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Analysis of the Relationship Between Macroeconomic Variables And Stock Prices In Emerging Market Economies: Empirical Evidence From Nigeria

Paul, Ndubuisi Ph.D

Abstract: *This study examines the relationship between macroeconomic variables and stock prices in Nigeria, over the period 1986-2015. The data for the research was taken from Central Bank of Nigeria (CBN). The cointegration method was adopted to measure the long-run relationship between macroeconomic variables (money supply growth rate, exchange rate, inflation rate, and 3-month treasury bill rate) and stock prices represented by the All Share Index (ASI). The direction of causality between the variables was tested using VECM Granger causality framework. The result from Johansen estimations revealed that stock prices and the independent variables have at least one common stochastic trend driving the relationship between them. The VECM results indicated long-run unidirectional causality between stock price and money supply growth, as well as bidirectional causality between stock price and exchange rate. Though in the short-run, causality do not run from any direction. In view of the long-run significant relationships between stock prices and macroeconomic variables, the study therefore recommends that the Central Bank of Nigeria should pursue appropriate policy measures in the areas of exchange rate, inflation targeting; interest rates, and money supply, growth to boost activities in the money and stock market and to ensure macroeconomic stability.*

Keywords: *Stock prices, inflation targeting, money supply, exchange rate, treasury bill rate.*

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I. Introduction

The stock market constitutes a vital organ of our modern socio-economic system, which is characterized by large scale production requiring a considerable amount of capital. There is a consensus among macroeconomists and finance theorists that stock market prices are driven by macroeconomic variables, the so called "fundamentals" in the economy. Moreover, it is also agreed that the linkage is two ways that is, feedback exists between the stock market and real activity. The question of whether the stock market can predict the economy has been widely debated. Those who support the market's predictive ability argue that the stock market is forward looking and current prices reflect the future earnings potential, or profitability of firms. Since stock prices reflect expectations about profitability and profitability is directly linked to economic activity, fluctuations in stock prices are thought to lead the direction of the economy (Ajao and Oseyomon, 2010). Stock market encourages the growth of the economy through the enlistment of long-term capital to the listed firms by pooling funds from surplus units to deficit units. It provides opportunities for economic units to invest their surplus funds, interest directly or indirectly with those who wish to procure; funds to expand their business or government. The stock market is an institution where the nation's company shares are bought and sold. The Nigerian stock Exchange (NSE) can be said to have existed for long enough to permit a critical efficiency of its achievements and failure annually. An important index of the efficiency of the capital (stock) market is the behaviour of prices as a result of changes in money supply. This index is an important indicator of the economic performance of any economy. The stock prices as an economic indicator consistently provide a warning about changes in economic activities and are reported daily by the stock exchange. Stock market performance, the yardstick to compare the performance of individual portfolios. Stock market makes it possible for the economy to ensure long-term commitments in real capital (Ologunde et al,2006). The relationship between macroeconomic variables and stock market indicators has engaged the attention of economists, financial scholars, stock market professionals and stock market regulators for many years. Majority of them had argued that macroeconomic variables such as broad money supply, inflation, interest rate, gross domestic product (GDP) and exchange rate have significant influence on stock market returns. Other empirical studies show that investors believed that monetary policy and macroeconomic variables have a large influence on the volatility of stock prices. Shostak (2006) related the changes of the returns volatility to the macroeconomic variables and believed that bond returns, short interest rate, producer prices or individual production growth rate have incremental information for monthly market volatility. Godfrey (2006) found that macroeconomic variables such as broad money supply can influence investors' investment decision and also motivate researchers to investigate the relationship between stock market returns and macroeconomic variables. He argued that a co-integrating relationship exists between macroeconomic variables and Nigerian stock exchange index.

II. Theoretical Framework

The theory of stock price behavior starts with the Markowitz model (1952, 1959). The Markowitz model (a single period model), showed exactly how an investor forms a portfolio at the beginning of the period and also, how to reduce the standard deviation of portfolio returns by choosing stocks that do not move exactly together. He worked out the basic principles of portfolio construction, which are the foundations of the relationship between risk and return. Based on the nature of this study, the theoretical framework we use in this study is Capita! Asset Pricing Model (CAPM), Arbitrage Price Theory (APT) and Efficient Market Hypothesis (EMH). These models present a sound theoretical foundation on which stock price movement may be attributed to be influences of the macroeconomic factors.

