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Time Series Analysis of Stock Market Indicators and their Relative Impacts on Market Capitalization in Nigeria (1985-2019)

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Abstract: Stock market variables are better understood when their behavior are examined over time through trend analysis and this understanding facilitates investment decision that is hinged on sound information. Thus, this study analysed stock market capitalization, all-share index, number of deals and value of transactions in the Nigerian Stock Exchange and their relative impacts on market capitalization using annual time series data obtained from Central Bank of Nigeria's statistical bulletin from 1985 to 2019. Econometric techniques applied in the data analysis include correlation test, Fully Modified Ordinary Least Squares, Dynamic Ordinary Least Squares, Canonical Cointegrating Regression, Bai-Perron multiple breakpoint tests, and Granger causality techniques. Findings indicate that all the variables have positive and significant correlation with market capitalisation and are also cointegrated. Moreover, except number of deals which has negative significant influence; all-share index and value of transactions have positive significant impacts on market capital capitalization in Nigeria. Furthermore, there is a unidirectional causality from number of deals to market capitalization as well as bi-directional causality between stock index and market capitalization. The study also identifies five structural breaks in the models in years 1993, 1998, 2003, 2008 and 2014. It can therefore be concluded that there is significant positive correlation and relationship among stock market indicators in Nigeria. It is recommended that high value of capital market transactions be encouraged by the government through various policies like tax incentives on high value capital market transactions, capital market transactions loans.

Keywords: All-share index, value of shares, number of deals, market capitalization, Nigerian Stock exchange.

1. Introduction

The capital market is a financial market where medium to long term funds are exchanged by the deficit and surplus economic units. In other words, (Babarinde *et al*., 2020), capital market has been described as a financial market for trading long term loanable funds in the form of securities such

as shares, stocks, loan stock, bonds and derivative securities. The stock exchange is an important sector in any economy due to its primary function of raising capital through sale of stocks for the efficient operation of various companies (Madueme, 2011). The market is important in that is serves as a driver of the growth of any economy (Ganguly, 2020; Babarinde *et al*, 2020). Activities in the capital market are gauged by market indicators such as its market capitalization, volume of transactions, value of transactions, stock index, number of new companies listed, value of government securities, total listed companies, volume of shares traded etc. These indicators are time series in nature are not static but dynamic over time. For the resources in the market to be fully tapped by the investment community particularly, the investors, a proper description and understanding of the statistical behavior of these variables is necessary. Thus, it is necessary to carry out a study on fluctuations in stock market in understanding its behavior. Empirically, there have several studies on capital market with focus on different as aspects of the market like macroeconomic determinant studies (Omodero,2020;), firm level determinant studies (), statistical analysis of market variables (Dhungana, 2010; Achia *et al.*,2013; Priya & Arabinda, 2019), forecasting of stock indices (Uzuke, *et al*. 2016; Varghese *et al*, 2016; Eke, 2019). However, there appears to be very few studies that interface capital market variables with its performance indicator such as market capitalization as well as a trend analysis of these variables in developing country in Nigeria. Although, an attempt was made by Madueme (2011) to study the trends of stock index, volume, deals and market capitalization in the Nigerian Stock exchange and the relative impacts of these variables on market capitalization using daily time series. This current study extends Madueme's work from 2011 to 2019 in terms of duration, methodological techniques. In addition, while the said work applied econometric techniques like unit root, correlation test, multiple regression and graphic tools, in this current study, other econometric techniques are applied to properly characterize and describe the market variables. They include Bai-Parron multiple break point test, variance decomposition and impulse response analysis, among others. Furthermore, in this study, three Cointegrating regression techniques of the Fully Modified ordinary least squares, Canonical cointegratig regression and Dynamic ordinary least squares were also applied in determining the relative impacts of number of deals, value of transactions and all-share index on market capitalization in the NSE.

Therefore, the general aim of this study is to carried out a time series analysis of capital market indicators in Nigeria. The however, the study has two specific objectives, which are to identify the trend in the movement of stock index, number of deals, value of transactions and market

capitalization in the Nigerian Stock exchange from 1985 to 2019; and to assess the impacts of stock index, number of deals, and value of transactions on market capitalization in the Nigerian Stock exchange from 1985 to 2019

This study is organized as follows. In addition to this introduction, conceptual, theoretical and empirical literature are reviewed in section two. Methodology of the study is described in section and in section four various data analysis results are presented and discussed. Finally, the study's conclusion and recommendations are documented in section five.

2. Literature Review

Stock market is an organized financial market where brokers and traders buy and sell stocks, bonds and securities and thus facilitates capital expansion by companies via selling shares, channelizing savings, and increasing companies' profits (Bhargava *et al.*, 2016). Stock markets provide avenue for raising capital which are employed in the real sector for trade and investment and by implication, the market encourages business growth and ultimately economic growth. The Nigerian Stock Exchange (NSE) started in 1960 as Lagos Stock Exchange and the market has primary and secondary sub-sections where newly issued securities and already existing securities are traded respectively. A stock market is a public market for the trading of company stock (Varghese *et al.*, 2016) by providing a connection between purchasers and dealers of securities to come into exchange (Omodero, 2020). Stock market is considered as mirror of the nation's economy because it reflects the economic condition of the nation (Dhungana, 2010).

Capital market variables such as market capitalisation simply refers total market values of all securities listed on the capital market. It is a product of prices and number of securities listed on the Exchange. Market capitalization is a measure of the size of the market. Both value and volume of capital market transactions are indicators of market liquidity. The stock index (All-share index) is a measure of the overall direction of the market.

Theoretically, some theories have been propounded for the analysis and understanding of the behavior of the capital market. Prominent among these theories are the technical analysis theory, fundamental analysis theory, efficient market hypothesis, Capital Asset Pricing Model, Arbitrage Pricing Theory. This study examines these theories in turn.

Fundamental analysis theory emphasis the fundamentals of the firms as determinant of its securities prices. Hence, the true or real value of financial asset is the present value of the future cash flows of the firms at an appropriate discount rate. Dhungana (2010) observes that fundamental analysis is concerned with the estimation of the basic determinants of security values, such as future sales, expenses and earning for firms.

