

**THE RELATIONSHIP BETWEEN MACRO ECONOMIC VARIABLES
AND STOCK MARKET PERFORMANCE IN KENYA**

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D61/62083/2010**

**RESEARCH PROJECT SUBMITTED IN PARTIAL FULLFILMENT OF
THE REQUIREMENTS FOR THE AWARD OF MASTER OF BUSINESS
ADMINISTRATION DEGREE, SCHOOL OF BUSINESS,
UNIVERSITY OF NAIROBI**

NOVEMBER 2012

DECLARATION

This management research project is my original work and to the best of my knowledge, has not been presented for the award of a degree in any University.

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This research project has been submitted for examination with our approval as the University Supervisors

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DEDICATION

I dedicate this work to my parents William Oriwo and Josephine Oriwo, who ensured that our education was their priority in their entire life and to all family members and friends for their continuous moral and financial support throughout my Masters Degree program.

ACKNOWLEDGEMENT

I would like to first thank the Almighty God for his guidance, providence and protection throughout the period I have been doing the program.

Secondly to my family members and friends for the encouragement especially for the moral support I have always received from them. Special mention of my sister Mary for her constant moral and financial support throughout my education, may God continue blessing you. I also thank my supervisors Mr. Duncan Elly and Mr. Martin Odipo for guiding me through and ensuring that I finished the research work on time.

I am deeply indebted to all those people who, in their own small or big ways, directly or indirectly have contributed to the successful completion of this study. My gratitude goes to fellow MBA colleagues for their valuable suggestions, support and time throughout the period of the study.

Lastly my gratitude goes to the University of Nairobi community for their constant support during the period of my research.

TABLE OF CONTENTS

Declaration.....	i
Dedication.....	ii
Acknowledgement.....	iii
Table of Contents.....	iv
List of Figures.....	vi
List of Tables.....	vii
List of Abbreviations.....	viii
Abstract.....	ix
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background of the Study.....	1
1.1.1 Macroeconomic Variable.....	2
1.1.2 Stock Market Performance.....	2
1.1.3 Macroeconomic Variables and Stock Market Performance.....	3
1.1.4 Nairobi Securities Exchange.....	4
1.2 Research Problem.....	4
1.3 The Research Objective.....	6
1.4 Value of the Study.....	6
CHAPTER TWO: LITERATURE REVIEW.....	7
2.1 Introduction.....	7
2.2 Theoretical Review.....	7
2.2.1 Efficient Market Hypothesis (EMH).....	7
2.2.2 Capital Asset Pricing Model (CAPM).....	7
2.2.3 Arbitrage Pricing Theory.....	8
2.2.4 Behavioural Finance Theory.....	9
2.3 Empirical Review.....	9
2.4 Chapter Summary and Conclusion.....	12
CHAPTER THREE: RESEARCH METHODOLOGY.....	14
3.1 Introduction.....	14
3.2 Research Design.....	14
3.3 Research Population.....	14
3.4 Data Collection.....	14
3.5 Data Analysis.....	15
3.6 Research Model.....	15
3.7 Measures of Key Variables and Justification.....	16
3.7.1 NSE All-Share-Index.....	16
3.7.2 Inflation.....	16
3.7.3 Interest Rates.....	16
CHAPTER FOUR: DATA ANALYSIS AND FINDINGS.....	18
4.1 Introduction.....	18
4.2 Descriptive Statistics.....	18

4.3 Diagnostic Tests.....	21
4.3.1 Heteroskedasticity	21
4.3.2 Autocorrelation	22
4.3.3 Multicollinearity	22
4.4 Regression analysis.....	23
4.4.1 Regression results	24
CHAPTER FIVE: RESEARCH SUMMARY AND CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS	26
5.1 Introduction	26
5.2 Summary and Conclusion	26
5.3 Recommendations.....	27
5.4 Limitations of the Study	27
5.5 Suggestions for Further Research.....	28
References	29
Appendix 1 :List of Companies Listed at NSE.....	34
Appendix 2: Data Entry Form.....	36

LIST OF FIGURES

Figure 1. A Line Graph of Monthly NASI Data from March 2008 to March 2012	19
Figure 2. A Line Graph Representing Various Independent Variables	20

LIST OF TABLES

Table 1: Summery of Various Variables under Study	18
Table 2: A Table of Residual Squared.....	21
Table 3: Breusch-Godfrey Serial Correlation.....	22
Table 4: A Table of Collinearity Statistics	23
Table 5: A Table of Regression Model Summary	24
Table 6: A Table of Regression Coefficient Results	24

LIST OF ABBREVIATIONS

- ARDL- autoregressive distributed lag Model
- APT- Arbitrage Pricing Theory
- CAPM-Capital Asset Pricing Model
- CDSC- Central Depository and Settlement Corporation
- CDS- Central Depository System account
- CMA -Capital Market Authority
- EMH-Efficient Market Hypothesis
- GNP-Gross National Product
- GDP-Gross Domestic Product
- IFC-International Finance Corporation
- NASI- Nairobi Securities Exchange All Share Index
- NSE-Nairobi Securities Exchange
- NZSE40- New Zealand's stock market index
- ROA -Return on Assets
- SPSS- Statistical Package for Social Scientists

ABSTRACT

This study investigates the relationship between macroeconomic variables on NSE All share index and goes further to determine whether changes in macroeconomic variables can be used to predict the future NSE All Share Index. Three key macroeconomic variables have been examined and they include Lending Interest rate, Inflation Rate and 91 day T bill.

Secondary data for the periods March 2008 to March 2012 was collected as follows; data for NASI was collected from NSE, data for Inflation was collected from Kenya National Bureau of Statistics and finally data for Lending Rates and 91-day T Bill was collected from CBK. The data was later analysed using regression method and analysed data presented. Lending rate was dropped from the regression model since it is correlated with the 91-Day T bill.

