



Effects of Selected Macroeconomic Variables on Stock Market Returns in Nigeria

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Authors' contributions

This work was carried out in collaboration among the authors. Author AGA conjointly with author OOA designed the work and carried out the statistical analysis. Author OEO contributed in writing the literature and completing the first draft with author AGA. All authors read and approved the final draft.

Article Information

DOI: 10.9734/AJEBA/2020/v16i330242

Editor(s):

(1) Dr. Fang Xiang, University of International and Business Economics, China.

Reviewers:

(1) Herpreet Kaur, Veer Narmad South Gujarat University, India.

(2) R. Subathra, Government Arts College, Salem, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/59488>

Review Article

Received 22 May 2020
Accepted 29 July 2020
Published 05 August 2020

ABSTRACT

The paper empirically examines the effects of selected macroeconomic variables on stock market returns in Nigeria within the period 1985 and 2014 with a view to determining the macro-factors determining stock market returns in Nigeria. The Autoregressive Distributed Lag (ARDL) approach was employed to examine both the short and long-run effects of selected macroeconomic variables on stock market returns using annual time series data spanning 1985 to 2014. The findings show that both foreign direct investment inflows and external debt do not have significant impact on stock market returns in Nigeria while money supply and trade openness have significant positive effect on stock market returns in the long-run. The annual speed of adjustment towards equilibrium is 91 per cent. The causality results show two-way causality between the nominal stock market returns and foreign direct investment inflows, while one-way causality runs from nominal stock market returns to trade openness.

Keywords: *Macroeconomic variables; stock market returns; autoregressive distributed lag bounds testing approach; Zivot and Andrew unit root test; multivariate causality test.*

JEL Classification: *E44, F23, G12, H24.*

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1. INTRODUCTION

The Capital Market is the least known component of the Nigerian financial system, yet its performance is the best measure to gauge the economy (Gunu and Idris, 2009). The Nigerian Stock Exchange is characterised by few listed companies and low market capitalisation. The ratio of market capitalisation-to-GDP in Nigeria was 9.5% and 12.3% in 2011 and 2012 respectively compared to the average ratio of market capitalisation-to-GDP between 2003 and 2008 which is 22.8%. Despite this poor state of capital market, the external sector performance in the fourth quarter of 2013 remained impressive, evidenced by the larger current account surplus, increased home remittances and robust external reserves. The exchange rate was relatively stable in all segments of the economy while the stock of external debt rose to US\$8.82 billion, but was within sustainable level as Nigeria remained a low risk debt country. The real effective exchange rate (REER) index fell marginally to 72.95 from 73.55 in the preceding quarter indicating an appreciation of the naira in real terms relative to the [1].

A wide range of empirical studies has been carried out in Nigeria on the effect of macroeconomic variables on stock market returns. These studies have examined the implications of some varied key macroeconomic variables on stock market returns. [2] considered the effects of exchange rate, inflation rate, money supply and real output on stock market returns; [3] examined money supply, interest rate, exchange rate, inflation rate, oil price and gross domestic product as determinants of stock market returns; [4] considered inflation rate, exchange rate and market capitalization as key determinants of stock market returns; [5] focused on exchange rate, inflation rate, broad money supply and real per capita income as macroeconomic determinants of stock market returns; [6] also investigated inflation rate, interest rate and money supply as macroeconomic determinants of stock market returns. One unique empirical gap in these Nigerian studies is that the macroeconomic factors considered by these studies do not represent a comprehensive compendium of macroeconomic determinants of stock market returns in Nigeria. As they did not consider external sector factors that have long been recognised as important factors [7]. Thus, to fill this empirical gap, a more encompassing model that incorporates all identifiable critical

macroeconomic determinants of stock market returns is formulated.

Empirical studies on the effects of macroeconomic variables on stock market in Nigeria have generated mixed results. [2] found that the Nigerian Stock Exchange all share index could be significantly influenced by exchange rate, inflation, money supply and real output. While, in the long-run, all macroeconomic variables examined could have significant impact on Nigerian capital market performance. [4] found zero significant effects of macro variables on stock returns in Nigeria while [5] findings showed that variations in exchange rate and inflation rate exert positive effects on stock market performance but interest rate, broad money supply and real per capita income retarded the performance of Nigerian Stock Market. [6] also revealed that changes in inflation rates, interest rates and money supply promote the aggregate stock and exerted a negative long-run relationship between inflation rates, interest rates and All Share Index while a positive significant relationship exists between money supply and aggregate stock prices.

The divergent empirical results and conclusions stem from varied research methodologies adopted and the differences in study areas condition largely the nature macroeconomic variables derived. Besides, the Methodologies adopted in all studies fail to consider the structural breaks that may occur within the period of study. The present study fills this methodological gap by investigating the issue of structural breaks which previous study did not consider.

Furthermore, the direction of causality has posed a lot of controversies amongst researchers [8] Some researchers found uni-directional, bi-directional or no causalities between the stock market returns and macroeconomic variables [6,9-14]. For instance, [6] revealed a unidirectional causality from inflation to aggregates stock price and a two-way causality between money supply and aggregates stock prices; [12] found no causality between trade openness and economic growth and stock market development. [15] in China have shown one-way causality from stock market to macroeconomic variables.

The need to address the relationship between macroeconomic variables and stock market returns is pertinent for some reasons. First, it is

observed that most of the research studies carried out on the relationship between macroeconomic variables and stock market returns paid less attention to the issue of proper identification of structural break as a potential factor that could considerably obstruct the validity of regression estimates. The present study fills this methodological gap by implementing Zivot and Andrews unit root test to identify the structural break points that could largely negatively impact on our findings.