According to the author, the analysis aims to appraise the intrinsic value of a security and basically the actual price of security is determined by an appropriate interest rate of the future stream of income.

Technical analysis theory is a market oriented theory which entails the study of market price in an attempt to predict the future price movement using past market(Dhungana, 2010). According to the author, the analysts consider that the share price is fixed by supply and demand and such that every price sensitive factors automatically reflect in the share price, and only analysis of price movement is required

The efficient market hypothesis states that in an efficient market, security prices fully reflect available information in an efficient market such that one can beat the market because price of a moment does not affect the price of another moment (Dhungana (2010). A market could be weak form, semi strong form and strong form efficient. In Weak form Efficiency, the stock price reflects all past information while in Semi strong form Efficiency, all publicly available information plus records of past prices are impounded in the current prices of stock and the Strong form Efficiency reflected all relevant information that are publicly and also privately including market insider information (Dhungana, 2010). According to this hypothesis prices get affected by the demand and supply position. Prices reflect equilibrium position of the demand and supply (Dhungana, 2010).The Efficient market hypothesis stresses on the use of efficient information for investment decisions. It stresses the fact that the relative strength of investment decisions which influence stock prices are dependent on past information and the rationality of investors (Madueme, 2011).

Capital asset pricing model is an equilibrium model of the securities returns which is linked to beta risk. The model explains and calculates the rate of return of a company's asset in order to influence investment behavior, which includes the rate of return expected from such assets (Madueme, 2011). Arbitrage Pricing Theory (APT) tries to establish the prices and returns of stocks using various macro-economic variables. Some of these variables include inflation, exchange rate, production index, unemployment rate, interest rates, government expenditure. Instead of a single index of risk as in CAPM, APT disintegrates the various risks into different components.

Empirically, Madueme (2011) investigated the trend and impact of stock index, deals, value and volume on market capitalization in the Nigerian Stock exchange. The study shows that the variables are not stable over the study period while number of deals and stock index had more impact on market capitalization than other indices examined. Furthermore, the study shows that stock index impacted significantly on value and volume of shares, volume of shares and deals over the study period.

In another study, Achia *et al* (2013) carried out a time series analysis of the Nairobi Stock Exchange 20-Share index from January 1998 to March 2007 and also tests whether the efficient market hypothesis (EMH) hold in the case of the NSE 20 share index. The results indicate the EMH is not satisfied as both the ARIMA(1,1,1) and the GARCH(1,1) models are fit to the data in Nairobi. Moreover, Uzuke *et al* (2016) analyzed the NSE All Share Index between the period of January 1985 to September 2014 via the Box and Jenkins approach. The study indicates that ARIMA (2, 1, 0) is adequate to define the optimal order of the index and the is non-random

Furthermore, Priya and Arabinda (2019) conducted a statistical analysis of the stock prices of three construction companies namely DLF Ltd (DLF), Gammon India Ltd. (Gammon) and Hindustan Construction Company (HCC) in terms of their performances in the capital market of Bombay Stock Exchange (BSE). The results showed that stock of DLF is best performer followed by HCC and Gammon.

Dhungana (2010) applied technical analysis in Nepalese stock market using tools like moving average and bar diagrams. The author argues that most of the theories and assumptions of technical analysis matches with the Nepal's stock market. It was also argued that though mostly, fundamental factors influence the share price in Nepalese stock exchange but one cannot also ignore the past price and traded volume of the company.

Eke (2019) carried out time series analysis of monthly stock marketreturns in the Nigeria via ARIMAmodeling approach between January, 2008 to September, 2018. The study also confirmed ARIMA (2, 0, 3) model to be the best fit for the data and forecasted period showed a market with an unstable monthly stock market returns.

In summary, the empirical review has exposed the empirical lacuna in the area of trend analysis of stock market indicators despite the statistical analysis and forecasting of market indices in previous studies. Madueme (2011)'s study on the subject did not consider issue of structural breaks in the variables and few econometric techniques were applied to the daily time series data within the study period (1998-2009). In this current study, in addition to structural break analysis conducted, three cointegrating regression techniques (FMOLS, DOLS and CCR) were applied in the analysis of the impact of the selected stock market variables on market capitalization in Nigeria as against the Ordinary Least Squares (OLS) applied by Madueme (2011).

3. Methodology

This study extends the work of Madueme (2011) on the analysis of stock index, deals, value and volume on market capitalization in the Nigerian

Stock exchange. Secondary data in the form of annual time series data were collected from Central Bank of Nigeria (2019)'s statistical bulletin covering the period 1985 to 2019. The variables of study are number of deals (NOD), value of transactions (VATR), market capitalization (MCAP) and all-share index (ASI) in the Nigerian Stock Exchange.

The data are presented in tables and graphs and batteries of econometric techniques like descriptive statistical test, line graph, Augmented Dickey-Fuller (ADF) unit root test, variance inflation factor test of multicollinearity, Johansen cointegration rank test, cointegration regression techniques (FMOLS, DOLS, and CCR), Bai-Perron multiple breakpoint test, correlation test, Granger causality technique, variance decomposition analysis and impulse response analysis were applied in analyzing the data. The line graph and tabular descriptive statistics presents the statistical behaviour and trend of the variables and the correlation analysis was conducted to determine the relationship between MCAP, NOD, VATR and ASI while the Johansen cointegration test was conducted to determine the long-run relationship among the variables. The three regression techniques were applied to model the long-run impact of VATR, NOD and ASI on MCAP. The pairwise Granger causality test was conducted to determine the direction of causality among the variables. The impulse response analysis was conducted on the variables to determine the response of the variables to shocks/innovations in itself and other variables. The variance decomposition technique was also applied to measure of contribution of each variable to variation in itself and other variables.

