

**RELATIONSHIP BETWEEN THE NSE STOCK INDEX AND SELECTED
MACROECONOMIC INDICATORS (2000-2010)**

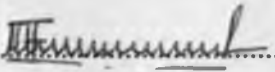
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**THIS MANAGEMENT RESEARCH PROJECT IS SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR AWARD OF THE DEGREE
OF MASTER OF BUSINESS ADMINISTRATION OF THE UNIVERSITY OF
NAIROBI**

OCTOBER 2011

DECLARATION

I hereby certify that except where due acknowledgement has been made, this project work is mine alone and has not been previously submitted in whole or in part for any other academic award.

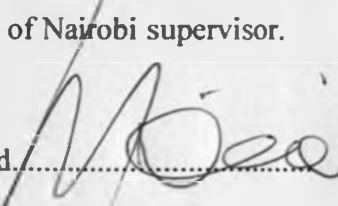
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I, hereby certify that this project has been presented for examination with my approval as the University of Nairobi supervisor.

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DEDICATION

This project is dedicated to my loving wife Emma, my daughter Sabina, Brothers Mark, Ronald, Mirera, Nyakwae, Jared, sisters Fridah, Dorris, Esther, Keziah, Elizabeth and my late parents Gekone and Sabina. God bless you all.

ACKNOWLEDGEMENTS

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Thanks be to God.

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LIST OF ABBREVIATIONS

ADF	Augmented Dicky Fuller
APT	Arbitrage Pricing Model
ATS	Automated trading system
CBK	Central Bank of Kenya
CBR	Central Bank Rate
CDS	Central Depository system
CI	Condition index
CPI	Consumer Price Index
ECM	Error correction mechanisms
EMH	Efficient market hypothesis
FED	Federal Reserve
FX	Foreign exchange
GDP	Gross Domestic Product
GNP	Gross National Production
GSE	Ghana Stock Exchange
IFE	International Fisher Effect
INF	Inflation
KES	Kenya Shilling
KLSE	Kuala Lumpur Stock Exchange
KNBS	Kenya National Bureau of Statistics
MPC	Monetary Policy Committee
MS	Money supply
NASDAQ	National Association of Securities, Dealers Automated Quotations
NSE	Nairobi Stock Exchange
PVM	Present value model
SES	Stock Exchange of Singapore
SP	Stock price
TOL	Tolerance

UK	United Kingdom
USD	United states dollar
US	United States
VIF	Variance inflation factor

ABSTRACT

This study examines the impact of macroeconomic variables, inflation, interest rate, exchange rate and money supply on the performance of shares at the Nairobi stock Exchange over the period 2000 to 2010. The performance of the stock exchange was represented by the movement of the 20 share price index. Data was obtained from NSE, CBK, and KNBS. The purpose of this study was to establish the relationship between the NSE 20 share index and the aforementioned macroeconomic variables.

The secondary data was collected from published reports and figures from the Nairobi stock exchange, the Central Bank of Kenya and the National Bureau of statistics. This data was analysed by use of multiple regression modelling.

The findings of the analysis indicate that the four selected macroeconomic variables (Inflation, Interest rate, Money supply and exchange rate) do indeed impact on the financial performance of the share prices at the Nairobi stock Exchange. However the four macroeconomic factors under study may not be the only ones that affect stock prices. Hence the study recommends that further research need to be carried out with more variables entered into the regression model.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

In today's globally integrated world, information access is easy and universal. According to the efficient-market hypothesis (EMH) theory (Fama, 1970), an efficient capital market is one in which stock prices change rapidly as the new information becomes available. The notion of informationally efficient markets leads to a powerful research methodology. If security prices reflect all currently available information, then price changes must reflect new information. Therefore, it seems that one should be able to measure the importance of an event of interest by examining price changes during the period in which the event occurs. On any period, stock prices respond to a wide range of economic news such as updated forecasts for GDP, inflation rates, interest rates and exchange rates. Several studies have found a correlation between changes in world economy and macro economic variables. Ahmed (2008) suggests that the movement of stock market indices is highly sensitive to the changes in the fundamentals of the economy. Conducive macroeconomic environment promotes the profitability of businesses, which propels them to a stage where they can access securities for sustained growth.

1.1.1 Conceptual Framework

The movement of stock indices is highly sensitive to the changes in fundamentals of the economy and to the changes in expectations about future prospects. Expectations are influenced by the micro and macro fundamentals which may be formed either rationally or adaptively on economic fundamentals, as well as by many subjective factors which are unpredictable and also non quantifiable. It is assumed that domestic economic fundamentals play determining role in the performance of stock market. However, in the globally integrated

economy, domestic economic variables are also subject to change due to the policies adopted and expected to be adopted by other countries or some global events. The common external factors influencing the stock return would be stock prices in global economy, the interest rate and the exchange rate. For instance, capital inflows and outflows are not determined by domestic interest rate only but also by changes in the interest rate by major economies in the world. Recently, it is observed that contagion from the US subprime crisis has played significant movement in the capital markets across the world as foreign hedge funds unwind their positions in various markets. Other burning example in Kenya is the appreciation of currency due to higher inflow of foreign exchange. Kenya shilling appreciation declines stock prices of major export oriented companies.

The modern financial theory focuses upon systematic factors as sources of risk and Contemplates that the long run return on an individual asset must reflect the changes in such systematic factors. This implies that securities market must have a significant relationship with real and financial sectors of the economy. This relationship generally viewed in two ways. The first relationship views the stock market as the leading indicator of the economic activity in the country, whereas the second focuses on the possible impact the stock market may have on aggregate demand, particularly through aggregate consumption and investment. The former case implies that stock market leads economic activity, whereas the latter suggests that it lags economic activity. Knowledge of the sensitivity of stock market to macroeconomic behaviour of key variables and vice-versa is important in many areas of investments and finance. This research may be useful to understand this relationship.

1.1.2 Macroeconomic Indicators on Kenyan Economy

The macroeconomy is the environment in which all firms operate and investors need to keep the big economic picture in mind. One obvious factor that affects the international competitiveness of a country's industries is the exchange rate between that country's currency and other currencies Bodie (2008). The exchange rate is the rate at which domestic currency

can be converted into foreign currency. A weak currency leads to a rise in the cost of oil products, equipment and raw materials which leads to high productions costs which do not support strong valuations, more so in counters that are in competitive industries, thus unable to pass through the extra costs to consumers. The appeal to foreign investors may reduce as gains made at the stock market risk being eroded by currency losses.

Equally important macroeconomic variable is inflation, which is the rate at which general level of prices rise. High rates of inflation are often associated with “overheated” economies, that is, the economies where the demand for goods and services is outstripping productive capacity, which leads to upward pressure on prices. According to Oxelhelm (2003), in the long run inflation is a monetary phenomenon. It occurs if the quantity of money grows faster than potential GDP. Most central banks’ primary monetary policy goal is to contain inflation. That is, a specific number or range in which inflation or price increases must remain is set.

Interest rates are another significant variable worth mentioning. High interest rates reduce the present value of future cash flows thereby reducing the attractiveness of investment opportunities. It is also worth noting that rapidly growing GDP indicates an expanding economy with ample opportunity for a firm to increase sales (Bodie et.al, 2008). Another popular measure of the economy’s output is industrial production. This statistic provides a measure of economic activity more narrowly focussed on the manufacturing side of the economy.

Macroeconomic statistics indicate the status of the economy of a state and aid in the process of forecasting the performance of various segments within the economy. They are published regularly at a certain time by governmental agencies and the private sector. Over the last ten years, the Kenyan economy has been reinventing itself despite the world recession and post election violence. From virtual stagnancy in 2001, the economy has expanded steadily to register a remarkable growth of more than 6% in 2006. This economic dynamism is expected to continue to the near future, fuelled by capital formation and favourable macroeconomic environment (Kenya National bureau of statistics, 2009).

In the past six years, the stock market in Kenya has grown rapidly with stock prices appreciating to record levels. On average, the prices of quoted shares have more than quadrupled in as many years, a performance that is difficult to replicate in conventional types of investments – savings and deposit accounts, real estate, etc. Naturally, this has generated unprecedented interest in the stock market by investors of all hues. In an area traditionally considered the preserve of the sophisticated investors, it is gratifying to see virtually insatiable appetite for investment in stocks and shares from ordinary Kenyans of all social strata. One of the direct results of increased investor activity in the stock market is that most of the public offerings of shares between 2003 and 2006 were massively oversubscribed.

1.1.3 Nairobi stock exchange

The Nairobi Stock Exchange comprised of 55 listed companies as at 31st December, 2010 with a daily trading volume of over USD 5 million and a total market capitalization of approximately USD 15 billion. Aside from equities, Government and corporate bonds are also

traded on the Nairobi Stock Exchange. Automated bond trading started in November 2009 with the KES 25 billion KenGen bond. Average bond daily trading is about USD 60 million.

The Nairobi Stock Exchange in 2006 introduced an Automated Trading System (ATS), which ensures that orders are matched automatically and are executed on a first come/first served basis. The ATS has now been linked to the Central Bank of Kenya and the CDS thereby allowing electronic trading of Government bonds. Short selling and same day turn-around trades are not permitted. Aggregate foreign ownership limit of NSE listed companies is 75%. Almost all NSE listed companies are open to additional foreign investment, including multinational subsidiaries. There are no foreign exchange controls in Kenya and no capital gains tax. Dividend withholding tax for foreigners is a final 10%.

1.2 Problem statement

One way of linking macroeconomic indicators and stock market returns is through arbitrage pricing theory (APT) (Ross, 1976), where multiple risk factors can explain asset returns. Several studies have considered how markets react to changes of macroeconomic indicators. Fama (1981) carried out a research on the relationship between macroeconomic indicators and stock prices. Kyereboah-Coleman and Agyire-Tettey (2008), examined the effects of macroeconomic variables on Ghana Stock Exchange. They found that macroeconomic indicators such as lending rates and the inflation rate affect stock market performance. Their results suggested that macroeconomic indicators should be considered by investors in developing economies.

This motivates the interest to examine the degree to which their conclusion is applicable to performance of stocks at the Nairobi stock exchange. In the last two decades, because of the globalisation trend, a number of researchers - such as Canova and De Nicolo (1995), Dickinson (2000) and Nasseh and Strauss (2000) - investigated the international effects of macroeconomic indicators on share prices. Most of these studies were done in the US and European countries. This study will test if there is an association between share values of equities traded in the Nairobi stock exchange and variables commonly used to proxy for particular economic factors; inflation, interest rates, exchange rates and money supply.

