

## **Inflation Rate and Stock Returns: Evidence from the Nigerian Stock Market.**

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### **Abstract**

*This study examined the impact of inflation rate on stock returns in the Nigerian Stock Market. It also attempted to determine whether inflation rate had any effect on stock returns in Nigerian stock market and to ascertain whether stock prices effectively predict stock returns in the Nigerian stock market, using monthly data covering the period 1995 to 2010. Secondary data were extracted from the Nigerian Stock Exchange Fact Book and the Central Bank of Nigerian Statistical Bulletin. The result indicates that the inflation rate has a negative but weak impact on stock return; hence, inflation is not a strong predictor of stock returns in Nigeria. Inflation variable appears to significantly respond to stock price changes. Caution should be exercised in interpreting this, particularly as it may not suggest that stock prices determines inflation or that inflation be anchored on the activities in the stock market in the course of policy perspective. The study recommended that the government should ensure inflation stabilization and appropriate tax administration that takes into cognizance the technical patterns of stock market activities and that monetary policies should be aimed at finding a more realistic price level that will be beneficial to investors in the Nigerian stock market.*

**Key words:** inflation rate, stock return, stock price

### **1. Introduction**

Inflation is conventionally defined as a persistent rise in the general level of prices of goods and services in an economy over a period of time. When the general price level rises, each unit of currency buys fewer goods and services, thus eroding the purchasing power of money. Inflation is measured by inflation rate, the annualized percentage change in the general price index (usually the Consumer Price Index) over time. The effects of inflation on an economy are numerous and can be positive or negative, but mainly negative. Negative effects of inflation includes a decrease in the real value of money and other monetary items over time, uncertainty over future inflation which may discourage investment and savings, and if inflation is very rapid, shortages of goods as consumers begin hoarding out of concern that prices will increase even more in the future. Positive effects includes ensuring that central banks can adjust nominal interest rates (intended to mitigate recessions), and encouraging investment in non-monetary capital projects. Economists generally agree that high rates of inflation are caused by an excessive growth in money supply. The essence of investment is to attain a reasonable return while minimizing risk. Minimizing risk and earning reasonable returns on investment calls for proper attention on the current rate of inflation otherwise the value of the investment will be eroded overtime.

The relationship between inflation rate and stock returns has been examined by several financial economists around the world. However, the relationship has not been widely investigated in the Nigerian Stock Market, hence; the study would significantly contribute to the existing literature on the subject matter. The stock market is an integral component of the financial sector; its performance is very critical to growth process of the economy at large. In the last ten years, there has been rapid increase in the activities of the stock market, which has also fostered rapid competitiveness in stock trading in securities (stocks).

In an increasing world of finance, the overall performance of the stock market is critical to viability of investment and in turn economic growth, thus, the inflation-stock market nexus is a critical issue in the stock market returns literature.

According to Boucher(2006), the inflation-stock returns correlation has been subjected to extensive study at the end of 1970s and the beginning of the 80s, Lintner(1975), Bodie (1976), Fama and Schwert (1977), Jaffe and Mandelker(1976), Nelson(1976), Fama (1981), Pyndick (1984) and confirmed by (Graham, 1996 Siklos and Kwok, 1999; Barnes *et al.*, 1999). Other early studies such as Modigliani and Cohn, 1979; Feldstein, 1980 focused on the negative relationship between inflation and the level of real stock prices, as reflected in dividend price ratios and price-earnings ratios. Ritter and Warr (2002), and Sharpe (2002) confirmed this negative relationship. A number of alternative hypotheses have been advanced in literature explaining the negative relationship between inflation and stock prices. These alternatives include; (i) a correlation between expected inflation and expected real economic growth (the “proxy hypothesis” suggested by Fama (1981); (ii) the hypothesis that investors may irrationally discount real cash flows using nominal interest rates (Modigliani and Cohn, 1979); (iii) changes in the expected returns and risk aversion. Experts believe that the rate of inflation will influence the stock market volatility and risk. Most emerging equity markets in Africa, particularly in Nigeria, have been bedeviled with sell-down in recent times with foreign portfolio investors shifting their money to a more matured market where their returns on investment will not be eroded by inflation. Since the issue of inflation in the region becomes more of concern, funds will begin to flow out from the region largely on the theme of inflation, the worst of which is not over especially with the increase in the price of oil (Geetha, Mohidin, Chanran and Chong, 2000).

In a comprehensive study of relationship between inflation rates and stock markets in US, Malaysia and China, Geetha, et al. (2011) stated that inflation rate can be divided into expected inflation and unexpected. Expected inflation rate is as a result that economist and consumers plan on year to year, if inflation is expected, people are less likely to hold cash, overtime money losses value due to inflation. While, the unexpected inflation is beyond what was expected by economists and consumers. In general, the effect of unexpected inflation is much more harmful than the effects of expected inflation. The major effect of unexpected inflation is a redistribution of wealth from lenders to borrowers. Several studies have been carried out on the relationship between inflation rates and stock markets or returns across emerging markets and developed economies. While some of these studies showed significant positive relationship between inflation rates and stock market, some found a significant negative relationship between stock market and inflation rate, and others found no significant relationship between the two variables. For instance, the studies of Fraser and Oyefeso (2002), Jang and Sul (2002), Moon (2001), Tessaromatis (1990), Peel, Pope and Paudyal (1990) all found significant positive relationship between inflation rates and stock market; Fama and Schwert (1977), Schwert (1981), Fama (1981), Geske and Roll (1983) and Kaul (1987) and others found a significant negative relationship between stock market and inflation. However, some other studies such as Pearce and Roley (1985), and Hardouvelis (1988) found no significant relationship between the two variables (inflation and stock market).

However, in view of the wide range of conflicting empirical studies on how inflation rates in emerging markets affect the rate of stock returns, one cannot draw conclusions from them with any minimal acceptable level of confidence. More also, given the continuous unstable development of the Nigerian stock market occasioned by upsurge in inflation rates and coupled with the impact of the recent global financial crisis, there is a growing interest in examining its impact on stock returns within the context of the Nigerian Stock Market. Also, the numerous literature on inflation and stock returns in Nigeria has not received the attention it deserves. Hence, the study seeks to empirically determine the impact of inflation rates on stock returns in the Nigerian Stock Market overtime and to see if there is any time series support for the inflation return-led hypothesis in the Nigerian context.