The findings in the study indicate that 91 –day T bill has a negative relationship with the NSE All share Index while Inflation do have a weak positive relationship with the NASI index. Based on these findings, the study recommends strict monitoring of the macroeconomic environment since the changes in the macroeconomic variables has an effect in the stock market performance, which in return influence the foreign investor’s decisions in the local investments.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The stock market promotes economic growth by providing avenue to pool large and long term capital through issuing of shares and stocks and other equities for industries in dire need of finance to expand their business. Thus, the overall development of the economy is a function of how well the stock market performs and empirical evidences have proved that development of the capital market is essential for economic growth (Asaolu and Ogunmuyiwa, 2010).

No doubt, a relationship exists between stock market development and growth of the economy and stock prices are generally believed to be determined by some fundamental macroeconomic variables such as lending rate, inflation, money supply and exchange rate. Empirical evidences have shown that changes in stock prices are linked with macroeconomic behaviour in advanced countries (Muradoglu *et al.*, 2000).

Ross (1976) employed statistical tools like factor analysis in the Arbitrage Pricing Theory (APT) and therefore initiated the use of variables without the need of pre specification of variables in determination of stock returns. But it did not take too long before the criticisms started to appear. One major criticism was that APT could not specify the factors, but just derive them statistically. This inadequacy of the APT was accepted even in the first empirical APT study done by Roll and Rose in 1980.

Roll and Ross (1980) maintained that the factors derived by factor analysis should be fundamental economic aggregates such as GNP or interest rates. Furthermore, they acknowledged that the APT could not specify these economic factors. Finally they suggested an investigation of economic factors that are proxy by derived factors in the APT (Roll and Ross, 1980).

Chen, Roll and Ross (1986) were the first to employ specific macroeconomic factors as proxies for undefined variables in the APT. The three researchers attempted to express

the equity returns as a function of macroeconomic variables. Since economic forces like interest rates, Treasury bill rates can influence expected dividends and the discount rate, it was concluded that stock prices hence stock returns are systematically affected by economic variables.

1.1.1 Macroeconomic Variable

Maghyereh (2002) argues that Macroeconomic environment is the overall aspects and workings of a national economy, such as income, output, and the interrelationship among diverse economic sector. Conducive macroeconomic environment promotes the profitability of business which propels them to a stage where they can access securities for sustained growth.

Asaolu and Ogunmuyiwa (2010) posit that the barometers for ensuring the performance of the economy include among others real GDP growth rate, rate of inflation, the exchange rate, fiscal position and the debt position. The lending rate, inflation rate as well as the Treasury bill rate can be singled out to affect stock market activity as they impinge directly on the state of corporate activity in the country.

The evidence that key macroeconomic variables help predict the time series of stock returns has been accumulated for nearly 30 years. The assault on the conclusions drawn from the EMH includes early studies by Fama and Schwert (1977) and Nelson (1977) among others all affirming that macroeconomic variables influence stock returns.

1.1.2 Stock Market Performance

Stock market performance is measured by stock market index which is an indicator of the direction of share price movement. It is a quick measure for judging the overall direction of the market and is considered to be an accurate indicator of changes in the stocks market. This means that a stock market index should neither understate nor overstate the market position and should be both precise and exact. The market index comprises of a selection of listed companies which represent a significant portion of

market capitalization and trade actively. The three main indices at the NSE are the Nairobi Stock Exchange (NSE) 20 Index, NSE All Share Index (NASI) and the American International Group (AIG) index (Kibuthu, 2005).

The Nairobi Securities Exchange All Share Index (NASI) was introduced in February 2008 to compliment the NSE 20 share index. This was part of the recommendations by the International Finance Corporation (IFC) and regulators of world stock markets to ensure a comprehensive dissemination of market information to investors. Unlike the NSE 20 Share Index, which measures price movement in selected, relatively stable and best performing 20 listed companies, the NASI incorporates all listed companies irrespective of their performance and their time of listing. It is calculated based on market capitalization, meaning that it reflects the total value of all listed companies at the NSE. It is considered to be most accurate measure of market movement because unlike the NSE 20 share index which is based on sampling, it takes into account shares of all listed companies (NSE, 2011).

1.1.3 Macroeconomic Variables and Stock Market Performance

High-lending rates tend to discourage companies from financing projects through loans from Commercial banks and thus they resort to a rather less expensive but equally efficient equity financing. This promotes stock market activity by way of additional listings. High-treasury bill rates on the other hand tend to encourage investors to purchase more government instruments. Treasury bills thus tend to compete with stocks and bonds for the resources of investors. This tends to reduce the demand for stock market instruments and cause an eventual reduction in stock prices. The expected relationship between stock prices and Treasury bill rates is thus negative but positive with respect to lending rates (Maghyereh, 2002).

Inflation can be defined as the decline in the purchasing power of money. Maghyereh, (2002) explains that Market capital which is defined as the product of the share price and the outstanding shares may therefore fall as the demand for shares falls due to the

substitution process. Inflation therefore is expected to have a negative relationship with stock market performance.

1.1.4 Nairobi Securities Exchange

Nairobi Securities Exchange was constituted in 1954 as a voluntary association of stockbrokers registered under the Societies Act. Dealing in shares and stocks started in Kenya in the 1920s. At that time, Kenya was a British colony. Stock broking was conducted solely by Europeans in areas of specialization such as accountants, auctioneers, estate agents and lawyers who met to exchange prices over a cup of coffee. Trading took place on gentlemen's agreement in which standard commissions were charged and clients were obliged to honour their contractual commitments such as making good delivery and settling relevant cost. There was no formal market, rules or regulations to govern stock broking (Munga, 1974).

By 1966, the NSE had begun measuring daily trading activity by computing the NSE Index. The index measured daily average price changes in 17 companies that were considered the most active stocks in the market. It was computed as a weighted average of price changes in the selected stocks and 1966 was used as the base year and set at 100 points (NSE, 2011).