Basically, the general regression model relating the capital market indicators, number of stock market deals, value of stock transactions and all-share index to market capitalization is specified in equation (1).

$$LMCAP_t = \beta_0 + \beta_1 LNOD_t + \beta_2 LVATR_t + \beta_3 LASI_t + U_t \tag{1}$$

Furthermore, the Granger causality equations for the study are specified in equations (2) to (6) thus:

$$LMCAP_t = \Sigma_{t=1}^{n} LNOD_{t-i} + \Sigma_{t=1}^{n} LVATR_{t-j} + \Sigma_{t=1}^{n} LASI_{t-k} + U_{1t} \tag{2}$$

$$LNOD_t = \Sigma_{t=1}^{n} LMCAP_{t-i} + \Sigma_{t=1}^{n} LVATR_{t-j} + \Sigma_{t=1}^{n} LASI_{t-k} + U_{2t} \tag{3}$$

$$LVATR_t = \Sigma_{t=1}^{n} LMCAP_{t-i} + \Sigma_{t=1}^{n} LNOD_{t-j} + \Sigma_{t=1}^{n} LASI_{t-k} + U_{3t} \tag{4}$$

$$LASI_t = \Sigma_{t=1}^{n} LMCAP_{t-i} + \Sigma_{t=1}^{n} LNOD_{t-j} + \Sigma_{t=1}^{n} LVATR_{t-k} + U_{4t} \tag{5}$$

The error terms (U_{1t}, U_{2t}, U_{3t} and U_{4t}) are assumed to be uncorrelated.

Where: MCAP=market capitalization (MCAP); ASI refers to all share index; NOD= number of deals in the Nigerian Stock Exchange; and VATR= value of transactions at the Nigerian Stock Exchange. t = 1985 to 2019.

4. Empirical Analysis

4.1. Descriptive Statistics

The description of the variables is provided in Table 1. A comparison of the mean value with the standard deviation values show all the variables except stock index (ASI) to exhibit wide dispersion from their average. All the variables are positively skewed indicating a long right tale distribution. With kurtosis less than 3, market capitalization (MCAP) and ASI are platykurtic as against number of deals (NOD) and value of transactions (VATR) which are leptokurtic, since their kurtosis exceed 3. The Jarque-Bera reveals that MCAP and ASI are normally distributed unlike NOD and VATR whose p-values are far below the ideal critical values to confirm normality of the variables.

**Table 1: Descriptive Statistics**

	MCAP	NOD	VATR	ASI
Mean	6221.907	780093.8	419450.1	198834.6
Median	764.9000	426163.0	59406.70	139582.4
Maximum	25890.22	3535631.	2350876.	605096.4
Minimum	6.600000	20525.00	225.4000	1407.400
Std. Dev.	8083.427	961255.6	589968.0	183755.7
Skewness	0.976828	1.395502	1.483380	0.541584
Kurtosis	2.527315	4.187139	4.690067	2.147733
Jarque-Bera	5.891963	13.41521	17.00123	2.770266
Probability	0.052550	0.001222	0.000203	0.250290
Observations	35	35	35	35

Source: Author's estimation using Eviews version 10.

4.2. Trend Analysis of Stock Market Indicators in Nigeria (1985-2019)

The trend analysis of the stock market indices in Nigeria (1985-2019) is carried out using the line graphs in Figures 1 to 4 below.

The trend analysis of stock index (All-share index) in Nigeria in Figure 1 suggests a rising trend of stock index in Nigeria beginning from the 90's uptill the peak around 2008. However, the index began to nose-dive from the 2008 and continue in a zig-zag movement but never fall flat as in the 80's and early 90's.

ASI
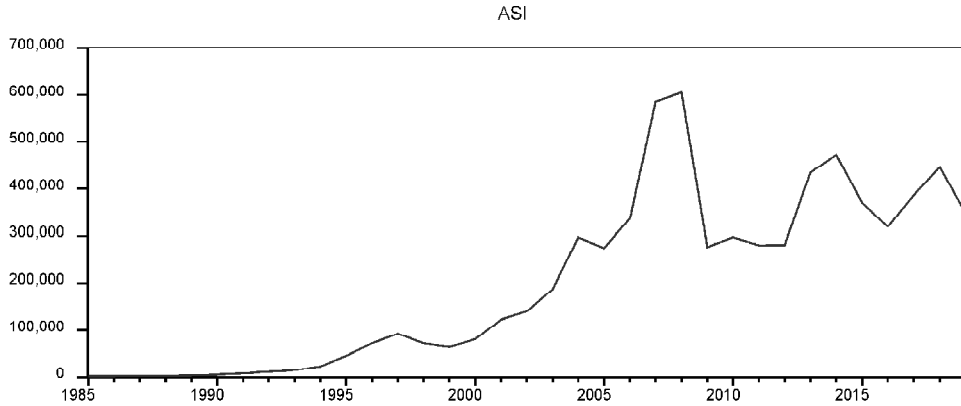
Figure 1: Trend Analysis of Stock Index (All-share index) in Nigeria (1985-2019)

Source: Author's estimation using Eviews version 10.