## **2. Literature Review**

The relationship between inflation and stock returns was first established in the context of Fisher effect, also known as the Fisher hypothesis. The Fisher effect is a product of the economic theory by Fisher (1930), who sought to explain the relationship between returns and inflation. For most of the period from 1930's to the 1970's, this theory was the logical explanation for the stock-inflation relationship, as it solidified the notion that assets underlying value is maintained in the face of inflation. However, Sharpe (2002) noted that during the 1970's investors found the Fisher theory to falter in the short and intermediate terms, as stock returns were negatively related to inflation.

The late 1970's thus heralded a wave of research in this area, with Nelson (1976), Jaffe and Mandelker (1976), Bodie (1976), Fama and Schwert (1977) and Modigliani and Cohn (1979) all producing empirical evidences to show the negative relationship between stock returns and inflation. Many reasons were provided, Feldstein (1980) arguing that taxation-inflation relationship played a pivotal role in influencing the relationship contrary to Fisher's theory. The most significant reasons put forward in the 1930's and 1990's for the new empirical evidences was independent effects of real economic activity to both stocks and inflation. Thus Fama (1981) argued that the direct relationship was spurious and was explained by the inferred (proxy) relationship between the variable and economic activity. Fama's argument was supported by Geske and Roll (1983), Gultekin (1983), Vanderhoff and Vanderhoff (1986), Chang and Pinegar (1987), Kaul (1987, 1990), Lee (1992), Ely and Richardson (1997), and Boucher (2006): however, criticized the proxy hypothesis and failed to find justifications for the Fama-generated explanation of the stock-inflation relationship.

Hence, the rest of this chapter focuses on the various issues relating to inflation and stock returns in Nigerian and in other parts of the world.

### **2.1 Stock Prices and Inflation Rate**

The observed negative relationship between stock returns and inflation rate during the post-world war II period was troublesome because it appears to contradict Fisher's (1930) hypothesis, which states that nominal asset returns move one-for-one with the expected inflation so that real stock returns are determined by real factors independently of the rate of inflation. According to Fisher (1930), assets which represent claims to physical or real assets, such as stocks, should offer a hedge against inflation. The inflation-stock returns correlation has been a subject of extensive study since the end of 1970's and the beginning of 1980 (e.g. Lintner, 1975; Bodie, 1976; Fama and Schwert, 1977; Jaffe and Mandelker, 1976; Nelson, 1976; Fama 1981; Pindyck, 1984) and was confirmed more recently (Graham, 1996; Siklos and Kwok, 1999; Barnes et al, 1999).

In analyzing the Fisher hypothesis, most of these empirical studies have focused on asset returns over relatively short time horizons (less than a year). However, Boudoukh and Richardson (1993) investigated the relationship between stock returns and inflation at both short (1 year) and long (5 year) horizons using long term annual US and UK data, and obtained quite interesting results that at the 1-year horizon nominal stock returns and inflation are approximately uncorrelated, while at the 5-year horizon the Fisher equation holds. Other early studies focused on the negative relationship between inflation and the level of stock prices, as reflected in dividend-price ratio and price earnings ratio (Modigliani and Cohn, 1979; Feldstein, 1980). More recently Ritter and Warr (2002), Sharpe (2002) confirmed this negative relationship.

### **2.2 the Stock Market**

In this section, we looked at the stock market which is sometimes referred to as the equities market. Companies issue shares which define the main part of their ownership structure, and these shares, also known as stocks, are either offered to the public when the company is listed or to individuals for privately owned entities. Reilly and Brown (2003) add to this definition by saying that equities are an ownership of a firm, with full participation in this success or failure. Companies issue shares to raise money to buy fixed assets or to enter into a business venture rather than use it for recurrent expenditure. A share, according to Hoesli and Macgregor (2000) is a paper asset which carries with it a hold on the capital and income of the company and a share in the management of the company through voting right proportional to number of shares held. Ross et al. (2005), on the other hand, noted that the term "common stock" has no precise meaning, and is usually applied to stocks that have no special preference in either dividend or bankruptcy, and where the stockholders receive certificate with a stated value of cash share called "par value" which is normally lower than the market value of the stock.

Common stocks of a listed company can be bought or sold freely on the stock exchange and the income for ownership is paid in the form of a dividend. Since a dividend is not guaranteed in either real or nominal terms, Hoesli and Macgregor (2000) pointed out that it depends primarily on the profitability of the company and on the policy of its directors. As owners of the firm, stockholders indirectly make the dividend policy and other operational decisions through whom they choose at their annual general meetings (AGM), using their voting rights. While directors work in the interest of shareholders, between these meetings sometimes they make decisions that are not in the shareholders' interest, thus creating agency problem. To counter, this challenge, shareholders limit the decision which the directors can make on their behalf to ensure some level of control.

According to Bodie et al. (2005), the most important characteristics of common stock as an investment vehicle is its residual claim and limited liability features. Residual claim means that stockholders are the last in line of all those who have a claim on the assets and income of the corporation. During the liquidation of the firm's assets, the shareholders have a claim to what is left after all other claimants such as the tax authorities, employees, suppliers, bondholders and other creditors can lose in the event of failure of the corporation in their original investment.

### **2.3 Inflationary Trend in Nigeria**

Inflationary trend in Nigeria during the period 1980 to 2012 was characterized by large growth rate that may be attributed to several inconsistent macroeconomic policies and structural bottlenecks. According to the official statistics from the National Bureau of Statistics (NBS), the inflation rate of 1980 was 11.4 percent. In 1981, inflation rate rose to 17.4 percent and thereafter fell to as low as 6.94 percent in 1982. In 1983, the inflation rate rose to a high double digit of 38.77 percent, 22.63 percent in 1984 and thereafter recorded an all-time low of 1.03 percent in 1985. Apart from 1982, 1985 and 1987; the inflationary growth rate in Nigeria since 1980 has become two digits.

