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# Macroeconomic Indicators and Stock Price Movement Nexus: A Study of the Nigerian Stock Market

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**Abstract:** This study explored the nature of the connection existing amongst movements in stock prices and macroeconomic activities in the Nigerian stock market. Different attempt have been made to find the relationship between macro-economic factors and stock prices in several capital markets, necessitating the use of different models. Co integration regression analysis and vector error correction mechanism was used to capture both the short run dynamics and long run relationship between the macroeconomic indicators and share prices from 1985-2014 since it captures the pre and post reform adjustment in the long run. The findings reveal that inflation rate increases in the same direction with share prices which aligns with theoretical expectation which is as a result of investors perceptionthat the stock market have an inflationary hedge in the post structural adjustmentperiod. While exchange rate increases in the same direction as share prices because with a rise in the exchange rate of a country, the stock prices of the country would become cheap and consequently attractive to Foreign investors. This study recommends that investors should watch the trend of macroeconomic variables fluctuations in order to predict stock price movement.

**Key words:** Stock price, stock market and investment, investors, vector error correction mechanism, macroeconomic variables

## INTRODUCTION

Viable investment that promote economic growth and development needs the injection of funding in the long term for more than the period private investors will commit their funds willingly, also above government capacity. The heartbeat of any economy is their capital market which is displayed in their capacity to instantaneously respond to economic fundamental changes, Maku and Atanda (2010). The capital market encouraged savings and real investment in a steady and healthy environment. Theses aggregate savings are channelled into real investment to increase the stock of capital which fuels economic growth in the country. The attributes of the capital market makes it easier for discerning minds to note any economy impulses, the stock exchange as a section of the Nigerian capital market is not exemption from the influences of macroeconomic forces which goes even beyond the scope of the capital market. These macroeconomic fundamentals determine the direction of stock prices in the Nigeria capital market. The stock market is a barometer and the hallmark of a country's economy, it provides investment opportunity, through liquidity and risks sharing, it accelerates economic growth by acting as a coordinate; scholars have defined it as the financial nerve of development in any economy. The stock market plays a vital role to investors and the government for the former it mobilizes funds for investment as it serves as an avenue where securities (shares, bonds and stocks) are bought and sold openly for the later it allows the use of various instruments to better satisfy their liquidity and risk preferences, thus encouraging savings and providing non-financial corporations with equity finance possibilities.

The increase and decrease in stock prices is a consistent phenomenon of economies and a major concern among the investors, corporation, policy makers and researchers as it influences their investment interest which is major reason for this study. 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. This theory is referred to the macroeconomic approach by researchers in the field of finance.

The main aim of this school of thought is to investigate the sensitivity of stock prices to aggregates in the macro-economy. The theory stands that stock price

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movement is caused by changes in macroeconomic aggregates which includes international oil prices, external debt, external reserves, money supply, interest rate, inflation rate and so on. It also relies on the logic that everything else depends on something done, stressing the connection among sectors to be focal in grasping the co-movement and persistency of macroeconomic time series.

**Statement of the research problem:** The price of any stock generally mirrors the expectations of investors in terms of corporate earnings and economic growth in the future. Thus, forecasts of the economy assist for investment decisions in the equity market. Therefore, when there is with adequate certainty a presumed recovery in the economy, this would send indications that it is an appropriate time to invest in stocks thus increasing the price of stocks. Also, in a presumed economic recession there would be pulling out of funds from stocks which in turn lead to a reduction in stock prices. In Nigeria, the downward trend the stock market is witnessing in recent times is connected to Foreign Portfolio Investment outflows caused by continuous crash in oil prices coupled with other macroeconomic influences.

It is illustrative that if the nation receives sufficient oil revenue as budgeted or above budgetary expectations, government will spend more this will increase the Nigerian Economic purchasing power, prompt the growth of the industrial sector, investment consequently having a multiplier effect in increasing firms earnings which will consequently by implication guarantee dividend payout and an increase in stock price. If on the other hand, the nation's oil revenue decreases below expectations then government will spend less and it is a swift indicator to investors in rating the economy and as such can cause a downward dive in the capital market. The influence of the rate of inflation is seen when there is either an increase or decrease in the inflation rate. If the rate is higher share prices moves up at a quicker pace when the rate is steady share price rise in proportion to price level to maintain a constant ratio of share prices to real earning, Feldstein. Due to inflationary pressures, savers may realise that the value of their savings are eroded. This may compel them to add to the current consumption thereby linking capital formation and national economic growth, Akani (2013). The relationship between exchange rate and stock prices is far from conclusive, the main theory that relates these financial markets is the traditional approach that exchange rates should lead stock prices in that, fluctuations in exchange rate would affect the firm's values through changes in competitiveness and changes in the value of the firm's asset and liabilities, ultimately affecting the firm's profits and value of equity.

Interest rate on the other hand is another important monetary policy instrument. Ologunde *et al*. (2006) gave this illustration; interest rate is managed by the monetary authority i.e. the Central Bank of Nigeria. If the interest rates on the depositors fund paid by banks are increased, investors would abandon the capital market and resort to banks which in turn have a multiplier effect in reducing capital investment and lowering economic growth. An inverse relationship exist between savings interest rate and stock prices because when interest rate increases, stock prices reduces because of less patronage in the capital market, consequently when interest rate reduces stock prices increases. GDP is a valid instrument to measure the growth of the economy which is crucial to the earnings of corporations and their future earnings expectations goes up or down. Fundamental stock market variables are influenced by growth trend which is because as there is a substantial increase in the output of a country indicates that a firm in different productive industries are doing well and this cause an increase in stock prices and because of this cause a robust increase in GDP.

