

## Inflation, Interest Rate, Real Gross Domestic Product and Stock Prices on the Nigerian Stock Exchange: A Post SAP Impact Analysis

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### Abstract

This study investigated the impact of Inflation, Interest rate and Real Gross Domestic Product on stock prices of quoted companies on the Nigerian Stock Exchange (NSE) post SAP. Times series data was used covering the period 1985-2012. The stationary properties of the data were tested using Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) unit root tests. They were all integrated at order I (1). The Johansen Multivariate Cointegration test indicates the existence of long-run equilibrium relationship among the variables in the model. There are no causal relationships between the variables based on the Granger Causality test result. Our equation estimation result indicates a good fit for the model. 96.8% of variations in the dependent variable were as a result of changes in the independent variables. The Durbin-Watson of 1.867475 is a little below the benchmark of 2 but we don't have to worry about serial correlation problem. Two other diagnostic tests the Breusch-Pagan-Godfrey test for heteroscedasticity and Ramsey RESET test for stability and both indicate we don't have to worry about those problems. Specifically, the findings suggest that inflation was the most important variable influencing stock prices in Nigeria. Therefore, it is the opinion of this paper that stronger measures be adopted to effectively combat the problem of inflation in Nigeria.

**Key Words:** Heteroscedasticity, Stability, interest rate, Cointegration, Causality, Inflation

### Introduction

It is a common trend for stock prices to rise and fall several times within a year. Stock prices are affected either positively or negatively by a number of factors within and outside the economic system and such factors include company profits; political factors; economic performance; interest rates; inflation rate and Real Gross Domestic Product. Investment in the stock market is long-term in nature; any development that could affect the stability of the polity or economy usually has serious impact on the stock prices. Since the introduction of the Structural Adjustment Programme (SAP) in 1986, stock prices on the Nigerian Stock Exchange (NSE) have been volatile and consistently lost points leading to sharp declines in their prices. The downward trend in the market performance has been attributed to varying reasons in line with those stated by Corrado, et al (2002). However, Onagoruwa (2006) was of the view that stocks with history of good performance and fundamental attributes are good to buy at times when prices are down and more affordable because they are most likely to bounce back since they have the capacity to absorb the depression in the market. The injection of new funds through public offer could turn around the fortunes of the market because of the expected liquidity. Hence, it is important for investors to get an understanding of the workings of stock prices, investors should not panic at the downward trends in the market arena. Of interest to them should be interest rates, inflation rates, liquidity, and the growth of their investment. In well-developed capital markets, share ownership provides individuals with relatively liquid means of diversifying investment risk. Stock prices, however have a high degree of volatility due to market fluctuations especially when pressure is being exerted to keep controlled interest rate closer to market prices, which are more likely to reflect inflation and scarcity of funds. The effect of inflation on stock prices are reflected especially where there is a change in the expected inflation rate. If the earning streams of a company remain unchanged and inflation changes from expected, stock prices experience a decline, then, investors who own stock in such a company will experience negative returns. The Real Gross Domestic Product (RGDP) which is the sum of the value added in the economy during a given period or the sum of incomes in the economy during a given period adjusted for the effect of increasing prices will impact on the liquidity of the capital market; hence its influence on stock prices.

### The Structural Adjustment Programme (SAP) In Nigeria

In the early 1980s, there was a severe pressure on Nigeria's balance of payments. The situation was further complicated by increased debt service burden, a crash in the international oil market, deterioration in economic conditions, and accumulated trade arrears. The impact on the economy was devastating because it worsened the unemployment level in the face of acute shortage of inputs necessary to sustain a satisfactory industrial production (Central Bank of Nigeria, 1986). The Structural Adjustment Programme (SAP) promoted by the World Bank and the International Monetary Fund (IMF), embarked upon by developing countries emphasized that self-sustained growth process requires substantial investible resources, which are readily available at the stock market. In 1986, the Nigerian government embarked on a Structural Adjustment Program (SAP) in order to correct the aforementioned economic ills. The program was classified into three categories: improvement of the financial structure; improvement of monetary management; and reform to strengthen capital movements and the foreign exchange market (Oresotu, 1992).

In view of the catalog of economic problems facing the economy, the Nigerian government set the following key objectives for its SAP.

