

**THE EFFECT OF CHANGES IN INTEREST RATES ON THE
PERFORMANCE OF THE NAIROBI SECURITIES EXCHANGE**

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DECLARATION

I declare that this Research Project is my own work and effort and that it has not been presented in any other university for an academic award.

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This Research Project has been submitted for examination with my approval as the candidate's University Supervisor.

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DEDICATION

I dedicate this research project to my family for their endurance, encouragement, financial and moral support as I pursued this programme.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIMS	Alternative Investment Market Segment
ANOVA	Analysis of Variance
CBK	Central Bank of Kenya
CDSC	Central Depository and Settlement Corporation Limited
CMA	Capital Markets Authority
FDI	Foreign Direct Investment
FISMS	Fixed Income Securities Market Segment
GEMS	Growth Enterprises Market Segment
IPO	Initial Public Offer
MIMS	Main Investment Market Segment
NSE	Nairobi Securities Exchange
NSE 20	Nairobi Securities Exchange Top 20 Share Index
NSE ASI	Nairobi Securities Exchange All Share Index
TB	Treasury Bill
VECM	Vector Error Correction Model
VWAP	Volume Weighted Average Price

ABSTRACT

The research project reviews the effect of changes in interest rates as on the performance of the Nairobi Securities Exchange (NSE). The interest rates used in the study are the 91 and 182 Treasury Bill (TB) rates while the stock market performance is measured by changes in the NSE 20 share index (NSE 20) and the NSE all share index (NASI). A number of studies have been carried out on the impact of various macroeconomic variables on the stock market performance with varying results. The impact of the different variable is included in the analytical model for this study which includes a number of variables such as changes in exchange rates, changes in money supply and changes in inflation. The inclusion of the variables was also important to reduce the unexplained variables in the model. Use of the 91 and 182 day TB rates was designed to assess whether the term of the TB rates had an impact on the stock market performance and whether any such changes were influenced when the review was restricted to the more active counters as measured by the NSE 20 or the changes impacted the entire stock market as measured by the NASI. The data for the study was sourced from Nairobi Securities Exchange for the stock market performance and from the Central Bank of Kenya website for the other macroeconomic indicators. The analysis was conducted using the multiple regression analysis using the NCSS 11 statistical analytical model and the results were also tested for Granger causality using Eviews statistical software. The results indicate that changes in the macroeconomic variables selected with the exception of inflation did not have a significant impact on the stock market performance and that the impact of changes in TB rates was marginal. Further, the causality test results indicated that changes in the TB rates did not causes changes in stock market performance. The results of the study suggest that the expansionary monetary policy adopted by the Government especially through borrowing to sustain increased government budgets has not had a significant impact on the stock market performance. It is therefore important for additional research into the real influences of changes in stock market performance to provide policy makers with a good basis for making policy decisions that will assist to grow the securities market.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Securities markets play a critical role in the development of the economy. While the Nairobi Securities Exchange (NSE) has been in existence for over 50 years, it has played a relatively marginal role in capital mobilization due to the small number of companies listed on the exchange, a list which has not grown in tandem with the rest of the economy. In recent years, there have been a number of changes to the capital markets regulatory framework in Kenya to encourage businesses to list on the exchange. According to Aurangzeb (2012), the stock market supports the growth of industry through ease of access to capital and provides a framework for measuring economic performance. Even though a number of studies have sought to establish whether a relationship exists between securities market performance and key macroeconomic indicators including interest rates, there is limited research on the impact of the macroeconomic indicators on the NSE and it is important for in-depth studies to be carried out on the factors that influence NSE's performance to facilitate policy interventions that allow it to play its rightful role in economic growth.

Mankiw (1999) explained that the performance of the stock market was a powerful indicator of economic performance of the wider economy. Measuring the efficiency of the stock market in reacting to macroeconomic indicators such as interest can therefore provide useful information to policy makers. Investors always look for investment opportunities in assets that provide the highest returns. The expectation is that investors will move their investments from one asset to another depending on the expected returns such that if the interest on savings increases, investors would move their funds from the stock market to banks resulting in a decrease in demand and prices of securities. Such a reaction would reflect a negative relationship between the stock market performance and interest rates.

Ochieng and Adhiambo (2012) in a study of the impact of macroeconomic indicators on the NSE performance observed that increases in the 91 day TB rate resulted in declines in the stock market performance as measured by the NASI. In the study they noted that increases in inflation had a marginal positive relationship with the NASI.

They recommended continued monitoring of the macroeconomic environment since it had an impact on the NSE performance. One of the key influences for this study was the increased government appetite for debt through borrowing in the domestic market to finance infrastructure projects. One of the consequences of the government forays into the domestic debt market is the reduction of credit available to the private sector, orchestrating increases in interest rates on both private sector credit and government borrowing. Increases in interest rates make the government treasury bills and bonds relatively more attractive compared to other investment opportunities such as the securities market, potentially pulling investments from the securities markets into the debt markets.

1.1.1 Interest Rate Changes

Ali (2014) defines interest as a charge a borrower pays to a lender to use the lenders' funds for a specified term. The interest rate is the price at which interest is paid by a debtor for the utilization of the funds borrowed. Interest rates are rarely static, often changing with changes in the macroeconomic environment. Sill (1996) explains that interest rates react to events in the international and domestic markets, national economic prospects and inflation. Fisher (1930) suggested that the nominal interest rate was a combination of the real interest rate and inflation. As inflation increases, investors demand higher returns to compensate them for the reduction in the value of their investment. When the government increases the volume of bonds in the market, investors demand higher returns in line with the laws of demand and supply. When the demand for treasury bills and bonds is high, the government is able to borrow at lower costs. When the amount of money circulating in the economy increases, it causes interest rates to fall but is often associated with a rise in inflation which eventually results in an increase in interest rates.

Dabale et al, (2013) concur with Keynesian economists that government can control interest rates through monetary policies such as manipulation of money supply to influence the money in supply which impacts the demand for goods and services. Excessive demand is often associated with increases in inflation which can be controlled through increase in interest rates to curtail domestic credit uptake. Aggarwal (2010) asserts that an increase in interest rates makes it attractive for investors to put money in debt instruments to the detriment of other investment

alternatives. Where debt instruments provide better returns than the stock market, there is an incentive to move funds from the stock market to the debt markets. Olweny & Omondi (2011) argue that interest rate fluctuations are a concern to the Kenya government in its efforts to maintain a stable low interest environment to boost investment and economic growth. In these efforts, the government uses monetary operations such as policy to influence macroeconomic variables including interest rates. One of these variables is change in money supply through the sale and purchase of Treasury Bills.

A review of the 91-day Treasury Bill interest rates for the last few years shows significant fluctuations starting with an average of 7.74% in 2008, 7.43% in 2009, 3.62% in 2010, 8.76% in 2011, 12.79% in 2012 and 8.92% in 2013 (Central Bank of Kenya Website). Significant volatility of this kind has an impact on other sectors of the economy such as the stock market which is the basis for this research which reviewed the effect of the interest rates on the NSE. The study also used both the 91 and 182 day TB rates to assess whether the term of the treasury bills had an impact on the NSE. The use of the TB rates is deliberate since they are linked to government borrowing, and a strong correlation between the interest rates and the stock market index would point to the potential impact of government borrowing and monetary operations on the securities exchange. The research tested the hypothesis that changes in interest rates have an effect on the stock market index as measured by the NASI and NSE 20.

1.1.2 Stock Market Performance

Monther et al, (2010) aver that the primary function of the stock market is to provide a trading platform for buyers and sellers of securities, allowing interactions which are critical in ensuring easy circulation of the securities which is one of the incentive for listing securities. The presence of buyers and sellers allows the stock market to set the price for securities, this is only possible if the market can fully but quickly assimilate and reflect the impact of changes in the economy. This is a mark of an efficient market. Yarti et al (2007), explain that an efficient market requires sufficient trades, constant liquidity and ease of entry and exit to operate. According to Yarti et al (2007) this one of the problems facing stock markets ion developing countries which struggle to maintain liquidity.

Chen et al. (1986) carried out a study on the link between stock prices and macroeconomic variables and noted that there was a long-run relationship between the two. It is clear from these studies that while some variables have a positive relationship with the stock market returns, many others have an inverse relationship. The impact of macroeconomic indicators may vary from market to market or from one period to another, providing a good incentive for research on the macroeconomic variables that influence the NSE performance. While the NSE remains an important avenue for attracting investment into the country, it relies heavily on foreign investors exposing it to vagrancies of international economic changes, with foreign investors frequently fleeing the market when the local economy suffers a downturn or when there are better investment opportunities locally and elsewhere in the world.

A strong and vibrant securities market mobilizes domestic resources and reduces reliance of businesses and the government on banks for funding. Through the stock market, businesses have access to cheaper sources of funding compared to banks and in this way the capital markets help to increase the efficiency of capital allocation.

1.1.3 Interest Rate Changes and Stock Market Performance

The capital and debt market often compete for resources, with interest rates offered in the debt market influencing the attractiveness of debt over other sources of funds. Lynge and Zumwalt (1980) found a difference in sensitivity of the stock market to interest rates of different maturities. However, they noted that there were other variables other than interest which had an impact on the stock performance. In their research, Flannery and James (1984) found a negative relationship between stock market performance and interest rates, this relationship subsisted between short-term and long-term interest rates especially for banking stocks.

Geske and Roll (1983) and Balmash and Trivoli (1991) found a significant positive connection between stock returns and the TB rates. They concluded that there was a lag in the stock market reaction to changes in interest, which they attributed to inefficiencies in the market. Breen, et al (1989) found a negative association between stock index returns and the TB rates which they attributed to the impact of interest rate increase on the cost of funding and profitability of the listed companies.

Muktadir-Al-Mukit (2012) in a study of the Dhaka Stock Exchange noted that the stock prices and interest rates were inversely related. He attributed this relationship to expansionary monetary policy which caused interest rates to decline. As a result, people were able to take more loans at a lower cost to invest in stock market. Further, he observed that at lower interest rates investors were reluctant to maintain funds in the bond market preferring to move such funds to the equity market.

1.1.4 Nairobi Securities Exchange

The NSE, one of the most important exchanges in Africa traces its beginning to the early 1920s when a number of traders organized an informal arrangement to trade shares. The precursor to the NSE was the Nairobi Stock Exchange, an association of stockbrokers interested in developing and regulating the trade in securities across East Africa. In its formative years, the stock market served the East African region and had a number of companies from Kenya, Tanzania and Uganda. This ended with the collapse of the East Africa Community in 1975 when Tanzania and Uganda companies withdrew from the bourse. In 1991, the NSE was incorporated as a private company limited by shares and formalized its operations through the introduction of a floor trading system. The NSE offered its shares to the public through an Initial Public Offer (IPO) on the NSE in 2014 following a successful demutualization process. A number of developments have taken place in the Kenya capital markets, making it easier to trade securities. These include the enactment of the Capital Market Authority Act (Cap 495A), which allowed the formation of the Capital Market Authority (CMA) to regulate the capital market operations. In November 2004, the central depository system was automated to facilitate the electronic clearing and settlement of the trade in securities on the NSE (NSE and CMA websites).

The market at the NSE is split into the Main Investment Market Segment (MIMS), Alternate Investment Market Segment (AIMS), Fixed Income Securities Market Segment (FISMS) and Growth Enterprises Market Segment (GEMS) which targets small and medium enterprises. The NSE operates 4 major indices; the NSE 20 Share Index (NSE 20), NSE 25 Share Index (NSE25), NSE All Share Index (NASI) and the FTSE NSE indexes. The NSE20 and NSE25 track the performance of the 20 and 25 best performing companies on the NSE selected based on market capitalization, number of transactions and turnover (My Stocks, 2014). NASI on the other hand reflects the total market value of all stocks traded on the NSE in one day (NSE Website).

