THE EFFECT OF SELECTED MACRO-ECONOMIC VARIABLES ON THE STOCK RETURNS AT THE NAIROBI SECURITIES EXCHANGE

PRESENTED BY

MWONGELA DAVID

D63/87559/2016

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN FINANCE, SCHOOL OF BUSINESS, THE UNIVERSITY OF NAIROBI

NOVEMBER 2018

DECLARATION

Declaration by the candidate

I hereby declare that this study is my original work.

Signature -- Date------------------------------------

MWONGELA DAVID   Registration Number: **D63/87559/2016**

Declaration by the Supervisor

This project has been submitted with my approval as University Supervisor.

Signature -- Date --
MR. DAN CHIRCHIR

Lecturer, University of Nairobi

Declaration by the co-supervisor

This project has been submitted with my approval as University co-supervisor.

Signature -- Date --

DR. MIRIE W. MWANGI

Chairman, Department of Finance and Accounting, University of Nairobi

ACKNOWLEDGEMENT

I am grateful to the Almighty God for His divine grace and favor. We make plans but He crowns them all.

DEDICATION

To my parents, wife and children whose unceasing support saw me through the whole project.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

APT	-	Arbitrage Pricing Models
NSE	-	Nairobi Stock Exchange
CAPM	-	Capital Asset Pricing Model
MPT	-	Markowitz Portfolio Theory
CLRM	-	Classical Linear Regression Model
NASI	-	Nairobi All Share Index
GDP	-	Gross Domestic Product
MSCI	-	Morgan Stanley Capital International
KNBS	-	Kenya National Bureau of Statistics
CPI	-	Consumer Price Index
WPI	**-**	World Price Index
CBK	-	Central Bank of Kenya
DIJA	-	Dow Jones Industrial Average
EMH	-	Efficient Market Hypothesis

ABSTRACT

The Nairobi Securities Exchange provides a massive platform for corporate and individual investors alike. This paper investigated the effect of interest rates, the inflation rate, the foreign exchange rate and the World Price Index on the NSE-20 share index for a period from January 2010 to December 2017. A multiple regression of the APT style was run using the EViews software 9th edition. The results show that all the predictor variables under the observation jointly affect the movement of the NSE-20 share index. Precisely, these macroeconomic variables explain about 11.97% of fluctuations of the NSE-20 share index. This means that close to 88.03% of these fluctuations were explained by other factors that were not incorporated in this study. The local variables, i.e. the interest rates, the inflation rate, and the foreign exchange rate all had a negative impact on the NSE-20, with all the three variables having negative correlation coefficients with the NSE-20. The inflation rate has a more significant negative effect on the NSE-20 share index than the 90-day treasury bill interest rate and the foreign exchange rate. The WPI has a positive correlation with the NSE-20, meaning that the movement of this index is in line with the international macroeconomics. From the study findings it was concluded that it is possible to predict the current and the future stock price index values of companies listed in the Nairobi securities exchange by studying the past values of interest rates, inflation, exchange rates and world price index in Kenya. The study recommends the incorporation of more macro variables in further studies so as to bridge the 88.03% gap explained by fluctuations in predictor variables such as GDP, money supply etc. that were not factored in this study.

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

The arbitrage pricing theory was put forth by Ross (1976) and sought show how changes in returns and key drivers of value are related (Kettell, 2001). Thus the APT promulgates that the expected returns of risky investments are influenced by macroeconomic variables. According to Alexander, Sharpe and Bailey (2001), APT asserts that the returns of risky securities is influenced by several macroeconomic variables which cannot be studied exhaustively. Several scholars and academicians locally and globally have studied different variables and came up with varying conclusions. For example, Roll and Ross (1980) and Chen, Roll and Ross (1986). Locally, Mumo (2017), Mugambi and Okech (2016), Ouma and Muriu (2014), Mwaore (2017) have all studied the effect of macroeconomic variables on the stock returns and came up with inconsistent results. The most commonly studied variables in Kenya include foreign exchange rate, inflation, interest rates and money supply. This study seeks to investigate the effect of macroeconomic variables on the stock returns at the Nairobi Securities Exchange with a focus on foreign exchange rates, inflation, interest rates and world price index as the representation of the global macroeconomic variables forming the 4-factor regression model of the APT type. Nairobi all share index (NASI) forms the population while NSE 20 is used as the sample representing the entire securities market in Kenya.

1.1.1. Macroeconomic Variables

Macroeconomics entails the study of the economy of a country as a whole. Macroeconomic variables therefore affect everybody in the society (Brooks 2008). Brinson et al (1991) posits that

1

macroeconomic variables as factors whose slight shift results in a global and material change that is spelt out in the economy or even at the national level and not just at an individualized level. The inflation, interest rates, foreign exchange rate among others are the most influential macroeconomic factors in any economy (Mwaore, 2015). However, Nisha (2015) examined the influence of macroeconomic factors on stock returns (India) and postulated that emerging markets are immensely affected by international macroeconomic factors and coopted world price index (WPI) as the proxy. Inflation rate as outlined by Basu (2011) is the general increase in prices of basic commodities over a period of time and is indicatively arrive at via the percentage change in the monthly consumer price index (CPI) or producer price index (PPI). Higher CPI signifies higher inflation (low purchasing power) and shrinkage in sales/profitability resulting in decreasing stock value and vice versa. Harvey (2012) defines foreign exchange rate as an expression of one currency relative to another. This is the price of buying or selling a currency to the other. The criticality of exchange rates exposure cannot be understated especially in risk management and also in the valuation of a stock (Li et al., 2009). Interest rates according to Crowley (2007) is the price paid to access someone else's money or assets. It is what a borrower parts with for in order to use money from the lender. Increased interest rates make funds too expensive for investors hence the curtailed investment translates to shrinkage in the overall economy (Mumo, 2018). Nisha (2015) explored the significance of global macroeconomic variables in the emerging markets and found gravity in its significance. These variables are therefore very important in any economy because they influence other activities such as savings and investments, economic well-being and the living standards of the people (Brooks 2008).

1.1.2. Stock Returns

Stock returns can be defined as the profits of holding a stock (Brooks, 2008). They include capital gain plus the dividends received during the holding period. The stock returns of a certain firm clearly give an indication of the level of profitability of the firm. However, many other macro and micro economic factors go into the profitability and the overall success of a firm.

From the price time series of a firm, we can get the stock returns. According to Brooks (2008), the price time series of a stock is not suitable for statistical analysis. Mumo (2018) posits that these prices should be converted into returns because returns are unit-free as compared to prices, and are therefore more suitable for statistical analysis than the prices. Stock returns can either be simple or compound. Simple returns are obtained by getting the proportionate difference in the prices between two successive trading days. Simple returns have their own weaknesses when used for statistical analysis and most researchers prefer to use compound returns. These returns are obtained by taking the natural logarithm of the price of a stock today over the price of the same stock yesterday. Stock prices play a critical role in give a general outlook of the economy for an investment platform (Mwaore, 2017). In this paper, stock returns are the dependent variables in the regression equation.

1.1.3. Macroeconomic Factors and Stock Returns

Stock returns are affected by both micro and macroeconomic variables. In turn, these returns also affect micro and macroeconomic variables (Mumo, 2017). According to the KNBS Leading Economic Indicators Bulletin 2018, the leading macroeconomic indicators in Kenya are the CPI and inflation, interest rates, agriculture, international trade, manufacturing, building and construction, energy, tourism and transport. The fluctuation of major currencies also affects stock

returns. This is because, on top of the fact that fluctuations in these currencies affect the balance of payments, listed firms are items of international concern. This paper considers the effect of a few local and global macroeconomic factors on the returns of stocks at the NSE. Specifically, it considers the effect of the inflation rate, foreign exchange rate, treasury bill rates and world price index on the earnings of stocks at the NSE.

Inflation reduces the real value of money. Therefore, uncontrolled inflation has a negative impact on stocks, except in inflation-indexed stocks. However, this is not always the case, as some sectors of the economy thrive when inflation is high. There are also empirical studies that argue that investors are compensated for inflation in capital gains and dividend payouts. For example, Vena (2014) found out that the returns of the firms listed at the NSE are positively correlated to the rate of inflation, meaning that when inflation is high, stock returns are also high. This paper will also test whether this is true or not.

On the other hand, according to economic theory, when the domestic currency of a certain country is stronger than the currency of the major export destinations, then the country's economy is healthy, and stock returns are high. When the home currency depreciates relative to other currencies, stock prices drop. In the NSE in particular, empirical studies have shown that rate of foreign exchange influences returns of publicly traded companies significantly (Chirchir 2011).

When it comes to interest rates, when the interest rate at which banks borrow from each other increases, the rate at which banks lend individuals and businesses rise as well. Individuals have less disposable income as increased interest rates make living costs high. Businesses also find it very expensive to access credit and fund their development projects. With little growth prospects and low profitability, the stock price of listed firms therefore takes a hit, other factors remaining constant. If stocks decline in several listed firms, there is a general decline in the entire market,

and equities become too risky to invest in. That explains why economic theory posits that an increment in the rates of interest leads to a decrement in stock prices.

