AN EMPERICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN SELECTED MACROECONOMIC VARIABLES AND STOCK PRICES: EVIDENCE FROM THE NAIROBI STOCK EXCHANGE

BY

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DECLARATION

This research project is my original work and has not been presented for a degree in any other University.

Signed..... Date.16/11/10.....

This project has been submitted for examination with my approval as the university supervisor.

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Signed..... Date.16th Nov. 2010

DEDICATION

I dedicate this project to my Dad and Mum.

ABBREVIATIONS

ADF	Augmented Dickey Fuller
ASPI	All Share Price Index
ATS	Automated Trading Systems
DF	Dickey-Fuller
DSE	Dhaka Stock Exchange
DSI	Dhaka Stock Index
ECM	Error Correction Model
EXR	Exchange Rate
GDP	Gross Domestic Product
INF	Inflation Rate
INTR	Interest Rate
MA	Master of Arts
MBA	Masters in Business Administration
MS	Money Supply
NASI	Nairobi Stock Exchange All-Share Index
NSE	Nairobi Stock Exchange
OLS	Ordinary Least Squares
UK	United Kingdom
UON	University of Nairobi
US	United States
VECM	Vector Error Correction Model

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ABSTRACT

The study was carried out to examine the relationship between selected macroeconomic variables and share prices proxied by NSE 20 share index, for the period covering 1987 to 2008. The hypothesis tested aimed at showing the relationship that exist between NSE 20 share index and exchange rates, inflation, interest rates, money supply and gross domestic product.

Secondary data were used in the study obtained from different sources including publications from the World Bank such as International Financial Statistics (IFS)S, Central Bureau of Statistics, Central Bank, African Economic Consortium and various publications of the University of Nairobi.

The data were regressed using the Error Correction Mechanism, due to non-stationarity. Results obtained showed that there is indeed significant relationship between NSE 20 share index and exchange rate, NSE 20 share index and inflation. Other variables used also indicated the existence of a relationship but the relationship was insignificant such as NSE 20 share index and interest rates, money supply and gross domestic product.

Based on these results, the study recommends investor education, as they need to understand the relationship between the stock market and the entire economy. The government needs to ensure interest rates are stable and be careful in the application of monetary and fiscal policies. The NSE should also introduce options and futures so that it can be able to compete with the global financial market.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The principle behind capital markets entails the creation of an enabling forum where users of capital can obtain the required capital financing from owners of such capital for an agreeable return while considering risk of their investment. Sharpe *et al* (2006) define a security market or financial market as a mechanism designed to facilitate the exchange for financial assets by bringing orders from buyers and sellers of securities together. In addition, they asserted that one of its main functions is "price discovery" – that is, to cause security prices reflect currently available information. The more quickly and accurately price discovery is achieved, the more efficiently financial markets will direct capital to its most productive opportunities, thereby leading to greater improvement in public welfare.

Iminza (1997) as cited in Nyamute (1998) noted that the state of the economy influences the way stock prices move. During periods of depression or recession, investments (including investment in shares) are depressed and therefore the demand for stocks will fall leading to the downward change in their prices. The opposite is also true, whereby during an economic boom, investments will rise leading to a rise in demand for shares, and hence an upward movement in the share prices.

Interest in the way stock markets move has grown during the past two decades or so as more and more individuals own stocks (shares) than ever before. Research findings from the developed markets show that stock markets are closely interrelated to influence and are also influenced by the other sectors of the economy. This relationship between equity markets and the general economy of a country is of interest to many more people in the community than just investors (Pattison, 1971). This is because equity markets play an important role in the economy in terms of allocation of resources, financial intermediation and the supply of capital (Feldman and Kumar, 1994).

There are competing views on the interplay between stock market and the macro economy. One view begins with the idea that some real factors (typically unobservable to researchers) lead to variations in prospective real rate of return on capital. Given the discount rates for owners of capital, an increase in prospective returns raises stock prices and vice versa. Researchers have attempted to use surrogate measures for these real factors (or economic fundamentals) that determine stock prices. The commonly used surrogates include overall economic activity (as captured by GDP), business investment, consumption, national income, household wealth, household investment, inflation, interest rates, money supply and so on. The second approach considers stock prices to behave in a random manner and as such they are unrelated to economic fundamentals. This appears to be the view that Keynes held when he termed stock markets as gambling casinos. Economists who view the stock market as gambling casinos would not carry out regressions between stock prices and economic variables (Munene, 2007).

It is well documented from economic theory that there is a close relationship between stock prices and economic factors (Reilly and Brown, 2006). Therefore, this study is clearly based on the first view of stock market dynamics, as the dynamic interactions among macro economic variables and stock prices are important in the formulation of the nation's macroeconomic policies.

Overview of the Nairobi Stock Exchange

The NSE, which was formed in 1954 as a voluntary organization of brokers, is now one of the most active markets in Africa. The NSE has played a role in increasing investor confidence by modernizing its infrastructure. At the dawn of independence, stock market activity slumped due to uncertainty about the future of independence in Kenya. However, after three years of calm and economic growth, confidence in the market was rekindled and the exchange handled a number of highly over-subscribed public issues. (Munga, 1974).

In 1980s the Kenyan government realized the need to design and implement policy reforms to foster sustainable economic development with an efficient and stable financial

system. In particular, it set out to enhance the role of the private sector in the economy, reduce the demands of public enterprise on the exchequer, rationalize the operations of the public enterprise sector to broaden the base of ownership and enhance capital markets in the formation of a regulatory body "the capital markets authority" in 1989, to assist in the creation of an environment conclusive to the growth and development of the country's capital markets (Statistical Abstract, 1990).

The NSE is poised to play an increasing role in the Kenyan economy, especially in the privatization of state owned enterprises. In 2006 the NSE installed the automated trading system (ATS), which has resulted in high trading volumes with the daily market turnovers exceeding Ksh110 million in some days. The implementation of the ATS provided for longer trading hours, increased trading efficiency and price discovery (Economic Survey, 2007)

The boom experienced at the NSE in the recent past has resulted to an increase in the volume traded, with the stock market registering increased activity especially with initial public offers. The rapid growth of the NSE has been subject to debate among scholars, Politicians and the general public. Statements have been reported in the media questioning the phenomenal growth of the NSE in the past three years and more specifically the appreciation of stock prices of quoted companies. The growth has been attributed to the high growth rate registered by the Kenyan economy in the last three years and the changing international perception of Kenya as a secure investment destination (Statistical Abstract, 2008).

In the beginning of the year, the NSE introduced the NSE All-share Index (NASI), which is complementary to NSE 20 share index in an effort to provide investors with a comprehensive measure of the performance of the stock market. The Nairobi Stock Exchange is one of the leading developing markets in the world and investing in stocks has been hyped so much that the mention of the initial public offer (IPO) reflexively elicits a pat on the pocket. Starting with KenGen offer in May 2006, the NSE has seen tremendous growth in the number of retail investors. However, the majority of investing

public is still in the dark on the operations of the stock market. Many still do not bother to follow up on their investments, preferring to once in a while to keep the tab through media reports.

In a surprising turn that has left retail investors drooling, the last two months following the listing of Safaricom were depressing and have nudged more keen interest in shares in that investors are taking more focus in the market and its performance. The need to know how the shares are determined in the market has become a necessity for many. A number confessed that they least understand how the market prices are arrived upon, what takes them up or brings them down. Thus due to the robustness of the market and emerging interests on stock price determination, this study aims to establish the relationship between macroeconomic factors and stock prices.

1.2 Statement of the problem

The causal nexus between stock prices and macro economic variables has received a lot of attention from academicians, where studies have used different macroeconomic variables and data from both developed and developing countries. Many research findings have been done in developed markets such as Humpe and Macmillan(2007), Chen *et al* (1986), Adel (2004) which suggests a relationship between various economic indicators and the stock prices, although only a few of such studies have been done in developing markets.

In Kenya, many studies have been conducted on the stock market focusing on various aspects of share price determination. They include Munga (1974), Munene (2007), Gitobu (2000), Mwangi (1977) among others. The majority, if not all, of such studies have examined the composite stock indices of the Nairobi Stock Exchange. Only a few studies, relate the performance of the stock market as a whole to the general economy which include Nyamute (1998) and Sifunjo (1999). A gap in literature relates examining the cointegration between macro economic variables and stock market prices. This paper aims to test the presence of auto-correlation and multi-collinearity which has been

ignored in the previous studies. This is because predictor factors such as money supply, interest rates and inflation affect each other as well as affecting the response variable.