2.2.1 Capital Asset Pricing Model (CAPM)

Capital Asset Pricing Mode! (CAPM) was created by Harry Markowitz in year 1950 and developed by William Sharpe (1963), Lintner (1965, 1969) and Mossin (1966), to investigate the effects risk had on the expected return of an investment relative to the market portfolio. The capital asset pricing model relates the expected return of an asset to its riskiness measured by the variance of the asset's historical rate of return relative to its asset class. This model was used to examine the significance of relationship between the expected returns and risk. There are few assumptions which need to be considered in CAPM, Firstly, the investors will only invest in the asset when the expected return is at least equal or more than the required return. Secondly, CAPM assists in determining the required return on an asset. Finally, the determination of required return can be represented by the asset's value. Moreover, beta coefficient needs to be included in calculating the required return for CAPM as well as measuring the market risk (Gitmary-2012). The model decomposes a portfolio's risk into systematic and specific risk. Systematic risk is the risk of holding the market portfolio. To the extent that any asset participates in such general market moves, that asset entails systematic risk. Specific risk is the risk which is unique to an individual asset. It represents the component of an asset's return which is uncorrelated with general market moves (Ouma and Muriu 2014).

Fama & French (2004) in the portfolio theory stated that investors choose portfolios that are said to be mean-variance-efficient, and found along the efficient frontier for portfolios. The CAPM assumes that any portfolio that is mean-variance-efficient and lies on the efficient frontier is also equal to the market portfolio. The implications of this, according to the authors, are that the relation between risk and expected return for any efficient portfolio must also hold for the market portfolio, if equilibrium is to be maintained in the asset market. The model is presented in the following linear form;

$$R_t = \propto + \beta X_t + \varepsilon_t$$

Where

R_t represents the return to an asset, X_t represents the return of an underlying portfolio of assets (often measured as a domestic market index), and ε_t represents the asset-specific return, all at time t. The formula above shows that beta coefficient is positively related to the required return, β, indicates the statistical relationship between the asset's return and the return on the total portfolio of the assets. This can be evidenced by the research conducted by Biniv (2012) who stated that the higher the beta coefficient, the higher the required rate of return in the Saudi Stock Market (Emerging market). According to the capital asset pricing model (CAPM), the marketplace compensates investors for taking systematic risk but not for taking specific risk. This is because specific risk can be diversified away. When an investor holds the market portfolio, each individual asset in that portfolio entails specific risk, but through diversification the investors' net exposure is just the systematic risk of the market portfolio (Ouma and Muriu, 2014).

2.2.2 Arbitrage Pricing Technique Model

The Arbitrage Pricing Theory (APT) model as formulated by Ross (1976)in which the return on an asset is specified as a function of a number of risk factors common to that asset class rests on the assumption that stock price is influenced by limited and non-correlated common factors and by a specific factor totally independent of the other factors. The APT is another model of asset pricing based on the idea that equilibrium market prices should be perfect, in such a way that prices will move to eliminate buying and selling without risks (arbitrage opportunities).The basis of this theory is the analysis of how investors construct efficient portfolios and offers a new approach to explaining the asset prices and also states that the return on any risky asset is a linear combination of various macroeconomic factors that are not explained by this theory. (Daramola. 2011).

An arbitrage model takes the following form:

$$R_t = \propto + \beta_1 X_{1t} + \beta_2 X_{2t} + \ldots\ldots.. + \beta_n X_n + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..2.2$$

The model is similar in form to equation 2.1, except that the X's represent a set of n\ factors common to a class of assets, and the betas represent the sensitivity of the asset's return to each factor. Arbitrage Pricing Theory addresses the question of whether the risk associated with the particular macroeconomic variable is reflected in the expected market returns. The model assumes that investors take advantage of arbitrage opportunities in the broader market; thus, an asset' rate of return is a function of the return on alternative investments and other risk factors. The APT in contrast to CAPM acknowledges several sources of risk that may affect an asset's expected return. The model attributes the expected return of a capital asset to multiple risk factors, and in the process measures the risk premiums associated with each of these risk factors (Ouma and Muriu, 2014).

Bernanke et al (1999) argued that the CAPM and APT have advantages and disadvantages as models of asset returns. The CAPM is seen as parsimonious and commonly employed by equity analysts, but requires a precious identification of the portfolio against which the asset is compared. On the other hand, Mishkin (2007) contends that, APT accommodates multiple sources of risk and alternative investment, the model suffers from a similar challenge of identification since many factors, both international and domestic could influence an assets performance. The model, as with the CAPM, is subject to certain assumptions; the first of these being mat investors may borrow and lend at the risk-free rate, there are no taxes and short selling of securities is unrestricted. The second assumption assumes that a wide variety of securities exist, thus risk unique to those securities may be diversified away, and lastly, investors are risk averse who aim to maximize their wealth.

According to Morel (2001), by using the arbitrage reasoning, it can be shown that in an efficient market where stock prices respond appropriately to various variants and sources of information, the expected return is a linear combination of each factor's beta. Arbitrage Pricing Technique Model (APT) which could be taken as a protest of CAPM believes that the asset price is influenced by both the market and non-market factors such as foreign exchange, inflation and unemployment rates. The implication of this theory is that it can be used to focus on the long run relationship between the stock market and broad money supply which is one of the major macroeconomic variables. However, one of the defects of APT in spite of its advancement of asset pricing model is that the factors to be included in asset pricing are unspecified (Adaramola, 2012).