We also are in the era of globalization and financial markets in the world are becoming more and more integrated. Firms operate on a global scale and investors diversify their wealth outside the borders of their home country. The economy of a country is therefore tied to the economic and political conditions of other countries. The rate of return of stocks in the NSE therefore depends on the economic and political conditions beyond the Kenyan borders. This underpins the need to study how the World Price Index and other global macroeconomic variables affect the returns of publicly traded firms in Kenya. The MSCI World index is taken to be the proxy the global macroeconomic variable in this paper. With more than 1600 constituents across 23 countries, this index is one of the most reliable equity indices in the world, according to msci.com. It covers developed economies such as Australia, Canada, France, Hong Kong, Austria, Israel, Finland, Italy, Netherlands, Switzerland, New Zealand, Japan, Norway, Portugal, Ireland, Germany, Spain, Denmark, Sweden, Singapore, the U.K, the U.S and Belgium. This index is used by professional investors to analyze the performance of their local and international investments.

1.1.4. The Nairobi Securities Exchange

Shares and stocks trading in Kenya commenced around 1920s. Nevertheless, these transactions were informal owing to the fact that guidelines overseeing stock broking activities never existed. (Ngugi, 2003). In 1954, Nairobi Stock Exchange was founded as a voluntary association of stock brokers registered under the societies act. Formerly Nairobi Stock Exchange, the Nairobi stock exchange limited in July 2011 changed its name to Nairobi securities exchange to revolve into a full service securities exchange. It operates under the jurisdiction of Capital Markets Authority (CMA) and boasts of 64 listed companies, on top of being listed itself. Major indices include the

NASI and the NSE 20 share index (NSE, 2017). The NSE 20 share index is driven by the weighting of the market capitalization of twenty companies. The NSE 20 share index has been oscillating over time with these swings and swerves affecting the volatility of share returns Ndegwa (2015). Ndegwa (2015) further posits that a wide array of macroeconomic variables not limited to exchange rate, government expenditure, inflation, interest rates and oil prices have had distressing effect on the overall economic environment thereby impacting the performance of the securities comprising the NSE 20.

1.2. Research Problem

The interrelationship between the macroeconomic environment and the capital market is an area that has been researched widely in the whole world. Studies in both developed and developing countries try to explain how various factors in the economy affect stock returns. There is an endless number of macroeconomic factors that can be studied in relation to the capital markets and therefore none of the studies done so far has come to a conclusive end. There is therefore the need to continue studying this subject, and this explains why this study is important. Moreover, the movement of macroeconomic variables in emerging markets is more unpredictable compared to the movement of the same variables in developed markets. The Nairobi Stock Exchange, being an emerging market in an undeveloped country needs to be studied deeply.

Indeed, in the recent periods, the movement of macroeconomic variables in Kenya has been very unpredictable. This has led to volatility in stock returns. Many researchers locally and globally have tried to explain these movements in relation to the capital market. Empirical studies have proven that macroeconomic factors and stock returns are highly correlated (Ouma and Muriu, 2014). The macro-economy in general affects stock returns. Of interest to many investors is the

effect of specific macroeconomic variables with a special regard to the significance and direction of effect.

While it has been shown that macroeconomic aggregates have a notable sequel on stock returns, it is not always easy to determine how each macroeconomic factor affects the stock returns of a particular stock market in isolation. This is because the number of factors affecting stock returns increase by the day such as changes in the political environment, technological development, crowd psychology, global trends and many more.

Several studies in Kenya and abroad have managed to explain the size and direction of effect of various macroeconomic factors on stock returns. Some of these studies include Ouma and Muriu, (2014), Muchiri (2012), Oriwo (2012), Karubari (2017), Mugambi and Okech (2016), Rotich (2016), Songole (2012), and Mumo (2017). Most of these studies concentrated on the impact of money supply, foreign exchange, inflation and interest rates, GDP and industrial production index as discussed in chapter 2. The findings in these studies are that macroeconomic factors together have a direct bearing to the financial outcome of corporations listed at the NSE.

Clearly, almost all the previous empirical studies on this subject focused on the domestic variables only. It is a well-known fact the returns of the firms listed at the NSE are affected by global economic factors. However, this area has not been studied widely in the Kenyan context. This study fills this research gap. There are such studies in other countries. For instance, Nisha (2015) studied the effect of both local and global macroeconomic variables on the Bombay Stock Exchange and found out that the stock returns in India were influenced by the interest rates, exchange rates, gold price and money supply. It was also observed that there is a strong correlation between the Bombay Stoke Exchange and the world price index, which places India on the map of global financial markets. This study follows the same approach, but in the Kenyan context. In

the support of this move, previous studies have shown that globalization and digitalization are stronger than ever (Zelga, 2017), and the global standpoint in the study of how macroeconomic factors influence stocks cannot be overlooked. According to Zelga (2017), capital markets are exposed to global macroeconomic influences, and a majority of listed companies in the stock exchanges are global concerns having a strong impact on the local investment environment. This emphasizes the need to investigate the influence of global macroeconomic variables on the returns of the corporations whose shares are trading at the NSE. Indeed, this paper will attempt to answer the question: how do global and local macroeconomic variables affect stock returns at the NSE?

1.3. Objectives of the Study

The objective of this study is to probe the effect of selected macroeconomic variables on the returns of the firms at the Nairobi Securities Exchange.

1.4. Value of the Study

This study will be useful to several professionals and the government. To begin with, professional investors will use this study to decide on the investments to choose when there are changes in various macroeconomic factors, both locally and globally. They will find the study useful in helping them perform investment analysis, measure performance, decide the most appropriate way to allocate resources and create appropriate hedging positions. Foreign investors will also find this study useful in evaluating how viable it is to invest at the NSE at various times depending on the performance of other major economies of the world.

The government will also benefit from this study by deciding the best fiscal and monetary studies to adopt at various times in order to stabilize the economy. It will know how its activities will affect the returns of the companies whose shares are traded at the NSE. The global aspect of the

study also helps the government to evaluate the economy in terms of the performance of other developing and developed economies in the world. It gives the government and indeed the entire population an idea of how healthy the Kenyan economy is as compared to other economies of the world.

Researchers and scholars will also find this study useful in forming the basis of further studies. The area of securities exchange is widely researched in all corners of the world and researchers will find the results of this study useful in forming other research questions and hypotheses. The aspect of the effect of global macroeconomic factors on the local economy is brought up in this paper. Scholars and researchers may want to study the effect of other global factors apart from the World Price Index on the returns of the firms listed at the NSE.

CHAPTER TWO

LITERATURE REVIEW

2.1.Introduction

Capital markets are very essential in the economic development of a country. People always want to invest in it and make a kill. That is why there has been ongoing research on the way investors choose the financial instruments to invest in. This chapter examines these studies both from a theoretical standpoint and empirical standpoint and identifies the research gap.

2.2.The Theoretical Review

This piece explores the efficient market hypothesis, the Mean Variance Portfolio theory, Capital Asset pricing model and the Arbitrage pricing theory. These are the theories on which the study is based.

2.2.1. The Efficient Market Hypothesis

According to the EMH by Malkiel and Fama (1970), there exists no arbitrage opportunity in the pricing of assets. That means that price of an asset in the market incorporates all the available information. This theory therefore asserts that the value or price of stocks reflects all the available information with regard to both the micro and macroeconomic environment.

Based on the EMH, investors and researchers have always been looking for a way of choosing the right securities to invest in. The first notable research in the way people choose investments is the Mean Variance Portfolio theorem, or the Markowitz Portfolio Theory (1952). Later came the CAPM that was an improvement of the MPT. The CAPM has several weaknesses, one of them being that it summarizes the systematic risk into only one parameter, the beta. The Arbitrage

Pricing Theory is a multifactor model that posits that the returns on a risky security can be explained with respect to a series of factors.

2.2.2. Mean-Variance Portfolio Theory

The MPT was the first real trial to show the advantages of diversification for investors using statistical techniques (Brooks 2008). According to the theory, risk and return are the only two factors that determine investing decisions. When investors choose investments, they do so depending on the mean as well as variance of the expected returns. Higher returns are expected when high risks are taken and vice-versa. The MPT is thus used to make efficient portfolios. Though useful, the MPT has several weaknesses. For instance, it ignores the actuarial risk, or the risk that the counter parties in an agreement will fail to honor their obligations. The CAPM was introduced as a more useful version of the MPT.

2.2.3. The Capital Asset Pricing Model

While the MPT is used by individual investors to make investing decisions on a certain security, the CAPM covers the entire market. It explains the inter-play of risk and return in the whole market. For the CAPM to hold, the market should be in equilibrium and investors must act in accordance with the MPT. The CAPM also assumes that all investors have identical one period horizon. Unlimited borrowing is allowed to all investors according to this model. Information is also assumed to be freely and constantly available, with the market of risky assets being perfect. Moreover, an investment on risk free security is considered, where the variance on the return is zero and the only differential in the investor returns is occasioned by their ability to take up more risks. It posits that the anticipated return of an asset in relation to its riskiness is derived from the variance of the security's historic rate comparative to portfolio.