This study will introduce an additional macroeconomic variable, which has been found to have causal relationships with stock prices. In addition, due to a time lapse from when similar studies have been done in Kenya, there is need to compare results with the previous studies to identify differences in findings. The study will also use a longer period of study as opposed to previous studies. Further, it will examine both the short run and long run causal relationships among stock prices and macro economic variables, by use of the error correction mechanism which takes into account the time series characteristics of variables. Therefore, this study will analyze the movement and or changes of the stock prices (proxied by the NSE 20 share index) in relation to movements or changes in five macro economic variables over a period of thirty years 1978-2008.

1.3 Objective of the study

To determine the relationship between the stock prices (proxied by NSE 20 share index) at the Nairobi Stock Exchange and the movement in inflation rate, exchange rate, money supply, interest rates and gross domestic product.

1.4 Significance of the study

The assumption of this study is that changes in the macro economic variables cause's changes in the stock prices and it will contribute to literature in several ways;

Portfolio managers and economic policy makers

Identification of factors influencing pricing of stocks at emerging markets such as the NSE is essential to the institution of public and private policies geared towards improving the stability and efficiency of the stock market. The study is useful for the capital market authority, the NSE, the CBK and other policy-making bodies, which will create an appropriate environment in order to enhance the operations of the stock market.

Investors

The findings of this study are also important to investors and other market participants at the NSE as it provides information on stock prices, a key consideration in all investment decisions. Investors can follow trends in the economy and determine to what extent these macroeconomic indicators affect their likely returns.

Academicians

The study belongs to an expanding literature in that it will form a basis for future research in the academic world.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section is devoted to reviewing relevant literature. The first part gives the overview of the literature and the second, the empirical studies.

2.2 Overview of the Literature

Security analysts, financial experts, economists and other interested parties all agree that there is a link between the overall economic environment and the performance of the stock market. Chen *et al* (1986) note that asset prices are commonly believed to react to economic news. They further noted that, financial theory suggests that macro economic variables should systematically affect stock market returns which include: the spread between long and short interest rates, expected and unexpected inflation, industrial production and the spread between high and low grade bonds.

Economic theory would argue that the relation between financial markets and the macro economy is not entirely in one direction. However, stock prices are usually considered as responding to external forces (even though they may have a feedback on other variables), (Chen *et al*, 1986). Thus, fluctuations in the stock market are related to fluctuations or changes in the economy as a whole. This is because the determination of the price of a particular firms share price or value of the investment is a function of many interacting forces, mainly the demand for and the supply of the stock.

One area of interest in the relationship between stock market and other sectors of the economy is the competition for funds between stocks and other assets in the economy. Investors, who are assumed to be rational, would want to minimize their risks and maximize their returns by diversifying their portfolios into as many securities as possible. Thus stocks act as a risk hedge for investors who are diversifying their portfolios away from money markets instruments such as T- bills. In addition, given the intended amount of funds that is usually available to investors, one would expect a kind of trade-off

between investment in stocks and investment in other securities, such as interest bearing securities.

Research evidence shows that the relationship between the general economic condition and the way the stock market performs is very strong. Apart from the investor's expectations about firms' profitability, this relationship is also due to the fact that the stock market relates to various economic series and indicators. Research also indicates that stock prices usually lead the changes in the economy, that is, stock prices turn before the economy does.

2.3 Relationship between Stock Prices and Economic Variables

Share Prices and Inflation

Inflation is the persistent rise in aggregate level of prices of goods and services in an economy. Repetitive price increases erode the purchasing power of money and other financial assets with fixed values creating serious economic distortions and uncertainty. Adrangi *et al* (2001) point out that some portion of inflation rate will be anticipated by economic agents and capital markets. However the unanticipated portion of inflation may surprise equity markets and affect returns.

Enduring interest to academics, investment professionals and monetary policy makers has been the empirical relationship between inflation and stock prices. Fisher (1930) hypothesis states that nominal asset returns move one for one with the expected inflation so that real stock returns are determined by real factors independent of the rate of inflation. According to Fisher, assets which represent claims to physical or real assets, such stocks should offer a hedge against inflation, providing a hedge against rising prices. If the implied positive relationship between stock prices and the inflation does not hold, stocks investors will be vulnerable to inflation.

A number of alternative hypothesis have been advanced to explain the negative relation between inflation and stock prices. They 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 expected return and risk aversion and, (iv) the inflation non neutralities tax code which distorts accounting profits.

The "proxy hypothesis" suggested by Fama (1981) claims that the negative stock return inflation relation is spurious. The anomalous stock return inflation relation is in fact induced by a negative relation between inflation and real activity. Fama's hypothesis predicts that rising inflation rates reduce real economic activity and demand for money. A reduction in economic activity negatively affects future corporate profits and stock prices. The resulting negative relationship between the stock returns and inflation is referred to as the "proxy effect" in the sense that it reflects the detrimental consequences of inflation on real economic activity. Fama argues that the proxy effect vanishes when real activity does not fall because of inflation.

The positive correlation between stock prices and inflation has mainly been explained using three hypotheses. The first hypothesis is based on the argument that inflation or the monetary authorities responses to inflation damages the real economy, in particular the profitability of the corporate sector. The second explanation is that inflation makes investors more risk averse, arising up equity premium, and thus the real discount rate. The third explanation is given by Modigliani and Cohn (1979), who assert that the correlation between stock prices and inflation is a result of inflation illusion. They argued that stock market investors fail to understand the effect of inflation in nominal dividend growth rates and extrapolate historical nominal growth rate even in periods of changing inflation. From the rational investors, stock prices are undervalued when inflation is high and overvalued when inflation is low.

Increase in the rate of inflation is likely to lead to economic tightening policies, which in turn increases the nominal risk free rate and hence raises discount rate. The effect of a higher discount rate would not necessarily be neutralized by an increase in cashflows resulting from inflation, primarily because cash flows do generally grow at the same rate

as inflation. Defina (1991) attributes this to nominal contracts that disallow the immediate adjustment of the firms' revenues and costs. Cashflows would probably decrease initially if the cost of inputs adjusts faster to rising inflation than output pries. Therefore, according to Gitman and Joehnk (2002), inflation is detrimental to stock prices. Higher inflation leads to higher interest rates and lower price earnings multipliers, and generally makes equality securities less attractive.

Share Prices and Exchange Rate

There is need to examine the economic relationship between stock prices and foreign currency exchange rates before looking at the causal relationship. Theory demonstrates a direct relationship between the two financial price variables, which is approached from the balance of payment perspective. Government policy, national consumption and savings, and the accumulation and allocation of financial assets (investments) are all variables having a direct impact on the exchange rate (Grabbe, 1986).

The balance of payments is divided into two principal divisions. The current account and the capital account. The current account is the record of all purchases and sales of goods and services with respect to the rest of the world and the capital account represents the flows of financial assets – either bought or sold outright, or in payment of goods and services. A number of these transactions involve the foreign currency market. Import or exported goods will usually be priced in terms of a foreign currency at least on one side of the transaction, and sometimes the currency of denomination of the trade will be foreign on both sides. Similarly, foreign currency transactions are involved when financial assets are bought and sold, or borrowed and lend across national boundaries.

Depreciation of a country's currency will lead to an increase in demand for exports and thereby increasing cashflows to the country, assuming that the demand for exports is sufficiently elastic. Alternatively if the currency is expected to appreciate, the market will attract investors. This rise in demand will push up the stock market level, suggesting that stock markets returns will be positively correlated to the changes in the exchange rates. The impact of exchange rates 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. If a country is export-oriented and its currency appreciates, it reduces the competitiveness of its exports and would therefore, have a negative impact on the domestic market. This is because the listed companies in the stock market which are exporters would be less profitable, and thus less attractive to investors. The opposite would be true if the currency depreciates making exports competitive. This phenomenon was witnessed in the NSE during 1993/94 when the Kenyan shilling depreciated drastically, making the plantation (tea and coffee) companies earn huge profits, and helping the stock exchange as a whole to boom (Economic Survey, 1994).

Share Prices and Interest Rates

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 a 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 it earnings (profit) potential will be severely eroded and hence investors will mark down its value. Reilly and Brown (2006) however, complicated the matter a bit by stating that cash flows from stocks can change along with interest rates and it is not certain whether these changes in cash flows will augment or offset the change in interest rates.

Interest rates influence the level of corporate profits which in turn influence the price that investors are willing to pay for the stock through expectations of higher future dividends payment. Most companies finance their capital requirements and inventories through borrowings. A reduction in interest rates reduces the cost of borrowing and thus serves as an incentive for expansion. This will have a positive effect on future expected returns for the firm. Also, a substantial amount of stocks are purchased with borrowed money, hence an increase in interest rates would make stock transactions more costly. Investors will require a higher rate of return before investing, and this will reduce demand and lead to a price deprecation.

Stock Prices and Money Supply

There is wide agreement among economists that changes in the quantity of money have important influences on the movement in equity prices. Growth rate of money supply would affect the aggregate economy and hence the expected stock returns.