A look at the trend analysis of market capitalization in the Nigerian Stock Exchange in Figure 2 indicates almost horizontally close to the origin movement in the capitalization from 1985 through 2000. From the 2000 the capitalization began a very sharp increase and this is sustained through even uptill 2019. This suggests an expansion in the value of listed securities in the NSE from year 2000 and upwards.
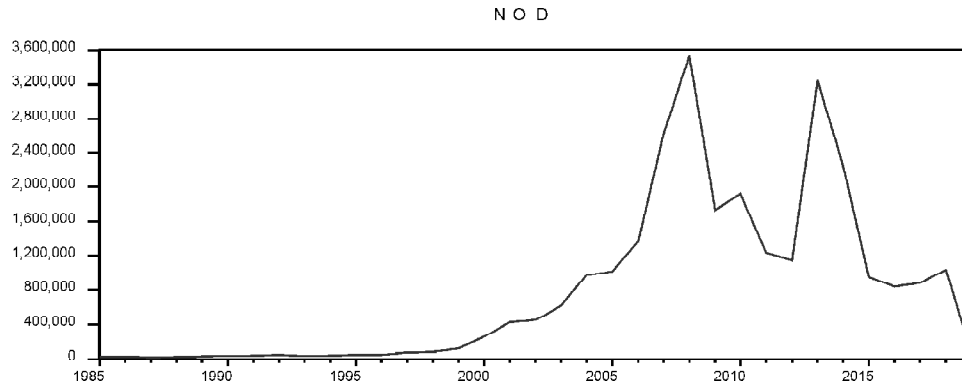
M C A P
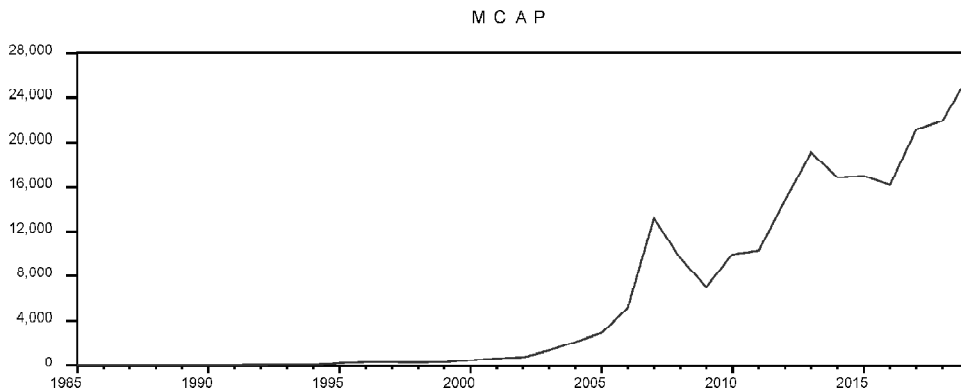
Figure 2: Trend Analysis of Stock Market Capitalisation in Nigeria (1985-2019)

Source: Author's estimation using Eviews version 10.

Furthermore, Figure 3 contains the trend analysis of number of deals in the Nigerian Stock Exchange (1985-2019). The number of deals(NOD) is on horizontal trend from 1985 up till the beginning of 1995. Thereafter, the number of deals experienced a steady increase up to a peak around 2007 and 2008. A fall in NOD was witnessed after 2008 up till 2012. There was a
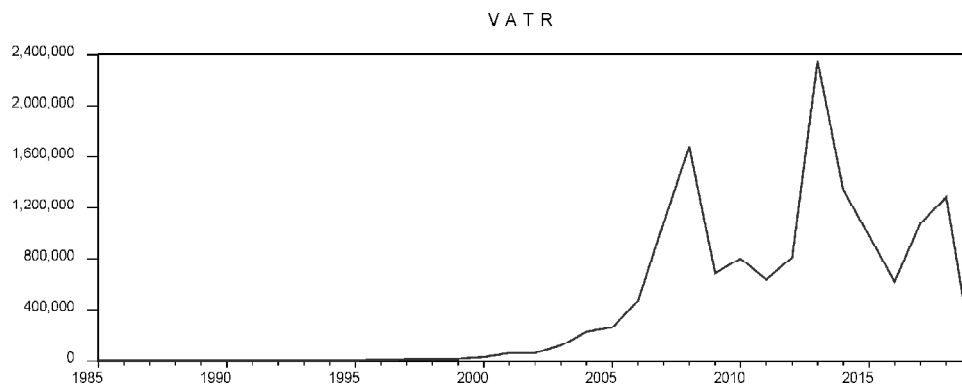
N O D

Figure 3: Trend Analysis of Stock Market Indices in Nigeria (1985-2019)

Source: Author's estimation using Eviews version 10.

subsequent rise in NOD in 2013 but still fell back up till 2015 and continued in a horizontal-like movement from the post-2015 years.

Moreover, the trend analysis of value of stock market transactions in Nigeria (1985-2019) is depicted in Fig. 4. Like other market indicators, value of transactions in the Nigerian capital market was very low before year 2000, as revealed by the origin based horizontal line of the trend of the market indicator (VATR) from 1985 to 2000. However, from 2000, a mild rise in the value of transactions in the Nigerian capital market was experienced. This followed by a zig-zag movement in the indicators to reach the zenith in the study period around 2013.

From the trend analysis of the four market indicators examined in this study (MCAP, NOD, VATR and ASI), it is clear that there was a relatively low level of capital market activities in the pre-2000 years. Post-2000 as

V A T R

Figure 4: Trend Analysis of Value of Stock Market Transactions in Nigeria (1985-2019)

Source: Author's estimation using Eviews version 10.

suggested by the trends, could be stylized as period of more capital market activities and movement in indicators of the market in the forms of deals, index, value of transactions and market capitalization in the Nigerian capital market between 1985 and 2019. Although, not extremely volatile, but the market indicators are not relatively stable over the period of investigation.

4.3. Multicollinearity Test

This study evaluates the independent variables to ensure that the degree of collinearity among the variables are not such that will impair the result of the study when combined in a model. Thus, Variance Inflation Factors (VIF) test is carried out and reported in Table 2. None of the variables has a Variance Inflation Factors value of above 10, therefore, they could be considered not having multicollinearity problem.

Table 2: Variance Inflation Factors

Variable	Variance Inflation Factors (VIF)
NOD	6.6218
VATR	5.9757
ASI	4.4156

Source: Author's estimation using Eviews version 10.

4.4. Correlation Analysis

This analysis is carried out to determine the nature (direction and strength) of relationship between market capitalization (MCAP) and each of number of deals (NOD), Value of transactions (VATR) and stock index (ASI). A coefficient of more 50% is regarded as strongly correlated while the sign determines the direction of relationship; positive coefficient signifies proportional/direct relationship while negative coefficient denotes inverse/indirect relationship. The level of significance measured by the probability value of the coefficient buttresses the nature of relationship, such that a p-value of less than 1%, 5% and 10% suggests a statistically significant relationship at the respective levels of significance. The result of the correlation analysis as presented in Table 3 show a strong, positive and

Table 3: Correlation Coefficients

Correlation	MCAP	NOD	VATR	ASI
Coefficient	1.0000	0.5511	0.7450	0.8032
p-value	——-	0.0006	0.0000	0.0000
Strength		Strong	Strong	Strong
Direction		Positive	Positive	Positive
Statistically Significant?		Yes	Yes	Yes

Source: Author's estimation using Eviews version 10.

statistically significant relationship correlation between each of number of deals (NOD), Value of transactions (VATR) and stock index (ASI); and stock market capitalization (MCAP) in Nigeria between 1985 and 2019.