In Kenya, a number of studies have been conducted on the relationship between macroeconomic indicators and performance of companies quoted at the NSE. Among them are Nyamute (1998) who analyzed the movement and/or the changes of the stock price (i.e. the NSE 20 – share INDEX) in relation to movements and/or changes in four of the major economic indicators (interest rate, money supply, inflation and exchange rate). She noted an inverse relationship in movement of NSE 20 share INDEX against the macroeconomic indicators. Mbashu (2007) conducted a study on the relationship between macroeconomic variables and sector specific-returns at the NSE. He used linear regression and correlation analysis to test the relationship using interest rate, exchange rate, inflation rate and oil prices as the macroeconomic indicators. He also noted an inverse relationship between changes in macroeconomic indicators and sector specific returns of firms quoted at the NSE.

This study intended to use a ten year period data to investigate the conclusions reached in the above studies and address the issues raised by Sifunjo (1999) on the Nyamute (1998) study by taking a longer study period. It is also worth noting that many changes have happened to the Kenyan capital market since the two scholars carried out their studies which calls for the review of the conclusions arrived at by the aforementioned scholars. This study complements the existing literature by filling a gap in this line of research.

1.3 Objective of the study

The objective of this study was to investigate the relationship between selected macroeconomic indicators (Inflation, Interest rate, Money supply and Exchange rate) and the performance of equities at the Nairobi stock exchange from year 2000 to 2010.

1.4 Importance of Study

The study is significant, as it leads to better understanding of the economic forces in an emerging stock market like the Nairobi Stock Exchange. The study seeks to add more literature to what has already been done by the other scholars like Nyamute (1998), Sifunjo (1999) and Mbashu (2007).

The study will be useful in finding out the predictability of stock market implying violation of market efficiency hypothesis.

Presently, a large number of global players are analysing carefully the movements of stock market in Kenya. Therefore, at this point, an understanding of macroeconomic variables that

affect the Kenyan stock market may be useful for policy makers, traders, investors and all other stakeholders.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Several researchers have attempted to establish the relationship between macro-economic variables and stock market indices or stock prices using various dynamic models. Time series data being non-stationary in nature, sometimes tends to give spurious results on application of simple regression analysis. Therefore, Wassel and Saunders (2005) revisited the issue pertaining to the relationship between social security and private saving and contributed to the importance of adopting appropriate time series analysis. The researchers established the fact that each time series being used for econometric model should be tested whether it is stationary or not. It was concluded that earlier results generated by Feldstein (1996), were misleading and by using an appropriate method of time series investigation; it was found that there is no statistical evidence of negative impact of social security on savings. Tsoukalas and Sil (1999), used vector autoregressive approach to explore the relationship between stock return and fundamental variables. Mohan (2006), established relationship between domestic saving and economic growth for various economies with different income levels using Augmented Dicky Fuller (ADF) test (1981), and Granger causality test (1974).

Maysami et al. (2004) examined the relation among the macroeconomic variables and the sector stock indices represented by SES All-S Equities Finance Index, SES All-S Equities Property Index and SES All-S Equities Hotel Index as well as Singapore composite Index using Johansen and Juselius (1990) vector error correction model. The researchers concluded

that the Singapore stock market and the SES All-S Equities Property Index had significant relationship with all macroeconomic variables identified, while the SES All-S Equities Finance Index and SES All-S Equities Hotel Index had significant relationship with only select variables. The variables include interest rate, inflation, exchange rate, industrial production and money supply.

Ewing (2002) examined the response of returns to shocks of four key economic variables, i.e. monetary policy, output, risk and inflation on the NASDAQ Financial 100 Index. The researcher used the newly developed technique of “generalised impulse response analysis”. Results state that monetary policy shock reduces financial sector return having a significant initial impact that continues to affect returns for two months. Unexpected changes in economic growth have a positive initial impact but exhibit no persistence, and inflation is associated negatively.

Dima et al. (2006), showed a different impact that the explanatory variables taken into account have on the dynamics of the mutual funds index. The directing interest ratio works at a minimal level of the expected efficiency level that affects the structure of the portfolios of these funds and the results obtained thereof.

Holden and Thomson (1992) surveyed the recent developments relating to unit roots and co-integration relationship and established a general approach for application of these methods. Dolado et al. (1999) and Escudeso (2000) established that analysis of unit root and co-

integration mechanisms has played a prominent role in econometrics and macroeconomics. Coleman and Tetey (2008) studied the impact of macroeconomic indicators on the Ghana Stock Exchange (GSE) and concluded that lending rates from deposit money banks and inflation have an adverse impact on stock market performance.

2.2 Theoretical framework

2.2.1 Financial Economic Theory

One way of linking macroeconomics variables and stock market returns is through arbitrage pricing theory (APT) (Ross, 1976), where multiple risk factors can explain asset returns. While early empirical papers on APT focused on individual security returns, it may also be used in an aggregate stock market framework, where a change in a given macroeconomic variable could be seen as reflecting a change in an underlying systemic risk factor influencing future returns. Most of the empirical studies on APT theory, linking the state of the macroeconomy to stock market returns, are characterized by modelling a short run relationship between macroeconomic variables and the stock price in terms of first difference, assuming trend stationary.

An alternative, but not inconsistent approach is the discounted cash flow or present value model (PVM). This model relates the stock price to future expected cash flows and the discount rate of these cash flows. Again, all macroeconomic factors that influence future expected cash flow or the discount rate by which these cash flows are discounted should have an influence on the stock price. The advantage of the PVM model is that it can be used to focus

on the long run relationship between the stock market and macroeconomic variables. Campbell and Shiller (1988) the relationship between stock prices, earnings and expected dividends. They find that a long term moving average of earnings estimate predict dividends and the ratio of this earning variables to current stock price is powerful in predicting stock returns over several years. They conclude that these facts make stock prices and returns much too volatile to accord with a simple present value model.

2.2.2 Stock Prices Behaviour: Schools of Thought Views

There are five schools of thought on stock price behaviour. These are the fundamentalist schools, the technical school, the random walk hypothesis school, the behavioural school of finance and macro-economic hypothesis school.

Fundamentalist View

To the fundamentalist, the value of a corporation's stock is determined by expectations regarding future earnings and by the rate at which those earnings are discounted. The fundamentalists apply present value principles to the valuation of corporate stock, using dividends, earnings, assets and interest rate to establish the price of stock.

Technicality View

The technical school on the other hand, opposes the fundamentalists' arguments, and claims that stock price behaviour can be predicted by the use of financial or economic data. They submit that stock prices tend to follow definite pattern and each price is influenced by preceding prices, and that successive prices depend on each other. According to Smith (1990),

technical analysts engage themselves in studying changes in market prices, the volume of trading and investors' attitude.

Random-Walk Hypothesis

Both the “technical” and “fundamental” analyses have been challenged by scholars who subscribe to the random-walk hypothesis, which sees stock price movements in terms of a probability distribution of different possible outcome. The random-walk hypothesis is based on efficient market assumption that investors adjust security rapidly to reflect the effect of new information. Believers in the efficient capital market hypothesis argue that stock prices are essentially random and therefore, there is no chance for profitable speculation in the stock market. An interesting feature of random walk is the persistence of random shocks. Empirical test of the random-walk hypothesis have been carried out by scholars like Moore (1962) and Fama (1965). These scholars independently tested the statistical randomness of successive changes in stock prices. Their findings showed insignificant departures from randomness and were both inconclusive and insufficient.

Behavioural View

The behavioural school of finance holds that market might fail to reflect economic fundamentals under three conditions. When all three apply, the theory predicts that pricing biases in financial markets can be both significant and persistent. The first behavioural condition is irrational behaviour. It holds that investors behave irrationally when they don't correctly process all the available information while forming their expectations of a company's future performance. The second is systematic patterns of behaviour, which hold that even if

individual investors decided to buy or sell without consulting economic fundamentals, the impact on share prices would be limited. Lastly, limits to arbitrage in financial markets ascertain that when investors assume that a company's recent strong performance alone is an indication of future performance; they may start bidding for shares and drive up the price. Some investors might expect a company that surprises the market in one quarter to go on exceeding expectations Bodie (2008).

Macroeconomist View

The usual method of using factor analysis approach to determine the factors affecting asset returns, some scholars have measured macroeconomic factors to explain stock return and found that changes in interest rate are associated with risk premium. They interpreted the observation to be a reflection of changes in the rate of inflation, given the finding of Fama (1977) that changes in the rate of inflation are fully reflected in interest rates (Emenuga, 1994). The macroeconomic approach attempts to examine the sensitivity of stock prices to changes in macroeconomic variables. The approach posits that stock prices are influenced by changes in money supply, interest rate, inflation and other macroeconomic indicators. It employs a general equilibrium approach, stressing the interrelations between sectors as central to the understanding of the persistence and co-movement of macroeconomic time series, based on the economic logic, which suggests that everything does depend on everything else.

2.3 Macroeconomic Shocks and Stock Market Returns

The issue of causality between macroeconomic variables and share returns over the years have stem up controversies among researchers based on varying findings. Theoretically,

macroeconomic variable are expected to affect returns on equities. But over the years the observed pattern of the influence of macroeconomic variables (in signs and magnitude) on share returns varies from one study to another in different capital markets.

2.4 Macroeconomic Indicators

2.4.1 Interest rate

Stock prices have been investigated for their relation to domestic macroeconomic indicators which are represented by interest rates, the industrial production index, foreign exchange rate, money supply and inflation. In theory, the relationship between stock prices and interest rate is the choice of investors in portfolio among bond and stock (Apergis and Eleftheriou, 2002). With higher interest rates, investors prefer bonds as this implies that stock prices will decrease. On the contrary, a decrease in interest rates leads to an increase in stock prices. Reilly et al. (2007) have attested to this negative relationship.

Lobo (2002) explains that the main factor affecting stock market volatility is the change in FED's disclosure policy. When FED raises more (less) interest rates than expected, it is considered bad (good) news to stock market. Both have a positive effect, but the bad news has a stronger impact on market volatility. Similar phenomenon has been found in studies on developing market, for instance Istanbul stock market (Erdem et al., 2005). Bohl et al. (2007) suggest that the positive relationship relies on the heteroskedasticity in interest rates and stock returns. The covariance between interest rates and stock return is positive when shock creates great volatility in stock market. In addition, Apergis and Eleftheriou (2002) find a positive

correlation between interest rates and stock prices in Athens stock exchange. However, this correlation is statistically insignificant because stock prices depend on inflation rather than nominal interest rate movement, despite the close relationship between inflation and nominal interest rates. To sum up, theory suggests a negative association between stock prices and interest rates. However, empirical results are mixed.

Another group of studies investigate the co-movement between stock prices and interest rates in stock markets in a group of countries. For example, Wongbangpo and Sharma (2002) examine the effects of long term interest rates on stock prices in five Asian countries. A negative long term linkage between stock prices and interest rates was observed in the Philippines, Singapore and Thailand. However, a positive relation was detected in Indonesia and Malaysia. The causes for these differences should be attributed to the inflation rate and money supply in each country. The high rate of inflation in Indonesia and the Philippines influences the long term negative relation between stock prices and money supply, while the money growth in Malaysia, Singapore and Thailand reduces the positive effect on their stock market.