An increase in money supply would indicate excess liquidity available for buying securities, resulting in higher security prices. It would also 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 corporate earnings effect, which may increase future cash flows and stock prices. Moderate growth can have a positive impact on the economy and the market. Rapid growth, however, is inflationary and therefore detrimental to the stock market.

Share Prices and Gross Domestic Product

Economic analysis sets tone for security analysis. If the economic future looks bleak, you can probably expect most stocks returns to be equally dismal. If the economy looks strong, stocks should do well (Gitman and Joehnk, 2002). The behaviour of the economy is captured in the business cycle, which reflects the changes in total economic activity over time. One of the measures of business cycle is gross domestic product (GDP) which is the market value of goods and services produced in an economy during a period of time irrespective of the nationality of the people who produce the goods and services. Normally, GDP moves up and down with the business cycle and thus when an economy is strong leading to a boom in the cycle, investments will rise, demand for shares will rise and hence an upward movement in the share prices. During periods of recession, the economy is weak; investments will be depreciated leading to a fall in demand for stocks and thus a downward change in prices.

2.4 Empirical Studies

Sifunjo (1999) carried out a study on the relationship between exchange rates and stock prices in Kenya for a period of six years from November 1993 to May 1999. The study employed cointegration and error-correction approach using Dickey-Fuller (DF) and

Augmented Dickey – Fuller (ADF) tests. The study provided evidence that, exchange rates "Granger cause" stock prices in Kenya. There exists a unidirectional causality from exchange rates to stock prices. Therefore from the study, the movements in exchange rates exert significant influence on stock price determination in Kenya. However, his study cannot be relied to give conclusive results because he considered only one variable, but offered suggestion that more macroeconomic variables can be tested to determine their relationship on stock prices.

Ibrahim (1999) investigated the lead-lag relationship between stock prices and seven macro economic variables for an emerging market, Malaysia, using cointegration and Granger causality tests. The results of the study strongly suggested information inefficiency in the Malaysian market. Results from the bivariate analysis provided evidence of cointegration between the stock prises and three macro economic variables – consumer prices, credit aggregates and official reserves. Specifically, it indicated that the stock prices respond to deviations from the long run equilibrium path traced between the stock market and the three macroeconomic variables.

In addition, there seemed to be a dynamic causal link from the official reserves to stock price changes. From the analysis the study also found that, stock prices can act as an informational variable for the movement of industrial production, money supply (M_1) and the exchange rate. Findings were further strengthened when the analysis was extended to multivariate settings. where stock prices were found to be significantly Granger-caused by changes in official reserves and exchange rates in the short run.

Nyamute (1998) studied the relationship between share prices and major macro economic variables in Kenya for a period of six years from (January 1992 to December 1997). The study analyzed whether or not five macro economic factors affect the performance of the NSE which included, money supply, interest rates, inflation rates and exchange rates. The study used regression analysis and conducted eight tests, where all the variables were found to have an impact on the performance of the stock exchange (as measured by the stock index). However, the treasury bill rate and exchange rate were found to be positive and more significant than either inflation or money supply.

However, he performed regression analysis on non stationary series, which violates the classical theory of regression analysis with stationary time series and will also lead to spurious relations that induce serial correlation, which violate the basic assumptions for estimating the regression equation. Hence, biased estimates leading to incorrect statistical inferences if such series are not co-integrated. Secondly, since the order of integration of the time series used in the study is not known, the regression coefficient will be meaningless (Granger, 1986). Thirdly, no test of structural break in the model was done, even when it was obvious that the data set selected spread across two economic structures: the fixed exchange regime and the floating exchange rate regime (Chow 1960). Moreover, the assumptions nominal distribution of the residuals, homoscedasticity and no autocorrelation are restrictive.

Mohiuddin, *et al* (2008), carried out an empirical study of the relationship between macro economic variables and stock prices: A study on Dhaka stock Exchange (DSE). The study aimed at investigating the explanatory power of various macro factors such as inflation rate, exchange rate, interest rate, money supply and production index on the variability of the stock price in Bangladesh. Multiple regression analysis was employed in the study and all share price index of the Dhaka stock exchange was used as a proxy for stock price. The results indicated no significant relationship exists between the stock price and any of the macro economic factors. However, after the remedial measures of heteroscedasticity were taken care of, interest rates were found to have a negative and significant relationship with the market returns.

Their study used time series data and yet they failed to use an estimation technique that takes into account time series characteristics of variables. It is necessary to achieve stationarity of such variables so that the mean and variance estimates, would be unbiased estimates of the unknown population mean and variance. Because of performing multiple regression on non-stationary data, spurious regression results would be unavoidable. Also, it is clear from their study that not all the data were available for the period of study and they did not perform any diagnostic checks which render the findings questionable.

The relationship between inflation and stock prices in Kenya, a study by Munene (2007). The study used monthly data on selected stocks from a sample of six companies listed at the Nairobi stock exchange, for a period of four years (2002-2006). OLS estimation technique was employed to estimate a single equation with the real returns as the dependent variable and explanatory variables as actual inflation, expected inflation and information dummy. Also, the Error Correction Model (ECM) was applied to capture the long run equilibrium after variables were differenced to achieve stationarity. The study found a negative relationship between stock returns and expected inflation contrary to Fisher (1930) hypothesis. But in the short run and long run models, expected inflation and information dummy were found negative with expected inflation not statistically significant. A positive relationship was revealed between actual inflation and stock prices and the dividend information dummy but the actual inflation being significant.

The study by Wickremasinghe (2005) examined the causal relationships between stock prices and six macro economic variables in Sri Lanka, for the period January 1985 to December 2004. The study analyzed both long and short run relationships by employing Johanesen's test, Error-Correction Model, variance decomposition and impulse response. In the Johanesen's test, one cointegration relationship was found among the stock price and macro economic variables, also five long run and two short run relationships were found.

As far as the direction of causal relationships are concerned, a bi-direction causal relationships was found from the All Share price Index (ASPI) to consumer price index, the ASPI to the money supply and the ASPI to the US dollar exchange rate. After the performance of variable decomposition, the study revealed that at shorter horizons most of the forecast variance of the stock prices was explained by the stock prices themselves. However, at longer horizons, gross domestic product and money supply play an important role in explaining the forecast variance in stock prices. As far as macro economic variables are concerned, the stock prices are able to explain the forecast variance of the US dollar exchange rate only. In addition, the study depicted that a shock to equations for macro economic variables generate response from the ASPI at short

horizons. At long horizons, the ASPI does not show any variability for shocks to macro economic variables. Also a shock given to the equation for the money supply generated negative response from the ASPI at all horizons considered. All macro economic variables except for money supply generated an initial negative response and underwent a certain degree of volatility at short horizons as a result of a shock to the equation for the ASPI except gross domestic product.

Adel (2004) studied the dynamic relationship between macro economic factors and the Jordanian stock market. He analyzed long-term equilibrium relationships between real economic activity – represented by industrial production, money supply, inflation and interest rates, and the Amman Stock Exchange Index. The study employed Johansens (1991) vector error correlation model (VECM), and the Augmented Dickey Fuller (1991) test and the Philips and Perron (1988) test to determine unit root. The empirical results showed that the stock prices and macroeconomic variable have a long-term equilibrium relationship. Money supply (M_2) and industrial production were found to have a positive effect in the determination of Jordanian stock prices, while inflation and interest rates (TB) revealed a negative relationship with stock prices.

Humpe and Macmillan (2007), examine whether a number of macroeconomic variables influence stock prices in the US and Japan, within the framework of a standard discounted value model. They applied co integration analysis using Johansen (1991) procedure in order to model the long term relationship between industrial production, the consumer price index, money supply, long term interest rates and stock prices in the US and Japan. Using US data, they found evidence of a single cointegration vector between stock prices, industrial production, inflation and the long-term interest rates. Stock prices were positively related to industrial production and negatively to both the consumer price index and long-term interest rate. However, they found an insignificant (although positive) relationship between US stock prices and the money supply. For the Japanese data, they found two cointegrating vectors. One normalized on the stock price provided evidence that stock prices, are positively related to industrial production but negatively related to the money supply. The study also found that for the second vector normalized

on industrial production, industrial production was negatively related to interest rate and the rate of inflation.

Economic forces and the stock market, a study by Chen *et al* (1986) in the US for a period of 5 years found that asset prices react sensitively to economic news especially to unanticipated news. The study found several economic variables being significant most notably: industrial production, changes in risk premium, twists in the yield curve and somewhat more weekly measures of unanticipated inflation and changes in expected inflation during period when these variables were highly volatile. The study also found inflation to be negatively and industrial production to be positively related to stock prices in the US. The most striking result in the study was that even though a stock market index, such as the value weighted New York Stock Exchange Index, examines a significant portion of the time series variability of the stock returns, it had an insignificant influence on pricing when compared against the economic state variables. They also examined the influence on pricing to innovations in real per capital consumption, where they found that consumption variable was never significant. In addition, they looked at the impact of an index of oil price changes on asset pricing and found no overall effect.

