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IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET VOLATILITY:

A case study of the Nairobi Stock Exchange.

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Submitted in partial fulfillment of the requirements for the Degree of

BBS Actuarial Science at Strathmore University

Strathmore Institute of Mathematical Science

Strathmore University

Nairobi, Kenya

JUNE, 2017.

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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5/12/2017 ..... [Date]

This Research Project has been submitted for examination with my approval as the Supervisor.

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CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

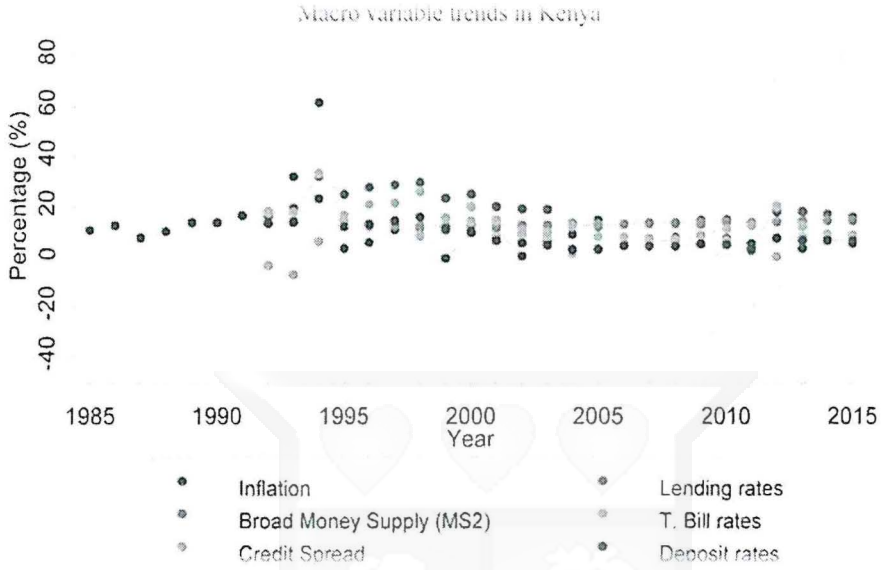
Over the past decade, the stability of inflation rate has been a key focus of the macroeconomic policy in Kenya with a view of maintaining the rate at a one digit level. Since 1980, Kenya has experienced a turbulent macroeconomic environment due to political uncertainties such as the 1982 coup and the political assassination of key leaders during the Moi era combined with changing weather patterns which have significantly affected agricultural outputs which is the mainstay of the Kenyan economy. (Olweny, 2011) Macroeconomic instabilities affect economic growth and development and empirical evidence suggests that volatility in certain variables get priced in stock markets. Of late, special attention has been paid to the relationship between macro-economic variables and stock market both by finance specialists and economists. It's not a new thing to see stock market news daily on our television screens and dailies. In fact, it is hard for a country to live without a stock market. Investors consider macroeconomic variables when they value stock. Interest rates, exchange rates, GDP are among the factors that affect the performance of stock prices in Kenya. The Kenyan stock exchange has been performing poorly over the past few months now. As a matter of fact, the Kenyan stock exchange is the worst performing this year globally with the decline dragging valuations ever since Bloomberg started collecting data. Shares on the NSE have dropped 6.7%, extending last year's 8.5% decline, due to the fear among many investors about General elections slated for August the 8th. (Changole, 2017) This in essence has brought about a degrading economy whereby inflation has set in and food prices have gone up to extraordinary prices never witnessed before. As a matter of fact, the impact of inflation on the stock market has become an important issue. Due to the high rate of inflation in Kenya, the effect becomes more important. According to Bloomberg, Kenya's G.D.P had been forecasted to slow down by 0.2% from 5.9% in 2016 to 5.7% in 2017. With the oncoming general elections, it is expected that the economy will further worsen, and the stock exchange further deteriorate. Many investors are opting out of investing in the country or waiting for the valuations to go down and domestic investors favoring bonds because of the issue on volatility whereby many pension schemes lost their value in equity holdings, so they wanted to play a bit safer in government bonds. Inflation which is a macroeconomic variable has majorly affected the stock prices hence sending it into Intensive Care Unit.

Stock market plays a very important role in economic growth and development. It is a center of network transactions where buyers and sellers of securities meet at a specified price. Movement of stock markets is an important indicator of the growth of the economy. A well-organized stock market mobilizes the savings and activates the investment projects, which lead to the economic activities in a country hence growth of the industry and commerce of the country as a consequence of liberalized ad globalized policies adopted by most emerging and developed country. The key function of a stock market is to act as a mediator between savers and borrowers. it further mobilizes funds from a large pool of savers and directs it into worthy investments that are sure going to generate sufficient profits. It also provides liquidity from

domestic expansion and credit growth. The stock market performance can be measured by changes in its index which is inclined by many factors macroeconomic, social and political factors. A stock market is also a subsidiary market which assigns policy for investors to easily buy and sell the stocks. Stock prices depict predictions of the upcoming representation of corporate firms whether they are performing poorly or the vice versa.

However, there is a stronger relationship between macroeconomic variables and stock market performance. Studies of the relationship between stock market development and performance and macro-economic variables go a long way in history. Such kind of analysis is subject to research and analysis by interested stakeholders. Many factors can be a signal to stock market shareholders to expect a higher or lower return when investing in the stock market securities and one of those factors is macroeconomic variables. Changes in macroeconomic variables can significantly affect stock prices in the stock market hence affect the economic growth of Kenya. As a result of the active link between macroeconomic variables and stock prices, the two can be used to set out macroeconomic policies for the nation. The effect of macroeconomic variables on stock markets is still a topic under intense study. The commonly studied variables are inflation, exchange rates, industry productivity, interest rates, money supply and short-term interest rates. Unfortunately, empirical studies on these variables have given divergent results from one market to another and even over different time periods.

A simple plot of key macroeconomic variables shows the volatility in the macroeconomic environment.



1.2 PROBLEM STATEMENT:

There have been numerous arguments and debates on whether it is true that there exist a relationship between the macroeconomic variables and the stock market generally. Some stakeholders have drafted several research papers on the above topic but without satisfaction. He nexus between macroeconomic fundamentals and stock market has been a major topic of concern within the financial economics sector. This nexus is an object of ongoing interest of investors, academics and policymakers. Several theories and empirical evidence alike have shown much detail on this subject of concern to economies. However, one thing that has failed to come out is what precedes the other: do macroeconomic variables precede stock prices or is it vice versa and what are the implications to the economy of a country if the two circumstances happen. Furthermore, we would like to also know if the two factors really have a causal relationship or not.

Earlier this year, President Kenyatta signed the bill to cap interest rates at 4%. This led to the Nairobi Stock Exchange being the worst performing stock market globally. A section of banks started suspending issuance of unsecured loans hours after President Uhuru Kenyatta signed the populist interest capping bill into law. This meant that the interest rates which is a macroeconomic variable fell which directly affected the stock prices and generally the stock market leading to investors pulling out therefore no enough funds in the economy causing inflation which was characterized by the high prices of food commodities with Unga among them. From this it's clear the macroeconomic variables preceded the stock market bring about problems in the economy. With this it can be evidently seen one can use the macro economic variables to predict the performance of stock prices at the Nairobi Stock Exchange.

However, the idea of macro-economic variables preceding the stock prices is a cause for alarm. It has dire consequences to the economy of a country.

In another circumstance, the stock prices can precede the macroeconomic variables. This can really help the economists in predicting future unwanted calamities that may hit the country.