The two key performance indices are namely the NSE all share index and NSE 20 share index. The study used the NSE All share index to measure NSE performance in the study. The Nairobi Securities Exchange has played an important role in mobilizing resources and providing a means by which companies can raise capital. The NSE promoted the inflow of foreign capital from 1995 when the government permitted foreign investors to invest in the ownership of local quoted companies (Jebet, 2001)

1.2 Research Problem

The Macroeconomic Factor Model (MFM) has been of great interest to various researchers after APT failed to pre specify the factors in its model rather than deriving

them statistically. Another concern about APT was the inability to make economic interpretation of the results derived from the model. These inadequacies led to emergence of a new model based on macroeconomic variables called MFM. Since macroeconomic forces influence expected dividend and discount rate, it can be concluded that stock prices and hence stock returns are systematically affected by macroeconomic variables. After 1986, the relationship between various macroeconomic variables and stock returns has been widely documented for various countries majorly in developed countries and therefore the need to undertake the studies in developing countries as well, Kenya included. There exists no theoretical framework for the selection of macroeconomic variables and hence different studies have yield different results based on the macroeconomic factors included in the model and therefore there is need to harmonize the MFM model.

Towards the end of the year 2011, Kenyan economy experienced very unpredictable movement of macroeconomic variables like very high lending interest rates and high rates of inflation that led to several domestic workers take industrial actions. Foreign currency rates were very volatile and led to importers losing a lot of funds in imports since the foreign currency rates were not favourable while farmers and exporters were beneficiaries of the same. This led to Central Bank of Kenya increase the base lending rates in a bid to stabilize the Kenyan currency that had performed poorly as compared to the major world currencies. All these however did have an effect on the returns of various investments in the country since more funds were being channelled towards consumption rather than investments. The study is therefore designed to establish the resultant relationship between these specified factors in the economy.

Several Kenya studies have been done in regard to the performance of companies listed at NSE. Oyoga (2010) carried out a study to determine the impact of corporate governance on performance of financial institutions listed in the NSE. The study concluded that there exist a relationship between corporate governance and stock market performance. This Kenyan study however assumed that all macroeconomic variables are

held constant hence the conclusions made from the study was incomplete. Masila (2010) carried out a study to establish the determinants of stock market development at NSE. In her study, the researcher considered macroeconomic stability in general without taking an in depth study on various macroeconomic variables. The results of the previous studies have also changed according to the macroeconomic factors used, the research methodology employed and the countries examined. Since the studies done in Kenya have not taken into consideration each macroeconomic variable, this study therefore examines the relationship between macroeconomic variables and stock market performance in Kenya. This study is designed to answer the question: What is the relationship between macroeconomic variables and stock market performance in Kenya?

1.3 The Research Objective

The objective of the study is to investigate whether there exists a relationship between macroeconomic variables and stock market performance in Kenya.

1.4 Value of the Study

The study offers valuable contribution to the theory and practise. First the study adds to the body of knowledge that exist on EMH and therefore forms the basis of further research by identifying the knowledge gap that arises from this study, further, the study creates forum for further discussions and debate on various macroeconomic variables and how they relate to the stock market performance and in general, the economy.

To practice, the study enables the regulators to formulate different policies and decisions for ensuring and creating smooth trading and investment atmosphere in the stock market based on their experience and knowledge on predictable stock market price behavior. Finally, the efficient trading activity in the stock exchange also contributes to the national interest of young Kenyan investors.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter looks at the various theories that inform the study as well as the empirical evidence. The first section highlights the various theories that study looks into and they include; Efficient Market Hypothesis, Capital Asset Pricing Model, Behavioral finance theory as well as the Arbitrage Pricing Theory while the second section examines the previous empirical researches done in this area of study.

2.2 Theoretical Review

2.2.1 Efficient Market Hypothesis (EMH)

Fama (1970) proposed an efficient market hypothesis (EMH) suggesting that earning abnormally high profits would be impossible due to competition among investors who follow a profit-maximizing behaviour. Fama (1970) made a distinction between three forms of EMH: the weak form, the semi-strong form and finally the strong form. However, it is the semi-strong form of EMH that has formed the basis for most empirical research. The EMH assumed that economic actors possess all the relevant information so that all changes in macroeconomic variables are fully reflected in stock prices.

Various macroeconomic variables including inflation, money supply and exchange rate were determined as a source of stock prices changes by various researchers (Fama, 1981; Chen et al., 1986 and Mayasami and Sims, 2002). EMH enables us to make an inference that changes in these macroeconomic factors definitely have an effect on the stock prices. The study is therefore geared towards determining the expected relationship between the various macroeconomic variables and the stock market performance in Kenya.

2.2.2 Capital Asset Pricing Model (CAPM)

Pricing common stocks has been a great concern in the finance literature. Building on Markowitz' (1952) mean variance portfolio model, Sharpe (1964), Lintner (1965) and Mossin (1966) introduced the first and generally accepted asset pricing theory, commonly called Capital Asset Pricing Model (CAPM). CAPM uses just one factor,

namely stock market index, in order to explain a given common stock returns. The basic version of CAPM has some restrictive assumptions that include; Investors are rational and risk averse, the markets are perfect and investors can borrow and lend unlimited amounts at the risk-free rate etc. Each of these assumptions was exposed to intense criticisms, which initiated improvements in the model by introducing new versions of CAPM. An important criticism was about the unique role of the market in the model. As a result of adding extra variables to the model, multifactor models emerged.

King (1966) and Merton (1973) pioneered the studies on multifactor models. Although their studies made contribution to asset pricing theories, market index was again the main pricing variable in their models beside the other variables employed. (Ross, 1976) finally linked the macroeconomic variables to the common stock returns through the APT theory.