2.2.3 Efficient Market hypothesis

The growing empirical literature on the relationship between money growth and stock prices has produced a hypothesis called, "Efficient Market Hypothesis (EMH).The Efficient Market Hypothesis (EMH) is one of the theoretical models applicable for studies in which money supply is closely associated with stock prices. According to the mastermind of this theory Professor Eugene Fama (1965), an efficient market holds whenever stock prices are reflected fully on existing information available in the market leading to equitable estimations for underlying asset value. By bringing the elements of rational expectations hypothesis, it rules out the possibility of any overriding negative influence of money supply on stock prices. The three levels of EMH include the weak form, semi-strong form and strong form. An efficient stock market, it stresses, is expected to reflect the readily available information on monetary growth rates, interest rates, and expectations formed from them. EMH assumes that the impact of the change of money supply on share price reaction is limited and the speed of adjustment does not leave a room for traders to obtain abnormal returns because stock prices incorporate all relevant information. Believers in the efficient capital market hypothesis argue that stock prices are essentially random and therefore there is no scope for profitable speculation in the stock market. If one could predict tomorrow's price on the basis of today's, we would all be millionaires (Gujarati and Porter, 2009).

2.2 Empirical Review

Many empirical studies have been carried out to disclose the relationship between money supply and stock prices.. Several studies on the relationship between macroeconomic variables and broad money supply have been carried out over the years in both developed and developing countries. Some of these studies have supported the positive relationship while others have supported the negative relationship. Whatever the relationship, the relationship between stock prices and money supply creates some gap.

Chude and Chude (2013), studied the impact of money on stock, prices with special attention to anticipated and unanticipated changes in money supply. He used a two-stage regression model in his analysis. In the first stage, he replicated Barros's model ' of money supply, in which money supply is regressed against previous money supplies, the unemployment rate, and real Federal government expenditure. In the second stage, the stock index is regressed upon anticipate money growth using estimates from the regression for the first stage. Residuals of the first are used as unanticipated component, which is regressed upon a stock index to out the effect of the unanticipated component. He found that unanticipated changes in money supply have a larger impact on the stock prices than anticipated changes, supporting the efficient market hypothesis. Pearce and Roley (1985) found that stock price respond only to the unanticipated change in the money supply as predicted by the efficient market hypothesis. As unanticipated increase in the announced money simply depresses stock prices and vice versa.

Dharmendra et al (2009) studied the relationship between monetary expansion and stock prices in Pakistan. Ml and M2 were used as dependent variables expansion and stock prices in Pakistan. M1 and M2 were used as dependent variables while stock indices of six sectors were used as independent variables. An Augmented Dickey Fuller test was used to find a relationship between money supply and both short and long run changes in stock market prices. The study found that money supply causes changes in stock prices not only in the long run, but also in the short run, predicting that the stock market is not efficient with respect to the money supply, or in other words, finding that the efficient market hypothesis does not persist.

Maku and Atanda (2010) examined the determinants of stock price in Nigeria using Augmented Dickey Fuller unit root test, Augmented Engle Granger Co-integration test and Error Correction Model. The empirical analysis showed that the NSE all share index is more responsive to changes in exchange rate, inflation rate, money supply, and real output. While, the entire incorporated macroeconomic variables were found to have simultaneous and significant impact on the stock prices in the long-run.

Adaramola (2012) used modified Error Correction Model Approach to examine the determinants of stock prices in Nigeria. The study reveals that stock market liquidity, interest rate and one period lagged stock market development were significant predictors of stock prices in Nigeria.

Owusu-Nantwi and Kuwornu (2011) study of the impact of interest rates on stock market returns indicated that the variable is not significant for the stock market in Ghana. Interest rate as captured by 91 - Treasury bill rate indicated a negative relationship with the stock market return when the authors employed Ordinary Linear Squares method with monthly data of 1992- 2008.

Eze (2011) investigates the effect of macroeconomic variables on stock prices in Nigeria using ordinary least square; co integration and error correction model. It was discovered that stock price is strongly determined by broad money supply, exchange rates and consumer price index in the short and long-run.

Nozar and Phillip (2012) in a study titled 'Capital market as a veritable source of development in Nigeria economy' using Ordinary Least Square and Cochrane-Orcutt iterative methods, observed that the capital market has not contributed positively to the development of the Nigerian economy. Though, there is a positive relationship between the rate of transactions in the capital market and the development of Nigerian economy.

Ossisanwo and Atanda (2012) used ordinary least square method to study the determinants of stock price in Nigeria: A time series analysis between 1984 and 2010, and found that interest rate, previous stock return levels, money supply and exchange rate are the main determinants of stock prices in Nigeria. Osamuonyi and Evbayiro-Osagie (2012) also arrived at the same finding when they attempted to determine the relationship between macroeconomic variables and the stock prices. The study used yearly data of interest rates, inflation rates, exchange rates, fiscal deficit, GDP and money supply from 1975 to 2005 employing Vector Error Correction Model (VECM) to study the short-run dynamics as well as long run relationship between the stock market index and the six selected macroeconomic variables from the Nigerian economy. Money supply (M2) was found to have a significant but negative relationship with Stock Market Index in both the short-run and long run.