- (i) To restructure and diversify the productive base of the economy so as to reduce dependence on the oil sector and imports;
- (ii) To achieve a fiscal and balance of payments viability;
- (iii) To lay the basis for a reasonable non-inflationary growth; and
- (iv) To lessen the dominance of unproductive investments in the public sector, improve the sector's efficiency and intensify the growth potential of the private sector.

The main strategy designed to achieve these objectives include an adoption of a realistic exchange rate policy, liberalization of external trade and payment system, and, adoption of appropriate policies in all sectors with greater reliance on market forces. Others include a reduction in administrative controls, and rationalization and restructuring of public expenditures and custom tariffs. Ikhide and Alawode (2001) contain a comprehensive discussion of the sequencing of SAP in Nigeria. They note that the program began with the establishment of a second-tier foreign exchange market (SFEM) and subsequently, interest rate liberalization.

The objectives of interest rate management in Nigeria include the moderation of inflation, reduction of pressure on balance of payments position, stability in exchange rate, stimulation of savings and investment and the promotion of macroeconomic and financial sector stability. The monetary policy reform was geared to stabilize the economy in the short-run and to introduce a market system for effective allocation of resources. The efforts were directed at promoting financial savings, reducing distortions in investment decisions and inducing an effective intermediation between savers and investors. The initial approach included the rationalization of credit controls in such a way that banks were given more discretion in allocating credit in the economy. Liquidity and reserve requirements measures were relaxed for merchant as well as for commercial banks.

Interest rates were deregulated in stages. According to Oresotu, retail lending rates, were reviewed upward and the minimum rediscount rate (MRR) was also allowed to change. As observed by Aziakpono and Babatope-Obaso (2003), the MRR was fixed at 15 percent in August 1987 but was reduced to 12.75 percent in December 1987. Subsequent to the initial measure of interest rate deregulation, the spread between deposit and lending rates began to widen. For example, in 1989, average savings rate was at 16.4 percent while prime-lending rate was at 26.8 percent representing a spread of about 10.4 percent. The monetary authorities intervened by limiting the spread between deposit, and lending rates. Sanusi (2002a) notes that widening of interest rate spread in the 1990s was due to the oligopolistic nature of the banking system.

The reform of the financial structure led to changes in the Nigerian financial sector in an effort to foster competition, strengthen the supervisory role of the regulatory authority and streamline the relationship between the public and financial sectors of the economy. To foster competition, new financial institutions were granted licenses. For example, Oresotu notes that 79 new banks with 824 nationwide branches began operations between 1986 and 1991. Odife (1988) contains a more comprehensive account of the motivation and design of the structural adjustment program in Nigeria.

The power of the Central Bank of Nigeria (CBN) was enlarged via two new Decrees: the Central Bank of Nigeria Decree #24 and the Banks and Other Financial Institutions Decree #25 (BOFID). The new laws facilitated the introduction of new financial instruments for the purpose of enhancing the ability of the CBN to manage the monetary system. Moreover, according to Sanusi (2002a, 2002b), interest rate deregulation de-emphasized the use of credit allocation and control policies. It paved the way for the use of indirect controls such as open market operations (OMO), reserve requirements, and moral suasion in monetary management (Nnanna, 2001).

Since the introduction of structural adjustment programme (SAP) in Nigeria, the country's stock market has grown very significantly (Alile, 1996; Soyode, 1990). This is as a result of deregulation of the financial sector and the privatization exercises, which exposed investors and companies to the significance of the stock market. Equity financing became one of the cheapest and flexible sources of finance from the capital market and remain a critical element in the sustainable development of the economy (Okereke-Onyiuke, 2000). Though the stock market is growing, it is however characterized by complexities. The complexities arise from trends in globalization and increased variety of new instruments being traded: equity options, derivatives of various forms, index futures etc. However, the central objectives of the stock exchanges worldwide remain the maintenance of the efficient market with attendant benefit of economic growth (Alile, 1997).

There is a dearth of literature on the impact these variables and the complexities on the Nigerian Stock Exchange (NSE) since the introduction of SAP. This paper attempts to fill this gap and in the process investigates the impact of inflation, interest rate and real GDPs on stock prices on the Nigerian Stock Exchange (NSE) post SAP. It is aimed at examining the relationship between real gross domestic product, inflation rate, interest rate, and stock prices with a view to determining whether the fluctuations in the behaviour of stock prices is influenced by these variables and the impact arising thereby. It is a twenty-seven year time series study covering the period 1985 – 2012.