To add onto this nexus, many have asked themselves whether they really exist a relationship between the two factors. This study investigates whether the changes in macroeconomic variables i.e. volatility affects the stock prices performance in the Nairobi Stock Exchange. it investigates the effects of selected macroeconomic variables on the NSE 20 share index (value weighted) monthly prices. The macroeconomic variables that were selected and identified for this study are log monthly consumer price index (lnCPI) which is a measure of inflation, log average monthly exchange rates (Kenya shilling to the US dollar), log credit spread, log average monthly supply, quasi money in banks and quasi money in Nonbank Financial Institutions. With this, we will evidently see the relationship between the macroeconomic variables and stock prices in the Nairobi Stock Exchange.

1.3 RESEARCH QUESTIONS

1. Do macroeconomic variables precede the stock prices in Kenya and what are the consequences if they do so?
2. Do stock prices precede macroeconomic variables and what are the implications of the circumstance above?
3. Does a relationship exist between the macroeconomic variables and stock prices and if yes, what is the relationship?

1.4 RESEARCH OBJECTIVES

1. To find out whether the macroeconomic variables precede the stock prices and the consequences on the economy of Kenya.
2. To find out whether stock prices precede the macroeconomic variables.
3. To be able to find out if there really exist a causal relationship between the two factors namely, macroeconomic variables and stock prices.

1.5 IMPORTANCE OF THE STUDY

The importance of the study lies in knowing the impact of macroeconomic factors on Nairobi Stock Exchange that is represented by the share prices response to these variables (the economic factors) thus this becomes an indicator for the investors to be able to reflect these variables on the share prices.

The study will enlighten the concerned stakeholders e.g scholars and economists on the relationship between the two factors.

It will be also an eye-opening lesson to the public concerning the effects that can occur when either of the two factors precede the other.

It will also seek to enlighten financial economists and all stakeholders both in the financial and nonfinancial sector on the much reported issue of changes in macroeconomic variables by financial institutions and the significance of the changes in stock market returns in Kenya.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The subject matter on macroeconomic variables and stock prices has been a major topic of discussion in the recent years. With the NSE being ranked as the poorest of all globally by Bloomberg, this issue has even attracted more audience than ever before within the financial economics circus. It is an object of ongoing interest from investors, academicians etc. Several theories, research papers and papers alike have been written concerning this nexus to no satisfaction. Literature such as Sharpe have provided a theoretical basis by which stocks may be valued. However, the underlying assumptions upon which many of these models are derived and based have several key weaknesses. These weaknesses have become increasingly evident in the implementation and practical application of the model in real life situations. However, from a theoretical point of view, these models present a sound theoretical foundation on which stock market movement may be attributed to the influences of the macroeconomic factors. The efficient market hypothesis has been taken up in this paper to underpin the relationship between the stock market and economic activities.

NAIROBI STOCK EXCHANGE

The Nairobi Securities Exchange was established in 1954 as Nairobi Stock Exchange based in the capital city of Kenya, Nairobi. It was at first a voluntary association of stock brokers in the European community registered under the Societies Act by then Kenya under the British colonialization. The shares of the Nairobi Securities Exchange are listed and traded on its main board.

Apart from stock and bond trading being the main business of the NSE, the exchange also has the following investments:

- NSE Clear Limited which offers a provision of clearing house services for the derivatives or futures exchange. (100% shareholding)
- Central Depository and Settlement Corporation Limited which offers a provision in clearing, settlement and depository services. (22.5% shareholding)

2.1 THEORETICAL FRAMEWORK:

2.1.1 Efficient Market Hypothesis

Also known as the random walk theory, it assumes that market prices should include all available information at a point in time.

In an efficient market, on the average, competition will cause the full effects of new information on intrinsic values to be reflected instantaneously in actual prices. Eugene Fama (Fama E. , 1970) described an efficient market as a market where prices always reflect all available information. Profiting from predicted price movements is unlikely and very difficult as the efficient market hypothesis suggests that the main factor behind price changes is the arrival of new information. There are different kinds of information that affect security values.

The efficient market hypothesis is stated in three variations mainly

- Weak form hypothesis
- Semi strong form hypothesis
- Strong form hypothesis

My research focusses on semi strong form hypothesis because after all the semi strong hypothesis states that all publicly available information is already incorporated into current prices; that is the asset prices reflect all public available information.

The semi strong form hypothesis is indeed used to investigate the negative and positive relationship between macroeconomic variables and stock prices since it postulates that economic factors are fully reflected in the price of stocks. Public information in this case relates to data from company's financial statements, the financial situation of company's situation. Hence information is public and there is no way of making profits from information that everybody Tom, Dick and Harry know.

2.2 EMPIRICAL FRAMEWORK

Naik and Padhi (Naik, 2012) did a similar research on the two factors but basing it on the Indian stock exchange. they found out that macroeconomic variables and the stock market index are cointegrated and thus a long run equilibrium relationship exist between them in the india stock market. They found a positive relationship between stock prices and money supply but a negative relationship with inflation. They applied the vector error correlation model to explain the relation between macroeconomic variables and the Indian stock exchange. From their study, exchange rates and short-term interest rates are insignificant in determining stock prices. Furthermore, they also found out that interest rates and the exchange rates exert insignificant influence on stock prices. Other studies by Kumar and Patel found out that a long run relationship exists between stock returns and various macroeconomic variables in the Indian Stock exchange.

Talla (Ochieng, 2012) investigated the effects of selected macroeconomic variables on stock prices of the Stockholm Stock Exchange. He found that inflation and currency depreciation have a significant negative influence on stock prices. He also found out that interest rates have an insignificant negative relationship and money supply has a positive relationship.

In Ghana, Kuwomu and Victor (Kuwomu, 2011) also observed the relationship between macroeconomic variables and stock prices. They collected data from 1992 to 2008 and concluded that inflation, exchange rates, treasury bill rates and consumer price index have a significant relationship with stock market returns. Inflation and buyer price index show a positive relation but treasury bill rate and exchange rates show significant negative impact on stock market returns. Being a West African country and having the richness of oil, the found out that crude oil doesn't affect the stock market returns.

Several economists documented the impact of foreign exchange which is a macro variable on stock prices during the last two decades. Aggarwal, Soenen and Hennigar, Abdalla and Murinde (Aroni, 2011) all tried to explore the relationship between exchange rates and stock prices. The theory explains that changes in exchange rates greatly or have an important bearing on the firms' overall profits through the firms' foreign operations which results in fluctuations in stock prices. The intensity and direction of changes in stock prices depends upon the nature of the firm. Mixed results were found in industrial countries. Aggarwal found a positive relationship between exchange rates and stock prices.

The money supply subject matter was widely tested for a variety of economies. Ratanapakorn and Sharma (Wongbampo, 2002) explored positive relationship between stock prices and the exchange rates in the US. While Humpe and Macmillan found negative impact of money supply and NK225 in Japan.

Fama (Fama E. , 1970) examined the relationship between real output and stock prices and showed that there was a strong relationship between stock prices and the gross national product.

Humpe and Macmillan explored positive long run relationship between stock prices and the industrial production in the US.

Cajueiro and Tabak (Naik, 2012) show that out of the nine selected European transition economies, stock markets in Bulgaria and Ukraine don't show predictability in the short run and all stock returns including Bulgaria show strong time varying in the long run.

Hasanov and Omany (Akbar, 2012) reveal that out of eight transition stock markets, only four stock markets including Bulgaria show weak form efficiency and exhibit unit root.

Mateev and Videv (Kumar) find that country risk, trade deficits and unexpected inflation are more important factors in affecting stock market movements in Bulgaria.