The market for stocks is probably influenced by policies in the economy; furthermore, because of reduced debt and untimely and undependable information on company defined information specifically, variables in the macro-economy are left as the only data available for investors to depend on to assist them in making decisions. Theoretically there are implications establishing a valid relationship amongst macroeconomic variables and stock prices as existent. Many literary studies on this subject matter were targeted majorly at developed society markets. Meanwhile, over the years there have been evidences of increasing inflows of funds into the stock markets of emerging societies majorly for asset allocation efficiency propelled by increased liquidity in developed market and liberalization efforts of government day in day out and as such attention should be given to changes in macroeconomic variables as they are indicators to investors on the Nigerian economy as well as the country's market conditions.

**Research questions:**

- Is there any short term adjustment between exchange rate, interest rate, inflation rate, GDP, oil prices and stock prices?
- To what extent and in how can changes in stock prices be determined by macroeconomic variables fluctuations in Nigeria?
- Is there any long term dynamic relationship existing between exchange rate, interest rate, inflation rate, GDP, oil prices and stock prices?

**Research objectives:** The major objective of this study is to assess the relevance of selected macroeconomic variables in predicting the trends of stock prices in Nigeria from 1985-2014. However, the specific objectives are as follows:

- To investigate the short term adjustments between exchange rate, interest rate, inflation rate, GDP, oil prices and stock prices?
- To analyze the extent to which changes in stock prices is determined by macroeconomic variables fluctuations in Nigeria
- To examine whether there is any long term dynamic relationship between exchange rate, interest rate, inflation rate, GDP, oil prices and stock prices in Nigeria

**Statement of research hypotheses**

**Hypothesis one:**

- $H_0$: there is no significant short run adjustment between inflation rates, interest rates, exchange rate, GDP, oil price and share prices in Nigeria
- $H_1$: there is a significant short run adjustment between inflation rates, interest rates, exchange rate, GDP, oil price and share prices in Nigeria

**Hypothesis two:**

- $H_0$: there is no significant long run relationship between inflation rates, interest rates, exchange rate, GDP, oil price and share prices in Nigeria
- $H_1$: there is a significant long run relationship between inflation rates, interest rates, exchange rate, GDP, oil price and share prices in Nigeria

**Scope of study:** In carrying out this research work, attention is directed to the Nigerian stock market depicting the trend of stock prices, employing time series data from 1985-2014 which capture the adjustment, post adjustment and post reform periods in Nigeria. For emphasis sake and review of relevant literature, inferences would be made from other economies. In order to avoid data bias, ambiguity and also to have the same volume of data, this study employs the all share index instead of the individual share prices in order to obtain substantial result.

This study is divided into five parts. Part one above is the introduction. Part two reviews the relevant literature, part three discusses the methodology employed in this study and part four is data presentation and analysis while part five discusses the findings and recommendations.

**Literature review**

**Introduction:** This study is divided into three parts: the conceptual framework, the theoretical review and the empirical literature. The conceptual framework majorly defines the various macroeconomic variables and their individual economic impact on stock prices. The theoretical review discusses different models relating macroeconomic variables to stock prices which are relevant. The empirical part will assess if the observed findings in the literature are in line with the expectations expressed in the theoretical section and finally the stylized facts would be discussed.

**Conceptual framework**

**Economic implications of variations in economic aggregates on stock prices**

**GDP in relation to stock prices:** GPD values are a strong indicator for an economy whether at a boom or a recession. The growth of any economy is crucial in terms of the earnings expectations of corporate entities and a crucial drive for stock prices. A term which is commonly referred to as "follow the growth" approach, indicates investments made in the stock market when the growth of that economy is on a rise, which is the more definite option investors are inclined to opt for. Sante (2010) in his study surveyed the stock market performance and GDP growth of 83 countries within the 1900 and 2009, even shorter periods and it was indicative that high growth economies investments most likely don't fail. As such most studies carried out showed investments made in strong growing economies stock market produces similar or under results in terms of returns than exposures in countries with medium or slow growth.

**Interest in relation to stock prices:** The rate in the money market can be seen as money market rate is considered as a proxy for interest rate. As a component in the financial market, instruments in this market have shorter maturity period and are highly liquid in nature. Participants in this market take advantage of it majorly as a borrowing channel, thus, a hike in the rate of interest will evidently follow a decline in the price of shares; this is because higher interest rate raises the opportunity cost of holding money which in turn causes stock substitution for securities bearing interest. The rate of interest is a crucial variable in the macro-economy as it relates directly to its growth.

**Exchange rate in relation to stock prices:** The next macroeconomic variable expended in the course of the work is the rate of exchange, the study used the bilateral nominal exchange rate of the Nigerian Naira (N) against

one unit of a Foreign currency, dollar ($). The justification for this is that the main market for Nigerian Foreign trade is the United States. A hike in the rate of exchange leads to a decrease in the price of stocks due to inflationary expectations. Besides, companies who import heavy incur high cost as a result of weakened home currency resulting in lower share prices and earnings. Consequently the stock market that comprises of various firms negatively responds to any depreciation in the currency. Nevertheless, domestic exporting companies gains from depreciations in currency majorly because it causes their products to become cheaper thus attractive to Foreign clients. On the macroeconomic scale, depreciations in the currency increase exports of the domestic companies which in turn discourage the industry for imported goods. Generally, the influence of the rate of exchange on the price of stock is either a negative or positive association. Going by the study carried out by Doong *et al.* (2005) research, we assume the negative relationship is predominant.