The CAPM has several limitations. Indeed, some empirical studies do not support it. Several modifications to it have been done, but still the model is very limited, though very useful. Some CAPM extensions include the CAPM version with zero-beta, and the CAPM version with multi-periods. Recently, Mumo (2018) studied the CAPM with time-varying beta. These extensions didn't make much of a difference. Models with less restrictive assumptions are therefore better in predicting the actual behavior of security markets than the CAPM.

2.2.4. The Arbitrage Pricing Theory

The APT is an equilibrium market model that is less restrictive compared to the CAPM. Originally developed by Ross (1976), this model is based on arbitrage-free pricing. When a market is in equilibrium, there should be only one price for an asset. The return provided by such an asset can be explained as a linear function of variables or indices, according to Sahu (2015). This relationship can better be explained using the equation $R_i = \alpha + \beta_1 x_{1t} + \beta_2 x_{2t} + \cdots + \beta_t x_t + \varepsilon_t$ where, R_i is the return of a risky asset, x_{it} are the various risky factors determining the return while the betas explain the sensitivity of the stock return to each of the factors.

The APT is very general, meaning that any set of factors can be studied, Mumo (2017). This means that it considers the fact that the returns of risky assets are influenced by risks from several different sources. It is also based on the no-arbitrage condition, which is very essential in the financial environment, Ndegwa (2015).

2.3. Determinants of Stock Returns

Stock prices and returns are mainly influenced by the demand and supply forces. Stock return has been renowned as a noteworthy dictator of investment's success or failure Ndegwa (2015, thus exemplifying the quest for organizations to be able to reach their strategic operations and growth

prospects through financing of these strategic goals in order to play and sustain their role in creating value-add to the various firm's stakeholders (Ndegwa, 2015)

2.3.1. Inflation

Inflation denotes the universal rise in commodity prices over time period. According to Basu (2011), inflation is the continual rise in the price of all commodities in an economy over time thus eroding the purchasing power of the local currency in the economy. Inflation therefore has a spiral influence on the other macroeconomic not limited to interest rates, exchange rates and gross domestic product (Njau, 2011). In their Kenya Economic Outlook (2017) publication, Deloitte observed a rise in inflation from 6.3% in 2016 to 10.3% in March 2017 mainly explained by the increased cost of food and electricity and was expected to stabilize at an average of 5% with sound CBK monetary policies.

2.3.2. Interest Rate

Chen et al (1986) articulates interest rate as the price that someone pays to consume someone else's funds, the deferred consumption by the lender for borrower's consumption today. Chen et al (1986) found that interest indeed has an influence on the stock returns and so was Ouma and Muriu (2014) who found that interest rate negatively affected the long term prices of stocks. Mumo (2017) posits that the rate of 91-day treasury bill endured economic mishaps to steady at the 8% mark in 2015 to 2017 period despite the pressure from interest rate capping.

2.3.3. Exchange rate

Exchange rate denotes the price of acquiring a certain currency in place of another, the price of a currency for a unit of another currency. US dollar (USD) remains the focal currency in Kenya in relation to foreign currency investments as well as general trade of goods and services, Ndegwa (2015). Findings by Nisha (2015), Mugambi and Okech (2016) and Songole (2012) suggest an

inverse trend line between exchange rates and stock returns. Mumo (2017) however found a direct relationship. Ndegwa (2015) meanwhile points to the presence of a link between exchange and stock returns.

2.3.4. World Price Index

MSCI World Index indicates a value-weighted world price index and is acts as a proxy for the global macroeconomic variable in this study. According to MSCI.com, world price index is a natural gauge index for in excess of six thousand worldwide stocks, expressive of solely the advanced economies of the world like Australia, France, Germany, Norway, Spain, United Kingdom, Italy, Japan, New Zealand, United States, Singapore to name a few (Nisha, 2015). Nisha (2015) in the research on Bombay stock exchange found that world price index had a positive influence on the stock returns.

2.4. Empirical Review

Several scholars both locally and around the globe have studied the effect of various macroeconomic factors on the stock returns. For instance, Nisha (2015) studied the effect of both local and global macroeconomic variables on the Bombay Stock Exchange and found out that the stock returns in India were influenced by the rate of interest, exchange rates, gold price and money supply. Jambotkar and Raju (2018) also performed a similar study. Their results were that macroeconomic variables together had an indisputable influence on the movement of various market indices in India but the impact of one variable independently was insignificant. Elsewhere, Osamuonyi, and Evbayiro-Osagie, (2012) performed a similar study in Nigeria and found out that the interest rates, GDP and money supply affected the Nigerian stock market index negatively while inflation, fiscal deficit and exchange rates affected the same index positively.

Another study by Talla (2013) examined the impact of inflation, currency depreciation, money supply and interest rates on the Stockholm Stock Exchange. He found that currency depreciation and inflation revealed negative and significant impression on the Stockholm stock exchange. The impact of interest rate was negative but significant while that of money supply was positive and insignificant. Sirucek (2012) performed a review of the US stock market indices, particularly the S&P 500 and DIJA and selected macroeconomic variables, specifically producer price index, interest and inflation rates, Industrial production index, money supply, oil prices and unemployment. He found that the S &P 500 is majorly affected by the rate of interest while DIJA is affected by the producer price index, industrial production index and oil prices. Both indices were affected by changes in inflation rate and unemployment.

Similar studies have also been conducted locally. For instance, Ouma and Muriu (2014) investigated the effect of inflation, money supply (M2), foreign exchange, and interest rates on the performance of stocks at the NSE. Their findings were that these macroeconomic factors had notable effects on the returns of risky securities at the NSE. Stock returns were particularly affected by money supply, inflation and exchange rates. The rate of interest had minimal impacts on the returns in the NSE. They used monthly date between 2003 and 2013. Muchiri (2012) did a similar study. He used secondary data of 59 corporations enlisted in the NSE as at June 30 2016 and found that both the amount of money in circulation and the inflation rate had a positive impact on the stock returns while interest rates had negative effect on the same returns. Foreign exchange rate had a negative impact as well but its effects were more significant than the other three variables. Jointly, these variables explained 95.6% of the stock returns. Therefore, this study supports the fact that stock returns are affected more by macroeconomic aggregates than by each of the variables singly.

This study is similar to another study by Oriwo (2012) which studied the relationship between the lending rates of interest, inflation rates and the rate on a 91-day treasury bills on the Nairobi All Share Index. Oriwo (2012) used all the 58 listed firms on the NSE at the time of the study and found out that the rate on the 91-day Treasury bill impacted negatively on the NASI. The impact of the inflation rate was positive but insignificant. The lending rate was dropped from the regression equation because it was found to be correlated with the 91-day Treasury bill. Recently, Karubari (2017) studied the effect of lending interest rates, the GDP and inflation on the stock market depth at the NSE using all the 66 listed firms in the NSE between January 2006 and December 2016. She found out that the economic growth positively affected the value of traded stocks at the NSE while both inflation rates and interest rates had negative impacts. Mumo (2017) performed the same study, but used a broader monthly data set (the NSE 20 share index for 18 years) and got similar results. Several other studies gave similar results. Precisely, Mugambi and Okech (2016) studied the effect of the inflation, interest and exchange rates as well as the GDP on the returns of listed commercial banks in the NSE. Inflation, exchange and interest rates were found to have noteworthy impacts on the stock returns of the listed banks. The effect of the GDP was insignificant. Songole (2012) studied the influence of the market interest rate, CPI, foreign exchange rate and Industrial Production Index on the firms listed at the NSE and found that the market interest rate, CPI and exchange rates had a negative correlation with the stock market returns while the industrial production index had a positive relationship.

2.5. Conceptual Framework

This study is concerned with the effect selected local and global macroeconomic variables on the returns of the firms enlisted at NSE. The selected macroeconomic variables which are the interest rates, exchange rates, inflation and the World Price Index are the independent variables or the

input. The returns of companies enlisted at the NSE is the dependent variable or output. In this study, the focus is on technical factors as determinants of stock returns.