In 1988, the inflation rate stood at a very high 61.21 percent, due to the Structural Adjustment Programme (SAP) which was introduced in 1986. In 1990, the inflation rate fell again to a low 3.61 percent and subsequently rose to 22.96 percent in 1991, and 48.80 percent in 1992. In 1994, the inflation rate recorded an all-time high of 76.76 percent the highest in the decade and ever recorded. In 2000, the inflation rate stood at 14.56 percent but however fell to 11.60 percent in 2005. The year 2008 recorded an inflation rate of 15.10 percent which however dropped to 12.2 percent in 2009. In 2011 and 2012, inflation rate stood at 12.4 and 13.2 percent respectively. The annual changes in inflation rate over the entire period of 1980 – 2012 are quite instructive. It shows that inflation rate has been double digit, except for 1982, 1985, 1987, 1990, and 2006, when inflation rate respectively stood at a single digit.

### **2.4 Evidence of Inflation Rate and Stock Returns**

The empirical studies can be sorted into three distinct groups: event studies, short horizon studies, long horizon and long-term studies (Luintel and Paudyal, 2006). From the event studies, evidence shows that there is a negative (or significant) effect of unexpected inflation announcements on stock returns. Schwert (1981), Pearce and Roley (1985), McQueen and Roley (1993), Flannery and Protopapadakis (2012), Graham et al. (2002) and Adams et al. (2004) all found a significant negative impact of inflation news on stock returns. But Joyce and Read (2002) found no significant evidence of unexpected inflation impact on stock prices. The empirical studies are viewed from two perspectives; short run and long run. From the short horizon studies, a large number of studies document the cross-sectional negative relationship between stock returns and inflation. Examples include Bodie (1976), Nelson (1976), Jaffe and Mandelker (1976), Fama and Schwert (1977), Geske and Roll (1983), James et al. (1985), Kaul (1987, 1990), Lee (1992), Graham (1996), Hess and Lee's (1999). They all found that common stock returns are negatively related to inflation.

However, some short-horizon studies show that the relationship could be either positive or negative varying over different time horizons, across countries or even across different industries (see 1993 Schotman and Schweitzer, 2000, Ryan, 2006) or depending on different monetary regimes, different components of inflationary economies or regimes (see Kaul, 1987, 1990; Graham, 1996; Barnes et al; 1999). Gultekin (1983) suggests that the relationship varies across countries. Marshall (1992) points out that the relationship varies with different components of inflation. Corroborating this empirical studies is the work by Barnes et al.(1999) and Choudhry (2001) which further showed that the relationship varies across different inflationary regimes. Similarly, a monetary regime varying relationship is suggested by Kaul (1987, 1990).

In the long-horizon, most studies found that a positive relationship between inflation and stock returns, while others showed mixed results, indicating lack of consensus; see (Bouldoukh et al., 1994; Schotman and Schweitzer, 2000; Engsted and Tanggared, 2002; Wong and Wu 2003). Similarly, Ryan (2006), Elyand Robinson (1997), Anari and Kolari (2001) and Luitnel and Paudyal (2006) examine the long-run relationship between inflation and stock returns in a cointegrating framework and found that good price elasticity is greater than unity. Employing a cointegrating framework, Ahmed and Cardinale (2005) however for the U.S, the U.K, Germany and Japan, mixed results sensitive to the data horizon and the lag length chosen. Laopodis (2006) used the bivariate and multivariate vector autoregressive cointegrating specifications, the empirical results showed the existence of two weak negative relationship.

The literature on the relationship between inflation and stock returns has been examined by numerous studies. Although it is still too early to conclude the inflation stock returns relationship, more and more literatures show that this relationship varies across different time horizons. The empirical findings are mixed, positive, negative or neutral. Negative or insignificant relations have been found in inflation announcement studies, while positive, negative or insignificant relations have been found in short horizon studies and a positive relationship is found in most long or long-term cointegration analysis. In addition, empirical results also show that the relationship between inflation, stock returns and inflationary economies or regimes varies in the short horizon study.

### **2.5 The Theoretical Relationship between Inflation Rate and Stock Returns**

Theoretically, the relationship between inflation rate and stock returns is underpinned on economic theory. Economic theory posits that inflationary pressures erode the value of money, thus making a given unit of money purchase fewer goods.

A strong association is presumed to exist between stock returns and domestic inflation rate. If the value of money diminishes during high inflation rate, then inflation rate influences stock market risk. The risk here is defined in terms of the fall in return of securities, since the value or return of securities is expressed in monetary terms, then a fall in the value of money during high inflation implies a diminishing level of stock returns.

In particular, domestic inflation rate influences stock returns because in times of high inflation, people easily recognize that stock market is in a state of difficulty, consequently, people are laid off from their jobs, which could cause reduction in production. If people are laid off, they tend to switch their resources to consumption of essential items of life and forego investment in capital market. This is because the value of money upon which stock returns are based is eroded, and as such people no longer find it profitable to invest in stocks. On account of this, people would stop purchasing shares and in some cases, direct their investments which would reflect in reduced trading volumes and traded values of most securities in the market. This eats up into corporate profit which in turn, makes dividends to diminish. If dividends decrease, the expected returns of stocks decrease, thereby causing stocks to depreciate in value. (Fama 1981).

This negative association between stock returns and the rate of inflation is thus; in line with theory postulates suggesting that high rate of inflation increase the cost of living and a shift of resources from investment to consumption. This leads to a fall in demand for market securities and subsequently leads to reduction in the volume of stock traded and stock market returns. (Fama 1981, Ozurumba 2012).

### **2.6 Performance of the Nigerian Capital Market Since 1986**

An evaluation of the performance of the Nigerian capital market from 1986-2009, is done here using some of the generally accepted criteria, which includes;

- (i). Number of listed companies.
- (ii). Number of listed securities.
- (iii). Size of the market capitalization and;
- (iv). All-share price index, which is a measure of the performance of the market.