**Fluctuations in the international oil price in relation to stock prices:** The major source of income to the Nigerian economy is the oil industry. Oil one of the most valuable, versatile and flexible non reproductive, depleting natural resources is Nigeria's major source of Foreign exchange earning constituting about 97% of Nigeria's Foreign exchange earnings, since the 80's. Asaolu and Ilo (2012) stated that the growth engine of the Nigerian economy is oil. It comprises of 70% of the budgetary revenue. It is also seen as the Nigerian economic backbone as it is the focal source of the Nigerian economy comprising of 97% since the 80's, a little above just 20-25% GDPin total in the 80's, finally, comprising of 70% budgetary revenue. Oil has remained the engine of growth of the Nigerian economy. The oil industry is the main backbone of the Nigeria economy. Oil one of the most valuable, versatile and flexible non reproductive, depleting natural resources is Nigeria's major source of Foreign exchange earnings. The study stated that in Nigeria, persistent vandalisms of oil ridges and hostage situations especially in the Niger Delta area has significantly brought about oil production and exploration fluctuations. Persistent decline in the price of oil might be a negative indicator and contribute significantly to investors pulling out their investments.

**Theoretical framework on share pricing:** Several researches have formulated several theories and framework connecting variables in the economy to the returns on stock. Some of these are: Fama (1970) semi strong market hypothesis, Ross (1976) and Roll and Ross (1980) arbitrage pricing theory amongst others. Most of these theories and postulations will be treated in this section, illustrating the connections of these specific variables in the macro-economy to returns on stock as well as its price.

**Arbitrage pricing model:** Postulated in 1976 by Ross, the Theory is seen as a different means to link variables in the macroeconomy to returns in the stock market, noting that the return is a dependent factor on asset price. Ross (1976) introduced a multipurpose method in explaining the pricing of assets using this theory. He stated that the main sway on the return on asset are basically forces in the economy which includes:

- Unexpected risk premium shifts
- Unexpected transient in industrial production level
- Unexpected hike in inflation level
- Unexpected shifts in interest rate structure terms. The above factors are referred to with specific factor coefficient to measure asset sensitivity to each factor

It is seen as a distinct method in measuring the price of assets, thus deriving base from law of one price. It is a basic fact that for a market to be said as efficient two separate items would not sell for separate prices; else arbitrage chances cannot exist. Therefore, APT demands stock returns to be related linearly to indexes stated in the equation:

$$R_i = a_i + b_{i1}I_1 + b_{i2}\ I_2 + ... + b_{ij}I_j + e_i$$

Where:

$a_i$ = The level anticipatedstock return iwith zero value indices
$i_j$ = Stock return impact on the value of the jth index that impacts the return on stock i
$b_{ij}$ = The jth index stock sensitivity
$e_i$ = A zero mean and variance random term

Chen *et al.* (1986) stated that individual stock relies on expected and unexpected variables. According to them investors returns is influenced unexpected incident and as such connects these returns to prevailing conditions in the economy as a whole. This theory is generally considered as the global asset pricing model as it has been the primary motive for other studies. Factors in the macroeconomythat are components of these model are either monetary or real economic factors which are: industrial production, the rate of exchange, the rate of interest, the rate of inflation, the international price of oil amongst others. Empirically and theoretically, emerging stock exchange volatility is a widely found feature. The establishment of the Arbitrage Pricing Theory (APT) led to several researchers conducting different test employing

several substitute as factors for APT and loading factors. Characteristics affecting returns expected should be stated before and then it would be easier to measure market prices over a given period of time.

The major difference between the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Technique/model (APT) is that the former suppose the price of asset as dependent on factor in the market, thus is seen as a one factor model. Arbitrage Pricing Technique/model (APT) can be seen in contrast with CAPM because the later believes that the price of asset is affected by non market and market forces which includes; inflation, rates of unemployment, Foreign exchange. Nevertheless, a major flaw of APT despite its contribution in propelling asset pricing model is that factors included in asset pricing are not stated.

**The efficient market hypothesis:** Ibenta is of the view that one of the key concepts underlying investment analysis is the notion of efficient capital markets. From the investor's point of view, it is necessary for such an investor to be involved in a fair game (Finnerty, 1976). The Efficient Market Hypothesis (EMH) was developed from the Random Walk Theory. The EMH says that market is efficient at times since share prices reflect available information in the market. In this case, the market price is the only good and correct guide for the share selection. Efficiency in the capital market is seen from the functions of expected capital in the economy which are classified into.

**Allocation efficiency:** Here, the capital market is expected to optimally allocate scarce savings to productive investments in a way that benefits all in other words, channelling funds to those firms with the most promising real investment opportunities.

**Operational efficiency:** Here intermediaries provides suitable funds channels at minimum cost from savers to investors

**Pricing efficiency:** This exists when prices are used as signals for capital allocation and such places as set by forces of demand and supply. It should be noted that markets are said to be efficient if prices fully reflect all available information. In this market all investors realises the same level of returns at a given risk level and no scheme devised by an individual to earn higher returns.

**Fundamentalist theories:** Akani (2013) stated that it is the statistical evaluation of stock prices using audit reports, profit and loss statements, balance sheets, dividend records, sales data etc to forecast future business conditions. Fundamental analysis involves an estimate of the intrinsic value of a security by evaluating the basic financial and economic facts about the company that issues the security. The intrinsic value is the present worth of the future dividends or earnings expected from the share. Once the intrinsic value is determined, it is then compared to the current market value. If the current market value is below the intrinsic value, a buy recommendation is issued as it is under-priced because the price of such share is expected to move up in future to match with the intrinsic value. In the other words when the market price of a share is higher than the intrinsic value, the share s perceived to be overpriced and as such, the investor is advised to sell the shares. Okafor is of the view that fundamentalists use three basic performance indicators in predicting intrinsic values. These are the earnings record, index of risk and conversion rate for funds.