Tabak (2006) studied the dynamic relationship between stock prices and exchange rates in the Brazilian economy. The study used recently developed unit root and cointegration tests, which allows endogenous breaks, to test for a long run relationship between the variables. Linear and non-linear causality tests were performed after considering both volatility and linear dependence. The study found that there is no long run relationship, but there is a linear Granger causality from stock prices to exchange rates in line with the portfolio approach: stock prices lead exchange rates with a negative correlation. Furthermore, evidence of non-linear Granger causality from exchange rates to stock prices was found which is in line with the traditional approach: exchange rates lead stock prices. However, it was obvious that the data set selected spread across two economic structures: the crawling peg exchange regime and the floating exchange rate, and no test of structural break in the model was done.

Adam and Tweneboah (2008) examined the impact of macro economic variables on stock prices in Ghana. They used databank stock index to represent the stock market and inward foreign direct investment (IFDI), treasury bill rate (as measure of interest rates), the consumer price index (measure of inflation), average crude oil price and exchange rates as variables. The study analyzed quarterly data for the above variables from 1991 to 2007 employing cointegration test and Vector Error Correction Models (VECM). The test examined both long run and short run dynamic relationships between the stock market index and the economic variable. The paper established that there is cointegration between macroeconomic variable and stock prices in Ghana indicating long run relationship. The VECM analyzed showed that the lagged values of interest rate and inflation have a significant influence on stock market. The inward foreign direct investments, the oil prices and the exchange rate demonstrated weak influence on price changes. Also the establishment of lead lag relation indicated that the DSI is not informational efficient with respect to interest rate, inflation, IFDI, exchange rate and world oil prices.

Summary

There is no empirical consensus on the relationship between macro economic variables and stock prices. Specifically, the direction of relation between the financial price variables is not resolved. This study has identified various drawbacks in related studies and those without significant drawbacks are also considered relevant literature for this study. It is evident that most studies on stock prices and the macro economy have been done in developed countries which are relatively more efficient. In addition, the economic conditions in these countries are different from ours, for example the interest rates in developed countries are determined by market forces and there is more public awareness of stock trade. Also, developed countries have a greater variety of financial assets and there is need for a model that is suitable to our economy. Therefore this study aims to fill the gaps identified and add to the growing literature on macroeconomic variables and share prices in Kenya.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter will begin by defining the sample population, sample frame and identify the type and sources of data. It will subsequently set out the relevant hypothesis to be tested and then specifying the model to be used in the study. A detailed explanation of the data analysis technique will be given in conclusion.

3.2 Sample Population

The population of this study will consist of 55 listed companies at the Nairobi Stock Exchange.

3.3 Sample Frame

The sample selected will be the NSE 20 share index, as a representative of all listed companies. Yearly data for the period 1978 to 2008 will be used for the NSE 20 share index (s), inflation rate (INF), money supply (MS), interest rate (INTR), exchange rate (EXR) and Gross domestic product (GDP).

3.4 Type and Sources of data

The study will use published data for the period 1978 to 2008. The data will be obtained from the central bureau of statistics and government of Kenya publications. Other sources will include International Financial Statistics (IFS) published by the International Monetary Fund (IMF) and the World Bank publications. The African economic consortium, the central Bank of Kenya and the University of Nairobi through their various publications will also provide vital information to the study.

Interest rates will be measured using Treasury bill rate, exchange rate will be measured in Kenya shillings against the US dollar, money supply using M3 i.e. total money supply in Kenyan products, annual inflation rate and real Gross Domestic Product will be used.

3.5 Research Hypotheses

1. H_0: There is no relationship between share prices and interest rates.
   H_1: There is a negative relationship between share prices and interest rates.

2. H_0: There is no relationship between share prices and exchange rates.
   H_1: There exists a positive relation between share prices and exchange rates.

3. H_0: There exists no relationship between share prices and inflation.
   H_1: There is an inverse relationship between share prices and inflation.

4. H_0: There is no relationship between share prices and money supply.
   H_1: There exists a positive relationship between share prices and money supply.

5. H_0: There exists no relation between share prices and Gross Domestic Product.
   H_1: There is a positive relationship between share prices and Gross Domestic product.

The level of significance selected is $\alpha = 0.05$,

3.6 Research Model

Several studies agree that fluctuations in share prices are caused by macro economic variables. However, these studies do not concur on the relative importance of each of the factors as determinants of share prices. The model to be used in this study will be adopted form the work of Mohiuddin *et al* (2008) in their study of Dhaka Stock Exchange (DSE). However, in this study the equation will be refined where Gross domestic product is introduced instead of index of production as a variable. Also this study will use yearly data as opposed to quarterly data used by Mohiuddin *et al*. The implicit form of the model is;

$$S(t) = F(EXR, INTR, INF, MS, GDP)$$
$$\quad\quad + \quad - \quad - \quad + \quad +$$

The sign below each explanatory variable, tells us the relationships that exist between the dependent and the respective explanatory variable.

Where

S (t) – is the NSE – 20 share index at year t

INTR – The interest rate

EXT – The exchange rate

INF – The rate of inflation

GDP – The gross domestic product

MS – Money supply

This model can therefore be represented mathematically and explicitly to include the error term ε_t as follows;

$$s(t) = \beta_0 + \beta_1 EXR + \beta_2 INTR + \beta_3 INF + \beta_4 MS + \beta_5 GDP + \varepsilon_t$$

Where

β_0 - is the constant term

β_1 – Coefficient of exchange rate

β_2 – Coefficient of interest rate

β_3 – Coefficient of rate of inflation

β_4 – Coefficient of money supply

β_5 – Coefficient of gross domestic product

ε_t – The error term

3.7 Data Analysis

The estimation technique to be used is the Error Correction Mechanism, which takes into account the time series characteristics of variables. The procedure aims at finding the order of integration, that is, the number of times that a variable has to be differenced to achieve stationary. It is necessary to achieve stationarity of the variables so that the mean and variance estimated from such variables would be unbiased estimates of the unknown population mean and variance. Therefore, if the study is to use non-stationarity series, it

would produce biased estimates leading to incorrect statistical inferences if such series are not cointegrated. The Augmented Dickey-Fuller test will be used to test for integration, where as the Engle-Granger Two Step procedure will be used to measure cointegration. The study will also perform diagnostic checks on the data which will include; multicollinearity, residual tests and stability tests.

CHAPTER FOUR
DATA ANALYSIS

4.1 Introduction

In this chapter, results of empirical analysis are presented. First are the unit root tests, second are the diagnostic tests and finally is a report on the regression results.

4.2 Unit Root Tests

Time series data are always associated with stationary problems. A stochastic process is said to be stationary if its mean and variance are constant over time and the value of the variance between the two time periods, is not independent on actual time at which the covariance is computed i.e. weak stationarity (Gujarati, 2003). Hence unit root test provides a basis for assessing whether a time series is non-stationary and integrated of a particular order for elimination of spurious results.

There are other tests for testing stationarity such as Phillips Pernon test, but this study is going to use the Augumented Dickey-Fuller test. In testing the existence of a unit root, we test the hypothesis that $\rho=0$ where ρ is α-1 and $\alpha=1$, in the equation ($\Delta yt= \rho yt-1+ vt$). Where vt is the error term. If $\rho=0$ we conclude that there is unit root meaning that the variables are non-stationary or integrated.

A) Unit Root Test on NSE 20 Share Index

i) In Levels

ADF Test Statistic	-1.123092	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

The ADF value does not exhibit excess negativity and therefore it is insignificant. We fail to reject the null hypothesis and conclude that the variable is no-stationary. Therefore a first difference unit root test is conducted to find out the level of integration, and the results are presented below:

ii) First Difference

ADF Test Statistic	-3.227750	1% Critical Value*	-3.6852
		5% Critical Value	-2.9705
		10% Critical Value	-2.6242

Following the results of the test, the ADF of NSE 20 share index is excessively negative at 5% after the first difference and thus we reject the null hypothesis and conclude that the variable is integrated of order one [Ex~I(1)].

B) Unit Root Test on Foreign Exchange Rate

i) In Levels

ADF Test Statistic	-0.825908	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

The ADF is insignificant because it does not exhibit excess negativity. Consequently we fail to reject the null hypothesis and conclude that the exchange rate variable is no-stationary. The test for first difference yields the following results;

ii) First Difference

ADF Test Statistic	-4.099382	1% Critical Value*	-3.6852
		5% Critical Value	-2.9705
		10% Critical Value	-2.6242

The ADF value for foreign exchange rate shows excess negativity 1% after the first difference. This means that it is significant and thus we reject the null hypothesis and conclude that the variable stationary after the first difference. This means that exchange rate is I (1).