The analysis of the major indicators of activity in the capital market showed that the market has experienced remarkable progress since 1986. Transactions in equities in the market, based on its current level of development could be considered to be weakly formed as the level of information dissemination and processing influence market behaviour remained weak. However, with the computerization of trading, and increased transparency in delivering corporate information, the market has become more efficient. Transactions in the stock exchange recorded increases in the number of listed securities companies, market capitalization and price index during the period. The improved performance of all four key indicators was traceable largely to the establishment of the second-tier securities market (SSM). In 1985, and the deregulation of interest rates in 1987, coupled with the privatization of some government owned companies in 1991.

The number of companies listed on the exchange (equities) grew by 95.0 percent from 100 at the beginning of 1988 to 195 at the end of December 1999. Total securities listed and traded also increased from 244 in 1987 to a peak of 286 in 1996, before declining to 268 in 1999 and increased between 2000 and 2012. The growth of listed companies coupled with greater awareness on the part of investors resulted in the increase in the number of securities issued and traded. This also contributed to the increase of market capitalization which grew from 8.3 billion or 7.6 percent of GDP in 1987 to 294.1 billion or 8.7 percent of GDP at the end of 1999 and about 12.64 trillion in 2008.

The number of listed companies on the Nigerian stock exchange is comparable with those of many emerging market. For example, out of the 17 stock markets in Africa, Nigeria had the third largest market of equity listings of 183 in 1988, surpassed only by Egypt (650) and South Africa (642). Nigeria also had a higher number than Poland (143), Jordan (139), Argentina (136) and Venezuela (91). It however recorded fewer listings compared to India (5843), Brazil (536) and Indonesia (282). Further insight into the performance of the market showed that share-price index rose during the period under review. The observed upward trend of share prices in the stock market was an indication of relative prosperity in the economy. The all-share price index grew by 22 percent in 1990, 33.9 percent in 1995 but dropped in 1998 and 1999 and rose again between 2000 and 2012.

Transaction in the secondary market showed remarkable growth. A total of 1,528.4 million shares valued at 3,7488.8 million, in 5,855.7 deals were traded 1988 and 1998. Transactions in the Nigerian Stock Market (NSE) grew from 21.5 million shares valued at 249.5 million in 1988 to 33.4 million shares worth 553.2 million at the end of 1990. By 1995, the total volume of shares traded on the market had risen to 396.91 million. Between 1996 and 1997, the average volume of shares traded was 1,062.7 million, valued at 8,564.1 million, in 1999; securities traded averaged 3,025.7 million shares, valued at 2,915, 905.988.41. (Babalola and Adegbite, 2005; Business Day. October, 2012).

Nigeria's Stock Market Index is the Nigerian Stock Exchange's All Share Index (NSE-ASI or simply ASI), and currently provides a composite picture of the financial health of 233 listed equities. The ASI attained a value of 100 in 1984 with increased listings and financial activity, the index value saw changes from 12,137; 20,129; 23,846; 24,086; to 33,358 at the end of the years 2002-2006 respectively. With respective end-of-year market capitalizations of ₦0.748 trillion, ₦1.32 trillion, ₦1.93 trillion, ₦2.90 trillion and ₦5.12 trillion. The ASI attained a value of ₦57,900 (and ₦9.42 trillion capitalization) at the end of year 2007, started the year 2008 at ₦58,580 (with market capitalization of ₦10.284 trillion), and then went on to achieve its highest value ever of ₦66,371 trillion on March 5, 2008, with a market capitalization of about ₦12.640 trillion (Ozurumba, 2012). In spite of this high value over the years, the ASI has severally declined exhibiting a secular bear posture since July 17, 2008, when at ASI of 52,910, the index fell below 20% of its all time high. It fell further, crossing below the 50,000 mark on August 8, 2008 and closing on October 22 at 42,207 (at 36.4% loss from high within just seven months, and a year to date decline of 27.9%) (Mobolaji, 2008) cited in Ozurumba (2012).

### 3. Methodology

The method of empirical analysis in this study is the autoregressive distributed lags (ARDL) approach to the estimation of the relationships between stock returns and inflation rate. This approach is very suitable for the study because it effectively captures persistence in prices disequilibrium over time and has been reported to be very efficient in forecasting (Ibrahim, 2010 and Panopoulou, 2007). Disequilibria in prices are persistent mainly because of the role of expectations in price determination. Thus, it is often the case that a well-defined pattern of influence is exerted on current prices by past price levels over a significant length of time.

The autoregressive distributed lags approach to estimation involves the use of the lagged endogenous variables and the other independent variables which are distributed over a period of time to predict current behavior of the endogenous variables. One statistical advantage of this method is that it has effectively developed an in-built capacity to correct serial correlations that are often present in time series data. Since one of the aims of the study is to forecast stock returns based on inflationary pressures, the ARDL model also captures some periods-ahead in the study. Moreover preliminary time series properties of the data will be evaluated based on the augmented Dickey-Fuller as well as the Philip Perron unit root tests. The test is required since the data used in the ARDL model are assumed to be integrated of order one (i.e, 1 [1]). This test will further reveal the level of persistence in prices in comparison with stock returns in Nigeria.

#### 3.1 Model Specification

In order to analyze the relationship between inflation rate and stock return, a general model used in the study is specified as an Autoregressive Distributed Lag (p,q) equation as:

$$R_t = \alpha_0 + \sum_{i=0}^p \beta_i R_{t-i} + \sum_{j=0}^q \theta_j \Delta CPI_{t-j} + \epsilon_t \dots\dots\dots (3.4.1)$$

Where R = stock returns

$\Delta CPI$  = change in or growth rate of consumers price index (proxied for inflation rate)

$\beta$  = the autoregressive term  
 $\theta$  = coefficient of the distributed lags of price changes  
 $\epsilon$  = the disturbance term  
 $t$  = time period (which is measured in months in this study)

$p, q$  = respective lag length for the variables in ARDL

Generally, total return is the theoretical growth in values of a shareholding over a specified period, assuming that dividends are reinvested to purchase additional unit of equity at the closing price applicable on the ex-dividend date. In this study, we apply a little adaptation to the definition above and present the formula as:

$$R_t = \frac{P_t}{P_{t-1}} \dots\dots\dots (3.4.2)$$

Where  $R_t$  = return on share price  
 $P_t$  = contemporary share price  
 $P_{t-1}$  = previous period share price

In order to select the length in the model both the Akaike information criterion (AIC) and the Scharze-Bayesian criterion (SBC) are employed. The selection of the lag length is critical to the study since an inappropriate length can imply instability in the model.

