
RESPONSIVENESS OF STOCK MARKET RETURN TO MACROECONOMIC POLICIES IN NIGERIA: AN EMPIRICAL REVIEW

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Abstract

This study examined the responsiveness of stock market to macroeconomic policies in Nigeria. In a market economy, the role of the stock market is very important. A well-functioning stock market assists the development process in an economy through boosting of savings and allowing for a more efficient allocation of resources. The general purpose of this study is to ascertain the response of stock market to macroeconomic policies. The study adopted a descriptive research design and data were sourced from secondary sources. To empirically ascertain the response of the stock market to macroeconomic policies; the study adopted the vector error correction model (VECM) in analyzing the data. Based on the analysis conducted, the unit root test result showed that there is a long-term relationship between macroeconomic variables and stock market; and the normalized co-integrating relationship showed the presence of more than one co-integrating relationship agreeing with the unrestricted co-integration rank test. Therefore, the results obtained indicate that the Nigerian stock market is responsive to macroeconomic variables. Thus, the study concludes that the stock market is responsive to macroeconomic variables at 5% level of significance. The study therefore recommends that investors in the stock market should monitor the trend of macroeconomic variables in taking investment decisions.

Keywords: *Stock market, Macroeconomic, Investors, Exchange rate, Inflation*

INTRODUCTION

Stock market is affected by many highly interrelated economic, social, political, and these factors interact with each other in a very complicated manner. Therefore, it is generally difficult to identify the effective factors on stock price index. Over the past few decades, the interaction of stock market and macroeconomic variables has been an interesting case study for the relationship between macroeconomic variables and stock market in both developed and developing countries. It is often argued that stock prices are determined by some of macroeconomic variables such as the interest rate, the exchange rate, the inflation rate, and money supply. Anecdotal evidence from the financial press indicates that investors generally believe that monetary policy and macroeconomic events have a large influence on the volatility of the stock price (Gan et al., 2006). This implies that macroeconomic forces can influence investors' investment decision and motivated many

researchers to investigate the relationship between stock price and macroeconomic variables.

In a market economy, the role of the stock market is very important. The good functioning of the stock market is vital in the contemporary economy, in order to achieve an efficient transfer of monetary resources from those who save money toward those who need capital and who succeed to offer it a superior utilization; the capital market can influence significantly the quality of investment decisions. The gathering of temporary capitals that are available in the economy, the reallocation of those that are insufficiently or inefficiently used at a certain moment and even the favoring of some sectoral reorganization, outline the capital market's place in the economy of many countries (Shaw, 2003).

A well-functioning stock market may assist the development process in an economy through two important channels: boosting savings and allowing for a more efficient allocation of resources. Savings are presumed to increase as the stock market provides households with assets that may satisfy their risk preferences and liquidity needs (Taylor, 2007). Over the past few decades (1980-2010), the connection between macroeconomic variables and the movement of stock market prices has been a subject of interest among academics and researchers (Amado, C., & Teräsvirta, T. (2014); Audrino, F., & Bühlmann, P. (2001)). It is often argued that stock prices are determined by some fundamental macroeconomic variables such as interest rate, exchange rate, gross domestic product, inflation, oil prices and money supply.

Statement of the Problem

It is believed that domestic economic fundamentals play determining role in the performance of stock market. Knowledge of stock market sensitivity to macroeconomic behavior of key variables and vice-versa is important in many areas of investments and finance. However, the increase and decrease in stock prices is a consistent phenomenon of economics and a major concern among the investors, corporation, policy makers and researchers as it influences their investment interest. The debate on the validity of stock prices to be adequately predicted by changes in macroeconomic variables is a serious debate which has posed serious concerns to both practitioners and academia worldwide over the years.

