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ANALYSIS OF MACROECONOMIC AGGREGATES ON STOCK PRICES IN NIGERIA: AN APPLICATION OF CO-INTEGRATION AND CAUSALITY TESTS 1985 – 2011

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ABSTRCT: *This study examined the analysis of macroeconomic aggregates on stock prices using evidence from Nigeria Economy. The study investigated the nature of relationship between macroeconomic aggregates proxies by inflation rates, interest rates and money supply while All Share Index (ASI) standing as a proxy for Aggregates Stock Prices.. In course of this study, secondary data were sourced from the Central Bank of Nigeria statistical bulletin and the Nigerian stock exchange fact book. The Granger Causality Test and Johansen Co-integration Test in a Vector Error Correction Model (VECM) setting were employed. The descriptive analysis was also used to mirror their relationship. The empirical results demonstrate that changes in inflation rates, interest rates and money exert a significant impact on aggregate stock within the period understudy. The results also shows that where is a negative long-run relationship between inflation rates, interest rates and All Share Index while a positive significant relationship exist between money supply and aggregates stock prices. However, on the causality test, the study shows a unidirectional causality running from inflation to aggregates stock price and a bi-directional causality between money supply and aggregates stock prices. Therefore, we recommended that macroeconomic policy should be channeled towards improving aggregates stock prices which in turn enhance overall returns on stock market and the Nigerian economy at large.*

KEYWORDS: Macroeconomic Aggregates, Stock Prices, Co-integration

INTRODUCTION

Generally speaking, since the establishment of the Nigeria capital market in 1960, billions of naira worth of shares is being traded in the Nigerian stock market on a daily basis. A lot of people depend on the stock market as their major source of income while others have their retirement funds and benefits tied to the stock market. However, a down turn in stock prices can cause major disturbances in the lives of many and by extension cripple any economy for instance, the global financial meltwdown of 2008, 2009 to late 2010 has been a reference point which no doubt seriously affect the Nigerian stock market and the stock prices, Agundu, Akani and Uzobor (2009) while a well performing stock market will not only impact positively on individual investors but also influence real economic activity such as consumption and investments which in turns affect the national economy.

Capital market is a form of financial institution set up for granting of medium and long term loans. It is a market for government securities, cooperate bonds, mobilization and utilization of long term funds for developmental purposes Ogwbulu, (2010). In this market, investors provide long term funds in exchange for long term financial assets offered by borrowers and such securities can be raised in an organized market such as the stock exchange.

Therefore, underwriting syndicated loans and project financial are involved. Thus, it is a mechanism whereby surplus economic unit desirous of investing surplus funds interact directly or through

financial intermediaries with those who wish to procure funds for their business. Participants in this market include, the Nigerian stock exchange, discount houses, investment banks, stock Broking firms, the government, individuals, Securities and Exchange Commission (SEC). Mobilization of savings for investment which is healthy for an economy is an important feature of the capital market. As a market place where security (stocks, bond, and shares) are bought and sold openly with relative case, the existence of stock market is important to the investors. The stock exchange is a capital market that helps to broaden the share ownership base of firms and evenly distribute the nations wealth by making it possible for people in different locations to acquire shares, bonds and development stock through the simple mechanism of the stock market. For the government also, the stock exchange provides the mechanism for exchanging and mobilization of capital for creating goods and services for the satisfaction and well being of the citizens. In doing this, the stock exchange is not only crucial but also central to the entire mobilization process. This is in view of the opportunity for continuous trading in securities that the market offers.

However, prior to 1960, the then colonial administration made several attempts to introduce capital market activities in Nigeria. For instance, in 1946, the colonial administration floated three hundred British pounds of bonds which were packaged and transacted in London. However, capital market activities in Nigeria commenced with the establishment of the Lagos Stock Exchange in 1960 backed by law in 1961. The Lagos Stock Exchange was established as a self regulatory body to provide facilities for dealing in listed securities, overseeing the trading of those securities and ensure fair pricing of securities. Its establishment was a product of the Federal Government approval of the Barback Committee recommendations. The recommendations of the committee according to Nwankwo (1991) were: 1. The creation of facilities for dealing in shares 2. The establishment of rules regulating transfer of shares 3. Initiate measures to encourage savings and issuance of securities by government and other organizations.

The Lagos Stock Exchange was later renamed the Nigerian Stock Exchange (NSE) in 1977 and as such has increased its trading floors to nine. They are Lagos established in 1961; Kaduna (1998); Port Harcourt (1980); Kano (1989); Onitsha (1990); Ibadan (1990); Abuja (1999); Yola (2002) and Benin (2005). The exchange started operations in 1961 with 19 securities listed for trading. As at July, 2010, the NSE has 261 listed securities according to Nigeria Stock Exchange Factbook. Some of the listed companies have foreign/multinational affiliations in various sectors ranging from agriculture through manufacturing services. In 1985, the NSE introduced the second-tier security market (SSM) for the listing of small and medium scale enterprises that are unable to meet the stringent requirements of the "first tier market". Clearing, settlement and delivery of securities are done electronically by the central securities clearing system limited (CSCS), a subsidiary of the stock exchange which was incorporated in 1992 as part of efforts and investor friendly. In March 1, 2000, the NSE launched and commenced operation on its Trade Guaranteed Fund (TGF) scheme, aimed at arresting the risk .of failed trade that may arise from the inability of a stockbroker to cover his/her purchase. It also commenced T + 3 settlement system in 2000 and launched its e-business platform in July 2002. It made remarkable progress in internationalization of the exchange in 1999 with the cross border listing of M-Net / super sport" on the exchange. The company was concurrently listed on the Johannesburg Stock Exchange (JST), signed a memorandum of understanding with Ghana and Nairobi Stock Exchange to facilitate cross border listing of securities. In March 2005, Trade Alert was launched by the NSE to secure the market against unethical conducts, especially unauthorized sale of client's shares. This help to communicate market related information to subscribers.

However, the NSE operates in two markets as follows: The Primary Market is the market for new issues of securities. The mode of offer for the securities traded in this market includes offer for subscription, right issues, offer for sale and private placements. The fund raised through the segment goes to companies as equity capital and the Secondary Market is the market for trading in existing securities, it consists of the stock exchange and over the counter markets. Money raised in this segment goes to investors while ownership of securities goes to the new investors. Activities in this

segment of the market have substantially increased over the years prompting to the opening of trading floors in other parts of the country by the NSE.

Statement of the Problem

Stock market is indeed a feature of the economics of the Western democracies and as such, constitutes 'the most important situation for massive capital development. Inspite of the various roles such market plays in any economy, a lot of factors exert some impact on stock prices in the market which include interest rate, inflation rate, money supply, just to mention but a few. The effect of inflation rates are reflected especially where there is a change in the expected inflation rate. It will affect stock prices in the sense that, if the rate is higher, share prices increases at a faster rate and when the rate is steady, share prices rise in proportion to price level to maintain a constant ratio of share prices to real earnings according to Feldstein (1978).

Interest rates on the other hand along with monetary aggregates form targets of monetary policy in Nigeria. According to Ologunde, (2006) Interest rates in Nigeria are managed by the monetary authorities through the Central Bank of Nigeria. If the rate of interest paid by banks to depositors is increased, investors patronize the banks and fewer investors will invest in the capital market. This will lead to a decreased capital investments in the economy and in turn lower economic growth and development. A major impediment to the realization of development through the intermediation role is the wide spread gap existing between deposit and lending rates. The rate spread which is the difference between the banks earning from loaned funds and its cost of funds is influenced by non-interest expense such as prudential and reserve requirements, market structure, inflation the effects of inflation rate are reflected especially where there is a change in the expected inflation rate which will affect stock prices according to Feldstein (1978). Due to inflationary pressures, savers may realize that their savings are eroded. This may no doubt impel them, to add to the current consumption thereby hindering capital formation and the nation's economic growth. The relationship between inflation, share prices and rates of return is probably best illustrated within the context Of Dividend Discount Model (DDM). Investors will set the price of a share to a point at which the expected return on the share is equal to the required rate of return Geyser and Lowies (2006). Supposing that the expected inflation rate increases, it brings about a fundamental change in the cash flows of the company and as may change in inflation act on both revenues and expenses which will in turn affect stock prices.

Monetary policy on the other hand is one of the most effective tools that a central bank has at its disposal and many economists has consider it the most important macro economic policy Anyanwu (1993). The central bank uses monetary policy frequently to cause a desired level of change in real activities and it is believed to have a significant effect on the stock market. Specifically, money supply is one of the components of monetary policy used by the central bank. It is argued that changes in money supply should have impact on stock prices and therefore the need to examine such relationship between the most effective economic policy instrument or tool of money supply and one important determinant of an economy – the stock market. There is also an age long controversy in the literature of financial economics as to the nature of the relationship between stock prices and inflation. As earlier mentioned, Fisher (1930) argued that the expected nominal interest rates comprises the expected real interest rate and the inflation premium known as the Fisher effect. This suggests that an increases in inflation premium increases expected nominal interest rate which when transposed implies a positive one to relationship between stock prices and inflation.