Also, extant literature has not sufficiently examined the short- and long run dynamic effects of macroeconomic variables on stock market returns. It is pertinent to separate the total effects of macroeconomic variables on stock market returns into short run and long to specifically capture the temporal effects of macroeconomic variables on stock market returns. A variable could have divergent effects depending on whether the periods are short or long. In addition, it is pertinent to address the issue of causality among the variables to identify macroeconomic factors that have the potentials to predict stock market returns. By this approach, the policy makers would best be guided regarding the factors that could contribute to efficiency of stock market returns in Nigeria.

Thus we examine the effect of selected macroeconomic variables on the Nigerian stock market returns and also establish the causality among the macroeconomic variables and stock market returns within the study period. To approach these issues, the study is divided into five sections. Besides the introduction, section 2 reviews some pertinent empirical literature. Section 3 presents the methodology and section 4 reports the empirical results while section 5 concludes the paper.

2. LITERATURE REVIEW

Arbitrage pricing theory advanced by Stephen Ross in 1976 as a general theory of asset pricing has assumed a great importance in pricing of assets. The theory has served as an alternative to the Capital Asset Pricing Model (CAPM). As a multi-factor model, it is hinged on investor's assumption that the stochastic properties of returns on capital assets are in line with factor structure. Ross (1976) asserts that expected returns on assets are largely linearly linked with the factor loadings or beta conditional on whether equilibrium prices do not provide arbitrage advantage over static portfolio of assets. The

empirical literatures reviewed are based on the relationship that exists between the stock market returns and the following variables; Foreign Direct Investment, External Debt, Trade Openness, Money Supply and economic growth.

2.1 Foreign Direct Investment and Stock Market Returns

[16] applied panel autoregressive distributed lag model (PARDL) estimation technique to examine the effect of foreign direct investment on stock market development for eight nations for a period of 1980 to 2011. The study found that foreign direct investment has a positive effect on the development of stock market in the long-run and therefore could enhance a sustained economic growth. [17] examined the nexus between foreign direct investment (FDI) and economic growth for 124 countries for the period 1971–2010 using three-Stage Least Squares (3SLS) estimation technique. He found that the main determinants of FDI are labour force, economic freedom and trade openness. Thus, the finding is inconsistent with that of [16].

Applying the Generalized Method of Moment (GMM) estimation technique by [18] in examining the contribution of stock markets to economic growth in selected six SSA countries Africa, results showed that private capital stock market development as measured by market capitalization and stock turnover ratio have significant positive on growth in per capita output.

In the same vein, [19] investigated the impact of foreign direct investment on stock markets. By applying Ordinary Least Square (OLS) method of regression for the period 1988-2009, a positive effect of foreign direct investment on Pakistan stock market was discovered. In contrast, [20] employed the Vector Error Correction Model (VECM) to examine the relationship between foreign direct investment and stock market development in Ghana over the period of 1991 to 2007. The result showed that the inward foreign direct investments demonstrated weak influence on price changes.

2.2 External Debt and Stock Market Returns

In Nigeria, [11] investigated the effect of financial crisis and foreign debt management on economic growth in Nigeria within the period of 1980 to 2010. The econometric method of the Ordinary

Least Square (OLS) was employed. From their results, a positive and significant relationship was found between FDI and Economic growth. In contrast to the empirical findings of [11,21] employed Error Correction Mechanism (ECM) to examine the effect of government expenditure and government debt on the country's value of transactions over the period of 1982 to 2012. Their result revealed that federal government recurrent expenditure, domestic debt and external debt have a significant effect on value of transactions.

Recently, [22] examined macroeconomic variables of external debt in Pakistan from 1976 to 2010 by using the ARDL estimation technique. The selected factors analysed in the study are fiscal deficit, nominal exchange rate and trade openness. From the results, foreign aid is significant and positive to explain the level of external debt while terms of trade shows negative relationship to external debt.

2.3 Trade Openness and Stock Market Returns

[29] examined the effect of trade openness on the pattern of stock price behavior. Results from the model applied in the study forecast that stock returns showed non-zero serial correlation in a closed economy. Surprisingly, when the country opens up the frontier of trade activities, the stock returns displayed a zero serial correlation. It can be concluded that the variation in the results show that once the country opens itself to trade; the growth process becomes self-sustained due to optimal use of imported intermediate resource inputs.

Also, [24] examined the relationship between trade openness and informational efficiency of stock markets in some emerging economies. The fixed effects panel results showed a significant negative relationship between trade openness and stock return. On this basis, they argued that a greater level of trade openness is enhanced with a higher degree of informational efficiency in emerging stock markets. Further analyses revealed no significant association between the extent of financial openness and the degree of informational efficiency.

In addition, [25], applied a cross-sectional panel econometric techniques in their study. They found that trade openness is a factor that promotes economic growth. On the contrary, [26] found limited evidence that trade openness

enhance growth through its impact on financial development in some selected SSA economies using cointegration and causality methodologies.

In Nigeria, [27] explored the impact of globalization and stock exchange on economic growth from 1981 to 2011. The study employed ordinary least square (OLS) regression in their study. Results of their study showed that the Trade Openness, Total Inflow of Capital and Net Flow of Capital had a positive linear relationship with the Total Market Capitalization of the Nigeria Stock Exchange.

2.4 Money Supply and Stock Market Returns

[28] investigated the relationship between money supply and the Standard & Poor's 500 Index in developed countries. Using quarterly data and a two-stage regression estimation technique, a positive relationship between changes in money supply (M2) and stock prices was found. In contrast, [29] employed GARCH, GJR-GARCH, and E-GARCH models to analyse the relationships between changes in the money supplies of Korea and the United States and volatility of the Korean stock market from 1980 to 2013. Results revealed that changes in money supply do not impact the flow of information to the Korean market.