The price of the securities market reflects the available information. The Efficient Market Hypothesis (EMH) which is credited to Eugene Fama suggests that at any given time, security prices take into account all the available information eliminating possibilities of arbitrage opportunities (Fama, 1965). Fama postulates that the market can exist in three forms, the weak form, semi strong form and the strong form. In the weak form, the stock prices reflect all the currently available market information, the semi strong form assumes that stock prices incorporate all publicly available information, while in the strong form stock prices reflect all publicly or privately available information (Fama, 1991). Nyamosi (2014) carried out a study to test whether the NSE was efficient in the semi strong form by testing the speed at which the market adjusted for earning announcements. The study found evidence of excess returns before and after the earnings pronouncements. This together with evidence of overreaction and under-reaction pointed to the market reflected a market that is not in a semi strong form.

1.2 Research Problem

The stock market plays a major role in the economic development of a country by providing a platform for raising and allocating capital for investment. Through the stock market a vast number of citizens who would otherwise not have access investment opportunities are able to invest in viable projects. The stock market also attracts investments from outside the country serving as an important avenue for foreign direct investment (FDI). The investors receive returns either through dividends or capital appreciation. There is often competition between the stock market and other investment opportunities such as debt because the debt markets provide an alternative investment vehicle and higher returns in the debt markets may tempt investors to move funds from the stock market into debt according to Muktadir-Al-Mukit (2012).

Several studies have documented the impact of various macroeconomic variables such as gross domestic product, inflation, exchange rates, interest and money supply on the stock market. The majority of these studies have been carried out in developed world, leaving a gap in the developing countries especially in Africa where the NSE is a major player.

Breen et al, (1989) in a study of the relationship between the TB rates and stock market performance found an inverse association between the stock index returns and the TB rates. They explained that the negative relationship was because an increase in interest rates caused an increase in the funding costs for firms resulting in a decline in earnings which is a major contributor to declining stock prices. Hasan and Tarij (2009) in a study of the Pakistan stock market found that that the interest rates and exchange rates where inversely related to the stock market returns. Similar conclusions were reached by Alam and Uddin (2009) in their study of the impact of interest rates on fifteen different stock exchanges between 1998 and 2013, where they found that the stock market prices were inversely related to the interest rates in all the markets that they reviewed. Corrado et al (2002) and Kasman et al, (2011) also concluded that interest rates and the stock market index are negatively correlated and explained that this observation was because interest rates increases limit the ability of investors to borrow, reducing the funds available for investment in securities. The assumption in this case is that investors borrow to invest in the stock market which is has not be tested in the Kenyan context.

Locally, Ochieng et al, (2012) investigated the relationship between lending interest rates, inflation rate and 91 day Treasury Bill rate and the NSE stock market performance based on the NASI, to find out whether the changes in the three macroeconomic variables could be used to predict stock market performance. The study which covered the period March 2008 to March 2012 and applied regression analysis found that the 91 day TB rate had an inverse relationship with the NASI while inflation exhibited a marginal positive relationship with the NASI. They recommended continued monitoring of the impact of macroeconomic variables on the stock market as a guide to investors and policy makers. Chirchir (2012) also carried out a study of the impact of interest rates on the NSE. The variables in the study were interest rates based on the weighted average lending rate charged by commercial banks in Kenya and stock prices based on the NSE 20 between October 2002 and September 2012. They used the Toda Yamamoto method and found that there was no significant causal relationship between interest rate and share price.

A number of scholars have carried out research on the impact of changes in interest rates on the stock market performance. However, research on the effect of changes in interest rates on the NSE is limited. There is also limited research on the impact of the TB rates, with the available research applying the market lending rates which do not reflect the return investors receive when they deposit their funds with the commercial banks. The TBs provide an alternative investment for investors due to the attractive interest rate offered as the government has in the recent past significantly raised the level of domestic borrowing to plug budget gaps. It is important to determine whether the increase government policy of domestic borrowing has an impact on the stock market performance, such activity is also reinforced by various monetary actions that the CBK takes in the financial markets to control inflation and cushion the local currency. Understanding the impact of these factors on the stock market will assist investors and the policy makers to make better investment decisions and discourage actions that have a negative impact on the market respectively. The study also takes into account both the 91 day and the 182 day Treasury bill rates to determine if the different TB maturities have an impact on the stock market index. This study covers a period of five years based on the monthly average interest and stock market prices.

1.3 Objectives of the Study

1.3.1 General Objective

The general objectives of the study was to investigate the effect of changes in interest rates as measured by the 91 and 182 day TB rates on the NSE stock market performance as measured by the NSE 20 and NASI.

1.3.2 Specific objectives

The specific objectives of the study were as follows:

- a) To determine whether a relationship exists between changes in the TB rates and changes in the stock market performance.
- b) To determine whether the term of the TB bills has a bearing on the stock market performance.

1.4 Value of the Study

This study benefits various parties including the NSE, Government, investors, financial analysts, stockbrokers, and scholars. The findings indicate that TB rates do not have a significant impact on the stock market performance. This is a critical consideration when the government is making monetary decisions which have an impact on the economy in general and the securities market in particular.

Investors also benefit from an understanding of the reaction of the market to changes in government monetary policy on interest rate, which is important when making investment decisions especially in an environment of uncertain government positions. These decisions are important for stockbrokers who advise clients on stocks to purchase or sell and also on general investing decisions. The stock analysts and stockbrokers have a responsibility to provide information to investors and the public on buy and sell decisions, the results of this study will help them to make informed decisions especially when macroeconomic variables changes.

Future researchers will have a reference point from the information gathered that will contribute to understanding the factors that influence stock market performance. This research allows the exclusion of TB rates from the analysis of the factors that influence stock market performance allowing future researchers to concentrate on other factors to enhance the understanding of stock market dynamics.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the available literature on the effect of changes in interest rates on stock market performance at the Nairobi Securities Exchange. The chapter presents a brief introduction, the theoretical framework and conceptual framework, the main variables that impact stock market performance from previous studies, empirical review and a summary of the chapter.

2.2 Theoretical Framework

Dawson, (2009) defined a theory as a systematic explanation for the relationship between phenomena, which provides an explanation for certain occurrences. Theoretical review is the theoretical foundation of a study, providing a review of existing theories and hypotheses that underpin the study. In this study, the theoretical framework will cover existing theories on interest rates and stock performance.

The theories that are covered in this study include the Efficient Market Hypothesis (EMH), McKinnon and Shaw Theory, Fisher's Theory and Classical Theory.

2.2.1 Efficient Market Hypothesis

In 1970, Eugene Fama published his famous paper on efficient capital markets (Fama 1970) where he defined three different forms of market efficiency: weak form, semi strong form, and strong form. In a weak-form efficient market, all the available information is already factored into the stock prices and historical price movements and trading volumes are not useful in predicting future stock returns. For a semi strong efficient market, prices take into account all the information in the weak form but in addition the prices also reflect all the information that is in the public domain. Such information includes data in financial statements, macroeconomic and microeconomic forecasts, industry analyses, company public filings and other gleanings from announcements by the firms. Investment is required to obtain information for the semi strong form including observation of financial statements, accounting data, competition data, and industry knowledge. The strong form is the highest level of market efficiency where market prices reflect all information available under the weak and semi strong market efficiencies but it goes further to

also include all private information that the firms hold. It is difficult to attain this level of efficiency since it assumes that insider information is available to the market. Trading in insider information is illegal in many countries making it difficult for such information to be available for the market to attain the strong form efficiency level.

Under the EMH, the stock prices reflected all the available current information eliminating opportunities for arbitrage. However, scholars have come to the conclusion that the stock market prices are not based purely on market information. DeBondt et al, (1995) argued that investors are subject to optimism and pessimism influences that caused prices of stocks to deviate from the rational prices. These results are consistent with other researchers who found significance correlation between stock prices changes to different days of the week. Haugen and Lakonishok (1988), French (1980) documented relatively high January returns while Hawawini et al (1995) and Ariel (1990) found similar patterns around the end of the month and the holidays respectively. The EMH is useful because it explains the extent to which a market assimilates information while its criticisms help to explain unexpected reactions of the market to phenomena.

2.2.2 Arbitrage Pricing Model

Ross (1976) pioneered the arbitrage pricing theory (APT) which postulates that the return on an investment is a function of a number of risk factors. Under the model, investors have access to information on returns available on alternative investments and the returns they demand for their investments are a function of the returns available for alternative investments, taking into account the impact of other risk factors.

Chen et al, (1986), observed that economic indicators affected the return on stocks due to their impact on interest rates and dividend payments. They used macroeconomic indicators as substitutes for undefined variables in the APT model, postulating that the investment returns were a function of the macroeconomic variables. Ochieng and Adhiambo (2012) also alluded to this understanding in their observations that interest rates had an impact on company profits and by extension dividend payments and discount rates, lending credence to the theory that macroeconomic factors affected the stock prices. The APT provides a good basis for

understanding the factors that influence the stock market prices, an impact that has been confirmed in subsequent researches. This study focussed on the impact of changes in TB rates on the stock market performance, an extension of existing studies across the world that help to understand the factors that influence stock market performance

2.2.3 McKinnon and Shaw theory (Complementary hypothesis)

In the 1990s many developing countries embarked on liberalization edged on by the Bretton Woods institutions (the World Bank and the International Monetary Fund). The financial systems liberalization measures were based on the work of McKinnon and Shaw (1973) who had argued that financial market controls including interest caps had a negative impact on efficient allocation of resources. The complementary hypothesis that McKinnon and Shaw pioneered provides that real interest rates have an impact on savings and that demand for loans relies on both the availability of loanable funds and the interest rates. Under the hypothesis, savings and loans are complimentary as one feeds into the other. Low interest rates stifle savings and encourage consumption but retaining the low interest rates increases demand for debts due to the increase in profitability arising from reduced finance costs. However, without adequate savings, the demand for debt will put pressure on interest rates which cannot be satisfied in countries with interest caps creating a potential underground debt market. This is one consequence of controls that the IMF sought to eliminate through the elimination of controls in the financial markets.

The theory provides that fixing nominal interest rates leads to the likelihood of negative real interest rates because regulated economies are often associated with high inflation environments. This often leads to reductions in accumulation of capital. The complementary hypothesis provides useful information on the relationship between interest rates and the stock market returns especially from the perspective of the impact of financing costs on profitability.

2.2.4 Fisher's Theory

The theory of interest rate by Fisher assumes that the rate of interest is based on the available funds and the expectations on price which is a crucial determinant for investment. In fixed interest countries the interest rates depends on the objectives of

that country. However, some countries use the flexible model which depend on the forces of demand and supply. When the government wants to achieve a particular goal, they intervene in the market through monetary policies to maintain the interest rate or the market equilibrium at a given level, resulting in a reduction of the impact from external forces according to Patterson et al, (1999). Bank stocks are sensitive to a number of interest rate variables but are more sensitive to changes in long-term government yields and returns. Forster et al, (2003) indicates that when long-term interest rates change, there exists a negative relationship with returns of other interest rates sensitive assets, exerting pressure on asset prices.

Interest rates reflect the cost incurred by borrowers that affect the investor's cost of funds and at low interest rates more investors are attracted by the low cost of borrowing. Various results have shown that, when interest rates increase, the share price falls and when the prices are rising, the interest rates are falling. Theoretically, the stock is worth what the public or a person is willing to pay for it. The prices, tend to be a factor of market forces of demand and supply of that stock.