4.5. Stationarity Analysis

Non-stationary variables when estimated in a time series regression model tend to produce nonsensical results due to the fact that the outputs are time-variate or time-dependent. To avoid this, this study examines the unit root properties pf the variables of study using the Augmented Dickey-Fuller (ADF) unit root test. The result of the test as presented in Table 4 show none of the variables to be stationary in level due to the fact the p-value of the test fail to reject the null hypothesis of presence of unit root in each of the variables.

A non-stationary variable when differenced could eliminate the unit root element in the variables, thus the variables after first difference became stationary. The p-value of the test at first difference led to the rejection of hypothesis of unit root in all the variables at 1% level of significance. It can therefore be said that all the variables of study are I(1) series, that is, MCAP, NOD, VATR and ASI are integrated of order 1.

Table 4: Augmented Dickey-Fuller (ADF) Unit Root Test

A. ADF Test at Level				
Variables	*MCAP*	*NOD*	*VATR*	*ASI*
t-test value	1.0130	-2.0762	-2.4414	-1.4592
p-value	0.9958	0.2550	0.1385	0.5417
Decision	Not Stationary	Not Stationary	Not Stationary	Not Stationary
B. ADF Test at First Difference				
Variables	*MCAP*	*NOD*	*VATR*	*ASI*
t-test value	-5.7023	-5.9312	-6.2786	-6.1319
p-value	0.0000*	0.0000*	0.0000*	0.0000*
Decision	Stationary	Stationary	Stationary	Stationary
I(d)	I(1)	I(1)	I(1)	I(1)

Source: Author's estimation using Eviews version 10.

Note: * and ** rejection of unit root at 1% and 5% respectively because the p-value<1% and 5% respectively.

4.6. Cointegration Analysis

Do the capital market indicators co-move in the long run? To answer this question, the Johansen unrestricted cointegration rank test was conducted and results reported in Table 5. The Trace test result in Panel A indicates 3 cointegrating equations at the 0.05 level while the Max-eigenvalue test in Panel B indicates 1 cointegrating equation at the 0.05 level. Both tests reveal

the existence of a long-run relationship among stock index, deals, values and market capitalization in the Nigerian Stock Exchange in the period of investigation.

Table 5: Johansen Unrestricted Cointegration Rank Test

A. Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.
None *	0.804793	89.89911	47.85613	0.0000
At most 1 *	0.407137	35.98715	29.79707	0.0085
At most 2 *	0.370102	18.73500	15.49471	0.0157
At most 3	0.100152	3.482460	3.841466	0.0620

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

B. Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.804793	53.91195	27.58434	0.0000
At most 1	0.407137	17.25216	21.13162	0.1604
At most 2 *	0.370102	15.25254	14.26460	0.0348
At most 3	0.100152	3.482460	3.841466	0.0620

Max-eigenvalue test indicates 1 cointegrating equation at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Author's estimation using Eviews version 10.

4.7. Estimation of Models

In this paper, long-run and model of the impact of number of deals, value of transactions, stock index on market capitalization in the Nigerian Stock Exchange are examined and results presented in Tables 6.

Tables 6: Cointegration Regression Results

Variables	FMOLS		DOLS		CCR	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
NOD	-0.010581	0.0000*	-0.007622	0.0000*	-0.010756	0.0000*
VATR	0.013708	0.0000*	0.015818	0.0000*	0.013822	0.0000*
ASI	0.047788	0.0000*	0.027183	0.0000*	0.048203	0.0000*
C	-588.3647	0.4561	-223.7349	0.4008	-559.0318	0.4705
R-squared(R^2)	0.872614		0.993475		0.872202	
Adjusted R^2	0.859875		0.989354		0.859422	

Source: Author's estimation using Eviews version 10.
Note: J-B= Jargue-Berra test of normality; BG= Breusch-Godfrey Serial Correlation LM Test; ARCH = ARCH Heteroscedasticity Test; RESET: Ramsey RESET Test; *significant at 1%;

The long-run model estimations via FMOLS, DOLS and CCR regression technique was adopted in this study. The long-run estimates of the FMOLS model are presented in Table 6 show stock index (ASI) to have positive and significant long-run effect on market capitalization in the Nigerian Stock Exchange. Likewise, in the long-run, value of transactions in the Nigerian Stock Exchange is positively signed and significantly impactful on market capitalization in the Nigerian Stock Exchange. These findings established a direct impact of stock index and value of capital market transaction in the promotion of market size (market capitalization) in the Nigerian Stock Exchange in the long-run. Contra-wise, the number of deals (NOD) to be negatively signed and significantly influential on market capitalization in Nigeria in the long-run. This suggests that number of capital market deals deter capital market capitalization in Nigeria in the long-run.

Comparatively, in the long-run, stock index has the most significant influence on market capitalization. The second in the hierarchy of influence is the value of a capital market transactions. Number of deals has the least influence among the three capital market indicators, on market capitalization in the Nigerian Stock Exchange.

4.8. Granger Causality Analysis

In addition to the analysis of the influence of number of deals, value of transactions and stock index on market capitalization in the Nigerian Stock Exchange, this study also investigates the pairwise wise causality analysis of the direction of influence among all the capital market indicators examined in this study.

The pairwise Granger causality tests results in Table 7 show a unidirectional causality flowing from number of deals in the Nigerian Stock Exchange to market capitalization in the market in the study period. Likewise, there is a causality running from stock index to value of transactions in the Nigerian Stock Exchange but not vice versa. Moreover, there is a complete feedback effect between stock index and market capitalization in the Nigerian Stock Exchange, such an increase in the stock index will granger-cause a corresponding increase in market capitalization in the Nigerian Stock Exchange in the study period.