However, in developing countries, [30] investigated the presence of causality between macroeconomic variables and stock returns in Ghana from 1995 to 2010 by applying VECM, Impulse Response and Error Variance Decomposition test as well as Granger causality test. Results from the study revealed that in the short-run, a significant relationship existed between stock returns and money supply. The result of the Granger causality showed that there is a unidirectional causality between stock returns to money supply. Also in Jamaica, [31] used similar model as [30] to analyse the long-run association between stock prices and monetary variables. From their findings, JSE Main Index is negatively influenced by M2. Furthermore, the Granger causality tests result showed that a one-way direction, that is, only M2 is a predictor of stock prices.

Applying different technique than [32,5] employed OLS technique to examine the determinants of stock returns in Nigeria using annual data for the period between 1984 and 2010. They found that money supply is one of

the primary determinants of stock returns in Nigeria.

2.5 Economic Growth and Stock Market Returns

[33] examined a relationship between stock market development, financial market development and economic growth. Results from their study revealed that stock market development promotes economic growth in Belgium, especially in the study period. The findings showed that time-induced variation in the relationship between stock exchange and economic growth can best be explained by Institutional changes.

In the same vein, [34] investigated the role of stock market development on economic growth in some selected Africa countries for the period of 1980 to 2010. Their findings found support in the study by [35] that countries endowed with stock markets have rapid growth potentials than countries without stock markets endowment. Also, countries which have relatively developed stock markets have lower probability to grow faster than small countries with stock markets. Besides, they found that a positive relationship between investment, human capital formation and openness positively influence economic growth, while inflation and government consumption and corruption are negatively linked with economic growth.

To estimate equation (1), variables are transformed into natural-log form in equation (2) as follows:

$$\ln NASI_t = \alpha + \beta_1 \ln FDI_t + \beta_2 \ln EXT_t + \beta_3 \ln TOP_t + \beta_4 \ln M2_t + \beta_5 \ln RGDP_t + \mu_t \quad (2)$$

The α represents the constant; the β_i represents the sensitivity or reaction of the stock returns to each risk factor or variable and μ_t represents the residual term assumed to have a normal distribution.

Unit root tests:

To avoid spurious regression, it is expedient to check the properties of time series data. Hence, this study employs the Augmented Dickey Fuller (ADF) unit root test, Phillip Perron test and Zivot and Andrews unit root test. We obtained optimal lag length using Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC), sequential modified LR test statistic, Final Prediction Error and Hannan-Quinn test.

2.7 Co-integration Analysis

To check the existence of cointegration, the study applies a bounds testing approach to cointegration analysis. Moreover, the ARDL bounds testing approach best accommodates variables of mixed order of integration i.e. stationary and non-stationary, I(0) and I(1) respectively in the same regression. The approach is amenable to small sample size and could better handle endogeneity issues, thereby providing unbiased long-run estimates with valid statistics. The model is of the form:

[36] empirically examined the impact of capital market on Nigerian economic growth from the period of 1990-2010. Employing Johansen co-integration and Granger causality tests, results showed that a long run association exists between capital market and economic growth. Also, the causality test results suggested two-way causation between the GDP and the value of transactions (VLT) and one-way causality from Market capitalisation to the GDP.

In sum, the bulk of empirical papers reviewed focuses on investigating the long run impact of macroeconomic variables on stock market returns. However, no specific study to the best of our knowledge has attempted to separate the total effects of macroeconomic variables on stock market returns into short and long run effects. The present study fills this empirical gap.

2.6 Model Specifications

Following from the discussions in the theoretical framework, the theory postulates the relationship between stock prices and selected macro-economic variables as:

$$NASI_t = (FDI_t, EXT_t, TOP_t, M2_t, RGDP_t) \quad (1)$$

Where NASI is Nigerian Stock Exchange Index; FDI is Foreign Direct Investment; EXT is External debt; TOP is Trade Openness; M_2 is broad money supply; RGDP is the real Gross Domestic Product and t stands for time period of the scope.

$$\Delta \ln NASI_t = a_1 + \sum_{j=1}^p \alpha_j \Delta \ln NASI_{t-j} + \sum_{j=0}^p \beta_j \Delta \ln FDI_{t-j} + \sum_{j=0}^p \delta_j \Delta \ln EXT_{t-j} + \sum_{j=0}^p \theta_j \Delta \ln TOP_{t-j} + \sum_{j=0}^p \pi_j \Delta \ln M2_{t-j} + \sum_{j=0}^p \omega_j \Delta \ln RGDP_{t-j} + \phi_1 \ln NASI_{t-1} + \phi_2 \ln FDI_{t-1} + \phi_3 \ln EXT_{t-1} + \phi_4 \ln TOP_{t-1} + \phi_5 \ln M2_{t-1} + \phi_6 \ln RGDP_{t-1} + \mu_t \dots \dots \dots (3).$$

To test for the existence of long run relationship, F-test is implemented to investigate the hypothesis that:

$$H_0 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = \phi_6 = 0$$

$$H_a = \phi_2 \neq \phi_3 \neq \phi_4 \neq \phi_5 \neq \phi_6 \neq 0$$

If the maintained hypothesis is not supported, this is an evidence of long run relationship among the variables.

Model specification on the effect of macroeconomic variables on stock market returns. The autoregressive distributed lag (ARDL) modelling framework is parameterised to examine the effect of macroeconomic variables on stock market returns. The model is expressed as follows:

$$\Delta \ln NASI_t = a_1 + \sum_{j=1}^p \alpha_j \Delta \ln NASI_{t-j} + \sum_{j=0}^p \beta_j \Delta \ln FDI_{t-j} + \sum_{j=0}^p \delta_j \Delta \ln EXT_{t-j} + \sum_{j=0}^p \theta_j \Delta \ln TOP_{t-j} + \sum_{j=0}^p \pi_j \Delta \ln M2_{t-j} + \sum_{j=0}^p \omega_j \Delta \ln RGDP_{t-j} + \phi_1 \ln NASI_t + \phi_2 \ln FDI_t + \phi_3 \ln EXT_t + \phi_4 \ln TOP_t + \phi_5 \ln M2_t + \phi_6 \ln RGDP_t + \mu_t \dots \dots \dots (4)$$

Where Δ the first difference operator, p is the optimal lag structure which is automatically selected, D is dummy for structural break point and μ_t is error term assumed to be independently and identically distributed. Thus, the effect of the selected macroeconomic variables on the stock returns will be measured by testing the joint significance of the coefficients of the variables.