The tendency for macroeconomic indicators to affect stock markets is without dispute since finance theory had laid bare the nexus between macroeconomic indicators and stock market indices (Hosseini, Ahmah, & Li, 2011). In Nigeria, although the performance of the NSE All Share Index was affected by macroeconomic variables during the period from January 2000 to December 2019, the mechanism of these relationships has not been studied. Over the last decade sub-Saharan Africa has experienced a paradigm shift of economic development towards private sector approaches for the mobilization of investible funds for economic growth and sustainable development (Osinubi, 2010). Nigeria is an example of a small open economy and arguably has a less sophisticated stock market

as compared to the United States, yet the country engages in international trade with several countries, including the United States and Europe.

The broad objective of this study is to examine the responsiveness of stock market returns to macroeconomic variables in Nigeria. Specifically, the objectives of the study are to;

- i. Investigate the response of stock market returns to inflation rate
- ii. Determine the response of stock market returns to exchange rate
- iii. Examine the response of stock market returns to interest rate

Research Hypotheses

H₀₁: The stock market does not respond significantly to changes in inflation rate

H₀₂: The stock market does not respond significantly to changes in exchange rate

H₀₃: The stock market does not respond significantly to changes in interest rate

CONCEPTUAL LITERATURE REVIEW

Stock market can be defined as an institution where the securities of joint stock companies are traded freely and the prices are determined by the forces of supply and demand. Simply put, it is a place where buyers and sellers come together to exchange their holdings (shares, bonds, derivatives etc.) during business hours. It is the citadel of capital, the temple of values and the axe of which the whole financial structure of the capitalist system turns (Francq, & Zakoian, 2012)

Furthermore, Ilbeigi, Castro-Lacouture, & Joukar, (2017) stated that the stock exchange can also be a mechanism (barometer as some would suggest) which can measure and detect the systems of an impending economic boom or decline long before the predicted prosperity or decline actually occurs. All over the world, stock markets act as important catalyst for economic growth and development. Without a fully developed stock market, a country would not be able to grow its equity funding and move towards more balanced financial structures as the stock exchange is the engine room for fund generation as the market enables publicly traded companies to raise investment capital through the sale of shares to investors.

Stock market reacts in response to various factors ranging from economic, political and socio-cultural behavior of any country. It supports resource allocation and spurs growth through different channels. By reducing transaction costs and liquidity costs, stock markets can positively affect the average productivity of capital. By pooling resources for larger projects which would otherwise have difficulty accessing finance, stock markets can mobilize savings and spur the rate of investment. Through the promotion of acquisition of information about firms, stock markets may promote and improve resource allocation and the average productivity of capital.

In an efficient capital market, stock prices rapidly adjust according to the new information available; therefore, the stock prices reflect all information about the stocks.

This means that an investor cannot use the readily provided information to predict the stock prices movements and make profits by trading shares. In short, an efficient market incorporates new information quickly and completely. We also know that the stock prices reflect expectations of the future performances of corporate profit. As a result, if stock prices reflect these assumptions, then they should be used as indicators of economic activities. So, the dynamic relationship between stock prices and macroeconomic variables can be used to guide a nation's macroeconomic policies (Maysami et al., 2004).

Arbitrage pricing theory

Arbitrage pricing theory is a general theory of asset pricing that has become influential in the pricing of assets. This theory was developed primarily by the economist Stephen Ross in 1976 as an alternative to the CAPM. It is a multi-factor model in which every investor believes that the stochastic properties of returns of capital assets are consistent with factors structure. Ross (1976) argues that if equilibrium prices offer no arbitrage opportunities over static portfolio of assets, then the expected returns on the assets are approximately linearly related to the factor loadings or beta. In other words, the expected returns of a financial asset can be modeled as a linear function of various macroeconomic variables or theoretical market indices, where the sensitivity to change in each factor is represented by a factor-specific beta coefficient. The model-derived rate of return will then be used to price the asset correctly and the asset price should equal the expected end of period price discounted at the rate r , implied by the model. If the price diverges, arbitrage should bring it back into line. APT can be written as;

$$E(r_i) = r_f + \beta_{i1} RP_1 + \beta_{i2} RP_2 + \beta_{i3} RP_3 + \dots + \beta_{in} RP_n \quad (3)$$

Where $E(r_i)$ is the risky asset's expected return; r_f is the risk free rate; β_{in} is the sensitivity of the asset to factor n , also called factor loading; RP_n is the risk premium.