However the study of the impact of macro-economic aggregates (inflation, interest rates and money supply) is one of the research in economic and financial studies that the out come has been quite controversial. Empirical evidence from studies and researches conducted at various times and in various countries under various model specifications with regards to stock price-inflation relationship have at best been mixed. For instance, the evidence from some studies conducted in the US rather

indicates an inverse relationship between stock prices and inflation, in contrast to Fisher's hypothesis bodie and Nelson (1976) Fama and Schwart (1977). On the other hand, results from the studies conducted by Firth (1979), Gultekin (1983), Boudouth and Richardson (1993), Anari and Kolari (2001) find robust support for the Fisher's hypothesis that the stock market provides a hedge (partial or complete) against inflationary pressures, Ogbulu (2010). Existing literature in the Nigeria context in support or against fishers hypothesis is very scanty and mixed conclusive evidence yet and as such, the researcher found the need to contribute to the existing research. Therefore, other studies have also show mixed reaction whether inflation causes stock prices to change and vice versa or whether money supply and interest rates can be used to predict stock prices.

In view of these and other controversy, this study seeks to contribute on-going debate by examining empirically the impact of changes in inflation, interest rate and money supply on stock prices in Nigeria as well as to ascertain the direction of causality among these variables. It will also specifically establish whether there is any functional long-run relationship between inflation, interest rates, money supply and stock prices in the Nigerian context.

Objectives

1. To examined if changes in inflation rates has any significant impact on stock prices in Nigeria.
2. To determine whether changes in interest rates cause changes in stock prices and explore the direction of causality.
3. To find out if changes in money supply causes changes in stock price in Nigeria.
4. To examine whether there is any long-run dynamic relationship between stock prices, inflation rates, interest rates money supply and stock prices.

Research Questions

In view of the problem stated, the following questions have been formulated;

1. Do changes in inflation rates have any significant impact on stock prices?
2. Do changes in interest rates cause changes in stock prices and what is the direction of causality?
3. Do changes in money supply have any significant impact on stock price?
4. Is there any long-run dynamic relationship between inflation rates, interest rates money supply and stock prices?

Research Hypotheses

HO_1: There is no significant relationship between inflation rates and stock prices.
HO_2: There is no significant relationship between interest rates and stock prices.
HO_3: There is no significant relationship between money supply and stock prices.
HO_4: There is no significant long-run relationship between inflation rates, interest rates money supply and stock prices

THEORETICAL LITERATURE

Theories of Share Pricing

It is important to know that there are two types of values of an asset (I) the intrinsic or actual worth of the share and (II) the extrinsic or the market value according to Ibenta (2005). The intrinsic value of a company's share is defined as the actual worth or the theoretical price of the share determined by the economic facts about the company that issued the security. It is found by substituting the economic or financial data of the company into any of the various valuation models that have been developed in finance theory which include the asset method (balance sheet), the earning method, the dividend valuation method, realization value method, super-profit method, dual capitalization method, capital asset pricing method (CAPM) and arbitrage pricing method (APM), the extrinsic value is the price at which the share of the company can be sold in the open market. Okafor (1983) is of the view that

market rationality does imply that the price of a security would represent a consensus, or at least, the dominant market evaluation of the worth. It therefore implies that the market price of a security may not always agree with its appraised value, that is, value of a security obtained through independent assessment of its worth by individual investors. Thus, securities would normally have one market value at any point in time, it could have different appraised values reflecting the assessment of individual investors.

It is in the light of these that security evaluation attempts to achieve two objectives:
(a) To determine the appraised value of a security through a rigorous analysis of its value.
(b) To determine whether the security is miss-priced in the market.

A security is said to be miss-priced in the market if it is overvalued or under-valued. Over-valuation occurs when the market price of a security is more than its appraised value while the reverse is the case with under-valuation that is security appraised valued being higher than the market value.

The Basic Theories of Share Pricing are:

The Fundamentalist Theory

This 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 (1983) 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.

The Technical Approach

According to Okafor (1983), it eschews the basic notion of intrinsic values for securities. It relies on market forces for an explanation of security price movement. The basic difference between the fundamental and technical approach according to Ibenta (2005) is that fundamental analysis lay emphasis on real variables such as dividends, earnings etc which influence stock price movements while the technical lay emphasis on price movement resulting from a number of factors which could be real or imaginary, rational or irrational, emotional or psychological, permanent or transient. The approach by technical analyst is summarized by Okafor (1981) as:

a) The price (value) of securities is determined by forces of demand and supply.
b) Demand and supply forces are influenced by both rational and irrational factors.
c) Movements in stock prices tend to follow identifiable, systematic, self-sustaining and recurring trends.
d) Market trends constitute solid foundations on which profitable trading rules can be erected.

The Random Walk Theory

The random walk theory according to Ibenta (2005) asserts that share price movements occur in a random order without any sequence share price movement of today is independent of the one of

yesterday. The theory argued that the Likelihood of future earnings cannot be predicted from past earnings using fundamental or technical analysis but the theory believes that the market is efficient such that all information both from the past and present and even that of the future have been reflected in the market price of the security.

The RWH states that:

1. The market prices of securities fully reflect all available and relevant information about securities.
2. The changes in security prices are not systematic but rather random.
3. There is no specific and recurring pattern in the behaviors of stock market prices which would form a basis for formulating reliable trading rules

The Efficient Market Theory

Ibenta (2005) 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. Capital market efficiency can be viewed from the roles the capital expected to perform in the economy which are classified into:

i) **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, channeling funds to those firms with the most promising real investment opportunities.

ii) **Operational Efficiency:** Copeland and Watson (1983) defined it as a situation whereby intermediaries who provide the service of channeling funds from savers to investors do so at a minimum cost.

iii) **Pricing Efficiency:** This exists when prices are used as signals for capital allocation and such places ac 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 such a market, the same rate of return for a given level of risk should be realized by all investors and no scheme devised by an individual to earn higher returns.

Assumptions of Market Efficiency

Samuelson (1965) as cited in Ibenta (2005) enumerated the following assumptions:

1. No transaction cost of trading in securities
2. Information is freely available to all market participants
3. All investors have the same time horizon.
4. All investors have homogeneous expectations especially as to the implication of current information for the current price and distribution of future prices.

The efficiency of the market has been tested at three levels which include according to Akinsulire (2006)

1. Weak Form Efficiency
2. Semi-Strong Form Efficiency
3. Strong Form Efficiency

Weak Form Efficiency: This implies that information available is restricted to past share process, returns and trading volumes; hence future prices cannot be predicted from historical price data. In this type of market, investors cannot earn any excess or abnormal profit based on historical price. However, Weak Form Efficiency according to Ibenta (2005) when intrinsic value of security prices is

altered as new information becomes available and the behavior is such that actual security price will fluctuate at random from day to day around the intrinsic value. Okafor (1983) is of the view that test of the weak form have generally taken the form of empirical studies of the serial correlation between successive changes in the prices of securities and in most of those studies, the resulting co-efficient of correlation have been low.

Semi Strong Form Efficiency: This occurs when current prices reflect not only historical information but also published information about the companies whose securities are under consideration Okafor, (1983). By implication, efforts to analyze and acquire information contained in published annual reports and accounts would confer no advantage and no investor can consistently improve his or her forecast of future price movements simply by analyzing macro economic news such as earning statements, annual reports or other available sources. However, test conducted to prove the semi-strong form has been generally indirect since the test focused on investigation of the movement of stock price adjustments to such public information as dividend declaration, stock splits, adverse courts judgments etc. The general finding has been that the market anticipates all relevant public information fairly accurate.

Strong-Form Efficiency: Is a situation where all relevant information (public or private) is reflected in market price Ibenta (2005). This implies that nobody can profit from any information, not even insider information, in other words, those who have access to privileged information about companies, or those having first access to relevant information such as security analysts, portfolio managers and flour specialists cannot use such information to earn abnormal returns since is open to the public. Notwithstanding, according to Okafor (1983), the Strong-Form Efficiency has been tested by examining the performance of portfolios of assets owned by portfolio managers that have monopolistic access to relevant information about securities. These include professional analysts who manage mutual funds, market specialists and investors with inside knowledge about companies. The idea is that these individuals will use their superior knowledge and ability to earn excess returns on their market transactions and portfolios owned by them is expected to out-perform portfolios composed of randomly-selected securities. The evidence has been inconclusive. Research findings from Scholes (1992) and others indicate that insider knowledge and privileged information can produce superior returns thereby contradicting the strong form. However, the excess returns attributable to inside information have not been sufficiently large to warrant outright rejection. Then, apart from specialist and insiders, no other groups have been shown to benefit from privileged information. Thus, professionally managed mutual funds have not been shown to earn abnormal returns.

