and  $\beta'V_t$  is I(0).  $r$  is the number of cointegration equation(s), each column of  $\beta'$  is the cointegrating vector and  $\alpha$  is the error correction parameter which measures the speed of convergence to the long-run steady state of  $\Delta\varphi_t$ . Johansen test of cointegration is highly sensitive to the choice of lag length, thus VEC lag Exclusion Wald Test is conducted to justify significance of the chosen lag length. The decision on long run relationship is based on trace statistic and maximum eigenvalue statistic.

Ho:  $r = 0$  Economic growth and equity market performance variables that are cointegrated are used to specify a vector error correction model (VECM) to determine the long-run equilibrium adjustment of equity market and economic growth.

### 3.6. VECM Representation

Having established that the variables of interest are cointegrated we therefore specify an ECM and estimate it under a VAR framework. This is with the view to obtaining information about the short-run relationship between economic growth and each stock market indicators; and long-run adjustment to changes in growth. A VECM representation is given below:

$$\Delta\varphi_t = \sum_{i=1}^p \alpha_i\Delta\varphi_{t-i} + \sum_{j=1}^q \beta_j\Delta X_{t-j} + \psi_t D_t + \Psi ecm_{t-1} + \varepsilon_t \dots\dots\dots (11)$$

Where  $\alpha_i$  and  $\beta_j$  are coefficients that determine the short-run relationship among the considered variables,  $ecm_{t-1}$  is the one period lag of the residuals derived from the cointegrating regressions of GDP on each equity market variable. It measures the speed of convergence to the long-run steady state,  $\varepsilon_t$  is the white noise.  $X_t$  is a vector of exogenously deterministic macroeconomic variables.  $D_t$  is a dummy that captures the effect of the financial crisis is also incorporated in  $X_t$ .

### 3.7. Diagnostic Checks of the VECM

Diagnostic tests are conducted for the residuals of the parsimonious model. Firstly, the adequacy of the model is examined using the R-Squared and F-Statistic. Secondly, the stability of the parsimonious model is tested by applying the cumulative sum (CUSUM) and cumulative sum of square (CUSUMQ) of the recursive residuals of Brown *et al* (1975). Thirdly, the Breusch-Godfrey serial correlation LM test is applied to test the hypothesis of no serial correlation. Fourthly, the residual series is further tested for heteroskedasticity. Finally, using the Jarque-Bera, the null hypothesis that the residuals are normal distributed is tested.

#### 4. Discussion of Results

GDP is estimated with each of the three equity market variables alongside the control variables to test if the endogenous variable (GDP) should be treated as exogenous (See full result is in appendix 1). This process yielded three estimated models: model 1, model 2 and model 3. The block exogeneity test results in Table 2 indicate that GDP can be treated as endogenous in model 1 and model 3 at 1% and 5% significant levels, respectively. More so, the equity market variables in the models have individual significant impact on GDP, implying that MCap Sec and Tover granger cause GDP. On the other hand, GDP cannot be treated as endogenous even at 10% significant level for model 2 because all the exogenous variables do not jointly influence it.

Table 2: VEC Granger Causality/Block Exogeneity Wald Tests

<b>Dependent variable: D(LNGDP)</b>				
	<b>Excluded</b>	<b>Chi-sq</b>	<b>df</b>	<b>Prob.</b>
<b>Model 1</b>	<i>D(LNMCAP)</i>	26.64345	6	0.0002***
	<i>D(LNGEXP)</i>	23.9937	6	0.0005***
	<i>D(LNM2)</i>	26.04966	6	0.0002***
	<i>All</i>	43.99995	18	0.0006***
<b>Model 2</b>	<i>D(LNSEC)</i>	17.10614	8	0.029**
	<i>D(LNGEXP)</i>	11.61381	8	0.1693
	<i>D(LNM2)</i>	8.527645	8	0.3837
	<i>All</i>	33.04114	24	0.1032
<b>Model 3</b>	<i>D(LNTOVER)</i>	13.36716	8	0.0998*
	<i>D(LNGEXP)</i>	18.85092	8	0.0157**
	<i>D(LNM2)</i>	9.754531	8	0.2827
	<i>All</i>	39.37915	24	0.0249**