**Empirical review:** No satisfactory theory would argue that the relation between the financial market and the macro economy is entirely one direction. Asset prices are universally believed to react sensitively to economic news as well as several external forces. Chen *et al*. (1986) stated that it should be noted that all economic variables are endogenous only natural forces such as earthquakes; tsunami and the likes are truly exogenous to world economy. He also stated that set of economic state variables have systematic influence on stock market returns and he examined their influence on asset pricing and discovered that asset pricing depends on their exposure to these economic state variables which is consistent with the asset pricing theories by Merton (1973) and Cox *et al*. (1985).

Fama (1981) stated that his study discovered a meaningful connection amongst indicators of the macro-economy and the price of stock. His study led to other studies, expatiating on the subject matter to grasp the relevance of this connection in selected group of countries or a single country. Wongbangpo and Sharma (2002) investigated the influences of interest rate in the long run has on the price of stock in selected Asian Countries. He found a long term positive relation in Indonesian and Malaysia but found a negative long term linkage amongst interest rate and the price of share inPhilippines, Singapore and Thailand. Al-Tamimi as cited in Olugbenga recognized selected internal company influences and external influences as factors affecting the price of assets. His study illustrated this using a simple regression model to evaluate the correlation coefficients amongst independent and dependent variables which is seen as:

$$SP = f(EPS, DPS, OL, GDP, CPI, INT, MS)$$

Where:
SP = The price of stock
EPS = Earnings per share
DPS = Dividend per share
OL = The price of oil
GDP = Gross domestic product
CPI = Consumer price index
INT = The rate of interest
MS = The supply of money

He found that the internal factor's of the firm shows the most impact on the price of stocks significantly. Kyereboah-Coleman examined the effect of macroeconomic variables on the Ghana stock exchange and found that macroeconomic indicators such as lending rate, inflation rate and so on affect the stock market performance. Their result concludes that these indicators must be considered by investors in developing countries. Khaled (2009) empirical research showed that there exist a statistically significant association among domestic production sector, money market and stock prices in Vietnam. The studies further indicated that the fundamentals of the US macro-economy (both external macroeconomic variables) substantially affects the price of stock in Vietnam and even indicates that these external fundamentals influence is stronger than that of the local market. Chen *et al*. (1986) stated that anequilibrium relationship in the long run exist amongst relevant macroeconomic variables and stock prices as the prices of asset is responsive to unexpected news.

On the contrary, Yao and Bedi (2011) investigated the role of macroeconomic variables in stock market movement in Cote d Ivoire. Dynamics in the short term were found through the input response function and forecast variance decomposition analysis. The study used a casualty test to determine the relations existing between relevant variables in the short run. It revealed that a strong bi-directional association exist amongst domestic interest rate and Stock Price index (SP). This implies that interest rate changes can be used to forecast future movements in stock prices. They also used co-integration analysis which supported that long run relationship exist between s hare prices and macroeconomic variables. However, the linkages among selected macroeconomic variables and the movements in the stock prices domestically were discovered as weak, thus, macroeconomic indicators in Cote d Ivoire are not appropriate indicators to forecast future movements in the stock market. However, it was indicated that relevant policies of the monetary authorities should be enforced to manage the rate of inflation which in turn would decrease the volatility of the stock market.

Benjamin examined the dynamic relationship between the prices of stock and exchange rate in the Brazilian economy and found out that there is no long run relationship but a unidirectional causality from stock prices to exchange rate in line with the portfolio approach. Stock prices leads to exchange rate with a negative correlation but there is no bidirectional causality from exchange rate to stock prices in line with the traditional approach. Izedonmi and Abdullahi (2011) empirical test on the effects of key macroeconomic variables (inflation, market capitalization, exchange rate) on stock prices in Nigeria has found no significant effect of those variables on stock prices in Nigeria which is broadly consistent with similar studies carried out in most developed and emerging economies. Yohannes examined stock market efficiency in Nigeria with regards to indicators in its macro-economy.The study employed the casualty method, however, it discovered an indecisive result.

## MATERIALS AND METHODS

**Model specification:** This study consists of the empirical method used to examine the relationship between macroeconomic aggregates and stock prices in Nigeria from 1985-2014. 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 stock index (used as a substitute for the price of stock) and macroeconomic variables. The model considers stock price as the dependent variable because it is a core factor in explaining the dynamics of stock market performance. The variables to be considered in the study are stated below discussed in Appendix 1:

- SI: share price index
- ER: exchange rate
- INF: inflation rate
- INTR: interest rate
- OP: international oil price

The implicit form of the model is stated below:

$$SI = F(ER, INF, INTR, OP)$$

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

$$LSI = \alpha_{it} + \beta_0 LER_t + \beta_1 LINF_t + \beta_2 LINT_t + \beta_3 LOP_t + U_t \quad (1)$$

$U_t$ is the error term which captures all the other variables not explicitly covered in the model, the error term is to be independently distributed. Our prior expectation about the relationship between share prices and the selected macroeconomic variables is that these indicators have significant effects and consequently may predict the future price trend. Concerning the signs and estimated coefficients are such that OP and IF are expected to be positive, i.e., >0 while INT is expected to be negative, i.e., >0. And exchange rate can be either positive or negative, i.e., >0 or <0. The $\alpha^3$t is the constant term, $\beta_1$>0, $\beta_2$>0, $\beta_3$>0, $\beta_4$>0 are parameters/coefficients to be estimated relating to the short run dynamics of the convergence to the equilibrium and to measure the speed of adjustment in data from the short run equilibrium to the long run equilibrium and to show how fast the system adjust to restore equilibrium.