2.2.3 Arbitrage Pricing Theory

An asset pricing model is based on the idea that an asset's returns can be predicted using the relationship between that same asset and many common risk factors. The theory predicts a relationship between the returns of a portfolio and the returns of a single asset through a linear combination of many independent macro-economic variables (Ross, 1976).

Several literatures now exists which investigates the relationship between stock market returns and a range of macroeconomic factors. Empirical works based on the APT theory are characterized by modelling a short run relationship between macroeconomic variables and the stock price in terms of first differences assuming trend stationary (Fama, 1981 and Fama and French, 1989) while testing the validity of Arbitrage Pricing Theory affirm that macroeconomic variables are causally related to share returns.

2.2.4 Behavioural Finance Theory

Behavioural finance is the study of the influence of psychology on the behaviour of financial practitioners and the subsequent effect on the overall market's performance. It is an attempt to explain and increase understanding of the reasoning patterns of investors, including the emotional processes involved and the degree to which they influence the decision making process. Behavioural finance attempts to explain the what, why and how of finance and investing, from human perspective. The traditional theories of finance had the central paradigms that portfolio allocation is based on expected return and risk; risk-based asset pricing models such as the CAPM and other similar frameworks (Fama and Fisher, 1996).

Hong and Stein (1997) presents evidence that can be interpreted in terms of an epidemic model in which investors spread information about stocks to one another by word of mouth consequently ignoring the principles of portfolio theory. Daniel, Hirshleifer and Subramanyam (1997) found that the judgment biases of investors can produce overreaction to some events and under reaction to others. The announcement period price response is incomplete because informed investors overweigh their prior beliefs about the stock prices. Eventually the mispricing is fully absorbed as further public information confirms the information implied by the event announcement. The general prediction for selective events is thus momentum; stock returns after an event announcement will tend to have the same sign as the announcement period return

2.3 Empirical Review

Atje and Jovanovic (1993) found strong evidence to support the view that stock market development leads to economic growth. Using data from 1976 to 1993 on 41 countries including both developed and developing, Levine and Zervos (1996a) investigated the relationship between economic growth and stock market development. They all found a strong positive correlation between the stock market development and long-run economic growth after controlling for the initial level of per capita GDP, initial level of investment in human capital, political instability and measures of fiscal and monetary policies as well as exchange rate policy.

Ajayi and Mougoue (1996) examined the relationship between stock prices and exchange rates. They studied both the short-run and long-run relationships between the two variables in eight major industrial markets. Their results showed that an increase in domestic stock prices has a negative short-run effect on the domestic currency value. However, sustained increases in the domestic stock prices in the long run cause an increase in the domestic currency, due to the increased demand for the currency. Maghyereh (2002) investigated the long-run relationship between the Jordanian stock prices and selected macroeconomic variables, again by using Johansen and Juselius (1999) 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.

Gunasekarage, Pisedtasalasai and Power (2004) examined the influence of macroeconomic variables on stock market equity values in Sri Lanka, using the Colombo All Share price index to represent the stock market and the money supply, the treasury bill rate (as a measure of interest rates), the consumer price index (as a measure of inflation) and the exchange rate as macroeconomic variables and with monthly data for the 17-year period from January 1985 to December 2001 and employing the usual battery of tests, which included unit roots, co integration they examined both long-run and short-run relationships between the stock market index and the economic variables. The Vector Error Correction Model analysis provided support for the argument that the lagged values of macroeconomic variables such as the consumer price index, the money supply and the Treasury bill rate have a significant influence on the stock market.

Patra and Poshakwale (2006) examined the short-run dynamic adjustments and the long-run equilibrium relationships between selected macroeconomic variables, trading volume and stock returns in the Greek stock market during the period of 1990 to 1999. They reach results showing that short run and long run equilibrium relationship exists between inflation, money supply and trading volume and the stock prices in the Athens stock

exchange. No short run or long run equilibrium relationship is found between the exchange rates and stock prices.

Gan *et al.* (2006) while investigating the relationships between New Zealand stock market index and a set of seven macroeconomic variables from January 1990 to January 2003 using co-integration and Granger causality test found out that there exists a long run relationship between New Zealand's stock market index (NZSE40) and the macroeconomic variables tested. The Granger causality test result shows that NZSE40 is not a leading indicator for changes in macroeconomic variables.

Abugri (2006) performed a study to determine whether selected macroeconomic indicators like exchange rates, interest rates, industrial production and money supply in four Latin American countries significantly explain market returns. His research results indicated that the global factors are consistently significant in explaining returns in all the markets. The country macroeconomic variables are found to impact the markets at varying significance and magnitudes.

Robert (2008) while conducting a study on the effect of macroeconomic variables on stock market returns for four emerging economies of Brazil, Russia, India and China affirmed that there was no significant relationship between present and past market returns with macroeconomic variables, suggesting that the markets of Brazil, Russia, India and China exhibit weak form of market efficiency. Also, no significant relationship was found between respective exchange rate and oil price on the stock market index prices of the four countries studied.

Coleman and Tettey (2008) while examining the impact of macroeconomic variables on Ghana Stock Exchange using quarterly data for the period 1991 to 2005 concluded that market lending rates from deposit money banks have adverse effect on stock market performance. The study also found inflation to be negatively related to stock market performance and this effect takes time because of the presence of a lag period.

Masila (2010) carried out a study to establish the determinants of stock market development at NSE. She used data for income level, savings and investments, stock market liquidity and macroeconomic stability among others from various secondary sources for the periods 2005 to 2009. She affirmed that NSE development has been steady since 1995 when foreign investors were allowed to invest at NSE. She, however, noted that this development has been affected by various factors most importantly was the macroeconomic stability of the various variables.

Oyoga (2010) carried out a study to determine the impact of corporate governance on performance of financial institutions listed in the NSE. He used the data from fifteen listed financial institutions for the period 2005 to 2009. Corporate governance measures considered were board composition, shareholding composition and compensation while the measure for performance was given as the ROA (Return on Assets). The researcher concluded that there is a relationship between corporate governance and performance. He also highlighted the fact that other external factors are also very instrumental in determining the overall performance of a given market.