EMPIRICAL LITERATURE

There are a number of studies that are related to our present concern on the impact of inflation and interest rates on stock market prices in Nigeria. One of them is that of Geyser (2006) which focuses Southern African Developing Community (SADC) with particular reference to South Africa and Namibia. The study considered the roles and functions of Johannesburg Securities Exchange and the Namibian stock Exchange. He used the dividend discount model to examine the relationship and the study extended to rates of return. According to him, returns will set the price of a share at time that is to a point at which the expected return on the share is equal to the required rate of return. He considered first a world that is inflation free and assumes the company to be paying out all free cash flow as dividend thereby calculating it by dividing the dividend by the required rate of return. Second, he assumed an interest in inflation rate which brings about a change in the rate of return. Based on this, he established a clear difference between an increase in inflation and a decrease in the share price i.e. as inflation increases, so do the required rate of return. Geyser therefore shifted attention to rate of return rather than stock market prices of the two countries under investigation. Geyser adopted the work done by Eugene (1982) which investigated the relationship between the change in the nominal interest rate and change in expected inflation. Following the same pattern, Geyser collected a time-

series data from the consumer price index (CPI) as a measure of inflation and the stock prices of selected companies both in Johannesburg Stock Exchange and that of Namibia. Geyser therefore, concluded that neither of the two selected countries offers a perfect hedge against inflation although the results vary. Bernanke (2005) was also interested in what causes changes in stock prices. He however investigated the anticipated and unanticipated components of monetary policy by looking at the impact of changes in the federal funds rate on equity prices. Observations used in the model are the days in which federal funds rate were changed corresponding to Federal Open Market Committee (FOMC) meetings. This way, they are easily able to identify the anticipated and unanticipated components by looking at the discrepancies between FOMC reports and the actual change in rates. Bernanke adopted vector auto regression model on 131 observations. The author found a higher reaction by the stock market to unanticipated changes in the federal funds rate.

Alagidede, (2009) also examined whether common stock can provide a hedge against inflation using six African countries like Nigeria, Egypt, Morocco, Tunisia, Kenya and South Africa as case studies. Data was obtained from the six countries which consist of stock price indices. The stock price indices are comprised of the most actively traded stocks in each country and include at least 70% of the value of shares traded. The author also used the monthly consumer's price index (CPI) for each country obtained from the international financial statistics (IFS) of IMF. Alagidede adopted cointegration technique to examine the validity of Fisher's hypothesis in African stock markets while evidence indicates that in four countries namely: Egypt, Tunisia, Kenya and Nigeria, the stock market provides a partial hedge to investors in periods of rising inflation, no evidence of long run relationship between stock prices and inflation in Morocco while the reverse is the case in South African stock markets. According to the author, the South African stock market is very efficient in inflationary environment as investors are compensated in high stock returns when goods prices are on the increase. Kandir (2008) investigated the role of seven macroeconomic variables in explaining the Turkish stock prices between July 1997 and June 2005. The variables are: Industrial production index, change in consumer price index, growth rate of narrowly defined money, exchange rate, interest rate, growth rate of international crude oil price and the return on the MSCI world equity index while the analysis based on stock portfolios rather than single stocks. His empirical findings reveal that exchange rates, interest rate and world market return seems to affect the entire portfolio returns while inflation is significant for only three of the twelve portfolio years. On the other hand, industrial production, money supply and oil prices do not appear to have any significant impact on stock prices. Kandir's findings suggest that macro economic factors have a wide spread effect on stock prices since characteristic portfolios do not seem to be influenced in any different manner by the macro economic variables.

Chen, (1986) selected some variables to estimate the US stock prices. The variables selected include inflation, consumption, interest rate etc between January 1953 and November 1984. In their research, they found a strong relationship between the macro economic variables and stock prices within the period. They therefore concluded that asset prices react sensitively to economic news, especially to unanticipated news. Burmeister and Wali (1986) continued with similar path of research laid down by Chen (1986). Having conducted previous research suggesting that the variability of stock prices could be explained by unanticipated changes in certain macro economic variables including inflation, long and short term interest rate etc, they concluded that more research was needed. In addition, Abdullah and Hayworth (1993) observed that the US stock prices are related positively to inflation and negatively related to short and long term interest rates.

Poon and Taylor (1991) parallel the Chen (1986) study on the United Kingdom stock market. Their results show that macro economic variables do not affect share prices in the United Kingdom as they do in United States. They however suggested that either different macro economic factors have an influence on share prices in U.K or that the methodology employed by Chen1 Roll and Ross (1986) is inefficient. In a similar development, Clare and Thomas (1994) investigated 18 macro economic factors on stock prices in U.K. They find oil prices; retail price index, bank lending and corporate default risk to be important risk factors for the U.K stock prices Priestly (1996) pre-specified the

factors that may carry a risk premium in the U.K stock prices. Seven macro economic and financial factors namely: default risk, industrial production, exchange rate, retail sales, money supply, unexpected inflation, change in expected inflation, interest rates, commodity prices and market portfolios. For the Arbitrage Pricing Theory (APT) model, with the factor generating from the rate of change approach all factors is significant. For Japanese stock market, Hamad (1988) replicated Chen (1986) study in the multi-factor APT framework. He was of the view that stock prices are significantly influenced by the changes in expected inflation and unexpected changes in t he risk premium as well as structure of interest rates. Through the APT model, Brown and Otsuki (1990) explore the effects of the money supply, production index, crude oil price, exchange rates, call money rates, and residual market error on the Japanese stock market. They observed that these factors are associated with significant risk premium.

Maysami and Koh (2000) tested the relationship between the Singapore stock index and selected macro economic variables over a seven year period between 1988 and 1995. They found out that there existed a positive relationship between stock prices and changes in money supply but negatiie relationships between stock prices and inflation, stock price and interest rates as well as exchange rate. To examine the interdependence between stock prices and fundamental macro economic factors n the five South East Asian countries (Indonesia, Malaysia, Philippines, Singapore and Thailand) was the main purpose of Wongbangpo and Shama (2002). Monthly data from 1985 to 1996 was used to represent GNP, consumer price index, money supply, interest rate and the exchange rates for the five countries. Their results show that high inflation in Indonesia and Philippines influences the long run negative relation between stock prices and money supply, while the money growth in Malaysia, Singapore and Thailand induces the positive effect for their stock markets. The exchange rate is positively related to stock prices in Indonesia, Malaysia and Philippines but negatively related in Singapore and Thailand.

Aje (2009) investigated the impact of inflation, interest rates and real GDP on stock prices in Nigeria. He found out that real GDP was the most important variable affecting stock prices in Nigeria. There also exist an inverse relationship between inflation and stock prices, interest rates and stock prices on Nigeria since a reduction in interest rate and inflation resulted in increased stock prices of quoted companies in the Nigerian stock exchange. Olagunde (2006) investigated the relationship between market capitalization and interest rate in Nigeria between 1981 and 2000. Findings show that the prevailing interest rate exerts positive influence on stock market capitalization rate. Government development stock rate exerts negative influence on stock market capitalization rate while prevailing interest rates exerts negative influence on government development stock rate. Mahmood and Diniah (2009) examined the relationship between prices and economic variables in six Asian - pacific selected countries of Malaysia, Korean, Thailand, Hong Kong, Japan and Australia. The monthly data on stock price indices, foreign exchange rates, consumer price index and industrial production index that spars from 1993 and 2002 were used. They focused their analysis particularly on the long run equilibrium and short-run multivariate causality between these variables. The results show a long-run equilibrium relationship between stock price indices and other variable like foreign exchange rates, consumer price indices and industrial production index in only four countries, namely; Japan, Korean, I-long Kong and Australia. As for short run relationship, all countries except for Hong Kong and Thailand show some interactions. The Hong Kong shows relationship only between exchange rate and stock prices while the Thailand reports significant interaction only between output and stock prices.

Tan, Loh and Zainudin (2006) examined the relationship between macroeconomic variables and the Malaysian stock indices during the period of 1996 -2005. They found out that inflation, industrial production, crude oil price and treasury bills rate have long run relation with Malaysia stock prices. Results also show that consumer price index, industrial production index, crude oil price and treasury bills are significantly and negatively related to Malaysia stock prices in the long run, except industrial production index coupled with a positive coefficient. Barley and Chung (1996), examined the impact of macro economic risks on equity market of the Philippines. Findings of the study show that,

financial fluctuations, exchange rate movements and political changes on owners of Philippines equities cannot explain Philippines stock prices.