2.3 Determinants of Stock Market Performance

The stock market is an important barometer of the economy of the country. A number of theorists have researched on the factors which affect the stock market performance including key macroeconomic indicators such as inflation, income, savings, exchange rates, employment, interest rates and money supply among others. Geetha et al. (2011) observes that inflation has an underlying impact on these indicators and by extension on the stock market performance. In this section, the research paper reviews some of the studies that have been carried out on the impact of key indicators on the stock market performance.

2.3.1 Interest Rate Changes

The relationship between stock prices and interest rates has been studied widely. Onasanya et al (2012) found that Interest rates had a negative relationship with stock prices in Nigeria. Kuwornu et al, (2011) noted that the 91-Treasury bill rates had a negative relationship with the stock market return. Uddin et al (2007) found that changes in interest rates had a significant negative relationship with the share prices.

According to Chandra (2004) interest rates are based on the assessment of the borrower's default risk, the risk free returns, and the return that the lender expects from the loan, inflationary expectations, and returns on alternative investment opportunities among others. Changes in interest rates can affect investor preference between the stock market and money market investment opportunities, with shifts to the equity markets boosting the stock market performance. According to Kevin (2000), the interest rate in most economies fluctuates between defined ranges on the basis of the monetary policies adopted by the central banks of the countries in question. This helps to modify the impact of demand and supply which is the key guiding factor in unregulated economies.

Smith (1990) found that in the United States of America, the stock prices rose when there was an expectation of interest rate cuts by the Federal Reserve. Goswami and Jung (1997) also observed this phenomena in South Korea where they noted a negative relationship between stock prices and interest rates. Changes in interest rates affect the cost of funding operations and investments resulting in a decline or increase in the financing costs. Reductions in financing costs have a positive impact on profits, boosting shares values and the shareholder dividend expectations. Mukherjee and Naka (1995) observed that changes in the TB rates had a direct impact on the risk free rate of interest which is the basis for setting commercial interest rates and could by this implication affect the discount rate. These changes impact current and future interest rates according to Fama and Schwert (1977).

Maysami et al., (2004) found a significant positive connection between interest rates and stock market returns in Malaysia. These results contradict Ochieng et al (2012) who in their study noted a negative relationship between the 91 TB rate and the stock market index (NASI). The quantum of research in Kenya on the relationship between the interest rates and stock performance is not exhaustive and this research which covers a different time period and includes TB of different maturities contributes to the knowledge in this important area.

2.3.2 Exchange Rate

In a globally interconnected world where people from different countries trade with one another, it is necessary to have globally accepted currencies to ease the settlement of trade proceeds. The price at which one currency is changed for another is the exchange rate. The value of a currency changes from time to time depending on the forces of demand and supply. This is often linked to the balance of payments position of a country with those countries which have healthy currency reserves better cushioned to protect their currencies from fluctuations. Investments in a country's stock market is often carried out in that country's domestic currency and fluctuations in the currency have a significant impact on the value of the investment. If the currency appreciates, then foreign investors will receive a correspondingly lower capital refund than they originally invested.

Apart from the impact on the traders on the bourse, Benita and Lauterbach (2004) observed that companies with international trading operations were affected by changes in the exchange rates due to the potential impact on the cost of sales or impact on export sales. This has an impact on the profitability of companies which has a direct influence on the stock prices. Adjasi et al., (2008) and Hsing (2011) in a study of the impact of exchange rates on the performance of the Johannesburg Stock Exchange found a positive relationship between the exchange rates and stock performance. Cheng et al., (2011) and Bailey et al (1995) in a study of the Taiwan and Mexican stock markets respectively also found a positive relationship between the exchange rates and stock prices.

2.3.3 Money Supply

Money supply refers to the amount of money in circulation within the economy. Governments often implement measures that increase the amount of money in the economy to stimulate demand. However, an increase in the money supply without a corresponding increase in the supply of goods into the economy often results in inflation due to the impact of too much money chasing few goods. Fama (1981) noted the relationship between money supply, inflation and stock prices when he observed that an increase in money supply often led to a decline in the stock prices. However, this negative effect may be countered by money growth, which increases

cash flows and stock prices. Mukherjee and Naka (1995) countered this observation with their argument that increases in money supply increased available cash flow resulting in an increase in demand and price of equities.

Ray and Sarker (2014) postulate that increase in money supply can result in increased investments which have a positive impact on economic growth and stock market activity. However, they point out that growth based on expansionary monetary policy largely depends on fiscal discipline which if lacking may cause inflation resulting in reduced growth and stock market activity.

2.3.4 Inflation

Inflation is the general increase in the price of goods and services, which is often attributed to an increase in the money supply. As the prices increase, the purchasing power of a country's currency declines since more money is required to purchase the same quantity of goods. Investors and lenders often include a premium in the interest and discount rates to cater for the impact of inflation. For consumers, large and frequent increases in the inflation rates generate fears over future ability to afford goods forcing them to hoard goods, which is often a precursor to food shortages and social instability.

Coleman and Tetey (2008) established a time lagged negative relationship between inflation and stock market performance. This was confirmed by Ochieng et al (2012) who uncovered a weak positive relationship between the inflation rate and the NSE performance.

2.4 Empirical Review

Pal and Mittal (2011) carried out a study on the impact of select macroeconomic variables on the performance of a number of stock exchanges in India for the period January 1995 to December 2008. Their study concluded that inflation had an impact on a vast number of markets while interest rates and foreign exchange only impacted one market.

Ahmed and Imam (2007) analyzed the relationship between the stock market performance and a number of macroeconomic indicators for the period July 1997 to June 2005 and noted that with the exception of interest rates, there was no long run relationship between the stock market performance and the variables. These findings

were contradicted in a study by Chen et al. (1986) who found that TB rates, inflation and industrial output had a significant impact on stock returns. These findings are supported by Ratanapakorn and Sharma (2007) who examined the relationship between the stock price index and macro-economic variables in the United States between 1975 and 1999 and found that the stock prices had a positive correlation with industrial production, inflation, money supply, short term interest rate and exchange rates but were negatively related to long-term interest rates.

Eita (2011) investigated the impact of economic activity, interest rates, inflation, money supply and exchange rates on the stock market prices in Namibia using time series for the period 1998 to 2009 and found a positive relationship between stock prices, money supply and economic activity. Inflation and interest rates had an inverse relationship with stock prices. These study findings concur with those of Liu & Shrestha (2008) whose study of the factors impacting the Chinese stock market between the years 1992 and 2011 found that industrial production and money supply had a positive correlation with stock market performance while inflation, interest rate and exchange rate had an inverse correlation with the stock performance. Naik and Padhi (2012) confirmed these findings in a study of the Indian Stock Market. The only exception was the exchange rates and short-term interest which they found to have no significant impact on stock prices. Coleman & Agyire-Tetty (2008) also found that TB rates did not have a significant impact on stock prices in a study of the Ghana Stock Exchange which they carried out using data for the period 1991 to 2005.

Dasgupta (2012) using the Johansen and Juselius's co-integration test found that in the long-run the Indian stock markets prices were positively related to interest rates and industrial production. These results however, contradict those of William Breen, Lawrence Glosten, and Ravi Jangannathan (1989) and Hsing (2004) who found a negative relationship between the stock index and the interest rates and concluded that a rise in interest rates adversely affected earnings resulting in lower stock prices. Raouf et al (2010) in a study of the Pakistan stock market found a significant negative relationship between the interest rates and the stock market performance.

Lee (1997) established that the relationship between the stock market performance and interest rates changed over time moving from a negative relationship to no discernable relationship and finally in some instances to a weak positive relationship. Hashemdah and Taylor (1988) tested for causality between interest rates and stock performance but the results of the tests were not conclusive. Gupta et. al (nd) confirmed these findings in tests that they carried out using data from the Indonesia stock exchange for the period 1993 to 1997.

Humpe and Macmillan (2007) in a study of the association between long term interest rates and stock prices in the United States and Japan found a significant relationship in the United States but not in Japan. These results are echoed in Ratanapakorn and Sharma (2007) who found stock prices to be negatively related to the long-term interest rate, while the short-term interest rates had a positive relationship with the stock prices. Kunt (1996) found that countries with low interest rates have strong stock markets. The stock markets in the developing countries which are still maturing are associated with high interest rates.

Geske and Roll (1983) and Bulmash and Trivoli (1991) found that stock returns have a significant positive relationship with both current and lagged one-year treasury bill rates and spreads. They concluded that investor reaction to the interest rate changes was delayed and attributed this to market inefficiencies. Hasan, et al (2000) examined the impact of changes in TB rates on the Sri Lankan stock market returns and found a positive relationship between the short-term TB rates and the market returns, with the effect increasing with the increase in the term of the TB rates. These results contradict studies of other markets by different scholars. Some of the contradictory findings include Bulmash and Trivoli (1991), Abdullah and Hayworth (1993) and Madura and Schnusenbergl (2000) who observed that the United States stock returns were negatively related to the short and long term interest rates.

Nikiforos (2006) found that the impact of interest rates on the stock market in the United States was different from one decade to the next. In the 1970s and the 1980s, there was found to be no relationship between the Federal Reserve Bank rate and the stock market index but the relationship turned negative in the 1990s. Finally, Gazi and Mahmudul (2009) carried out a study of the relationship between interest rates and

stock market performance in fifteen developed and developing countries and observed a significant negative association between changes in interest rates and stock market performance.

2.5 Conceptual Framework

The theories provide a broad view of the impact of interest rates on the stock market performance. In this research is expected that the Treasury bill interest rates measures for 91-Day and 182 Day TB rates have a direct influence on the NSE market

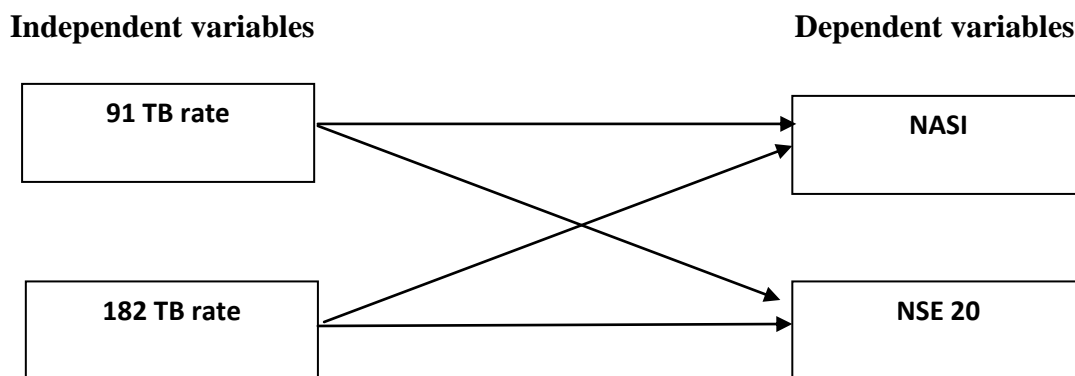


Figure 2.1: Conceptual Framework

2.6 Summary of Literature Review

Many studies found that the changes in interest rate had a negative relationship with changes in stock market performance. Based on the complementary theory, investors in equities would be attracted to the debt markets when the interest rates increase. This is an important area of interest to policy makers and investors and though the amount of research on the impact of microeconomic variables, specifically interest rates on the stock exchange is wide, there is limited research on the NSE. The research done mostly covers commercial bank lending rates, even though the interest rates that bank provides on savings are low while the interest on loans is high. The TB rates on the other hand provide attractive returns on a risk free basis making them a strong competitor to the stock markets for investment funds.