The a priori expected signs of variable coefficients are as follows: Foreign Direct Investment (FDI) coefficients (ϕ_2) and (β_j) are expected to be positive; External debt (EXT) coefficients (ϕ_3) and (δ_j) are negative; Trade openness (TOP) coefficients (ϕ_4) and (θ_j) are expected to be positive; Money supply (M2)

coefficients (ϕ_5) and (π_j) are a priori positive; Economic growth (RGDP) coefficients (ω_j) and (ϕ_6) are positive.

2.8 The Short and Long Run Causalities between the Selected Macroeconomic Variables and Stock Market Returns

In order to investigate the short and long run causalities between the selected macroeconomic variables and stock market returns, Granger causality test is implemented within ARDL framework to achieve this objective. If there is cointegration among the series, then the Vector Error Correction Model (VECM) can be formulated in this form (model 5):

$$\begin{bmatrix} \Delta \ln NASI_t \\ \Delta \ln FDI_t \\ \Delta \ln EXT_t \\ \Delta TOP_t \\ \Delta \ln M2_t \\ \Delta \ln RGDP_t \end{bmatrix} = \begin{bmatrix} \eta_1 \\ \eta_2 \\ \eta_3 \\ \eta_4 \\ \eta_5 \\ \eta_6 \end{bmatrix} + \sum_{m=1}^p \begin{bmatrix} \alpha_{1m} & \beta_{1m} & \lambda_{1m} & \delta_{1m} & \pi_{1m} & \phi_{1m} \\ \alpha_{2m} & \beta_{2m} & \lambda_{2m} & \delta_{2m} & \pi_{2m} & \phi_{2m} \\ \alpha_{3m} & \beta_{3m} & \lambda_{3m} & \delta_{3m} & \pi_{3m} & \phi_{3m} \\ \alpha_{4m} & \beta_{4m} & \lambda_{4m} & \delta_{4m} & \pi_{4m} & \phi_{4m} \\ \alpha_{5m} & \beta_{5m} & \lambda_{5m} & \delta_{5m} & \pi_{5m} & \phi_{5m} \\ \alpha_{6m} & \beta_{6m} & \lambda_{6m} & \delta_{6m} & \pi_{6m} & \phi_{6m} \end{bmatrix} \begin{bmatrix} \Delta \ln NASI_{t-m} \\ \Delta \ln FDI_{t-m} \\ \Delta \ln EXT_{t-m} \\ \Delta TOP_{t-m} \\ \Delta \ln M2_{t-m} \\ \Delta \ln RGDP_{t-m} \end{bmatrix} + \begin{bmatrix} \varpi_1 \\ \varpi_2 \\ \varpi_3 \\ \varpi_4 \\ \varpi_5 \\ \varpi_6 \end{bmatrix} ECT_{t-1} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \varepsilon_{4,t} \\ \varepsilon_{5,t} \\ \varepsilon_{6,t} \end{bmatrix} \quad (5)$$

Δ represents first difference operator; m is the lag length; t denotes the year ($t=1,2,\dots,T$); ε_{it} is a normally distributed random error term for all the periods with a zero mean and a finite variance. The error-correction terms (ECTs) are derived from the cointegrating equations. The first lagged ECTs represent the long-run dynamics, while differenced variables represent the short-run dynamics of the variables. The short run causal relationship is measured through the joint significance of the parameters of the first differenced variables using F-test or Lagrangian Multiplier test (LM-test), whereas the long run causal relationship is measured through the significance of parameters of the lagged ECTs using t-test.

2.9 Definition and Measurement of Variables

- **Nominal Stock returns:** It is defined as the actual performance of the stock market. Stock returns are measured by the Nigeria All Share Index NASI calculated by multiplying the Market Capitalization of all listed companies by 100 divided by the base Market Capitalization. It is defined as the real performance of the stock market. The real stock return is measured by dividing the NASI by the prevailing consumer price index at the current periods [37].
- **Foreign direct investment:** FDI is defined the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long term capital and short-term capital as shown in Balance of Payments. It is measured as the net inflow of foreign direct investment in current U. S dollars.
- **External debt:** Total external debt is defined as debt owed to non-residents repayable in currency, goods or services. Total external debt is the sum of public, publicly guaranteed, and private non-guaranteed long term debt, use of IMF credit, and short-term debt. Short-term debt includes all debts having an original maturity of one-year or less and interest in arrears on long term debt. It is measured total external debt stock in current U.S dollar.

- **Trade openness:** It is defined as the level of a country's integration to the world economy. It is measured by the sum of exports and imports of goods and services in current local currency [38].
- **Money supply:** It is defined as the size of the banking sector in relation to the economy as a whole. It is measured by money and quasi money as the current local currency.
- **Real GDP:** Defined as the level of economic growth. It is measured as Gross Domestic Product in constant local currency.

2.10 Estimation Techniques

This study employed VECM approach to test the short-run and long run causality between macroeconomic variables and stock market returns. The order of lag selection was based on Akaike Information Criteria (AIC) and Schwartz Bayesian Criteria (SBC).

2.11 Source of Data

This study adopts annual time series data from 1985 to 2014. Foreign direct investment, External debt, Trade openness, Money supply and Real GDP was sourced from World Bank Development Indicator Database (2014). While inflation rate, exchange rate and All Share Index was extracted from [39].

