

**THE RELATIONSHIP BETWEEN MONETARY POLICY AND  
PERFORMANCE OF THE NAIROBI SECURITIES EXCHANGE**

**BY:**

**MWANZA D. K.**



**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF  
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## DECLARATION

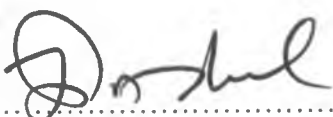
This research project is my original work and has not been submitted to any other University or institution of higher learning for an academic award.

Signed.......... Date *7/11/2012* .....

**Mwanza D. K.**

**D63/63482/2011**

This research project has been submitted for examination with my approval as the University Supervisor.

Signed.......... Date *07/11/12* .....

**Dr. Josiah Aduda**

Chairman

Department of Finance and Accounting

School of Business, University of Nairobi

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Lastly to my wife and daughters, your support, encouragement, prayers and patience for my absence cannot escape my attention.

## **DEDICATION**

This project is dedicated to my wife, Gladys Mwikali, and daughters Cynthia Mutheu and Cyrilla Mbinya.

## ABSTRACT

The aim of this descriptive and correlational study was to determine the relationship between monetary policy and performance of the Nairobi Securities Exchange. The Performance measure of the Nairobi Securities Exchange used was the NSE 20-Share Index which was regressed against the monetary policy instruments including 91-day Treasury bill rate, exchange rate (US dollar), money supply (M3), repo rate, cash ratio requirement (CRR) and Central Bank rate (CBR).

The period of the study was six years from June 2006 to June 2012. The study period was relevant because one of the variables, Central Bank rate (CBR), was introduced in Kenya for the first time in June 2006 as the rate at which Central Bank of Kenya lends money to commercial banks through the overnight Lombard window. The study employed monthly secondary data which was obtained from the Central Bank of Kenya and Nairobi Securities Exchange. Data were analyzed using the Ordinary Least Square method which assumes linearity between the dependent variable and the independent variables and the analysis technique was multiple regression aided by research software 'eviews' version 7.

The study found that the monetary policy instruments jointly influenced the variation in the NSE 20-share index with a strong adjusted  $R^2$ . Furthermore, the NSE 20-Share Index was found to be positively correlated with money supply (M3), repo rate (RR), cash ratio requirement (CRR) and the Central Bank rate (CBR) and negatively correlated with 91- day Treasury Bill rate and exchange rate. The findings confirmed the researcher's priori expectation that NSE 20-share index would be both positively and negatively correlated with the independent variables.

The rest of the paper is organized as follows: chapter one covers introduction by addressing issues related to background of the study, statement of the problem, study objective and the significance of the study; chapter two focuses on literature review; chapter three is about the research methodology; chapter four covers data analysis, results and discussion; and lastly chapter five addresses summary, conclusion and recommendations.

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## ABBREVIATIONS

APT – Arbitrage Pricing Theory

ATS - Automated Trading System

AIMS – Alternative Investment Market Segment

CAPM – Capital Asset Pricing Model

CBK – Central Bank of Kenya

CBR – Central Bank Rate

CRR – Cash Reserve Ratio

EMH – Efficient Market Hypothesis

FISMS – Fixed Income Securities Market Segment

GDP – Gross Domestic Product

MIMS – Main Investments Market Segment

MPC – Monetary Policy Committee

NASI – NSE All Share Index

NSE – Nairobi Securities Exchange

OMO - Open Market Operations

VAR – Vector Auto Regression

ARCH - Autoregressive Conditional Heteroskedasticity

GARCH – Generalized Autoregressive Conditional Heteroskedasticity

SVAR – Structural Vector Auto regression

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Monetary policy refers to a combination of measures designed to regulate the value, supply and cost of money in an economy in line with the expected level of economic activity. The target of monetary policy may be the achievement of desired level or rate of growth in real activity, the price level, the exchange rate, or the balance of payments. Bernanke and Kuttner (2004) argue that the objective of monetary policy is to achieve price stability, including asset prices, and sustainable economic growth. Methods of monetary policy include setting the interest rate charged by the central bank, sales or purchases of securities to control the money supply, and changes in the required reserve ratios of banks and other financial institutions. The central bank can affect other interest rates both through open market operations to affect the probability that banks are going to need to borrow at its own lending rate, and by the announcement effect of changes in the central bank's minimum lending rate, which are regarded by the markets as statements about the authorities' forecasts and objectives.