Mookerjee and Yu (Akbar, 2012) examined the nexus between Singapore stock returns and four macroeconomic variables such as narrow money supply, broad money supply, exchange rates and foreign exchange reserves using monthly data from October 1984 to April 1933. Their study revealed that both narrow and broad money supply and foreign exchange reserves exhibited a long run relationship with stock prices whereas exchange rates didn't.

Wongbampo and Sharma (Wongbampo, 2002) explored the relationship between stock returns in 5 Asian countries i.e. Malaysia, Indonesia, Philippines, Singapore and Thailand with the help of five variables such as GNP, inflation, money supply, interest rates and exchange rates. They found out that in the long run all the five stock price indexes were positively related to growth in output and negatively related to the aggregate price level. However, they found a negative relationship between stock prices and interest rates for Philippines, Singapore and Thailand but positive relationship for Indonesia and Malaysia.

Rahman et al (Ouma, 2014) examined the macroeconomic determinants of stock market returns for the Malaysian stock market by employing co integration technique and vector error correction mechanism (VECM). They found that interest rates, reserves and industrial production index were positively related while money supply and exchange rates were inversely related to Malaysian stock market return in the long run. Their causality test indicates a bi-directional relationship between stock market return and interest rate returns.

Asaolu and Ognumuyiwa (Kuwomu, 2011)investigated the impact of macroeconomic variables on average share price for Nigeria. Their result from the causality test indicated that the average share price doesn't Granger cause any of the nine macroeconomic variables in Nigeria in the sample in the sample period (1986-2007). Only exchange rate Granger causes average share price. However, the Johansen Co-integration test affirmed that a long run relationship exist between average share price and the macroeconomic variables.

Wasserfallen examined the effects of unexpected variations in many macroeconomic variables on aggregate stock price indices for Great Britain, West Germany and Switzerland. His results indicate that the effects of macroeconomic news are either very small or obscured by a low signal to noise ratio.

Asperem (H, 2010) investigated the relationship between stock indices, asset portfolios and macroeconomic variables in ten European countries. He established that employment, imports, inflation and interest rates are inversely related to stock prices. While expectations about future real activity, measures for money and the US yield curve are positively related to stock prices and macroeconomic variables are shown to be strongest in Germany, Netherlands, Switzerland and the Great Britain.

Nasseh and Strauss (Aroni, 2011) confirmed existence of significant long run relationship between stock market prices and domestic and international economic activity in six countries. They also found out that stock price levels are significantly related to industrial production, business surveys of manufacturing orders, short term and long term interest rates and finally production.

Uddin and Allam (Akbar, 2012) examine the linear relationship between share price and interest rate as well as share price and changes of interest rate. Furthermore, they also explore the association between changes of share price and interest rate and lastly changes of share price and changes of interest rates in Bangladesh. They find that for all cases the interest rates has significant negative relationship with share price and changes of interest rates has significant negative relationship with changes of share price.

Gjerde and Saettem (Pal, 2012) study the relation between stock returns and macroeconomic variables in Norway. Their results show a positive relation between oil price and stock returns as real economic activity and stock returns. However , their study fails to show a significant relation between stock returns and inflation.

Bhattarcharya (Umar, 2014) analyze the causal relationship between the stock market and three macroeconomic variables in India's case using the Granger non-causality. The three macroeconomic variables are exchange rate, trade balance and foreign exchange reserves. The results suggest that there is no causal linkage between stock prices and the three macroeconomic variables under consideration.

Bellalah, Masood, Darshini, Levyne and Triki (Umar, 2014)investigate the link among macroeconomic with China Stock returns. Auto Regressive Distributed Lag approach is used in this investigation. They concluded that the inflation has a positive impact on stock prices. The interest rate, inflation, industrial production index, imports and exports have significant influence on stock returns.

Pilinkus and Boguslaukas (Sohail, 2009) sought to find out the short term relation among macroeconomic variables and stock returns in Lithuania. Augmented Dickey Fuller test was used in this investigation. The data used was from the year 2000 to 2009. They concluded that the money supply and GDP positively affect the stock returns despite the fact that rate of employment, rate of interest rate and exchange rate negatively affect the stock returns.

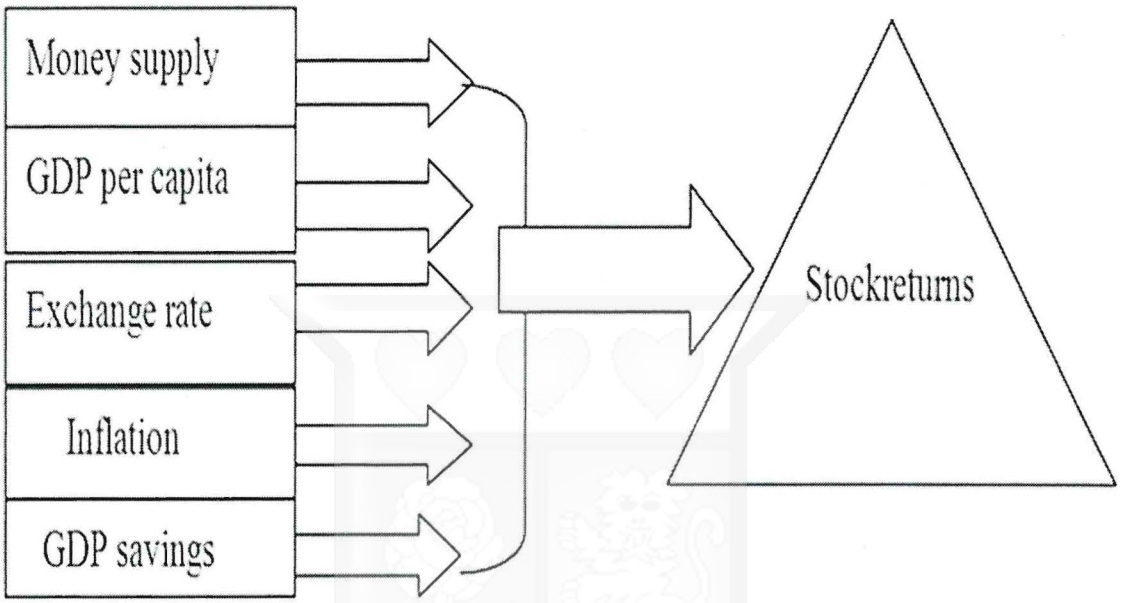
SUMMARY

TOPIC OF PAPER	COUNTRY DONE	RESULTS
Pilinkus and Boguslaukas	Lithuania	Money supply, GDP positively affect the stock returns.
Bellalah, Masood, Darshini, Levyne and Triki	China	Interest rate, Inflation, Industrial production index, imports and exports have significant influence on stock returns.
Bhattarcharya	India	No causal linkage between stock prices and exchange rate, trade balance and foreign exchange reserves.
Gjerde and Saettem	Norway	No significant relationship between stock returns and inflation.
Uddin and Allam	Bangladesh	Interest rate has a significant negative relationship with stock prices
Asaolu and Ognumuyiwa	Nigeria	Only exchange rate Granger causes average share price. However, the Johansen Co-integration test affirmed that a long run relationship exist between average share price and the macroeconomic variables.
Rahman et al	Malaysia	They found that interest rates, reserves and industrial production index were positively related while money supply and exchange rates were inversely related to Malaysian stock market return in the long run
Cajueiro and Tabak	Bulgaria and Ukraine	Stock markets in Bulgaria and Ukraine don't show predictability in the short run and all stock returns including Bulgaria show strong time varying in the long run.
Humpe and Macmillan	Japan	They found that the money

		supply had a negative impact on stock market in Japan
Mookerjee and Yu	Singapore	Their study revealed that both narrow and broad money supply and foreign exchange reserves exhibited a long run relationship with stock prices whereas exchange rates didn't.
Wongbampo and Sharma	Malaysia, Indonesia, Philippines, Singapore and Thailand	They found out that in the long run all the five stock price indexes were positively related to growth in output and negatively related to the aggregate price level. However, they found a negative relationship between stock prices and interest rates for Philippines and Singapore

2.3 CONCEPTUAL FRAMEWORK

Independent Variable Dependent Variable



The framework of this dissertation spells out the relationship between interest rates, inflation rate, exchange rates and money supply which are all independent variable and stock market returns which is a dependent variable as measured by the NSE All share index. This research adopts this conceptual to help explain the impact of macroeconomic variables on stock market volatility.