3. EMPIRICAL FINDINGS AND DISCUSSION

3.1 Results of Unit Root Test without Break

From Table 1, based on ADF test (Augmented Dickey and Fuller test), all variables are non-stationary at level but was stationary at first difference making the variables all $I(1)$ variables. Based on Phillip-Peron test [40], all variables except foreign direct investment and external debt are non-stationary at level but are stationary at first difference. By implication, foreign direct investment ($Lfdi$) and external debt ($Lext$) are $I(0)$ variables. The mixed order of integration provides a compelling need to apply ARDL bounds test for cointegration.

Table 1. Unit root test results: Augmented Dickey Fuller and Phillip Perron method

Variables	ADF			PP		
	Level	First Diff	Status	Level	First Diff	Status
LNASI	-2.0769 [0.2548]	-3.7752 [0.0081]*	I(1)	-2.0377 [0.2700]	-3.7752 [0.0081]*	I(1)
LFDI	-2.5506 [0.1146]	-7.9107 [0.0000]*	I(1)	-5.0222 [0.0003]*	-7.8089 [0.0000]*	I(0)
LEXT	Fg;0-2.5129 [0.1232]	-3.7398 [0.0089]*	I(1)	-3.2224 [0.0288]*	-3.6887 [0.0100]*	I(0)
LM2	-1.6763 [0.4305]	-3.5404 [0.0142]*	I(1)	-0.8728 [0.7824]	-3.5899 [0.0126]*	I(1)
TOP	-2.2909 [0.1814]	-6.9855 [0.0000]*	I(1)	-2.1853 [0.2155]	-6.9817 [0.0000]*	I(1)
LRGDP	-0.8529 [0.7879]	-3.2610 [0.0268]*	I(1)	-0.6290 [0.8490]	-3.2610 [0.0268]*	I(1)

*Note: The values in parentheses are the probability values while the values without parentheses are the t-statistical values and ** means significant at 5% Source: Author's computation*

3.2 Results of the Structural Break Test

The Zivot and Andrew unit root test transforms Perron's unit root test that is based upon an exogenously determined break date into an unconditional unit root instead of treating the break date as fixed. They proposed a test where a single break date is estimated. The test allows for a single break in

the intercept and the trend (slope) of the series [41].

The result in Table 2 indicates that, at level, only real stock market returns (Lrnasi) and money supply (Lm2) has a unit root with a structural break but, after first difference, the variables become stationary. While all other variables (Lnasi, Lfdi, Lext, Top and Lrgdp) are stationary with a structural break.

Table 2. Zivot-Andrews structural break unit root test

Variables	Level		1 st Difference	
	P-values	Time break	P-values	Time break
LNASI	0.000603	2009	0.029219	2008
LFDI	0.029007	2008	0.052063	2002
LEXT	0.000003	2006	0.000001	2006
LM2	0.286904	1993	0.002676	1991
TOP	0.006868	2009	0.012746	2009
LRGDP	0.001201	2002	0.001168	2002

Source: Author's Computation

3.3 Lag Order Selection

Table 3. VAR Lag order selection criteria for all the variables in the model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-58.6742	NA	4.85e-06	4.790683	5.078647	4.876310
1	100.0362	235.1265	5.88e-10	-4.298975	-2.283229	-3.699588
2	135.6247	36.90659	9.50e-10	-4.268494	-0.524965	-3.155346
3	228.5744*	55.08133*	6.46e-11*	-8.486993*	-3.015682*	-6.860086*

Note: * indicates lag order selected by the selection criteria. LR, FPE, AIC, SIC and HQ indicate sequential modified LR test statistic, Final Prediction Error, Akaike Information Criterion, Schwarz Information Criterion and Hannan-Quinn respectively, Source: Author's Computation

*The various lag selection criteria chose lag three as the optimal lag length

3.4 ARDL Bounds Test Result

The ARDL bounds test was applied to test for long-run relationship among the variables. The results of the ARDL bounds testing approach is shown in Table 4.

The result in Table 4 shows that there exists a long-run relationship among the stock market returns and macro-variables in the model. The F-statistic of 31.08 is larger than the upper critical bounds of 3.79 at 5 per cent level.

Table 4. Bounds testing results

Model	F-Statistics	
F_{LNASI} (LNASI, LFDI, LEXT, LM2, TOP, LRGDP)	31.08	
Critical Values	I(0)	I(1)
1%	4.68	3.41
5%	3.79	2.62
10%	3.35	2.26

Source: Author's Computation

Table 5. Long and short run effects of macro-economic variables on stock market returns

Dependent Variable: Nominal Stock Market Returns (LNASI)		
	Coefficient	Prob.
Short-run Estimates		
ΔLNASI(-1)	0.7448**	0.036
ΔLFDI	-0.4335**	0.013
ΔLEXT	0.3102*	0.064
ΔLM2	-3.4883**	0.010
ΔTOP	-2.3540**	0.019
ΔLRGDP	-4.4374*	0.096
Long-run Estimates		
Constant	39.8558**	0.037
LFDI	1.3289	0.068
LEXT	-0.0665	0.700
LM2	2.5170**	0.015
TOP	6.0126**	0.015
LRDGP	-2.6783*	0.056
ECT(-1)	-0.9045**	0.016
R-squared	0.9998	
Adjusted R-squared	0.9983	
F-stat	[673.4528]	0.000

Source: Author's Computation Note: ** Statistical significant at 5% level

Table 6. Diagnostic test statistics of the variables

Test	Nominal Stock Returns (Model LNASI)
χ^2 Normal	2.2394 [0.3264]
χ^2 Serial	0.0153 [0.9015]
χ^2 ARCH	0.2172 [0.6412]
RESET	5.8658 [0.1364]

Source: Author's Computation

3.5 Autoregressive Distributed Lag (ARDL) Model

The ARDL model result is presented in Table 5.