Monetary policy has been used by governments and central banks to control the economy. Section 4 of the CBK Act Cap 491, Laws of Kenya amplifies this responsibility of the government and the Central Bank on monetary policy. Subsection 5 states that 'The Minister shall specify at least in every period of 12 months, the price stability target in consultation with the Bank and economic policies to be taken by the Government' ([www.centralbank.go.ke](http://www.centralbank.go.ke)). The Central Bank of every country is the agency

that has the responsibility of formulating and implementing monetary policy on behalf of the government in an attempt to achieve a set of objectives that are expressed in terms of macroeconomic variables such as the achievement of a desired level or rate of growth in real activity, the exchange rate, the price level or inflation, the balance of payment, real output and employment.

According to Aziza (2010), two types of monetary policy exist and include expansionary policy or contractionary policy. An expansionary policy increases the total supply of money in the economy rapidly or decreases the interest rate. When the central bank wants to carry out an expansionary monetary policy, it goes to the security market to buy government bonds with money, thus increasing the money stock or the money in circulation in the economy. Expansionary policy is traditionally used to combat unemployment in a recession. A contractionary policy on the other hand decreases the total money supply or increases it only slowly, or raises the interest rate. When the central bank wants to implement a contractionary monetary policy, it goes to the security market to sell government bonds for money thus decreasing the money stock or the money in circulation in the economy. Contractionary policy is used to combat inflation. Furthermore, monetary policies are described as follows: accommodative, if the interest rate set by the central monetary authority is intended to create economic growth; neutral, if it is intended neither to create growth nor combat inflation; or tight if it is intended to reduce inflation.

### **1.1.1 Monetary Policy in Kenya**

Monetary policy in Kenya is formulated and implemented by the CBK and is aimed at preserving the value of the Kenya shilling. It involves the control of liquidity circulating in the economy to levels consistent with growth and price objectives set by the government. The volume of liquidity in circulation influences the levels of interest rates, and thus the relative value of the local currency against other currencies. Maintaining price stability is crucial for a proper functioning of a market-based economy as it encourages long-term investments and stability in the economy. The CBK uses three major tools to implement monetary policy: open market operations, discount window operations and reserve requirements ([www.centralbank.go.ke](http://www.centralbank.go.ke)).

Open Market Operations (OMO) involves the central bank buying or selling securities in the secondary market in order to achieve a desired level of bank reserves or injecting money into the economy through buying securities in exchange for money stock to influence availability of money in the economy. Discount window operations provide secured short-term loans to commercial banks on overnight basis at punitive rates, thus restricting banks to seek funding in the market resorting to central bank funds only as a last solution. The reserve requirements enable the central bank to retain a certain proportion of commercial banks' deposits as non-interest bearing reserves at the Central Bank aimed at restricting commercial banks ability to expand bank credit ([www.centralbank.go.ke](http://www.centralbank.go.ke)).



To implement the monetary policy tools cited above and thus influence the economic activity through macroeconomic variables, the CBK employs monetary policy instruments that include the Treasury bill rates, exchange rate, broad money (M3), repo rate, cash reserve ratio or liquidity ratio and the central bank rate (CBR) ([www.centralbank.go.ke](http://www.centralbank.go.ke)). These monetary policy instruments are the focus of this study as the independent variables.

### **1.1.2 Nairobi Securities Exchange**

The NSE is the only stock exchange market in Kenya and is located in Nairobi city. It was formed in 1954 as a voluntary organization of stock brokers and is now one of the most active capital markets in Africa. As a capital market institution, the Stock Exchange plays an important role in the process of economic development. It helps mobilize domestic savings thereby bringing about the reallocation of financial resources from dormant to active agents. Long-term investments are made liquid, as the transfer of securities between shareholders is facilitated. The Exchange has also enabled companies to engage local participation in their equity, thereby giving Kenyans a chance to own shares ([www.nse.co.ke](http://www.nse.co.ke)).