2.4 Chapter Summary and Conclusion

After reviewing the literature on the impact of macroeconomic variables on stock market performance, it is clear that different researchers have studied different macroeconomic variables with respect to the financial performance of the stock markets. These macroeconomic variables include lending rates, GDP, exchange rates, Treasury bill, money supply etc. The results for these researches have been different. The empirical results indicated that the relationship between macroeconomic variables and the stock market performance can either be positive, negative or none at all. For example the findings of the studies done by Maghyereh (2002) among others showed that there exists a relationship between the macroeconomic variables and stock market indices while study done by Patra and Poshakwale (2006) showed that there is no relationship found between the selected macroeconomic variable and stock prices.

Since the reviewed studies give different results depending on the variables included in the study as well as the state of industrialization of the country of study and the method of analysis employed, it's advisable therefore that more studies need to be done for harmonised results. Studies done in Kenya have not taken into consideration different macroeconomic variable and this study therefore examines the impact of some selected macroeconomic variables on stock market performance in Kenya. The study answers the question: What is the relationship between macroeconomic variables and stock market performance in Kenya?

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology employed in the study. The research design, research population, the data collection methods as well as data analysis have been discussed comprehensively.

3.2 Research Design

The study is a correlation study. The basic empirical question here is to determine whether there exists a relationship between stock market performance and some few selected macroeconomic variables. Data for the NSE all share index and the Macroeconomic Variables data was collected for the periods between February 2008 and February 2012. Various researchers for example (Coleman and Tetty, 2003 and Asaolu and Ogunmuyiwa, 2010) have successfully used the design to analyze the stock prices and different macroeconomic variables.

3.3 Research Population

This study uses a census of all listed companies at the Nairobi Securities Exchange. There are 58 companies listed in NSE as at March 2012. Their stock returns through the NSE all share index was analyzed together with the selected macroeconomic factors, i.e. 91day T-Bill rate, inflation rate and the Lending rate.

3.4 Data Collection

Secondary data was used in this study. A time series of monthly data spanning from March 2008 to March 2012 was used employing 48 data points enough for effective inference. The data was obtained from various sources. Data on Treasury bill rates and lending rate was collected from the Central Bank of Kenya's monthly publication. The monthly inflation rate was collected from the Kenya National Bureau of statistics. The NSE All Share Index is an average measure of the performance of all quoted companies in NSE spanning through insurance, manufacturing, banking, service companies and real estate. The data for NSE all share index was collected from the NSE bulletin.

3.5 Data Analysis

Co intergration analysis (Regression with non stationary variables) was used to analyze the relationship between various macroeconomic variables and the performance of the Nairobi Securities Exchange. The majority of macroeconomic variables are found to be non stationary. Therefore, estimation results from running regression models would imply obtaining spurious relationships. Cointegration analysis could be applied to avoid dubious regression results. Engel and Granger (1987) two-step procedure has widely been used by many researchers. The research used autoregressive distributed lag (ARDL) bound test approach which has been suggested by Pesaran and Shin (1999). ARDL approach has an advantage in a sense that it relaxes a restrictive assumption that all variables must be integrated of order one variable. ARDL method allows some variables to be integrated of purely order 1, and some of order 0 or mutually Co integrated. Thus, under uncertainty condition of variable characteristics, ARDL method may be most suitable. Moreover, the estimates of ARDL approach are unbiased and efficient. It also has the following advantages: Method is powerful even for small sample size investigations, it helps to estimate long-run and short-run relationship models and lastly it determines explanatory strengths of exogenous variables.

3.6 Research Model

In order to undertake the empirical analysis on the relationship between the selected macroeconomic indicators and the performance of the stock market index, the below macro-econometric model was used.

Empirical model to be estimated is as below;

$$Y_t = \beta_0 + \beta_1 X_{1t-1} + \beta_2 X_{2t-1} + \beta_3 X_{3t-1} + \mu_{t-1}$$

Y is the dependent variable (NSE Performance) and X_1 is the 91 Treasury bill rate, X_2 is the Lending rate and X_3 is the inflation rate. β_j represents the various coefficients while μ_t is the error term.

3.7 Measures of Key Variables and Justification

In this section provides details on how to quantify the different variables listed above for analysis purpose.

3.7.1 NSE All-Share-Index

This variable captures the overall performance of the stock market. Market index is a listing of stocks and a statistic reflecting the composite value of its components. It is used as a tool to represent the characteristics of its component stocks, all of which bear some commonality such as trading on the same stock market exchange, belonging to the same industry or having similar market capitalization (NSE, 2011). NSE all share Index was settled on because it captures all the other performance measures such as market capitalization, liquidity, and turnover ratio.

3.7.2 Inflation

Inflations can be defined as a decrease in purchasing power of money. High rates of inflation increase the cost of living and a shift of resources from stock market instruments to consumables. This leads to a reduction in the demand for market instruments which tends to reduce the volume of trading and thus value of traded stocks with no price increase (Coleman and Tettey, 2008). Inflation rates can be estimated from the Consumer price index that is normally computed by the Kenya National Bureau of Statistics. Since the inflation rates affect dividend paid for a given common stock, it finally has an effect on the stock returns and hence its inclusion on the model.

3.7.3 Interest Rates

The study used both the lending rate of CBK base lending rates and the 91-day Treasury bill interest rates. The 91-day Treasury bill is regarded as the risk free rate of return in the market while the CBK lending rates reflects the cost of funds.

The data for the two rates was collected directly from the CBK monthly bulletin. Both interest rates can influence the expected discount rate which has an effect on the expected stock returns hence their inclusion in the model.