Interest rates

Inflation

Exchange rate

The World Price Index

Fundamental factors

Market sentiment
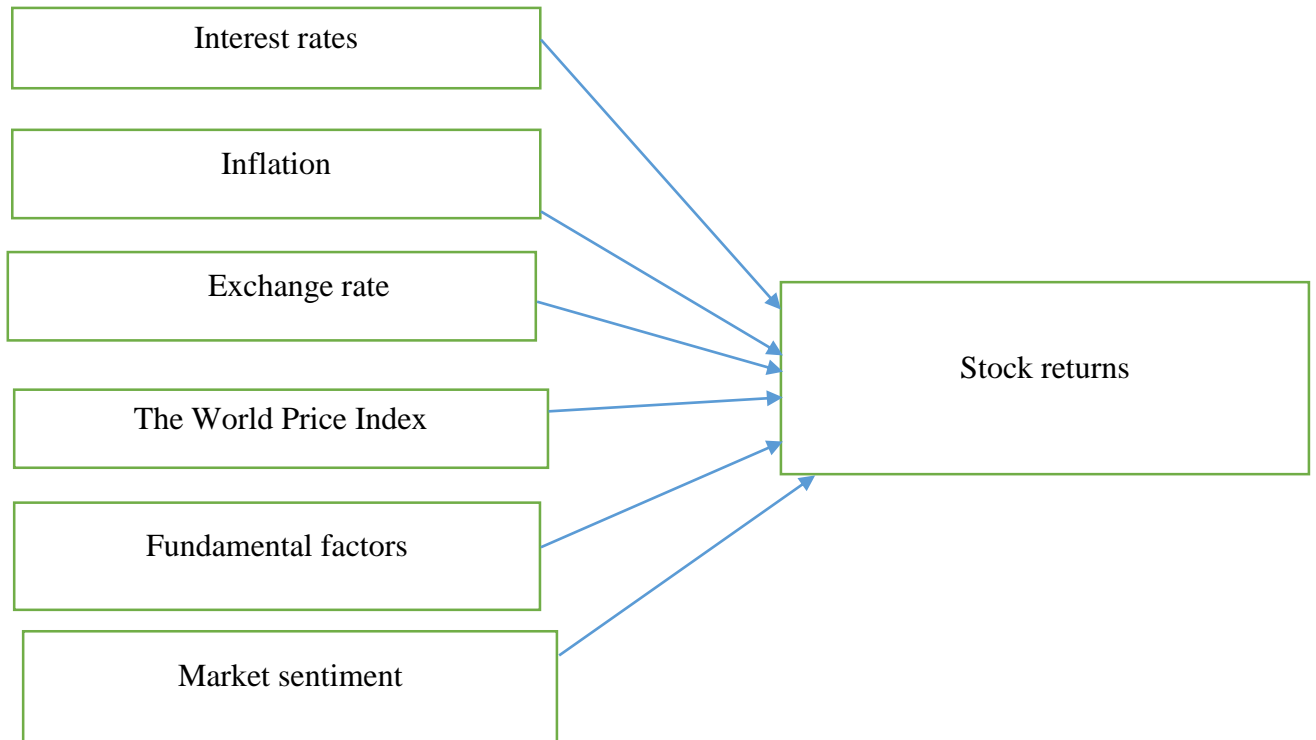
Stock returns

Figure 1.1 The independent and dependent variables

2.6. Conclusion of the Literature Review

In summary, there has been several studies on the effect of various macroeconomic variables on the stock returns of firms listed on the NSE, but none of these studies has considered the global macro economy. Such studies exist elsewhere, and this study brings in the aspect of global macroeconomic variables in the study of the effects of returns on the listed firms in the NSE.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1.Introduction

This section explains how the data used in this paper will be obtained, how it will be analyzed and how it will be presented. It also explains the research approach used in the paper.

3.2.Research Design

This study follows a descriptive research approach. It identifies and classifies the effect of the selected local and global macroeconomic variables on the stock returns at the NSE. It explains how the returns of publicly traded firms in Kenya are affected by unexpected changes in interest, foreign exchange, and inflation rates as well as the world price index. It is both quantitative and qualitative, as numerical data got from the KNBS and the CBK is used to make inferences about the less tangible aspects of the NSE.

3.3.The Population

This study targets all constituent companies in the Nairobi All Share Index in the Nairobi Securities Exchange.

3.4.Sample Design

A suitable representative of the market portfolio is chosen to be the NSE 20-share index, which consists of the most traded and principal stocks with the highest market capitalization. It is both a non-probabilistic and purposive sample. It is a reflection of the entire market and we can generalize the results of this study to the entire NSE

3.5. Data Collection

This study uses secondary data. Historical data for the NSE 20 share index will be obtained from the NSE. The values of the interest rates, foreign exchange rates and inflation rate are obtained from the KNBS and the CBK. The world price index is obtained from msci.com, which is the official website of Morgan Stanley Capital International, an American firm that provides equity, hedge fund and stock market indexes for investors (Wikipedia). The main data collection tool for this paper is therefore reports and releases by the KNBS, CBK and the NSE.

3.6. Data Analysis

This study uses monthly returns data of the 20 firms that form the NSE 20 share index from January 2010 to December 2017. Analysis is performed through multiple regression in E-Views using an APT-style model.

The model used can be expressed as:

$$Sr_t = \alpha + \beta_1 * IR_t + \beta_2 * IFR_t + \beta_3 * FER_t + \beta_4 * WPI_t + \varepsilon_t$$

Where

Sr_t is the NSE 20 share index returns in month t, IR_t is the interest rate for month t, IFR_t is the inflation rate for month t, FER_t is the foreign exchange rate for month t, WPI_t is the World Price Index for month t and ε_t is the error term of the regression model for month t. $\beta_1, \beta_2, \beta_3$ and β_4 are the coefficients of the macroeconomic variables.

Before the data is fitted to this model, it is first transformed in various ways. To begin with, continuously compounded stock returns will be calculated using the formula:

$$R_t = \log\left(\frac{pt}{pt-1}\right) * 100 ,$$

Pt is the NSE 20 index at time t. 91-day Treasury bill rate will be converted into an annualized rate by dividing the rate by 12. Excess returns over the risk free rate for each stock will be calculated. The set of changes or differences for each of the variables will also be generated, since it is the unexpected changes in these variables that explain the returns of risky securities, according to the APT. These changes are the differences between the actual value of the variable and its expected value (Roztocki and Weistroffer, 2007). One assumption made here is that investors do not expect a change in the macroeconomic variables.

3.6.1. Regression Analysis

The set of changes or differences in the macroeconomic variables generated is regressed against excess stock returns of each firm. The regression results will show the variables that have significant impacts on the excess returns of the listed firms. They will also show the signs of the coefficients which will signify the direction of effect.

3.6.2. Diagnostic Tests

Before the data is analyzed, linearity tests on the data will be performed to ensure that a multiple regression model is suitable for the data analysis. The unit root test will also be performed to confirm stationarity or non-stationarity while the white test or residual plots are used to test for heteroscedasticity.

3.6.3. Tests of Significance

The normality test will be performed to allow hypothesis testing. Using the F-statistic, the hypothesis that each of the slope parameters are jointly zero will be tested. The coefficients will be examined to confirm whether they have the expected signs, using prior theoretical and empirical

knowledge of the effect of the specific variable on stock returns. The sizes of the parameters will

also be studied to confirm whether they are plausible.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1. Introduction

This study examines the effect of selected local and global macroeconomic variables on the stock returns of the corporations enlisted at the NSE. The selected macroeconomic variables include inflation, rate of interest, foreign currency exchange plus the world price index. The regression analysis is done using Eviews software 9th edition. The data used for this study is available in appendix II.

4.2. Descriptive Statistics

By means of descriptive statistics, mean and standard deviation of the four predictor variables was computed out of which are the below results in table 4.1.

Table 4.1 Descriptive Statistics

|	EXCESS_NSE20_RETURNS	DERUSD	DINFL	DLIR	DWPI
Mean	-0.780214	-0.2874	0.006947	0.014105	-10.357
Median	-1.477257	-0.268	0.02	0.04	-14.85
Maximum	12.42279	7.594	1.37	3.8	120.17
Minimum	-12.04675	-4.913	-1.33	-3.3	-123.88
Std. Dev.	4.647273	1.6566	0.5597	0.6347	51.06126
Skewness	0.539135	1.6007	-0.025	0.5339	0.431119
Kurtosis	3.103442	11.397	3.5433	22.492	3.2734
Jarque-Bera	4.644576	319.69	1.1791	1508.4	3.238709
Probability	0.098049	0	0.5545	0	0.198026
Sum	-74.12037	-27.309	0.66	1.34	-983.91
Sum Sq. Dev.	2030.132	257.9906	29.45081	37.872	245081.7
Observations	95	95	95	95	95

Source: Research Findings.

The NSE 20 returns, inflation rate and world price index are approximately symmetrically skewed indicating that they are normally distributed. From the rule of thumb, if the skewness is in the

22

range of -0.5 and +0.5, then the distribution is held to be approximately symmetrical. This is supported by Kurtosis of a greater than +3. The normality test is rejected very strongly for the DERUSD and DLIR series because the Jarque-Bera statistic in these series are very significant (do not lie between -0.5 and +0.5), and the P-values are 0 in both cases. This is also supported by their kurtosis values which are more than 3 by far meaning that these two series do not follow a normal distribution. For the rest of the series, the null hypothesis of normality is not rejected because the p values are more than 0.05 at 5% significance level, meaning that the series can be assumed to follow a normal distribution.

The four explanatory variables in this study i.e. interest rates, inflation rates, foreign exchange rate and the World Price Index are plotted to show their volatilities over time as shown below. These graphs show that these macroeconomic variables are volatile. The researcher seeks to find out if the volatility in these macroeconomic variables is priced in the stock returns and if so, to what extent.