Trading at the NSE is automated through the ATS. The products traded are shares and bonds, with over 50 different types of shares and over 60 bonds. Bonds are in two groups namely treasury bonds issued by the government and corporate bonds issued by companies. On the other hand, shares are grouped into four sectors including agriculture;

commercial and services; finance and investment; and industrial and allied sectors ([www.nse.co.ke](http://www.nse.co.ke)).

The NSE is organized into three market segments namely; the Main Investments Market Segment (MIMS), the Alternative Investment Markets Segment (AIMS) and the Fixed Income Securities Market Segment (FISMS). The MIMS is the main quotation market, the AIMS provide an alternative method of raising capital to small, medium sized and young companies that find it difficult to meet the more stringent listing requirements of the MIMS while the FISMS provides an independent market for fixed income securities such as treasury bonds, corporate bonds, preference shares and debenture stocks, as well as short term financial instruments such as treasury bills and commercial papers ([www.nse.co.ke](http://www.nse.co.ke)).

There are 60 listed companies at the NSE as of July 2012 classified according to the sector in which they operate as follows: agricultural (7); automobiles and accessories (4); banking (10); commercial and allied (9); construction and allied (5); energy and petroleum (4); insurance (6); investment (4); manufacturing and allied (9); and telecommunication and technology (2) ([www.nse.co.ke](http://www.nse.co.ke)).

### **1.1.3 The NSE 20-Share Index**

The NSE 20-Share Index has been in use since 1964 and measures the performance of 20 blue-chip companies with strong fundamentals and which have consistently returned positive financial results. The NSE 20 Share Index (^N20I) is a price weight index. The

members are selected based on a weighted market performance for a 12 month period as follows: Market Capitalization 40%, Shares Traded 30%, Number of deals 20%, and Turnover 10%. Index is updated end of day only. Included in the Index are Mumias Sugar, Express Kenya, Rea Vipingo, Sasini Tea, CMC Holdings, Kenya Airways, Safaricom, Nation Media Group, Barclays Bank Kenya, Equity Bank, Kenya Commercial Bank, Standard Chartered Bank, Bamburi Cement, British American Tobacco, Kengen, Centum Investment Company, East African Breweries, EA Cables, Kenya Power & Lighting Company Ltd. and Athi River Mining. This index primarily focuses on price changes amongst these 20 companies ([mystocks.co.ke/stock=%5EN201](http://mystocks.co.ke/stock=%5EN201)).

The NSE 20-Share Index is the long-standing benchmark index used for equities traded on the NSE and represents the geometric mean of share prices of the NSE's 20 top stocks. It has recently been joined by the more broad-based NSE All Share Index (NASI), aimed at capturing the market capitalization of all the NSE's listed equities traded in a day. The NSE 20 lost more than one-third of its value in 2008 as the investors began fleeing stocks after brokerage collapses and the global credit crisis ([www.nse.co.ke](http://www.nse.co.ke)). Other measures of stock performance used at the NSE include market capitalization and equity turnover.

Several studies carried out on the stock market performance in Kenya have used the NSE 20-share index as a measure of the NSE performance. Some of these studies include Nyamute (1998); Mutoko (2006); Siele (2009); and Abdallah (2011). The current study will use the NSE-20 share index as a measure of the stock market performance as well.

#### **1.1.4 The Expected Relationship between Monetary Policy and Stock Market Performance**

Some observers view the stock market as an independent source of macroeconomic volatility to which policymakers may wish to respond (Bernanke and Kuttner, 2005). Monetary policy shifts significantly affect stock returns, thereby supporting the notion of monetary policy transmission through the stock market. Blinder (1998) argued that monetary policy has important macroeconomic effects only to the extent that it moves financial market prices that really matter such as the long-term interest rates, stock market values, and exchange rates. Cassola and Morana (2004) have observed that monetary policy decisions generally exert an immediate and significant influence on stock index returns and volatilities in both European and US markets. Their findings also indicate that European Central Bank's (ECB) press conferences following monetary policy decisions on the same day have defined impacts on European index return volatilities, implying that they convey important information to market participants. Greenspan (2002) stated that central banks should remain focused on achieving price stability and maximum sustainable growth, suggesting that policymakers should respond to stock prices according to their influence on the outlook for output and inflation.