**4. Stock Empirical Analysis**

The dynamics of stock returns with regard to price changes in Nigeria is the focus of this empirical research. Thus, the processes of an Autoregressive Distributed Lags (ARDL) are examined. The nature of the research therefore requires that the time series properties of the data used in the study are to be investigated. This implies that the stationarity and long run properties of the data are examined in order to ensure that the estimates are representative of the time series being studied. The procedure for this analysis involves the testing for unit roots among the time series in the analysis. Moreover, due to the nature of the relationships being studied, Granger Causality tests are carried out to determine the direction of causality between prices and stock returns. Then, the ability of prices to forecast stock returns is examined by analyzing the forecast properties of the estimated model.

**4.1 Lag Length Selection**

In order to present a realistic ARDL model, the length of the lags used in the estimation is determined. This is based on the Schwarz Information Criterion which imposes more restrictions in the selection process than the AIC. Table 4.1 below shows that values for the SIC and the AIC for lags from one to six. In the table, it is seen that with a value of 6.955, the lag of six has the highest SIC. Though the AIC selects the third lag as the maximum, we choose the sixth lag because, as mentioned earlier, the SIC provides a more refined selection pattern. Thus, all the lags used in the estimation have the length of six months (or halve of a year). Ideally, this period is long enough to include any structural effects between both returns and prices and the period is also short enough to fit within the ARDL dynamics.

**Table 4.1: Maximum Lags Selection**

Lags	AIC	SBC
1	6.734	6.785
2	6.737	6.824
3	6.750	6.873
4	6.738	6.897
5	6.729	6.925
6	6.722	6.955

Source: Output from Eviews 7.

**4.2 Unit Root Analysis**

A time series is said to be non-stationary if the mean and variance of the time series is dependent over time. On the other hand, a time series is stated as stationary if the mean and variance is constant over time. According to Gordon (1995), most economic time series are non-stationary and only achieved stationarity at the first difference level or at a higher level. Generally, unit root test involves the test of stationarity for variables used in regression analysis. The importance of stationarity of time series used in regression borders on the fact that a non-stationary time series is not possible to generalize with respect to other time periods apart from the present.

This makes forecasting based on such time series to be of little practical value. Moreover, regression of a non-stationary time series on another non-stationary time series may produce spurious result.

The Augmented dickey Fuller (ADF) test is employed in order to analyze unit roots. The results are presented in levels and first difference. This enables us determine in, comparative terms, the unit root among the time series and also to obtain more robust results. Table 4.2 presents results of ADF test in levels without taking into consideration the trend in variables. The reason for this is that an explicit test of the trending pattern of the time series has not been carried out. In the result, the ADF test statistic for each of the variables is shown in the second column, while the 95 percent critical ADF value is shown in the third column. The result indicates that both returns and prices have time-invariant series properties. This is so because their respective ADF test values in levels are much greater than the 95 percent critical ADF value of -2.877. The implication of this is that these series do not move *inter dem* with time changes. This is actually to be expected with the series considering the frequency of the data and the periods included in the sample. The All Share Index variable however is non-stationary in levels.

**Table 4.2 Unit Root Test for Variables in Levels**

Variable	ADF Test Statistic	95% Critical ADF Value	Remark
<b>R</b>	-10.92	-2.877	Stationary
<b>P</b>	-14.64	-2.877	Stationary
<b>ASI</b>	-1.915	-2.877	Non-Stationary

*Result extracted from the Eviews 7 Output.*

Box and Henkins (1978) have argued that non stationary time series in levels may be made stationary by taking their first differences. A given series is said to be integrated of order  $d$  (denoted  $I(d)$ ) if it attains stationarity after differencing  $d$  times. If the series is  $I(1)$  it is deemed to have a unit root. This situation arises if the first difference of the series is  $I(0)$ . We take the first differences of the respective variables and perform the unit root test on each of the resultant time series. The reason for this is to ensure that the data are essentially amenable to short run dynamics. The result of the unit root test on these variables in first differences is reported in table 4.3 below. From the result, it is seen that all the variables in the time series have ADF test statistics that are greater than the 95 percent critical ADF values (in absolute values). This implies that the ASI variable is actually difference-stationary, attaining stationarity after the first differences of the variables.

**Table 4.3: Unit Root Test for Variables in First Differences**

Variable	ADF Test Statistic	95% Critical ADF Value	Remark
<b><math>\Delta R</math></b>	-11.28	-2.877	Stationary
<b><math>\Delta P</math></b>	-10.50	-2.877	Stationary
<b><math>\Delta ASI</math></b>	-5.311	-2.877	Stationary

*Result extracted from the Eviews 7 outputs.*

### 4.3 Granger Causality Tests

Granger causality testing is a preliminary aspect of an autoregressive-based analysis which may also provide the background for estimating dynamic relationships. The results of the Granger causality tests are reported in table 4.4 below. As is generally the case, the F-test is conducted on the null hypotheses in order to determine the direction of causality between each pair of variables. The rejection of each of the null hypothesis is based on the significance of the F-value for the particular relationship.

The test result shows that there is unidirectional relationship between prices and stock prices (ASI). Only the F test for the causality from ASI to prices is significant at the 5 percent level, indicating that ASI actually Granger-Causes price changes. In other words, price level responds to stock price but not the other way round. One basic implication of this result is that policies aimed at curbing general price rises have to consider, in a significant way, the dynamics of price changes in the stock market; stock prices is a unique aspect of general price level. The test also shows a feedback effect between stock prices and stock returns; they both Granger-Cause each other. This result is to be expected since rising stock returns is only a reflection of rising prices while rising prices ensure stimulation of stock returns. The aspect of more importance is the causality between stock returns and general price level or inflation. In the result, the F-value for the two null hypotheses fail the significance test at the 5 percent level, showing that we cannot reject the null hypotheses in both cases.