2.4 RESEARCH GAP

After reviewing the literature, I came to the conclusion that not even one highlighted the fundamental issue of which of the two factors precede the other and the effects of each preceding the other. The two factors in this case relate to macroeconomic variables and stock prices.

I also found that there is a lack of consistent methodological rigor and standard statistical control for the conduct of my study. The application of different methodologies in the analysis of macroeconomic variables has mainly been the use of econometric models. The use of multiple regression models has been very minimal and absent in emerging markets.

In this study, I aimed to fill this gaps by highlighting the effects of both circumstances when stock prices precede the macroeconomic variables and vice versa. Furthermore, I also seek to use multiple regression approaches with a comprehensive statistical test to bring to light the

statistical evidence on the subject matter between macroeconomic variables and stock market returns in Kenya.

Additionally, both past and contemporary studies on outcomes and methodologies of the relationship between exchange rates and stock market returns and macroeconomic variables are not clear cut. Some studies established a significant long run relationship between stock market returns and exchange rates, other studies had rather reported a depreciation of currency as reasons for changes in stock prices.

CHAPTER 3: RESEARCH METHODOLOGY

This attempts to explain the different techniques used in the research. It details the actual process that is going to be used in finding plausible solutions to the research questions that have been formulated.

3.1 RESEARCH DESIGN

This research is quantitative research, explanatory in nature making use of hypothesis testing techniques to determine the extent to which macroeconomic variables affect stock market performance and volatility.

3.2 DATA COLLECTION

My data will be secondary data. It is also a numeric/ quantitative data. I obtained the data mainly from secondary sources. The Nairobi Stock Exchange website provided data on inflation rate, interest rate, exchange rate and money supply. Furthermore, the NSE website provided all data on the NSE All Share Index. Other sources to complement analysis of data and literature were sourced from during the period world development indicators by the World Bank.

3.3 DATA ANALYSIS

A hypothesis is a statement about the value of a unknown parameter in the model. It evaluates two mutually exclusive statements about a population to determine which statement is best supported by the sample data. The hypothesis tested here is the null hypothesis. Hypothesis tests are used when you want to test a claim or a hypothesis about a parameter.

The hypothesis for my study are the following:

1. Hypothesis 1

H_0: Changes in exchange rates have no significant effect on stock market in Kenya

H_01: $\beta_1=0$

H_11: Changes in exchange rates have a positive effect on stock market in Kenya.

$H_11>\beta_1$

2. Hypothesis 2

H_02: Changes in inflation rates have no significant effect on stock market returns in Kenya.

H_02: $\beta_2=0$

H_12: Changes in inflation rates have a positive effect on stock market returns in Kenya.

$H_12>\beta_2$

3. Hypothesis 3

H_03: Changes in interest rates have no significant effects on stock market returns in Kenya.

$H_0 3$: $\beta_3=0$

$H_1 3$: Changes in interest rates have a positive effect on stock market returns

$H_1 3>\beta_3$

4. Hypothesis 4

$H_0 4$: Changes in Money supply have no significant effect on stock market returns in Kenya.

$H_0 4$: $\beta_4=0$

$H_1 4$: Changes in Money supply have a positive effect on stock market returns in Kenya.

$H_1 4>\beta_4$

3.3.1 TEST STATISTIC

In this study, I shall test the hypothesis that macroeconomic variables i.e. interest rates, inflation rate, money supply and exchange rates influence stock returns in Kenya. Since the hypothesis has several hypothesis I shall use F test to investigate whether there is a significant evidence that all the specified independent variables have zero coefficients at a level of significance of 5% ($\alpha=0.05$). The regression analysis is also of use in this study. It will be my method of estimation. Regression analysis is used to identify the direction and significance of relations between Kenyan Stock returns and the macroeconomic factors. The regressions are performed by utilizing the Ordinary Least Squares and to estimate the regression coefficients. Each regression coefficient estimated by OLS will coincide with the true value on the average and will have the least possible variance.

3.4 TIME PERIOD

My research will be longitudinal in nature because it will be carried out over a period of time due to the regression and correlation analysis that would be required in answering the research questions and carrying out the research objectives. Granger causality test would also need to be carried out to see if there exist a causal relationship between the independent variables and stock market returns.

3.5 TARGET POPULATION

The population of the data to be used in this research are stock market returns of the top 20 listed companies in the NSE.

3.6 SAMPLING AND SAMPLE SIZE

My sample size was about 20 top listed companies in the NSE and my sampling method was stratified sampling method where I divided the companies into 5 strata's.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter provides the details concerning data analysis results and discussions of the study findings as set out in the research objective and research methodology. The study sought to establish how macro-economic variables affect stock market performance in Kenya: Case of Nairobi Securities Exchange.

4.2 Response rate

Data obtained spanned a period of 10 years that is from the year 2006 to 2016. The study targeted a sample of 20 companies composing the NSE 20 share index as of 1st July 2014. The study obtained all the required data concerning the 20 companies and therefore the study attained 100% return rate.

4.2 Data Validity

This refers to the reasonableness and correctness of the data used in the study. Soundness of data requires that all data sets fall within the same range as well as the numeric should be digits. Data was obtained from credible sources including NSE, Knoema, Central Bank of Kenya and Kenya National Bureau of Statistics. The data for this study was valid in that the data range was for the period of 17 years. In addition to that, the data sets were all numeric. Data sets ranged from the period of 2006 to 2016.

4.3 Descriptive characteristics

	NSE 20 SHARE INDEX	INFLATION	MONEY SUPPLY	GDP PER CAPITA	CBK INTEREST RATES
MEAN	4,357.74	7.815454545	1,592,382,577,461.11	1152.818182	8.28
MEDIAN	4,520.11	6.58	1,522,207,881,390.40	1055	8.51
STDV	608.7090895	3.122488412	704796179816.59	247.8253851	2.248098186
VAR	370526.7556	9.749933884	4967376550840640000000.00	61417.42149	5.053945455

The study results revealed that money supply varied mostly followed by real GDP per capita followed by NSE share index and inflation coming in closely followed by interest rates as shown by their corresponding standard deviations. Furthermore, the data wasn't normally distributed since their respective mean, median was not exactly the same. However, the data was sufficiently appropriate for the study.

4.4 Correlation analysis

The study analysis conducted correlation analysis in R. it revealed that the data sets were highly correlated with each other. For example the NSE 20 share index was found to correlate more with money supply as compared with the rest of the variables. Money supply was also highly correlated with real GDP per capita. In general, the data sets were highly correlated meaning a change of one of the variable would result to a substantial change on the other variables which is expected for such macroeconomic variables.