Studies carried out in Kenya indicate that there exist a relationship between monetary policy variables and the performance of the NSE though they have not stated the direction of the relationship. Sifunjo (1999) found an unidirectional causality from exchange rates to stock prices. Mutoko (2006) tested the effect of Treasury bill rates on stock market returns using the GARCH model and found that Treasury bill rates had a

significant impact on the asset returns of the various segments, the NSE 20-share index and all market returns as a whole. Nzale (2008) found that liquidity ratios may have an impact on share prices as they are likely to affect the organization's fundamental asset values.

The priori expectation of this study is that monetary policy affects the performance of the stock market as a critical component of the economy. Moreover, the researcher expects that various monetary policy instruments stated in the model as independent variables will be correlated to the NSE 20-share index differently either positively or negatively.

## **1.2 Statement of the Problem**

Although several studies have discussed the relationship between stock market performance and macroeconomic variables, very few studies have used monetary policy variables to explain changes in stock prices in Kenya. Those that have ventured into this area of study have considered only some selected monetary policy variables. For instance, Sifunjo (1999) examined the causal relationship between foreign exchange rates and stock prices in Kenya from 1993 to May 1999. He found that there exists unidirectional causality from exchange rates to stock prices.

Mutoko (2006) studied the effect of Treasury bill rates on stock market returns using GARCH model. She found that Treasury bill rate has a significant impact on the asset returns of the various segments, the NSE 20-share index and all market returns as a whole. Nzale (2008) studied on the relationship between liquidity ratios and share

performance of companies listed on the NSE. He found that liquidity ratios may have an impact on share prices as they are likely to affect the organization's fundamental asset values. Those that have looked at the relationship between macro-economic variables and NSE performance have found a positive relationship. They include Nyamute (1998), Mbashu (2007), Siele (2009) and Abdallah (2011).

It is therefore clear that no past study in Kenya has ever analysed the relationship between all the monetary policy variables and the NSE 20-share index in a single model and there exist a research gap. The current study ventured into this path breaking exercise by examining the relationship between monetary policy and the performance of the NSE as measured by the 20-share index to determine whether variations in the NSE stock price movements can be linked to changes in monetary policy variables.

This study therefore investigated the impact of monetary policy variables on the performance of the NSE using six year (June 2006 – June 2012) time series data on 91-day Treasury bill rate, exchange rate, repo rate, broad money (M3), overnight discount rate (CBR), and cash reserve ratio (CRR). These data was obtained from the CBK and NSE.

### **1.3 Research Objective**

The study sought to establish the relationship between monetary policy and the performance of the NSE.

## **1.4 Significance of the Study**

The study would be important to various stakeholders, chief among them being:

### **Scholars and researchers**

The study will contribute to the existing body of knowledge on the relationship between monetary policy and performance of stock markets and thus serve as a source of reference for further research. The recommendations for future research will also help researchers to carry out more studies to extend the understanding of how monetary policy decisions influence the performance of stock markets.

### **Investors and investment analysts**

The study will help investors and investment analysts in understanding the behaviour of the stock market given the monetary policy stance of the monetary authority as they look out for which stocks to add on to their investment portfolios across the market industries. Investors and investment analysts will find the study useful as they conduct macro-analysis of the stock market which employs factors such as money supply, price level and inflation, interest rates and balance of payments in order to determine which stocks to invest in, when to invest or even when to pull out.

### **Policy makers**

The study will enable policy makers understand the growing need to formulate monetary policies that will be responsive to changes in NSE 20-share index, since the stock market

is a veritable source of long-term capital. The effectiveness of monetary policy should therefore be anchored on the potency of its instruments on stock market performance.



## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents a review of the related literature on the subject under study as presented by various researchers and scholars. The review has drawn materials from several sources that are closely related to the theme and objective of the study. The chapter contains seven areas as follows: first, the concept of monetary policy; second, monetary policy tools; third, the stock market; fourth, effects of monetary policy on stock market performance; fifth, theoretical framework; sixth, empirical studies; and seventh, conclusions from literature review.