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter presents information to determine the relationship between NSE stock market performance and some selected macroeconomic variable indicators. Data collected from CBK, KNBS and NSE is analyzed and findings are presented. To determine the strength of this relationship, scatter plots, correlation, regression model as well as tests of significance were established.

4.2 Descriptive Statistics

This study undertakes to research on the relationship that exists between stock market performance and some selected macroeconomic variables. Monthly stock market performance using the NSE All share index was collected from NSE, the monthly inflation rates were obtained from KNBS and finally the 91 day T Bill as well as the lending rates data was obtained from the CBK data base.

Below is the summery of the findings;

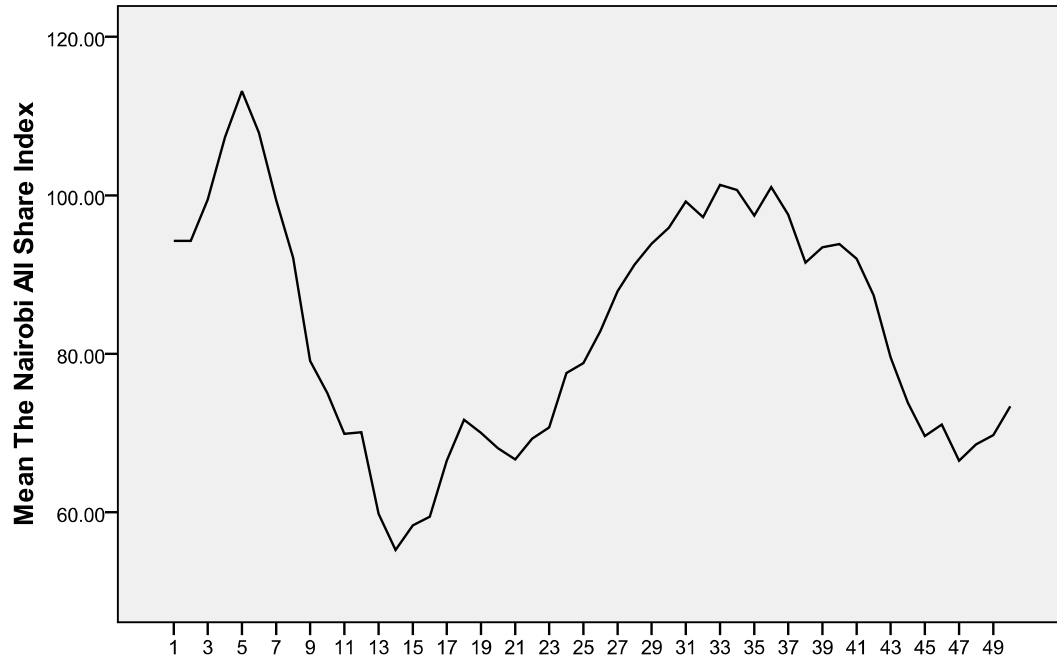
Table 1: Summery of Various Variables under Study

Descriptive Statistics

	Mean	Std. Deviation	N
The NSE All Share Index	82.7865	15.1380	50
CPI (Measure of inflation)	169.5284	88.99431	50
The Lending Rate	6.6034	6.32429	50
The 91 day Treasury Bill	7.5945	4.53994	50

From Table 1, the average NASI during the period is 82.78 and for CPI (proxy for inflation rates), lending rate and 91 day Treasury bill is 169.52, 6.603 and 7.594 respectively.

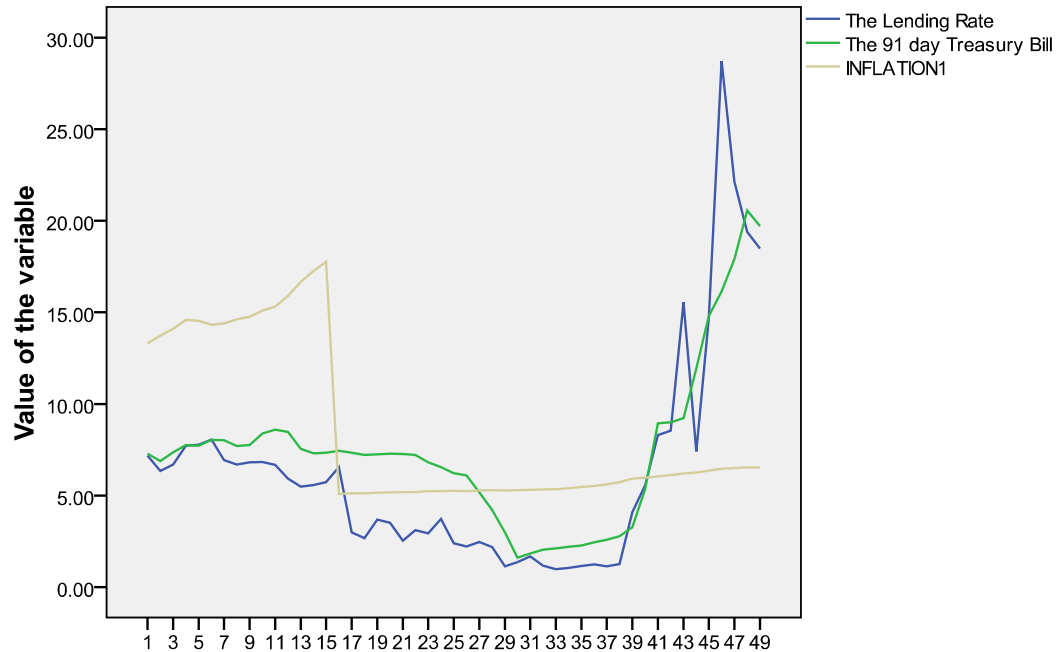
Figure 1. A Line Graph of Monthly NASI Data from March 2008 to March 2012



Monthly data from March 2008 to March 2012

The NASI index started from a low of 92.00 from March 2008 to an all time maximum of 131 in August in 2008. The rate has been fluctuating depending in various macroeconomic environment as well as the different government and monetary policies in place.