Figure 4.1 Line Graph of Foreign Exchange Rate (USD/KES) from Jan 2010 to Dec 2017
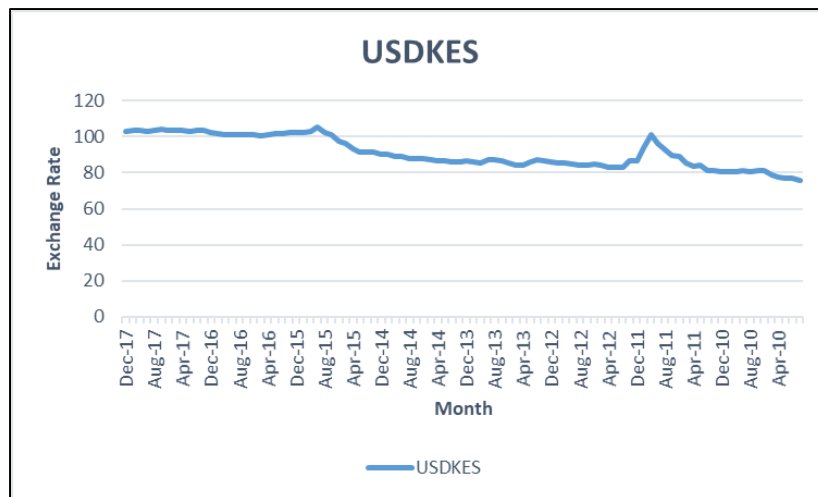
Source: CBK and Research Findings

The USDKES exchange rate has been increasing from 2010 to 2017 closing at 103.095 in Dec 2017. The exchange rate peaked in Sep 2015 at 105.275 and was at its lowest at 75.785 in Jan 2010 with a mean of 91.214 and a standard deviation of 1.6566.

Figure 4.2 Line Graph of Inflation Rate from Jan 2010 to Dec 2017

Source: KNBS and Research Findings

The inflation rate has been fairly stable from 2010 to 2017 with a mean of 7.63%, a low of 3.9% in Jan 2011 peaking at 16.5% in Mar 2011. Despite the upswing witnessed in Sep 2011 to Nov 2012 where the mean rose to 14, inflation eased off at an average of 8% to close at 8% on Dec 2017 standard deviation of 0.5597.

Figure 4.3 Line Graph of Interest Rate from Jan 2010 to Dec 2017

24

The Treasury bill rate was erratic over the period of study with a high of 21.65% in Oct 2015 and a low of 1.6% in July 2010. The average rate was 8.845% and a standard deviation of 0.6347.

Figure 4.4 Line Graph of World Price Index from Jan 2010 to Dec 2017

The World Price Index

The world price index was steadily on the rise for the period of study with a low of 1041.30 in Jun 2010 and a high of 2103.50 in Dec 2017, at an average of 1530.09 with the standard deviation being 51.06126.

Figure 4.5 Line Graph of NSE 20 Share Index from Jan 2010 to Dec 2017

Share Price - NSE 20 Share Index

The NSE 20 share price index was fairly stable experiencing a few bumps for the period of study with a low of 2794.27 in Jan 2017 and a high of 5491.37 in Feb 2015, a mean of 4152.47, a resultant standard deviation of 4.647273.

Economic data is known to be heteroscedastic, to mean that the variance of the errors change with time. Since the data set in this study is small, plotting the residual plots will suffice to test for heteroscedasticity. The residual plots shown in appendix I show that the residuals of the regression change progressively over the model an emblem of heteroscedasticity.

4.3. Results of Correlation Analysis

The correlation coefficient is used measure the strength of the relationship between the relative movements of the two variables. Confined between -1 and +1, the coefficient means a perfect negative correlation if -1 and perfect positive correlation if +1. Table 4.1 below details the findings.

Table 4.2 Correlation Coefficient Matrix

	EXCESS_NSE_20	DERUSD	DINFL	DLIR	DWPI
EXCESS_NSE_20	1	-0.737048376	-0.517672035	-0.339880079	0.17475235
DERUSD	-0.737048376	1	-0.072960677	-0.346995362	-0.98340153
DINFL	-0.517672035	-0.072960677	1	0.123656742	-0.622435945
DLIR	-0.339880079	-0.346995362	0.123656742	1	-0.801091479
DWPI	0.17475235	-0.98340153	-0.622435945	-0.801091479	1

Source: Research Findings.

The variables have a linear influence on the share price. All the variables significant negative correlation with share price save for the world price index.

4.4. Regression Analysis

The Annual average inflation rate is used as the proxy for the inflation rate, as it is the annual average CPI. The exchange rate of the Kenyan Shilling against the US Dollar is used to represent the foreign exchange rate because of its increased volatility in the recent periods. For the interest

rates, the 91-day Treasury bill rate is used. The World Price Index is used to represent the global macroeconomic variables.

The series of differences for each of variable is obtained. These differences can be understood as the difference between the realized or actual value of a variable and the expected value. These differences are used because APT asserts that it the changes in these macroeconomic variables that affects stock returns rather than their levels. Price series are converted into returns series and excess returns of each firm are computed using the formula:

Excess returns = Index returns –annualized treasury bills rate. Excess returns series over the NSE-20 are generated as by deducting the monthly risk-free rate from the continuously compounded returns of these series.

Figure 4.6 Line Graph of NSE 20 Share Index Excess Returns
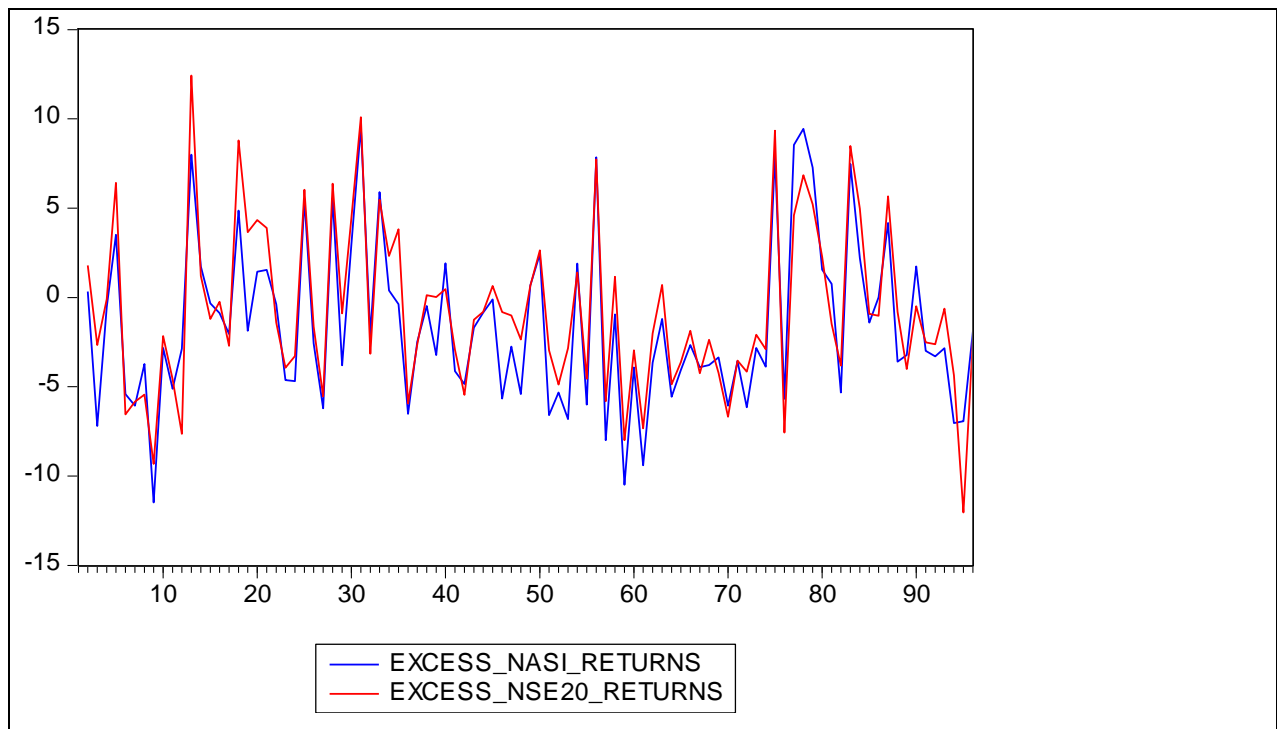
Source: Research Findings.

These excess stock returns series are regressed against the differences in the macroeconomic variables. The regression equation is of the form:

$$Sr_t = \alpha + \beta_1 * IR_t + \beta_2 * IFR_t + \beta_3 * FER_t + \beta_4 * WPI_t + \varepsilon_t$$

The regression analysis outcomes can be summarized in the table below

4.4.1. Model Goodness of Fit

Table 4.3 Results of Model Goodness of Fit

Dependent Variable: EXCESS_NSE20_RETURNS Method: Least Squares Date: 11/22/18 Time: 19:05 Sample (adjusted): 2 96 Included observations: 95 after adjustments			
R	0.345928		
R-squared	0.119666	Mean dependent var	-0.780214
Adjusted R-squared	0.08054	S.D. dependent var	4.647273
S.E. of regression	4.456199	Akaike info criterion	5.877665
Sum squared resid	1787.194	Schwarz criterion	6.01208
Log likelihood	-274.1891	Hannan-Quinn criter.	5.931979
F-statistic	3.058489	Durbin-Watson stat	1.921885
Prob(F-statistic)	0.02062		

 Source: Research Findings.