2.4.2 Consumer prices index

Another important variable that is used in prior research to examine the relationship between macroeconomic indicators and stock prices is consumer prices index (CPI). Prior studies argue that CPI is such a specific factor representing for several macroeconomic variables such as discount rate, inflation and goods market (Nasseh and Strauss, 2000; Wongbangpo and Sharma, 2002 and Gunasekarage et al. 2004). Gunasekarage et al. (2004) found that CPI as

proxy for inflation has significant influence on Sri Lanka's stock market. Wongbangpo and Sharma (2002) investigate how goods market affects the stock markets in five Asian countries, namely Indonesia, Malaysia, Philippines, Singapore and Thailand. To check the effect of goods market, the authors use gross national production (GNP) and consumer prices index (CPI). A negative effect has been found between CPI and stock prices. This can be explained as the results of the higher risk of future profitability. An increase in prices level will increase the cost of production which, in turn, would reduce future profitability. However, there are still some other opinions that higher prices level can also have a positive effect on stock prices due to the use of equities itself as equipment for hedging inflation. In Nasseh and Strauss paper (2000), CPI is used as representative for discount rate because stock prices are always listed at nominal prices. Their research suggests that CPI is prices neutrality or its explanation as stock prices will react by one percentage for each percentile change in CPI.

2.4.3 Exchange Rates

We hypothesize a positive relation between the exchange rate and stock prices. A depreciation of the Kenya shilling will lead to an increase in demand for Kenya's exports and thereby increasing cash flows to the country, assuming that the demand for exports is sufficiently elastic. Alternatively, if the Kenya shilling is expected to appreciate, the market will attract investments. This rise in demand will push up the stock market level, suggesting that stock market returns will be positively correlated to the changes in the exchange rates (Mukherjee and Naka 1995). The impact of exchange rate changes on the economy will depend to a large extent on the level of international trade and the trade balance. Hence the impact will be determined by the relative dominance of import and export sectors of the economy.

2.4.4 Monetary policy

Friedman and Schwartz (1963) explained the relationship between money supply and stock returns by simply hypothesizing that the growth rate of money supply would affect the aggregate economy and hence the expected stock returns. An increase in M2 growth would indicate excess liquidity available for buying securities, resulting in higher security prices. Empirically, Hamburger and Kochin (1972), and Kraft and Kraft (1977) found a strong linkage between the two variables, while Cooper (1974), and Nozar and Taylor (1988) found no relation.

In the opinion of Mukherjee and Naka (1995), the effect of money supply on stock prices is an empirical question. An increase in money supply would lead to inflation, and may increase discount rate and reduce stock prices (Fama, 1981). The negative effects might be countered by the economic stimulus provided by money growth, also known as the corporate earnings effect, which may increase future cash flows and stock prices. Maysami and Koh (2000), who found a positive relationship between money supply changes and stock returns in Singapore, further support this hypothesis.

2.5 Empirical Evidence on Macro-Economic Indicators

The relationship between macroeconomic factor and firm performances is extensively investigated. The findings of this literature suggest that there is a significant linkage between macroeconomic factor and stock return. Chen, Roll and Ross (1986) test the multifactor model in the USA by employing seven macroeconomic variables. They find that consumption, oil

prices and the market index are not priced by the financial market. However, industrial production, changes in risk premium and twist in the field curve were found to be significant in explaining stock return. Chen (1991) performed the second study covering the USA. Findings suggest that future market stock returns could be forecasted by interpreting some macroeconomic factors on stock return in the UK stock return. Mukherjee and Naka (1995) used vector error co-relation approach to model the relationship between Japanese stock return and macroeconomic variables. Co-integration relation was detected among stock prices and the six macro-economic variables namely exchange rate, inflation rate, money supply, real economic activities, long term government bond rate and call rate.

Maghyereh (2002) investigated the long-run relationship between the Jordanian stock prices and selected macroeconomic variables, again by using Johansen's (1988) cointegration analysis and monthly time series data for the period from January 1987 to December 2000. The study showed that macroeconomic variables were reflected in stock prices in the Jordanian capital market.

Emerging stock markets have been identified as being at least partially segmented from global capital markets. As a consequence, it has been argued that local risk factors rather than world risk factors are the primary source of equity return variation in these markets. Accordingly, Bilson, Brailsford, and Hooper (1999) aimed to address the question of whether macroeconomic variables may proxy for local risk sources. They found moderate evidence to support this hypothesis.

Oxelhelm and Winlborg (1987) developed the “macroeconomic uncertainty strategy” (MUST) analysis, based on a full recognition of the interdependence among selected macroeconomic variables that make up the macroeconomic environment of a company. The analysis was built on a multivariate linear regression framework between cash flows and macroeconomic factors (i.e. interest rate, exchange rate, purchasing power parity and political risk). One of the equilibrium relationships they established was the international Fisher effect containing the nominal exchange rate, and the macroeconomic price variable – the interest rate. They concluded that deviation from IFE cause excess profits or losses on the financial side of a company. They also noted that interest rate changes may affect the commercial side of a company through their influence on, for example the demand for capital goods.

A number of studies have been conducted in Kenya to investigate the relationship between macroeconomic variables and performance of firms at NSE. Among them are Nyamute (1998) who analysed the movement and/or the changes of the stock price index (i.e. the NSE 20 share index) in relation to movement and/or changes in four major economic indicators (interest rate, money supply, inflation rate and exchange rate). She concluded that changes in the macroeconomics cause a simultaneous change in the NSE 20 share index. Sifunjo (1999) examined the causal relationship between foreign exchange and stock prices in Kenya from 1993 to May 1999. He concluded that a movement in exchange rate exert significant influence on prices in Kenya. Mbashu (2007) conducted a study on the relationship between macroeconomic variables and sector-specific returns at the NSE. He used interest rate, exchange rate, inflation and oil prices as the macroeconomic variables. He used linear

regression and correlation analysis to test the relationship and concluded that increase in interest rates reduced earnings from firms because borrowing becomes expensive.

Maysami and Sims (2002, 2001a, 2001b) employed the Error-Correction modelling technique to examine the relationship between macroeconomic variables and stock returns in Hong Kong and Singapore (Maysami and Sim, (2002b), Malaysia and Thailand (Maysami and Sim 2001a), and Japan and Korea (Maysami and Sim 2001b). Through the employment of Hendry's (1986) approach which allows making inferences to the short-run relationship between macroeconomic variables as well as the long-run adjustment to equilibrium, they analysed the influence of interest rate, inflation, money supply, exchange rate and real activity, along with a dummy variable to capture the impact of the 1997 Asian financial crisis. The results confirmed the influence of macroeconomic variables on the stock market indices in each of the six countries under study, though the type and magnitude of the associations differed depending on the country's financial structure.

Islam (2003) replicated the above studies to examine the short-run dynamic adjustment and the long-run equilibrium relationships between four macroeconomic variables (interest rate, inflation rate, exchange rate, and the industrial productivity) and the Kuala Lumpur Stock Exchange (KLSE) Composite Index. His conclusions were similar: there existed statistically significant short-run (dynamic) and long-run (equilibrium) relationships among the macroeconomic variables and the KLSE stock returns.

2.6 Summary of literature review

From the aforementioned studies, it is clear that many scholars have researched on the relationship between macroeconomic variables and share returns in different parts of the world. Of fundamental significance is the fact that many of this studies have been done in developed economies. A few scholars like Nyamute (1998), Sifunjo (1999) and Mbashu (2007) have researched on this topic in Kenya. The study will also address the concerns raised by Sifunjo (1999) on the Nyamute (1998) on the research methodology used in that particular study on the performance of regression analysis on non stationery time series data and hence violating the classical theory of regression analysis with time series which leads to spurious relations that induce serial correlation that violate the basic assumptions for estimating the regression equation. This study undertakes to confirm the existence of these relationships and the strength of the same. The study period of ten years (2000 – 2010) is deemed adequate to support well thought out findings and capture any details that may have been overlooked by the earlier studies. The study will provide more information to other scholars who may be keenly interested in the topic and point out any knowledge gaps that may need further research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlights the various methods and procedures the researcher adopted in conducting the study in order to answer the research questions raised in the first chapter. The chapter was organized in the following structure: the research design, population and sample, data collection methods, sampling design and sample size, research procedures, and data analysis methods.

3.2 Research Design

This study used a causal research design. Causal research was used to identify cause and effect relationship among variables. Causal research attempts to establish when one thing happens then another thing follows (Zikmund, 2003). This study looked at evidence for establishing causality because it appears that the cause (microeconomic variables) precedes the effects (share price fluctuations). The period of study focused on NSE performance for the period between 2000 and 2010. This design was appropriate because it gives conclusive results on impact of macroeconomic factors on stocks.

3.3 The Population and Sampling Design

3.3.1 Population and sample size

Cooper and Schindler (2003) describe a population as the total collection of elements whereby references have to be made. The population was the largest set of observations while the

smaller set is called the sample. The population of interest for this study was the 55 companies that were listed at the NSE by the end of 2010 financial period.

3.4 Sampling Technique

The sample of this research consisted of all the 55 companies listed consistently at the NSE for the past ten years in order to deduce a meaningful relationship.

3.5 Research Procedure

The study used secondary data from CBK, KNBS and NSE for the period 2000 to 2011.

3.6 Data Collection Method

The study used secondary data. The secondary data provided the stock prices at different times of macroeconomics variance. The source of secondary data was from review of journals, past research findings, books, magazines, internet among others. The study used secondary data from the Kenya bureau of standards (annual economic survey reports), the quarterly and annual reports from the Central Bank of Kenya and monthly published by the NSE.

3.7 Data Analysis and Presentation

The researcher used qualitative and quantitative technique in analyzing the data. Descriptive analysis was employed; which include mean, frequencies and percentages. Factor analysis was also done. The organised data was interpreted on account of concurrence to objectives using assistance of computer packages especially Eviews 6.0 to communicate research findings. Tables and charts were used for data presentation. Regression analysis was used to establish the relationship between the independent and dependent variables. The textual data from the field was subjected to qualitative analysis.

$$SP = \beta_0 + \beta_1FX + \beta_2INF + \beta_3INT + \beta_4MS + \varepsilon$$

Where:-

SP = Stock price index (Monthly observations of the NSE stock price index).

β = represents the parameters of each variable.

ε = is the error term representing variations in the model not explained by the independent variables (Model error).

FX = Foreign exchange rate (monthly average of the Kenyan shilling against the U.S dollar – the cost of converting one Usd Dollar into Kenya shilling).