This research provides a good opportunity to assess the impact of the TB rates on the stock market considering that the TB rates are a direct competitor of the stock market for investment funds. Understanding the impact of interest rates on the stock market provides additional information for government and investors to assess the impact of government policy on investment decisions.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section defines the research methods used in the study. It reviews the research design, target population, sample design, data collection procedures, and finally data analysis and presentation.

3.2 Research design

Saunders, Lewis and Thornhills (1999) define research design as the framework that guides the collection and analysis of data. It is the tool that links the study findings to the research problem, helping to ensure that the research problem is resolved.

Descriptive research design was adopted in the study. Mugenda and Mugenda (2003) explained that a descriptive research design is used when data is collected to describe a person, organization, settings or phenomena. This design was used because the research relied on secondary data and descriptive research designs help to describe the phenomena and provide linkages to existing literature and research.

3.3 Data collection

The research used secondary data obtained from Nairobi Security Exchange and the CBK. NSE provides data relating to performance of stocks at the end of every month, index data based on the end of month, index data based on the Volume Weighted Average Price (VWAP) at the end of the last working day of each month. The VWAP data was collected for both the NSE 20 and the NSE All Share Indices.

3.4 Data Analysis

According to Mugenda and Mugenda (2003) data that has been collected should be arranged and analysed in a way that allows the researcher to draw meaningful conclusions. The data was organized in spreadsheets, tables, and charts to assess possible relationships between the different variables.

The data was analyzed using NCSS 11, a statistical analysis software, The NCSS 11 software allows descriptive statistics, hypothesis testing (t-tests, chi-square, 1-way and 2-way ANOVA tests) distribution testing, linear and non-linear regression, correlation, multi-dimensional scaling, time series and chart options. The study relied on multiple regression and correlation analysis.

The research also tested for causality between the changes in the TB rates and the stock market performance using the Granger causality test. This was to determine whether a link existed between the changes in TB rates and changes in stock performance.

3.4.1 Analytical Model

For purposes of the review, the study used the following analytical model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon \dots\dots\dots(i)$$

Where:

Y: is the market performance as measured by the NASI or NSE 20 share indices

α: is the constant.

β₁, β₂, β₃, β₄, β₅: is the coefficient of independent variable (slope of regression equation)

X₁: is the Average monthly change in 91 TB rates

X₂: is the Average monthly change in 182 TB rates

X₃: is the Average monthly change in inflation rates

X₄: is the Average monthly change in US\$/Kes Exchange rates

X₅: is the Average monthly change in broad money supply (M2)

ε: is the stochastic error term.

The inclusion of the changes in inflation rates, changes in foreign exchange. The coefficient reflects the relationship between the TB rates and the stock market index as measured by the NASI and NSE 20.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.1 Introduction

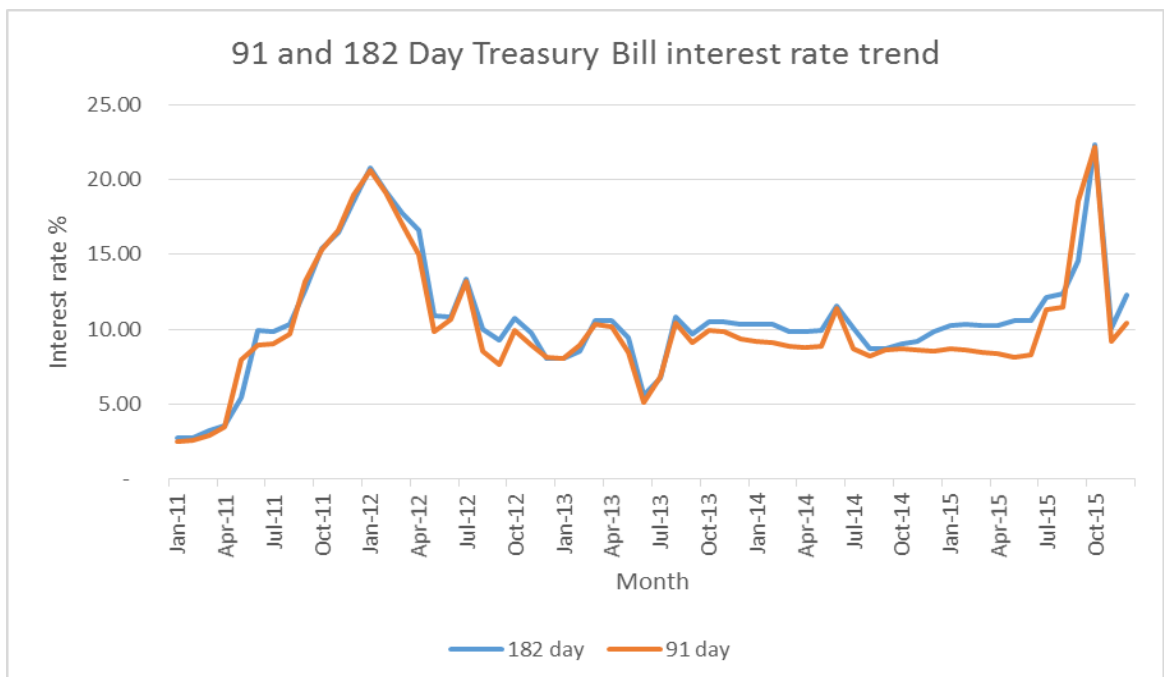
This chapter presents the results of the study. The research used descriptive statistics to present the results followed by tables. The chapter is divided into section 4.2 which presents descriptive statistics, 4.3 on regression analysis and 4.4 on discussion and interpretation of findings.

4.2 Descriptive Statistics

4.2.1 Treasury Bill Rates Trend Analysis

The 91 and 182 day Treasury bill rates exhibited the similar trends over the period under study. At the start of the period, the interest rates were on an upward trend up to January 2012 when they started to decline. From April 2012 to July 2013, the interest rates were volatile but with a general downward trend. Between October 2013 and July 2015 the interest rates were generally stable but increased sharply up to a high of 22% in October 2015. The interest rates trend are shown in figure 4.1 below

Figure 4.2: 91 and 182 Day Treasury bill interest rate trend



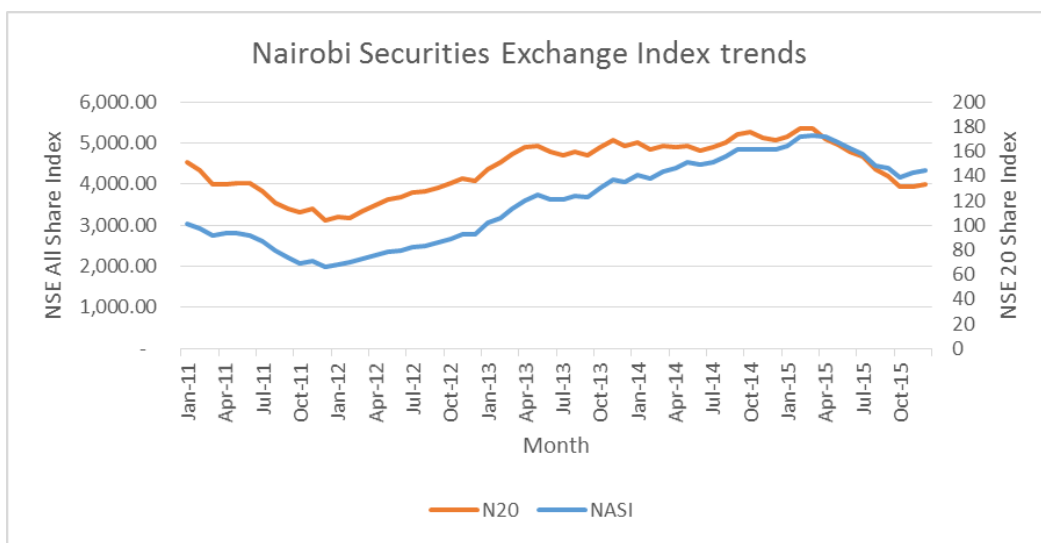
Source: Research Findings

4.2.2 Nairobi Securities Exchange Index Analysis

The NSE exhibited three discernable trends during the period under review. For the period January 2011 to January 2012, NSE was on a general decline trajectory and started to rise up to April 2015 when the indices began to decline once again. During the period under review, the two indices were on a similar trend indicating that generally both indices reacted in a similar manner to economic variables.

The trends are shown in Figure 4.2 below.

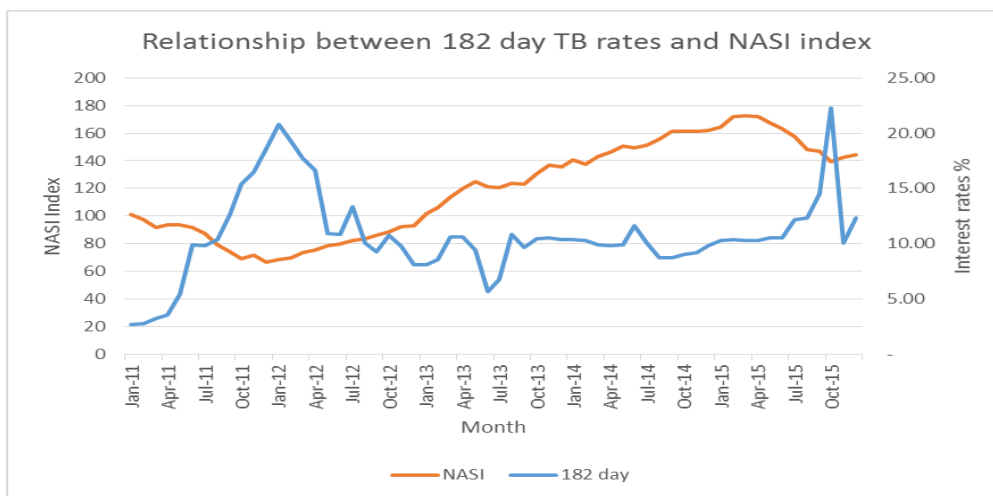
Figure 4.2: NASI and NSE 20 share Index trends



Source: Research findings

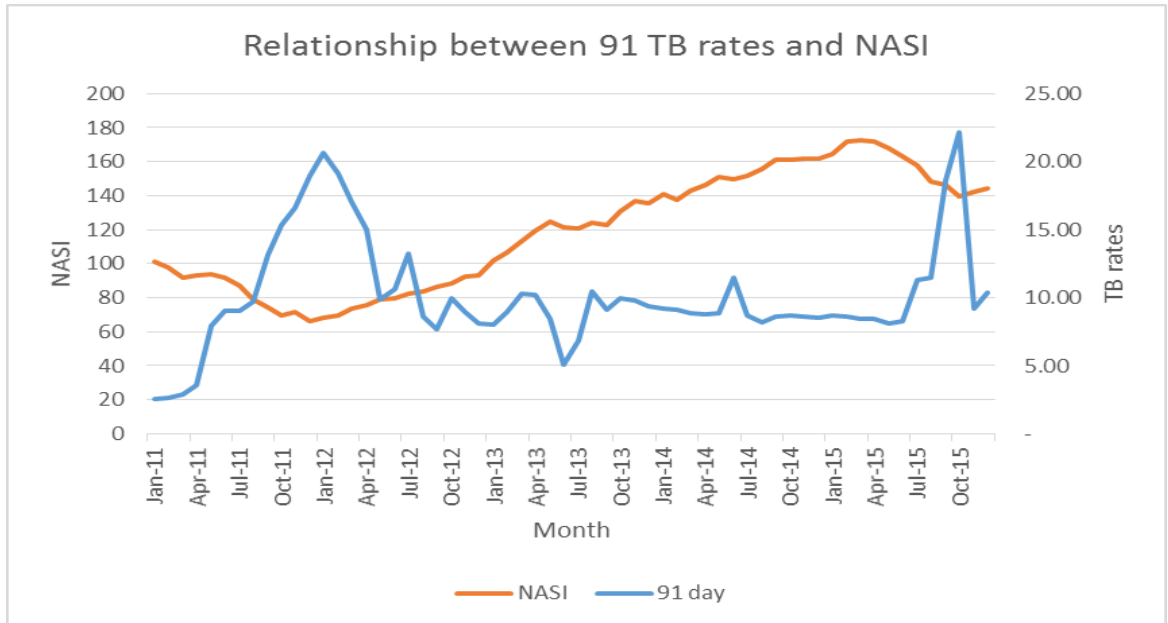
4.2.3 Descriptive relationship between study variables