C) Unit Root Test on Interest Rates

i) In Levels

ADF Test Statistic	-2.170691	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

The ADF value is insignificant and therefore we reject the null hypotheses and conclude that the value is non-stationary. A first difference unit root test is conducted and the results are shown below:

ii) First Difference

ADF Test Statistic	-5.425579	1% Critical Value*	-3.6852
		5% Critical Value	-2.9705
		10% Critical Value	-2.6242

The ADF value is excessively negative at 1% after first difference. We reject the null hypotheses and conclude that interest is I(1) variable.

D) Unit Root Test on Inflation

i) In Levels

ADF Test Statistic	-3.072128	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

Based on the results, the ADF value exhibits excess negativity and therefore we reject the null hypotheses. It is significant at 5%, thus we conclude that inflation is stationary in levels.

E) Unit Root Test on Money Supply

i) In Levels

ADF Test Statistic	-1.409370	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

The ADF value is insignificant and the thus we reject the null hypotheses. A first difference unit root test is conducted as below:

ii) First Difference

ADF Test Statistic	-4.141008	1% Critical Value*	-3.6852
		5% Critical Value	-2.9705
		10% Critical Value	-2.6242

We reject the null hypotheses because the ADF value exhibits excess negativity at 1% and thus money supply is I (1).

F) Unit Root Test on Gross Domestic Product

i) In levels

ADF Test Statistic	-1.048463	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

The ADF value is insignificant and therefore we fail to reject the null hypotheses and conclude that the variable is non-stationary. The tests for first difference are as follows:

ii) First Difference

ADF Test Statistic	-4.590539	1% Critical Value*	-3.6852
		5% Critical Value	-2.9705
		10% Critical Value	-2.6242

We reject the null hypotheses as the ADF value exhibits excess negativity at 1% and therefore after the first difference, GDP is I (1).

In conclusion, the unit root results indicate that all the variables are I(1) except for inflation which is an I(0). This means that all the variables are integrated of order one except inflation which is integrated of order zero. To confirm co integration, the Engle-Granger Two Stage Procedure is employed. The following long run equation is thus estimated. Inflation is not included as it is stationary in levels.

$$s(t) = \beta_0 + \beta_1 EXR + \beta_2 INTR + \beta_3 MS + \beta_4 GDP + \varepsilon_t$$

Where β's – are coefficients of explanatory variables

□*i* – is the error term

EXR – Foreign exchange Rate

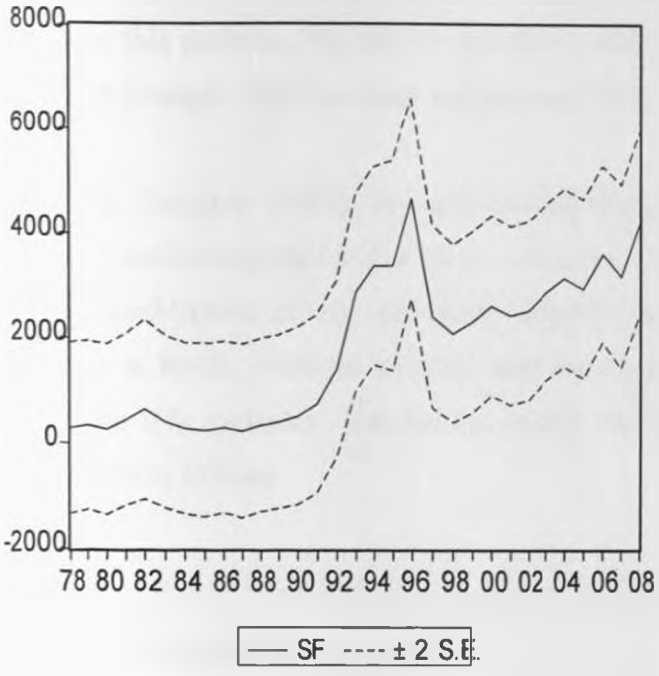
INTR- Interest rates

Ms -Money Supply

GDP - Gross Domestic product

The forecast value of NSE 20 share index is shown below;

Fig 1: Forecast Value of NSE 20 Share Index



Forecast: SF
Actual: S
Forecast sample: 1978 2008
Included observations: 31

Root Mean Squared Error 727.9258
Mean Absolute Error 524.4545
Mean Abs. Percent Error 38.27956
Theil Inequality Coefficient 0.156436
Bias Proportion 0.004835
Variance Proportion 0.026716
Covariance Proportion 0.968449

Using the forecast inputs, the residuals are obtained as follows;

ECM = S – SF

We apply the unit root on the residual (ECM) and the results are as follows;

Unit Root on ECM

ADF Test Statistic	-3.249138	1% Critical Value*	-3.6752
		5% Critical Value	-2.9665
		10% Critical Value	-2.6220

As from the results above, the residuals exhibit excess negativity in levels and thus they are stationary.

A drawback of differencing a non-stationary time series in an attempt to achieve stationarity is that the exercise results in a loss of valuable long term relationship between variables. In the circumstance, in order to carry out a meaningful study, we must find out an approach which will allow the definition of the relationship in terms of variable levels and avoid the problem of spurious regressions. Co integration has been suggested as a remedy to this problem. The theory was developed by Granger (1981) and elaborated by Engle and Granger (1987) as cited in Gujarati(2003).

Engle and Granger (1987), defined cointegration as a situation whereby two non-stationary series integrated of the same order have a long-run relationship. In other words a linear combination of non-stationary variables may exist overtime. The ECM being stationary in levels, confirms cointegration showing that there is a long run equilibrium among the I(1) variables. The results justify the use of a short run Error Correction relationship as follows:

$$\Delta s(t) = \beta_0 + \beta_1 \Delta EXR + \beta_2 \Delta INTR + \beta_3 \Delta MS + \beta_4 \Delta GDP + \beta_5 INF + \beta_6 ECM(-1) + \varepsilon_i$$

Where, Δ is the difference operator.

ECM (-1) is the Error Correction Mechanism

4.3 Diagnostic Checks

A) Multicollinearity

Mukras (1993), asserts that multicollinearity arises from the presence of independence or the lack of independence among the explanatory variables in a multivariate regression model. The test for multicollinearity used in this study is the correlation matrix which is shown below;

Table 1: Correlation matrix

	D(EXR)	D(INTR)	INF	D(MS)	D(GDP)
D(EXR)	1.000000				
D(INTR)	0.174228	1.000000			
INF	0.365590	-0.043562	1.000000		
D(MS)	0.123721	0.269290	0.193168	1.000000	
D(GDP)	0.300496	0.249271	0.179739	0.969321	1.000000

The correlation matrix tests whether there is a linear relationship between explanatory variables. Correlation below 0.5 indicates no muticollinearity and those greater than 0.5 show degree of multicollinearity. However, if the result is in excess of 0.8 then it's concluded that there is serious multicollinearity. According to the above data, there is no multicollinearity between the explanatory variables.

B) Residuals Tests

Examination of the residuals is a good visual diagnostic to detect autocorrelation or heteroscedasticity. Residual tests, test the behaviour of the error term. In this study the tests include Histogram- Nornality test, Serial Correlation test and the white Heteroscedasticity test.

i) Serial Correlation LM Test

The test finds out whether the residuals are serially correlated, that is whether there is presence of autocorrelation. The null hypotheses are that the residuals are not correlated. The Breusch-Godfrey Serial Correlation test shows a probability of 0.293483 at the second lag structure. The value is insignificant thus we except the null hypothesis and conclude that there is no autocorrelation.

Table 2: Breusch-Godfrey Serial Correlation

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	1.300373	Probability	0.293483
Obs*R-squared	3.305930	Probability	0.191481

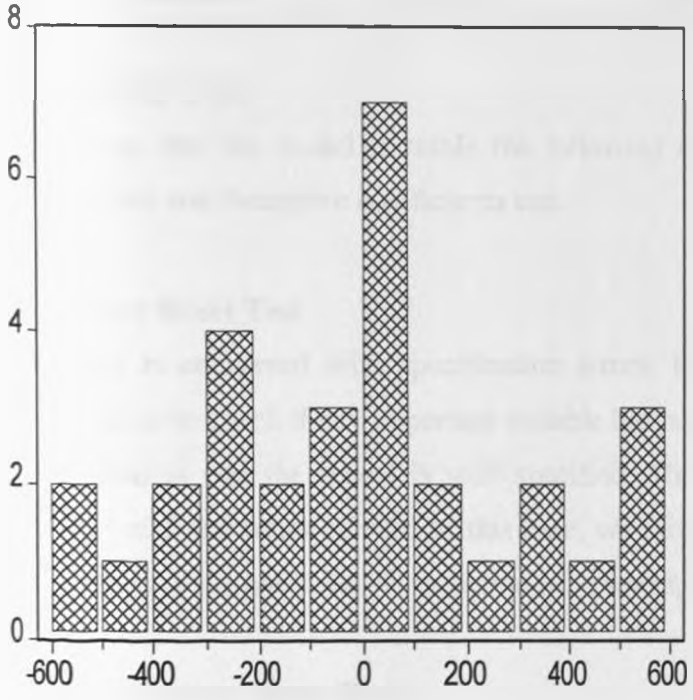
ii) Histogram- Normality Test

OLS assumes that the random variable or error term is normally distributed around a zero mean and a constant variance. Absence of this implies that OLS estimates are still BLUE but we cannot assess their statistical reliability by classical tests of significance. The test finds out whether the variables are normally distributed or not. The null hypothesis for the test is that the model is normally distributed. The test uses the Jacque-

Bera statistics under null hypothesis of normality.