INF = Inflation rate (is the month on month annual percentage change in the average rate of inflation).

INT = interest rate (monthly interest rate on 91- day treasury bills as obtained from the Central Bank of Kenya).

MS = Money supply (monthly data for the same period of the stock market data (2000 – 2010), selected from various issues of the monthly bulletin published by the Central bank of Kenya)

Using the regression analysis I calculated the values of the constant coefficients and the slope coefficients β_0 , β_1 , β_2 , β_3 , β_4 and ε respectively from the data collected.

The equation was tested for applicability in determining the strength of the relationship by the use of correlation analysis through scatter plot, analysis of variance and the test of significance.

The model was also tested for relevance using residual plot and the following multicollinearity

tests, variance inflation factor (VIF), Tolerance (TOL) and condition Index (CI). The Eviews

6.0 Computer software was used to analyze the data.

3.8 Assumptions of the study.

- i. That the correct functional form of the regression equation is known.
- ii. That the observations are typical in the sense that they represent a cross section of an environment about which the researcher wishes to generalize.
- iv. That there is no multi-collinearity among the values of the predictor variables.

The study will relax the assumption made by Nyamute (1998), stating that the model takes a normal distribution of the residuals and the one stating that there is no Auto-correlation among the response variables.

The main hypothesis is that a negative relationship exists between the four macroeconomic indicators (inflation, interest rate, money supply and exchange rate) and the NSE index. The causal direction will be from the macroeconomic indicators to the stock prices.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.0 Introduction

This chapter presents information to determine the relationship between macroeconomic indicators (inflation rate, foreign exchange rate of US dollar against Kenya shilling, interest rate and money supply) and the performance of equities at the Nairobi stock exchange. Data collected from NSE, CBK and KNBS was analyzed using qualitative and quantitative techniques. The study determined macroeconomic variables effect on stock price index by determining the strength of the relationship by the use of correlation analysis through scatter plot, analysis of the variance and the test of significance. The comparison period for this study was from 2000 to 2010. The advantage of this approach is that the event study approach tests for short-term movements in stock prices that are outside of the historical pattern, taking into account statistical errors in the estimates of the historical relationship. The mean average for stock price index yearly was calculated. For each year, t-statistics and test of significance was done using EViews 6.0.

4.1 Data analysis and Findings

Macroeconomic indicators and stock price indexes from 2000 to 2010 have been summarised in the table that follows in the next page to aid the study, conclusions and recommendations. This study undertakes to research on the relationship that exists between the major macroeconomic indicators and the performance of equities at the Nairobi Stock Exchange. In order to make informed conclusions, this study has relied on data obtained from the Kenya National Bureau of statistics, The Central Bank of Kenya and the Nairobi Stock Exchange. The

data has been summarised in the table below and EViews 6.0 software has been employed in the manipulation of data and informing the framework on which the conclusions will borrow from and any suggestions for further research.

In order for the study to identify whether there is a relationship between the stock price index and macroeconomic indicators, the study researcher collected the relevant data from three institutions (NSE, CBK and KNBS). Stock price index from the NSE was in form of day index, an average from these days index formed the monthly means. Foreign exchange rate, interest rate and money supply data was collected from CBK monthly publications. Inflation rate (price consumer index) data was collected from KNBS monthly publications. The behavior of each variable over the study period has been presented in a graphical form in the pages below.

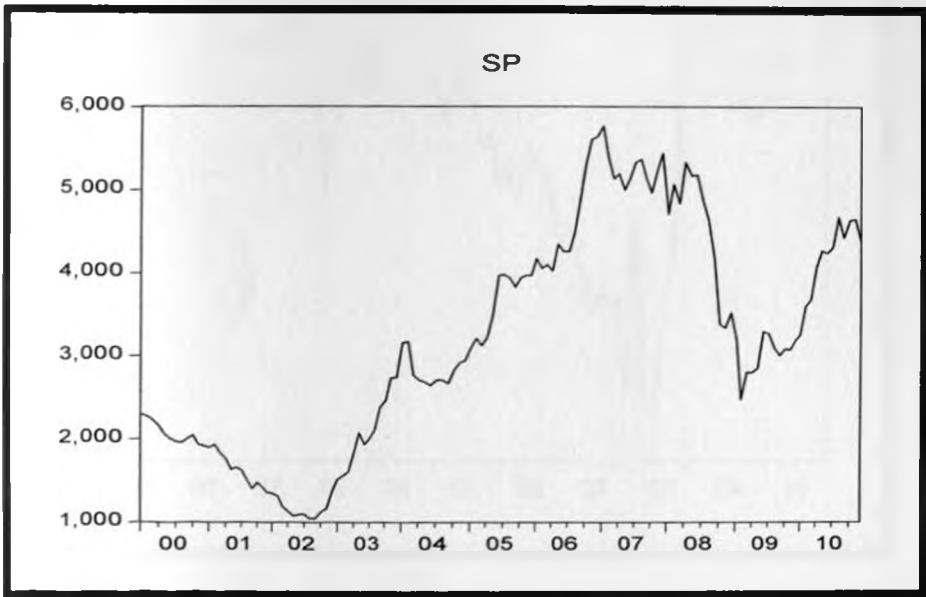
Table: 1. Summary of Foreign Exchange, Inflation Rate, Treasury Bill Rate and Money Supply

Years	NSE(INDEX)	Foreign exchange(KES/ USD)	Inflation rate (%)	Treasury Bill Rate (%)	Money supply (KES)
2000	2070	76.18	5.73	11.79	350.21
2001	1625	78.56	4.33	12.73	358.47
2002	1163	78.56	2.03	8.94	380.02
2003	2080	78.73	9.83	3.73	420.61
2004	2827	76.14	11.67	3.19	477.56
2005	3648	79.22	10.50	8.45	530.38
2006	4597	75.39	14.47	6.81	609.72

2007	5263	72.13	9.79	6.80	709.64
2008	4523	67.27	26.19	7.71	850.51
2009	3013	69.81	17.26	7.38	960.55
2010	4182	79.56	3.87	3.61	1,183.28

4.1 Stock price index

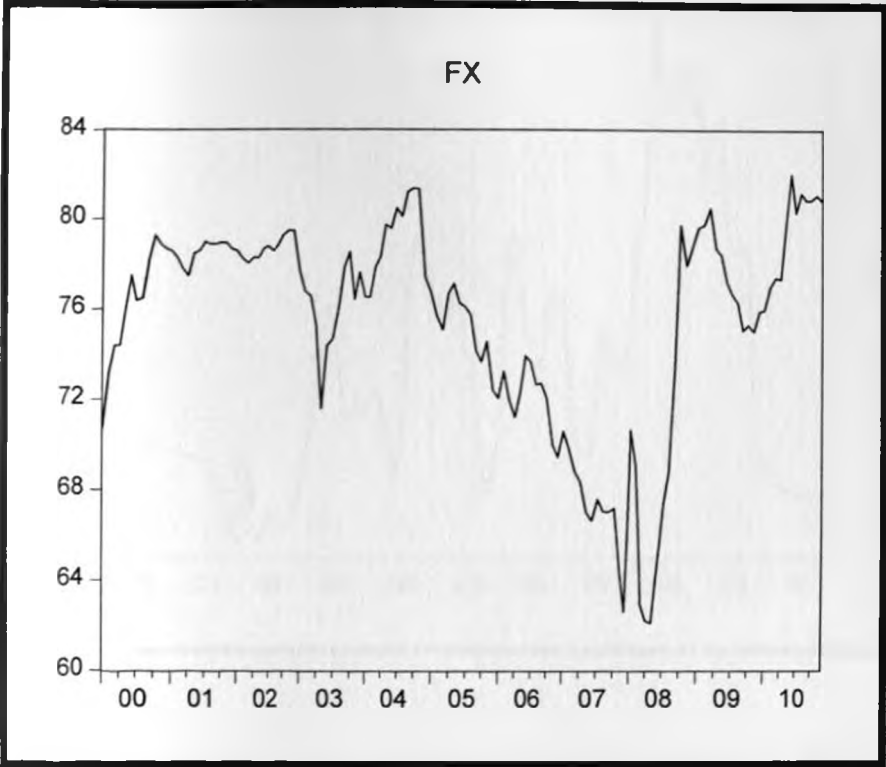
Figure 1: Yearly data of stock price index



The study presents the stock price index yearly means from 2000 to 2010 as shown by the figure 1 above.

4.2 Foreign exchange rate

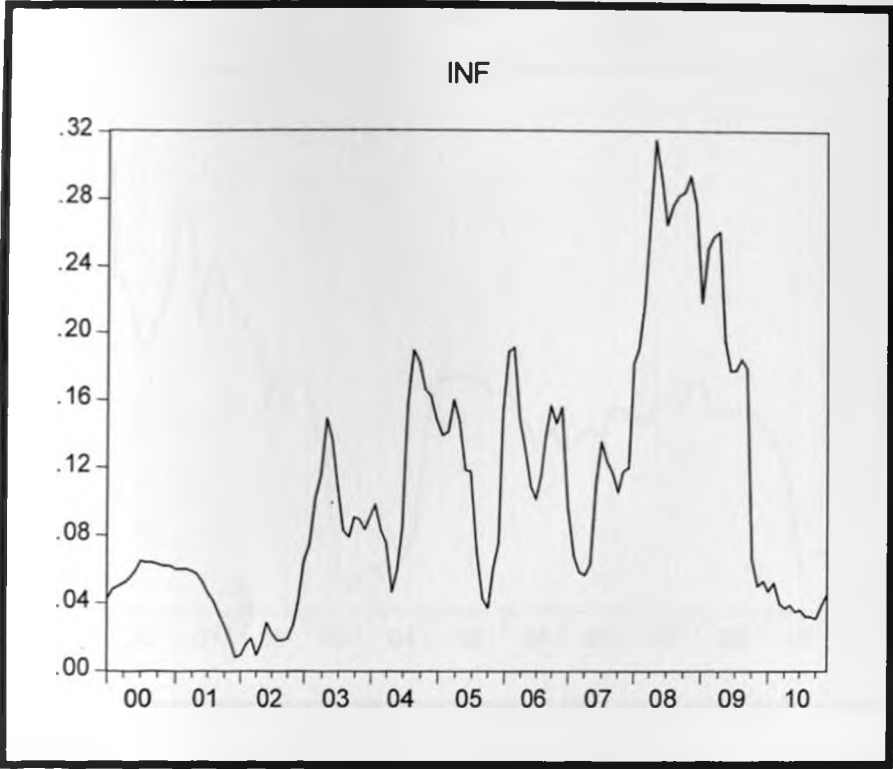
Figure 2: Yearly data of foreign exchange rate of Kenya shilling to US dollar



From the figure above the Kenyan shilling has witnessed immense fluctuations against the dollar. In managing the exchange rate, the Kenyan government has allowed the exchange rate to be determined by the forces of demand and supply. Kenya is a net importer and this exposes the exchange rate into immense fluctuations during the times of high fuel prices and other imports.