A 34.6 % direct relationship between dependent and predictor variables exists out of which 11.97% is explained by variations in foreign exchange rates, interest rates, inflation and the world price index. This also infers that 88.03% of the swings in share prices are accounted for through other factors beyond the researcher's model. A 3.058489 F-statistic validates the model; hence the model can be used with certainty in predicting the dependent variable.

4.4.2. Analysis of Variance (ANOVA)

Table 4.4 Results of ANOVA

Test for Equality of Means Between Series Date: 11/22/18 Time: 21:48 Sample: 1 96 Included observations: 96				
Method		Df	Value	Probability
Anova F-test		(5, 564)	3.539436	0.0037
Welch F-test*		(5, 247.089)	3.989805	0.0017
*Test allows for unequal cell variances				
Analysis of Variance				
Source of Variation		Df	Sum of Sq.	Mean Sq.
Between		5	7825.971	1565.194
Within		564	249409.7	442.2157
Total		569	257235.6	452.0837
Category Statistics				
				Std. Err.
Variable	Count	Mean	Std. Dev.	of Mean
DERUSD	95	-0.287463	1.656678	0.169972
DINFL	95	0.006947	0.559738	0.057428
DLIR	95	0.014105	0.63474	0.065123
DWPI	95	-10.35695	51.06126	5.238775
EXCESS_NSE 20_RETURNS	95	-1.563257	4.580812	0.469981

Source: Research Findings.

The model on being regressed gave 257235.6 sum of squares and a mean square of 452.0837
resulting in a F value of 3.539436, higher than the F critical value of 2.64. Therefore, the selected
macro variables contribute significantly explaining the swings in the share price and this can be
reliably used in predicting the dependent variable.

4.4.3. Model Coefficients

Table 4.5 Estimates of the Model Coefficients

Dependent Variable: EXCESS_NSE20_RETURNS Method: Least Squares Date: 11/22/18   Time: 19:05

| Sample (adjusted): 2 96 | | | | |
| Included observations: 95 after adjustments | | | | |

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.60036	0.478055	-1.25583	0.2124
DINFL	-1.365624	0.878958	-1.55368	0.1238
DLIR	-0.426544	0.829484	-0.51422	0.6084
DWPI	0.02269	0.009305	2.438573	0.0167
DERUSD	-0.245761	0.301872	-0.81412	0.4177

Source: Research Findings.

The betas (coefficients) of the regression model serve in showing the trend of the relationship of the dependent and independent variables. The signage of the coefficients of independent variables are in line with the theoretical assumptions that a rise in interest rate, inflation and foreign exchange rate has a negative impact on the share price. The World Price Index, proxy of the global macroeconomic variables shows a mild positive bearing on the price of shares.

4.5. Discussion of Findings

The descriptive statistics resulted in a share price mean of 4152.47, a high of 5491.37 and a low of 2794.27. A meagre 4.647273 was recorded as the standard deviation on the NSE 20 share price index. On to the predictor variables, the means and standard deviations are as below respectively: Foreign exchange rate was 91.214 and 1.6566, Interest rate was 8.845 and 0.6347, Inflation was 8 and 0.5597 while WPI was 1530.09 and 51.06126.

The correlation coefficient shows a negative relationship of the predictor variables with the index for inflation at -1.365624, interest rate at -0.426544, exchange rate at -0.245761 and a positive low significant relationship of WPI at 0.02269 against the index. These outcomes of the regression model positively identify with the empirical studies that interest rate, inflation and exchange rate are inversely related to the share price though with varying degrees. The insignificant direct relationship of WPI with the share price is also supported by previous studies.

The regression model further posits that 11.97% of the share price variations are explained by changes in inflation, rate of interest, USD/KES rate plus world price index inferring that 88.03% is explained by other factors.

Results from ANOVA show F statistic of 3.539436. Only 5 observations were found to be higher than 2.64. This confirms that the model is suitable for predicting the share price.

The findings on the study show that the four predictor variables exert an influence on the prices of stocks enlisted in NSE 20 share price index. These findings are in agreement with Nisha (2015), Mugambi and Okech (2016), Mwaore (2017) and Songole (2012) whose findings are that there exists an inverse relationship between inflation, exchange rate, interest and the share price. An insignificant positive direct relationship is observed by Nisha (2015) on Bombay Stock Exchange. While the study findings agree with Mumo (2017) that the four predictor variables have an influence on the share prices of stocks listed in NSE 20 share price index, they contradict on the direction of the signage of the coefficients. Mumo (2017) posits that the signage of inflation, interest and exchange coefficient is positive.

The findings from the study further support the EMH theory that the stock returns are affected by changes in macroeconomic factors.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter offers a snapshot of what was done during this study, the limitations of the study, suggestions for further research. It further enumerates conclusions and recommendations of the findings.

5.2. Summary of the Findings

The objective of the study was to determine the effect of selected macroeconomic variables (inflation, rate of foreign exchange, interest rate and world price index) on the stock returns at the NSE. The independent variables were investigated to establish the effect on in forecasting the stock returns. The world price index was used as a proxy for global macroeconomic variables. The selected macroeconomic variables were found to jointly drive the stock returns (share prices) at 11.97% insinuating that 88.03% of the stock return at the NSE fluctuations was occasioned by macroeconomic variables not in the model and therefore not included in the study. F statistic of 3.539436 was higher than the F critical value of 2.64 thus validating the model as good and statistically viable for predicting the stock returns.

The results from the model show that a unit change in inflation would translate to 1.365624 units decrease in the stock return, a unit change in interest rate would to 0.426544 units drop in the stock return, a unit change in exchange rate translates to 0.245761 units decrease in the stock return and a unit change in the world price index leads to 0.02269 units increase in the stock return.

5.3. Conclusion

The study concludes that only 11.97% of the swings in stock returns are as a consequence of swings in the nominated macroeconomic factors. The four factors had a mild effect on stock returns. 91-day treasury bill - a proxy for interest rate, the consumer price index – proxy for inflation, USD/KES rate – for exchange rate negatively influenced the stock returns. Global macroeconomic variables measured using WPI as the proxy had a mild positive effect on the stock returns. The study therefore concludes that at 11.97%, 88.03% is material and thus more other factors ought to be incorporated for a strengthened model.

5.4. Recommendation for Policy

The government should formulate policies that will create an enabling environment for inflation to be optimized. This minimizes its impact of the stock returns and also makes it possible for predictability. The contribution of government in ensuring the stability of interest rates cannot be assumed. The central bank should formulate and enforce monetary and fiscal policies that favor stability of interest rates. CBK policies should also lead to a stable shilling so as to safeguard investors and the economy at large from unfavorable changes in exchange rates. This also means stable returns from the firms' operations. Researchers and scholars should take cognizance of the findings and embody them in the pool of knowledge. The impact of global macroeconomic factors on the returns at the NSE would important in evaluating the influences globalization and digitization present. Investors should adopt the model in predicting the share prices of companies listed at the NSE. This saves them from losses occasioned by the changes in the four predictor variables as well gains that would be arise from missed opportunities.

5.5. Limitations of the Study

Data was collected from CBK, KNBS and MSCI, collated there for other purposes and not specifically and primarily for the sake of this study. This means that it may not be a true reflection of the actual scenario. Some of the data used was conflicting, especially data from KNBS which was different from publication to another. This puts a dent on the accuracy and reliability of the data.

The study assumed that the selected macroeconomic variables did not change over the period of the study. This may not be the case. By their very nature, macroeconomic variables are very volatile. On top of the volatility, the predictability effect especially in the short and medium term is also questionable. With conflicting findings from empirical studies, the choice of macroeconomic variables remains subjective and so is the outcome.

The study was pegged on the assumption that the predictor variables convey a linear relationship with the dependent variable. This relationship was not aggressively validated before its adoption. The possibility of a different relationship either individually or jointly cannot be wished away.

5.6. Recommendations for Further Research

The results on the macroeconomic factors that affect stock returns are diverse and conflicting both for emerging and developed economies/markets. The four predictor variables (inflation, interest, exchange rate and world price index) only account for 11.97% of the fluctuations in stock returns. The study recommends further research could be conducted to include more macroeconomic variables so as to bridge the 88.03% gap. The study also recommends other variables be incorporated as a measure for global macroeconomic factors.

The study focused on a 10-year horizon. For stability in results, studies could also be done that focuses on longer time horizons. It was assumed that during the period of study the economic environment was stable and that during the period stock return were only affected by the four predictors. It is possible that the macro environment was erratic and unpredictable. The study recommends relaxing the assumptions for a different outlook.