#### **2.2 The Concept of Monetary Policy**

Monetary policy comprises the formulation and execution of policies by the central bank to achieve the desired objective or set of objectives; the policies and decisions are aimed at guiding bank lending rates to levels where credit demand and money growth are at a level consistent with aggregate supply elasticity (Faure, 2007). The objectives and goals that the central bank seeks to achieve generally are low inflation (usually targeted), protection of value of currency, full employment and sustainable economic output. The CBK regards its main objective as the formulation and implementation of monetary policy directed to achieving and maintaining stability in the general level of prices in order to achieve stable prices, low inflation, and to sustain the value of the Kenya shilling ([www.centralbank.go.ke/monetarypolicy](http://www.centralbank.go.ke/monetarypolicy)). These goals are pursued through some conventional instruments which reflect the goals this study is pursuing. The conventional

instruments at the disposal of the Central Bank are interest rates, open market operations, reserve requirements, moral suasion, lending, direct credit control and prudential guidelines.

Monetary policy guards an economy against inflation and ensures stability of prices, interest rates and exchange rates which protects the purchasing power of a country's currency and promotes savings, investment and economic growth. Through monetary policy, the Central Bank creates conditions that allow for increased output of goods and services in the economy, thereby improving the living standards of the people. The Central Bank formulates a policy to expand or contract money supply in the economy after detailed analysis and estimation of the demand for money in the economy (Rotich et. al, 2007). The CBK achieves this by use of instruments like: reserve requirement where commercial banks are required by law to deposit 6% of their deposits with the CBK. This is used to influence the amount of loans banks can advance the public and thus affects the supply of money. An increase in this proportion reduces the amount of money available for commercial banks to lend while a reduction increases the amount of money available to commercial banks for loaning, (CBK, 2012).

Monetary policy is referred to as either being an expansionary policy, or a contractionary policy. An expansionary policy increases the total supply of money in the economy rapidly or decreases the interest rate. When the central bank wants to carry out an expansionary monetary policy, it goes to the security market to buy government bonds with money, thus increasing the money stock or the money in circulation in the economy.

Expansionary policy is traditionally used to combat unemployment in a recession. A contractionary policy on the other hand decreases the total money supply or increases it only slowly, or raises the interest rate. When the central bank wants to implement a contractionary monetary policy, it goes to the security market to sell government bonds for money thus decreasing the money stock or the money in circulation in the economy. Contractionary policy is used to combat inflation. Furthermore, monetary policies are described as follows: Accommodative, if the interest rate set by the central monetary authority is intended to create economic growth; Neutral, if it is intended neither to create growth nor combat inflation; or tight if it is intended to reduce inflation, Aziza (2010).

### **2.3 Monetary Policy Instruments**

The government has a number of tools to influence the economy in the desired direction. The two most significant ones are fiscal and monetary policy. However the focus of this study is on monetary policy. Bermanke and Kuttner (2004) note that the influence of monetary policy instruments on the macroeconomic variables (employment, inflation and output), which it is meant to regulate is largely indirect. They further assert that the most direct and immediate effects of monetary policy actions, such as changes in the federal funds rate, are on the financial markets. Policymakers' actions affect asset prices and returns, as they strive to modify economic behaviour in ways that will help to achieve their ultimate objectives. Crowder (2004) states that the effectiveness of monetary policy depends on its ability to change economic behaviour of economic agents. He also alludes to the fact that the tools available to central banks have direct effects on interest rates and

quantities of money and can only influence the ultimate objectives in as much as changes in the interest rates and money supply adjust economic behaviour.