Figure 4.3: Relationship between 182 day TB rates and NASI index



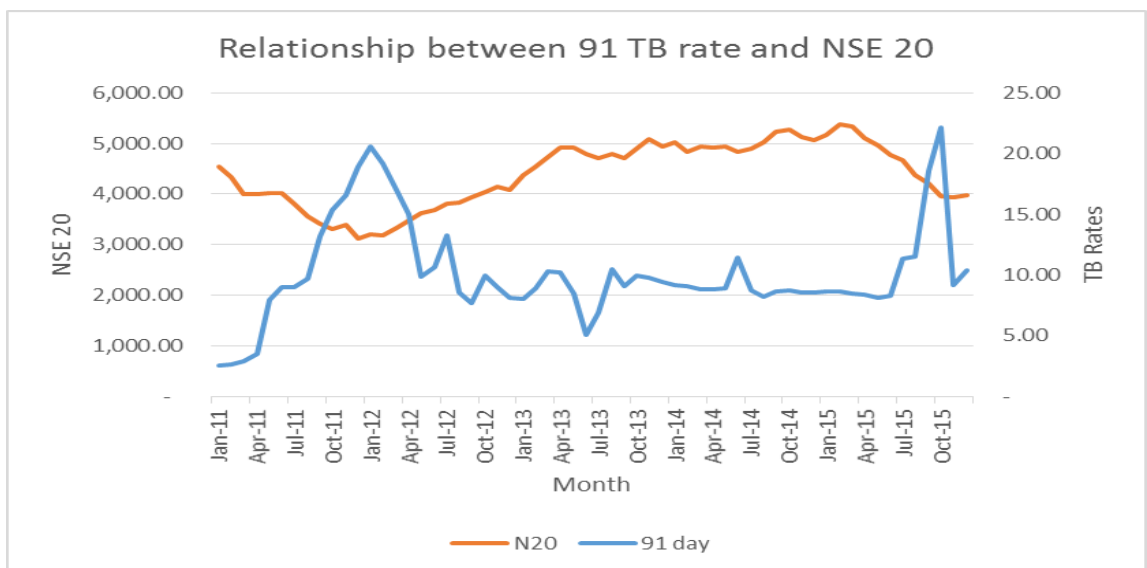
The 182 day TB rate and the NSE NASI index exhibited a largely negatively relationship during the period under consideration. There were periods of significantly different movements around January 2012 and July 2015, period associated with government action to tame inflation and protects the currency.

Figure 4.4: Relationship between 91 day TB rates and NSE NASI index



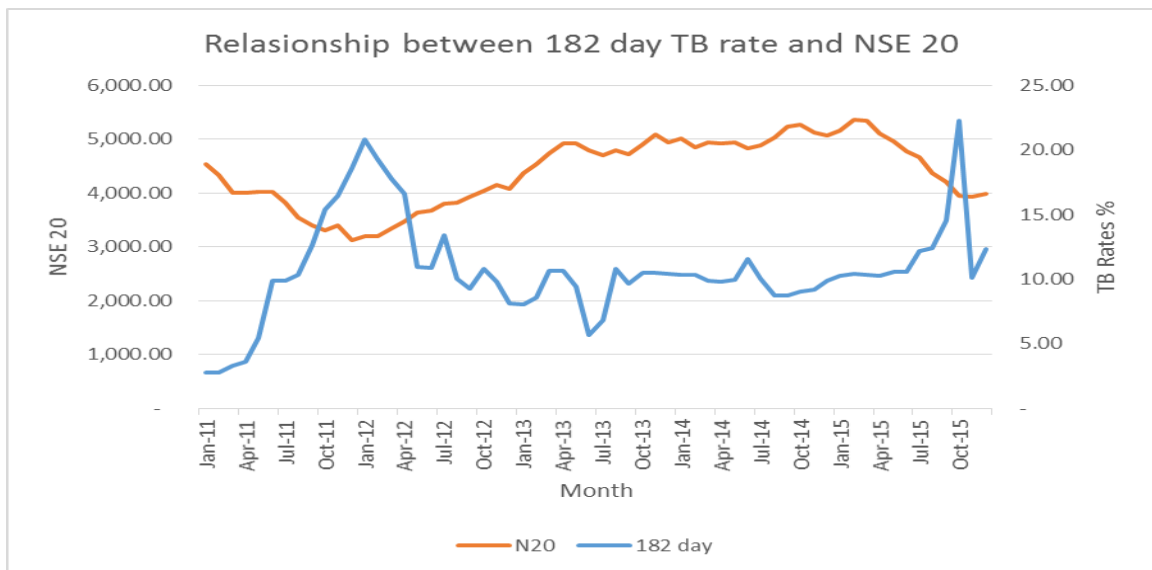
The 91 day TB rate and NASI exhibited a negative relationship during the period with the stock index declining when the TB rates increased.

Figure 4.5: Relationship between 91 day TB rates and NSE 20 index



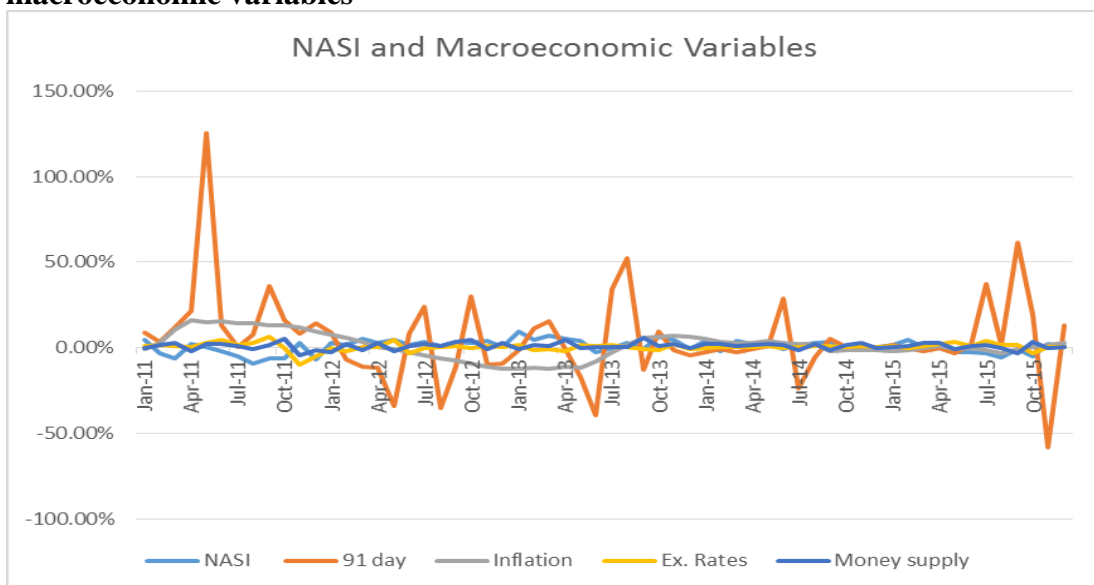
The 91 TB interest rate exhibited a negative relationship with the stock index, largely supporting the notion that as interest rates rise the stock index declines.

Figure 4.6: Relationship between 182 day TB rates and NSE 20 index



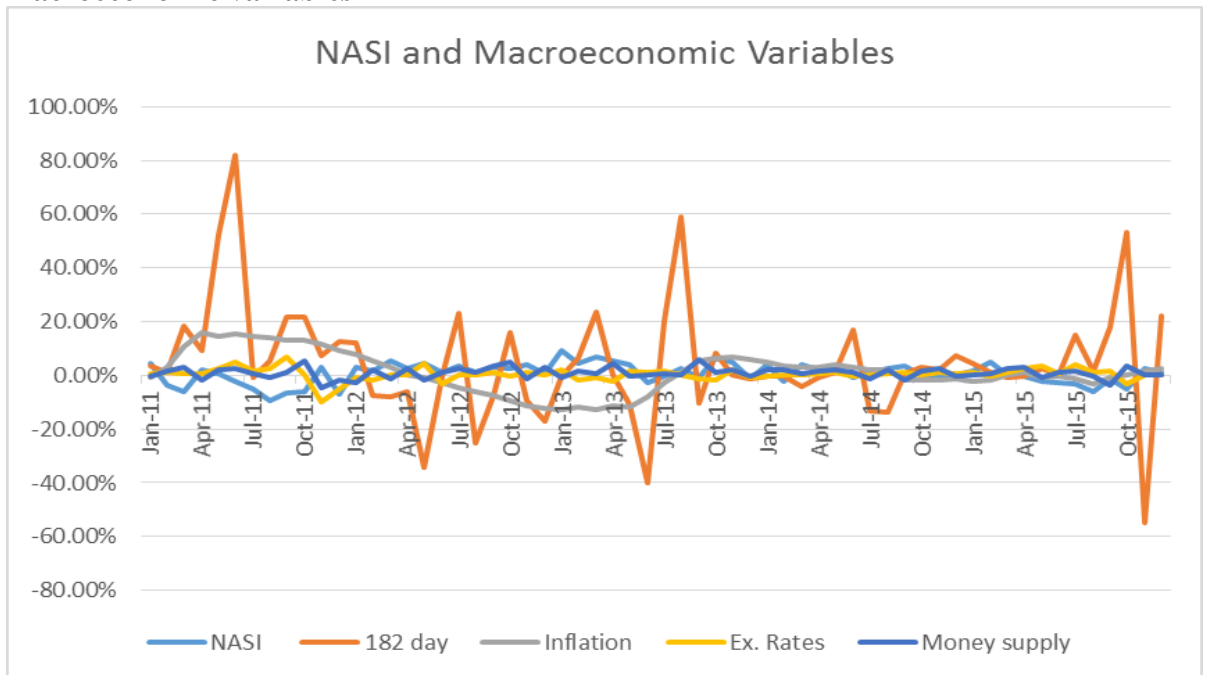
The above charts indicate that there is a negative relationship between the Nairobi Stock Market performance and the 91 and 182 day Treasury Bill interest rates. However, during the period when the government took monetary action through interest increases to control inflation or protect the currency, the sharp increases in interest rates were not representative of the stock market changes.