The correlation analysis revealed that the data were highly correlated with each other e.g. the NSE 20 share index was found to correlate much more with money supply as compared to the rest of the variables. Also, money supply was highly correlated with GDP per capita. In general,

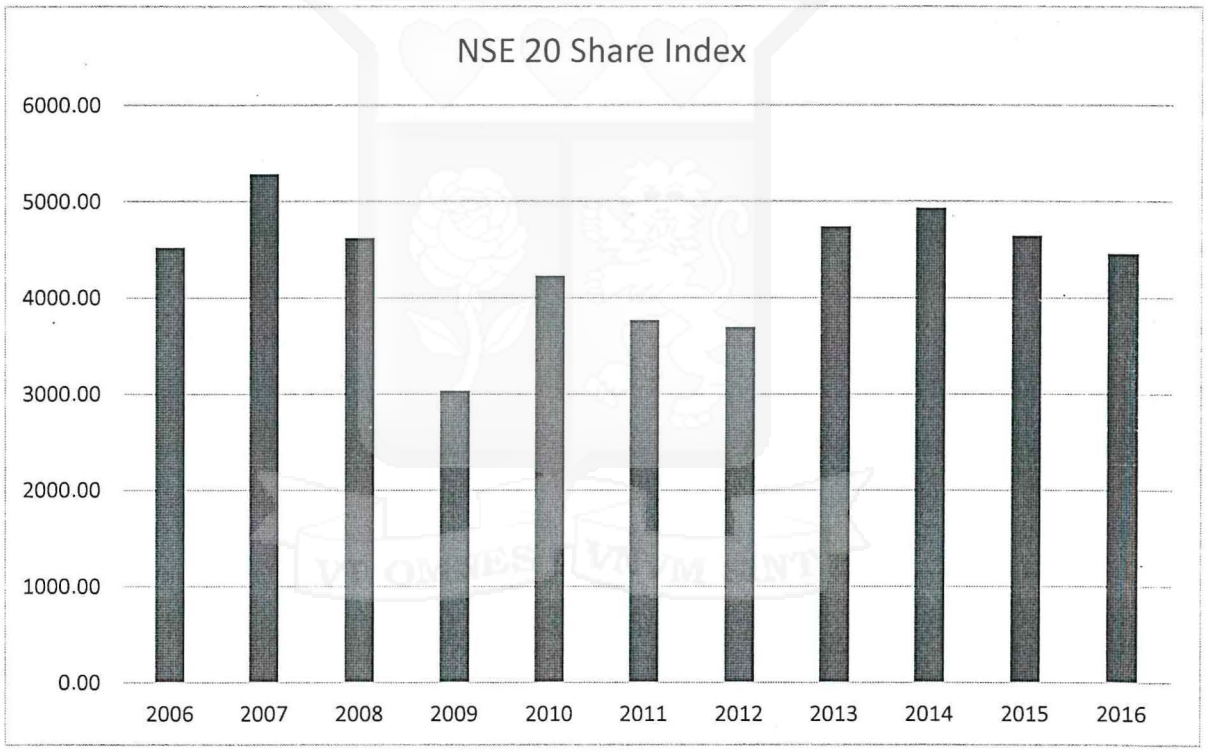
the data sets were highly correlated meaning a change of one of the variable would result to a substantial change on the other variables which is expected for such macroeconomic variables.

4.5 Regression Analyses and Hypothesis Testing

In order to establish which of the factors comes before the other and whether there exist a causal relationship, the researcher conducted a regression analysis using R software where NSE All share index was regressed against the four predictor variables which are interest rates, money supply, GDP per capita and inflation.

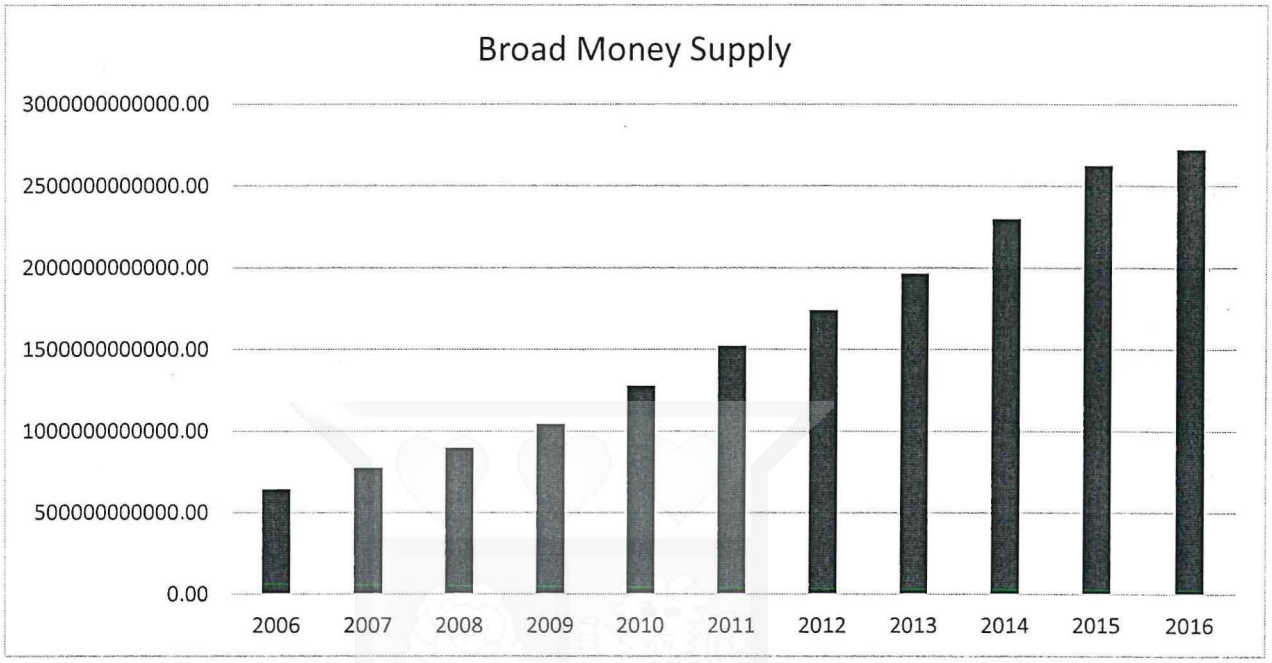
Before the regression analysis, the researcher sought to establish the trend of the four data sets in order to establish the trend of the macroeconomic variables. Therefore, he used line graphs to depict the trend of the involved variables as shown by the figures in the ensuing part of the analysis.