Table 5 shows the result of the effect of selected macroeconomic variables on Nominal stock market returns in Nigeria. The coefficient of foreign direct investment (Lfdi) is negative and insignificant at 5 per cent in the long run. This is consistent with the position of [42] on the Nigerian stock market. The result does not support the work of [43] that FDI promotes institutional and regulatory reforms which encourage greater confidence in the domestic capital market that stimulate the variety of investors and trading volume.

Also, the coefficient of External debt (Lext) is negative and statistically insignificant at 5 per

cent significance level. This finding aligns with that of [21] who showed that external debt does not significantly impact stock returns in the long run.

In addition, money supply (Lm2) has a significant positive effect on the level of stock market returns in the long-run. This suggests that a one per cent increase in money supply leads to 2.52 per cent increase in the level of stock market returns. The result on money supply contravenes the a priori expectations that there is a negative relationship between money supply and stock market returns. In practice, the increase in money supply can cause a corporate earning effect on future cash flows and stock prices thereby increasing the level of stock market returns. Also, these results are similar to that of [44] who showed that money supply exert significant impact on stock market returns in Nigeria.

Similarly, the coefficient of Trade openness (Top) is positive and significant in the long run. This suggests that a unit increase in trade openness will lead to 6.01 per cent increase in the stock market returns in Nigeria. This finding is consistent with the work of [45] that globalisation through trade openness positively impacts the Nigerian stock market. In contrast, economic growth (Lrgdp) has an insignificant negative effect on stock market returns in the long-run. This finding is in line with the work of [35] that there is a weak evidence of growth-led finance using market size as indicator of stock market development.

The Error Correction Term (ECT) indicates the speed of adjustment from short run equilibrium to the long run equilibrium state [46]. The coefficient of the error correction term or the speed of adjustment towards equilibrium is - 0.905%, meaning that it is adjusting at a pace of 90.50% annually towards long run equilibrium. The coefficient of the error correction term (ECT) is statistically significant at 5 per cent.

In the short-run, the coefficient of foreign direct investment (Lfdi) of 0.43 is negative and significant. This implies a one per cent increase in foreign direct investment induces 0.43 per cent decrease in stock market returns. This finding does not conform to the a priori expectation of positive relationship. One possible explanation is that Brownfield FDI rather Greenfield FDI largely dominates the investment climate in Nigeria. This result negates the findings of [22] who reported that there is a positive relation between the stock market and foreign direct investment. The coefficient of external debt (Lext) is positive and insignificant corroborating the finding [21] who reported an insignificant impact of external debt on stock market returns. One possible explanation for this is that the Nigerian government does not channel the external debts resources to infrastructural development capable of spurring capital market activities.

With respect to the effect of money supply on stock market returns, the result shows that money supply has a negative and significant effect on stock market returns in the short run. The result indicates a one per cent increase in money supply will lead to a 3.49 per cent decrease in stock market returns. This finding is in conformity with those of [5] who found out that broad money supply retard the performance of

Nigerian stock market between 1984 and 2010.

Also, in the short-run, the coefficient of trade openness (Top) is negative and statistically significant at 5 per cent level implying that a unit increase in trade openness would lead to 2.35 per cent decrease in stock market returns. A possible reason for this relationship is that, the openness exposed the economy to external shocks which translated to technological inefficiency. This finding aligns with [24] who found a negative relationship between trade openness and stock market returns. In addition, economic growth (LRGDP) has a negative and insignificant effect on stock market returns.

It is observed that the model estimated is well-behaved in terms of goodness of fit suggested by high R^2 and its adjusted value. The value of R^2 shows that stock market returns is 99.98% explained by the model macro-regressors in both the short-run and the long run. The F-statistical value is statistically significant at 5 per cent.

3.6 ARDL Model Diagnostic Tests

The results of the diagnostic test in Table 6 show that all the diagnostic texts of Jarque-Bera test of normality, the Breusch-Pagan test of serial correlation, Lagrange Multiplier test of autocorrelation, the Autoregressive Conditional Heteroskedasticity (ARCH) Test and Ramsey reset test for model misspecification are all valid.

3.7 Test of Model Stability

The stability of the model is tested via Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) tests propounded by [1]. Both the cumulative sum (CUSUM) and cumulative sum of squares (CUSUM sq) curves stay within the two critical bounds indicating model stability.

3.8 Multivariate Time Series Vector Error Correction Model (Vecm) Causality

After exploring the short and long run relationship between the selected macroeconomic variables and stock market returns in Nigeria, we carried out the multivariate causality test based on VECM. The short-run, long-run and joint Granger causality results based on error correction model set out in equation (5) are reported in Table 7. Empirical evidence shows that in the short run,

Table 7. Short-run, long-run and joint causality among all the variables for model LNASI

Dependent Variables	Short run						Long-run	Joint
	Δ LNASI	Δ LFDI	Δ LEXT	Δ TOP	Δ LM2	Δ LRGDP	ECT(-1)	
Δ LNASI	---	2.5603 [0.0109]**	0.7629 [0.3824]	1.2810 [0.2577]	0.0689 [0.7930]	0.3272 [0.5673]	-0.0273 [0.3589]	0.5199 [0.7804]
Δ LFDI	4.0489 [0.0442]**	---	4.1688 [0.0412]**	10.2360 [0.0014]***	0.7062 [0.4007]	1.3547 [0.2444]	-0.2138 [0.0000]***	7.4706 [0.0003]***
Δ LEXT	0.2771 [0.5986]	0.3114 [0.5768]	---	4.0775 [0.0435]**	0.0088 [0.9252]	0.0941 [0.7591]	-0.0320 [0.4827]	1.2998 [0.3022]
Δ TOP	13.4403 [0.0002]***	0.2219 [0.6376]	1.8838 [0.1699]	---	0.1991 [0.6555]	2.3835 [0.1226]	0.0009 [0.9048]	2.7071 [0.0433]**
Δ LM2	0.0653 [0.7984]	0.0078 [0.9298]	0.0683 [0.7938]	0.3528 [0.5525]	---	0.0723 [0.7880]	0.0037 [0.7246]	0.1841 [0.9779]
Δ LRGDP	1.8021 [0.1795]	1.5969 [0.2063]	0.1970 [0.6571]	0.0047 [0.9451]	3.2759 [0.0703]*	---	0.0008 [0.8520]	1.6941 [0.1743]