## Literature Review and Theoretical Framework

### The Fundamental Theory

This theory argues that at any point in time; an individual security has an intrinsic or true value, which is the present value of the future receipts accruing to the security holder. This view is essentially the same as the basic valuation model. It is based on the assumption that the analyst needs to consider the major factors affecting the economy, the

industry and the company. To make an appropriate investment decision, the environment within the company and its reaction to that environment in terms of investment and financing policies determines the future net receipts. It is also affected by the state of national economy, government economic policies such as inflation control, balance of payments, government budgetary and interest rate policies. The effect of each of these factors is largely dependent on the nature of the company's activities.

The fundamentalists forecast stock prices on the basis of market information about the economy, industry and the company. As it is usually the case, when the market anticipates an event, such as national budget, fiscal policies or exchange rate policies; the share prices are affected. It may be argued that market price approaches 'intrinsic' or 'true' value 'asymptotically', that is, it gets nearer and nearer but never quite gets there. During this time, new information may alter the intrinsic value so that market prices will have to start chasing a new intrinsic value such that to calculate the intrinsic value is to predict the market price. If fundamental analysis is used as a guide to investment decision, the buy and sell decision will be based on the discrepancy between intrinsic and market prices; if the intrinsic is greater than the market, the investor should buy, and sell if the market price is greater than intrinsic price. The amount of discrepancy and speed with the market approaches an intrinsic value may be regarded as indications of the degree of perfection in the market.

### **Technical/Chartist Theory**

This approach is based on the view that future patterns of share prices are repetitions of the same patterns of price movement which had occurred in the past; that is, historical price patterns are repeated in the future (Akinsulire, 2006). According to Corrado et al (2002), technical analyst makes attempt to predict the direction of future stock price movement based on historical price and volume behaviour; and investment sentiment. Bodie, Kane and Marcus (1999), supported this view that it is essentially the search for recurrent and predictable patterns in stock prices. Although technicians recognized the value of information regarding future economic prospects of the firm, they believe that such information is not necessary for a successful trading strategy. This is because whatever the fundamental reason for a change in stock prices, if the price responds slowly enough; the analyst will be able to identify a trend that can be exploited during the adjustment period. The key to successful technical analysis is a sluggish response of stock prices to fundamental supply and demand factors. Technical analysts also called chartists study records or charts of past stock prices to find patterns to exploit to make profit using Dow Theory, which is a method of analyzing and interpreting stock market movement which dates back to the turn of the century. Share prices/values can be measured using primary, secondary and tertiary trends. Though, there is no real theoretical justification for this approach, it can at times be spectacularly successful. Studies outside Nigeria have suggested that the degree of success is greater than could be expected merely from chance (Mayo, 2000). Nevertheless, not even the most extreme chartist would claim that every major price movement can be predicted accurately and sufficiently enough to make the correct investment decision. Many critics of charting suggested that it is unscientific as to be of no practical value, because there is no theoretical justification of this theory except its pointing to empirical evidence of its correctness (Akinsulire, 2006).

### **Random-Walk Theory**

A third theory of stock behaviour is the random walk theory which emerged as an attempt to disprove chartist theory. The theory states that a new market price of a share will stem solely from the reaction of investors to new, relevant information about the share and will be totally independent of the old market price. The random walk theory is of the view that the intrinsic value of stock price will be altered as new information become available and the behaviour of investors is such that actual stock prices will fluctuate at random from day to day around the intrinsic value. Because of random erratic movement in stock prices, an investor cannot safely rely on prediction of such movement for deciding when to trade in securities (Olowe, 1997). A random walk means that price changes are unpredictable, so using technical analysis to predict stock price is useless. The relevant test of efficiency in this model is whether prices incorporate all information that is available at the time. In its pure form, the Efficient Market Hypothesis (EMH) states that information efficient financial markets reflect all new relevant information fully. The three levels of efficiency are; the weak form, semi-strong form and strong form.