4.5.1 NSE 20 Share Index



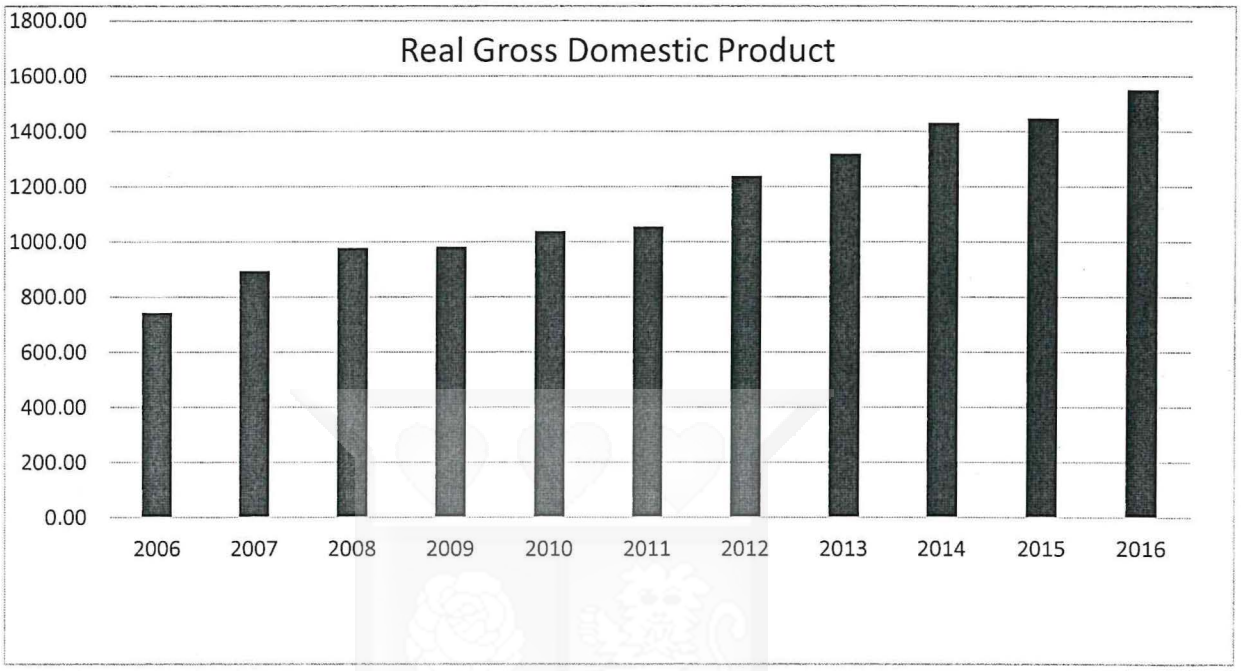
The study established that the average annual NSE index has fluctuated throughout the period. The NSE 20 share index showed major fluctuations from 2006. The share index massively declined in 2008 and 2009 due to the after effects of post election violence. However, it picked up very well in 2010 to a value of 4300 from 3000. It however fell again in 2011 and further in 2012 before picking up in 2013 and subsequently in 2014 and finally falling again in 2015 and 2016.

4.5.2 Money Supply



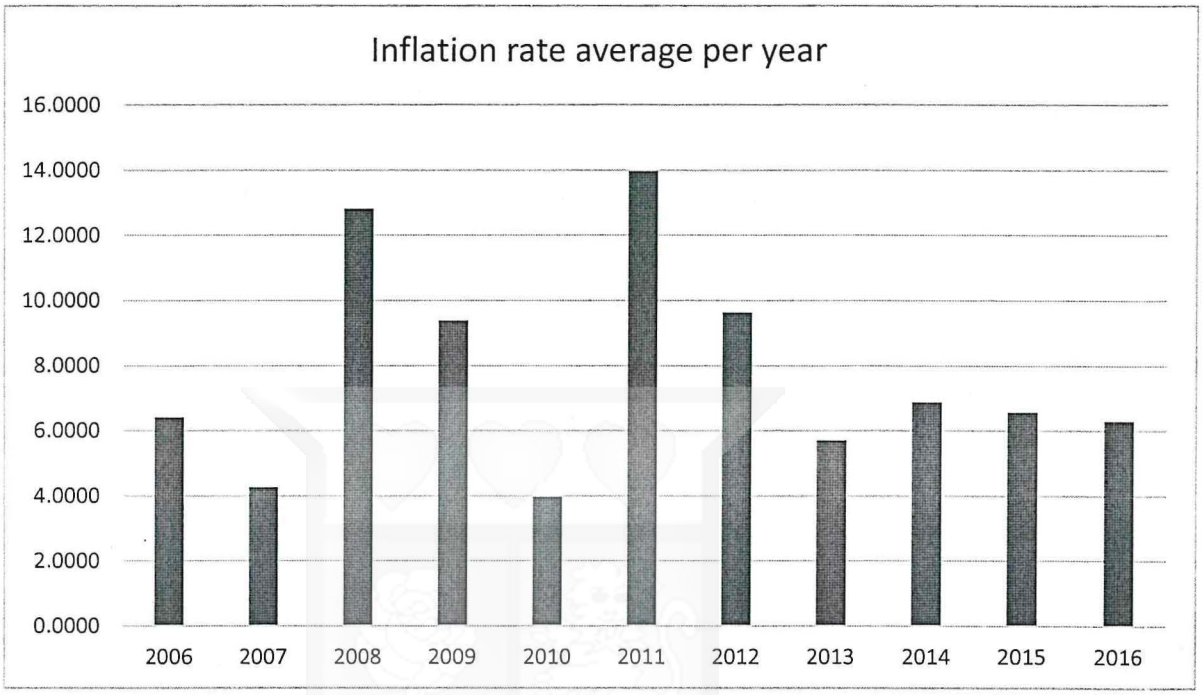
The study reveals that the amount money supply in US Dollars has steadily risen during the period of study notably the period between 2009 and 2014 whereby the graph rose more steeply than the rest but was followed with an even steeper graph between 2013 and 2015. This was followed by a slight increase between 2015 and 2016.

4.5.3 Real Gross Domestic Product



The study established that gross domestic product per capita generally fluctuated through the period between 2006- 2016 exhibiting a sluggish growth. It also shows that the growth increased greatly during the period 2006-2008 and 2012-2016.

4.5.4 Inflation



As for inflation, there were huge fluctuations throughout the 10 years. These huge fluctuations can be explained by the fact that the economy was very unstable during the period. During 2007, the rate of inflation in Kenya went down. This is the same year Kenyans went to exercise their democratic right. The 2007 election was marred by violence and ethnic clashes which affected the economy leading to the NSE being termed the worst globally according to Bloomberg. However, the rate of inflation increased in 2008 but later fell in 2009 following the improvement in the economy of Kenya. It further fell in 2010 before rising up in 2011 and falling further in 2012 and 2013. In short, the rate of inflation was fluctuating during the study period of 2006 to 2016.

4.6 Model Summary Statistics

Model Summary						
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
				R Square change	F Change	dfl
.536[a]	0.2674	-0.2209	705.4	.424	0.5476	6

a. Predictors: (Constant) , Money Supply, Real GDP per capita, Inflation, CBK Interest rates
b. Dependent Variable: NSE 20 Share Index

The study results revealed that there is a weak positive relationship between the selected macroeconomic variables and the NSE 20 share index as depicted by coefficient of determination (R) pf 0.536 and correlation Coefficient (R- Square) of 0.424. therefore the selected macroeconomic variables Money Supply, Real GDP per capita , Inflation and Interest rates do command an influence equivalent to 42.4% only of the changes in the NSE 20 share index meaning that many other variables apart from the above mentioned influence NSE 20 share index.

4.7 Analysis of variance

	Degrees of freedom	Sum Squared	Mean squared	F value	Pr(>F)
Inflation	1	1024059	1024059	2.0579	0.2014
Money Supply	1	9876	9876	0.0198	0.8926
Real GDP per capita	1	54406	54406	0.1093	0.7521
CBK Interest rates	1	1701	1701	0.0034	0.9553
Residuals	6	2985752	497625		

The regression analysis obtained P-value test for significance equal to 0.7085 which is greater than 0.05 depicting that a possible model between the NSE 20 share and the selected predictor variables is statistically insignificant. By use of the F-table, the F: 10,3 0:05 was 2.63 which was greater than the F-test statistic= 0.5476, determined through the analysis as shown by R which also indicated the model was statically insignificant.

Other additional studies carried out by R software are as below:

R version 3.4.2 (2017-09-28) -- "Short Summer"

Copyright (C) 2017 The R Foundation for Statistical Computing

Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.

You are welcome to redistribute it under certain conditions.

Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.