The Jacque-Bera probability is 0.788972, which is insignificant and thus we fail to reject the null hypothesis and conclude that the residuals are normally distributed.

Fig 2: Histogram-Normality Graph



Series: Residuals	
Sample 1979 2008	
Observations 30	
Mean	1.32E-13
Median	27.65592
Maximum	591.5707
Minimum	-597.8222
Std. Dev.	315.4865
Skewness	0.079816
Kurtosis	2.405226
Jarque-Bera	0.474048
Probability	0.788972

iii) White Heteroscedasticity Test (no cross terms)

The assumption of homoscedasticity may imply that the residuals have a common variance. The violation of this assumption is known as heteroscedasticity. The consequences of heteroscedasticity are two fold. The estimates of the regression parameters are still unbiased but inefficient, and the estimates of the variance are biased.

This test is for non-homoscedasticity of the error term. The null hypothesis for the test is homoscedasticity or the variance of the error term is zero. According to the test, the probability of the F-statistics is 0.186742 and it's insignificant. This means that we fail to reject the null hypothesis and say that there is homoscedasticity or the variance of the

error term is constant.

Table 3: White Heteroscedasticity Test

White Heteroscedasticity Test			
F-statistic	1.587205	Probability	0.186742
Obs*R-squared	15.85159	Probability	0.198128

C) Stability Tests

To ensure that the model is stable the following tests are applied: Ramsey Rest test, Cusum test and Recursive coefficients test.

i) Ramsey Reset Test

The test is concerned with specification errors. Its tests whether the model is well specified or to check if any important variable has been omitted from the model. The hull hypothesis is that the model is well specified. The probability is 0.286676 when the number of fitted terms is two. In this case, we fail to reject the null hypothesis as the probability is insignificant. Thus the model is well specified.

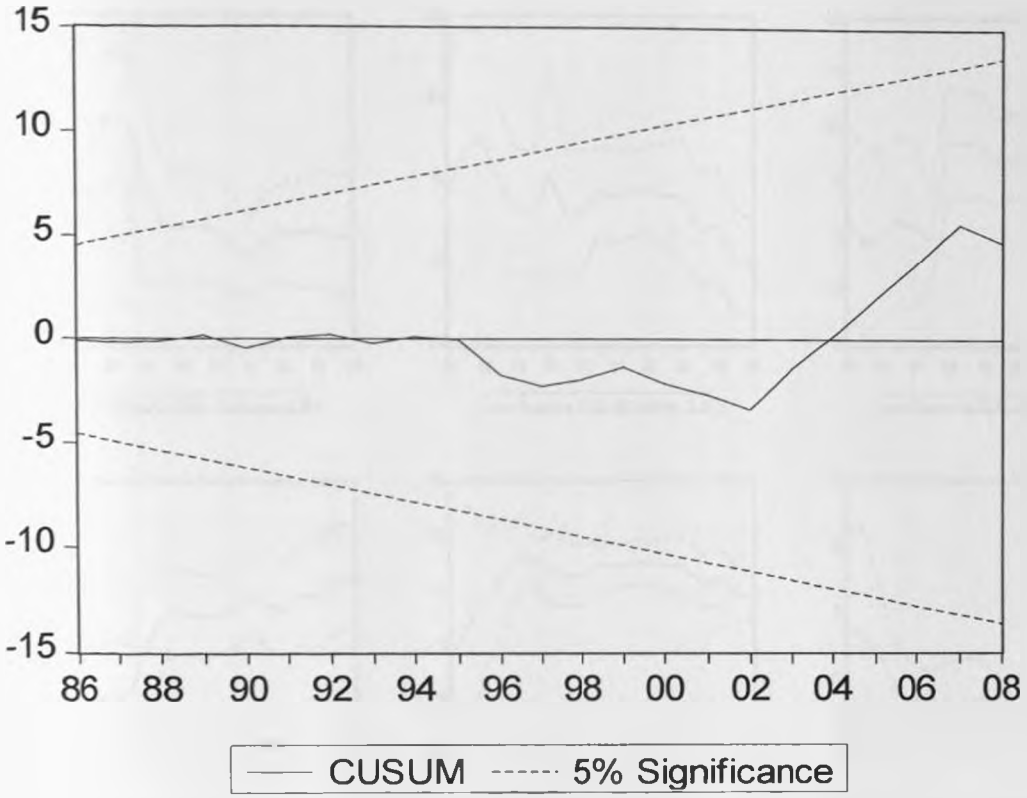
Table 4: Ramsey Reset Test

Ramsey Reset Test			
F-statistic	1.326774	Probability	0.286676
Log likelihood ratio	3.569722	Probability	0.167820

ii) Cusum Test

This tests the stability of the model at 5% level of significance. Our model according to the below figure is seen to be stable. This means that the model is not sensitive to changes in the size of the sample.

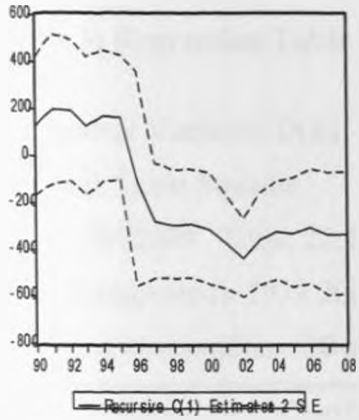
Fig 3: Cusum Test Graph

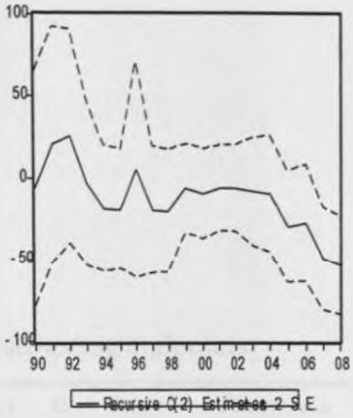


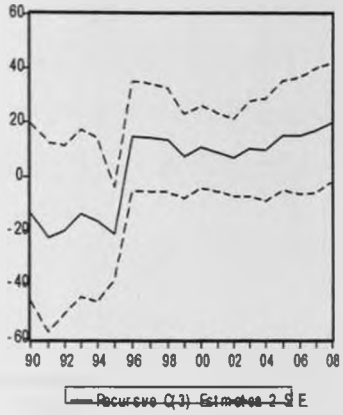
iii) Recursive Coefficients

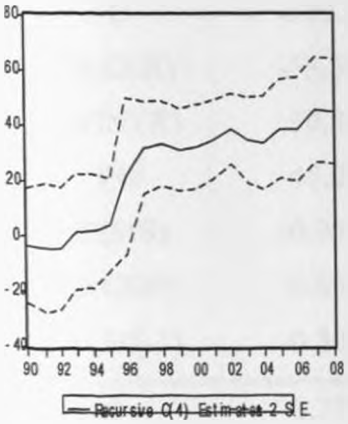
This is concerned with whether the coefficients of the model are stable at 5% level of significance. C (1) shows the stability of the constant coefficient while C (2) to C (6) shows the stability of the explanatory variables and C (7) is the stability of ECM. All the coefficients are within the boundaries thus the variables are stable.