Figure 2. A Line Graph Representing Various Independent Variables



Monthly data from March 2008 to March 2012

The above line graph represents the trend of various macroeconomic variables in the study. Both the 91 day T bills as well as the Lending rate have a common trend. From March 2011 has been on the upward trend with decline expected since the government through various monetary policies has been able to control both the Lending rates. The inflation rate was in the all time high in 2008/2009 and has declined in the years 2010 and 2011.

Before carrying out the regression analysis, various tests were done on the data to ensure that key assumptions of regression model are not violated. Tests to detect the presence of heteroskedasticity, Autocorrelation as well as multicollinearity were undertaken.

4.3 Diagnostic Tests

Examination of the residuals is a good visual diagnostic to detect autocorrelation and heteroscedasticity.

4.3.1 Heteroskedasticity

Heteroskedasticity occurs if variance of residuals isn't constant across observations in the sample. A key assumption of regression analysis is that the variance of the residuals is constant across the observations. Effect of heteroskedasticity is that standard errors and F-test become unreliable but coefficient estimated becomes unaffected (Newey and West, 1987). To detect heteroskedasticity (Non Homoscedasticity) of error term, we carry out a null hypotheses that the variance of the error term is zero. From the test carried out, the F statistic is found to be 1.165 with a probability of 0.078 which is insignificant. We therefore fail to reject the null hypothesis and conclude that the variance of the error term is constant.

Table 2: A Table of Residual Squared

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6919770.385	3	2306590.128	5.627	.002 ^a
	Residual	1.886E7	46	409900.595	1.165	.078
	Total	2.578E7	49			

a. Predictors: (Constant), The 91 day Treasury Bill, The Inflation Rate, The Lending Rate

b. Dependent Variable: The NSE All Share Index

R-Squared can be used to measure the fraction of the variation of dependent variable that is explained by the regression equation. It can therefore be used to check the validity of the resultant model. In the above model, the coefficient of determination (R Squared) is 0.636. This implies that 63.6% of the changes in the explanatory variable can be explained by the predictor variable. This leaves only 36.4% unexplained by the model.

Since the Adjusted R-Squared isn't affected by the sample size, it therefore becomes the best measure. Our adjusted R-squared measure is 0.582 hence the explanatory variables can explain well the changes in the predictor variable.

4.3.2 Autocorrelation

This refers to a situation in which the residual terms of the independent variables are correlated with one another. Positive serial correlation results in coefficient standard errors which are too small leading to misleading results (Newey and West, 1987). The null hypothesis is that the residuals are not correlated. The Breusch-Godfrey serial correlation test gives a probability of .0438. This value is insignificant thus we accept the null hypothesis and conclude that there is no correlation.

Table 3: Breusch-Godfrey Serial Correlation

Breusch-Godfrey Serial Correlation			
F-statistics	1.7564	Probability	0.0438
Obs*R-squared	2.951	Probability	0.2568

4.3.3 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 (Mukras, 1995). This condition distorts the standard error of estimates hence leading to problems when conducting t-tests for statistical significance of parameters. Multicollinearity can be tested by checking for correlation among the independent variables.

Table 4: A Table of Collinearity Statistics

Coefficients^a

Model	Correlations			Collinearity Statistics	
	Zero-order	Partial	Part	Tolerance	VIF
1 (Constant)					
The Inflation Rate	.084	.146	.127	.991	1.009
The Lending Rate	-.274	.291	.260	.191	5.241
The 91 day Treasury Bill	-.430	-.446	-.427	.190	5.252

a. Dependent Variable: The NSE All Share Index

Variance Inflation Factor (VIF) measures the degree to which the interrelatedness of the variable with other predictor variables inflates the variance of the estimated regression coefficient for that variable. Therefore, a high VIF value indicates high multicollinearity of that variable with other independents and instability of the regression coefficient estimation process. VIF=1 is ideal hence in our model hence the independent variables are not correlated while the Lending rate and the 91 day T bill is highly correlated and therefore one variable (Lending rate) can be eliminated from our model.

4.4 Regression analysis

The study also conducted a regression analysis in order to predict future stock performance using the macroeconomic variables. Empirical model to be estimated is as below;

$$Y_t = \beta_0 + \beta_1 x_{1t-1} + \beta_2 x_{2t-1} + \beta_3 x_{3t-1} + \mu_{t-1}$$

4.4.1 Regression results

R-Squared is used to measure the fraction of the variation of dependent variable that is explained by the regression equation. It can therefore be used to check the validity of the resultant model. The resultant R-Square results are as below;

Table 5: A Table of Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.798 ^a	.636	.582	13.17831

a. Predictors: (Constant), The 91 day Treasury Bill, The Inflation Rate

In the above model, the coefficient of determination (R Squared) is 0.636. This implies that 63.6% of the changes in the explanatory variable can be explained by the predictor variable. This leaves only 36.4% unexplained by the model. Since the R-Squared doesn't increase with an increase in the sample size, it therefore becomes the best measure. Our adjusted R-squared measure is 0.582 hence the explanatory variables can explain well the changes in the predictor variable.

Table 6: A Table of Regression Coefficient Results

Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	94.736	4.973		19.050	.579
	The Inflation Rate	.006	.021	.035	.279	.781
	The 91 day Treasury Bill	-1.677	.420	-.505	0.0989	0.274

a. Dependent Variable: The Nairobi All Share Index

From the table, the trend multiple regression model below can be deduced.

$$\text{NASI} = 94.736 + 0.035\text{INF} - 0.505\text{TBILL}$$

There is a direct positive relationship between NSE All Share Index and Inflation, while the relationship between the NASI and T bill is negative. This implies that when the rates of 91 day T Bill go up most investors find it more attractive as compared to investing on common shares at NSE and hence the decline in the stock market activity leading to decreased performance.