Mohammed, Hussian and Ali (2009) examined the relationship between macroeconomic variables and Karachi Stock Exchange in Pakistan context. They used quarterly data of foreign exchange formation, money supply, interest i-ate, industrial production index, and whole sale price index. The result showed that exchange rate and exchange reserve highly affected stock prices. Niarehos and Alexakis (2000) investigated whether it is possible to predict stock prices with the use of macroeconomic variables in the Athens Stock Exchange. Macro economic variables they used are inflation, money supply and exchange rate. The period covered January 1984 to December 1984 on a monthly basis. The statistical evidence suggests that monthly stock prices in the Athens Stock Exchange are positively related to those variables. Feldstein (1978) also carried out a research on the relationship between inflation and stock prices using the U.S economy. A stock valuation model was adopted to derive the share demand of investors in different tax situations and then calculates the share value that achieves market equilibrium. The market equilibrium analysis examined the impact of inflation when both stocks and bonds are held by risk averse investors in quite different tax situations. It also showed how the equilibrium ratio of share prices to earnings can fall even if the demand price per share for some individuals is actually increased by inflation. The increase in the effective tax rate caused by inflation has not been the only adverse influence on the level of share prices during the last decade in U.S rather the slow down on productivity growth, the higher cost of energy and the increased international competition has all reduced pretax profitability. Although, there is no clear evidence of a permanent fall in profitability (Feldstein and Summers, 1977), the transitory reduction may have caused some investors to project lower long-term pretax profitability. An adverse effect on price earning ratios can also be attributed to an increase in uncertainties and one of such is the increasing ratio of debt to equity on corporate balance sheets.

Eric (1982) examined the impact of money supply on stock prices with special attention to anticipated and unanticipated changes in money supply. He adopted a two-stage regression model in his analysis. In the first stage, he replicated Sarro'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 anticipated money growth using estimates from the regression for the first stage. Residuals of the first stage equation are used as the unanticipated component, which is regressed upon a stock index to figure out the effect of the unanticipated component. He found out that unanticipated change in money supply have a larger impact on the stock market than anticipated changes, supporting the efficient market hypothesis. Tursoy and Rjoub (2008) also studied the impact of thirteen macro-economic variables on the Turkish stock prices between February 2001 and September 2005. The variables include: money supply, industrial production, crude oil price, consumer price index, import, export, gold price, exchange rate, interest rate, gross domestic product, foreign reserve, arid unemployment rate and market pressures index. These variables were regressed against eleven (11) industry portfolios of Istanbul Stock Exchange to observe the effects of those variables on differences among the industry sector portfolios.

Sellin (2001) examined the effect of money supply on stock prices and argued that money supply will affect stock prices only if the change in money supply alters expectations about the future monetary policy. He was of the view that a positive money supply could lead people to anticipate tightening monetary policy in the future. The subsequent increase in bidding for bonds will drive up the current rate of interest and as interest rate goes up, the discount rate goes up as well while the present value of future earnings decline and this in turn declines stock prices. The author therefore argued that economic activities decline as a result of increases in interest rate which further depresses stock prices. Bernanke and Kenneth (2005) also examined the relationship between stock prices and money supply and argued that the price of a stock is a function of its monetary value and the perceived risk in holding the stock. A stock according to them is attractive if the monetary value it bears is high and unattractive if the perceived risk is high. They argued that money supply affect stock prices through

the effect on both the monetary value and the perceived risk. Money supply affects the monetary value of a stock through its effects on the interest rate. The authors therefore suggested tightening the money supply which will in turn raise the real interest rate since an increase in interest rate raises the discount rate. Ogbulu (2010) examined whether there is a dynamic long-run relationship between inflation, interest rates and stock returns in Nigeria in addition to determining the direction of causality among the above mentioned variables. Johansen co-integration techniques and the ECM (Error Correction Models) as well as the Granger causality test were employed while the empirical results demonstrate vividly that there is a positive long-run dynamic and significant relationship between inflation and stock returns and a negative long-run relationship between interest rates and stock returns in Nigeria. The findings also show that there is a uni- directional causality running from inflation rates and interest rates to stock prices respectively and a bi-directional causality between inflation rates and interest rates. The paper thus provides robust support for the Fisher's hypothesis in the Nigerian context suggesting that stock prices in Nigeria provide a hedge against inflation.

Geske and Roll (1983) also examined the relationship between stock prices and inflation and contended that the negative relationship found in some studies is spurious and not real. For them, changes in expected inflation are inversely related to fluctuations in expected output in the economy. Hence, if the public comes to believe that cost of living will rise and the nations aggregate output will decline at about the same time, then real stock prices may fall due to a more pessimistic outlook for business profits. Other scholars like Asogu (1991) Afolabi and Efunwoye (1995) Firth (1999), Boudoukha and Richardson (1993) Pnari and Kolari (2001) Lintel and Pandyal (2006) examined such interactions. In their separate studies, some concluded that the relationship between stock prices and inflation is positive while others found out a negative relationship. However, they note that the causal relationship between these variables remain a debatable issue in the literature of finance.

Given this brief literature survey, it is evident that there is as yet no consensus in the literature of finance as to the exact nature of the relationship between macroeconomic aggregates and stock prices for that matter. At best, the general opinion is that there exists a long-run relationship between macroeconomic aggregate and stock prices but the direction of causality is still very much fraught with conflicting results. It is therefore, in the light of the above controversy that the present paper becomes imperative. Being a macro economic analysis and given the fact that most of the earlier studies on finance – stock prices link have tended to ignore the macroeconomic aggregates aspect of the debate, it is necessary to use data from the Nigerian economy, the Nigerian capital market and the Central Bank of Nigeria (CBN) as extracted from the statistical bulletin various years as a basis to undertake an empirical investigation of the macroeconomic aggregate – stock prices relationship not only to shed more light on the raging controversy but also to unearth the nature of the long-run relationship, specifically between macroeconomic aggregates and stock prices within the Nigerian context as well as examine the direction of causality between the variables.

METHODOLOGY AND DATA

In carrying out country-specific and time-series analysis of data in financial econometrics, it is important to examine the stationary properties of the time series. A time series is stationary if its mean, variance and auto-covariance are not time-dependent. Hence any series that is not stationary is called non-stationary. Two basic types of time series models exist and these are autogressive (AR) models and the moving average process (MA).

An AR model is one where the current value of a variable Y depends upon only the values that the variable took in previous periods plus an error term. Thus, an AR model of order P, denoted as AR (Ip) can be expressed as:

$Y_t = \alpha + \phi\, Y_{t-1} + \phi_2\, Y_{t-2} + \ldots \phi\, Y_{t-p} + \varepsilon_4$…… (1)
Where ε_4 is a white noise disturbance term. Alternatively, eq (1) can be written as:
$Y_t = \alpha + \sum\phi_1\, Y_{t-1} + \varepsilon_4$ ……..(2)

Where α is a constant and $\phi_1 \ldots \phi_p$ are parameters of the model or using the lag operator, it becomes:

$$\sum_{i=1}^{\rho}$$

$Y_1 = \alpha + \phi_1 L^1 Y_1 \varepsilon_4$ …….……..(3)
Or $\phi(L)Y_t = \alpha + \varepsilon_t$ where

$\phi(L) = (1-\phi_1 L - \phi_2 L^2 \ldots \phi_p L^p)$……...(4)

On the other hand, if U_t is a white noise process with E (U_t) = 0 and Var (Ut) = a^2, then

Yt = $\alpha + U_t + \phi_1$ U1 $U_{t-1} + \phi_2 U_{t-2}$ + ……+ϕ_q Ut-q…… (5) is a q^{th} moving average model denoted MA (q). eq. (5) can be restated as:

$$Y_t = \alpha + \sum_{i=1}^{q} \phi_1 U_{t-1} + U_t \text{ ……...(6)}$$

Thus, a moving average (MA) model is linear combinations of white noise process such that Y_t is a function of current and lagged values of a white noise disturbance process. (Brooks, 2008). Using the lag operator notation, equation (6) becomes:

$$Y_t = \alpha + \sum_{i=1}^{q} \phi_1 L^1 U_t + U_t \text{ …….....(7)}$$

Or as $Y_t = \alpha + \phi(L)\, U_t$ where

$\phi L = 1 + \phi_1 L + \phi_2 L^2 + \ldots\ldots + \phi_q L^q$ ……(8)

However, by combining this AR (p) and MA (q) models an ARMA (p,q) model is obtained. Thus, in an ARMA model, the current value of some series Y_t depends linearly on its own previous values plus a combination of current and lagged values of a white noise error term. This can be stated as:

$Y_t = \alpha + \phi_1 Y_{t-1} + \phi_2 Y_{t-2 + \ldots +} \phi_p Y_{t-p +}\ \phi_1 U_{t-1} + \phi_2 U_{t-2} + \ldots \phi_q U_{t-q}$……(9)

Where

$E(U_t = 0)$; $E(U_t^2) = \alpha^2$; $E(U_t\, U_3) = 0$, $t \neq s$

It is evident from the foregoing that stationarity in a time series is a desirable property for an estimated AR model. The reason being that a model whose co-efficients are non-stationary will have a non-declining effect on the current values of Y_t as time progresses which is counter productive, empirically defective and could lead to spurious regressions.