Mayo (2000) criticized the random walk theory on two grounds. That:

- (i) It is reasonable to expect that over a period of time, stock prices will rise to generate a positive return unless the return is entirely the result of dividend.
- (ii) Stock prices are not randomly determined but it is change in security prices that are randomly determined, security prices are rationally and efficiently determined by earnings, interest rate, dividend policy etc.

### **Hypothesis Formulation**

#### **Inflation and its Effect on Stock Prices, we expect $\beta_1 > 0$**

Asogu (1991) was of the view that inflation is generally used to describe a situation of rapid, persistent and unacceptable high rises in the general price level in an economy, resulting in general loss of purchasing power of the currency. According to him, inflation causes serious discomfort for consumers, investors, producers and the government. Some attempts have been made to study the character of inflation in Nigeria. Asogu (1991) undertook an

empirical investigation based on ten different specifications that covered monetary, structural and open economy aspects of inflation. The variables used include money supply and its lagged values, Real Gross Domestic Product (RGDP) and its lagged values, aggregate domestic credit to the economy and its lagged values, government expenditure and its lagged values. Others are industrial production index, import price index and official exchange rate in all, the models were estimated and the character of inflation seems to be well captured.

In summary, the results of the estimations suggested that real output, especially industrial output, net exports, current money supply, domestic food prices and exchange rate changes were the major determinants of inflation in Nigeria. The study, therefore, confirms the importance of structural character of the economy; open economy and monetary aspects of inflationary trend in Nigeria. In another study of inflation in Nigeria, Masha (2000) quoted Fakiyesi (1996), who argued that inflation is dependent on growth in broad money, the rate of exchange of the Naira vis-à-vis the dollar, the growth of real income, the level of anticipated inflation, which is based on the previous year's level of inflation. Causes of inflation can however be broadly categorized into the 'fiscal' and 'balance of payment' views. Proponents of the fiscal view have argued that continuous expansion of base money essentially arises from a fiscal disequilibrium. Attempts have been made to show that the economy will be characterized by two inflation equilibria if there is an exogenous real fiscal deficit; a change in Cagan semi-logarithmic money demand function and rational expectations. The high inflation equilibrium will be stable and the low inflation equilibrium unstable (Montel, 1989) as cited in (Afolabi and Efunwoye, 1995).

It is a common belief that inflation is advantageous to common stock. This is majorly because it is argued that inflation increases the returns to shareholders since price of products rise faster than wage rates. The expected relationship between inflation and returns to owners of equity would be valid if business firms were debtors and if the current interest rates on debt finance failed to reflect the future changes in the price level. According to Jhingan (1997), when there is inflation, most prices are rising, though some price rise faster than others. Kirkpatrick and Nixon (1986) as cited in Afolabi et al (1995) have shown from their studies that there is a relationship between inflation and rising prices. Asogu (1991) states that inflation rate is expected to vary *ceteris paribus*, positively in relation to changes in prices. Therefore, in assessing the impact of inflation on performance of stock prices of quoted companies; if there is a relationship, one should expect a positive association between inflation and the variation in stock prices. Kolari (2001) using stock price and goods price data from six industrial countries showed that long-run Fisher elasticity of stock prices with respect to goods prices exceeds unity and range from 1.04 to 1.65 which supported the Fisher effect that inflation has a negative short-run effect on stock returns but turns positive over longer horizons.

However, Tamtom (2002) asserted that a negative long-run relationship exist between stock prices and inflation; in turn implying that higher stock prices are associated with lower inflation contrary to recent proposals.

#### **Interest Rate and its Effect on Stock Prices, we expect $\beta_2 < 0$**

Interest rate structure in Nigeria has overtime been controlled and managed by Central Bank of Nigeria (CBN) prior to the introduction of SAP. Every year, the CBN fixes the range within which both the deposit and lending rates are to be maintained. According to Jhingan (1997), interest rate can be classified into various categories; Deposit rates, Lending rates, Treasury bill rate, Inter-Bank rate and Minimum Rediscount rate.

Oresotu (1992) explains that the basic functions of interest rates in an economy in which individual economic agents take decisions as to whether they should borrow, invest, save and/or consume, are summarized by International Monetary Fund (IMF) under three aspects; namely:

- interest rates as return on financial assets serve as incentive to savers, making them defer present consumption to a future date
- interest rates being a component of cost of capital affect the demand for and allocation of loanable funds;
- the domestic interest rate in conjunction with the rate of return on foreign financial assets and goods are hedged against inflation.