The set of instruments available to monetary authorities may differ from one country to another, according to differences in political systems, economic structures, statutory and institutional procedures, development of money and capital markets and other considerations. Generally, monetary policy makes use of various instruments which include interest rate, reserve requirements (cash requirements or cash ratio and liquidity ratio), selective credit controls, rediscount rate, treasury bill rate amongst others (Aziza, 2010). The CBK uses three major tools to implement monetary policy: Open Market Operations, discount window operations, and reserve requirements ([www.centralbank.go.ke/monetary policy](http://www.centralbank.go.ke/monetary%20policy)). These monetary policy tools are influenced through various instruments which include Treasury bill rates, exchange rate, money supply (M3), repo rate, discount rate (CBR), and cash reserve ratio (CRR) or liquidity ratio, all of which are the focus of the current study.

### **2.3.1 Open Market Operations (OMO)**

Open market operations are the Central Bank's principal tool for implementing monetary policy (Sargent and Smith, 1987). These purchases and sales of government Treasury and government agency securities largely determine the Central Bank rate (CBR) which is the interest rate at which depository institutions lend balances at the Central Bank rate to other depository institutions overnight. CBR in turn affects monetary and financial

conditions, which ultimately influence employment, output, and the overall level of prices.

Central banks in most industrial countries conduct monetary policy mainly via open market operations, where money is supplied in exchange for securities discounted with a short run nominal interest rate (Wallace, 1981). Hence, the costs of money acquisition depend on the current discount rate and the availability of collateral. In macroeconomic theory, however, it has often been claimed that open market operations are irrelevant in the sense that they are equivalent to lump-sum money transfers (Eggerston and Woodford, 2003).

The Central Bank buys or sells on behalf of the government securities to the banking and non-banking public, that is in the open market. One such security is Treasury Bills. When the Central Bank sells securities, it reduces the supply of reserves and when it buys back securities-by redeeming them, it increases the supply of reserves to the Deposit Money Banks, thus affecting the supply of money.

### **2.3.2 Repo Rate**

Repo rate is the interest rate at which the central bank sells and or repurchases government securities to or from commercial banks ([www.centralbank.go.ke](http://www.centralbank.go.ke)). In Repo transactions, securities are exchanged for cash with an agreement to repurchase the securities at a future date. The securities serve as collateral for what is effectively a cash loan and, conversely, the cash serves as collateral for a securities loan. There are several

types of transactions with essentially equivalent economic functions: standard repurchase agreements, sell/buy-backs and securities lending defined as repos.

A key distinguishing feature of repos is that they can be used either to obtain funds or to obtain securities (Brunetti, et. al., 2009). This latter feature is valuable to market participants because it allows them to obtain the securities they need to meet other contractual obligations, such as to make delivery for a futures contract. In addition, repos can be used for leverage, to fund long positions in securities and to fund short positions for hedging interest rate risks (Ewerhart and Tapking, 2008). As repos are short-maturity collateralized instruments, repo markets have strong linkages with securities markets, derivatives markets and other short-term markets such as interbank and money markets which are important monetary policy tools.

Repos are useful to central banks both as a monetary policy instrument and as a source of information on market expectations. Repos are attractive as a monetary policy instrument because they carry a low credit risk while serving as a flexible instrument for liquidity management. In addition, they can serve as an effective mechanism for signaling the stance of monetary policy (Hördahl and King, 2008). Repo markets can also provide central banks with information on very short-term interest rate expectations that is relatively accurate since the credit risk premium in repo rates is typically small. In this respect, they complement information on expectations over a longer horizon derived from securities with longer maturities (Eggerston and Woodford, 2003).

### 2.3.3 91-day Treasury Bill Rate

Modigliani and Cohn (1979) presented the money illusion effect in which markets tend to be depressed when nominal interest rates are high even though the real interest rate is not high. They argued that stock markets react inappropriately to inflation due to investors' ignorance that interest rate rise is to compensate for the rise in inflation.

Howells and Keith (2000) argue in their book that, equity prices just like the price of all assets will respond to changes in interest rates. That is to mean, if the Central Bank raises the interest rates, for instance, the rate available on the risk-free assets goes up and if more can be earned on risk-free assets, then the holders of risky shares will want a higher return as well. The share prices will also fall if the equity market as a whole becomes more risk averse and demand a higher premium for any level of risk. However, Bernanke and Kuttner (2003) concluded that very little of the market's reaction can be attributed to the effect of monetary policy on the real rates of interest.