4.3 Inflation rate

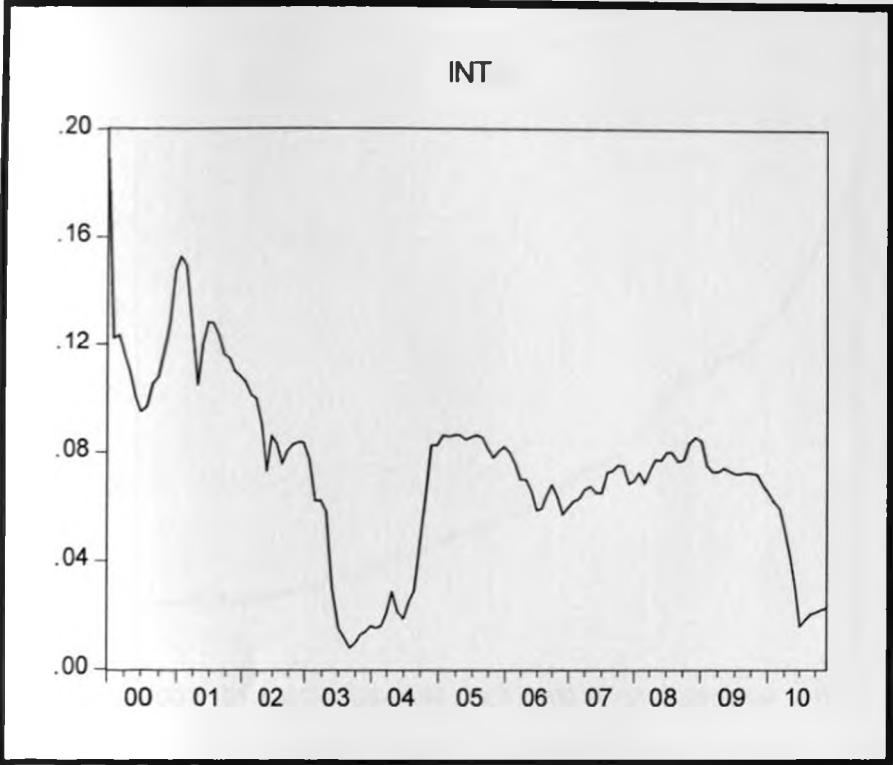
Figure 3: Yearly data of consumer price index



The consumer price index is as shown above by figure 3. The reasons for flactuations in inflation rates are numerous among them being the unpredictable weather patterns that significantly affect food production and international oil prices that more often than not affect industrial production and other aspects of kenyan consumers.

4.4 Interest rate

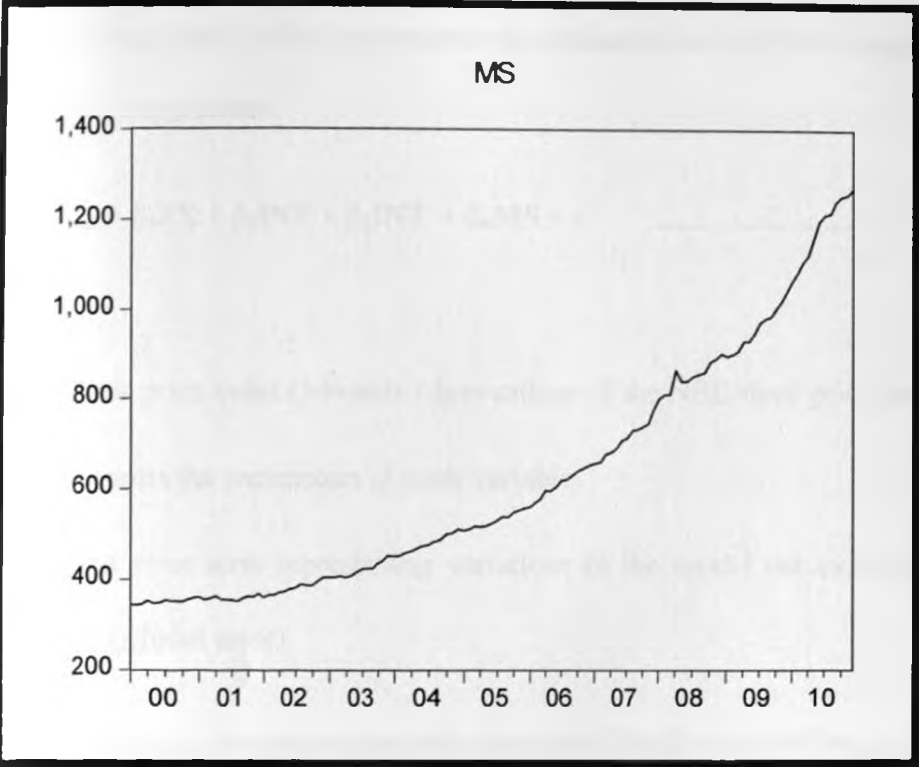
Figure 4: monthly data of 91 days Treasury bills interest rate



Interest rates act as the cost of capital to companies. They are also returns on the alternative assets such as savings accounts and treasury bills. As cost of capital, interest rates influence the profitability and value of quoted companies; for if a company pays a very high interest rate on its debt capital, then its earnings will be severely eroded and hence investors will mark down its value at the stock market.

4.5 Monetary policy

Figure 5: monthly data of money supply to circulation by CBK



Money supply was as shown by figure 5. Above with a steady increase from 2000 to 2010.

Money supply has direct and indirect influence on stock prices. The indirect influence of money supply on stock prices is through its effects on interest rates and expected corporate earnings. In the short run, the effect of the changes in money supply is more significant on the equity market than on the bonds market. It is also important to add that that money supply growth is an important predictor of changes in the expected inflation and hence stock returns signal changes in expected inflation.

4.6 Regression Equation

The study also conducted a regression analysis in order to determine Stock price index as linearly dependent on the macroeconomic indicators as specified in equation which yields the following expression:

$$SP = \beta_0 + \beta_1FX + \beta_2INF + \beta_3INT + \beta_4MS + \varepsilon \dots\dots\dots (i)$$

Where:-

SP = Stock price index (Monthly observations of the NSE stock price index).

β = represents the parameters of each variable.

ε = is the error term representing variations in the model not explained by the independent variables (Model error).

FX = Foreign exchange rate (monthly average of the Kenyan shilling against the U.S dollar).

INF = Inflation rate adopted for this study, is the month – on – month rate as computed and reported by the KNBS and CBK.

INT = interest rate adopted for this study is the 91-day treasury bills rate as computed by the CBK. This rate is the benchmark for all other rates in the economy including commercial lending rates.

MS = Money supply (monthly data for the same period of the stock market data (2000 – 2010), selected from various issues of the monthly bulletin published by the Central bank of Kenya. In this study, money supply is taken to be the M2 as defined by the Central Bank of Kenya. CBK

defines M2 as comprising M1 (currency outside banks and demand deposits) and quasi-money.

Other definitions include M3 reserve money.

4.7 Regression Analysis

In carrying out the regression analysis, tests on the violations of key assumptions of regression analysis were done. We have taken steps to detect and correct the effects of heteroskedasticity, serial correlation and multicollinearity as explained below:

Heteroskedasticity

A key assumption of regression analysis is that the variance of the residuals is constant across observations. Heteroskedasticity occurs when the variance of the residuals is not constant across observations in the sample. This happens when there are subsamples that are more spread out than the rest of the sample. The effect of heteroskedasticity is that standard errors are unreliable, F-test is unreliable but the coefficient estimates are not affected. In our analysis we have used to Newey and West (1987) standard errors and covariance method to correct any effect of heteroskedasticity.

Serial correlation

Serial correlation, also known as autocorrelation, refers to the situation in which the residual terms are correlated with one another. Because of the tendency of the data to cluster together from observation to observation, positive serial correlation typically results in coefficient standard errors that are too small which may call for rejection of the null hypothesis when it is actually true. The F-test will also be unreliable. In our analysis we have used to Newey and West (1987) standard errors and covariance method to correct any effect of heteroskedasticity.

Multicollinearity

Multicollinearity refers to the condition when two or more of the independent variables, or linear combinations of the independent variables, in a multiple regression are highly correlated with each other. This condition distorts the standard error of estimate and the coefficient standard errors, leading to problems when conducting t-tests for statistical significance of parameters. Multicollinearity can be detected by checking for correlation among independent variables. The correlation analysis of the independent variables in this study is as follows:

Table 2: Correlation analysis of independent variables

	FX	INF	INT	MS
FX	1.000000	-0.371938	-0.061308	-0.103797
INF	-0.371938	1.000000	-0.105931	0.308533
INT	-0.061308	-0.105931	1.000000	-0.407381
MS	-0.103797	0.308533	-0.407381	1.000000

From the analysis in table 2 above, there is no high correlation among the independent variables. Therefore, multicollinearity is not a problem in our study.

Results of the regression analysis

The table shows the results of the regression analysis. The results are after considering the effects of heteroskedasticity, serial correlation and multicollinearity:

Table 3: Regression analysis results table

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	15588.06	1944.304	8.017297	0.0000
FX	-177.3399	23.19723	-7.644871	0.0000
INF	549.3201	1259.866	0.436015	0.6636
INT	-7720.662	3022.478	-2.554415	0.0118
MS	2.402388	0.499036	4.814059	0.0000
R-squared	0.769785	Mean dependent var		3180.932

Adjusted R-squared	0.762535	S.D. dependent var	1352.519
S.E. of regression	659.0885	Akaike info criterion	15.85674
Sum squared resid	55168507	Schwarz criterion	15.96593
Log likelihood	-1041.545	Hannan-Quinn criter.	15.90111
F-statistic	106.1648	Durbin-Watson stat	0.191040
Prob(F-statistic)	0.000000		

The p values above show the level of significance of the variables in the study. The null hypothesis is that the coefficients of the independent variables (FX, INF, INT and MS) are equal to zero. While the alternative hypothesis is that the coefficients of the independent variables are different from zero. From the results above, the coefficients of foreign exchange (FX), t-bill interest rates (INT) and level of money supply (MS) are statistically significant from zero at 5% significance level. The coefficient of the inflation rate (INF) is not significantly different from zero at 5% significance level.

The probability value of the F-statistic is significant at 5% meaning that at least one of the independent variables explains the dependent variable. In addition the coefficient of determination (R-squared) of 76.978% indicates that the four independent variables in our study collectively explain 76.978% of the movement or changes in the dependent variable.