The literature of financial econometrics is replete now with ample tests for stationarity in time series data as well as different treatments to induce stationarity. Hence, in this paper, the Augmented Dickey – Fuller (ADF) (1981), unit tests are employed to check whether the series data are stationary or not. That is, consider an AR (1) process:

$Y_t = \alpha + \phi Y_{t-1} + \varepsilon_4$ ……. (10)

Where α and ϕ are parameters of the model and ε_4 is a white noise disturbance term. Y_t is stationary, if and only if, -1< 1ϕ1 <1. However, if $\phi = 1$, then Y_t is a non-stationary series. That is, if the time series is started at some point (t), the variance of X_t increases steadily with time and goes to infinity. On the other hand, if the absolute value of 1ϕ1 is more than t, then the series Y_t is explosive. Hence, the hypothesis of a stationary series is usually tested whether the absolute value 1ϕ1 is strictly less than unity. Thus, for testing unit root, Y_{t4} is subtracted from both sides of eq.(10), then we have:

$\Delta Y_t = \alpha + \Psi Y_{t-1} + \varepsilon_4$ …….……. (11)

Where $\Psi = (\phi - 1)$ and the null hypothesis can be tested as Ho: $\Psi = 0$. This unit root test is however only applicable where the series is an AR (1) process. For higher order serial correlation in the series, the assumption of white noise disturbance term is violated. However, the ADF test corrects for high order correlation by making the assumption of an AR(p) process as:

$$\Delta Y_t = \alpha + Y_{t-1} + \sum_{j=1}^{p} \Delta Y_{t-j} + \varepsilon_4 \quad \text{……. (12)}$$

That is, the additional lagged terms are included to ensure that the errors are uncorrelated. Hence, if the calculated i=1ADF statistics is less than their critical values from the fuller's table, then the null hypothesis Ho: $\Psi = 0$ is accepted and the series are non-stationary or not integrated of order zero. Thus, to induce stationarity, many time series need to be appropriately differenced. Hence, a time series is said to be integrated of order d, if it has become stationary after differencing it d times. (Brooks, 2008).

In this paper, we examine whether the time series are co-integrated by adopting the method of Granger (1969). That is, two or more variables are said to be co-integrated if each variable individually is integrated of order one, but a linear combination of the variables is integrated of lower order say zero.

Thus, a long-run relationship between the variables is present when there exists at least one co-integrating vector. That is, if Y_{1t} and Y_{2t} are co-integrated 1 (1) so that εt, 1(0), then this implies that there exists a long-run equilibrium between Y_{1t} and Y2t to which the system converges overtime and the disturbance term can be construed as the disequilibrium error. The first step in the Engle and Granger (1987) co-integration method is to estimate the co-integrating equation.

$Y_t = \alpha_0 + \alpha_1 X_t + U_t$…….. (13)

and then to calculate the residual

$U_t = Y_t - \alpha_0 - \alpha_1 X_t$ …….. (14)

Then we check the stationarity of the residuals. Hence, if Y jadn X are co-integrated the error term will be stationary and this is accomplished by testing the residuals of co-integrating regression for stationarity by performing ADF unit root tests.

Granger Causality Test

To determine the direction of causality between the variables, we employ the standard Granger causality test. (Granger, 1969). The test is based on vector error correction model (VECM) which suggests that while the past can cause or predict the future, the future cannot predict or cause the past. Thus, according to Granger (1969). X Granger causes Y if past values of X can be used to the past values of Y. The test is based on the following regressions:

$$Y_t = \alpha_o + \sum_{i=1}^{n} \alpha_1^{\,y} Y_{t-1} \sum_{i=1}^{n} X_{\alpha 1} \times U_t \quad \text{..... (15)}$$

and

$$X_t = \beta_o + \sum_{i=1}^{n} {}^{y}_{\beta_1} Y_{t-1} \sum_{i=1}^{n} X_{\beta_1} \times Y_t \quad \text{..... (16)}$$

Where X_t and Y_t are the variables to be tested while ε is the white noise disturbance terms. The null hypothesis $\alpha_1 = \beta_1^{\,Y} = 0$ for all 1's is tested against the alternative hypothesis $\alpha_1 \neq 0$ and $\beta_1^{\,Y} \neq 0$. If the co-efficient of α_1 are statistically significant but that of $\beta_1^{\,Y}$ are not, then X causes Y. If the reverse is true, then Y cause X. However, where both co-efficient of α_1 and $\beta_1^{\,Y}$ are significant then causality is bi-direbtional.

Model Specification

In this sub-section, models that will be used to test the hypothesis earlier generated are specified. The models include;

(1) $ASI = \beta_0 + \beta_1 Infr + \beta_2 Intr + \beta_3 Mss + \mu_t$ - - - (17)

Where

ASI	=	All share index
INFR	=	Inflation Rates
INTR	=	Deposit Interest Rates
MSS	=	Money Supply
μ_t	=	Error term

2. INFR = $\sum_{i=1}^{n} \alpha i ASI_{t-1} + \sum_{j=1}^{n} \beta_j INFR_{t-j} + u_t$ - - (18)

3. INTR = $\sum_{i=1}^{n} \alpha i ASI_{t-1} + \sum_{j=1}^{n} \beta_j INTR_{t-j} + u_t$ - - (19)

4. MSP = $\sum_{i=1}^{n} \alpha i ASI_{t-1} + \sum_{j=1}^{n} \beta_j MSS_{t-j} + u_t$ - - (20)

The apriori expectation shows that:

b_1	-	0	<	b_1	<	0
b_2	+	0	>	b_2	<	0
b_3	+	0	>	b_3	<	0

Table 1: Data Presentation of Aggregate stock price, inflation interest rate and money supply data for Nigeria (1985 – 2011)

Years	ASI	INFR	INTR	MSS
1985	127.3000	5.500000	9.250000	23818.60
1986	163.8000	5.400000	9.250000	24592.70
1987	190.1000	10.20000	14.90000	29994.60
1988	233.6000	38.30000	13.40000	42780.30
1989	325.3000	40.90000	18.90000	46222.90
1990	513.8000	7.500000	19.60000	64902.70
1991	783.0000	13.00000	15.70000	86152.50
1992	1107.600	44.50000	20.80000	129085.5
1993	1543.800	57.20000	23.60000	198479.2
1994	2205.000	57.00000	15.00000	266944.9
1995	5092.200	72.80000	13.60000	318763.5
1996	6992.100	29.30000	12.90000	370333.5
1997	6440.500	8.500000	7.040000	429731.3
1998	5672.700	10.00000	10.20000	525637.8
1999	5266.400	6.600000	12.68000	699733.7
2000	8111.000	6.900000	10.60000	1036080.
2001	10963.10	18.90000	10.20000	1315869.
2002	12137.70	12.90000	10.30000	1599495.
2003	20128.90	14.00000	14.30000	1985192.
2004	23844.50	15.00000	13.69000	2263588.
2005	24085.80	17.90000	10.53000	2814846.
2006	33189.30	8.200000	9.750000	3937311.
2007	57990.20	5.400000	10.29000	5349254.
2008	31450.80	11.60000	11.95000	8468490.
2009	20827.20	12.40000	13.30000	10767378
2010	31450.80	13.20000	14.65000	13066266
2011	208727.20	14.00000	14.65000	15365151

Source: Central Bank of Nigeria Statistical Bulletin, 2011 and Nigerian Stock Exchange Fact Book Various Years.
Note: ASI = All Share Price Index, INFR = Inflation Rate, INTR = Interest Rate, MSS = Money Supply

Fig. 1: Line graph showing the relationship between Inflation and Interest rates (1980 - 2011)