The symbols \*\*\*, \*\* and \* denote rejection of null hypothesis at 1%, 5% and 10% significant levels

Before applying Johansen test of cointegration with the lag used in the VEC Granger Causality and Block exogeneity wald text, we exercised caution by testing the null hypothesis of (non)significance of the lag used in the models using VEC lag exclusion Wald test. This is necessary because cointegration test is highly sensitive to the choice of lag length. The Wald statistic as well as its p-value for the lag length used in each model is reported in Table 3. The table reveals that the choice of lag 6 and lag 8 are significant at 5% probability level. The choice of lag length beyond lag 3 in Model 2 is not significant.

Table 3: VEC Lag Exclusion Wald Tests  
(Joint Significance test of the chosen lag)

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
<b>DLag 1</b>	42.16527 [ 0.000373]	52.2616 [ 9.94e-06]	96.7129 [ 1.43e-13]
<b>DLag 2</b>	36.26816 [ 0.002655]	40.51738 [ 0.000654]	60.19528 [ 4.85e-07]
<b>DLag 3</b>	40.81446 [ 0.000591]	34.81495 [ 0.004213]***	41.94566 [ 0.000402]
<b>DLag 4</b>	36.34242 [ 0.002593]	22.03183 [ 0.142167]	48.2563 [ 4.33e-05]
<b>DLag 5</b>	33.19392 [ 0.006965]	23.44045 [ 0.162458]	45.18381 [ 0.000130]
<b>DLag 6</b>	29.25837 [ 0.022251]**	29.40552 [ 0.131341]	42.60111 [ 0.000321]

<i>DLag 7</i>	21.0331 [ 0.177242]	46.78279 [ 1.110008]	47.82155 [ 5.07e-05]
<i>DLag 8</i>	23.17767 [ 0.109067]	41.69323 [ 0.100038]	51.87728 [ 1.15e-05]***
<i>df</i>	16	16	16

Numbers in [ ] are p-values

Johansen's test of cointegration is performed using Lag 6, lag 3 and lag 8 for model 1, model 2 and model 3, respectively and the result is reported in table 4. The result shows that the trace statistics and maximum eigen-values provide evidence that the null hypothesis of no cointegrating vector in model 2 cannot be rejected at 5% significance level. This implies that long run relationship does not exist. However, with reference to the Johansen's cointegration test result for model 1 and model 3, the trace statistics and maximum eigen-values suggest that the null hypothesis cannot be rejected at 5% significance level, suggesting that the equity market variables have long run relationship with economic growth. However, we focus on model 1 for ease of analysis and parsimony.

Table 4: Johansen Cointegration Tests for Equity Market Models

	Ho: rank=r	Eigenvalue	Maximum Eigen values	Critical Value (5%)	Trace Statistics	Critical Value (5%)
<i>model 1</i>	r=0	0.58599	47.62109*	32.11832	98.9656*	63.87610
	r<=1	0.37001	24.95115	25.82321	51.34451*	42.91525
	r<=2	0.31994	20.82108*	19.38704	26.39336*	25.87211
	r<=3	0.09805	5.57229	12.51798	5.57229	12.51798
<i>model 2</i>	r=0	0.321398	21.71231	32.11832	57.5925	63.8761
	r<=1	0.256623	16.60692	25.82321	35.88019	42.91525
	r<=2	0.174686	10.7515	19.38704	19.27328	25.87211
	r<=3	0.141162	8.521778	12.51798	8.521778	12.51798
<i>model 3</i>	r=0	0.70931	64.24588*	27.58434	102.6784*	47.85613
	r<=1	0.367979	23.85927*	21.13162	38.43252*	29.79707
	r<=2	0.210539	12.29308	14.2646	14.57324	15.49471
	r<=3	0.042902	2.280162	3.841466	2.280162	3.841466

\* denotes rejection of the hypothesis at the 0.05 level

The error correction model (ecm) for model 1 and model 3 is obtained from the normalized cointegrating vector which is given below:

$$\text{Model 1: } ecm1 = lngdp + 0.243436 * lnmcap + 0.368287 * ln m2 + 0.121348 * lngexp + 6.875242$$

Having established long run equation for the growth models, we therefore estimate the short run dynamics in a VECM environment with the view to capturing the speed of adjustment to equilibrium whenever the model receives shock. This is important because short run and long run are governed by different mechanism and such dynamics has significant policy implications. Thus, the parsimonious results of the over-parameterized specifications for model 1 are shown in table 5. These results are obtained by discarding variables that are statistically insignificant while ensuring that the information criteria are minimized.