Type 'contributors()' for more information and

'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or

'help.start()' for an HTML browser interface to help.

Type 'q()' to quit R.

[Previously saved workspace restored]

> Mydata<-read.csv("C:\\Users/ENVY/Documents/mdata.csv",header=TRUE)

> mydata

[1] ĐÏ.à..

<0 rows> (or 0-length row.names)

> mydata

[1] ĐÏ.à..

<0 rows> (or 0-length row.names)

> summary(mydata)

ĐÏ.à..

Mode:logical

> Macroecon

	NASI	INFL	MS	GDP	CBK
1	4,520.11	6.42	644,295,400,000.00	743	6.81
2	5,286.26	4.27	775,880,140,000.00	895	6.80
3	4,620.63	12.82	896,520,484,867.80	978	7.70
4	3,037.24	9.39	1,044,063,756,335.10	982	7.38
5	4,228.88	3.97	1,277,533,897,163.20	1,039.00	3.60
6	3,768.43	13.98	1,522,207,881,390.40	1,055.00	8.73
7	3,695.03	9.64	1,741,288,952,397.30	1,239.00	12.76
8	4,742.43	5.72	1,964,909,332,869.90	1,319.00	8.93
9	4,933.16	6.88	2,299,896,568,811.50	1,431.00	8.93
10	4,644.24	6.58	2,625,659,346,892.20	1,448.00	10.93
11	4,458.72	6.30	2,723,952,591,344.80	1,552.00	8.51

> Macro<-read.csv("C:\\Users/ENVY/Documents/Macroecondata.csv",header=TRUE)

> Macro

	NASI	INFL	MS	GDP	CBK
1	4520.11	6.42	6.44295e+11	743	6.81
2	5286.26	4.27	7.75880e+11	895	6.80
3	4620.63	12.82	8.96520e+11	978	7.70
4	3037.24	9.39	1.04406e+12	982	7.38
5	4228.88	3.97	1.27753e+12	1039	3.60
6	3768.43	13.98	1.52221e+12	1055	8.73
7	3695.03	9.64	1.74129e+12	1239	12.76

8 4742.43 5.72 1.96491e+12 1319 8.93

9 4933.16 6.88 2.29990e+12 1431 8.93

10 4644.24 6.58 2.62566e+12 1448 10.93

11 4458.72 6.30 2.72395e+12 1552 8.51

> lm<-(NASI~INFL+MS+GDP+CBK,data=Macro)

Error: unexpected ',' in "lm<-(NASI~INFL+MS+GDP+CBK,"

> fit<-lm(NASI~INFL+MS+GDP+CBK,data=Macro)

> summary(fit)

Call:

lm(formula = NASI ~ INFL + MS + GDP + CBK, data = Macro)

Residuals:

Min	1Q	Median	3Q	Max
-1169.9	-274.6	121.4	306.5	684.1

Coefficients:

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	4.141e+03	2.821e+03	1.468	0.192
INFL	-9.820e+01	7.966e+01	-1.233	0.264
MS	-4.716e-10	1.570e-09	-0.300	0.774
GDP	1.450e+00	4.472e+00	0.324	0.757
CBK	7.584e+00	1.297e+02	0.058	0.955

Residual standard error: 705.4 on 6 degrees of freedom

Multiple R-squared: 0.2674, Adjusted R-squared: -0.2209

F-statistic: 0.5476 on 4 and 6 DF, p-value: 0.7085

```
> coefficients(fit)
 (Intercept)        INFL          MS         GDP         CBK
4.141283e+03 -9.819720e+01 -4.716383e-10  1.450484e+00  7.584125e+00
> anova(fit)
Analysis of Variance Table

Response: NASI
          Df  Sum Sq Mean Sq F value Pr(>F)
INFL       1 1024059 1024059  2.0579 0.2014
MS         1    9876    9876  0.0198 0.8926
GDP        1   54406   54406  0.1093 0.7521
CBK        1    1701    1701  0.0034 0.9553
Residuals  6 2985752  497625
> residuals(fit)
        1         2         3         4         5         6
 183.77014  580.45901  684.09767 -1169.89823 -454.38324  121.40690
        7         8         9        10        11
-572.29544  108.64779  408.82649  204.26176  -94.89285
> influence(fit)
$hat
        1         2         3         4         5         6         7         8
0.6050820 0.4318178 0.5882625 0.1795378 0.5470233 0.6945850 0.6014320 0.2116048
        9        10        11
0.2393465 0.4931197 0.4081886

$coefficients
```

```
  (Intercept)       INFL         MS       GDP        CBK
1  1170.10416 -14.2722595  4.328890e-10 -1.59375967  15.909871
2    87.20210 -51.0124227 -5.294848e-10  0.81010488  37.873804
3 -2769.81655  90.7584236 -1.640304e-09  4.58620329 -55.981256
4   415.64418 -22.8504455  4.834112e-10 -1.12366616  19.193516
5  -782.25421   8.6041302 -9.118756e-11 -0.03438061  97.663973
6   544.10344  27.3839313  4.148474e-10 -1.09310157 -14.786469
7  1570.38707  26.0309002  7.925032e-10 -1.51540933 -171.418059
8  -106.72083  -3.0582786 -6.438072e-11  0.19717039   2.218339
9  -471.27044   0.6167853 -1.746349e-10  0.75462942  -9.245703
10  516.28586  -7.7525594  4.009056e-10 -1.03956444  17.025618
11   52.29911  -1.2916572 -2.067580e-11 -0.07836455   8.029347

$sigma
     1      2      3      4      5      6      7      8
761.6085 691.7733 608.1334 513.3406 711.3309 766.4844 657.8762 770.8151
     9     10     11
743.7770 762.0288 770.7836

$wt.res
        1         2         3         4         5         6
 183.77014  580.45901  684.09767 -1169.89823 -454.38324  121.40690
        7         8         9        10        11
-572.29544  108.64779  408.82649  204.26176  -94.89285

> vcov(fit)
             (Intercept)         INFL         MS         GDP
```

```
(Intercept)  7.956212e+06 -4.020073e+04  3.991835e-06 -1.197822e+04
INFL        -4.020073e+04  6.345370e+03  5.473209e-09  2.161036e+01
MS           3.991835e-06  5.473209e-09  2.466135e-18 -6.800814e-09
GDP         -1.197822e+04  2.161036e+01 -6.800814e-09  1.999863e+01
CBK         -1.746482e+04 -5.195588e+03 -1.467859e-08 -5.023795e+01
                   CBK
(Intercept) -1.746482e+04
INFL        -5.195588e+03
MS          -1.467859e-08
GDP         -5.023795e+01
CBK          1.683090e+04
>
```

4.8 Discussion of Research findings

The study results have revealed that both the NSE 20 share index and the selected macroeconomic variables i.e. Inflation, GDP per capita, Central Bank Interest rates and Money supply have been growing throughout the period in general. As shown in the figures, the NSE All share index fell during the years 2009 then rose up in 2010 before falling in 2011 and further in 2012 before picking up in 2013.

Also, as depicted by the figures, the money supply has been growing over the years at a steady rate. The real growth in GDP per capita also declined during the period of 2007 due to the political turmoil that was witnessed during the period. In particular the elections held in December 2007 was marred by political upheavals which brought about ethnic clashes that temporarily deteriorated the economic performance. Therefore, the study results established that both the NSE performance and the selected macroeconomic variables experienced some deterioration just before, during or/and immediately after the electioneering periods. Furthermore, the study also confirms that the political climate in Kenya can also influence major economic variables as well as financial markets.