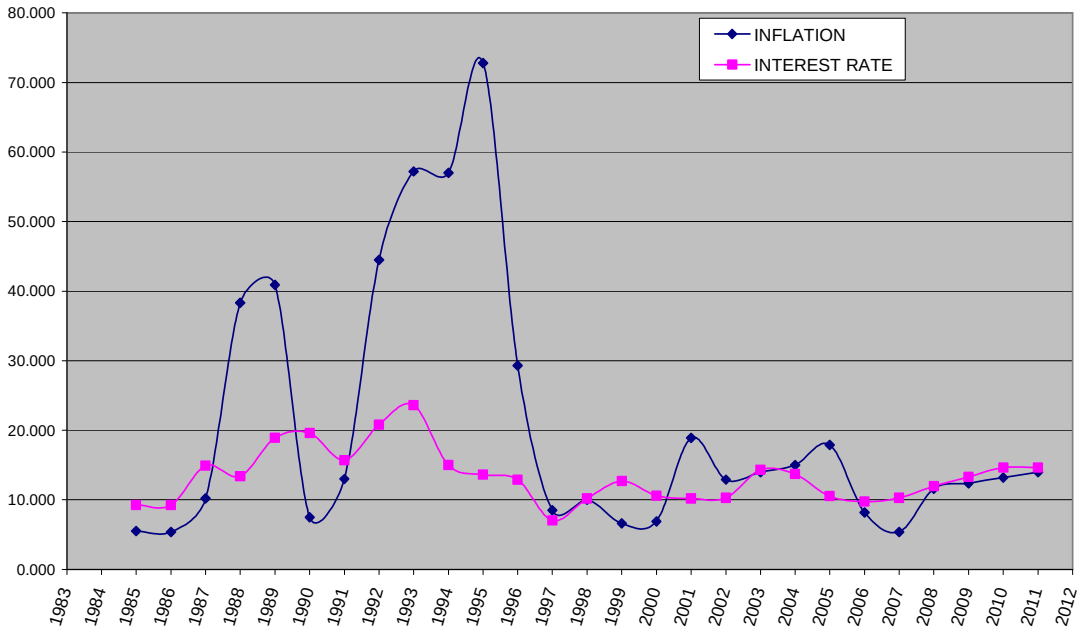


Fig. 2: Line graph showing the relationship Aggregate Stock Price Money Supply (1980 - 2011)

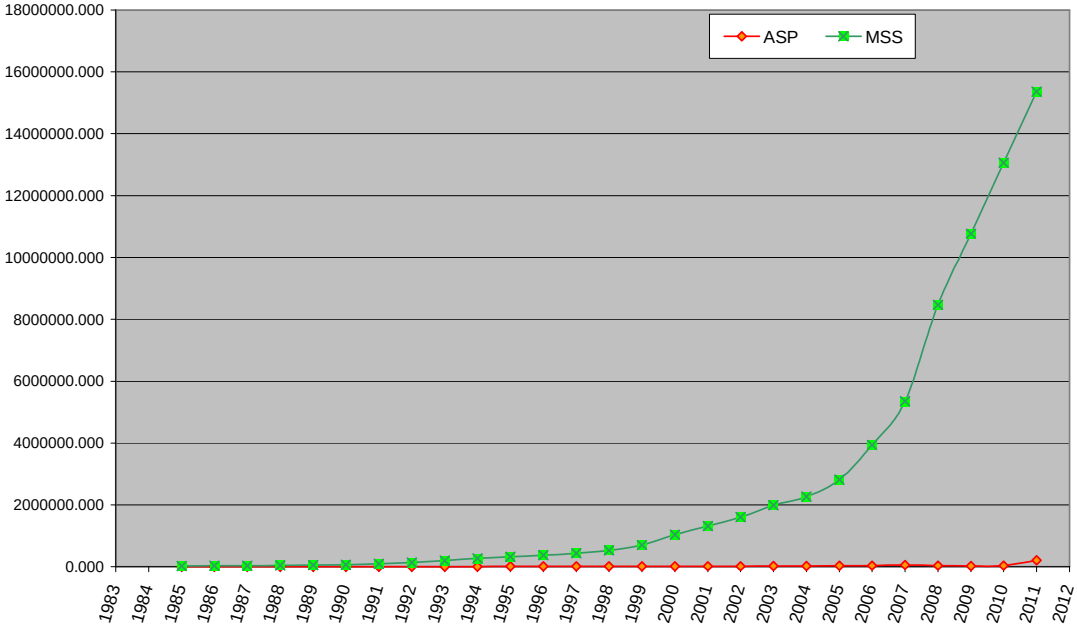


Fig. 3: Line graphy showing the relationship between Inflation and Interest rates (1980 - 2011)

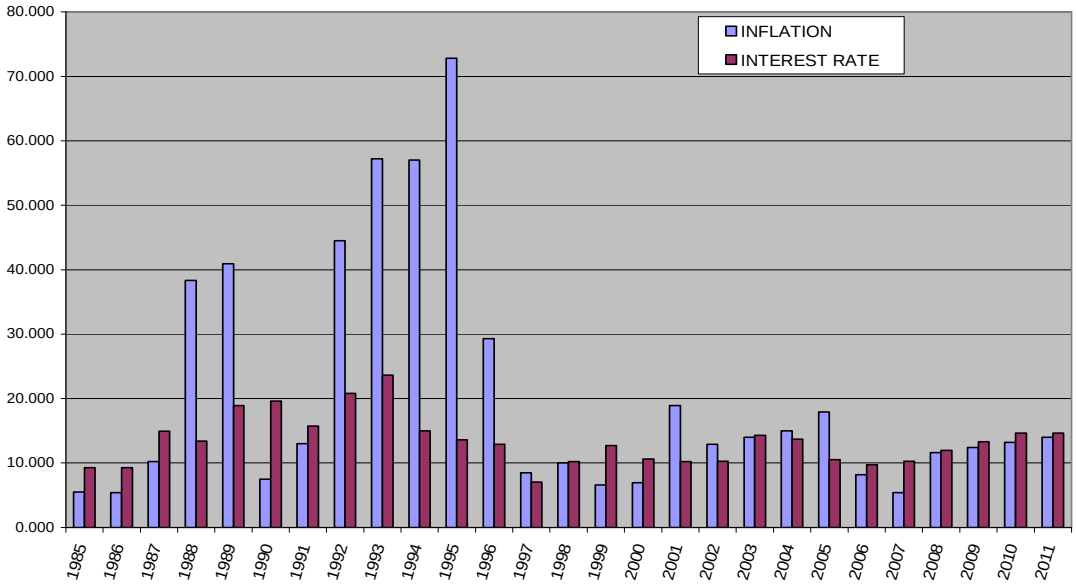
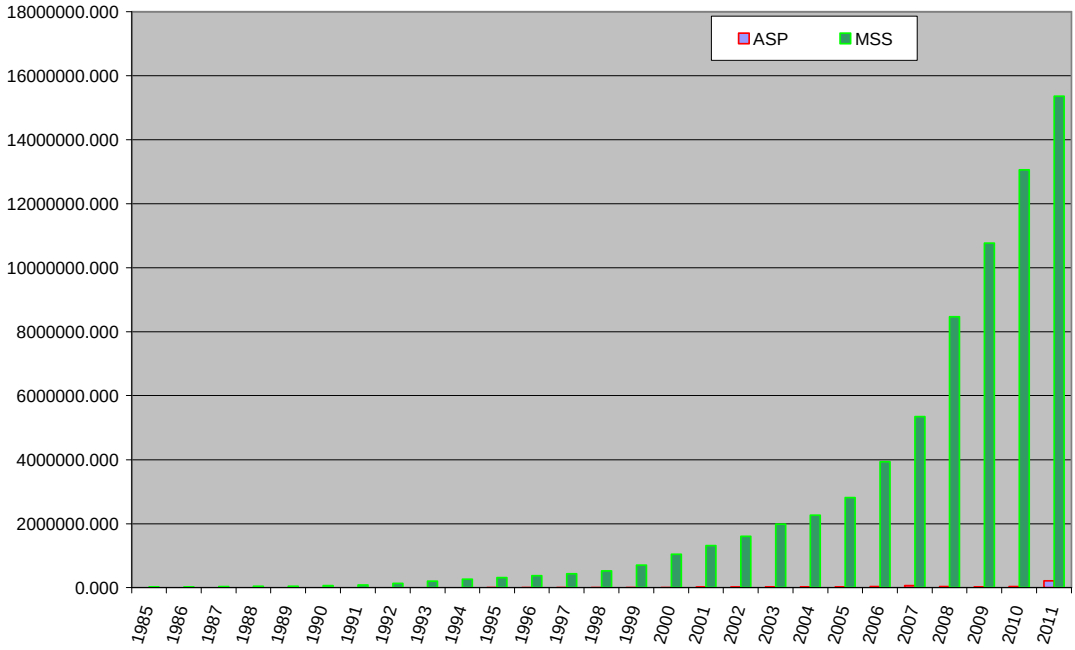


Fig. 4: Bar chart showing the relationship between Aggregate Stock Price Money Supply (1980 - 2011)



From the table, line graph and bar chart shown above, the Aggregates Stock Price proxied by All Share Index (ASI) and macroeconomic aggregates represented by inflation rates (INFR), interest rates (INTR) and money supply (MSS) from 1985 to 2011. it can be observed that the value of All Share Index (ASI) stood at 127.300, 163.8000, 190.1000, 233.6000 and 325.3000 for 1985, 1986, 1987, 1988 and 1989 respectively. Also, in 2007, 2008, 2009, 2010 and 2011, the values of All Share Index (ASI) increase to 57990.20, 31450.80, 20827.20, 31450.80 and 208727.20 accordingly. The values for macroeconomic aggregates show that inflation rates (INFR) fluctuates from 5.5, 5.4, 10.2, 38.3, 40.9 and 7.5 for 1985, 1986, 1987, 1988 and 1989. The interest rates (INTR) values changes between 5.4, 11.6, 12.4, 13.2 and 14.0 for 2007, 2008, 2009, 2010 and 2011.