Robinson (1952) argued that the financial system does not spur economic growth and that, instead financial development simply responds to developments in the real sector. Thus, many influential economists give a very minor role, if any, to the role of financial system, particularly the stock market in economic growth. The interest rate that concerns the central bank as a monetary policy is the 3 months' short-term interest rate also called the Treasury bill rate which it influences through the sale of short term government securities and forms the basis for the setting of commercial bank lending rates.

### **2.3.4 Money Supply**

Money supply is the sum of currency outside banks and deposit liabilities of commercial banks (CBK, 2012). Deposit liabilities are defined in narrower and broader senses as follows: narrow money (M1); broad money (M2); and extended broad money (M3). These aggregates are defined as follows:

$M1 = \text{Currency outside banking system} + \text{demand deposits.}$

$M2 = M1 + \text{time and savings deposits} + \text{certificates of deposits} + \text{deposit Liabilities of Non-Bank Financial Institutions (NBFIs).}$

$M3 = M2 + \text{residents' foreign currency deposits.}$

The CBK has been targeting monetary aggregate (broad money M3) in its policy decisions, Rotich et al. (2007) implying that at times of high inflation, or positive output, the CBK responded by reducing money supply.

### **2.3.5 Exchange Rate**

Exchange rate can be defined as the price at which a country's currency can be exchanged for another country's currency. Exchange rate volatility has implications on a country's financial sector, the stock market to be precise. Benita and Lauterbach (2004) found that exchange rate volatility have real economic costs that affect price stability, firm profitability and a country's stability. Establishing the relationship between stock prices and exchange rates is important for a few reasons. First, it may affect decisions about monetary and fiscal policy. Gavin (1989) shows that a booming stock market has a



positive effect on aggregate demand. Second, the link between the two markets may be used to predict the path of the exchange rate.

Exchange rate movement affects output levels of firms and also the trade balance of an economy. Share price movements on the stock market also affect aggregate demand through wealth, liquidity effects and indirectly the exchange rate. Specifically a reduction in stock prices reduces wealth of local investors and further reduces liquidity in the economy. The reduction in liquidity also reduces interest rates which in turn induce capital outflows and in turn causes currency depreciation (Adjasi et al, 2008). Hsing (2011) found a positive relationship between exchange rate and the stock market in Johannesburg Stock Exchange. Bailey and Chung (1995) conducted a study on Exchange Rate Fluctuations, Political Risk, and Stock Returns at the Mexican stock market and the results proved there is a positive relationship between exchange rate fluctuation and stock market return.

Exchange rate volatility has attracted much attention in financial economics in developed and developing economies due to its implications in the financial markets, especially the stock market. Different implications were observed between exchange rate volatility and stock market returns, depreciation in the local currency leads to increases in stock market prices in the long run (Adjasi et al, 2008). Kanas (2000) found that exchange rate changes didn't affect stock returns at all.

### **2.3.6 Discount Rate (CBR)**

The Central Bank Rate (CBR) or discount rate is the rate at which the central bank lends funds to commercial banks through the overnight window aimed at managing liquidity in the economy. It is reviewed and announced by the monetary policy committee every two months and its movements, both in direction and magnitude, signals the monetary policy stance (CBK, 2011). The CBR movements are reflected in changes in short-term interest rates.

A reduction of the CBR signals an easing of monetary policy and a desire for market interest rates to move downwards. Lower interest rates encourage economic activities and thus growth. When interest rates decline, the quantity of credit demanded should increase.

### **2.3.7 Cash Reserve Ratio**

The cash reserve ratio is the proportion of a commercial bank's deposit liability which must be deposited at the central bank at no interest (CBK, 2011). It is also called liquidity ratio and is used as a tool in monetary policy influencing the country's economy, borrowing and interest rates. It works like brakes on the economy's money supply.

A reduction in the CRR releases liquidity thus enhancing the capacity of commercial banks to expand credit whereas an increase in the CRR tightens liquidity and could also dampen demand driven inflationary pressures.