4.7.1 The relationship between selected macroeconomic indicators and the performance of equities at the Nairobi stock exchange

There is an inverse relationship between the Treasury bill rate and the Stock price index. The coefficient beta is -7,720.66. There is also an inverse relationship between the exchange rate

and the Stock price index as given by -177.33 coefficient beta. The stock price is also positively related to inflation rate and level of money supply.

4.7.2 Regression Equation

$$\text{Stock price index} = \beta_0 + \beta_1\text{FX} + \beta_2\text{INF} + \beta_3\text{INT} + \beta_4\text{MS} + \varepsilon$$

From the table 3 above the regression equation is as written below.

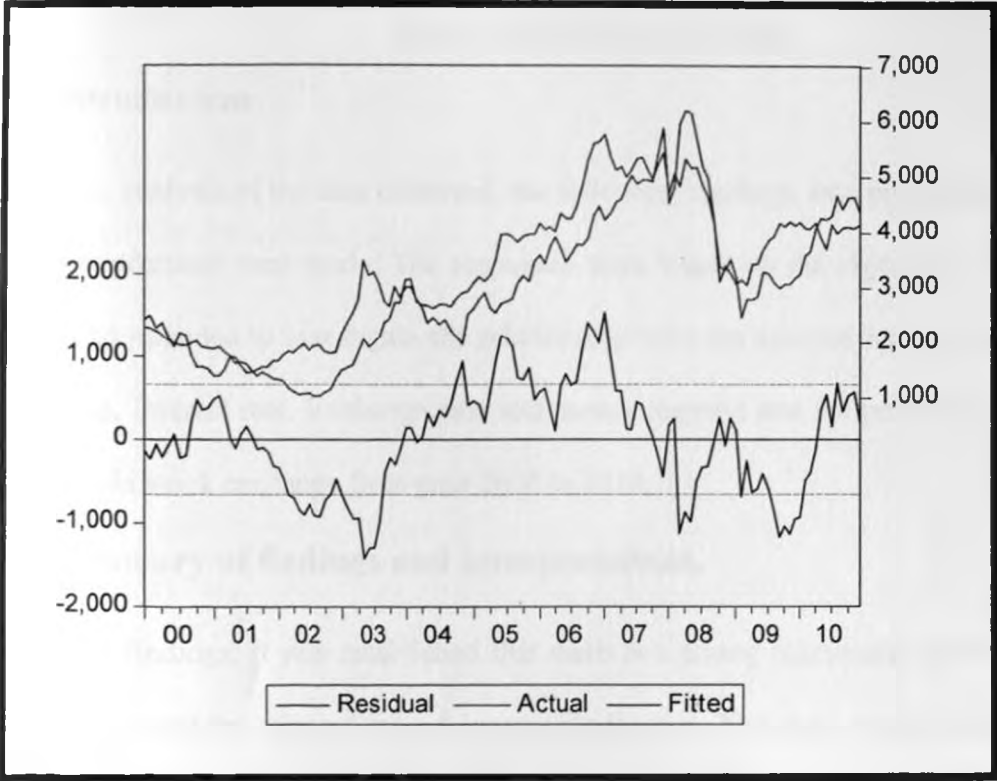
$$\text{SP} = 15588.0592026 - 177.339854233*\text{FX} + 549.320082905*\text{INF} - 7720.661683*\text{INT} + 2.4023876646*\text{MS} \dots\dots\dots (ii)$$

The table on Appendix IV shows the results for the predicted stock price and the actual stock price as retrieved from the NSE 2010 data. It shows the results that would have been obtained if the data were to be predicted using the stated regression equation of:

$$\text{SP} = \beta_0 + \beta_1\text{FX} + \beta_2\text{INF} + \beta_3\text{INT} + \beta_4\text{MS} + \varepsilon$$

The figure below shows a graphical analysis of the actual stock price index, predicted stock price index and the residual values drawn from appendix iv.

Figure 6: The graphical analysis of actual, predicted and residuals of the stock price index



CHAPTER FIVE

SUMMARY OF FINDINGS, INTERPRETATIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

From the analysis of the data collected, the following findings, interpretations, conclusion and recommendations were made. The responses were based on the objectives of the study. The study had intended to investigate the relationship between selected macroeconomic indicators (Inflation, Interest rate, Exchange rate and money supply) and the performance of equities at the Nairobi stock exchange from year 2000 to 2010.

5.2 Summary of findings and interpretations.

From the findings, it was established that there is a strong relationship between the NSE 20 share index and the selected macroeconomic indicators. The study model also showed that the stock price index was negatively affected by interest rate and exchange rate. The money supply and inflation rate affected the stock price index positively over the study period. That meant that the stronger the Kenya shilling, the lower the inflation rate, low interest rate and controlled money supply, the NSE 20 share index will be impacted positively. There appeared to be a trend pointing towards a strong relationship between the economic environment and the political climate in Kenya. This was supported by the fact that the market improved steadily after the political transition 2003. The government had combined its programme of economic recovery with steps to improve governance, yet strife within the government itself was affecting the country's democratic dispensation negatively and spilling over to the economy. Kenya's structural reforms remained slow with several aspects of the reform process delayed

by government inertia but declined in 2007 when the country went into another general election.

The study found out that foreign exchange rate of Kenyan shilling to US dollar was weaker in the year 2000 and continued weakening in the following year 2001, but in 2003 the Kenyan shilling became stronger but that did not last since the preceding year 2004 the shilling become weaker again as in the years 2001 to 2002. This was because there were several structures that the government was trying to put in place that had been neglected by the former regime. From 2005 to 2007 the shilling was becoming stronger year by year and this might have been due to the stability of the macroeconomic indicators, political environment among other positive factors. There was a drastic change of strength from 2008 when the shilling started losing ground against the dollar due to political instability that was in the country which led to the post election violence, global economic crises and the drought that followed.

The research also established that the reasons for the high inflation rate were numerous among them unpredictable weather patterns and high fuel prices. From 2003 inflation rate in the country began to increase again after having been on a downward trend. Inflationary pressure had been caused by increasing food and fuel prices. As food crop prices had edged up on international markets, domestic prices had also been forced up by the twin factors of dry weather (which restricts supply) and the holiday season (which expands demand). The primary cause had been the global commodity price spikes of 2008 that drove up food and fuel prices. Prices of food and non-alcoholic beverages, which comprise 36 percent of the CPI basket, were 7.8 percent higher in 2009 than in 2008. The increases were particularly pronounced for beef,

milk and cooking fat. Similarly, increased prices of fuels such as kerosene and cooking gas had both a direct effect (by edging up the Housing, Water, Electricity, Gas and Other Fuels index) and an indirect effect (through increased transportation and business costs). Poor regional weather conditions (drought) and the after effects of the global financial crisis also contributed to a jump in inflation in 2009. But after that Inflation had since begun to decline once again.

The study found out that interest rate increased then followed by downward trend. This increased the borrowing power of individuals and increased revenue to the government to cater for its expenditure rather than international borrowing. Interest rates decisions are taken by The Monetary Policy Committee (MPC) of the The Central Bank of Kenya. The official interest rate since 2005 is the Central Bank Rate (CBR), which replaced the 91-day Treasury Bills rate. This showed an increase in the same year since most banks had gained loan portfolio.

The researcher found out that Money supply had a steady increase from 2000 to 2010. This showed that the government expenditure increased from 2000 to 2010 thus the economy. The government's medium-term fiscal strategy was built around three pillars: a revenue policy framework that aims at maintaining domestic revenue at above 21 per cent of GDP; an expenditure strategy that gradually reduces the level of expenditure to GDP, while allowing for expansion in poverty reduction programmes and capital expenditure; and, reducing the budget deficit to less than 3 per cent of GDP. The authorities have been relying on increased revenue collection by improving the quality of tax administration rather than raising tax rates in order to attain the revenue objective. Fiscal reform was by no means complete; reforms in tax administration had begun to yield increasing domestic revenues. The government's expenditure

management programme, however, continued to suffer from the huge public sector wage bill. The monetary authorities achieved some success in reducing the growth of monetary aggregates.

5.3 Conclusions and Recommendations

The study shows that there is a significant relationship between the selected macroeconomic indicators and stock price index. However, a comparison of the years also shows that there is a significant relationship between the selected macroeconomic indicators and stock price index. Accordingly, it is difficult to conclude that politics is the event that causes the difference in market performance if the macroeconomic indicators were kept constant.

From the findings, it is concluded that the 20 share Index (Equities Performance at NSE) is directly affected by the performance of the macroeconomic indicators. The empirical evidence obtained from the study supports the unidirectional granger causality of the NSE 20 Share Index performance by the selected macroeconomic indicators in Kenya.

The study recommends that macroeconomic variable need to be closely monitored and prudently managed in order to spur faster economic growth as they influence more than 76% of the share performance at the Nairobi Stock Exchange.

5.4 Limitations of the study

The study focused on annual and monthly price movement as influenced by the four selected macroeconomic variables. It is thought that more reliable and accurate conclusions could emerge if weekly data is used.

This study is also limited to macroeconomic variables and fails to factor in the aspect of investor behaviour in investigating the share price movement at the NSE.

The study also did not take into account all the macroeconomic variables like the global oil prices, unemployment levels in an economy, foreign remittances.

5.5 Suggestion for Further Research

Using non-stationary series, cointegration analysis has been used to examine whether there is any long run equilibrium relationship. For instance, when non-stationary series are used in regression analysis, one as a dependent variable and the other as an independent variable, statistical inference becomes problematic. Cointegration analysis becomes important for the estimation of error correction models (ECM). The concept of error correction refers to the adjustment process between short-run disequilibrium and a desired long run position. As Engle and Granger (1987) have shown, if two or more variables are cointegrated, then there exists an error correction data generating mechanism, and vice versa. Since, two variables that are cointegrated, would on average, not drift apart over time, this concept provides insight into the

long-run relationship between the two variables and testing for the cointegration between two variables.

Majority of the researchers in Kenya have employed regression analysis in the studies apart from Sifunjo (1999) who employed Cointegration analysis in his study on “the relationship between foreign exchange rate and the NSE stock index”. As can be seen, Sifunjo’s study involved only one macroeconomic variable. The researcher recommends employment of Cointegration analysis involving the four variables, to establish the strength of the relationship between inflation rate, exchange rate, money supply and interest rate and the NSE 20 Share index. The study further recommends a study on the impact of investor behaviours on the Nairobi Stock exchange.

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APPENDIX 1

COMPANIES LISTED AT THE NSE BY SECTOR.