**Estimation techniques:** This study engages a three step procedure to determine the extent to which macroeconomic aggregates impacts on share prices in the Nigerian Stock Exchange. These procedures are the unit root test by PP and KPSS, Johansen Co-integration Technique and the Vector Error Correction Model (VECM).

**Unit root test:** A series is referred to a weak or covariance stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or lag between the time periods not on the time at which the covariance is calculated.

**Johansen cointegration technique:** After the unit root test, the test for integration among the series is conducted. The presence of co-integration indicates that there is a stationary long term relationship amongst the variables. Co-integration exists amongst non stationary variables if their linear combination such as the residuals of the co-integration regression is stationary. If a stationary co-integrating relationship is established among the variables, spuriousity can be avoided. Essentially, co-integration can be used to find out if the independent variable can be used to predict the dependent variables both in the short run and the long run.

**Error correction mechanism:** Short run equilibrium may not occur even if long run equilibrium exists among variables in the regression model. Hence, information obtained from the co-integration test is subject to the vector error correction model. VECM is the most suitable method of analysis reason being that it shows short run dynamics between the variables being studied. It also enables one obtain a measure of the speed of adjustment to the long run relationship and assess the presence and direction of these casualties, VECM, thus helps to correct discrepancies.

**Data description:** Data extracted was on quarterly basis from selected firms' stock prices, inflation rate, exchange rate, broad money supply, interest rate; oil prices and GDP in Nigeria were analyzed and used throughout the process. For the purpose of the study a period of thirty years (1985-2014) was useddepicting the post-adjustment, adjustment and reform eras in Nigeria. Also, this study was restricted to the Nigerian capital market. The panel data sets were sourced from various issues of the Central Bank of Nigeria Statistical Bulletin, World Development Index and the NSE Daily Equities Report. As at 1985, there were ninety three equity stocks in the Nigerian stock market. However, the work uses the stock index of all equities quoted that have been active and persistentin the market within the time frame.

## RESULTS AND DISCUSSION

**Introduction:** This research work is primarily interested in finding out the relevance of selected macroeconomic variables in predicting the trends of stock prices in Nigeria from 1985-2014. This chapter is concerned with the presentation of data, analysis of data and interpretation of findings from the model as specified in the previous chapter as well as testing the research hypothesis which is meant to empirically test variable estimates in the model earlier specified. This chapter also presents the descriptive analysis, the unit root results, co integrations and error correction model as well as their interpretations. This estimation was done using E-views 7.0. The empirical study is based on annual data from 1985-2014 from the Central Bank of Nigeria (CBN) Statistical Bulletin, stock exchange fact book.

**Data analysis and interpretation of results:** This study deals with the analysis of data and interpretation of findings, the method of data analysis employed are the Phillips Peron'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.

Table 1: A table showing the unit root test results

| | 1st difference | | | Levels | | |
|---|---|---|---|---|---|---|
| Variables | PP-statistic | Critical value at 5% | Remarks | PP-statistic | Critical value at 5% | Remarks |
| LSI | -4.191753 | -2.971853 | Stationary | -2.027114 | -2.967767 | Non stationary |
| LEXR | -6.313985 | -2.971853 | Stationary | -1.720430 | -2.967767 | Non stationary |
| INF | -5.757247 | -2.971853 | Stationary | -2.676145 | -2.967767 | Non stationary |
| LNTR | -5.723654 | -2.971853 | Stationary | -0.041628 | -2.967767 | Non stationary |
| LGDP | -5.026984 | -2.971853 | Stationary | -2.207256 | -2.967767 | Non stationary |
| LOP | -8.415839 | -2.971853 | Stationary | -2.579099 | -2.967767 | Non stationary |

Researcher's compilation from E-views 7.0; a variable is stationary when PP value is greater than the critical value

Table 2: A table showing unrestricted co integration rank test

| Hypothesized no Of CE(s) | Max-Eigen statistics | 0.05 critical value | Prob.** | Hypothesized no of CE(s) | Trace statistic | 0.05 critical value | Prob.*** |
|---|---|---|---|---|---|---|---|
| None* | 45.989240 | 40.077570 | 0.0096 | None* | 123.276900 | 95.753660 | 0.0002 |
| At most 1 | 28.025050 | 33.876870 | 0.2123 | At most 1* | 77.287650 | 69.818890 | 0.0112 |
| At most 2 | 23.346920 | 27.584340 | 0.1591 | At most 2* | 49.262600 | 47.856130 | 0.0366 |
| At most 3 | 12.299150 | 21.131620 | 0.5184 | At most 3 | 25.915670 | 29.797070 | 0.1312 |
| At most 4 | 7.814566 | 14.264600 | 0.3979 | At most 4 | 13.616520 | 15.494710 | 0.0941 |
| At most 5* | 5.801956 | 3.841466 | 0.0160 | At most 5* | 5.801956 | 3.841466 | 0.0160 |

Researcher's compilation from E-views 7.0

Table 3: Normalized co integrating relationship

Normalized co integrating coefficients (Standard error in parenthesis)

| LSI | LNER | LINF | LINTR | LGDP | LOP |
|---|---|---|---|---|---|
| 1.000000 | 2.193503 | -5.230607 | -1.595848 | 0.433867 | -2.408409 |
| | (0.54219) | (0.75428) | (1.62951) | (0.88025) | (0.65076) |
| | [4.0456353] | [-6.9345694] | [-0.9793423] | [0.4928907] | [-3.7009174] |

Researcher's compilation from E-views 7.0; standard error and t-statistics are stated in parenthesis as () and [] respectively

**Unit root test**

**Unit root result:** The section examines the unit root property of the variables in the model. This 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. The test statistics for the log levels of share price index, exchange rate, inflation rate, interest rate and gross domestic product and oil prices 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 six 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 the 5 per cent level. Thus, from all of the tests, the unit roots tests indicate that each variable is integrated of order one.