Notes 1: ***Statistical significant at 1%; ** Statistical significant at 5% level; * Statistical significant at 10% level; Figures in the squared parentheses “[]” represent probabilities values of the Chi-square. Note 2: Lnasi, Lfdi, Lext, Lm2, Top, Lrgdp represent natural logarithm of Nigerian all share index, natural logarithm of foreign direct investment, natural logarithm of external debt, natural logarithm of money supply, trade openness and natural logarithm of real gross domestic product respectively. Source: Author's Computation

there exists a bi-directional causality between the nominal stock market returns (LNASI) and foreign direct investment (LFDI). A uni-directional causality runs from nominal stock market returns to trade openness (TOP). Also, both external debt (LEXT) and trade openness (TOP) Granger-cause foreign direct investment (LFDI). Trade openness Granger-causes external debt (LEXT). Lastly, one-way causality runs from money supply (LM2) to economic growth (LRGDP).

Regarding the long run causality, all the ECTs coefficients – nominal stock market returns equation, external debt equation, trade openness equation, money supply equation and economic growth equation are statistically insignificant. This suggests an absence of long run causality running to nominal stock market returns, external debt, trade openness, money supply and economic growth. However, an exception is registered for the foreign direct investment inflows equation, which is negative and statistically significant. This suggests a presence of long run causality running from nominal stock market returns (LNASI), external debt (LEXT), trade openness (TOP), money supply (LM2) and economic growth (LRGDP) to foreign direct investment (LFDI).

Finally, empirical result shows that F-test statistic is statistically significant in foreign direct investment and trade openness equations. It suggests that strong causality runs from nominal stock market returns, external debt, trade openness, money supply and economic growth to foreign direct investment inflows. Likewise, strong causality runs from nominal stock market returns, foreign direct investment inflows, external debt, money supply and economic growth to trade openness.

4. CONCLUSION AND POLICY RECOMMENDATIONS

The study examined the effect of selected macroeconomic variables on stock market returns in Nigeria using ARDL model on Nigerian data. We find that both foreign direct investment inflows (FDI) and external debt do not influence Nigerian stock market returns, but money supply and trade openness significantly positively affect the level of stock market returns particularly, in the long-run. In addition, despite the fact that FDI does not significantly impact the stock market returns in the long run and its negative impact on stock market returns in the short run, the causality results show that FDI Granger-causes

stock market returns in the short run. Thus, the policy makers are expected to formulate policies to regulate the nature of FDIs flows into the Nigerian economy and ensure they boost the capital market activities and not depress the domestic financial market.

Furthermore, the results suggest the need for the Nigerian policy makers to strategically promote policies that will enhance the growth of money supply that is consistent with the pace of development in the country. A sub-optimal money supply will substantially retard growth. However, policy makers should be wary of the potential danger of unregulated money supply capable of unduly inflating the economy. Also, since trade openness could positively impact on stock market returns, the policy makers should embrace policies that could further open up the economy. Besides, given that foreign direct investment inflows negatively impact on stock market returns, efforts should be made to monitor the nature of the Greenfield foreign direct investment inflows into the economy particularly those that could expose the Nigerian economy to external shocks. In addition, external debt should be curtailed to ensure fiscal sustainability of the economy.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Brown R, Durbin J, Evans J. Techniques for testing the constancy of regression relations over time. *Journal of the Royal Statistical Society, Series B.* 1975;37:149-63.
2. Macias JB, Massa I. The global financial crisis and sub-Saharan Africa. The effects of slowing private capital inflows on growth. ODI Working Paper 304. London: Overseas Development Institute; 2009.
3. Adaramola AO. The impact of macroeconomic indicators on stock prices in Nigeria. *Developing Country Studies.* 2011;1(2):1-14.
4. Izedonmi PF, Abdullahi IB. The effects of macroeconomic factors on the Nigerian stock returns: A sectoral approach. *Global Journal of Management and Business Research.* 2011;11(7).
5. Osisanwo BG, Atanda AA. Determinants of stock market returns in Nigeria: A time