Emenike and Odili (2014) examine the impact of macroeconomic variables on stock price volatility in Nigeria using GARCH-X model. Five macroeconomic variables: broad money supply, consumer price index, credit to the private sector, US dollar/Naira exchange rate, and the net foreign assets, were included in the conditional variance model of the Nigerian Stock Exchange (NSE) All-share Index. Results of the GARCH-X model suggest that the NSE price volatility is positively influenced by changes US dollar/ Naira exchange rates and credit to private sector but negatively influenced by changes broad money supply and inflation. On the other hand, changes in net foreign assets shows negative but not significant influence on changes in s tock price volatility.

III. Data And Model Specification

3.1 Data

The study uses annual data covering the period from 1986-2015 to investigate the effect of macroeconomic variables on stock prices. Four widely used macroeconomic variables are employed: inflation rate, money supply growth rate, 3-month treasury bill rate (interest rate), and real exchange rate. These factor have been identified among the most significant determinants of stock prices in Nigeria.

3.2 Model specification

Following the empirical literature on the relationship between stock prices and macroeconomic variables, it becomes necessary to form the long-run relationship between ASI, Infla, Mspgr, Tbr and Exr in linear form as follows:

ASI = F(infla,mspgr, tbr,exr) …… (1)

The above equation can be re-written econometric model and in their natural log form thus:

$InASI_t = \propto + B1\ Inmspgr_t + B_2\ Inexr_t + B_3\ Infla_t + B4\ In\ Tbr_t + U_t$ ……2

Where:

$InASI_t$ = natural log of All share Index (proxy for stock prices)
$Infla_t$ = natural lo g of inflation rate
$Inmspgr_t$ = natural log of money supply growth rate
$Inexr_t$ = Natural log of exchange rate.
B_1 to B_4 are the elasticities with respect to change in ASI
Ut = Stochastic error term

$Intbr_t$ = natural log of 3-month treasury bill rate (proxy for interest rate)

Appriori expectation;
$B_1>0$, $B_2>0$, $B_3<0$, $B_4>0$

3.3 Estimation Procedure

3.3.1. Unit root Test

In time series analysis, before running the cointegration test the variables must be tested for stationarity. For this purpose, we use the conventional ADF tests. Therefore, before applying this test, we determine the order of integration of all variables using unit root tests by testing for null hypothesis H_0: $\beta = 0$ *(i.e.* β has a unit root), and the alternative hypothesis is H_1:β This is to ensure that all the variables are integrated at 1(1) to avoid spurious result.

3.3.2 Johansen Cointegration

This study adopt a dynamic vector autoregressive regression (VAR) which explores cointegration. The essence is, to capture the causal dynamics relationship between stock prices and macroeconomic variables, and at the same "time to observe the long run and short dynamics. For instance, given a VAR with possible long run cointegration amongst a set of variables.

Therefore, we start with the Johansen co -integration equation which starts with the vector auto regression (VAR) of order *p* is given by:

$$y_t = \mu + A_1 y_{t-1} + \cdots A_p y_{t-p} + \varepsilon_t \quad (3)$$

Where y_t *a (n* x 1) *vector of variables under consideration in log form that are integrated at order one-commonly denoted 1(1), n=5*A_P *are the parameters to be estimated,* $£_t$ *are the random errors. This* (VAR) can be re-written as;

$$\Delta y_t = \mu + \prod y_{t-1} + \sum_{i=1}^{p=1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (4)$$

Where, $\prod = \sum_{i=1}^{p} A_i - 1$ and $\Gamma_i = -\sum_{j=i+1}^{p} A_i$ (5)

The above equation is a pure Johansen Cointegration test. Gragory and Hansen (1996) noted that the Johansen test is a test for co-integration that allows for more than one co-integration relationship. If the coefficient matrix $\prod$ has reduced rank r < *n*, then there exist *n* x *r* matrices of α and β each with rank *r* such that;

$$\prod = \alpha\beta' \quad (6)$$

Where r is the number of co-integrating relationship, the element is α is known as the adjustment parameters in the vector error correction model and each column of β is a cointegrating vector. It can be shown that, for a given r, the maximum likelihood estimator of β define the combination of y_{t-1} that yield the r largest canonical correlations of Δy with y_{t-1} after correcting for lagged differences and deterministic variables when present. The two different likelihood ratio test of significance of these canonical correlations are the trace test and maximum eigenvalue test.

$$\lambda_{trace}\,(r) = -T\sum_{i=r+1}^{n} In\,(1-\lambda_l) \quad (7)$$

and

$$\lambda_{max}\,(r, r+1) = -Tln\,(1-\lambda_{r+1}) \quad (8)$$

Here, T is the sample size and λ_l is the i^{th} ordered eigenvalue from the $\prod$ matrix in equation 3 or largest canonical correlation. The trace tests the null hypothesis that the number of r co-integrating vector against the alternative hypothesis of n co-integrating vector where *n* is the number of endogenous variables. The maximum eigenvalue tests the null hypothesis that there are *r* cointegrating vectors against an alternative of *r* + 1 (see Brooks 2002).