Apparently, there is no causality between stock returns and inflation. Particularly, changing price level does not directly change stock returns neither do stock returns stimulate any form of behaviour in inflation in Nigeria.

**Table 4.4: Granger Causality Test results**

<b>Null Hypothesis:</b>	<b>F-statistic</b>	<b>Probability</b>	<b>Decision</b>	<b>Causality</b>
P does not Granger Cause ASI ASI does not Granger Cause P	0.481 2.276	0.790 0.049	Accept Reject	<b>Unidirectional</b>
R does not Granger Cause ASI ASI does not Granger Cause R	5.098 6.114	0.000 0.000	Reject Reject	
R does not Granger Cause P P does not Granger Cause R	0.5618 0.5219	0.000 0.482	Reject Accept	<b>No-causality</b>

Result extracted from the Eviews 7 output.

#### 4.4 The Ardl Procedure

The empirical relationship between the price level and stock returns within a dynamic framework is estimated in the ARDL model and the result is presented in *Table 4.5* below. The result is presented within three time horizons. The full sample period is estimated along with two forecast periods in order to check the behaviour of the relationships within different time horizons. The general outcome of the entire estimation is rather low. The explanatory power, i.e. the  $R^2$ , of the models is not quite satisfactory for each of the h-quarter forecasting equations, reaching 11.2 percent for the full sample equation. This indicates that each of the models has rather unimpressive predictive abilities. However, the prediction performance seems to improve for the two forecast horizon. The F statistics further support the model issues with the adequacy of the models in explaining variations in aggregate stock return levels. The null hypothesis that all slope coefficients are jointly zero may not be rejected at the 5 percent level, especially for the two forecast horizons. Moreover, contrary to the case of the  $R^2$ , the value of the F-statistic is better for the full sample result as against the prediction horizon results.

The estimated autoregressive coefficients are significant at the 5 percent only for the full sample result and for the first and fifth lags of returns even though the coefficients are small. Both of the coefficients are positive showing that stock returns are likely to return to a mean reverting condition after a short term destabilization in the system. Indeed, most of the coefficients of the lagged returns variables are positively signed.

**Table 4.5: h-Quarter Ahead Dynamic forecast of Prices in Nigeria – 1995-2010**

<b>Coefficient Estimates</b>	<b>Forecast Horizons</b>		
	<b>Full</b>	<b>12</b>	<b>18</b>
<b>C</b>	1.22	1.675	1.794
<b>P(-1)</b>	-0.316	-0.746	-0.265
<b>P(-2)</b>	0.243	0.073	0.986
<b>P(-3)</b>	-0.141	-0.543	-1.244
<b>P(-4)</b>	-0.618	-1.162	0.708
<b>P(-5)</b>	0.194	0.773	5.172
<b>P(-6)</b>	-0.449	-1.794	-8.305
<b>R(-1)</b>	0.159*	0.075	0.103
<b>R(-2)</b>	0.084	0.032	-0.166
<b>R(-3)</b>	0.113	0.188	0.156
<b>R(-4)</b>	-0.145	-0.303	-0.351
<b>R(-5)</b>	0.161*	0.115	0.086
<b>R(-6)</b>	-0.079	-0.132	-0.149
<b>R<sup>2</sup></b>	0.112	0.218	0.406
<b>F-Stat</b>	1.73	0.533	0.63
<b>D.W.</b>	2.03	1.97	1.97

\*shows significance at 5 percent level.

None of the price lags has significant effect on stock returns. However, our focus is on the signs of the coefficients since the main goal of this analysis is the forecasting of stock returns. Most of the price lag coefficients are negative, indicating that prices seem to have a negative but weak impact on stock returns in Nigeria. As inflationary pressure intensifies, stock returns seem to fall thereby forcing a negatively spiraling effect on the stock market.

The results of the forecast horizons are similar to those of the full sample period. Indeed, in terms of the signs of the price coefficients the exact results are shown for the 12 period ahead forecast horizon, but a slightly different outcome is seen for the 18 period ahead forecast horizon. It seems that forecast result for a shorter horizon (say one year ahead) performs better than those of a longer time perspective. It is generally clear in these results however that price level or inflation has a rather ineffective but weak impact on stock returns in Nigeria. The DW statistics for each of the model results are quite close to the value of two, showing the absence of autocorrelation in the models. This implies that the models have dynamic prediction elements that will make the forecast results credible.

#### 4.5 Dynamic Prediction Tests

Note that the test statistics used in this section are essentially within sample statistics. Since within-sample goodness of fit needs not reflect the model ability to forecast out of sample, we simulate the forecasts of real output growth for the 5 forecasting horizons to further assess the relative predictive ability of the ARDL. The forecast diagnostics for each of the horizons are reported in table 4.6 below. From the Table, it is comforting to note that the significant predictive content of the determinants for stock returns is robust to these out-of-sample statistics. However, these predictive outputs are only a reflection of the results of the ARDL model. More specifically, ARDL models have generally weak and unimpressive statistics. The RMSE and RAE seem to be falling with the forecast horizons. This suggests that the errors in the forecasts are being minimized with increasing forecast horizons. The Theil's inequality statistics is the main statistic of interest. In the result, the first two forecast exhibit the lowest coefficients. This suggests that the forecast are better for these time horizons. This result is rather incongruent with the RMSE and RAE results. The most improvement is in one-month forecasting equation. All the forecast horizons however have Theil's coefficients that are far more than the 5 percent level. Thus, we can generally agree that the ARDL model did not perform well in all the h-quarter horizons. Apparently, inflation and price levels are not effective predictors of stock returns. Relative to the covariance proportions, the variance proportions for the initial one-month horizons are smaller, confirming the fact that the ARDL performs the price behaviour. Smaller horizons are more easily captured in the forecasts.

**Table 4.6: Dynamic Forecast Performance of Stock Returns**

Horizon	RMSE	MAE	MAPE	TheilCoef.	Variance Prop.	Covariance Prop.
<b>1</b>	18.426	13.77	58.47	0.711	0.441	-0.0
<b>6</b>	19.61	16.00	85.34	0.807	0.959	0.041
<b>12</b>	14.37	10.21	99.82	0.813	0.909	0.067
<b>18</b>	12.32	8.41	100.8	0.822	0.922	0.077
<b>24</b>	10.88	7.24	1027.6	0.786	0.829	0.170

Result extracted from the E view 7 outputs.