AGRICULTURE SECTOR

KAKUZI LIMITED

REA VIPINGO PLANTATIONS LIMITED

SASINI TEA AND COFFEE LIMITED

COMMERCIAL AND SERVICES

ACCESSKENYA LIMITED

CAR AND GENERAL (KENYA) LIMITED

CMC HOLDINGS LIMITED

HUTCHINGS BIEMER LIMITED

KENYA AIRWAYS LIMITED

MARSHALLS (E.A) LIMITED

NATION MEDIA GROUP LIMITED

SAFARICOM LIMITED

SCANGROUP LIMITED

STANDARD GROUP LIMITED

TPS EASTERN AFRICA (SERENA) LIMITED

FINANCE AND INVESTMENT

BARCLAYS BANK LIMITED

CENTUM INVESTMENT LIMITED

CFC INSURANCE HOLDINGS LIMITED

CFC STANBIC HOLDINGS LIMITED

DIAMOND TRUST BANK KENYA LIMITED

EQUITY BANK LIMITED
HOUSING FINANCE COMPANY LIMITED
JUBILEE HOLDINGS LIMITED
KENYA COMMERCIAL BANK LIMITED
KENYA REINSURANCE CORPORATION LIMITED
NATIONAL BANK OF KENYA LIMITED
NIC BANK LIMITED
OLYMPIA CAPITAL HOLDINGS LIMITED
PAN AFRICAN INSURANCE HOLDINGS LIMITED
STANDARD CHARTERED BANK LIMITED
THE CO-OPERATIVE BANK OF KENYA LIMITED

INDUSTRIAL AND ALLIED

ATHI RIVER MINING LIMITED
B.O.C KENYA LIMITED
BAMBURI CEMENT LIMITED
BRITISH AMERICAN TOBACCO KENYA LIMITED
CARBACID INVESTMENTS LIMITED
CROWN BERGER LIMITED
EAST AFRICAN CABLES LIMITED
EAST AFRICAN PORTLAND CEMENT LIMITED
EAST AFRICAN BREWERIES LIMITED
EVEREADY EAST AFRICA LIMITED
KENGEN LIMITED
KENOLKOBIL LIMITED
KENYA POWER AND LIGHTING LIMITED
MUMIAS SUGAR COMPANY LIMITED
SAMEER AFRICA LIMITED
TOTAL KENYA LIMITED

UNGA GROUP LIMITED

ALTERNATIVE INVESTMENT MARKET SEGMENT (AIMS)

BAUMANN & COMPANY LIMITED

CITY TRUST LIMITED

EAAGADS LIMITED

EXPRESS KENYA LIMITED

KAPCHORUA TEA KENYA LIMITED

KENYA ORCHARDS LIMITED

LIMURU TEA COMPANY LIMITED

WILLIAMSON TEA KENYA LIMITED

APPENDIX II

NSE 20 SHARE INDEX COMPANIES

1. ICDC INVESTMENT COMPANY
2. KENYA ELECTRICITY GENERATING COMPANY
3. MUMIAS SUGAR COMPANY
4. REA VIPINGO PLANTATIONS LTD.
5. CMC HOLDINGS
6. EXPRESS LTD.
7. NATION MEDIA GROUP
8. SASINI LTD.
9. KENYA AIRWAYS
10. SAFARICOM LTD.
11. BARCLAYS BANK (K) LTD.
12. EQUITY BANK
13. KENYA COMMERCIAL BANK
14. STANDARD CHARTERED BANK (K) LTD.
15. BAMBURI CEMENT LTD.
16. BRITISH AMERICAN TOBACCO LTD.
17. EAST AFRICAN BREWERIES LTD.
18. EAST AFRICAN CABLES
19. KENYA POWER & LIGHTING COMPANY
20. ATHI RIVER MINING

APPENDIX III

Secondary data from NSE, CBK and KNBS

Period	NSE index	T-bill rate	Money supply	Exchange rate	Inflation rate
Jan-00	2,301	18.92%	344.65	70.7	4.30%
Feb-00	2,278	12.27%	342.92	73.2	4.80%
Mar-00	2,233	12.39%	344.07	74.4	5.00%
Apr-00	2,162	11.61%	352.72	74.4	5.20%
May-00	2,053	10.99%	346.72	76.0	5.50%
Jun-00	2,003	10.06%	347.73	77.5	5.90%
Jul-00	1,967	9.52%	354.47	76.4	6.50%
Aug-00	1,959	9.70%	352.02	76.5	6.40%
Sep-00	2,001	10.57%	351.25	78.2	6.40%
Oct-00	2,043	10.81%	350.44	79.3	6.30%
Nov-00	1,930	11.80%	355.86	78.9	6.20%
Dec-00	1,913	12.90%	359.65	78.7	6.20%
Jan-01	1,897	14.76%	360.61	78.6	6.00%
Feb-01	1,933	15.30%	355.15	78.3	6.00%
Mar-01	1,831	14.97%	357.9	77.8	6.00%
Apr-01	1,768	12.90%	363.11	77.5	5.90%
May-01	1,636	10.52%	355.74	78.5	5.70%
Jun-01	1,657	12.07%	354.72	78.62	5.20%
Jul-01	1,621	12.87%	354.36	79.0	4.60%
Aug-01	1,506	12.84%	351.35	78.9	4.10%
Sep-01	1,401	12.39%	357.44	78.9	3.30%
Oct-01	1,473	11.63%	362.02	78.97	2.60%
Nov-01	1,420	11.50%	361.07	78.96	1.70%
Dec-01	1,355	11.01%	368.13	78.69	0.80%
Jan-02	1,343	10.85%	360.41	78.6	0.92%
Feb-02	1,314	10.61%	366.01	78.25	1.54%
Mar-02	1,183	10.14%	365.51	78.06	1.91%
Apr-02	1,129	10.01%	370.99	78.3	0.92%
May-02	1,071	9.04%	372.87	78.3	1.71%
Jun-02	1,087	7.34%	378.13	78.7	2.83%
Jul-02	1,097	8.63%	380.98	78.8	2.20%
Aug-02	1,043	8.34%	389.54	78.6	1.80%
Sep-02	1,043	7.60%	387.37	78.81	1.78%
Oct-02	1,116	8.07%	387.31	79.3	1.90%

Period	NSE index	T-bill rate	Money supply	Exchange rate	Inflation rate
Nov-02	1,161	8.30%	396.37	79.5	2.70%
Dec-02	1,363	8.38%	404.78	79.5	4.10%
Jan-03	1,511	8.38%	405.51	77.7	6.50%
Feb-03	1,558	7.77%	404.45	76.8	7.50%
Mar-03	1,608	6.24%	407.15	76.6	10.22%
Apr-03	1,847	6.25%	404.46	75.3	11.60%
May-03	2,075	5.84%	408.16	71.61	14.90%
Jun-03	1,935	3.00%	415.79	74.4	13.70%
Jul-03	2,005	1.54%	423.29	74.7	10.89%
Aug-03	2,107	1.18%	424.65	76	8.30%
Sep-03	2,380	0.82%	424.27	77.9	7.90%
Oct-03	2,457	1.00%	435.26	78.55	9.08%
Nov-03	2,737	1.30%	441.29	76.45	8.97%
Dec-03	2,738	1.41%	453.02	77.65	8.35%
Jan-04	3,158	1.61%	450.91	76.57	9.14%
Feb-04	3,175	1.53%	452.31	76.55	9.85%
Mar-04	2,771	1.62%	459.27	77.86	8.32%
Apr-04	2,708	2.11%	462.3	78.35	7.58%
May-04	2,689	2.87%	468.86	79.75	4.66%
Jun-04	2,640	2.13%	473.8	79.61	5.94%
Jul-04	2,708	1.88%	476.27	80.5	8.54%
Aug-04	2,709	2.49%	484.12	80.14	15.80%
Sep-04	2,671	2.91%	488.29	81.21	18.96%
Oct-04	2,830	4.52%	500.22	81.37	18.29%
Nov-04	2,918	6.26%	502.97	81.34	16.65%
Dec-04	2,946	8.29%	511.43	77.44	16.25%
Jan-05	3,094	8.30%	508.51	76.81	14.87%
Feb-05	3,213	8.66%	510.93	75.72	13.94%
Mar-05	3,126	8.62%	517.97	75.12	14.15%
Apr-05	3,228	8.68%	516.73	76.7	16.02%
May-05	3,505	8.66%	518.73	77.16	14.78%
Jun-05	3,972	8.50%	523.72	76.31	11.91%
Jul-05	3,982	8.59%	530.45	76.14	11.80%
Aug-05	3,939	8.66%	539.2	75.8	6.96%
Sep-05	3,833	8.58%	538.23	74.18	4.27%
Oct-05	3,939	8.19%	548.85	73.7	3.72%
Nov-05	3,974	7.84%	553.52	74.59	6.04%

Period	NSE index	T-bill rate	Money supply	Exchange rate	Inflation rate
Dec-05	3,973	8.06%	557.77	72.47	7.56%
Jan-06	4,172	8.23%	560.06	72.08	15.39%
Feb-06	4,057	8.02%	569.59	73.27	18.87%
Mar-06	4,102	7.60%	578	71.95	19.14%
Apr-06	4,025	7.02%	597.1	71.25	14.85%
May-06	4,350	7.01%	595.93	72.35	13.09%
Jun-06	4,260	6.60%	605.21	73.96	10.93%
Jul-06	4,259	5.89%	619.26	73.69	10.15%
Aug-06	4,486	5.96%	620.99	72.69	11.50%
Sep-06	4,880	6.45%	630.38	72.74	13.85%
Oct-06	5,314	6.83%	640.27	72.08	15.69%
Nov-06	5,615	6.41%	646.84	70.03	14.64%
Dec-06	5,646	5.73%	653.04	69.46	15.59%
Jan-07	5,774	6.00%	657.26	70.6	9.67%
Feb-07	5,387	6.22%	659.95	69.82	6.81%
Mar-07	5,134	6.32%	677.35	68.85	5.87%
Apr-07	5,199	6.65%	682.17	68.37	5.66%
May-07	5,002	6.77%	690.54	67.04	6.33%
Jun-07	5,147	6.53%	708.39	66.64	11.10%
Jul-07	5,340	6.52%	713.61	67.58	13.56%
Aug-07	5,372	7.30%	730.51	67.06	12.37%
Sep-07	5,146	7.35%	733.33	67.03	11.72%
Oct-07	4,971	7.55%	739.66	67.19	10.55%
Nov-07	5,235	7.52%	745.27	64.49	11.80%
Dec-07	5,445	6.87%	777.6	62.6	12.00%
Jan-08	4,713	6.99%	801.25	70.65	18.20%
Feb-08	5,072	7.28%	810.21	69.11	19.10%
Mar-08	4,843	6.89%	811.21	62.92	21.80%
Apr-08	5,336	7.35%	864.11	62.21	26.60%
May-08	5,176	7.76%	839.24	62.1	31.50%
Jun-08	5,186	7.73%	840.68	64.76	29.30%
Jul-08	4,868	8.03%	850.41	67.38	26.50%
Aug-08	4,649	8.02%	854.95	68.81	27.60%
Sep-08	4180	7.70%	859.33	73.3	28.20%
Oct-08	3,387	7.75%	883.5	79.74	28.40%
Nov-08	3,341	8.39%	890.23	77.97	29.40%
Dec-08	3,521	8.59%	901.06	78.8	27.70%