- series analysis. *African Journal of Scientific Research*. 2012;9(1):479-489.
6. Akani WH. Analysis of macroeconomic aggregates on stock prices in Nigeria: An application of Cointegration and Causality Tests 1985-2011. *International Journal of Business and Management Review*. 2013;1(3):56-79.
 7. Priyanka, A., Kumar, M. M. Effect of economic variables of India and USA on themovement of Indian capital market: An empirical study. *International Journal of Engineering and Management Science*. 2012;3(3):379-383.
 8. Aydemir O. Demirhan, Either relation between stock prices and exchange rates: Evidence from Turkey. *International Research Journal of Finance and Economics*. 2009;23:207-215.
 9. Asaolu TO, Ogunmuyiwa MS. Econometric Analysis of the impact of Macroeconomic variables on Stock Market movement in Nigeria. *Asian Journal of Business Management*. 2011;3(1).
 10. Ray S. Testing granger causal relationship between macroeconomic variables and stock price behaviour: Evidence from India. *Advances in Applied Economics and Finance (AAEF)*. 2012; 3(1).
 11. Bamidele TB, Joseph AI. Financial crisis and external debt management in Nigeria. *International Journal of Business and Behavioural Science*. 2013;3(4).
 12. Alajekwu UB, Ezeabasili VN, Nzotta SM. Trade openness, stock market development and economic growth of Nigeria: Empirical evidence. *Research Journal of Finance and Accounting* ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online). 2013;4(3).
 13. Nkechukwu G, Onyeagba J, Okoh J. Macroeconomic variables and stock market prices in Nigeria: A cointegration and vector error correction model tests. *International Journal of Science and Research (IJSR)* ISSN (Online). 2013;44:4(6).
 14. Olulu-Briggs OV, Ogbulu OM. Money supply and asset prices in Nigeria (2008 2013): An Empirical Review. *Research Journal of Finance and Accounting*. 2015;6(10).
 15. Abbas G, Bashir U, Wang S, Zebende GF, Ishfaq M. The return and volatility nexus among stock market and macroeconomic fundamentals in China. *Physica A*; 2019.
 16. Al-Mamun M. The effect of macroeconomic and market specific dynamics on stock market Development in Global Growth Generator. *Asian Economic and Financial Review*. 2013;3(9): 1152-1169.
 17. lamsiraroj S. The foreign direct investment–economic growth nexus. *International Review of Economics and Finance*. 2016;42:116-133.
 18. Anyamele OD. Trends in stock market in Sub-Saharan Africa. *Int. J. Eco. Res*. 2013;46:62–78.
 19. Razael, et al. The role of FDI on stock market development: The case of Pakistan. *Journal of Economics and Behavioural Studies*. 2012;4(1):26-33.
 20. Adam MA, Tweneboah G. Foreign direct investment and stock market development: Ghana's evidence. *International Research Journal of Finance and Economics*. 2008;26:178-185.
 21. Aigheyisi OS, Edore JO. Do government expenditure and debt affect Stock Market development in Nigeria? An empirical investigation. *Research Journal of Finance and Accounting (Online)*. 2014;5(20).
 22. Awan RU, Anju A, Rahim S. An econometric analysis of determinants of external debt in Pakistan. *British Journal of Economics, Management & Trade*. 2015;5(4):382-391.
 23. Basu P, Morey MR. Trade opening and the behavior of emerging stock market prices. *Journal of Economic Integration*. 2005;20(1):68-92.
 24. Lim K, Kim JH. Trade openness and the informational efficiency of emerging stock markets. *Economic Modelling*. 2011;28:2228–2238.
 25. Mbabazi J, Milner C, Morrissey O. Trade openness, trade costs and growth: Why sub-Saharan Africa Performs Poorly. *CREDIT Research paper*, No. 06/08; 2008.
 26. Gries T, Kraft M, Meierrieks D. Linkages between financial deepening, tradeopenness and economic development: Causality evidence from sub-Saharan Africa. *CIE Working Paper* No, 200; 2008.
 27. Nwadike GC, Nwibo SU. Effect of globalization on Nigeria stock exchange and capital market liberation on economic growth (1981 – 2011). *Journal of Business, Economics & Finance*. 2014; 3(3).
 28. Maskay B. Analyzing the Effect of Change in Money Supply on Stock Prices. *The Park Place Economist*. 2017;15:72-79.

29. Choi KH, Yoon SM. The effect of money supply on the volatility of korean stock market. *Modern Economy*. 2015;6:535-543. Available:<http://dx.doi.org/10.4236/me.2015.65052>
30. Issahaku H., Ustarz, Y., Domanban, P. B. Macroeconomic Variables and Stock Market Returns in Ghana: Any Causal Link?; 2013.
31. Raymond, K. Is There a Long-Run Relationship between Stock Prices and Monetary Variables? Evidence from Jamaica. Financial Stability Department, Bank of Jamaica; 2009.
32. Ajie HA, Nenbee SG. An econometric analysis of monetary policy and stock prices in Nigeria: 1986-2008. *International Journal of Economic Development Research and Investment*. 2010; 1(1).
33. Nieuwerburgh SV, Buelens F, Cuyvers L. Stock market development and economic growth in Belgium. *Explorations in Economic History*. 2006;43:13–38.
34. Ngare E, Nyamongo EM, Misati RN. Stock market development and economic growth. *Journal of Economics and Business*. 2014;74:24-39.
35. Akinlo AE, Akinlo OO. Stock market development and economic growth: Evidence from sub-Saharan African Countries. *Journal of Economics and Business*. 2009;61:162-171.
36. Kolapo FT, Adaramola AO. The impact of the Nigerian capital market on economic growth (1990-2010). *International Journal of Developing Societies*. 2012;1(1):11-19.
37. Ikoku AE, Hosseini A. The comparative performance of African stock markets: Nominal, real and U.S dollar returns. *International Journal of Business*. 2008;13(3):252-269.
38. Obaseki P, Ojo MO. Challenges of globalisation for macroeconomic. *Policy and Management in Nigeria CBN. Economic and Financial Review*. 1998;36(4):425.
39. Central Bank of Nigeria (CBN): Statistical Bulletin and National Bureau of Statistics Publication of the year; 2014.
40. Phillips PCB, Perron P. Testing for a Unit root in time series regressions. *Biometrika*. 1988;75: 335-46.
41. Zivot E, Andrews DWK. Further evidence on the great crash, the oil-price shock and the unit root hypothesis. *Journal of Business and Economic Statistics*. 1992;10:251-270.
42. Ibrahim MM. Stock market volatility and macroeconomic performance in the Nigerian Economy (Master's thesis); 2016.
43. Yartey CA. The determinants of Stock Market Development in Emerging Economies: Is South Africa different? IMF Working Paper, 08/38. Washington D.C: International Monetary Fund; 2008.
44. Maku OE, Atanda AA. Determinants of stock market performance in Nigeria: Long Run Analysis. *Journal of Management and Organizational Behaviour*. 2011;1(3).
45. Oluwole FO. Globalization and stock market growth in Nigeria. *European Scientific Journal*. 2014;10(31).
46. Nguyen HD, Pfau WD. The determinants and stability of real money demand in Vietnam. 1999-2009;2010.

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