**Co integration test:** 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 thereexists at least one co integrating equation among the variables in the model. This conclusion is 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 (45.98924), (5.801956) and trace statistics (123.2769), (77.28765), (5.801956) indicates the presence 2 and 3 co integrating equations at 1 percent 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 share price index.

Table 3 shows result of the normalized co integration coefficients of the variables for the instance when there are more than one co integration equation which was affirmed from Table 3 with the trace and maximum Eigen statistics. The results in Table 3 will be explained with respect to the inverse signs and magnitude of the variables in the normalized co integration result. The probability value of the t-statistic is used to indicate the significance or otherwise of the independent variable in the long run. Generally using the rule of thumb if the

Table 4: A table showing the vector error correction estimates

| Variables | D(LSI) | D(LNER) | D(LINF) | D(LINTR) | D(LGDP) | D(LOP) |
|---|---|---|---|---|---|---|
| ECM (-1) | -0.780721 | 1.066478 | -0.056411 | 0.169677 | -0.167390 | 0.216372 |
| Standard error | (0.35763) | (0.41494) | (0.47529) | (0.14160) | (0.09907) | (0.34659) |
| T-statistic | [-2.18301] | [2.57018] | [-0.11869] | [1.19826] | [-1.68963] | [0.62429] |

Researcher's compilation from E-views 7.0; standard error and t-statistics are stated in parenthesis as () and [] respectively

t-statistics is 2 or greater than two, 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 exchange rate, inflation and oil prices and share price index while gross domestic product and interest rate appears not to be significantly influencing share prices within the scope of this study.

The result from Table 3 shows a significant relationship between exchange rate and share price index at 5% level of significance. This further reveals that a percentage change in exchange results to a corresponding 2.19% change in share price index. The analysis of the result shows a proportionate change in exchange rate leads to a more proportionate change in share price index holding other variables at a constant. The evidence from the elasticity estimate reveals that the degree of responsiveness of share price index to the variations in exchange rate is greater than one and therefore elastic. This shows that exchange rate plays a determinant role in share price valuation.

The analysis of the co estimate of inflation reveals a significant long run relationship with share price index at 5% level of significance. A percentage change in inflate rate indicates 5.23% age change in share prices, all things being equal. The above evidence further reveals that a proportionate change in inflation rate will result to a more proportionate change in share prices. It therefore implies that the degree of the responsive of share price index is greater than unit elasticity and thus elastic.

The result from the parameter estimate for interest rate and gross domestic product reveals no significant relationship at 5% significance level. This further shows that the variations in interest rate and gross domestic produced no significant effect on share price within the period under consideration by the current study and hence, could not be considered a significant determinant of the variations in share prices within these periods.

There is an existence of a significant relationship between oil prices and share price index as indicated from the parameter estimate of oil prices. There is an inverse relationship between oil prices and share price index, a further analysis of the result indicates that a percentage change in oil prices will bring about 2.41%age changes in share prices. This implies that a proportionate change in oil prices has a more proportionate effect on share price. The estimated elasticity thus suggests a higher elasticity >1. Thus the degree of the responsiveness of share price index to oil price variations is adjudged to be elastic.

Hence exchange rate, inflation rate and oil prices reveals a significant effect on share prices which further reveals that the variations in exchange rate, inflation rate and oil prices plays a significant role in determining share prices.

**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 serves as a means of reconciling short run disequilibrium behaviour of an economic variable of interest with its long run behaviour

From Table 4 the result shows that the coefficient of the estimated share price index as expected is negative and it lies between zero and one and it is also significant at 5% level. The significance of the error correction model agrees with the co integration and gives the opinion that there is long run steady-state equilibrium between the level of share price index and the explanatory variables; exchange rate, inflation rate, interest rate and gross domestic product and oil prices.

Table 4 indicates that estimated lagged error correction term for share price 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 0.781, this implies that 78.1% of current error in the model would be corrected in the long-run. These indicate that whenever there is the presence of external shock resulting to disequilibrium of the system, the system could easily make short-run adjustment to re-establish long-run equilibrium given the speed of adjustment from the short-run to the long-run equilibrium at 78.1% per annum. The value is also known

as the speed of adjustment and it measures the rate at which disequilibrium in the model is corrected or adjusted to long run equilibrium path, this implies that 78.1% of the errors generated in the current period within the model are corrected in successive periods.

**Testing of hypothesis:** Here, the study tests the hypothesis to establish if there is a significant relationship between share prices and selected macroeconomic aggregates, what kind of relationship exist and also the responds share price index have to these macroeconomic indicators (Table 1-3).

**Hypothesis I:**

- $H_0$: there is no significant short run adjustment between inflation rates, interest rate, exchange rate, GDP, oil price and share prices in Nigeria
- $H_1$: there is a significant short run adjustment between inflation rates, interest rate, exchange rate, GDP, oil price and share prices in Nigeria

Based on results obtained from the error correction mechanism, share price index is negative and lies between zero and one at the level of 5% showing significance. Also, there is a high speed of adjustment of 0.781 which is 78.1% indicating that all short run shocks experienced from the selected macroeconomic aggregates would be adjusted in the long run. This is a pointer that all current disequilibrium in share price caused by variations in the international oil price (such as oil price fluctuations), GDP (based on growth experienced in the economy), interest rate (fixed from time to time by monetary authorities) and inflation rate; would be adjusted faster back to its original position.