The study results revealed that there is a weak positive relationship between the selected macroeconomic variables and the NSE 20 share index as depicted by coefficient of determination (R) of 0.536 and correlation Coefficient(R-Square) of 0.2674 depicting that there exists a weak positive relationship between macroeconomic variables and NSE 20 share index.

The established regression model however, indicated that inflation and interest rates have an inverse relationship with the NSE 20 share index as depicted by the fact its associated coefficient was negative, but the coefficients corresponding to money supply and real GDP per capita were positive. In addition to this, there exists a weak insignificant relationship between each of the selected macroeconomic variables and NSE 20 share index since the corresponding P values for each of the variables were larger than 0.05 as shown by the R work below.

Further , the obtained P-value for the model in general was 0.7085 which is greater than 0.05 depicting that the model between the NSE 20 share index and the selected predictor variables is statistically insignificant. This was supported by the F-test statistic from the F-table which was 2.63 which was greater than the F-test statistic= 0.5476, determined through the analysis done by R software.

The results partly agreed with the conclusion by Aduda, Masila and Onsongo (2012) reported that there is no relationship between the stock market development and Macroeconomic stability – inflation and private capital flows. Also, the conclusion concurs with Ting et al. (2012) who established that Kuala Lumpur Composite Index is consistently influenced by interest rate, money supply and consumer price index in the short run and long run in Malaysia. However, this conclusion disagrees with the posits of Jahur et al. (2014) who established that there is a negative relationship between inflation and stock market performance in Kenya.

The study however disagrees with Ochieng and Adhiambo (2012) who determined that inflation has a weak positive relationship with the Nairobi All Share Index (NASI).

This conclusion agrees with the revelations of Maku and Atanda(2010) who revealed that the stock market performance in Nigeria is mainly affected by macro-economic forces in the long-run in Nigeria. It however partly disagrees with the conclusion of Garcia and Liu (1999) who established that macroeconomic volatility does not affect stock market performance .

5.0 CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary, conclusion and recommendations of the study as per study objective.

5.2 Summary of Findings

The study sought to find out whether there exists a causal relationship between macroeconomic variables and stock market volatility and which factor precedes the other. It used the Nairobi Stock Exchange. The study was guided by an objective, to examine the effect of the selected macroeconomic variables on stock market performance. The selected macroeconomic variables included inflation rate, money supply, interest rate and real GDP per capita.

The study followed descriptive research design and used secondary data from NSE, CBK etc. the data spanned the period between 2006 and 2016. The data used for the analysis was the average annual figures and was obtained Nairobi Stock Exchange (NSE All share index), CBK and Kenya National Bureau of Statistics (GDP per capita) etc. The data was analyzed using R software.

The study results show that the NSE All share index which is used to measure stock performance as well as the CPI which is used to measure inflation, money supply and GDP deteriorated just before the General election in 2007 and 2013.

The regression analysis obtained Coefficient of determination (R), Correlation Coefficient (R-Square), P-Value and F-test statistics which were 0.536, 0.2674, 0.7085 and 0.5476 respectively. Since R was positive 0.536 the relationship between the stock market performance and the macroeconomic variables was positive. Since, R-Square was way below 0.75 as it was 0.2674 the relationship between NSE performances as measured by NSE 20 share index is very weak. However, the study results established that the relationship between inflation and stock Market performance is inverse as the corresponding coefficient in the model was negative.

Also since P-value was 0.7085 was greater than 0.05, the established model describing the relationship between the study variables is statistically insignificant. This was supported by the F-test as the obtained test statistics from the table was 2.63 which was greater than the F-statistic 0.5476 determined through the analysis in R.

Furthermore, P-values associated with each of the determinants variables were all greater than 0.05 depicting that the selected macro-economic variables were individually statistically insignificant in predicting the stock market performance.

5.3 Conclusion

This study concludes that there is a weak positive relationship between the selected macroeconomic variables together with stock market performance. The study also concludes that the relationship between inflation and stock market performance is inverse but insignificant. Furthermore, the study reveals that the money supply and GDP per capita have a positive but weak and insignificant relationship with stock market performance.

5.4 Recommendations

The study recommends that the central bank of Kenya (CBK) and other regulators should plan in advance and influence macroeconomic variables such as inflation, money supply on the right direction i.e. the economy should have sufficient money supply to ensure that there is enough money to conduct trade in the economy.

In addition, the economy should be cubed as it negatively affects the stock market performance. The country should aim to raise the GDP as it positively influences the stock market. The study also recommends that the investment community should plan in advance in case of any major activities that may affect the stock market take place e.g. The general election. This should help in curbing the after effects of such events. This is due to the fact that during the 2007 to 2010 period, most of the variables really declined i.e. GDP per capita and money supply. In 2007, Kenya experienced post-election violence which led to the economy suffering and subsequently the stock market went down. Fast forward to 2017 and history repeated itself. The unrest in many parts of the country which was characterized by nationwide demonstrations led by the opposition brought about a fall in the stock market leading it to be declared the worst performing globally as per Bloomberg report. It has worsened the economic stock performance as well as the selected macroeconomic variables.

The government in this case should ensure that the contestants running for various political seats don't engage in bad politicking but focus on agendas and things they will do for the citizens. This may help in curbing the deterioration of the stock market as it will provide a healthy political climate in the country which will also stop cases of violence. The electoral body should also tighten the grip on quality of election results.

5.5 Limitations of the study

The researcher was overwhelmed by the study because he had to work on the study alongside attend classes and read for his exams let alone other personal and social commitments. More over the study had to be conducted over a short period of time therefore posing a problem of time constraint. The researcher had to work for long hours into the night in order to achieve his target. This made the researcher tired at times which may affect the input into the study.

Another limitation is the data obtained may also have some small possible errors as they may vary with other data from various research companies. There may be possible errors during the process of measurement or during recording which may have been carried along into the research results. In addition to this, the researcher found a hard time maneuvering through the r software which required technical expertise in order to operate. Some errors also occurred when working with the software.

However, these factors were catered for by the fact that the researcher was carefully led by capable, experienced university lecturers, moderators and supervisors every step of the way.

On other matters concerning suggestions for further studies, further readings and research should explore on factors affecting each of the variables. Further readings should focus and establish the determinants of money supply, inflation, GDP per capita and money supply. In addition to this, studies can also be conducted to find out how other macroeconomic variables influence the stock market e.g. international remittances. This can help the regulators to safeguard the market performance so that appropriate results for the good of the investors and the listed corporate bodies. Comparison with different markets should also be studied so as to reach concrete conclusions as regards the subject of the study.

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APPENDICES

Appendix 2: Data for the Study

YEAR	NSE 20 SHARE INDEX	INFLATION	MONEY SUPPLY	GDP PER CAPITA	CBK INTEREST RATES
2006	4,520.11	6.42	644,295,400,000.00	743	6.81
2007	5,286.26	4.27	775,880,140,000.00	895	6.8
2008	4,620.63	12.82	896,520,484,867.80	978	7.7
2009	3,037.24	9.39	1,044,063,756,335.10	982	7.38
2010	4,228.88	3.97	1,277,533,897,163.20	1,039.00	3.6
2011	3,768.43	13.98	1,522,207,881,390.40	1,055.00	8.73
2012	3,695.03	9.64	1,741,288,952,397.30	1,239.00	12.76
2013	4,742.43	5.72	1,964,909,332,869.90	1,319.00	8.93
2014	4,933.16	6.88	2,299,896,568,811.50	1,431.00	8.93
2015	4,644.24	6.58	2,625,659,346,892.20	1,448.00	10.93
2016	4,458.72	6.3	2,723,952,591,344.80	1,552.00	8.51