Finally, via causality analysis, this study found no causality between each of the following pairs, stock index and market capitalization in the Nigerian Stock Exchange; number of deals and value of transactions in the Nigerian Stock Exchange; and stock index and number of deals in the Nigerian Stock Exchange.

Table 7: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.	Remarks
NOD does not Granger Cause MCAP	34	2.91019	0.0980***	Unidirectional causality
MCAP does not Granger Cause NOD		0.06788	0.7962	No causality
VATR does not Granger Cause MCAP	34	8.19836	0.0075*	Bi-directional causality
MCAP does not Granger Cause VATR		5.23686	0.0291**	Bi-directional causality
ASI does not Granger Cause MCAP	34	0.56344	0.4585	No causality
MCAP does not Granger Cause ASI		0.76438	0.3887	No causality
VATR does not Granger Cause NOD	34	1.89290	0.1787	No causality
NOD does not Granger Cause VATR		1.46432	0.2354	No causality
ASI does not Granger Cause NOD	34	1.13362	0.2952	No causality
NOD does not Granger Cause ASI		1.39005	0.2474	No causality
ASI does not Granger Cause VATR	34	4.34779	0.0454**	Unidirectional causality
VATR does not Granger Cause ASI		1.19232	0.2833	No causality

Source: Author's estimation using Eviews version 10.
Note: *, ** and *** rejection of the hypothesis at 1%, 5% and 10% respectively.

4.9. Structural breakpoint Analysis

A time series of long duration may be susceptible to the influence of structural changes in the country due to events in the economy, political arena, international scene, socio-cultural phenomenon and other. Therefore, model of the long-run effect of number of deals, value of transactions, all-share index and market capitalization in the Nigerian Stock Exchange are examined for any element of structural breaks using the Bai-Perron Multiple breakpoint test. The results of the test as shown in Table 8 indicate five breakpoints in the variables with the associated dates of 1993, 1998, 2003, 2008 and 2014. Spectacular among the dates is year 2008 which marks the year of the financial crisis and stock market crash. This year did not spell fortune for the capital market globally and most devastatingly in developing counties such as Nigeria.

4.10. Impulse Response Analysis

This study also examined the response of each variable to the shocks/innovations in itself and other variables of study using the impulse response functions(IRFs) or innovation accounting via the Cholesky one standard deviation innovation test approach. Figure 6 line 1 shows market capitalsiation to react positively to shocks in itself but negatively to shocks in other market indicators in the Nigerian Stock Exchange (VATR, NOD, ASI).

The IRFs of number of deals in the Nigerian Stock Exchange (NOD) reveals the positive response of the variable to shocks in itself, market

Table 8: Bai-Perron Multiple Breakpoint Tests

Bai-Perron tests of 1 to M globally determined breaks
Breaking variables: NOD VATR ASIT C
Break test options: Trimming 0.15, Max. breaks 5, Sig. level 0.05
Allow heterogeneous error distributions across breaks

Sequential F-statistic determined breaks:			5	
Significant F-statistic largest breaks:			5	
UDmax determined breaks:			5	
WDmax determined breaks:			5	

Breaks	F-statistic	Scaled F-statistic	Weighted F-statistic	Critical Value	
1 *	22.85011	91.40046	91.40046	16.19	
2 *	70.05760	280.2304	329.4793	13.77	
3 *	57.60560	230.4224	306.5357	12.17	
4 *	38.37867	153.5147	230.3431	10.79	
5 *	89.06545	356.2618	634.5301	9.09	
UDMax statistic*		356.2618	UDMax critical value**		16.37
WDMax statistic*		634.5301	WDMax critical value**		17.83

* Significant at the 0.05 level.

** Bai-Perron (Econometric Journal, 2003) critical values.

Estimated break dates:
1: 2007
2: 2008, 2014
3: 2003, 2008, 2014
4: 1997, 2003, 2008, 2014
5: 1993, 1998, 2003, 2008, 2014

Source: Author's estimation using Eviews version 10.

capitalization and value of capital market transactions in Nigeria. However, any shocks to stock index tell negatively on the number of deals in the Nigerian Stock Exchange in the study period.

Moreover, the IRFs of value of transactions in the Nigerian Stock Exchange (VATR) indicates the variable to respond positively to shocks in itself up till the third period. However, from the fourth period upward till the tenth period, the variable response to shocks in itself is negative. Shocks to market capitalization and number of deals in the Nigerian Stock Exchange are negatively reacted to by market capitalization in the Nigerian Stock Exchange. Contrary, VATR reacts negatively to any shocks to stock index in the Nigerian Stock Exchange.