3.3.3 Vector Error Correction Model (VECM) and Granger Causality Test

After testing for cointegration among the variables, the long run coefficients of the variables are the estimated. This study use the Engle and Granger (1987)test augmented by the error correction term for detecting the direction of causality between the variables. The advantage of using vector error correction (VECM) modelling framework in testing for causality is that it allows for the testing of short-run causality through the lagged differenced explanatory variables and for long-run causality through the lagged ECM term. A statistically significant ECM_{t-1} term represents the long-run causality running from the explanatory variables to the dependent variable. For instance, if two variables are non-stationary, but become stationary after first differencing and are cointegrated, the *p*th-order vector error correction model for the Granger causality test assumes the following equation:

$$\Delta InX_t = \alpha_{10} + \sum_{i=1}^{p_{11}} \theta_{11i}\Delta InX_{t-1} + \sum_{i=1}^{p_{11}} \partial_{12j}\Delta InY_{t-j} + \delta_{13}ECM_{t-1} + u_{1t} \quad (9)$$

$$\Delta InX_t = \alpha_{20} + \sum_{i=1}^{p_{21}} \theta_{21i}\Delta InX_{t-1} + \sum_{i=1}^{p_{22}} \partial_{12j}\Delta InY_{t-j} + \delta_{23}ECM_{t-1} + u_{2t} \quad (10)$$

Where $\theta$and ? are the regression coefficients, u_t is error term and p is lag order of x and y. The presence of short-run and long-run causality can be tested. If the estimated coefficients of y is statistically significant, then that indicates that the past information of y has a statistically significant power to influence x suggesting that y Granger causes x in the short-run. The long-run causality can be found by testing the significance of the estimated coefficient of $ECM_{t-1\ n}$. *ECM_{t-1} is the error correction term obtained from the cointegration model. The error coefficients indicate the rate at which the cointegration model corrects its previous period's disequilibrium or speed of adjustment to restore the long run equilibrium relationship. A negative and significant ecm_{t-1} coefficient implies that any short run movement between the dependant and explanatory variables will converge back to the long run relationship. Indeed it recovers any long-run information that is partially lost in the system with differenced coefficient. So, that this terms are needed to gain model stability in the long run. Narayan and Smyths (2008)*

IV. Data Analysis:

Our analysis is divided into two namely; descriptive statistics and empirical analysis.

4.1: Descriptive Statistics:

	InASI	Inmspgr	Inexr	In Infla	In Tbr
Mean	0.80415	29.84121	2.58564	2.44214	3.22104
Median	0.87302	24.6254	4.0762	4.21450	2.26156
Maximum	3.39264	26.7402	6.054310	6.905612	3.68210
Minimum	-0.30844	29.25410	-0.50465	-0.78402	2.40113
Std. Dev.	0.59245	0.46625	2.02214	1.95442	0.60705
Skewness	-0.00706	1.72215	-0.56424	-0.32147	0.50402

Kurtosis	2.42070	1.77602	1.63247	1.46905	2.00082
Jarque-Bera	0.32467	4.27015	4.56021	4.50061	2.47655
Probability	0.83640	0.111714	0.17940	0.16707	0.163702
Observations	**30**	**30**	**30**	**30**	**30**

Table I: Summary statistics of the variables (1986 to 2015)
Source: Extract from eview 9

Table I above provides the summary descriptive statistics, namely sample means; maximum, minimum, and Jarqe-Bera tests with their p-values. It is clear that all the statistics show the characteristics common with most time series for instance, normality in the form of platykurtic there are a number of noticeable supply differences, between the variables. First money supply growth rate (mspgr) has the largest unconditional average of 29.84121% while all Share Index (ASI) has the least unconditional average of 0.80415%. the standard deviation shows the level of volatility in the variables. It displays the rate at which each variable deviates from the mean value. From the table above, exchange rate is the most volatile at 2.022% while the money supply growth rate is the least volatile with0.4662%.

The skewness measures the asymmetric nature of the data. Skewness is a measure of the asymmetry of the probability distribution of a real-valued random variable about its mean. A normal distribution is symmetrical at point O. if the value is greater than zero (>0) it is positively skewed, but if less than zero (<0) it is negatively skewed (Wooldridge, 2010). From the table above, All share index (ASI), Exchange rate (Exr) and Inflation (Infl) are negatively skewed whereas money supply growth rate (mspgr) and interest rate (Tbr) are positively skewed.