Period	NSE index	T-bill rate	Money supply	Exchange rate	Inflation rate
Jan-09	3,199	8.47%	895.4	79.63	21.87%
Feb-09	2,475	7.55%	900.03	79.76	25.09%
Mar-09	2,805	7.31%	906.07	80.51	25.80%
Apr-09	2,800	7.33%	928.84	78.73	26.07%
May-09	2,853	7.45%	928.6	78.41	19.52%
Jun-09	3,295	7.33%	950.24	77.24	17.76%
Jul-09	3,273	7.24%	973.62	76.67	17.79%
Aug-09	3,103	7.25%	982.85	76.32	18.44%
Sep-09	3,005	7.29%	986.9	75.09	17.93%
Oct-09	3,084	7.26%	1,006.01	75.33	6.60%
Nov-09	3,077	7.22%	1,022.34	75.02	5.00%
Dec-09	3,185	6.82%	1,045.66	75.92	5.30%
Jan-10	3,261	6.56%	1,067.27	75.99	4.69%
Feb-10	3,599	6.21%	1,084.35	76.99	5.20%
Mar-10	3,676	5.98%	1,107.90	77.41	3.97%
Apr-10	4,062	5.17%	1,122.79	77.36	3.70%
May-10	4,271	4.21%	1,159.60	79.83	3.88%
Jun-10	4,242	3.06%	1,198.93	82.02	3.50%
Jul-10	4,309	1.60%	1,213.21	80.32	3.60%
Aug-10	4,674	1.83%	1,216.83	81.16	3.22%
Sep-10	4,428	2.04%	1,243.60	80.87	3.21%
Oct-10	4,638	2.12%	1,254.49	80.88	3.09%
Nov-10	4,652	2.21%	1,258.81	81.08	3.84%
Dec-10	4,377	2.28%	1,271.64	80.83	4.51%

APPENDIX IV

The actual Stock price index and the predicted Stock price index

Observations	Actual	Fitted	Residual	Residual Plot		
2000M01	2301.00	2440.99	-139.986	.	*	.
2000M02	2278.00	2509.65	-231.651	.	*	.
2000M03	2233.00	2291.44	-58.4396	.	*	.
2000M04	2162.00	2373.54	-211.540	.	*	.
2000M05	2053.00	2124.90	-71.8980	.	*	.
2000M06	2003.00	1935.31	67.6859	.	*	.
2000M07	1967.00	2191.57	-224.568	.	*	.
2000M08	1959.00	2153.50	-194.501	.	*	.
2000M09	2001.00	1783.00	217.996	.		*
2000M10	2043.00	1566.91	476.095	.		*
2000M11	1930.00	1573.88	356.122	.		*
2000M12	1913.00	1533.52	379.476	.		*
2001M01	1897.00	1408.86	488.139	.		*
2001M02	1933.00	1407.25	525.745	.		*
2001M03	1831.00	1528.01	302.991	.		*
2001M04	1768.00	1753.00	15.0040	.	*	.
2001M05	1636.00	1740.60	-104.604	.	*	.
2001M06	1657.00	1594.46	62.5444	.	*	.
2001M07	1621.00	1461.14	159.860	.		*
2001M08	1506.00	1471.21	34.7872	.	*	.
2001M09	1401.00	1516.19	-115.192	.	*	.
2001M10	1473.00	1569.61	-96.6127	.	*	.
2001M11	1420.00	1574.20	-154.197	.	*	.
2001M12	1355.00	1671.93	-316.927	.	*	.
2002M01	1343.00	1682.35	-339.353	.	*	.
2002M02	1314.00	1779.81	-465.811	.	*	.
2002M03	1183.00	1850.62	-667.624	*		.
2002M04	1129.00	1825.83	-696.826	*		.
2002M05	1071.00	1909.57	-838.572	*		.
2002M06	1087.00	1988.68	-901.677	*		.
2002M07	1097.00	1874.73	-777.732	*		.
2002M08	1043.00	1950.96	-907.957	*		.
2002M09	1043.00	1965.53	-922.526	*		.
2002M10	1116.00	1842.86	-726.857	*		.
2002M11	1161.00	1815.79	-654.792	*		.
2002M12	1363.00	1837.51	-474.510	.	*	.
2003M01	1511.00	2171.66	-660.659	*		.
2003M02	1558.00	2381.31	-823.308	*		.
2003M03	1608.00	2556.33	-948.330	*		.

Observations	Actual	Fitted	Residual	Residual Plot		
2003M04	1847.00	2787.22	-940.218	*	.	.
2003M05	2075.00	3500.27	-1425.27	*	.	.
2003M06	1935.00	3236.50	-1301.50	*	.	.
2003M07	2005.00	3298.60	-1293.60	*	.	.
2003M08	2107.00	3084.89	-977.894	*	.	.
2003M09	2380.00	2772.63	-392.632	.	*	.
2003M10	2457.00	2676.35	-219.349	.	*	.
2003M11	2737.00	3039.48	-302.482	.	*	.
2003M12	2738.00	2842.96	-104.956	.	*	.
2004M01	3158.00	3018.31	139.688	.	*	.
2004M02	3175.00	3035.30	139.701	.	*	.
2004M03	2771.00	2804.35	-33.3514	.	*	.
2004M04	2708.00	2682.84	25.1621	.	*	.
2004M05	2689.00	2375.60	313.395	.	*	.
2004M06	2640.00	2476.46	163.536	.	*	.
2004M07	2708.00	2358.15	349.850	.	*	.
2004M08	2709.00	2433.64	275.365	.	*	.
2004M09	2671.00	2238.83	432.169	.	*	.
2004M10	2830.00	2111.13	718.866	.	*	.
2004M11	2918.00	1979.71	938.287	.	*	.
2004M12	2946.00	2532.74	413.264	.	*	.
2005M01	3094.00	2629.09	464.908	.	*	.
2005M02	3213.00	2795.30	417.697	.	*	.
2005M03	3126.00	2922.86	203.138	.	*	.
2005M04	3228.00	2645.33	582.674	.	*	.
2005M05	3505.00	2563.29	941.713	.	*	.
2005M06	3972.00	2722.60	1249.40	.	.	*
2005M07	3982.00	2761.36	1220.64	.	.	*
2005M08	3939.00	2810.69	1128.31	.	.	*
2005M09	3833.00	3087.05	745.951	.	*	.
2005M10	3939.00	3224.77	714.225	.	*	.
2005M11	3974.00	3117.93	856.072	.	*	.
2005M12	3973.00	3495.46	477.537	.	*	.
2006M01	4172.00	3600.01	571.986	.	*	.
2006M02	4057.00	3447.20	609.796	.	*	.
2006M03	4102.00	3735.41	366.594	.	*	.
2006M04	4025.00	3926.64	98.3562	.	*	.
2006M05	4350.00	3719.86	630.137	.	*	.
2006M06	4260.00	3476.43	783.570	.	*	.
2006M07	4259.00	3608.60	650.403	.	*	.
2006M08	4486.00	3792.10	693.896	.	*	.
2006M09	4880.00	3780.87	1099.13	.	.	*

Observations	Actual	Fitted	Residual	Residual Plot		
2006M10	5314.00	3902.45	1411.55	.	.	*
2006M11	5615.00	4308.44	1306.56	.	.	*
2006M12	5646.00	4482.13	1163.87	.	.	*
2007M01	5774.00	4236.74	1537.26	.	.	*
2007M02	5387.00	4348.83	1038.17	.	.	*
2007M03	5134.00	4549.77	584.233	.	*	.
2007M04	5199.00	4619.84	579.162	.	*	.
2007M05	5002.00	4870.22	131.777	.	*	.
2007M06	5147.00	5028.77	118.226	.	*	.
2007M07	5340.00	4888.90	451.100	.	*	.
2007M08	5372.00	4954.96	417.041	.	*	.
2007M09	5146.00	4959.62	186.377	.	*	.
2007M10	4971.00	4924.59	46.4122	.	*	.
2007M11	5235.00	5426.07	-191.065	.	*	.
2007M12	5445.00	5890.19	-445.190	.	*	.
2008M01	4713.00	4544.21	168.786	.	*	.
2008M02	5072.00	4821.40	250.604	.	*	.
2008M03	4843.00	5966.47	-1123.47	*	.	.
2008M04	5336.00	6210.32	-874.325	*	.	.
2008M05	5176.00	6165.35	-989.347	*	.	.
2008M06	5186.00	5687.31	-501.313	.	*	.
2008M07	4868.00	5207.52	-339.515	.	*	.
2008M08	4649.00	4971.64	-322.640	.	*	.
2008M09	4180.00	4213.91	-33.9090	.	*	.
2008M10	3387.00	3127.14	259.856	.	*	.
2008M11	3341.00	3413.28	-72.2849	.	*	.
2008M12	3521.00	3267.33	253.669	.	*	.
2009M01	3199.00	3083.78	115.219	.	*	.
2009M02	2475.00	3160.57	-685.568	*	.	.
2009M03	2805.00	3064.50	-259.503	.	*	.
2009M04	2800.00	3434.81	-634.809	.	*	.
2009M05	2853.00	3445.74	-592.736	.	*	.
2009M06	3295.00	3704.81	-409.808	.	*	.
2009M07	3273.00	3869.17	-596.173	.	*	.
2009M08	3103.00	3956.21	-853.215	*	.	.
2009M09	3005.00	4178.18	-1173.18	*	.	.
2009M10	3084.00	4121.61	-1037.61	*	.	.
2009M11	3077.00	4210.11	-1133.11	*	.	.
2009M12	3185.00	4139.06	-954.063	*	.	.
2010M01	3261.00	4195.29	-934.288	*	.	.
2010M02	3599.00	4088.80	-489.804	.	*	.
2010M03	3676.00	4081.90	-405.899	.	*	.

Observations	Actual	Fitted	Residual	Residual Plot		
2010M04	4062.00	4187.59	-125.592	.	*	.
2010M05	4271.00	3913.10	357.899	.	*	.
2010M06	4242.00	3705.91	536.087	.	*	.
2010M07	4309.00	4154.97	154.032	.	*	.
2010M08	4674.00	3994.85	679.146	.	*	.
2010M09	4428.00	4094.33	333.674	.	*	.
2010M10	4638.00	4111.88	526.121	.	*	.
2010M11	4652.00	4083.96	568.039	.	*	.
2010M12	4377.00	4157.39	219.606	.	*	.