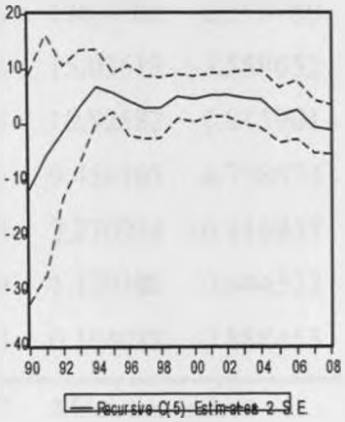
Fig 4: Recursive Coefficient Graph

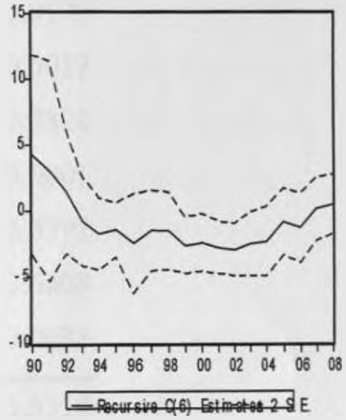


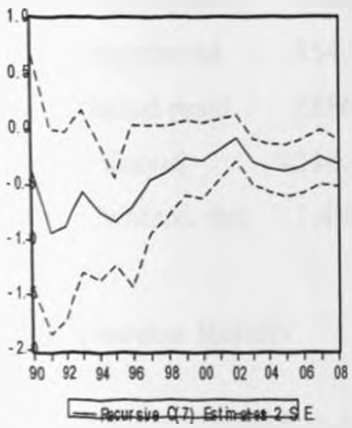












We finally present the regression results in the table below;

Table 5: Regression Table

Dependent Variable: D(S)

Method: Least Squares

Date: 10/22/09 Time: 22:13

Sample(adjusted): 1979 2008

Included observations: 30 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-332.8008	130.4702	-2.550780	0.0179
D(EXR)	-53.50858	15.03619	-3.558652	0.0017
D(INTR)	19.81835	10.92582	1.813901	0.0828
INF	45.00355	9.456765	4.758874	0.0001
D(MS)	-0.951174	2.270934	-0.418847	0.6792
D(GDP)	0.502049	1.129388	0.444532	0.6608
ECM(-1)	-0.300653	0.104088	-2.888453	0.0083

R-squared	0.737177	Mean dependent var	136.5310
Adjusted R-squared	0.668615	S.D. dependent var	615.3885
S.E. of regression	354.2549	Akaike info criterion	14.77887
Sum squared resid	2886421.	Schwarz criterion	15.10582
Log likelihood	-214.6831	F-statistic	10.75191
Durbin-Watson stat	1.465608	Prob(F-statistic)	0.000010

4.4 Regression Results

The R-Squared is used to measure the fraction of the variation of dependent variable that is explained by the regression equation. Thus it is used to compare the validity of regression results under alternative specification of the independent variables in the model (Mukras, 1993). In the model the coefficient of determination (R^2) equals 0.737.

This means that 73.7% of the changes in the explanatory variable can be explained by the changes in the predictor variables, leaving only 26.3% unexplained.

The adjusted R-squared is the unbiased measure. It is adjusted so that the R-squared does not increase with increasing sample. The adjusted R-Squared is 0.6686. The p-value (F-statistic) of 0.000010 shows that the model is significant at 5%, implying that the explanatory variables in the model are jointly significant.

The trend line multiple regression model using the regression coefficient gives:
NSE 20 SHARE INDEX = -332.8008 -53.50858EXR + 19.81835INTR + 45.00355INF - 0.951174MS + 0.502049GDP - 0.300653 ECM(-1)

There is direct relationship between INTR, INF, GDP and NSE 20 SHARE INDEX. On the other hand there exist inverse relationship between EXR, MS and NSE 20 SHARE INDEX. The individual significant test using P-value of the t-statistics shows that; EXR and INF are linearly related to NSE 20 SHARE INDEX, other predictor variables are not related hence should be dropped from the model.

The modified model becomes:
NSE 20 SHARE INDEX = -332.8008 -53.50858EXR + 45.00355INF - 0.300653 ECM(-1)

The coefficient of exchange rate bears a negative sign which is unexpected. This means that a higher exchange rate leads to a fall in share prices. However, exchange rate is statistically significant at 5%, and this shows that in Kenya foreign exchange have played a role in determining share prices. In similar studies conducted, others have conflicting results while others found the same. The study by Wickremasinghe (2005), found that all macroeconomic variables except money supply and GDP generated negative response and underwent a certain degree of volatility at short horizons as a result of a shock to the ASPI equation. While Sifunjo(1999) in Kenya, Ibrahim(1999) in Malaysia, Nyamute(1998) in Kenya,Tabak(2006) in Brazil, found exchange rates being

positive and significant. Adam and Tweneboah (2008) in Ghana on the other hand found positive and insignificant results.

The sign for interest rate is positive and unexpected. This means that in Kenya change in interest rate as measured by treasury bill rate do affect the behaviour of share prices (proxied by NSE 20 share index) positively, though insignificant. Similar results were found by Nyamute (1998) in Kenya and Adam and Tweneboah (2008) although significant. Others such as Mohiuddin *et al* (2008), Adel (2004), Humpe and Macmillan (2007) found interest rates negative and significant. However as expected, interest rates negatively relate to share prices because they affect the purchasing power of investors. Higher interest rate makes investors expect higher rate of return before investing, and this will reduce demand and lead to a price depreciation. Thus inflation is still important in determining share prices at the NSE.

Inflation has a positive sign which is unexpected and it's significant. However as expected, inflation in Kenya plays a negative role in price determination as it is evident with the findings of Nyamute (1998) and Munene (2007) in Kenya. Other similar results include Adel (2004) in Jordan, Humpe and macmillan (2007) in US and Japan, Chen *et al* (1986) in the US who found inflation being negative and significant.

The coefficient of money supply is negative and unexpected, also insignificant. This finding is in line with the study of Nyamute (1998) in Kenya, Humpe and macmillan (2007) in their Japan study though Ms was significant. Wickremasinghe (2005) in Sri Lanka, Adel (2004) in Jordan found Ms positive and significant. However Humpe and Macmillan (2007) in their US data ,Ms were found positive and insignificant. Since liquidity in an economy would determine purchasing power of investors, an increase in money supply would indicate excess liquidity available for buying securities, resulting in higher security prices. Hence money supply is important in stock market pricing.

Gross domestic product has a positive sign as expected but insignificant. Wickremasinghe (2005) in Sri Lanka found similar results although GDP was significant. GDP is the measure of business cycle which reflects the changes in total economic activity over time. Therefore it plays a major role in price determination at the NSE.

The one period error term is negative and statistically significant at 5%. Its coefficient which is -0.300653 implies that there are economic forces in the economy which operate to restore the long-run equilibrium path of the demand following short-run disturbances.

CHAPTER FIVE

SUMMARY AND CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

5.1 Summary and Conclusion

The objective of this study was to determine main determinants of share prices at the NSE using time series data covering the period 1978 to 2008. It aimed at finding the relationship between share prices as proxied by NSE 20 share index and selected macroeconomic variables which include foreign exchange rate, inflation, interest rates, money supply and gross domestic product. The estimation procedure takes into account the recent developments in time series modeling.

The results of the analysis revealed that all the variables are integrated of order one I (1), except inflation which is integrated of order zero. The ECM is found stationary in levels confirming cointegration , by Engle and Granger formulation. Therefore it was possible to estimate a dynamic NSE 20 share index using an error correction model (ECM), because it is the most efficient model for dynamic estimation or equation. The diagnostic tests revealed that there residuals are normally distributed, there is no autocorrelation, there is homoscedasticity and the model is well specified supported by the Cusum test. It is also validated by a negative and significant error correction term coefficient.

The study revealed that of all the variables studied only gross domestic product had the expected sign. In addition exchange rate and inflation were found to have significant impact on stock price determination at the NSE. On the other hand, interest rates, money supply and gross domestic product were insignificant.

5.2 Recommendations

The foregoing research findings demonstrate that various sectors of a county's economy are interrelated and interdependent. What happens in one section of the economy has an impact on the other sectors. The magnitude of the impact will depend on the strategic importance of a particular sector.

Fluctuations in the stock prices arising from fluctuations in foreign exchange rates can cause panic among portfolio managers. This will induce them to liquidate portions of their equity portfolio to hedge against currency losses. The net impact would be a slump in the NSE index an indicator of poor trading conditions on the stock market.

Listed companies on the NSE especially those with higher exposure to foreign exchange risk, may face higher operating and financing costs as well as bad debts. Publicly owned companies which rely on imports and exports will suffer from either appreciation or depreciation in the Kenyan currency, which ultimately affects their earnings, that is corporate profitability.

The effectiveness of exchange rates on NSE can be enhanced by adopting supportive policies. Even though Kenya has adopted a flexible exchange rate system which is the appropriate policy, devaluation and revaluation of domestic currency should be looked at. Because, high volatility in the foreign exchange market and hence in the stock market will have a greater impact on the development of NSE. The government through the central bank of Kenya need to intervene in the foreign exchange market, there is also need to introduce derivatives to help investors manage risk costs effectively. Futures and options should be introduced and investor education enhanced.

Interest rates have an impact on share prices and the government should look at policies to stabilize them. When financing deficits the government is forced to borrow from the public through treasury bills and bonds, by offering attractive returns (higher interest rates) which may led to " crowing-out effect". This means that other borrowers in the economy cannot match the government interest rates and are therefore unable to raise funds for investments, resulting in cut backs in investments. In addition financial institutions usually peg their interest rates on the government and thus if the government rates are high, general interest rates in the economy will be high further curtailing borrowing for investments.