Kurtosis measures the sharpness of the peak of a normal distribution curve. It is a measure of (tailedness" of the probability distribution of a real-valued to 3, it is mesokurtic distribution implying normal distribution if approximately greater than 3, it is leptokurtic distribution which has tails that asymptotically approach zero slowly and has more outliers than the normal distribution. While if approximately, less than 3 it is platykurtic which means that the distribution produces fewer and less outliers than the normal distribution (Wooldridge, 2010). Therefore, all the series show evidence of platykurtic with values less than 3.

The Jarque-Bera is a test for normality of the distribution where the null hypothesis is that the distribution of the sample is a normal one. If the probability value of the Jarque-Bera test significant, then the null hypothesis is rejected and the alternative is accepted which says that the sample is not normally distributed. If each variable is statistically significant (indicated by a zero probability), then the series are not normally distributed. Therefore the farther the probability statistic of a variable is to zero, the lower the value of its Jarque-Bera statistic and the more normally distributed it is and vice versa (Hosking. 2006). Hence, the variables can be described to be normally distributed.

4.2 Empirical Result

4.2.1 Stationary test

	Augument Dickey Fuller (ADF)				
Variables	**Levels**		**Ist Diff**		**Order of integration**
	t-Stat.	**p-value**	**t-stat.**	**p.value**	**(1)**
InASI	-1.64225	0.4012	-4.13904	0.00234	(1)
Inmspgr	1.217166	0.9968	-3.2857	0.01532	(1)
Inexr	-1.31396	0.3673	-3.39649	0.01490	(1)
Ininfla	-1.21011	0.6577	-3.23096	0.02194	(1)
Intbr	-0.1744	0.9447	-4.2913	0.00265	**(1)**

Table 2 Unit root test
level of significance at 5% * level of significant at 1%
Source: various computation from view 9

All the data are transformed into the natural log form. To determine the order of integration of the variables, the ADF (augmented Dickey-Fuller) test which the null hypothesis is $H_0 = \beta = 0$ (ie β has a unit root), and the alternative hypothesis is $H_1 = \beta < 0$are implemented. The results for the level and differenced variables are presented in table 2.

The stationarity tests were performed first in levels and then in first difference to establish the presence of unit roots and the order of integration in all the variables. The results of the ADF stationarity tests for each variable show that the tests fail to reject the presence of unit root for data series in level, indicating that these variables are non-stationary in levels. The first difference results show that these variables are stationary at 1% and 5% significance level (integrated of order one 1(1)). As mentioned in the preceding sections, a linear combination of I (1) series could be I (0) if the series are cointegrated. We thus proceed to test for cointegration of the time series.

4.2.2. Johansen Cointegration Result

Hypothesis	Trace Statistics	5% critical value	Max. Eigen value	5% critical value
r=0	79.503*	60.716	42.702*	30.676
r ≤ 1	36.675	46.756	16.843	24.643
r ≤ 2	17.654	24.676	14.826	20.213
r ≤ 3	7.684	14.549	7.023	13.216
r ≤ 4	0.211	3.041	0.211	3.041

Table 3: Johansen cointegration result

- Level of significant at 10%

**level of significance at 5%
*** level of significant at 1%
Source: computation from view 9

The results of the cointegration test, based on the Johansen cointegration approach are presented in table 3 above. Cointegration is tested on the long-run relationship between the dependent variable and independent variables. The table indicates that the test failed to accept the null hypothesis of no cointegration at 5% level of significance. Both the trace and maximum Eigen value suggest that there is a common stochastic trend and as such the number of free random walks has been reduced by one. Therefore, stock prices and macroeconomic variables have at least one common stochastic trend driving the relationship between them.

The Johansen co-integration test shows this by cointegation test shows this by comparing the statistic values with the critical values. In this study, it is clear that there is at most 1 cointegrating equation in the model with both trace and maximum eigen value suggest 5% significance level. This implies than equilibrium relationship exists among the co-integrating variables.

In addition, no matter the fluctuation in the short-run, these variables have the tendency to return to this equilibrium path in the long-run.

Normalized Cointegration Equation

$$\textbf{ASI} = 611.0 + \underset{(-4.782)}{29.203mspgr} + \underset{(-0.2606)}{0.3340exr} - \underset{(-3.107)}{2.063infla} + \underset{(-6.114)}{14.706Tbr} + U_t \quad \ldots\ldots\ldots \quad (11)$$

Equation (II) represents the normalized cointegration equation, while the values in the bracket are the t-statistics. The equation reveals that money supply growth, exchange rate and 3-month treasury bill rate positively and significantly influenced stock prices in Nigeria while inflation has a negative and significant impact on stock prices. Indeed, all the variables are in agreement with the apriori expectations. This finding is in line with Eze (2011), Maku and Atanda (2010).

However, since the presence of cointegration among variables means that causality must run from at least one direction, therefore we apply error correction model.