Empirical Review

Aue, Horváth, & Pellatt (2017) evaluated the effect of exchange rate volatility on stock prices in Nigeria over the period 1985 to 2014 with a view to ascertain the extent of currency volatility on stock prices as well as its stability in reducing volatility in Nigeria stock exchange market, using real exchange rate, interest rate, money supply and inflation. The Garch model was employed. His result revealed that real exchange rate and inflation rate has more effect on stock prices, while money supply has a positive effect on stock prices and interest rate has a negative effect. Result from GARCH-X model shows that NSE return volatility is positively influenced by changes in broad money supply and inflation rate. Net foreign asset shows a negative but significant influence in stock returns.

Kumar (2015) empirically examined the determinants of the stock market performance in Nepal using monthly data for the period of mid-August 2000 to mid-July 2014. The impact of major changes in politics and Nepal Rastra Bank's policy on lending against share collateral also was assessed. OLS results revealed that the performance of stock market respond positively to inflation and broad money growth, and negatively to interest rate. Stock market was also found to respond significantly to changes in political environment and the policy of Nepal Rastra Bank. This suggests that, in Nepal, share

investors seem to take equity as a hedge against inflation and consider stock as an alternative financial instrument. Further, availability of liquidity and the low interest rates stimulate the performance of the Nepalese stock market.

Stella (2017) analyzed the impact of macroeconomic indicators on the Nigerian Stock market performance using VAR model and granger causality tests to analyze the long run and short run dynamics of stock price movement and the macroeconomic variables with time series data spanning from 1981 – 2014. The results of Impulse response and Variance Decomposition showed that the response of all Share Index to one standard deviation in inflation, interest rate and real GDP were all fluctuating whereas its response to one standard deviation of exchange rate and Industrial Production Index were relatively stable overtime. The study recommended that the monetary authorities and policy makers should pay attention to changes in monetary aggregates in view of their sensitivity to stock price movements in Nigeria.

Gatsimbazi, Shukla, Mulyungi, and Ochieng (2018) analyzed the effects of exchange rate, GDP growth rate, inflation (CPI) and interest rate (KRR) on stock market performance measured by market capitalization. The study used monthly time series data for a period of 6 years. Engel Granger Cointegration tests were carried out to determine the long run relationship between the variables respectively. The study adopted VAR method in analyzing the effects of the above macroeconomic variables on stock market performance. This involved computing impulse response functions and Variance Decomposition Analysis. The findings indicated that GDP, inflation and exchange rate are negatively significant in affecting stock market performance while interest rate is negatively insignificant. The study recommended that public awareness campaign on the importance of RSE should be carried out, industrialization should be encouraged to avoid high importation, money supply should be regulated to reduce inflation, key repo rate should be lowered to encourage more borrowing for investment.

Jawad and Imran (2018) determined the effect of various macroeconomic variables on stock prices of Pakistan by analyzing the monthly data from May 2000 - August 2016. As all the variables are stationary at first difference thus ideal ARDL approach of bound testing is applied to check the short term and long term cointegration of the macroeconomic variables on stock prices. The findings suggest that stock prices of Karachi Stock Exchange in long term are significantly affected by money supply, exchange rate, and interest rate. In short term all the variables are insignificant except exchange rate which is negatively cointegrated with stock prices. The central bank shall be vigilant while changing the money supply in market because too much increase in money supply could affect investment as well as stock market. The regulator should keep interest rate relatively low to encourage economic activities, improve external economic environment through rule based exchange rate policy and avoid discretionary measures.