**Decision:** Thus, the study reject the null hypothesis and accept the alternative hypothesis that there is a significant short run adjustment between share price index and macroeconomic aggregates and this motion has a high speed of adjustment back to its original position.

**Hypothesis 2:**

- $H_0$: there is no significant long run relationship between oil price, inflation rate, interest rate, GDP and share price in Nigeria
- $H_1$: there is a significant relationship between oil price, inflation rate, interest rate, GDP and share price in Nigeria

Johansen Co-integration test was used to check whether long run relationship in order to carry this out. First the Phillip Peron's test was conducted to determine the stationarity of the time series, the series is said to be stationary at the order 1. Also, the normalized co integrating relationship agrees with the Johanesen co integrating relationship about the presence of co integrating relationship which implies there is a long run relationship.

**Decision:** It is on the above stated results that the study rejects the null hypothesis and accepts the alternative hypothesis that there is a long run relationship between macroeconomic indicators and share prices.

From Table 4 the Normalized Co-integration relationship coefficient for exchange rate is statistically significant which implies that it is statistically different from zero, this indicates that is a positive and significant relationship between exchange rate and share price index. Fluctuations in the exchange rate in the Nigerian economy would lead to changes in the prices of share when there is an increase in the rate of exchange (decrease in the value), there would be a corresponding increase in the prices of shares.

Using the Co-integration coefficients and the t-stat there is a negative significant relationship between inflation rate and share price index that rate of inflation in the Nigerian economy affects the price of shares when there is a decrease in inflation rate there would be a corresponding increase in share prices and also when there is an increase in inflation rate in the Nigerian economy share price would also decrease at the same rate.

There is an insignificant negative association amongst the rate ofinterest and the prices of share in the Nigerian stock market when the rate of interest on savings funds placed by various Bank is increased there would be a decrease in the price of shares in the stock market because customers would pull out their investment in the stock market to patronize the banks. Also, when there is a decrease in savings rate of interest people would rather patronize the stock market due to the increase gain they would receive. Although, findings showed that the rate of interest prevalent in the economy does not necessarily determine the price of share in the market.

There is an insignificant negative association amongst gross domestic product and share price in the stock market. This implies that as there is persistent growth in the economy this would attract both Foreign and local investors to invest in the stock market which would cause the prices of shares to increase overtime, also, a decrease in the growth of the Nigerian economy

would scare away both Foreign and local investors and cause a decrease in the price of shares due to reduced demand for stock market instruments.

There is a negative significant relationship between oil price and share price index; this implies that the price of oil in the International market affects the prices of shares in the Nigerian stock market negatively. This is largely because the Nigerian economy is solely dependent on oil produce as the major source of its income and fluctuations in the price of oil has a ripple effect on the economy and consequently on share price index overtime. More so, there is an inverse relationship between share price index and Oil price which means that when the price of oil increases, share price decreases with the percentage change and when the price of oil decreases, share price increases with the percentage change. This shows that in the long run the Nigerian Stock market complies with the golden rule that 'oil up stock down'. This is in line with the findings of Asaolu who stated that an increasing bullish/bearish oil market would cause a bearish/bullish market in the long run. This is because Nigeria use up large amount to import refined petrol despite it is one of the highest oil producing nations.

**Findings:** The findings of this study were derived from data generated from the survey. The Phillip Peron's Unit Root test was carried out to test for the stationarity of the variables so as to enable the study to further conduct the Johansen Co-integrating test to check for the existence of a long run relationship between share prices and macroeconomic indicators. Johansen Co-integrating test was used to check for the presence of Co-integrating relationship amongst variables. The Vector Error Correction Model was used to test the short run adjustment of share prices to shocks from variations in selected macroeconomic indicators which includes inflation, exchange rate, interest rate, gross domestic product and oil price, oil price was selected because of its defined peculiarity with the Nigerian economy. The time period selected was from 1985-2014 which covers pre adjustment period, adjustment and post adjustment period. The empirical findings of the data analysis are presented.

From Table 1, although, the Phillip Peron's Unit Root test result showed that the variables were not stationary at levels but all variables but 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. The implication of this is that there is an overall long run relationship between macroeconomic indicators and stock prices, thus, these indicators can be used to predict stock prices in the long run.

From Table 2, the normalised 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 exchange rate, inflation rate and oil price have a significant long run relationship with share price index. Although, oil price had an inverse significant relationship with stock prices which is largely because Nigeria spends huge amount of funds annually to import refined petrol and other petroleum products with the attendant negative impact on the economy. Rising oil prices lead to increase in production cost, increase in product prices and subsequent decline in demand for goods. A negative impact of rising oil price on the stock market may be considered reasonable for non-oil producing countries and not for an oil producing country like Nigeria.

Inflation rate increases in the same direction with share prices with aligns with theoretical expectation due to the perception market investors have that the stock market is a perfect hedge against inflation in the post structural adjustment period. If inflation rate changes, stock market investors adjust their perception of stock prices.

Exchange rate increases in the same direction as share prices because with a rise in the exchange rate of a country (consequently a reduction in the value of a firm's currency), the stock prices of the country would become cheap and consequently attractive to Foreign investors.

Interest rate has an insignificant relationship with stock price which implies that fluctuations in the rate of interest placed by commercial banks do not affect the share prices although there is an inverse relationship between share price and interest rate. When the interest rate increases investors pull out their funds and invest in stocks while when there is a decrease in the rate of interest, investors would rather patronize the banks and sell off stocks.