The study used multiple regression model to analyze the data in Eviews. Other data analysis tools could also be used to determine the effect of macroeconomic variables on the stock returns. It was conducted on the assumption that the predictor variables displayed a linear relationship. While this might hold true, it could also be farfetched. Further studies could be done to validate this assumption.

REFERENCES

About NSE. (n.d.). Retrieved October 10, 2018, from https://www.nse.co.ke/nse/about-nse.html.

Alexander, G.J., Sharpe, W.F. & Bailey, J.V. (2001). Fundamentals of investments. 3rd ed., Prentice-Hall, Englewood Cliffs, NJ.

Amata, O.E. (2017). Effect of macroeconomic variables on stock market volatility in Kenya. Unpublished PhD dissertation, JKUAT.

Basu, K (2011). (n.d.). Understanding inflation and controlling it. Retrieved on October 24, 2018, from https://www.kaushikbasu.org.

Brooks, C. (2008). Introductory econometrics for finance. Cambridge. Cambridge University Press.

Chen, N., Roll, R. & Ross, S. (1986), Economic forces and the stock market, *Journal of Business*, 59 (3), 383-403.

Chen, Y.H., & Lin, W.T. (2012). Pension benefits effects on capital market equilibrium, firm value, and financing decisions. *Journal of Business Research.* 25(1), 1-25.

Chirchir, K.D. (2011). The relationship between share prices and exchange rates: Evidence from Kenya. Unpublished MBA Project, University of Nairobi.

Crowley, J. 2007. Interest rate (2007). Interest rate spreads in English- speaking Africa. IMF working paper. April 2007.

Harvey, H. (2012). Exchange-rate volatility and money demand in selected South East Asian countries. *Economics and Finance Review*, 2(10), 1-7.

Jambotkar, M., & Raju, A.G. (2018). Impact of macroeconomic variables on the selected Indian sectoral indices: An empirical analysis. *International Journal of Academic Research and Development* 3(2), 450-456.

Kenya Economic Outlook (2017). Joining the dots, Deloitte and Touché publication. Retrieved November 28, 2018 from: https://www2.deloitte.com/…/Economic%20outlook%20ke%202017%20Final.pdf.

Karubari, N.T. (2017). The effect of selected macro-economic variables on stock market depth at the Nairobi Securities Exchange. Unpublished MSC project, University of Nairobi.

Kettell, B. (2001), Financial economics: Making sense of market information, FT/Prentice-Hall, London.

Lee, C., and Lee, A.C. (2013). Encyclopedia of finance. Springer US.

Li D, Moshirian F, Wee T, & Wu E (2009) Foreign exchange exposure: Evidence from the U.S. insurance industry. *Journal of International Financial Markets, Institutions and Money*, 19 (2), 306-320.

Lintner, J., (1965). The valuation of risk assets and the selection of risky investments   in stock portfolios and capital budgets. *Review of Economics and Statistics*,   47, 13-37.

Macroeconomics. (n.d). International encyclopedia of the social sciences…Retrieved September 24, 2018 from encyclopedia.com: http://www.encyclopedia.com/social sciences/applied-and-social-sciences-magazines/macroeconomics.

Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383-417.

Markowitz, H. (1952) Portfolio selection. *The Journal of Finance*, 7, 77–91.

MSCI ACWI INDEX. (n.d.). Retrieved October 10, 2018, from https://www.msci.com/acwi

Muchiri, G.H. (2012). The impact of macroeconomic variables on the performance of the Nairobi Securities Exchange. Unpublished MBA project, University of Nairobi.

Mugambi, M., and Oketch, T.C (2016). Effect of macroeconomic variables on stock returns of listed   commercial banks in Kenya. *International Journal of Economics, Commerce and Management,* 4(6), 390-418.

Mumo, P. M. (2017). Effect of macroeconomic volatility on stock prices in Kenya: A case of cointegration evidence from Nairobi Securities Exchange. *International Journal of Economics and Finance* 9 (2).

Mumo, P. M. (2017). The determinants of stock returns in the emerging market of Kenya: An empirical evidence. *International Journal of Economics and Finance*, 9(9), 8-21.

Mumo, S. M. (2018). The effect of time-varying beta on the validity of the CAPM in Nairobi Securities Exchange. *African Development Finance Journal,* 2(1), 161-181.

Mwaore, M. W. (2017). The effect of macroeconomic variables on share prices of firms listed on the Nairobi Securities Exchange. Unpublished MBA project, University of Nairobi.

Naik, P. K. (2013). Does Stock Market Respond to Economic Fundamentals? Time Series Analysis from Indian Data. *Journal of Applied Economic and Business Research,* Vol 3(No 1), 34-50.

Ndegwa, E. N. (2015) The Effect of Macro-Economic Variables On Stock Market Return at the Nairobi Securities Exchange. Unpublished MBA Project, University of Nairobi

Nisha, N., (2015). Impact of Macroeconomic Variables on Stock Returns: Evidence from Bombay Stock Exchange (BSE). *Journal of Investment and Management*, 4(5), 162-170.

Njau, D. K. (2011) The effect of selected macro-economic variables on the financial performance of private equity firms in Kenya. Unpublished MBA project, University of Nairobi.

Ngugi, R. (2003). Development of the Nairobi Stock Exchange: A historical perspective (No. 27). Kenya Institute for Public Policy Research and Analysis.

NSE (2017) website https://www.nse.co.ke/media-center/press-release.html retrieved October 11, 2017.

Ochieng, D. E., & Oriwo, E. A. (2012). The relationship between macroeconomic variables and stock market performance in Kenya. *DBA Africa Economic Review*,3(1), 38-49.

Odoyo, F., Muasya, R. & Kipyego, T. (2014). Effect of foreign exchange rates on price per share. *Journal of Business Administration and Education*, 6(2), 34-56.

Olweny, T., & Omondi, K. (2011). The effects of macro-economic factors on stock return volatility in the Nairobi Stock Exchange, Kenya. *Economic and Finance Review*, 1(10), 34-48.

Oriwo, A.E., (2012). The relationship between macroeconomic variables and stock market performance in Kenya. Unpublished MBA Project, University of Nairobi.

Osamuonyi, I. O., and Evbayiro-Osagie, I. (2012). The relationship between macroeconomic variables and stock market index in Nigeria. *Journal of Economics*, 3(1), 55-63.

Ouma, N.W., Muriu, P, (2014). The impact of macroeconomic variables on stock market returns in Kenya. *International Journal of Business and Commerce.* 3(11) 1-31.

Peter, Z., and P, Eisen R. 2012. Insurance economics. Springer-Verlag Berlin Heidelberg.

Ross, S. (1976). The Arbitrage theory of capital asset pricing. *Journal of Economic Theory.* 13(3). 341-360.

Rotich, A.K., (2016). The effect of selected macroeconomic variables on the financial performance of firms listed at Nairobi Securities Exchange. Unpublished MSC project, University of Nairobi.

Roztocki N. and Weistroffer H. R. (2007). How do investments in enterprise application integration drive stock prices? Proceedings of the 40th annual Hawaii international conference on system sciences.

Saeed, S. (2012). Macroeconomic factors and sectoral indices: A study of Karachi Stock Exchange (Pakistan). *European Journal of Business and Management*. 2012; 4(17):132 152.

Sahu, N. T. (2015). Macroeconomic variables and security prices in India during the liberalized period. Palgrave Macmillan US.

Sharpe, W.F. (1964), Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), 425-442.

Singh, P. (2014) An empirical relationship between selected Indian Stock Market indices and macroeconomic indicators. *International Journal of Research in Business Management*. 2014; 2(9):81-92.

Sirucek, M. (2012). Macroeconomic variables and stock market: US review. *International Journal of Computer Science and Management Studies*.

Songole, R.K. (2012). The relationship between selected macroeconomic variables and stock return at the Nairobi Securities Exchange. Unpublished MBA project, University of Nairobi.

Talla, J. T. (2013). Impact of macroeconomic variables on the stock market prices of the Stockholm Stock Exchange (OMXS30). Jonkoping International Business School.

Vena, H. 2014. The effect of inflation on the stock market returns of the Nairobi Securities Exchange. Unpublished MSC thesis, University of Nairobi.

Zelga, K. (2017). Influence of macroeconomic factors on the financial market. *World Scientific News*. 78 (2017), 164-169.

Zhu, B. (2012). The Effects of macroeconomic factors on stock return of energy sector in Shanghai Stock Market. *International Journal of Scientific and Research Publications*. 2(11),1-4.