Kaan and Michaela (2019) investigated the impact of macroeconomic factors, German government bond yields, sentiment and other leading indicators on the main German stock index, namely the DAX30, for the time period from 1991 to 2018. Using a

dataset on 24 factors and over a timeframe of about 27 years, we found evidence that across most subsamples, the Composite Leading Indicator (OECD), the Institute for Economic Research (ifo) Export Expectations index, the ifo Export Climate index, exports, the Consumer Price Index CPI, as well as 3 y German government bonds yields show delayed impacts on stock returns. We further found that the delayed impact of the constituents of the monetary aggregate M2 on stock returns changed direction between the crisis and post-crisis periods. Overall, the results illustrate that in the crisis period a larger number of factors and economic indicators had significant impacts on the stock returns compared to the pre- and post-crisis periods. This implies that in the post-crisis period a macro-driven market prevails.

Kyung-Chun (2017) investigated the simultaneous effect of macroeconomic developments on stock and foreign exchange (FX) market returns in a system that is characterized by dynamic interaction among asset returns. Using US and UK data, we find that US stock market returns are significantly responsive to domestic macroeconomic developments in output growth, interest rates and unemployment rate. US stock market returns are also responsive to UK surprises in money growth and inflation and the surprises in FX markets such as the ones in interest rates and trade balance. It was also discovered that the dollar/pound exchange rate is asymmetrically responsive to the money growth surprises in US and UK and in the FX market as well.

Azeez and Olanrewaju (2020) empirically examined the impact of macroeconomic variables (exchange rate, gross domestic product, inflation and interest rate) on stock market prices in Nigeria using quarterly time series data covering the period 1989 – 2018. The study employed the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. The econometric analysis began with pre-diagnostic test which is a pre-condition for estimating GARCH model (testing for clustering volatility and ARCH effect in the residual). Properties of the time series variables were examined and tested for stationarity using the Augmented Dickey-Fuller (ADF) unit root test. The test revealed that all the variables; all share index, exchange rate, gross domestic product, inflation, and interest rate were stationary at either level 1(0) or at first difference 1(1). The conditional variance equation of the GARCH model revealed that GDP has positive effect on stock prices while other macroeconomic variables have negative effect on stock return volatility. The study found that stock prices are more responsive to their lag values than the variables of exchange rates, gross domestic product, inflation and interest rate.

METHODOLOGY

Research Design

This study employed a descriptive research design which is relevant to an investigative study as it requires some analysis on the macroeconomic variables of an economy as well as the crystal clear concept on how the macroeconomic variables affect the stock market returns in Nigeria.

Method of Data Collection

Data for the study were collected by the use of secondary data only. The secondary source of information includes; CBN statistical bulletin publication, journals, and official website of the Nigerian stock exchange.

Specification of Model

This study consists of the empirical method used to examine the relationship between macroeconomic aggregates and stock market returns in Nigeria from 2000 to 2019. The study is based on assessing the extent to which macroeconomic aggregates fluctuations affects the stock market in specifying the model adopted one can assume linearity between the all share index and macroeconomic variables. The model considers all share index (ASI) as the dependent variable because it is a core factor in explaining the dynamics of stock market performance.

The implicit form of the model is stated below:

$$ASI = f(INF, EXR, INTR)$$

In specific terms, the above equations can be re-written in its explicit form as:

$$LASI = \alpha_t + \beta_1 LINF_t + \beta_2 LEXR_t + \beta_3 LINTR_t + U_t$$

Where: α = is constant

LINF = Log of Inflation

LEXR = Log of Exchange rate

LINTR = Log of Interest rate

U_t = is the error term which captures all the other variables not explicitly covered in the model.

β_1, \dots, β_3 = are parameters/coefficients to be estimated

Method of Data Analysis

This study engaged a three-step procedure to determine the extent to which macroeconomic aggregates affects the Nigerian stock market. These procedures are the unit root test by PP and KPSS, Johansen co integration technique and the Vector Error Correction Model (VECM).

DATA ANALYSIS AND INTERPRETATION OF RESULTS

This study employed Philips Perron's unit root test, the Vector Error Correction Mechanism and the Johansen Co integration test. The logarithms of the variables were obtained to bring the time series data of variables with different magnitude to same base.