These broad roles of interest rates according to Oresotu (1992) emphasize their significance in the structure of basic prices and indicate the need for study about their determinants under a flexible regime. During periods of rapidly changing prices, interest rate may be a poor index of the return due to an investor. Too expensive interest rate may choke off investment; Ogiogio (1988), Alile (1992) explain that interest rate in Nigeria would significantly influence the holding of financial assets by investors. Thus, an increase in interest rate would be accompanied by a decrease in stock prices (Aje, 2009).

#### **Real Gross Domestic Product (RGDP) and Stock Prices, we expect $\beta_3 > 0$**

The measure of aggregate output in the national income accounts is Gross Domestic Product (GDP) according to Blanchard (1997). He stated that there are three ways of thinking about an economy's GDP. These are:

- GDP is the value of the final goods and services produced in the economy during a given period
- GDP is the sum of value added in the economy during a given period ,
- GDP is the sum of incomes in the economy during a given period.

Nominal GDP is simply the sum of the quantities of final goods produced times their current price. Economists use nominal for variables expressed in units of the currency of the relevant country. Nominal GDP increases over time for two reasons. The first is that the production of most goods increases over time. The second is that the naira price of most goods increases over time. In order to measure production and its change over time, the effect of

increasing prices need to be eliminated. Hence, focus is on real GDP rather than nominal. Carstrom (2002) expressed that stock prices and future real gross domestic product growth are related. He gave two prominent explanations for this; the first explanation was that changes in information about the future course of RGDP cause prices to change in the stock market today. He also said that changes in stock prices, no matter what the source is, will reduce firms' asset positions and affect the cost of their borrowing. When it costs more for firms to borrow money, they borrow and invest less, RGDP growth slows.

Changes in information about the future course of RGDP may cause prices to change in the stock market. This explanation suggests that while stock prices are used to predict future economic activity, the actual causality is from future GDP growth to current stock prices.

### Model Specification

The functional form on which our econometric model is based is given as:

$$Y = f(X_1, X_2, X_3)$$

This can be specifically stated as:

$$ASPI = INFR, INTR, RGDP \quad \text{Eq. (1)}$$

The above model is specified linearly in the form of an equation as follows:

$$ASPI_t = \beta_0 + \beta_1 INFR_t + \beta_2 INTR_t + \beta_3 RGDP_t + U_t \quad \text{Eq. (2)}$$

Where

ASPI = All Share Price Index

RGDP = Real Gross Domestic Product

INFR = Inflation Rate

INTR = Interest Rate

$\beta_0$  = constant of the model

$\beta_1, \beta_2, \beta_3$  = are coefficients of the model

$U_t$  = Stochastic or error term

Log-linearly our model can be specified as follows:

$$\text{Log}ASPI_t = \beta_0 + \text{Log}\beta_1 INFR_t + \text{Log}\beta_2 INTR_t + \text{Log}\beta_3 RGDP_t + \epsilon_t \quad \text{Eq. (3)}$$

A priori expectations  $\beta_1, \beta_3 > 0, \beta_2 < 0$

### Empirical Results

This section discusses the empirical results of the study. The paper utilizes the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) unit root tests for the variables, namely all share price index, inflation rate, interest rate and real gross domestic product. The tests included an intercept but not a linear trend. The ADF and PP unit root tests results are presented in table 1 below.

**Table 1: ADF and PP Unit Root Tests Results**

VARIABLE	ADF	PP	Order of integration
<b>D(LOGASPI)</b>	-3.636801	-3.615208	I (1)
<b>5%</b>	-2.981038	-2.981038	I (1)
<b>D(LOGINFR)</b>	-7.745402	-11.89416	I (1)
<b>5%</b>	-2.981038	-2.981038	I (1)
<b>D(LOGINTR)</b>	-4.780130	-4.780130	I (1)
<b>5%</b>	-2.986225	-2.986225	I (1)
<b>D(LOGRGDP)</b>	-3.138539	-3.176494	I (1)
<b>5%</b>	-2.981038	-2.981038	I (1)

**Source:** Authors compilation from Eviews 7.0 printout

Both the ADF and PP tests results indicate that the variables are non-stationary at levels. However, they achieved stationarity at first difference or I (1). In each case, the test statistic exceeded the critical value at least at the 5 percent significance level. The series are stationary at first difference and maximum lag of one. That is, the model follows an integrating I (1) process.