Figure 4.7: Relationship between NASI, 91 day TB rates and other macroeconomic variables



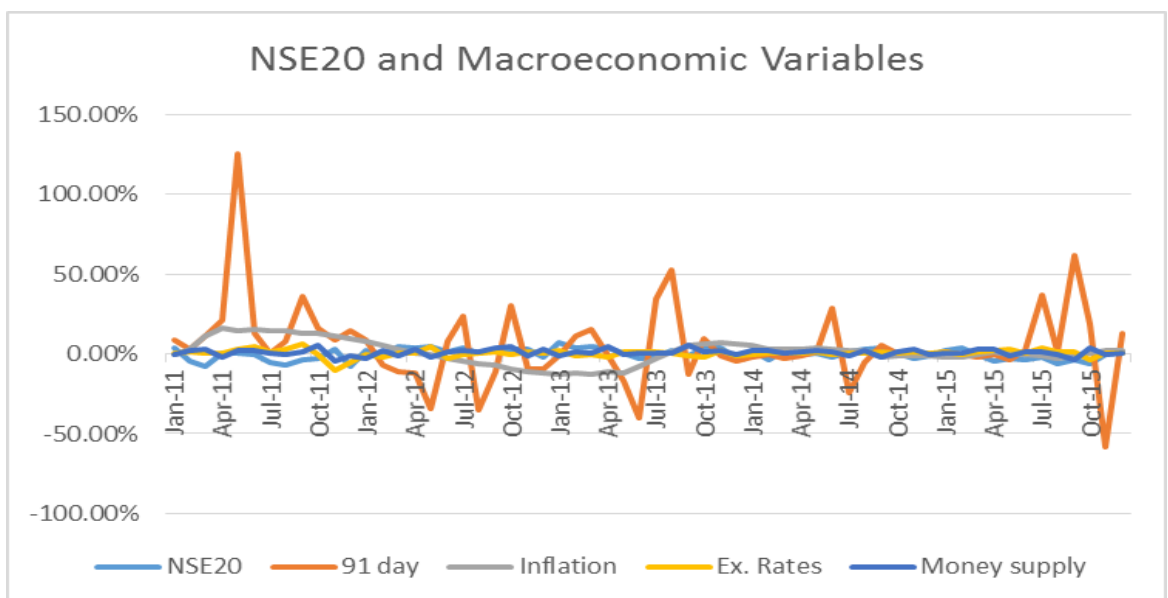
The 91 day TB exhibited greater oscillations during the period when compared to the other macroeconomic variables which remained largely stable during the period.

Figure 4.8: Relationship between NASI, 182 day TB rates and other macroeconomic variables



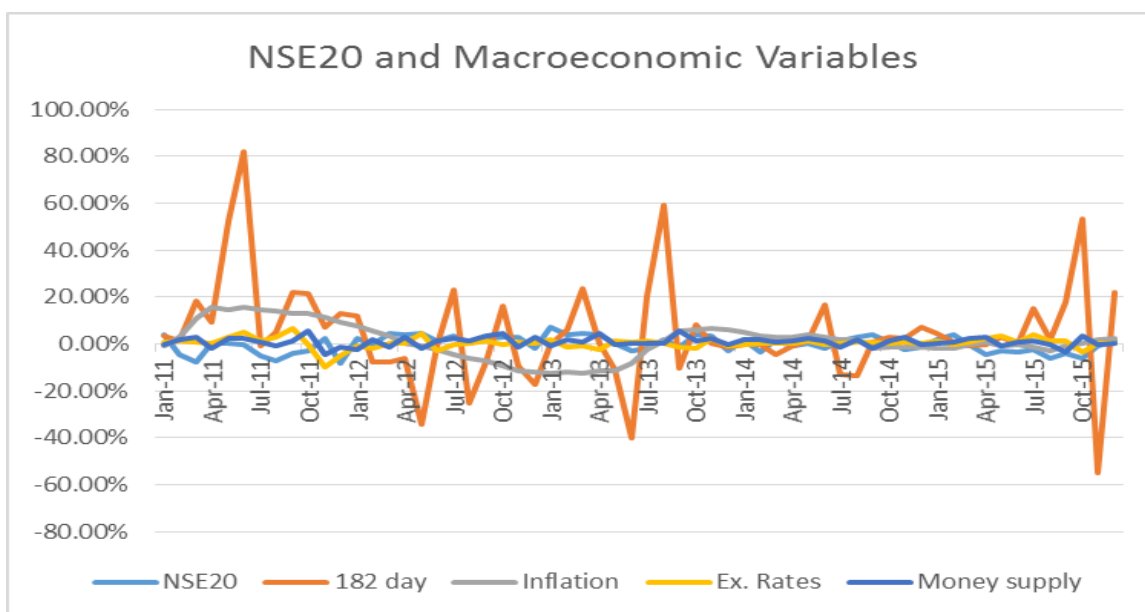
The 182 day TB exhibited greater oscillations during the period when compared to the other macroeconomic variables which remained largely stable during the period.

Figure 4.9: Relationship between NSE 20, 91 day TB rates and other macroeconomic variables



Apart from the 91 day TB rates which fluctuated significantly during the period. The changes in the NSE 20 were largely in tandem with the changes in the other macroeconomic variables.

Figure 4.10: Relationship between NSE 20, 182 day TB rates and other macroeconomic variables



The changes in the 182 day TB rates fluctuated significantly during the period. The changes in the NSE 20 were largely in tandem with the changes in the other macroeconomic variables.

4.3 Regression and correlation Analysis

Regression analysis attempt to find the best line of fit between the independent and dependent variables enabling researchers to estimate values of the dependent variable using values of the independent variable. Correlation on the other hand provides an indication of the degree of relationship between the independent and dependent variables. In correlation where the correlation coefficient (r) is zero, there is no relationship between the variables while a positive r indicates that when one variable goes up the other will also go up.

4.3.1 Multiple Regression Analysis

The research carried out a multiple regression analysis using the NCSS 11 statistical analysis software. The variables for the analysis were as: Independent Variable - Changes in the 91 Day TB rate, 182 Day TB rate, annual inflation rates, money supply and exchange rates. Dependent Variable – Changes in NASI and NSE 20. The review measures the impact of the independent variables on the NASI and the NSE 20 with separate analytical models.

The regression analysis seeks to fit the variables into the following analytical model.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + E \beta_5 X_5 + \epsilon \dots\dots\dots$$

Where:

Y: is the market performance as measured by the NASI or NSE 20 share index

α : is the constant.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$: is the coefficient of independent variable (slope of regression equation)

X₁: is the Average monthly change in 91 TB rates

X₂: is the Average monthly change in 182 TB rates

X₃: is the Average monthly change in inflation rates

X₄: is the Average monthly change in US\$/Kes Exchange rates

X₅: is the Average monthly change in broad money supply (M2)

ϵ : is the stochastic error term.

4.3.2 Multiple regression and correlation analysis – Impact on NASI

The summary report is as follows:

Item	Value	Rows	Value
Dependent Variable	NASI	Rows Processed	60
Number Ind. Variables	5	Rows Filtered Out	0
Weight Variable	None	Rows with X's Missing	0
R ²	0.2726	Rows with Weight Missing	0
Adj R ²	0.2053	Rows with Y Missing	0
Coefficient of Variation	4.6779	Rows Used in Estimation	60
Mean Square Error	0.001193488	Sum of Weights	60.000
Square Root of MSE	0.0345469		
Ave Abs Pct Error	145.571		
Completion Status	Normal Completion		

The above report summarises the results of the regression analysis, showing the variables used and the basic results from the analysis.

The coefficient of determination R² indicates that the regression model explains at least 27% of the changes in NASI. This is a relatively low percentage which indicates that there are other variables not included in the model which have an impact on the stock market performance.

Regression Coefficients T-Tests

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	Standardized Coefficient	T-Statistic to Test H0: β(i)=0	Prob Level	Reject H0 at 5%?	Power of Test at 5%
Intercept	0.01382391	0.00507798	0.0000	2.722	0.0087	Yes	0.7623
X91_day	0.002664958	0.02813844	0.0175	0.095	0.9249	No	0.0510
X182_day	-0.008147543	0.03447402	-0.0451	-0.236	0.8141	No	0.0562
Inflation	-0.2420925	0.0636496	-0.4727	-3.804	0.0004	Yes	0.9621
Ex_Rates	-0.2250287	0.1950785	-0.1353	-1.154	0.2538	No	0.2051
Money_supply	-0.2595152	0.2277618	-0.1365	-1.139	0.2596	No	0.2013

The estimated equation is therefore as follows:

$$\text{NASI} = 0.014 + 0.003X_1 - 0.008X_2 - 0.24X_3 - 0.23X_4 - 0.26X_5 + \varepsilon$$

Source	DF	R ² Lost If Term(s) Removed	Sum of Squares	Mean Square	F-Ratio
Intercept	1		0.003272387	0.003272387	
Model	5	0.2726	0.02415392	0.004830785	4.048
X91_day	1	0.0001	1.07053E-05	1.07053E-05	0.009
X182_day	1	0.0008	6.666345E-05	6.666345E-05	0.056
Inflation	1	0.1949	0.01726591	0.01726591	14.467
Ex_Rates	1	0.0179	0.00158809	0.00158809	1.331
Money_supply	1	0.0175	0.001549466	0.001549466	1.298
Error	54	0.7274	0.06444836	0.001193488	
Total(Adjusted)	59		0.08860229	0.001501734	

The results of the analysis above indicate that there is a weak positive relationship between the 91 day TB rate and the NASI, while the 182 day TB rate has a weak negative relationship with the NASI. The weak relationship is borne out by the results of the review of the impact of removal of the 91 day and 182 day TB rates on the analytical model and in this case the impact would be minimal.

4.3.3 Multiple regression analysis – Impact on NSE 20

The summary report is as follows:

Item	Value	Rows	Value
Dependent Variable	N20	Rows Processed	60
Number Ind. Variables	5	Rows Filtered Out	0
Weight Variable	None	Rows with X's Missing	0
R ²	0.1691	Rows with Weight Missing	0
Adj R ²	0.0921	Rows with Y Missing	0
Coefficient of Variation	-37.4319	Rows Used in Estimation	60
Mean Square Error	0.001139031	Sum of Weights	60.000
Square Root of MSE	0.03374953		
Ave Abs Pct Error	171.572		
Completion Status	Normal Completion		

The above report summarises the results of the regression analysis, showing the variables used and the basic results from the analysis.

The coefficient of determination R² indicates that the regression model explains at least 17% of the changes in NSE 20. This is a relatively low percentage which indicates that there are other variables not included in the model which have an impact on the stock market performance.

Regression Coefficients T-Tests

Independent Variable	Regression Coefficient b(i)	Standard Error Sb(i)	Standardized Coefficient	T-Statistic to Test H0: β(i)=0	Prob Level	Reject H0 at 5%?	Power of Test at 5%
Intercept	0.003542817	0.004960775	0.0000	0.714	0.4782	No	0.1080
X91_day	-0.002924218	0.02748898	-0.0211	-0.106	0.9157	No	0.0513
X182_day	0.007520894	0.03367833	0.0455	0.223	0.8241	No	0.0555
Inflation	-0.1866497	0.06218052	-0.3987	-3.002	0.0041	Yes	0.8384
Ex_Rates	-0.112495	0.1905759	-0.0740	-0.590	0.5575	No	0.0893
Money_supply	-0.2135453	0.2225049	-0.1229	-0.960	0.3415	No	0.1564

The estimated equation is therefore as follows:

$$\text{NSE 20} = 0.004 - 0.003X_1 + 0.008X_2 - 0.19X_3 - 0.11X_4 - 0.21X_5 + \varepsilon$$

Source	DF	R ² Lost If Term(s) Removed	Sum of Squares	Mean Square	F-Ratio
Intercept	1		4.877573E-05	4.877573E-05	
Model	5	0.1691	0.01251583	0.002503165	2.198
X91_day	1	0.0002	1.288954E-05	1.288954E-05	0.011
X182_day	1	0.0008	5.680327E-05	5.680327E-05	0.050
Inflation	1	0.1386	0.01026317	0.01026317	9.010
Ex_Rates	1	0.0054	0.0003968856	0.0003968856	0.348
Money_supply	1	0.0142	0.001049147	0.001049147	0.921
Error	54	0.8309	0.06150766	0.001139031	
Total(Adjusted)	59		0.07402349	0.001254635	

The results of the analysis above indicate that there is a weak negative relationship between the 91 day TB rate and the NSE 20, while the 182 day TB rate has a weak positive relationship with the NSE 20. The weak relationship is borne out by the results of the review of the impact of removal of the 91 day and 182 day TB rates on the analytical model and in this case the impact would be minimal.