### 5. Summary, Conclusion and Recommendations

#### 5.1 Summary of Findings

This study has sought to find the relative impact of inflation rate on stock returns in the Nigerian Stock Market. Using data spanning the period 1995 to 2010, econometric tools were employed to empirically examine the main effects of inflation rate on stock returns. A dynamic framework was developed for the analysis of the empirical model. Based on the empirical analysis, the following findings were made:

- That inflation or price level changes has a negative, but weak effect on stock returns in Nigeria. Rising inflation tends to remotely exert negative effects on stock returns.
- That inflation was not a strong predictor of stock returns in Nigeria. The predictive or forecast performance of prices in the stock returns model is very weak and insignificant.
- That inflation responded significantly to stock price changes, but the reverse is not the case. Changing stock prices (not returns) tended to cause inflation to move in certain directions.

Overall, it seems the price level is but one determinant of stock prices. There is inconclusive evidence that it is a significant determinant of stock prices. The reaction of aggregate stock returns to price changes is not strong. Given the large sample sizes, the significance tests do not provide overwhelming evidence that the stock market reacts sufficiently to inflationary pressures. Fama (1979) suggested why the stock market reaction to prices increases is weak.

He argued that inflation is contemporaneously correlated with unexpected movements in important real variables such as capital accumulation or real GDP, such that the correlation between stock returns and rising price level is spurious.

Another implication of the findings of this study is that the monetary and real sectors of the economy may be quite independent of each other, as stock prices may adequately explain the behaviour of inflationary process in Nigeria.

## **5.2 Conclusion**

Over the last few years, the real value of common stocks has been on the decent, coincident with a generally rising inflation. If inflation is one of the factors to blame for the dismal performance of stocks then it must reduce expected real corporate profit or raise the required rate of returns on stocks, according to the traditional model of stock prices. This study has shown that inflation has not been a very strong factor in stimulating stock returns in the Nigerian Stock market.

Another issue of importance is whether investors take into accounts the gains from a debt which accrues to corporations when inflation occurs. Apparently, this has not been the case for Nigeria because the role of institutional investors in the stock market has not been played out well over the years. This again calls for a deepening of the stock market in order to ensure that basic financial market fundamentals take effect in the market. Obviously, the magnitude of predictive relationship between inflation rate and stock returns has been lower over the years thereby supporting the idea that a monetary policy regime that aims for price stabilization exerts a self-reinforcing calming effect on stock market volatility. Hence, higher financial stability may be classified among the benefits of explicit inflation control. However, whether monetary authorities might be able to achieve financial stability via inflation targeting control method is an issue which can only be addressed in the context of a structural model.

Future researches would investigate more appropriate price inflation measures by separating stock market returns by stage of production (e.g. oil exploration v. gas retail) or to show a distributive effect, rather than looking at an aggregated market portfolio of securities. In the same vein, using different measures of price inflation for each section of the market may help identify the particular effects of inflation. Furthermore, the volatility of inflation should receive more attention. Finally, these findings may still be subject to the critique that the models are not causal, or that other variables also have a more significant impact Geske and Roll (1983); Pindyck (1983). This is always plausible, as stocks react to a multitude of micro- variables related to company and customer dynamics, as well as macro-variables that react to the relationship of the firm to the overall economy.

## **5.3 Recommendations**

The results obtained in the study are quite interesting and apt for some policy issues. These policy recommendations include:

Common stock - which represents a claim on real capital – may not be a hedge to rapidly changing prices in Nigeria. This also implies that investors in making good portfolio decisions do not have to view equities as long-term holdings against inflation's erosion of purchasing power. This caution is appropriate considering recent developments in the Nigerian capital market which suggests that equities may not necessarily be the best performing asset class over the short term.

The role of government in this direction is two-fold. Inflation stabilization and appropriate tax administration that takes into cognizance the technical patterns of stock market activities. A stable price system is a veritable instrument in that government can use to improve the domestic investment climate both in the real sector and in the capital market in general. Monetary policy should aim at finding a more realistic price level that will be suiting to investors in the stock market. Such policies geared at controlling inflation should take into cognizance the role of monetary and real variables especially as these will go a long way in further deepening of the stock market. It has been argued that inflation raises the real tax rate of corporate capital because of the tax treatment of depreciation charges and inventory changes.

During periods of rising prices, the tax system should incorporate a mechanism to factor in the weakening treatment of tax and depreciation issues during periods of rising prices. This will help the companies to adjust more favorably to inflation and shield its performance in the stock market.