### Co-integration Test

Following the ADF and PP tests, if all variables are I (1), the cointegration test is usually undertaken. The existence of the co-integration relationship implies that the variables share mutual stochastic trend and are linked in a common long run equilibrium. In this paper, test for co-integration utilizes the Johansen (1988) and Johansen and Juselius (1990) approach of testing the number of co-integrating vectors. More specifically, the paper performed the cointegration procedure with unrestricted intercepts and unrestricted trends in the vector auto-regression. The Johansen test employs two different likelihood ratio tests of significance of the correlations and thus the reduced rank of the  $\Pi$  matrix (Hjalmarsson and Osterholm 2007). These are the trace test and the maximum eigenvalue test. The trace test analyzes the null hypothesis of  $\tau$  cointegrating vectors against the alternative of  $n$  cointegrating vectors whereas the maximum eigenvalue test tests the null hypothesis of  $\tau$  cointegrating vectors against the alternative hypothesis of  $\tau + 1$  cointegrating vectors.

**Table 2: Johansen Cointegration Test result**

Date: 04/30/15 Time: 10:43  
 Sample (adjusted): 1989 2012  
 Included observations: 24 after adjustments  
 Trend assumption: Linear deterministic trend  
 Series: LOGASPI LOGINFR LOGINTR LOGRGDP  
 Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.716598	68.61229	47.85613	0.0002
At most 1 *	0.682730	38.35092	29.79707	0.0041
At most 2	0.357794	10.79884	15.49471	0.2242
At most 3	0.007081	0.170541	3.841466	0.6796

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level  
 \* denotes rejection of the hypothesis at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.716598	30.26137	27.58434	0.0221
At most 1 *	0.682730	27.55208	21.13162	0.0054
At most 2	0.357794	10.62830	14.26460	0.1738
At most 3	0.007081	0.170541	3.841466	0.6796

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level  
 \* denotes rejection of the hypothesis at the 0.05 level

We estimate equation (3) to determine the cointegrating rank of the system of variables. The lag length is automatically selected and the constant is restricted to allow for an intercept but no trend in the cointegrating equation. Table 2 above shows the results from the cointegration test. Both the trace test and the maximum eigenvalue test rejects the null hypothesis of no cointegrating vectors at the 5% level. On the other hand, both tests indicate at most one cointegrating equation at the 5% level. Based on this evidence, we posit that there exist a cointegrating relationship between stock prices, real gross domestic product, inflation rate and interest rate.

**Table 3: Equation Estimation Result**

Dependent Variable: LOGASPI

Method: Least Squares

Date: 04/30/15 Time: 10:41

Sample (adjusted): 1987 2012

Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.230212	3.598764	0.619716	0.5432
LOGINFR	0.068839	0.057079	1.206035	0.2434
LOGINTR	0.012780	0.065764	0.194325	0.8481
LOGRGDP	-0.273148	1.564648	-0.174574	0.8634
LOGASPI(-1)	0.906768	0.092564	9.796086	0.0000
LOGINFR(-1)	0.030674	0.056038	0.547386	0.5908
LOGINTR(-1)	0.215393	0.131480	1.638217	0.1187
LOGRGDP(-1)	0.116945	1.645827	0.071055	0.9441
R-squared	0.977389	Mean dependent var		8.629569
Adjusted R-squared	0.968596	S.D. dependent var		1.681569
S.E. of regression	0.297993	Akaike info criterion		0.664166
Sum squared resid	1.598396	Schwarz criterion		1.051273
Log likelihood	-0.634157	Hannan-Quinn criter.		0.775639
F-statistic	111.1545	Durbin-Watson stat		1.867475

Table 3 above is the empirical result obtained from the multiple OLS regression estimate using Eviews Statistical package 7.0 on I (1) series data. After adjustments, the model shows an  $R^2$  (coefficient of determination) of 97.7% and an adjusted  $R^2$  of 96.8%. Using the adjusted  $R^2$ , this implies that 96.8% of the total variation in stock prices (ASPI) is jointly explained by changes in real gross domestic product, inflation rate and interest rate. In addition, inflation rate and real gross domestic product have positive signs and in agreement with our a priori expectations while interest rate does not. The Durbin-Watson (1.867475) is a little below the traditional benchmark of 2.0 so we don't have to worry about serial correlation. The F-statistic (8.350441) with p-value 0.0000 is statistically significant and shows the joint effect of the independent variables on the dependent variable.