The growth of the economy proxy by the gross domestic product does not have significant impact in influencing the price of shares although there is a positive relationship between both of them. This is because even though there is an increased growth rate in the Nigerian economy over the years, it has no led to sustainable development and thus the stock market is yet to benefit from economic increase.

From Tables 3, results obtained indicate that the Nigerian Stock Exchange 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. The implication is 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 research work investigated the relationship between macroeconomic indicators and stock prices movement in the Nigerian Stock Market. In testing this relationship, literatures discussing similar issues across different countries were looked into and its relevance to the study were discussed extensively. The findings reveal that inflation rate increases in the same direction with share prices and when there is a change in inflation rate, the perception of investors in the stock market is adjusted. Therefore, the investors in the stock market should monitor the trend of macroeconomic indicators in taking investment decisions.

## RECOMMENDATIONS

This study recommends that monetary authorities concentrate its energy with specific intention towards creating a suitable environment that would ensure that the market deepens and thrives in the long run.

The study recommends before the Nigerian Stock Exchange can benefit from the Nigerian oil sector fund inflows, the federal government has to generate petrol for its citizens internally so that it can use the funds that would have gone otherwise to importing fuel to develop its economy, this can be done by repairing old refineries, building new ones and ensuring continuous maintenances of these refineries. Also, relevant authorities can intensify efforts towards reducing and stabilizing the level of inflation in the economy. This can be done through emphasis on increasing capital expenditure over recurrent ones and from time to time imposing budget surplus to curb increasing inflation rate. Finally, policies on export that would lead to the appreciation of the nation's currency should be promoted and executed so as to increase the worth of shares to external investors and consequently share prices.

The study recommends that investors can watch the trends of macroeconomic variables fluctuations and predict stock prices. However, it should be duly noted that the Nigerian Stock Exchange has the ability to fix itself and revert back to its original position in the long run.

**Appendix 1: Nigerian stock exchange description**

| INF | INTR | OP | SI | EXR | Years | GDP |
|---|---|---|---|---|---|---|
| 1985 | 67,908.55 | 7.435 | 9.50 | 0.023 | 1407.90 | 99.90 |
| 1986 | 69,146.99 | 5.717 | 9.50 | 0.190 | 1797.80 | 51.89 |
| 1987 | 105,222.84 | 11.290 | 14.00 | 0.300 | 2123.00 | 14.72 |
| 1988 | 139,085.30 | 54.511 | 14.50 | 0.300 | 2529.70 | 12.97 |
| 1989 | 216,797.54 | 50.467 | 16.40 | 0.400 | 3286.40 | 8.88 |
| 1990 | 267,549.99 | 7.364 | 18.80 | 0.800 | 5083.90 | 7.72 |
| 1991 | 312,139.74 | 13.007 | 14.29 | 1.090 | 8059.40 | 6.34 |
| 1992 | 532,613.83 | 44.589 | 16.10 | 0.090 | 11172.20 | 3.74 |
| 1993 | 683,869.79 | 57.165 | 16.66 | 1.090 | 14748.30 | 2.97 |
| 1994 | 899,863.22 | 57.032 | 13.50 | 2.000 | 22958.70 | 2.96 |
| 1995 | 1,933,211.55 | 72.836 | 12.61 | 2.000 | 45781.40 | 0.74 |
| 1996 | 2,702,719.13 | 29.268 | 11.69 | 9.300 | 71461.70 | 30.17 |
| 1997 | 2,801,972.58 | 8.530 | 4.80 | 12.000 | 91663.10 | 28.83 |
| 1998 | 2,708,430.86 | 9.996 | 5.49 | 15.500 | 71542.50 | 28.32 |
| 1999 | 3,194,014.97 | 6.618 | 5.33 | 19.410 | 63170.30 | 73.91 |
| 2000 | 4,582,127.29 | 6.933 | 5.29 | 28.400 | 80414.10 | 77.21 |
| 2001 | 4,725,086.00 | 18.874 | 5.49 | 24.500 | 122220.90 | 81.30 |
| 2002 | 6,912,381.25 | 12.877 | 4.15 | 25.150 | 139582.40 | 88.95 |
| 2003 | 8,487,031.57 | 14.032 | 4.11 | 28.770 | 186718.70 | 100.63 |
| 2004 | 11,411,066.91 | 14.998 | 4.19 | 38.270 | 296863.80 | 107.07 |
| 2005 | 14,572,239.12 | 17.864 | 3.83 | 55.670 | 274520.60 | 106.58 |
| 2006 | 18,564,594.73 | 8.240 | 3.14 | 66.840 | 304122.60 | 105.02 |
| 2007 | 20,657,317.66 | 5.382 | 3.55 | 75.140 | 585279.70 | 106.41 |
| 2008 | 24,296,329.29 | 11.578 | 2.84 | 100.600 | 605096.40 | 80.03 |
| 2009 | 24,794,238.66 | 11.538 | 2.68 | 63.250 | 277098.60 | 96.03 |
| 2010 | 29,205,782.96 | 13.720 | 2.21 | 81.070 | 297307.10 | 96.88 |
| 2011 | 37,409,860.61 | 10.841 | 1.41 | 114.150 | 302115.70 | 101.17 |
| 2012 | 40,544,099.94 | 12.217 | 1.70 | 113.660 | 316711.20 | 98.94 |
| 2013 | 54,204,808.02 | 8.476 | 2.17 | 111.360 | 36207.08 | 96.69 |
| 2014 | 63,258,588.00 | 8.476 | 1.76 | 98.270 | 33428.18 | 98.93 |

GDP-Gross Domestic Product, INF Inflation Rate, INT-interest rate, OP Oil price, SP-Share Price, EXR-Exchange Rate; CBN and OPEC Annual Report

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