## References

- Adams, G. McQueen, G & Wood, R. (2004). The effects of inflation news on high frequency stock returns. *Journal of Business*, 77, 547-574.
- Ahmed S. & Cardinale, (2005). Does inflation matter for equity returns, *journal of asset management*, 6, (4), 259-273
- Anari, A. & Kolari, J. (2001), Stock prices and inflation, *The Journal of Financial Research*, 26.(4), 587-602
- Boudoukh, J., Richardson, M. & Whitelaw, R.F. (1994), Industry returns and the Fishers Effect, *The Journal of Finance*, 49, 1595-1615
- Barnes, M.P., Boyd, J.H & B.D Smith (1999). Inflation and asset returns, *European Economic Review*, 43, 737-754
- Bodie, Z., (1976), Common stocks as a hedge against inflation, *Journal of Finance*, 31, 459-470
- Boucher, C., (2006) Stock price inflation puzzle and the predictability of stock market returns *Economic Letters*, 90, 205.
- Box, G.P. & Jenkins G.M (1978). Time series Analysis: Forecasting and Control, Revised Edition, Holden-Day
- Chang, E.C. & Pinegar, J.M., (1987). Risk and inflation, *Journal of Financial and Quantitative Analysis*, 22, (1), 89-99
- Choudhry, T., (2001). Inflation and rates of returns on stocks: Evidence from high inflation countries, *Journal of International Financial Markets, Institutions and Money*, 11, 75-96
- Ely, D. & Robinson, K.J., (1997). Are stock a hedge against inflation? International evidence using a long run approach, *Journal of International Money and Finance*, 16, (1), 141-167.
- Engsted T & Tanggaard, C (2002), The relation between asset returns and inflation at short and long Horizons, *Journal of International Financial Markets, Institutions and Money*, 12, 101-118.
- Fama, E.F. & Schwert, G.W., (1977). Asset returns and inflation, *Journal of Financial Economics*, 5, 115-146
- Fama, E.F., (1981) Stock returns, real activity, inflation and money, *American Economic Review* 71 (4), 545-565
- Feldstein, M. (1980) Inflation, tax rules and the stock market, *American Economics Review*, 70,(5), 839-847
- Fisher, R.A. (1930). The general theory of natural selection, Oxford University Oxford.
- Flannery, M.J. & Protopapadakis A.A, (2002). Macroeconomic factors do influence aggregate stock returns, *the review of financial studies*, 15, 751-782
- Geske, R. & Roll, R., (1983). The fiscal and monetary linkage between stock returns and inflation, *Journal of Finance*, 38, 1-33
- Gordon, D.V. (1995). Optional Lag Length in Estimating Dickey-Fuller Statistics: An Empirical Note, *Applies Economic Letter*, 2(6), 188-90.
- Graham, F.C. (1996). Inflation, real stock returns and monetary policy, *Applied Financial Economics*, 6, 29-35.
- Gultekin, N.B. (1983). Stock market returns and inflation evidences from other countries, *The Journal of Finance*, xxxviii,1, 49-65
- Hess, P.J. & Lee, B.S (1999). Stock returns and inflation with supply and demand disturbance, *The Review of Financial studies*, 12, (5), 1203-1218
- Hardouvelis, G. (1987). Macroeconomic information and stock prices, *Journal of Economics and Business*, 39, 253-57.
- Hoesli, M. & McGregor, B.D., (2000) Property Investment, Longman, UK.
- Jaffe, J. & G. Mandelker (1976). The fisher effect for risky assets: an empirical investigation *Journal of Finance*, 31, 447-458
- James C.S, Koreisha, S. & Partch M., (1985). A Varma analysis of the causal relations among stock returns real output and nominal interest rates, *Journal of Finance* 40, 375
- Joyce, M.A.S & Read V. (2002). Asset price reactions to RPI announcements, *Applied Financial Economics*, 12, 253-276
- Kaul G., (1990). Monetary regimes and the relation between stock returns and inflation expectation, *Journal of Financial and Quantitative Analysis*, 25, (3), 307-321
- Kaul, G., (1987). Stock returns and inflation: The role of the monetary sector, *Journal of Financial Economics*, 18, 253-274.
- Laopodis N.T (2006). Dynamic interaction among the stock market, Federal Funds Rate, Inflation and Economic Activity. *The Financial Review*, Eastern Finance Association, 41(4), 515-545.

- Lee, K, & Ni .S.,(1996). Stock returns real activities and temporary and persistent inflation, *Applied Financial Economics*, 6, 433-441.
- Luintel, K.B. & Paudyal, k. (2006). Are common stock a hedge against inflation? *Journal of Financial Research*, 29, 1-19
- Mobolaji , E.A. (2008). The global financial meltdown: Impact of Nigeria's capital and foreign reserves
- Modiglian, F. & Cohn, R.A (1978). Inflation rational valuation and the market, *Financing Analysts Journal*, 35, 24-24.
- McQueen, G. & Roley, V.V., (1993) Stock prices, news and business conditions, *Reviews on Financial Studies*, 3, 144-157
- Nelson, C.R, (1976). Inflation and rate of return on common stocks, *The journal of Finance*, 31, 471-483.
- Ozurumba, B.A. (2012). The impact of stock market return on foreign portfolio investment in Nigeria. *IOSR journal of Business and Management*, 2 (4), 10-19
- Panopoulou, E. (2007) Predictive Financial Models of the Euro Era: A New Evaluation Test,*International Journal of Forecasting*, 23: 695-705.
- Peel, D.A & Pope P.F. (1988). Stock return and expected inflation in the UK; Some new evidence, *journal of business finance and accounting*, 15,(4) 459-467
- Pindyck, R. S. (1983) Risk, inflation, and the stock market. (*NBER Working Paper No. 1186*)Pindyck, R.S. (1984). Risk, inflation and the stock market, *American Economic Review*, 74, (3), 335-351.
- Reilly, F.K. & Brown, K.C., (2003).*Investment analysis: portfolio management* (Seventh edition) Thomas South Western, Ohio, USA.
- Ritter, J.R. & R.S Warr (2002).The decline of inflation and the bull market of 1982-1999, *Journal of financial and Quantitative Analysis*, 37, (1), 27-61.
- Schotman, P.C. & Schweitzer, M. (2000).Horizon sensitivity of the inflation hedge of stocks, *Journal of Empirical Finance*, 7, 301-315.
- Schwert, G.W. (1981).The adjustment of stock prices to information about inflation, *The Journal of Finance*, 12, 435-444.
- Sharpe, S.A. (2002). Re – examine stock valuation: The implications of analysis earnings forecast, *The Review of Economics and Statistics*. 84(4), 632 - 648.
- Sharpe, W.F. (1994). A simplified model for portfolio and analysis, *Journal of management science*, 29, 277 – 293.
- Siklos, & B. Kwok (1999). Stock returns and inflation: a new test of competing Hypothesis *Applied Financial Economics*, 9,507-581.
- Tessaromatis, J. (1990). Money supply announcement and real interest rates: Evidence from the UK. Index-linked bond market, *journal of Banking and Finance*, Vol. XIV
- Vanderhoff, J. & Vanderhoff, M. (1986). Inflation and stock returns: *an industry analysis*, *Journal of Economics and Business*,38,341-352.
- Wong, K. & Wu, H. (2003). Testing fisher hypothesis in long horizons for G7 and Eight Asian Countries, *Applied Economics Letter*, 10,(14), 917-923.4