### Causality Test

To determine the direction of causality between the variables, we employ the pairwise Granger causality test (Granger, 1969). X Granger causes Y if past values of X can be used to predict Y more accurately than simply using the past values of Y. The result is presented in table 4 below.

**Table 4: Granger Causality Test Result**

Pairwise Granger Causality Tests

Date: 04/30/15 Time: 10:44

Sample: 1985 2012

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGINFR does not Granger Cause LOGASPI	26	0.32765	0.7242
LOGASPI does not Granger Cause LOGINFR		1.03362	0.3731
LOGINTR does not Granger Cause LOGASPI	25	0.64945	0.5330
LOGASPI does not Granger Cause LOGINTR		0.21815	0.8059
LOGRGDP does not Granger Cause LOGASPI	26	0.20347	0.8175
LOGASPI does not Granger Cause LOGRGDP		0.19245	0.8264
LOGINTR does not Granger Cause LOGINFR	25	2.43251	0.1133
LOGINFR does not Granger Cause LOGINTR		0.06711	0.9353
LOGRGDP does not Granger Cause LOGINFR	26	0.33513	0.7190
LOGINFR does not Granger Cause LOGRGDP		0.14920	0.8623
LOGRGDP does not Granger Cause LOGINTR	25	0.90813	0.4193
LOGINTR does not Granger Cause LOGRGDP		0.84294	0.4452

The results indicate the absence of any causal relationship between the variables in the model.

**Diagnostic Tests**

One of the assumptions made in the multiple regression equation is that the errors  $U_i$  in the model have a common variance ( $\sigma^2$ ). This is known as homoscedasticity assumption. If the errors do not have a constant variance we say they are heteroscedastic. Sometimes, the heteroscedasticity problem is solved by estimating the regression in a log-linear form. We employ the Breusch – Pagan-Godfrey test for heteroscedasticity.

**Table 5: Breusch-Pagan-Godfrey test of Heteroscedasticity**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.300406	Prob. F(3,23)	0.8247
Obs*R-squared	1.018060	Prob. Chi-Square(3)	0.7969
Scaled explained SS	0.293072	Prob. Chi-Square(3)	0.9613

Result of the Breusch-Pagan-Godfrey test indicates the absence of heteroscedasticity. The observed probability is higher than our chosen alpha level 0.05.

**Table 6: Ramsey RESET Test of Parameter constancy)**

Ramsey RESET Test

Equation: UNTITLED

Specification: LOGASPI C LOGINFR LOGINTR LOGRGDP LOGASPI(-1)

LOGINFR(-1) LOGINTR(-1) LOGRGDP(-1)

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.306081	17	0.2089
F-statistic	1.705846	(1, 17)	0.2089
Likelihood ratio	2.486192	1	0.1148

When we estimate a multiple regression equation and use it for predictions at future points in time we assume that the parameters are constant over the entire time period of estimation and prediction (Madala, 2007). To test this hypothesis of parameter constancy (or stability) the Ramsey RESET test is employed and the result in table 5 above.



## Summary and Conclusion

This paper investigated the impact of inflation, interest rates and Real GDP rates on stock prices on the Nigerian Stock Exchange (NSE). The findings were in line with a priori expectation expressed by Blanchard (1997) and Tamtom (2002).

An important finding is that the explanatory variables in the model result in 96.8% influence on the stock prices on the Nigerian Stock Exchange for the period 1985 – 2012. The paper also provides evidence of a long-term equilibrium relationship among the variables in the model. Specifically, the findings suggest that inflation was the most important variable influencing stock prices in Nigeria.

Conclusively, government should implement policies that will reduce inflation rate and poverty level through infrastructural development and improved standard of living. Also, interest rates should be made moderate in order to encourage investment and transactions in stocks in the Nigerian Capital Market.

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