4.3 Causality Test

Table 4: VECM Granger Causality

	Short run				**long run**	
Variables	**Δ(InASI)**	**Δ(Inmspgr)**	**Δ(Inexr)**	**Δ(Ininfla)**	**Δ(Intbr)**	**ΔECT**
Δ(InASI)		2.3764 (0.2674)	0.4771 (0.7211)	7.2661* (0.0263)	3.2396 (0.1792)	-0.0017* [-2.374]
Δ(Inmspgr)	0.0014 (0.9722)		0.60424 (0.7348)	0.9435 (0.61245)	1.40120 (0.4724)	4.92e-06 [-0.0064]
Δ(Inexr)	0.4106 (0.80024)	4.7246 (0.056)		10.41*** (0.0056)	9.261*** (0.0094)	-0.0627** [-3.2146]
Δ(Ininfla)	0.2322 (0.87060	2.6124 (0.273)	2.0234 (0.3546)		1.50534 (0.4624)	0.21606 [1.90224]
ΔInTbr	10.337*** (0.0056)	3.1664 (0.2053)	1.3245 (0.4208)	11.566*** (0.0024)		-0.04321** [-2.4564]

Table 4: Long run and short-run causality estimates

Note: *,**,*** indicate significant at 10%, 5% and 1% respectively.
Source: computation from eview 9

The study uses Grnager causality test augmented by the error correction term for detecting the direction of causality between the variables. The optimal lag order selected based on the Akaike information criteria (AIC) is 2. The VECM Granger causality divides causality results into long-run as well as short-run. The results regarding the VECM Granger causality are reported in table 4. The empirical results suggest that ECT_{t-1} has negative sign and statistically significant in exchange rate, stock prices and interest rates. This implies that there is bidirectional causality between stock prices and exchange rate, stock prices and interest rates respectively in the long-run.

A number of causal interactions exist in the short-run. The results in table 4 show a unidirectional causality running from inflation to stock prices, from stock prices to interest rates. In sum, the co-efficient of ECM(-1) in table 4 is negative and significant at 1% level. The co-efficient suggest that approximate 10% of the short-run disequilibrium is corrected in the long-run.

4.4 Discussion of Findings;

From the analysis, trace and maximum eigen statistic are significant at 5% level suggesting that there is a common stochastic trend thereby reducing the number of free random walks by one.

Therefore, stock prices and the macroeconomic variables have at least one common stochastic trend driving the relationship. Also the normalized cointegration revealed that money supply growth, exchange rate and interest rate contributed positively and significantly to stock prices while inflation contributed negatively and significantly to stock prices in Nigeria. Also the long-run cointegration is confirmed thro ugh the error correction term which is correctly signed and significant. The intuition here is that the null hypothesis of no long-run significant relationship between stock prices and macroeconomic variables is rejected. The VECM Granger causality divided causality results into long-run as well as short-run. Table 4 reveals that there is long-run unidirectional causality between stock prices and money supply growth at 5% level of significance. Whereas in the short-run , causality do not run from any direction. The empirical results suggest that ECMt-1 has negative sign and statistically significant in the exchange rate, inflation and interest rate. These indicates (a) bidirectional causality between stock prices and exchange rate at 5% level of significance in the long-run. However there is no causal relationship between them in the short-run. (b) Unidirectional causality between stock prices and inflation at 5% level of significance. There is also a noticeable unidirectional causality running from inflation rate to stock prices in the short-run.

(c) bidirectional causality between stock prices and interest rates at 5% level of significance in the long-run. These findings are in line with the findings of Eze (2011), Maku and Atanda (2010), Pearce and Roley (1983), Ossisanwo and Atanda (2012).

V. Conclusion

This paper sets out to investigate the nature of the relationship between stock prices and macroeconomic variables in Nigeria as well as the direction of causality between them using Granger causality test augmented by error correction term. The results revealed that the null hypothesis of no long-run significant relationship between stock prices and macroeconomic variable is rejected. Also we reject the null hypothesis that no causal significant relationship between stock prices and money supply growth in the long-run and vice versa in short-run. Thus the policy implication of these findings for Nigeria policy makers is that adequate care should be taken to evolve and initiate appropriate, monetary policies in the interest rate and money supply growth in view of the significant long-run relationship between them and stock prices as well as policies that will guide operation in the capital market.

5.1 Recommendations

From the findings; the following recommendation are suggested:

(1) Policy makers and regulators should monitors closely the level of activity in the Nigeria stock market in order to initiate appropriate economic reforms to actualize macroeconomic objectives. Such policies should ensure stability in the capital market.

(2) Securities in the Nigeria capital market should be appropriatly priced to restore confidence of potential investors

(3) The central Bank of Nigeria, in view of the significant relationships between stock prices and macroeconomic variables, should initiate appropriate exchange rate policies, inflation targeting policy, optimal money supply growth policy s well as interest rate reduction policies to boost activities in the money and stock markets as well as investor's confidence. These will bring stability in the capital market and boost economic growth.