4.3.4 Granger Causality test

The correlation results from the multiple regression analysis indicated a weak relationship between the changes in stock market performance and the changes in 91 and 182 TB rates. The research further carried out a causality assessment using the granger causality test to check whether there were indication of changes in the TB rates causing changes in the stock market performance. Granger causality test (Granger 1969) was developed by Clive Granger in the 1960s. The test attempts to predict occurrences of an X1 based on past values of another occurrence. According to Granger causality, if X1 "Granger-causes" X2, past values of X1 can be used to

predict X2. The test was carried out using the Eviews 9 SV statistical software to determine if there was a causality relationship between the changes in the stock market performance and changes in the 91 and 182 TB rates.

Separate assessments were made for causal relationship between NSE 20 and 182 Day TB rates, causal relationship between NSE 20 and 91 Day TB rates, causal relationship between NASI and 182 Day TB rates and causal relationship between NASI and 91 Day TB rates. The causality test sought to determine if changes in one variable had an effect on changes in the other variable after taking into account time-lags between the two events.

The Eviews statistical software displays the F values for the null hypothesis in respect of the two variable under consideration. In determining whether the null hypothesis or the alternative hypothesis are selected, the following test were carried out:

- a) If $F \geq 3.84$ then H (A) (Alternate hypothesis is accepted)
- b) If $F < 3.84$ then H (o) (Null hypothesis is accepted)

The implications of the above test on each of the relationships that were tested are explained against each of the Eviews statistical results.

The results from the tests are reproduced below:

a) Causal relationship between NSE 20 and 182 Day TB rates

Pairwise Granger Causality Tests

Date: 10/21/16 Time: 20:07

Sample: 1 60

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
N20 does not Granger Cause _182_DAY_TB	58	3.09829...	0.0533...
_182_DAY_TB does not Granger Cause N20		1.98806...	0.1470...

For first null hypothesis above, $F < 3.84$, therefore the null hypothesis is accepted. This means that changes in the stock market performance as measured by the NSE 20 do not cause changes in 182 day TB rates. In the second hypothesis $F < 3.84$, therefore null hypothesis is accepted and in this case too changes in 182 day TB rates do not cause changes in the stock market performance.

b) Causal relationship between NASI and 182 Day TB rates

Pairwise Granger Causality Tests

Date: 10/21/16 Time: 20:10

Sample: 1 60

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
NASI does not Granger Cause _182_DAY_TB	58	3.52084...	0.0366...
_182_DAY_TB does not Granger Cause NASI		1.08191...	0.3463...

For first null hypothesis above, $F < 3.84$, therefore the null hypothesis is accepted. This means that changes in the stock market performance as measured by the NASI do not cause changes in 182 day TB rates. In the second hypothesis $F < 3.84$, therefore null hypothesis is accepted and in this case too changes in 182 day TB rates do not cause changes in the stock market performance.

c) Causal relationship between NSE 20 and 91 Day TB rates

Pairwise Granger Causality Tests

Date: 10/21/16 Time: 20:09

Sample: 1 60

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
N20 does not Granger Cause _91_DAY_TB	58	5.24487...	0.0083...
_91_DAY_TB does not Granger Cause N20		1.52659...	0.2266...

For first null hypothesis above, $F \geq 3.84$, therefore the null hypothesis is rejected and the alternative hypothesis is accepted. This means that changes in the stock market performance as measured by the NSE 20 cause changes in 91 TB rates. In the second hypothesis $F < 3.84$, therefore null hypothesis is accepted and in this case changes in 91 day TB rates do not cause changes in the stock market performance.

d) Causal relationship between NASI and 91 Day TB rates

Pairwise Granger Causality Tests

Date: 10/21/16 Time: 20:12

Sample: 1 60

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
NASI does not Granger Cause _91_DAY_TB	58	5.96054...	0.0046...
_91_DAY_TB does not Granger Cause NASI		0.70127...	0.5004...

For first null hypothesis above, $F \geq 3.84$, therefore the null hypothesis is rejected and the alternative hypothesis is accepted. This means that changes in the stock market performance as measured by the NASI cause changes in 91 TB rates. In the second hypothesis $F < 3.84$, therefore null hypothesis is accepted and in this case changes in 91 day TB rates do not cause changes in the stock market performance.

4.3.5 Summary of findings and interpretations

The aim of the study was to test the effect of changes in the interest as measured by the 91 and 182day TB rates on the stock market performance, using the Nairobi Securities Exchange as the test case. Measuring of stock market performance were based on changes the NASI and the NSE 20. Different statistical tools were applied to test the hypothesis that changes in the interest rates have an impact on the stock market performance. The first test was multiple regression analysis of the impact of various macroeconomic indicators including TB rates on stock market performance. The results were used to develop an analytical model to predict the impact of the tested macroeconomic indicators on the stock market performance. In the analytical model, the regression coefficients were the least squares estimates of the parameters, providing an estimate of the extent to which changes in the dependent variable could be attributed to changes in the independent variable with the other independent variables remaining constant.

The p values in the regression coefficients for the 91 TB rates and the 182 TB rates are very high which indicates that the two variables are poor predictors of the stock market performance whether measured on the basis of the NASI or NSE 20. This

position is borne out by the results of the variance analysis which indicated that removal of the 91 and 182 TB day rates from the model had limited impact on the R^2 . The results showed that changes in the 91 day and 182 day TB rates had limited impact on the stock market performance.

The second test was the Granger causality test which sought to test whether changes in the stock market performance could be attributed to changes in the TB rates. The granger causality test indicated that there was no causal relationship between the stock market performance as measured by the NASI and NSE 20 and the 182 day TB rates. However, there was a causal relationship between the NASI and NSE 20 and the 91 day TB rates. In this case, the changes in the stock market performance had an impact on the 91 day TB rates. Causal relationships are to be considered with caution and it is important to carry out additional tests to confirm that a relationship exists between the two variables.

The study findings are in agreement with those of a number of other studies such as Coleman and Agyire-Tetty (2008) who in a study of the impact of macroeconomic variables on the performance of Ghana Stock Exchange found that the TB rates did not have a significant impact on the stock market performance. The findings are also consistent with those of Lee (1997) who found that over time the relationship between the interest rates and stock performance was not stable and it tended to shift from weak positive or negative relationship to no relationship.

The study findings are however at variance with the findings from a number of other studies which found a negative relationship between the stock market performance and interest rates. These studies include Ochieng et al (2012) who found a negative relationship between the Nairobi stock market performance and the changes in the 91 day TB rates.

The results of the causality test are consistent with findings by Chirchir (2012) who in a study of the impact of interest rates on the stock performance found that there was no significant causal relationship between the two. Hashemdah and Taylor (1988) did not find a conclusive causal relationship between interest rates and stock performance, a result that Gupta et al (nd) confirmed.

CHAPTER FIVE

SUMMARY AND INTERPRETATION OF FINDINGS

5.1 Introduction

This chapter gives a summary of the study and briefly explains the model that was used in the

study to test the relationship between the dependent and independent variables in the study. Conclusions from the study as well as the policy recommendations are also discussed in detail. A brief overview of the limitations of the study and some suggestions for further study are given at the end of the chapter.

5.2 Summary of findings

The study reviewed the effect of changes in the TB rates represented by the 91 and 182 day TB rates of the stock market performance using the NASI and the NSE 20. A background was provided to provide the justification for the study which included increase government dependence on domestic borrowing to fund development expenditure which had the potential to shift investments from the stock exchange to the debt markets. The study provided a basis for the use of two measures of the interest and the stock performance namely the 91 and 182 day TB rates and the NSE 20 and the NASI. The use of the two variables was to test whether changes in the TB terms delivered different results while the use of different stock market measures was to determine whether the changes in rates impacted only the heavily traded stocks or the impact was cross-cutting.

The study applied multiple regression analysis and the granger causality tests to check if there was a relationship between the two variables. The results from the study and analysis are consistent with the majority of other research that has been carried in other areas in the world and to a large extent it shows that the NSE reacts in a largely similar way to the other stock market in other parts of the world. A number of interesting observations came through from the research including potential causality between the stock market performance and the TB rates, with the stock market potentially influencing changes in the interest rates. This is an unexpected observation and a potential area for future research.

A number of theories underpin this study including the efficient market hypothesis, the weak relationship between the stock market and the interest rates points to a scenario where the factors affecting investments in the debt market do not appear to have a bearing on the alternative market in this case the equities market. There is scope for studies to understand whether the lack of depth in the NSE which is exhibited by a small number of listed companies and shares could have an impact on the reaction of the stock market to changes in macroeconomic indicators. The NSE exhibits a semi strong form state as it appears to rely on current available information. The APT supports the observation that the stock returns are affected by macroeconomic factors. In this study it is clear that the TB rates have limited influence on the stock market returns which makes it even more necessary to carry out more research to find the factors which influence NSE performance. This understanding is critical in putting in place measures to spur growth in the market. The complimentary hypothesis is important especially in the context of the introduction of interest rate caps in Kenya. Following the introduction of the caps, the banking stocks experienced a strong bear run which could be attributed to the direct impact of the caps on the revenues of the banks. Whether the caps will benefit other stocks due to the decline in financing costs is an issues that remains open for research.

The literature review found that a large number of research carried out, the interest rates had a negative relationship with changes in stock market performance. However, in most of these cases, the relationship was weak and there were instances where in the long-term there was not perceived relationship between the interest rates and the stock market performance. Given the number of contradictory findings coming out of the various studies, the study findings are important in reinforcing the position that interest rates are not a key determinant of stock market performance. These findings are consistent with those of Naik and Padhi (2012) and Coleman & Agyire-Tetty (2008) who in a study of the Indian and Ghana stock markets found that interest rates did not have a significant impact on stock prices.

5.3 Conclusion

The study found that changes in the 91 TB and 182 TB rates had little impact on the stock market performance. The other macroeconomic indicators that were included in the study to reduce the errors such as money supply and exchange rates were found to have a limited impact on the stock market performance. From the multiple regression analysis, the only macroeconomic indicator which has an impact on the stock market performance is the changes in inflation. All the other factors including the interest rates did not have significant impact on the stock market performance.

The study accepted the null hypothesis and concluded that TB rates do not have a significant impact on the stock market performance. This is consistent with previous studies on the impact of macroeconomic variables on the stock market which concluded that changes in interest rates did not have a significant impact on the stock market performance. The fact that the analytical model only explained a small part of the relationship indicates that there is scope for additional research to find the factors that influence the stock market performance

Understanding the stock market performance is critical for investors and regulators as it will allow them to make decisions that allow facilitate the growth of the local market and encourage companies especially from the African region to list on the bourse. This will require careful management of the bourse to cushion against the recent fluctuations experienced in the market which make the NSE alternate between being the best performing and the worst performing bourse in relatively short durations.