Finally, stock index reacts positively to shocks in itself and other market indicators (NOD, MCAP and VATR) in the study period.
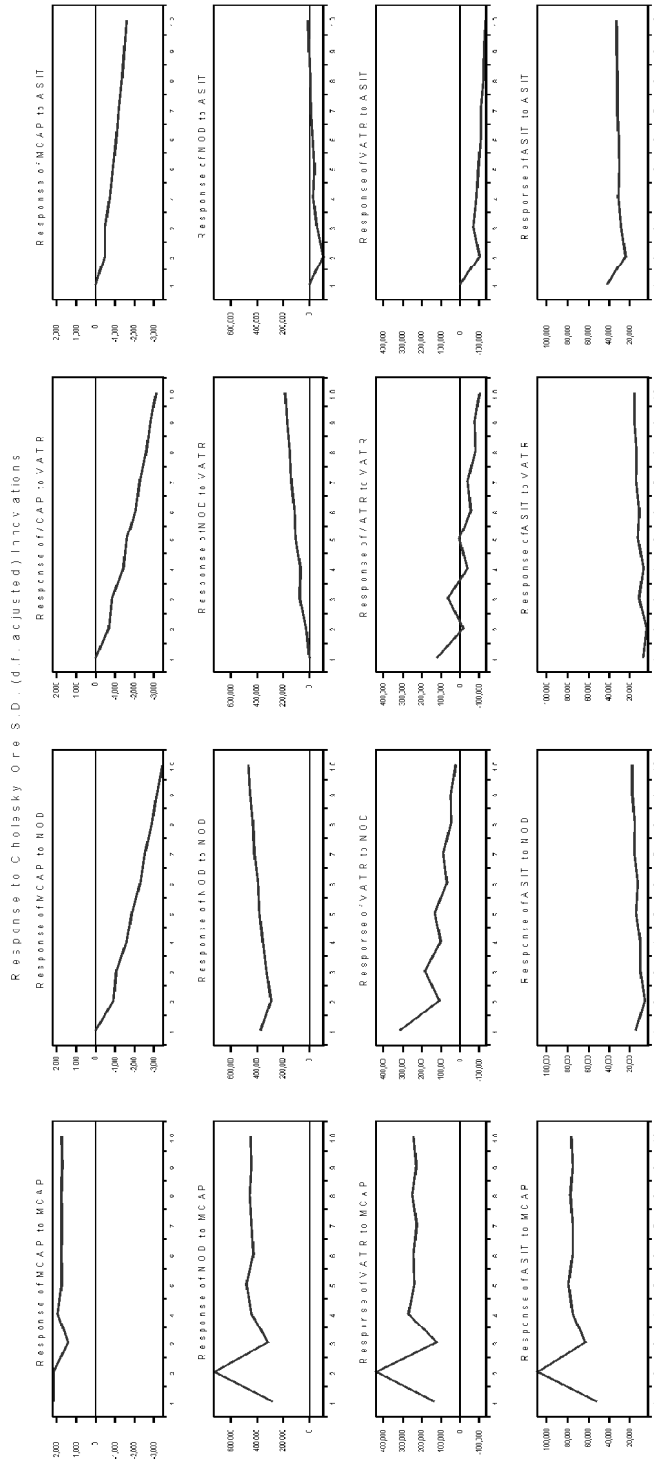
Figure 5: Impulse Response Functions of Market Capitalisation, Number of Deals, Stock Index and Value of transaction in the Nigerian Stock Exchange (1985–2019).

Source: Author's estimation using Eviews version 10.

4.11. Variance Decomposition Analysis

Presented in this sub-section are results of the variance decomposition analysis for market capitalization, number of deals, value of transactions and all-share index in Nigeria

4.11.1. Variance Decomposition Analysis of Market Capitalisation in the Nigerian Stock Exchange

The Variance decomposition analysis of market capitalisation in the Nigerian Stock Exchange (MCAP) presented in Table 9 shows number of deals (NOD), value of transactions (VATR) and stock index in the Nigerian Stock Exchange (ASI) to positively account for variation in Market Capitalisation in the Nigerian Stock Exchange (MCAP). As such, in the ninth period, 28% variation in MCAP is accounted for by changes in itself. Similarly, variation in NOD, VATR and ASI imparts roughly 36%, 28% and 8% respectively in the changes in Market Capitalisation in the Nigerian Stock Exchange (MCAP).

Table 9: Variance Decomposition of Market Capitalisation in the Nigerian Stock Exchange

Period	S.E.	MCAP	NOD	VATR	ASI
1	2169.284	100.0000	0.000000	0.000000	0.000000
2	3315.203	85.63962	7.823036	4.384961	2.152381
3	3876.804	75.65844	13.09487	8.055241	3.191453
4	4892.572	63.30315	18.97182	13.49818	4.226851
5	5813.968	53.81008	23.61313	17.19088	5.385913
6	6890.494	44.78936	27.95376	21.07211	6.184762
7	7968.234	38.22768	31.04317	23.85684	6.872310
8	9151.140	32.72083	33.63226	26.25909	7.387814
9	10332.49	28.39772	35.64591	28.13831	7.818064
10	11576.75	24.88827	37.26534	29.70647	8.139920

Source: Author's estimation using Eviews version 10.

4.11.2 Variance Decomposition Analysis of Number of Deals in the Nigerian Stock Exchange

The variance decomposition analysis of number of deals in the Nigerian Stock Exchange (NOD) in Table 10 also shows the positive response of the variables to changes in itself and other variables (MCAP, ASI, and VATR). In the ninth period, for instance, about 39%, 57%, 3% and 1% of the variation in NOD is accounted for by itself, MCAP, VATR and ASI respectively.

Table 10: Variance Decomposition of Number of Deals in the Nigerian Stock Exchange (NOD)

Period	S.E.	MCAP	NOD	VATR	ASI
1	467910.4	35.87528	64.12472	0.000000	0.000000
2	916033.8	71.77621	26.80966	0.086346	1.327794
3	1026345.	66.60885	31.45033	0.580662	1.360158
4	1174657.	64.90137	33.23219	0.762484	1.103958
5	1330167.	63.63405	34.17192	1.246526	0.947507
6	1455577.	61.81155	35.70597	1.661854	0.820627
7	1584572.	59.92821	37.19435	2.179132	0.698312
8	1710659.	58.48261	38.26481	2.650956	0.601623
9	1831644.	56.80794	39.47666	3.190577	0.524829
10	1950865.	55.35576	40.48976	3.689998	0.464480

Source: Author's estimation using Eviews version 10.

4.11.3. Variance Decomposition Analysis of Value of Transactions in the Nigerian Stock Exchange

Furthermore, the variance decomposition analysis of value of transactions in the Nigerian Stock Exchange (VATR) is presented in Table 11. According to the table (11), each of the capital market indicators as well the variable itself contributes positively to the variation in the value of transactions in the Nigerian Stock Exchange (VATR). In the ninth period, VATR imparts about 4% changes to itself while MCAP, NOD and ASI imparts approximately 65%, 21% and 9% respectively to variation in the value of transactions in the Nigerian Stock Exchange.