Variable coefficient for inflation in our model is positively signed. In Kenya however, inflation plays a major role in price determination and has a negative impact on prices. These results are therefore not consistent with findings from other researchers such as (Nyamute, 1998).

CHAPTER FIVE: RESEARCH SUMMARY AND CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS

5.1 Introduction

This chapter presents the summary of the findings of the study, conclusions and recommendations have also been made. The study had intended to establish the relationship between macroeconomic variables and the performance of the Nairobi Securities Exchange for the period March 2008 to March 2012. The study was carried out in line with the objective of the study.

5.2 Summary and Conclusion

From the study, it has been established that there exists a relationship between selected macroeconomic variables and the Nairobi All Share Index. The diagnostic tests revealed that the residuals are normally distributed, there is no autocorrelation and the multicollinearity test indicated that 91 day T bill rate and the Lending rates are correlated and therefore one variable was eliminated in the final model so that the estimates may be reliable.

From the model, the NASI is positively affected by inflation and negatively affected by the Treasury bill. Inflation leads to a reduction in the demand for market instruments which tends to reduce the volume of trading and thus value of traded stocks with no price increase (Coleman and Tettey, 2008). This can explain the weak positive relationship of 0.035 found in the study. There is a strong negative relationship between the 91 day T-bill and the NASI index. The reason could be that Treasury bills tend to compete with stocks and bonds for the resources of investors. This reduces the demand for stock market instruments and causes an eventual reduction in stock prices. The relationship between stock prices and Treasury bill rates is thus negative and is supported by various researchers for example (Maghyereh, 2002).

5.3 Recommendations

From the study, it can be observed that there exists a significant relationship between macroeconomic variables and the stock market performance. This relationship can either be positive or negative depending on which variable is being put under consideration.

This study therefore recommends that the macroeconomic environment is very important and should closely be monitored to ensure stability. Regions with stable macroeconomic environment enjoy increased activity at the stock market hence an increased performance.

Stock market performance is an indicator to the foreign investors on the stability of the stock market; it's therefore recommended that good measures should be put in place for example investor friendly policies to promote the stock market activities which return increases the stock market performance.

5.4 Limitations of the Study

In the study, only Inflation, 91 day T Bill and Lending rates were included in the model, in order to make a more conclusive study, other variables for example GDP, Money supply, exchange rate, monetary Policies and other variables should be included in the study.

The study did not incorporate the investor's behavior as captured in theoretical review for example herding behaviour theory. This implies that even though multiple macroeconomic factors may include all the variables in the model, some anomalies in the stock market performance can only be attributed to human behaviour which may be difficult to quantify.

Political and social environments in a given region do also have an impact on the stock market performance hence, the need to include such variables and replicate the study.

5.5 Suggestions for Further Research

The study did not incorporate the impact of Investor behaviour in the analysis and therefore the same study can be replicated with human behaviour in mind. Most studies have been done with the main measure of NSR performance being the NSE 20 share index. In this study, the NASI index was used. A study should therefore be done with the two measures of performance employed and comparisons and conclusions deduced.

The study employed the autoregressive distributed lag (ARDL) bound test approach to Cointegration which has been suggested by Pesaran and Shin (1999). The use of other different approaches to Cointegration for example Engel and Granger (1987) is recommended.

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APPENDIX 1

List of companies Listed at NSE

	Agricultural sector	22	City Trust Ltd
1	Eaagads Ltd	23	Olympia Capital Holdings ltd
2	Kapchorua Tea Co. Ltd	24	Trans-Century Ltd
3	Kakuzi	25	B.O.C Kenya Ltd
4	Limuru Tea Co. Ltd	26	BAT Kenya Ltd
5	Rea Vipingo Plantations Ltd	27	Carbacid Investments Ltd
6	Sasini Ltd	28	East African Breweries Ltd
7	Williamson Tea Kenya Ltd	29	Mumias Sugar Co. Ltd
	Commercial and services	30	Unga Group Ltd Ord
8	Express Ltd	31	Marshalls (E.A.) Ltd
9	Kenya Airways Ltd	32	Eveready East Africa Ltd
10	Nation Media Group	33	Kenya Orchards Ltd
11	Standard Group Ltd	34	A. Baumann Co. Ltd
12	TPS Eastern Africa (Serena) Ltd		Telecommunication & Technology
13	Scangroup Ltd	35	Access Kenya Group Ltd
14	Uchumi Supermarket Ltd	36	Safaricom Ltd
15	Hutchings Biemer Ltd		Construction and allied.
16	Longhorn Kenya Ltd	37	Athi River Mining
	Insurance	38	Bamburi Cement Ltd
17	Jubilee Holdings Ltd	39	Crown Berger Ltd
18	Pan Africa Insurance Holdings Ltd	40	E.A.Cables Ltd
19	Kenya Re-Insurance Corporation Ltd	41	E.A.Portland Cement Ltd
20	CFC Insurance Holdings		
21	British-American Inv. Company (Kenya) Ltd		

	Automobiles and accessories	54	The Co-operative Bank of Kenya Ltd
42	Car and General (K) Ltd	55	DTB
43	CMC Holdings Ltd		Energy and Petroleum.
44	Marshalls (EA) Ltd	56	Kenol Kobil Ltd
45	Sameer Africa ltd	57	Total Kenya Ltd
	Banking	58	KenGen Ltd
46	Barclays Bank Ltd	59	Kenya Power & Lighting Co Ltd
47	CFC Stanbic Holdings Ltd		
48	Housing Finance Co Ltd		
49	Kenya Commercial Bank Ltd		
50	National Bank of Kenya Ltd		
51	NIC Bank Ltd		
52	Standard Chartered Bank Ltd		
53	Equity Bank Ltd		

Extracted from NSE website on 18/06/2010

APPENDIX 2

Data Entry Form

Year and month	Average all share index	Average Inflation Rate	Average Lending rate	Average 91 Day T-bill Rate.