Unit Root Result:

The study utilized a Philips Perron unit root test which is crucial because it shows stationarity of the time series data in the long run as regressing non-stationary series on one another can yield spurious regression results. Unit root test is therefore crucial to test the nature of the time series to determine whether they are stationary or non-stationary

and to test for their order of integration, thus, this is done with the inclusion of intercepts components in the test equations at both levels and first difference. The results are displayed in Table 1.

Table 1: Unit root test result

1 st Difference				Levels		
Variables	PP-statistics	Critical value @ 5%	Remarks	PP-statistics	Critical value @ 5%	Remarks
LASI	-4.396744	-3.646745	Stationary	-3.527214	-3.646745	Non Stationary
LINF	-5.853926	-3.646745	Stationary	-1.350427	-3.646745	Non Stationary
LEXR	-5.343589	-3.646745	Stationary	-2.586618	-3.646745	Non Stationary
LINTR	-4.327464	-3.646745	stationary	-2.227056	-3.646745	Non Stationary

Source: E-view 21 output

The test statistics for the log levels of all share index, inflation rate, exchange rate and interest rate are statistically insignificant. This shows the null hypothesis of a unit root presence among the series cannot be rejected at levels for all the variables. Hence, this study applies the unit root tests to the first difference of the four variables. A stationary series was obtained for all the variables at first difference. The PP test rejects the joint null hypothesis for each variable at 5 per cent levels. Thus, from all of the tests, the unit roots tests indicate that each variable is integrated of order one.

Co integration Test

Table 2: Co integrating rank test

Hypothesized no. of CE(s)	Max Eigen Statistic	0.05 Critical value	Prob **	Hypothesized no. of CE(s)	Trace Statistics	0.05 Critical value	Prob***
None	36.602645	27.853405	0.0087	None	103.468550	81.707421	0.0004
At most 1	24.816340	29.614113	0.2140	At most 1	57.368472	51.376313	0.0261
At most 2	13.727552	19.646240	0.1492	At most 2	27.739200	31.846700	0.0113
At most 3	8.345648	6.536841	0.0312	At most 3	8.345648	6.536841	0.0312

Source: E-View 21 output

Generally, the existence of co integration signifies that there is at least one long-run equilibrium relationship among the variables. In this case, Granger causality exists among these variables in at least one way. The results of the long run equilibrium relationship are presented in Table 2. It shows that there exists at least one co integrating equation among the variables in the model. This conclusion was reached by comparing the Maximum Eigen value and trace statistics with their corresponding critical values. An Eigen value or trace statistics greater than the critical value indicates a co integrated series.

As shown in table 2 the maximum Eigen values (36.602645) (8.345648) and (trace statistics (103.468550), (57.368472), (8.345648) indicates the presence of 2 and 3 co-integrating equations at 5 per cent level of significance for the Maximum Eigen values and trace statistics respectively. Thus, the existence of a long run equilibrium relationship among the variables estimated for the all share index.

Table 3: Normalized co integrating relationship

<i>Normalized co integrating coefficients (standard error in parenthesis)</i>			
ASI	LINF	LEXR	LINTR
1.000000	-4.324816	3.867432	-1.384859
	(0.76549)	(0.68035)	(0.89046)
	(-5.4459463)	(4.1928706)	(-0.6894423)

Source: E-View 21 output

Table 3 shows result of the normalized co integration coefficients of the variables for instance when there are more than one co integrating equation which was affirmed in table 2 with the trace and maximum Eigen statistics. The results in table 3 were explained with respect to the inverse signs and magnitude of the variables in the normalized co integration result. The probability value of the t-statistics is used to indicate the significance or otherwise of the independent variable in the long run. Generally, using the rule of thumb if the t-statistics is 2 or greater than 2, the variable is significant but if the reverse is the case then it is insignificant.

The result of the normalized co-integrated relationship reveals a significant relationship between inflation rate and exchange rate while interest rate appears not to be significantly affecting all share index within the scope of the study.