Table 11: Variance Decomposition of Value of Transactions in the Nigerian Stock Exchange (VATR)

Period	S.E.	MCAP	NOD	VATR	ASI
1	364297.7	13.94405	74.77500	11.28095	0.000000
2	588338.7	60.56518	32.11591	4.390167	2.928744
3	635819.0	55.71742	35.85345	4.799350	3.629788
4	704360.4	60.14382	31.30720	4.193873	4.355104
5	761191.9	61.30590	29.84981	3.599206	5.245079
6	810859.5	62.97468	27.07105	3.640643	6.313637
7	854027.3	63.78775	25.48163	3.487462	7.243156
8	902774.1	64.78865	23.07317	3.879546	8.258639
9	943404.3	65.15955	21.41191	4.166130	9.262411
10	988523.7	65.37063	19.55323	4.854681	10.22147

Source: Author's estimation using Eviews version 10.

4.11.4. *Variance Decomposition Analysis of Stock Index in the Nigerian Stock Exchange (ASI)*

The variance decomposition analysis of the stock index in the Nigerian Stock Exchange (ASI) presented in Table 12 indicates the positive connections among the variables such that ASI explains about 14% variation in itself while the over variables, MCAP, NOD and VATR accounts for about 82%, 2% and 2% respectively in the variation in All-share index in Nigeria.

Table 12: Variance Decomposition of Stock Index in the Nigerian Stock Exchange (ASI)

Period	S.E.	MCAP	NOD	VATR	ASI
1	68509.09	57.48910	4.404060	1.089077	37.01776
2	130965.2	84.79128	1.378340	0.360546	13.46983
3	148980.3	83.47819	1.525404	0.871012	14.12540
4	170076.1	83.45946	1.506505	0.827772	14.20626
5	191038.5	83.44680	1.723925	1.074215	13.75506
6	208251.7	83.28016	1.788364	1.171336	13.76014
7	224640.1	82.71250	2.032932	1.385393	13.86917
8	240633.4	82.45811	2.173222	1.517516	13.85115
9	255358.2	81.93815	2.394968	1.720171	13.94671
10	269652.5	81.53236	2.574524	1.877163	14.01595

Source: Author's estimation using Eviews version 10.

In summary, the variance decomposition analyses above reveal that the variation in each market indicator examined (MCAP, VATR, NOD and ASI) are positively accounted by changes in the said variable as well as other variables.

5. Conclusions

This study conducts a trend analysis of four capital market variables (stock index (ASI), market capitalization (MCAP), number of deals (NOD) and value of traded shares (VATR)) in Nigeria as well the relative effects on market capitalization between 1985 to 2019. In analyzing the data, the study applied batteries of econometric techniques like descriptive statistical test, line graph, Augmented Dickey-Fuller (ADF) unit root test, Variance Inflation Factor test of multicollinearity, Johansen unrestricted cointegration rank test, three cointegration regression techniques (FMOLS, DOLS, and CCR), Bai-Perron Multiple breakpoint tests, correlation test, Granger causality technique, Variance Decomposition Analysis and Impulse Response Analysis.

Empirical findings from the descriptive analysis reveal that except for stock index which is not widely dispersed from its average value over the study period, all other variables (MCAP, VATR and NOD) exhibit wide dispersion from their mean. MCAP and ASI are normally distributed as against the non-normality of NOD and VATR as series. From the trend analysis, it is clear that there was a relatively low level of capital market activities in the pre-2000 years. Post-2000 as suggested by the trends, could be stylized as period of more capital market activities and movement in indicators of the market in the forms of deals, index, value of transactions and market capitalization in the Nigeria. In terms of correlation, all the variables are positive and significant correlation with MCAP. The stationarity test indicates none of the four market indicators is stationary at level but until after first difference. However, cointegration analysis uncover a long run equilibrium relationship among stock index, deals, values and market capitalization in the Nigerian Stock Exchange in the study period. Moreover, the regression analysis reveals the positive significant relationship between market capital capitalization and each of stock index (ASI) and value of capital market transaction. However, the number of deals (NOD) has negative significant influence on market capitalization in Nigeria. Further evidence from causality analysis uncovers a unidirectional causality flowing from number of deals in the Nigerian Stock Exchange to market capitalization. There is a unidirectional causality running from stock index to value of transactions. However, stock index and market capitalization granger-causes each other.

The Bai-Perron Multiple breakpoint test results indicate five breakpoints in the variables with the associated dates of 1993, 1998, 2003, 2008 and 2014. The impulse response functions(IRFs) shows market capitalsiation to react positively to shocks in itself but negatively to shocks in other market indicators in the Nigerian Stock Exchange (VATR, NOD, ASI). The IRFs of number of deals in the Nigerian Stock Exchange (NOD) reveals the positive response of the variable to shocks in itself, market capitalization and value of capital market transactions in Nigeria. However, any shocks to stock index tell negatively on the number of deals in the Nigerian Stock Exchange in the study period. Moreover, the IRFs of value of transactions in the Nigerian Stock Exchange (VATR) indicate the variable to respond positively to shocks in itself up till the third period. However, from the fourth period upward till the tenth period, the variable response to shocks in itself is negative. Shocks to market capitalization and number of deals in the Nigerian Stock Exchange are negatively reacted to by market capitalization in the Nigerian Stock Exchange. Contrary, VATR reacts negatively to any shocks to stock index in the Nigerian Stock Exchange.Finally, stock index

reacts positively to shocks in itself and other market indicators (NOD, MCAP and VATR) in the study period. The Variance Decomposition Analyses reveal that the variation in each market indicator examined (MCAP, VATR, NOD and ASI) are positively accounted for by changes in the said variable as well as other variables.

It can therefore be concluded that there is significant positive correlation and relationship among stock market indicators in Nigeria. It is suggested that high value of capital market transactions be encouraged by the government through various policies like tax incentives on high value capital market transactions, capital market transactions loans, aimed at stimulating capital market transaction in Nigeria in terms of monetary value and not just in terms of number. Efforts should be made by government, operators of the market to ensure there is increased public awareness on opportunities in the capital market. In that case market psychology that positively influence the stock index, signifying a bullish market trend, should promoted by encouraging high optimism in the economy by increasing public confidence in the capital market. Future studies should consider a high frequency time series data, like daily, weekly, monthly, quarterly basis. Other market indicators uncovered in this study, like value and number of government securities, number of foreign quoted firms, number of new companies listed, total listed companies, should be investigated in future research.

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