Table 5: Parameter Estimates of the Parsimonious Vector Error Correction models

Variables	Coefficient	P-Value
<i>ecm1(-1)</i>	-0.461428	0.0000
$\Delta \ln gdp(-4)$	0.330748	0.0062
$\Delta \ln mcap(-1)$	0.131765	0.0593
$\Delta \ln mcap(-4)$	-0.254705	0.0003
$\Delta \ln mcap(-6)$	0.165355	0.0158
$\Delta \ln m2(-3)$	-0.643282	0.0001
$\Delta \ln m2(-4)$	-0.341333	0.0533
$\Delta \ln m2(-5)$	-0.448026	0.0071
$\Delta \ln m2(-6)$	-0.492443	0.0076
$\Delta \ln gexp(-2)$	0.077978	0.0909
$\Delta \ln gexp(-3)$	0.110051	0.0585
$\Delta \ln gexp(-4)$	0.243126	0.0002
$\Delta \ln gexp(-5)$	0.1393	0.0041
Constant	0.134884	0.0000
<i>dummy</i>	-0.038895	0.2068
<i>Adjusted R-squared</i>	0.475558	
<i>S.E. of regression</i>	0.065914	
<i>Log likelihood</i>	79.011430	
<i>F-statistic</i>	4.432842	
<i>Prob(F-statistic)</i>	0.000114	
<i>Durbin-Watson stat</i>	1.744436	
<i>Schwarz criterion</i>	-1.818298	

*The result of model 1* shows that the long run relationship between GDP and equity market capitalization is statistically significant at 1%. This is evidenced from the very small p-value of one period lag of the ECM1. The negative value of the error correction term implies that the growth model converges in the long run whenever there is distortion in the equilibrium. The value of the error correction coefficient suggests that about 46% of disequilibrium is corrected in the long run. The first and sixth quarter lags conform to a-priori expectation of positive relationship between economic growth and market capitalization, as confirmed by Yartey (2008). Thus, the responsiveness of economic growth due to 1% change in the first and sixth lags of market capitalization is 0.13% and 0.17% increase at 10 and 5 per cent, respectively; implying that equity market in Nigeria is relatively inelastic.

Considering other short-run parameter estimates in the same model 1, economic growth in a particular quarter is determined by its fourth lag, the third to sixth lags of broad money supply and second to fifth lags of government expenditure. The responsiveness of economic growth to changes in lag three of broad money supply is elastic, but inelastic to lag four, lag five and lag six of broad money supply. The inverse relationship between economic growth and money supply is a deviation from the a-priori expectation, which could be attributed to structural rigidity in the economy. On the other hand, economic growth has positive relationship with the lagged values of government expenditure. The responsiveness of economic growth to government expenditure is inelastic. The results of model 1 further reveals that, though the 2008/2009 financial crisis has a weakening tendencies to economic growth, but the impact was not statistically significant. This is could be due to relatively low level of exposure of the economy to the international financial markets.

#### Diagnostic Checks of Model 1

The adjusted R-squared is relatively high and suggests reasonable level of model adequacy. Also, the F-Statistic of 4.43 and the corresponding p-value of 0.0001 shows that the overall model is significant at 1%. cumulative

sum (CUSUM) and cumulative sum of square (CUSUMQ) of the recursive residuals of Brown *et al* (1975). The stability test will show evidence of parameter instability when the residual of the estimated parsimonious model falls outside the two critical lines. The results of cumulative sum (CUSUM) and cumulative sum of squares (CUSUMQ) are shown in figures 1a and 1b below. The recursive residual plot of the model lies within the 5% critical lines, providing evidence that model 1 does not have parameter instability over the sample period. Furthermore, in Table 6, the null hypotheses of no serial correlation and no ARCH effect on the residuals of model 1 cannot be rejected at 5% significant level. Also, considering the Jarque-Bera statistic and the corresponding p-value, highly greater than 0.05, we have strong evidence that the null hypothesis cannot be rejected and we infer that the residuals of the model follow a normal distribution.