The increases in the All Share Index (ASI), may be attributed to several economic, regulatory and stock market reforms implemented in the country within the understudy. While drops in inflation rates (INFR) from 2008, 2009 and 2010 may be as result of contractionary monetary policy and other economic policies.

EMPIRICAL RESULTS AND FINDINGS AT LEVEL SERIES

From the level series results in the multiple regression, the overall F-statistic is 0.6808 which is statistical insignificant, R^2 = 55.36% while the adjusted R2 is 48.95% showing that variations in stock prices can be explained by changes in the explanatory variables. All explanatory variables interest rates, (INTR), inflation rates (INFR) and money supply (MSS) at 5% level of significance are not significant. However, with respect to the signs and sizes of the parameters estimates, the aggregates stock prices indicated a negative coefficient with -0.6770 INFR and not significant at a probability value of -0.4283, INTR = -0.1837, MSS = -0.0872 and are not also significant at 5% significant level at n=27. Furthermore, the overall fit of the model is not good given an F-statistic of 0.6808, (P-value = 0.588696). However, the Dubin Watson statistic is found to be d* = 1.2058 which is higher and

does not lies between D-Watson critical values of dL = 1.03; du = 1.64 and suggesting test inconclusive in the level series results. This indicates that there may be some degree of time dependence in the level series results which could lead to spurious regression results, suggesting the need for more rigorous analysis of the stationary properties of the level series data.

Table 2: Unit Root Test Summary Results

Variable	ADF Test: First Diff Statistic	Order of Integration
ASI	-1.386368	1(1)
INFR	-2.742814	1(1)
INTR	-2.348153	1(1)
MSP	4.365564	1(1)

Critical value: 1% = -3.7497; 5% = -2.9969; 10% = -2.6381
Source: Author's computation and extracts from E-view print out

From table 2 above, the results of the unit root tests show that the null hypothesis if a unit root for time – dependent variables of a non-stationary nature can be made stationary at the first difference. It also shows that the variables are integrated of order 1(1) since ASI (All Share Price Index), INFR (Inflation rates) INTR (Interest rate), and MSS (Money supply are all integrated of order 1(1) and became stationary at first differencing.

Table 3: Johansen Co-integration Test

Sample: 1985 – 2011; Included observations: 25; Test assumption: Linear deterministic trend in the data Series: ASI INFR INT MSP; Lags Interval: 1 to 1				
Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.770310	70.35126	47.21	54.46	None **
0.539123	36.51773	29.68	35.65	At most 1 **
0.435047	18.70140	15.41	20.0	At most 2 *
0.215016	5.568110	3.76	6.65	At most 3 *
* (**) denotes rejection of the hypothesis at S% (1%) significance level ; L.R. test indicates 4 cointegrating equation(s) at 5% significance level ; Unnormalized Cointegratwing Coefficients:				
ASI	INFR	INT		MSP
1.43E-OS	0.014003	-0.015331		1.20E-07
0.000192	-0.007488	0.OS3421		-1.94E-06
6.2SE-05	0.002494	0.OS9S83		-6.S1 E-07
4.OSE-OS	0.002986	-0.005261		-9.72E-07
Normalized Cointegrating Coefficient: 1 Cointegrating Equation(s)				
ASI	INFR	INT	MSP	C
1.000000	975.9191	-1068.471	0.008365	-29958.97
	(1640.14)	(2074.40)	(0.03138)	
Log likehood	-687.7786			

*(**) denote rejection of hypotheses of 5%(1%)
L.R test indicates 1 co-integrating equation(s) at 5% significant
Source: Author 's computation and extracts from E-view print out.

From table 3 above, the results of the Johnson co-integration test shows that we accept the alternative hypothesis if a most 1 co-integrating equation at 5% level of significance. This implies that, there is one linear combination of the variables that is stationary in the long-run and also confirms the existence of a long-run relationship between the macroeconomic aggregates (INFR, INTR and MSS) and stock prices proxy by All Share Index.

Vector Error Correction Model (VECM)

Given that ca long-run dynamic equilibrium relationship has been established, therefore, we estimate the error correction term using the Vector Error Correction Model to examine their speed and

magnitude at which the long-run equilibrium corrects for disequilibrium. To further the analysis of the long-run relationship, the All Share Index (ASI) under investigation is then specified in a VECM incorporating a two-period lag residual. The VECM is employed to capture the short-run deviations of the parameters from the long-run equilibrium. The autoregressive distributed lag techniques used with a maximum lag of 1 to obtain an over-parameterized result (table 4) and arriving at the parsimonious error correction results using the general to specific approach as presented in parsimonious result in table 5.

Table 4: Over Parameterized Result

Dependent Variable D(ASI); Method: Least Squares; Sample(adjusted): 1988 – 2011; Included observations: 24 after adjusting endpoints				
Variable	**Coefficient**	**Std. Error**	**t-statistic**	**Prob.**
C	8347.257	2603.956	3.205605	0.0107
D(ASI(-1))	-2.574089	1.049161	-2.4534474	0.0365
D(ASI(-2))	-4.565204	1.383305	-3.300216	0.0092
D(INFR)	73.68311	109.9351	0.670242	0.5195
D(INFR(-2))	-184.9615	116.2417	-1.591180	0.1460
D(INT)	97.01575	137.2656	0.706774	0.4976
D(INT(-1))	557.8990	711.0950	0.784563	0.4529
D(INT(-2))	-651.3884	437.7569	-1.488014	0.1709
D(MSP)	-688.7225	482.8391	-1.426402	0.1875
D(MSP(-1))	-0.014684	0.007707	-1.905221	0.0891`
D(MSP(-2))	0.001597	0.017160	0.093059	0.9279
ECM(-1)	0.047231	0.040159	1.176103	0.2697
	2.027136	0.766058	2646193	0.0266
R-squared	0785706	Mean dependent var		938.0500
Adjusted R-squared	0.499980	S.D. dependent var		8742.303
S.E. of regression	6181.864	Akaike info criterion		20.58463
Sum squared resid	3.44E+08	Schwarz criterion		21.22933
Log likelihood	-213.4309	F-statistic		2.749862
Durbin- Watson stat	1.362112	Prob(F-statcistic)		0.068268

Source: Author's computation and extracts from E-view print out

From the table 4 above, the over-parameterized results, shows that R^2 = 78.6% which indicates a strong relationship and a good fit with an F-statistic value of 2.749862 and a probability value of 0.068268 and a vector error correction term. This is further analyzed by a parsimonious ECM and is appropriately signed and significant.

Table 5: Parsimonious Error Correction Result

Dependent Variable D(ASI); Method: Least Squares; Sample(adjusted): 1988 – 2011; Included observations: 24 after adjusting endpoints				
Variable	**Coefficient**	**Std. Error**	**t-statistic**	**Prob.**
C	7474.020	1890.642	3.953165	0.0017
D(ASI(-1))	-2.438983	0.5 24745	-4.647936	0.0005
D(ASI(-2))	-4.642097	0.862609	-5.381460	0.0001
D(INFR(-1))	114.3903	72.97945	-1.567432	0. 1416
D(INT(-1))	-611.4691	333.1198	-1.835583	0.0894
D(INT(-2))	-545.3357	325.4500	-1.675636	0.1177
D(MSP)	-0.013660	0.005890	-2.319405	0.0373
D(MSP(-2))	0.052949	0.016725	3.165755	0.0074
ECM(-1)	1.770576	0.500238	3.539465	0.0036
R-squared	0.763491	Mean dependent var		938.0500
Adjusted R-squared	0.617947	S.D. dependent var		8742.303
S.E. of regression	5403.656	Akaike info criterion		20.31963
Sum squared resid	3.80E+08	Schwarz criterion		20.76596
Log likelihood	-214.5159	F-statistic		5.245774
Durbin- Watson stat	2.340026	Prob(F-statistic)		0.004333

From table 5 above, the parsimonious error correction results indicates a good fit with an F-ratio of 2.749862 and an R^2 of 0.78 and an adjusted R^2 of 0.49 meaning that the model explains approximately 78% of the variations in stock prices standing as a proxy by All Share Price Index, the D- Watson statistics of 2.362112 suggests absences of any autocorrelation and supported by a probability value of 0.0036 and is significant at 5% level of significance. Also, two of the variables, inflation rates and interest rates have a negative long run relationship and are not stationary at 5% while money supply has a positive relationship and is stationary at 5% significance level with probability value of 0.0074.