APPENDICES

Appendix I: Residual Plots

NSE 20 Index
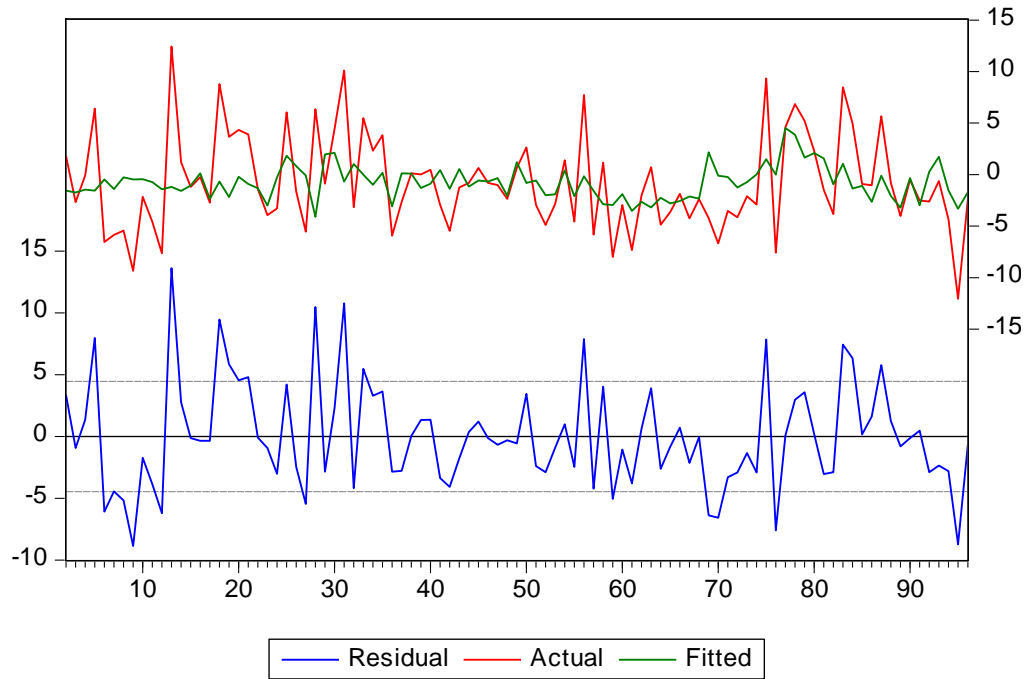
Appendix II: Study Data

Month	ERUSDKES	INFL	MSCI	IR	NSE 20
Dec-17	103.095	8.0	2,103.5	8.01	3,711.94
Nov-17	103.571	8.2	2,077.4	8.01	3,804.69
Oct-17	103.388	8.3	2,036.8	8.09	3,729.62
Sep-17	103.12	8.4	2,000.6	8.13	3,751.46
Aug-17	103.556	8.4	1,959.7	8.18	4,027.12
Jul-17	103.877	8.2	1,961.1	8.22	3,797.53
Jun-17	103.491	8.1	1,916.4	8.42	3,607.18
May-17	103.262	7.8	1,911.7	8.73	3,441.05
Apr-17	103.325	7.2	1,878.3	8.77	3,157.58
Mar-17	102.853	6.8	1,853.7	8.68	3,112.52

Feb-17	103.644	6.4	1,838.7	8.64	2,994.53
Jan-17	103.747	6.3	1,792.4	8.62	2,794.27
Dec-16	102.132	6.3	1,751.2	8.44	3,186.21
Nov-16	101.748	6.4	1,712.1	8.26	3,247.19
Oct-16	101.323	6.5	1,690.9	7.76	3,229.22
Sep-16	101.271	6.5	1,725.7	8.06	3,243.21
Aug-16	101.41	6.5	1,719.5	8.48	3,178.83
Jul-16	101.332	6.4	1,721.8	6.16	3,488.67
Jun-16	101.145	6.5	1,653.2	7.25	3,640.61
May-16	100.732	6.6	1,674.6	8.15	3,827.80
Apr-16	101.228	6.7	1,670.8	8.92	4,009.26
Mar-16	101.485	6.9	1,648.1	8.72	3,982.09
Feb-16	101.932	6.9	1,547.2	10.63	3,862.24
Jan-16	102.313	6.8	1,562.2	11.36	3,773.17
Dec-15	102.195	6.6	1,662.8	9.81	4,040.75
Nov-15	102.168	6.4	1,694.4	12.34	4,016.18
Oct-15	102.779	6.3	1,705.8	21.65	3,868.83
Sep-15	105.275	6.3	1,581.9	14.61	4,173.52
Aug-15	102.431	6.3	1,645.4	11.54	4,176.59
Jul-15	101.196	6.5	1,765.6	10.57	4,404.72
Jun-15	97.705	6.6	1,735.6	8.26	4,906.07
May-15	96.389	6.7	1,779.3	8.26	4,786.74
Apr-15	93.438	6.7	1,778.4	8.42	5,091.43
Mar-15	91.727	6.6	1,740.8	8.49	5,248.16
Feb-15	91.489	6.6	1,772.9	8.59	5,491.37
Jan-15	91.358	6.7	1,677.5	8.59	5,212.11
Dec-14	90.444	6.9	1,709.7	8.58	5,112.65
Nov-14	89.963	7.0	1,739.5	8.64	5,156.33
Oct-14	89.227	7.1	1,708.1	8.67	5,194.89
Sep-14	88.836	7.2	1,698.4	8.38	5,255.62
Aug-14	88.106	7.3	1,748.7	8.29	5,139.39
Jul-14	87.773	7.2	1,714.3	9.78	4,906.09
Jun-14	87.612	7.1	1,743.4	9.81	4,885.04
May-14	87.412	6.9	1,715.2	8.82	4,881.56
Apr-14	86.716	6.6	1,687.7	8.8	4,948.97
Mar-14	86.489	6.4	1,673.9	8.98	4,945.78
Feb-14	86.278	6.2	1,675.4	9.16	4,933.41
Jan-14	86.214	6.0	1,598.5	9.26	4,856.15
Dec-13	86.309	5.7	1,661.1	9.53	4,926.97

Nov-13	86.103	5.4	1,628.4	9.95	5,100.88
Oct-13	85.31	5.1	1,602.9	9.77	4,992.88
Sep-13	87.413	4.8	1,543.7	9.58	4,793.20
Aug-13	87.493	4.5	1,472.7	10.03	4,697.75
Jul-13	86.859	4.4	1,507.9	5.92	4,787.56
Jun-13	85.488	4.6	1,433.6	6.21	4,598.16
May-13	84.146	5.0	1,471.9	9.46	5,006.96
Apr-13	84.189	5.6	1,476.1	10.38	4,765.23
Mar-13	85.818	6.3	1,434.5	9.88	4,860.83
Feb-13	87.446	7.2	1,405.2	8.38	4,518.59
Jan-13	86.9	8.2	1,405.5	8.1	4,416.60
Dec-12	85.994	9.4	1,338.5	8.25	4,133.02
Nov-12	85.629	10.7	1,315.5	9.8	4,083.52
Oct-12	85.112	12.0	1,301.5	8.98	4,143.35
Sep-12	84.613	13.3	1,311.5	7.77	3,972.03
Aug-12	84.075	14.3	1,279.2	10.93	3,865.76
Jul-12	84.14	15.3	1,250.6	11.95	3,832.42
Jun-12	84.789	16.0	1,235.7	10.09	3,703.94
May-12	84.384	16.4	1,177.6	11.18	3,650.85
Apr-12	83.188	16.5	1,294.0	16.02	3,546.66
Mar-12	82.897	16.5	1,312.0	17.8	3,366.89
Feb-12	83.176	15.9	1,298.7	19.7	3,303.75
Jan-12	86.343	15.1	1,240.9	20.56	3,224.18
Dec-11	86.663	14.0	1,182.6	17.9	3,205.02
Nov-11	93.676	12.8	1,184.6	16.14	3,155.46
Oct-11	101.27	11.5	1,217.3	14.8	3,507.34
Sep-11	96.357	10.2	1,104.1	11.93	3,284.06
Aug-11	92.786	9.0	1,211.2	9.23	3,465.02
Jul-11	89.898	7.9	1,306.1	8.99	3,738.46
Jun-11	89.049	6.9	1,331.2	8.95	3,968.12
May -11	85.433	6.0	1,354.6	5.35	4,078.10
Apr-11	83.89	5.2	1,388.6	3.26	4,029.23
Mar-11	84.206	4.5	1,334.9	2.77	3,887.07
Feb-11	81.473	4.1	1,351.7	2.59	4,240.18
Jan-11	81.029	3.9	1,308.1	2.44	4,464.92
Dec-10	80.568	4.0	1,280.1	2.28	4,432.60
Nov-10	80.46	4.0	1,193.6	2.21	4,395.17
Oct-10	80.714	4.1	1,222.2	2.12	4,659.56
Sep-10	80.912	4.4	1,179.2	2.03	4,629.80

Aug-10	80.44	4.7	1,080.7	1.83	4,454.59
Jul-10	81.426	5.0	1,124.8	1.6	4,438.58
Jun-10	81.018	5.4	1,041.3	2.98	4,339.28
May-10	78.541	5.9	1,079.8	4.21	4,241.81
Apr-10	77.254	6.3	1,198.6	5.17	4,233.24
Mar-10	76.947	7.0	1,200.5	5.98	4,072.93
Feb-10	76.73	7.9	1,133.4	6.21	3,629.41
Jan -10	75.786	8.6	1,119.5	6.9	3,565.28