Higher returns also on treasury bills would lead to a shift from other investments and the stock market would be the first to suffer from the shift. Because returns from shares cannot match the returns from treasury bills, as shares are usually long term in nature as opposed to treasury bills.

Thus policy makers, investors and other players in the economy need to understand the relationship between the stock market and the economy as a whole. On the other hand, the government should be careful in applying monetary and fiscal policies to avoid hurting other sectors of the economy especially the stock market. Investors should also be well educated about the stock market to be able to understand how stock prices relate to the economy. So that they do not blame the company management as being solely responsible for the performance of share prices. They should understand that share prices are a function of many factors.

5.3 Limitations of the study

In a typical research, the study will always face some limitations. Data used in the study was secondary which were collected from different sources that give different data depending on the base years. This is a problem in that there is need to standardize the data into one base year to avoid overestimation or underestimation of data.

The problem of no standardization measure of the variables was also experienced. For example the study used Treasury bill rate while there are other rates like deposit rate and leading rates which could have been used instead. Analysis of these interest rates on share prices would yield different results. Foreign exchange rates used were US dollars, while others such as Sterling Pounds, the Euro and many more could have been used. This could have led to different results.

The research investigated the relationship of only five macroeconomic factors with stock market index. However, many other factors could be included in the model for the study such as non-economic variables. These variables may be important in determining share prices at the NSE and therefore future studies should assign some of these variables in

their studies. Also the NSE 20 share index used, which makes up 20 listed companies as representative of the entire listed companies at the NSE are too few. The data collected may not capture events taking place in the broader economy, nevertheless it was used to represent the market as a whole. Therefore the weaknesses of this study should form a basis for future research in the area for the author and other researchers.

APPENDICES

APPENDIX 1: DATA USED IN THE STUDY

YEAR	S	EXR	INTR	INF	MS	GDP
1978	426.7800	7.400000	6.230000	12.60000	10.63000	34.33000
1979	366.0300	7.330000	1.410000	8.400000	13.41000	42.95000
1980	367.7500	7.570000	6.670000	12.80000	14.65000	54.66000
1981	366.5600	10.29000	4.450000	12.60000	18.06000	51.79000
1982	351.2300	12.73000	5.560000	22.30000	21.99000	70.11000
1983	334.9000	13.76000	9.990000	14.60000	22.36000	76.83000
1984	289.1300	15.78000	13.35000	9.100000	23.22000	81.72000
1985	364.1600	16.28000	14.99000	10.80000	31.59000	117.1700
1986	459.5200	16.04000	13.21000	10.50000	42.04000	138.4300
1987	598.7300	16.52000	14.14000	8.700000	60.85000	201.2600
1988	615.9900	19.60000	13.22000	12.30000	71.30000	251.4600
1989	791.9900	21.60000	12.86000	13.50000	83.83000	298.7500
1990	653.5000	24.05000	13.48000	15.80000	142.9000	461.8700
1991	942.4700	28.07000	13.99000	19.60000	194.8200	593.2800
1992	1142.080	36.22000	14.70000	27.30000	271.6100	723.4200
1993	1628.050	68.16000	16.30000	46.00000	629.8200	1683.380
1994	3989.530	44.84000	16.51000	28.80000	668.3900	1301.320
1995	3446.920	55.94000	44.39000	1.600000	1002.530	1972.250
1996	3116.810	55.02000	24.56000	9.000000	1249.100	2456.330
1997	3364.940	62.68000	18.17000	11.20000	292.0500	623.2400
1998	2972.350	61.91000	22.12000	6.600000	303.7500	690.9100
1999	2637.090	72.93000	23.39000	5.800000	312.1100	742.1400
2000	2070.300	78.03000	15.01000	10.00000	314.6900	795.9700
2001	1624.820	78.60000	12.02000	5.800000	322.3300	882.7300
2002	1162.700	77.07000	12.73000	2.000000	404.7500	1038.760
2003	2097.760	76.14000	8.940000	9.800000	453.0200	1131.780
2004	2826.970	77.34000	3.670000	11.60000	511.4300	1273.980
2005	3655.080	72.37000	2.860000	10.30000	557.7700	1418.070
2006	4597.100	69.40000	8.440000	14.50000	722.6200	1620.730
2007	5290.620	62.67000	6.830000	9.800000	777.6000	1825.960
2008	4522.710	78.22000	7.700000	26.20000	901.0600	2099.800

APPENDIX 2: BREUSCH-GODFREY SERIAL CORRELATION TEST

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.300373	Probability	0.29343
Obs*R-squared	3.305930	Probability	0.19141

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 10/22/09 Time: 21:49

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	38.52979	131.0149	0.294087	0.7716
D(EXR)	7.696189	15.60662	0.493136	0.6270
D(INTR)	3.513791	11.01791	0.318916	0.7529
INF	-3.733930	9.638247	-0.387408	0.7024
D(MS)	0.406707	2.258228	0.180100	0.8588
D(GDP)	-0.169293	1.120260	-0.151119	0.8813
ECM(-1)	-0.123480	0.132154	-0.934363	0.3607
RESID(-1)	0.413771	0.266912	1.550215	0.1360
RESID(-2)	0.052786	0.253842	0.207950	0.8373

R-squared	0.110198	Mean dependent var	1.44E-13
Adjusted R-squared	-0.228775	S.D. dependent var	315.485
S.E. of regression	349.7172	Akaike info criterion	14.7955
Sum squared resid	2568344.	Schwarz criterion	15.2151
Log likelihood	-212.9318	F-statistic	0.32503
Durbin-Watson stat	1.980744	Prob(F-statistic)	0.94702

APPENDIX 3: WHITE HETEROSCEDASTICITY TEST (NO CROSS TERMS)

White Heteroskedasticity Test:

F-statistic	1.587205	Probability	0.186742
Obs*R-squared	15.85159	Probability	0.198128

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 10/22/09 Time: 22:00

Sample: 1979 2008

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	203654.5	117660.1	1.730871	0.1016
D(EXR)	-15860.90	7667.212	-2.068666	0.0541
(D(EXR))^2	1984.130	1038.556	1.910471	0.0731
D(INTR)	3713.888	3530.839	1.051843	0.3076
(D(INTR))^2	-282.9719	382.6235	-0.739557	0.4697
INF	-18663.18	16593.30	-1.124742	0.2763
INF^2	576.0165	587.6732	0.980165	0.3407
D(MS)	-3005.947	1940.833	-1.548792	0.1398
(D(MS))^2	22.55232	8.653700	2.606089	0.0184
D(GDP)	1795.208	869.0207	2.065782	0.0544
(D(GDP))^2	-6.045321	2.419640	-2.498439	0.0230
ECM(-1)	-81.48505	47.93300	-1.699978	0.1074
ECM(-1)^2	-0.023807	0.031528	-0.755105	0.4605

R-squared	0.528386	Mean dependent var	96214.03
Adjusted R-squared	0.195483	S.D. dependent var	116004.0
S.E. of regression	104049.7	Akaike info criterion	26.24181
Sum squared resid	1.84E+11	Schwarz criterion	26.84899
Log likelihood	-380.6271	F-statistic	1.587205
Durbin-Watson stat	1.921209	Prob(F-statistic)	0.186742

APPENDIX 4: RAMSEY RESET TEST

Ramsey Reset Test:

F-statistic	1.326774	Probability	0.286676
Log likelihood ratio	3.569722	Probability	0.167820

Test Equation:

Dependent Variable: D(S)

Method: Least Squares

Date: 10/22/09 Time: 22:06

Sample: 1979 2008

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-474.4415	167.6018	-2.830766	0.0100
D(EXR)	-67.51383	18.17778	-3.714086	0.0013
D(INTR)	19.84979	10.91845	1.818005	0.0834
INF	51.68649	13.00932	3.973037	0.0007
D(MS)	-2.824663	3.047198	-0.926971	0.3645
D(GDP)	1.431381	1.524718	0.938784	0.3585
ECM(-1)	-0.332230	0.109465	-3.035039	0.0063
FITTED^2	0.000645	0.000401	1.607513	0.1229
FITTED^3	-2.75E-07	1.97E-07	-1.397002	0.1770

R-squared	0.766662	Mean dependent var	136.5310
Adjusted R-squared	0.677771	S.D. dependent var	615.3885
S.E. of regression	349.3266	Akaike info criterion	14.79322
Sum squared resid	2562611.	Schwarz criterion	15.21358
Log likelihood	-212.8983	F-statistic	8.624764
Durbin-Watson stat	1.500777	Prob(F-statistic)	0.000036

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