Table 6: Pairwise Granger Causality Tests

Pairwise Granger Causality Tests Sample: 1985 - 2011 Lags: 2			
Null Hypothesis:	**Obs**	**F-Statistic**	**Probability**
INFR does not Granger Cause ASI	25	0.07205	0.93075
ASI does not Granger Cause INFR		0.81339	0.45900
INT does not Granger Cause ASI	25	0.17483	0.84101
ASI does not Granger Cause INT		0.54559	0.58879
MSP does not Granger Cause ASI	25	3.29724	0.06024
ASI does not Granger Cause MSP		22.7628	1.2E-05

*** sig at 5%**

Source: Extracts from E-view print out and Author's Computation

From the table above the Pairwise Granger Causality Tests provides a strong support for the existence of causality running uni-directionally from Inflation Rate to Stock Prices and Interest Rate to Stock Prices and a bi-directional causality between money supply and stock prices which is in line with the works of Ogbulu (2010) which posit a uni-directional causality running from inflation rates to stock prices and interest rates to stock prices.

Summary of Discussion on Test of Hypotheses

Table 7: Test of Hypotheses 1-3

	Statement of Hypotheses	**Coefficient**	**p-value**	**Decision (Null) hypotheses**
Ho_1	There is no significant relationship between inflation and stock prices	D(INFR(-1) (-114.3903)	(0.14176) Not significant	Accepted
Ho_2	There is no significant relationship between interest rates and stock prices	D(INT(-2) (-545.3357)	(0.1177) Not significant	Accepted
Ho_3	There is no significant relationship between money supply rates and stock prices	D(INSP(-2) (0.052949)	(0.0074) Significant	Rejected

Source: Extracts from E-view print out and Author's Computation

NB: The figures is parenthesis are the coefficient of the variable

From table 7 above which shows the summary of discussion on tests of hypothesis, inflation rates and interest rates dummy variables co-efficient are negative and probability of INFR = 0.1416 and INTR 0.1177 are not significant while money supply with a dummy variable coefficient is positive and probability value of (0.0074) is significant.

DISCUSSION OF FINDINGS

From the multiple regression result, the overall F- statistic is 8.6808 which is statistical significant and the coefficient of determination (R^2) of 55.36% while the adjusted R^2 of 48.98% showing that 55.36% of the variations can be explained by changes in the explanatory variables. The D-W statistic of 1.0246 suggests the presence of auto correlation in the level series. Given the above, the level series

OLS regression results should be taken with caution as it could lead to spurious regression results, suggesting the need for more rigorous analysis of the stationary properties of the level series data.

Having established the existence of time dependence in our level series data, the variables were tested using the ADF unit root tests. The results are presented in table 2 and therefore confirm that the level series data are stationary at the first difference and maximum lag of one. This means that the model follows an integrating process and therefore stationary. Furthermore, the test of stationarity in the residuals from the level series regression is significant at all lags and is integrated of order 1(1).

The parsimonious error correction results obtained in this result demonstrate succinctly that there exists a long run relationship between inflation rates, interest rates, money supply and stock prices. Also there is a significant long-run relationship between inflation rates, interest rates, money supply and stock prices. The long run dynamic parsimonious error correction results obtained in this study is a clear improvement over and above the level series regression results in table 5. In comparison, both the R^2 and the adjusted R^2 show remarkable improvement from 55.3% in the level series to 76.3% in the parsimonious error correction model and in the case of R^2 49% adjusted R^2 in the leve1 series to 61.8% in the parsimonious error correction model. Also both in the level series and parsimonious error correction the relationship between stock prices and inflation rates in Nigeria are negative which is contrary to fisher's postulation of positive relationship. The observed negative relationship between stock prices and interest rates finds support in the fundamental investment valuation model in finance. An increase in interest rates (whether deposit or lending) is 'accompanied by an increase in investors risk perception of the asset and hence lowers investors' expected risk-adjusted stream of income from holding the financial asset. Thus, an increase in interest rate would be accompanied by a decrease in stock prices (Aje, 2009). The result was however different in the case of money supply rather than a negative relationship, it was positive showing that an increase in money supply will bring about an increase also in stock prices all things being equal. Furthermore, the Durbin Watson statistic does better in the error correction model than in the OLS series (1.0245 for OLS series and 2.3400) in the parsimonious error correction model). Finally, the F- statistic in the OLS series is 8.6808 while it is 5.2458 in the parsimonious error correction model although they are all significant.

The Error Correction Model (ECM) lagged one period with a coefficient of 1.7706 shows that to large extent the level or impact of stock prices on the selected macro economic aggregate adjust rapidly well to changes indicating the existence of long run relationship between the variables.

The Pairwise Granger Causality test provides a strong support for the existence of causality running uni-directionally from inflation rate stock prices, from interest rates to stock prices and a bi-directional causality between money supply and stock prices. The result provides strong support to Ogbulu (2010) which posit a uni-directional causality running from inflation rates to stock prices and interest rates to stock prices.

Summary of Findings

From the results of our findings of the study, we summarized as follows:

1. There is a significant long-run relationship between stock prices and inflation rates, interest rates and money supply. We tested with multiple regression, the R^2 was 55.36%, adjusted R^2 was 48.98% showing that 55.36 of the variations can be explained by changes in the explanatory variables while the over all F-statistic was 8.6808. The Johansen co-integration/parsimonious error correction tests were also used and the result indicates a negative long-run dynamic relationship between stock prices and inflation rates, interest rates, and a positive long run relationship between stock prices and money supply.

2. The Pairwise Granger causality reveal a uni-directional relationship running from inflation to stock prices and we therefore accepted the alternative hypothesis that changes in inflation rates Granger cause changes in stock prices.
3. The Pairwise Granger causality test results also indicates uni-directional relationship running from interest rates to stock prices.
4. The Pairwise Granger causality test shows that the result indicates a bi-directional causality running from money supply and stock prices. We therefore accept the alternative hypothesis that changes in money supply Granger cause changes in stock prices.

POLICY IMPLICATIONS

The paper sought to examine the direction of causality between macroeconomic variables and stock prices employing the Johansen cointegration and the granger causality tests using data spanning the period of 1985 – 2011. The absence of consensus in the literature of financial economics with respect to the nature and degree of relationship between macroeconomic variables otherwise referred to as macroeconomic aggregates and stock prices proxy by all share index (ASI) as well as the controversy surrounding the direction of causality between these variables provide a compelling motivation to examine specifically the macroeconomic aggregates – stock prices nexus within the Nigerian context. The implications of the above findings are that the regulatory authorities in Nigeria should intensify efforts towards installing a conducive and enabling environment inclusive of more reforms, interplay of appropriate policy mix, given the significant long-run relationship between macroeconomic aggregates and stock prices as demonstrated in this study. In addition, policy initiatives involving interest rates, inflation rates, and money supply should be appropriately incorporated in the reforms as these control variables have shown in this study to impact significantly on stock price.

CONCLUSION

On the basis of the findings, the following conclusion can be evident.

1. Changes in inflation rates, interest rates and money supply have significant impact on stock prices in Nigeria within the period under review.
2. There is uni-directional causality between inflation rates and stock prices just as interest rates uni-directionally Granger cause changes in stock prices.
3. Changes in money supply as bi-directionally granger cause changes in stock prices.
4. There is a long-run dynamic negative relationship between inflation rates and stock prices just as it is between interest rates and stock prices.
5. There is a positive long-run dynamic relationship between money supply and stock prices.

RECOMMENDATIONS

Based on our findings, we therefore proffer the following recommendations

1. The government, in formulating monetary policy should be aware of the fact that the stock market responds more favorably to an increase to money supply and must therefore consider expansionary monetary policy. This will no doubt boost the stock market and have tendency of reducing unemployment rates.

2. Appropriate interest rates policies should be initiated that will guide the operations in the capital markets as well as other macro economic variables in view of the demonstrated negative relationship between stock prices and interest rates.

3. The monetary authorities (CBN) should as a matter of fact give enough indication to the market on its plan for the changing the money supply. This is important since the anticipated changes matter more than unanticipated changes and the more people anticipate changes in the money supply, the greater the effect of changes are translated into real economic activity.

4. In view of the long-run relationship between stock prices and these macro economic aggregate as demonstrated in this study, the regulatory authorities should intensifies efforts towards installing a conducive and enabling environment, inclusive of more reforms as this will enable the markets to thrive and deepened.

5. The Nigeria government should regulate the levels of inflation on the economy by reducing the current expenditure and increasing the capital expenditure. This is in view of the long-run relationship between stock prices and inflation rates in Nigeria.

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