The result from table 3 shows a significant relationship between inflation rate and all share index at 5% level of significance. This further reveals that a percentage change in inflation rate results to a corresponding 4.32% change in all share index. The analysis of the result shows a proportionate change in inflation rate leads to a more proportionate change in all share index holding other variables constant. The evidence from the elasticity estimates reveals that the degree of responsiveness of all share index is greater than unit elasticity and thus elastic.

The analysis of the co-estimate of exchange rate reveals a significant long-run relationship with all share index at 5% level of significance. A percentage change in exchange rate indicates 3.86% change in all share index, all things being equal. The above evidence further reveals that a proportionate change in exchange rate will result to a more proportionate change in all share index. It therefore implies that the degree of responsiveness of all share index to the variations in exchange rate is greater than one and therefore elastic. This shows that exchange rate plays a determinant role in stock market returns.

The result from the parameter estimate for interest rate reveals no significant relationship at 5% level of significance level. This further shows that the variations in interest rate produced no significant effect on all share index within the period under consideration by the current study and hence; could not be considered a significant determinant of the variations in stock market returns within these periods.

Hence, inflation rate and exchange rate revealed a significant effect on all share index which further reveals that the variations in inflation rate, and exchange rate plays a significant role in determining stock market returns.

Vector Error Correction

The vector error correction model shows the short run dynamics between the variables in the co-integration equation estimating the error correction. It is used to correct disequilibrium in co-integrating relationships and also series as a means of reconciling short run disequilibrium behavior of an economic variable of interest with its long run behavior.

Table 4: VECM

Variables	D(LASI)	D(LINF)	D(LEXR)	D(INTR)
ECM(-1)	0.846055	-0.264381	1.354476	0.183790
Standard Error	(0.42634)	(0.37266)	(0.52794)	(0.08816)
T-statistics	(-2.463810)	(-0.12794)	(2.743213)	(1.268635)

Source: E-View 21 output

Table 4 indicates that estimated lagged error correction term for all share index. The magnitude of the error correction term is negative and appropriately signed, its absolute value lies between zero and one and it's statistically significant. This implies a long run convergence of the model; it hereby implies that if any external shock is introduced into the model, the model would still converge with time. Evidence from result of the error correction estimate shows a very high speed of error adjustment of the model at 0.746, this implies that 74.6% of current error in the model would be corrected in the long run.

FINDINGS

Based on the results of the analysis; the Philip-Perron's unit root test showed that the variables were not stationary at levels but all variables were stationary at first difference which enabled the study to further conduct the unrestricted co integration rank test which showed the presence of more than one co integrating relationship. This implies that there is an overall long run relationship between macroeconomic variables and stock market, thus, these variables can be used to predict the stock market in the long run.

The normalized co-integrating relationship showed the presence of more than one co-integrating relationship agreeing with the unrestricted co integration rank test. It further showed that inflation rate and exchange rate have a significant long run relationship with all share index. Inflation rate increases in the same direction with all share index which aligns with apriori expectation due to the perception market investors have that the stock market is a perfect hedge against inflation. Exchange rate increases in the same direction as all share index because with a rise in the exchange rate of a country (consequently a reduction in the value of a firm's currency), the stock market of the country would become attractive to foreign investors. Contrary, interest rate has an insignificant relationship with all share index which implies that fluctuations in the rate of interest placed by commercial banks do not affect the stock market although there is an inverse relationship between stock market and interest rate.

Therefore, the results obtained indicate that the Nigerian stock market is affected by macroeconomic variables and as such responds to shocks from these variables in the short run. However, the Nigerian stock market has a higher capacity to recover from these shocks

and at a higher rate. This implies that no matter the variations affecting the market at a particular point in time, the market recovers quickly and returns back to its original position.

CONCLUSION

The study investigated the response of the Nigerian stock market to macroeconomic policies. The findings revealed that inflation rate and exchange rate increases in the same direction with stock market returns and when there is a change in inflation and exchange rate, the perception of investors in the stock market is adjusted. Therefore, the investors in the stock market should monitor the trend of macroeconomic variables in taking investment decisions.

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