REFERENCES

[1] Adaramola, A. 0. (2011), The impact of macroeconomic indicators on stock prices in , Nigeria, Developing Country Studies, Vol. 1, No.2,pp.l-15, www.iiste.org

[2] Adaramola, A. O. (2012). Exchange rate volatility and stock market behavior: the Nigerian experience, Research Journal of Finance and Accounting, Vol. 3(3).

[3] Ajao, M. G. and Oseyomon, E. P (2010), The predictive content of some leading economic indicators on stock prices, Journal of Research in National Development, Volume 8 No 1, June, 2010
[4] Akani, W, H. (2013). Analysis of macroeconomic aggregates on stock prices in Nigeria: an application of co-integration and causality tests, International Journal of Business and Management Review, Vol. 1, No 3, pp. 56-79, September 2013
[5] Bernanke, Ben S. and Gertler, M. (1999), Monetary policy and asset price volatility, federal reserve bank of Kansa City, Economic Review, Fourth Quarter.
[6] Biniv Maskay, (2012). Analyzing the effect of change in money supply on stock prices, The Park Place Economist, Volume 15 Issue 1 Article 16, pp. 72-79.
[7] Brooks, C. (2008). Introductory econometrics for finance. (2nd ed.), Cambridge: Cambridge University Press.
[8] Chude, N.P. and Chude D.I. (2013). Effect of money supply on the stock market returns in Nigeria, Journal of Business and Organizational Development Vol. 5, No. 2, Pp. 135-150.
[9] Gitman (2012) The money supply puzzle: review and interpretation, American Economic Review.
[10] Dharmendra D., Magda K., Subhash (2009). Causality between the money supply and share prices: A VAR investigation, Quarterly Journal of Business and Economics, Vol. 32.
[11] Engle, R. F. and Granger C. W J. (1987). Co - integration and error correction: representation, estimation and testing, Econometrical. Vol. 55, No. 2, pp. 251-276.
[12] Eze, S.O. (2011). The effect of monetary policy on stock market performance in Nigeria. Published Online www.google.com
[13] Fama, E. F. (1965). Efficient capital markets: a review of theory and empirical work, journal of Finance, Vol. 25, pp. 383 - 417.
[14] Godfrey, M, D., Granger, C. W. J. and Morgenstern, O. (2006) random walk hypothesis of stock market behavior, Kyklos, 17: l-30.Dol: 10.1111/j.l467.6435.l964.tb02458.
[15] Gujarati, D.N. and Porter, D. C. (2009). Basic econometrics, S^ed., Boston, McGraw Hill Publisher.
[16] Ouma, W. N and Muriu P. (2014), The impact of macroeconomic variables on stock market returns in Kenya, International Journal of Business and Commerce, Vol. 3,No.11,pp. l-31.www.ijbcnet.com.
[17] Owusu-Nantwi,V. and Kuworau, J. K. (2011). Analyzing the effect of macroeconomic variables on stock market returns: evidence from Ghana, Journal of Economics and International Finance, Vol. 3(No. 11), 605-615.
[18] Pearce, D. K. and Roley V. V. (1985). Stock prices and economic news, The Journal of Business, 58 (1), pp. 49 - 67.
[19] Shostak, F. (2006). Money supply and the stock market: is there a relationship, Brookes News Bulletin, Monday, September 4.
[20] Mishkin, F. (2007). The economics of money, banking and financial markets, Pearson Addison Wesley, Eight Edition, New York.
[21] Morel, C. (2001). Stock selection using a multifactor model empirical evidence from the French stock market, The European Journal of Finance, Vol. 7, No. 4, pp. 312-320.
[22] Nozar, H. and Philip T., (2012) Stock prices, money supply, and interest rates: the question of causality, I, Vol. 20, issue 12, pp, 1603 - 1611.
[23] Ologunde, A. O., Elumilade, D. O., & Asaolu, T. 0. (2006). Stock market capitalization and interest rate in Nigeria: a time series analysis, International Research Journal of Finance and Economics (No. 4). 154-166
[24] Osamuonyi, I. O., and Evbayiro-Osagie, I. (2012). The relationship between macroeconomic variables and stock market index in Nigeria", Journal of Economics, Vol. 3(No. 1), pp. 55-63.
[25] Ossisanwo, E.G. and Atanda, A.A. (2012). Determinants of stock market returns in Nigeria: a time series analysis, African Journal of Scientific Research,9(1): 479-489.
[26] Maku, E.O. and Atanda, A.A. (2009). Does macroeconomic indicators exert shock on the Nigerian capital market?, Paper No. 17917, Munish Publication, University of Demark.
[27] Maku, O.E. and Atanda, A.A. (2010). Determinants of stock market performance in Nigeria, Journal of Management and Organisational Behaviour, 1(3):. 1-16.

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