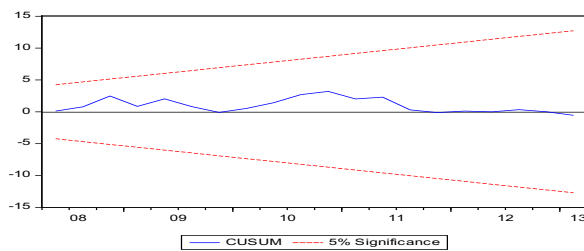


Fig. 1a: CUSUM of recursive residual in Model 1

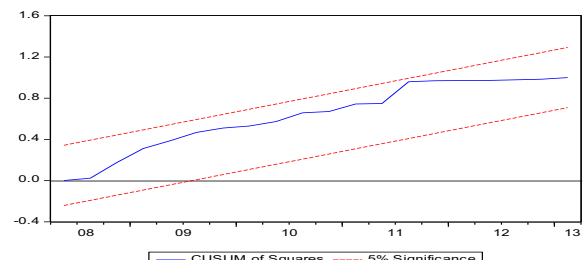


Fig. 1b: CUSUMQ of recursive residual in Model 1

Table 6: Residual Diagnostic of the Parsimonious Model 1

Test	Null Hypothesis	Jarque-Bera Stat	Obs-R-squared	P-Value*
Breusch-Godfrey Serial Correlation LM Test	No Serial Correlation on the Residuals		10.9066	0.0913
Heteroskedasticity Test: ARCH	No ARCH effects on the Residuals		9.64348	0.1405
Histogram-Normality Test	Residual Series is normally distributed	0.1710		0.9181

\*Null Hypothesis is cannot be rejected when P-value is greater than 5%.

## 5. Policy Implications of Research Findings and Conclusion

This paper examines the directional causality between equity market performance indicators and economic growth in Nigeria using the VEC Granger Causality/Block Exogeneity Wald test. The result established a uni-directional relationship running from equity market capitalization and turnover ratio of equities to economic growth, while bi-directional relationship was established between the number of securities traded on the floor of the Nigeria Stock Exchange and economic growth. Inductively, policy initiatives of the capital market regulators geared toward improving the equity market performance indicators would have direct impact on economic growth.

The Johansen and Juselius (1990) multivariate cointegration results established the existence of long-run relationship between each of equity market capitalization and turnover ratio of equities alongside economic growth, broad money supply and government expenditure with a dummy capturing effect of financial crises. On the other hand, the cointegration results fail to establish long-run relationship between the number of securities traded on the floor of the Nigeria Stock Exchange and economic growth alongside the control variables.

The parsimonious VECM for economic growth and equity market capitalization reveals that equity market performance indicator coefficients conforms with the a-priori expectation of positive relationship, which is

supported by the theoretical postulation that large stock market, measured by market capitalization tends to reduce the associated cost of fund mobilization and thereby enhancing investment in the productive sectors for economic growth. Similar result was obtained by Mohtadi and Agarwal (2001). Thus, market capitalization should be considered by stock market regulators as a veritable policy instrument for enhancing economic growth in Nigeria. Broad money supply and government expenditure were found to have negative and positive impact on economic growth, respectively. This negative impact of money supply on economic growth reflects the presence of structural rigidity in the economy as effort made to lubricate the economy through monetary expansion will fuel inflation which impact on the economy negatively. With this result, by and large, great caution should be exercised by the monetary authority with its monetary policy stance as an expansionary stance could be inimical to economic growth. Rather, fiscal policy tailored towards real sector and infrastructure development should be pursued.

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