5.4 Recommendations

From the summary and conclusions above, this study recommends the following. First, policy makers need to understand the factors that influence the stock market performance. The study found that the common macroeconomic factors such as money supply, interest rates and foreign exchange rates had limited impact on the stock market performance. Further, the term of the TB rates did not make a significant difference to the stock market performance.

Secondly, as a growing stock market there is need for additional research into other macroeconomic variables to have a better understanding of the combination of policies that are necessary to create a conducive environment for the stock market. The evidence from the review of the impact of macroeconomic variables indicates that there are potential causal relationships between the various variables. It will be useful to assess the variables that have the greatest impact on the stock market performance to allow the government to make useful interventions to spur growth in the stock market.

The results of causal analysis indicate that the changes in stock market performance have an impact on the 91 day TB rates. This is a potential areas for further research for government since a confirmation of the existence of this relationship will provide additional guidance to investors and the government on the factors that influence the pricing of financial instruments such as TB rates. It will also assist in the structural of the terms of the TB rates.

5.5 Limitations of the study

In this study there were a number of limitations mainly based on the use of secondary data, which was not sourced specifically for purposes of this study. The first issue is that the data used was secondary data which was not prepared specifically for this study. Thus, in case the data was distorted, the conclusions and findings made may not be accurate.

The second limitation is that the interest rates used for the study were based on the last Treasury bill issue in each of the month during the period. This will generally be affected by the size of issue.

The study focusses only on interest rates although the available information indicates that the stock performance is affected by a wide number of variables, in addition to the interest rates. A review of all the factors or a wide number of factors will assist to create a model that would more accurately predict the changes in the stock market as a result of changes in macroeconomic variables.

Finally, another limitation to the study was the period analysed. The study only analysed a period of five years from 2011 to 2015. Since the period covered was short, generalizing the findings may be hard in addition to the likelihood that the findings may be different if a longer period was analysed. The study also did not adjust the data obtained to remove seasonal fluctuations which may distort findings.

5.6 Suggestions for future study

Further study is recommended where both secondary and primary data can be used to determine the effect of lending interest rates on NSE performance. This will ensure that information not captured in secondary data is obtained which can be essential in making conclusions and recommendations. This will address potential biases that could arise from the use of data which was not specifically prepared for purposes of this study. Another suggestion would be to carry out a review covering over ten years to address potential limitations arising from the use of five year data in this study. This will help to ensure that results from the study better reflect the stock performance in Kenya. The data can also help to explain fluctuations arising from temporary changes such as political instability and unexpected monetary interventions.

Further study is also recommended to determine the effect of lending interest rates on NSE performance but using different measure of performance. These measures can be turnover on new cash flow into the NSE and share prices. Adjustment also can be done on turnover computed to remove turnover which is as a result of investors not getting loans due to high interest rates or investors selling shares to buy others which are better performing.

A number of studies outside Kenya have indicated that the stock market performance is affected by a multiple of variables and it would be useful to understand the impact of the variables such as inflation, exchange rates, money supply on the stock performance. One of the issues arising from the study was the possible causal relationship between the changes in stock market performance and the 91 day TB rates. It will be useful to assess the factors that impact the interest rates and the potential impact of stock market performance on the interest especially the interest rates.

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APPENDICES

APPENDIX I: COMPANIES LISTED ON THE NAIROBI SECURITIES EXCHANGE

SECURITIES	TRADING SYMBOL
AGRICULTURAL	
Eaagads Ltd	EGAD
Kakuzi Ltd	KUKZ
Kapchorua Tea Co. Ltd	KAPC
The Limuru Tea Co. Ltd	LIMT
Rea Vipingo Plantations Ltd	REA.
Sasini Ltd	SASN
Williamson Tea Kenya Ltd	WTK
AUTOMOBILES & ACCESSORIES	
Car & General (K) Ltd	C&G
Marshalls (E.A.) Ltd	MASH
Sameer Africa Ltd	FIRE
BANKING	
Barclays Bank of Kenya Ltd	BBK
CFC Stanbic of Kenya Holdings Ltd	CFC
Diamond Trust Bank Kenya Ltd	DTK
Equity Bank Ltd	EQTY
Housing Finance Co. Kenya Ltd	HFCK
I&M Holdings Ltd	I&M
Kenya Commercial Bank Ltd	KCB
National Bank of Kenya Ltd	NBK
NIC Bank Ltd	NIC
Standard Chartered Bank Kenya Ltd	SCBK
The Co-operative Bank of Kenya Ltd	COOP
COMMERCIAL AND SERVICES	
Express Kenya Ltd	XPRS

SECURITIES	TRADING SYMBOL
Hutchings Biemer Ltd	HBER
Kenya Airways Ltd	KQ
Longhorn Kenya Ltd	LKL
Nation Media Group Ltd	NMG
Scangroup Ltd	SCAN
Standard Group Ltd	SGL
TPS Eastern Africa Ltd	TPSE
Uchumi Supermarket Ltd	UCHM
CONSTRUCTION & ALLIED	
ARM Cement Ltd	ARM
Bamburi Cement Ltd	BAMB
Crown Paints Kenya Ltd	BERG
E.A. Cables Ltd	CABL
E.A. Portland Cement Co. Ltd	PORT
ENERGY & PETROLEUM	
KenGen Co. Ltd	KEGN
KenolKobil Ltd	KENO
Kenya Power & Lighting Co Ltd	KPLC
Total Kenya Ltd	TOTL
Umeme Ltd	UMME
INSURANCE	
British-American Investments Co.(Kenya) Ltd	BRIT
CIC Insurance Group Ltd	CIC
Jubilee Holdings Ltd	JUB
Kenya Re Insurance Corporation Ltd	KNRE
Liberty Kenya Holdings Ltd	CFCI
Pan Africa Insurance Holdings Ltd	PAFR
INVESTMENT	
Centum Investment Co Ltd	ICDC

SECURITIES	TRADING SYMBOL
Olympia Capital Holdings Ltd	OCH
Trans-Century Ltd	TCL
INVESTMENT SERVICES	
Nairobi Securities Exchange Ltd Ord 4.00	NSE
MANUFACTURING & ALLIED	
A.Baumann & Co Ltd	BAUM
B.O.C Kenya Ltd	BOC
British American Tobacco Kenya Ltd	BAT
Carbacid Investments Ltd	CARB
East African Breweries Ltd	EABL
Eveready East Africa Ltd	EVRD
Kenya Orchards Ltd	ORCH
Mumias Sugar Co. Ltd	MSC
Unga Group Ltd	UNGA
TELECOMMUNICATION & TECHNOLOGY	
Safaricom Ltd	SCOM
GROWTH ENTERPRISE MARKET SEGMENT (GEMS)	
Flame Tree Group Holdings Ltd Ord 0.825	FTGH
Home Afrika Ltd	HAFR

**APPENDIX II: MONTH END 91 AND 182 DAY TREASURY
BILL RATES**

Month	182 day TB Rate (%)	91 day TB Rate (%)
Jan-11	2.73	2.52
Feb-11	2.76	2.60
Mar-11	3.27	2.91
Apr-11	3.58	3.52
May-11	5.44	7.94
Jun-11	9.91	9.00
Jul-11	9.85	9.00
Aug-11	10.36	9.71
Sep-11	12.62	13.19
Oct-11	15.36	15.31
Nov-11	16.47	16.60
Dec-11	18.58	18.95
Jan-12	20.80	20.61
Feb-12	19.25	19.15
Mar-12	17.73	17.01
Apr-12	16.62	14.99
May-12	10.92	9.87
Jun-12	10.86	10.68
Jul-12	13.38	13.23
Aug-12	10.03	8.58
Sep-12	9.27	7.65
Oct-12	10.76	9.95
Nov-12	9.77	8.99

Month	182 day TB Rate (%)	91 day TB Rate (%)
Dec-12	8.10	8.14
Jan-13	8.07	8.04
Feb-13	8.57	8.93
Mar-13	10.60	10.32
Apr-13	10.60	10.21
May-13	9.43	8.48
Jun-13	5.64	5.11
Jul-13	6.79	6.86
Aug-13	10.82	10.46
Sep-13	9.67	9.11
Oct-13	10.49	9.94
Nov-13	10.52	9.82
Dec-13	10.38	9.40
Jan-14	10.34	9.17
Feb-14	10.33	9.12
Mar-14	9.88	8.85
Apr-14	9.82	8.78
May-14	9.93	8.89
Jun-14	11.59	11.44
Jul-14	10.06	8.69
Aug-14	8.69	8.21
Sep-14	8.74	8.65
Oct-14	9.00	8.71
Nov-14	9.20	8.60
Dec-14	9.86	8.57
Jan-15	10.28	8.68

Month	182 day TB Rate (%)	91 day TB Rate (%)
Feb-15	10.38	8.64
Mar-15	10.30	8.44
Apr-15	10.27	8.41
May-15	10.55	8.12
Jun-15	10.55	8.27
Jul-15	12.15	11.33
Aug-15	12.36	11.51
Sep-15	14.55	18.61
Oct-15	22.29	22.13
Nov-15	10.09	9.21
Dec-15	12.34	10.41

**APPENDIX III: NSE STOCK PERFORMANCE: NASI AND NSE
20 SHARE INDEX**

Month	NASI	N20
Jan-11	101.18	4,540.16
Feb-11	97.67	4,325.35
Mar-11	91.58	3,997.12
Apr-11	93.46	4,005.36
May-11	93.87	4,023.81
Jun-11	92	4,017.57
Jul-11	87.38	3,820.08
Aug-11	79.27	3,549.84
Sep-11	74.04	3,406.80
Oct-11	69.46	3,307.87
Nov-11	71.48	3,393.52
Dec-11	66.55	3,122.80
Jan-12	68.54	3,197.88
Feb-12	69.63	3,188.41
Mar-12	73.33	3,338.57
Apr-12	75.37	3,478.25
May-12	78.72	3,629.66
Jun-12	79.73	3,681.78
Jul-12	82.63	3,805.71
Aug-12	83.66	3,826.02
Sep-12	86.32	3,927.35
Oct-12	88.7	4,037.80
Nov-12	92.44	4,145.77
Dec-12	93.03	4,073.36
Jan-13	101.83	4,368.88
Feb-13	106.34	4,538.41

Month	NASI	N20
Mar-13	113.61	4,731.91
Apr-13	119.7	4,913.62
May-13	124.74	4,922.03
Jun-13	121.45	4,787.89
Jul-13	120.78	4,706.97
Aug-13	123.9	4,792.27
Sep-13	122.94	4,719.49
Oct-13	130.79	4,904.60
Nov-13	136.95	5,081.28
Dec-13	135.4	4,931.99
Jan-14	140.91	5,021.89
Feb-14	137.8	4,843.12
Mar-14	143.2	4,941.18
Apr-14	146.44	4,913.45
May-14	150.84	4,931.74
Jun-14	149.67	4,827.54
Jul-14	151.58	4,892.66
Aug-14	155.72	5,030.51
Sep-14	161.17	5,225.63
Oct-14	161.45	5,264.52
Nov-14	161.54	5,132.20
Dec-14	161.99	5,062.96
Jan-15	164.43	5,161.48
Feb-15	172.21	5,370.29
Mar-15	172.82	5,344.78
Apr-15	171.87	5,108.13
May-15	167.67	4,960.95
Jun-15	162.99	4,780.22
Jul-15	157.67	4,670.53

Month	NASI	N20
Aug-15	148.29	4,375.13
Sep-15	146.58	4,209.62
Oct-15	139.31	3,953.83
Nov-15	142.62	3,929.51
Dec-15	144.24	3,986.51