## 2.4 The Stock Market

Godspeed (2008) defines stock market as the institutional framework through which public companies issue new share capital in the primary market and the ownership of the shares changes hands in the secondary market. Mishkin (2007) defines a stock as a security that is claimed on the earnings and assets of corporations. Stocks are sold in a formal market called the stock exchange. Economic agents buy shares because they value the dividends that their investments will pay in future. Equity stock not only pays a dividend but also capital gains if the owner transfers ownership in the secondary market.

Common stock markets in the world include S and P 500 in the United States, the FTSE 100 in the United Kingdom, the Nikkei Stock Average in Japan, the Hang Seng in Hong Kong, DAX in Germany, CAC 40 in France, Bovespa in Brazil to mention a few while NSE is the Kenya's stock market. Eapen (2002) opined that stock market is the best indicator to forecast future economic activities and describe the actual causal effect between future economic growth and stock prices. An efficient stock market provides guidelines as a means to keep appropriate monetary policy through the issuance and repurchase of government securities in liquid market which is an important step towards financial liberalization. Similarly, a well organized and active stock market could modify patterns of demand for money and would help create liquidity that eventually enhances economic growth.

The existence of the stock market enables individual investors to transfer the control of their savings to the market place with confidence. Individual investors exchange their

savings for shares of companies that are listed on the stock exchange. The share gives the individuals the right to vote and appoint directors of the company who have the responsibility of steering the performance of the company. If the company is doing well the shareholders are entitled to a return on their investment in form of a dividend on each share held. Management has to perform adequately and satisfactorily or they will have to be replaced by competent managers. Shareholders therefore keep a firm grip on management so that they at least try to guarantee a return on their investment (Pilbeam, 1998).

Stock markets promote higher standards of accounting, resource management and transparency in the management of business. This is because financial markets encourage the separation of owners of capital, on the one hand, from managers of capital, on the other. The stock exchange also improves the access to finance of different types of users by providing the flexibility for customization. Lastly the stock exchange provides investors with an efficient mechanism to liquidate their investments in securities. The very fact that investors are certain of the possibility of selling out what they hold, as and when they want, is a major incentive for investment as it guarantees mobility of capital in the purchase of assets ([www.nse.co.ke](http://www.nse.co.ke)).

Among the main measures of stock market performance include; stock market indexing, market capitalization and stock turnover. Stock market indexing is one of the most widely used measures of stock performance. Investors hold portfolios of many assets but it is cumbersome to follow progress on each security in the portfolio. Thus it is prudent to

observe the entire market under the notion that their portfolio moved in the same direction as the aggregate market. The market index such as the NSE index is used to observe total returns for an aggregate market and these computed returns are to judge performance of individual portfolios. The assumption is that randomly selecting a large number of stocks from the total market should enable the investor to generate a rate of return comparable to the market (Simiyu, 1992).

Dufour and Tessier (2006) argue that asset prices tend to incorporate a forward-looking component and may provide leading indicators of economic activity or inflation. This observation is quite relevant in the context of an inflation-targeting regime, where the monetary policy stance is set according to inflation forecasts. The stock market is a conduit for meaningful investment for individuals who want to borrow their funds on the money market. Individuals can borrow in the money market, buy stocks and later sell the stocks for capital gain. The stock market existence is highly relevant in developing and emerging market economies where it has yet been adequately exploited; there is a huge dependence on bank lending channel. There is still more room for development of equity markets in emerging economies.

Although central bank officials need to watch closely stock market activity, it is considered highly risky for monetary authorities' decisions to be solely dependent on signals from stock market participants in developing policy (Dufour and Tessier, 2006). The stock market has some highly emotional tendencies which move prices in all sorts of directions. Bordo et al. (2009) assert that financial markets are inherently volatile and that market prices often stray from fundamentals. The tragedy will be the response of

monetary policy authorities to non-fundamental movements in the stock market which may easily become a recipe for further instability in the financial markets.

## **2.5 Effects of Monetary Policy on Stock Market Performance**

The origin of the relationship between money supply, interest rates and stock prices point to Friedman's money demand function. Friedman (1956), attempted to integrate two distinct decisions to be made by agents; a decision on the quantity of savings (IS) and decision on how to allocate those savings among assets in a portfolio (LM) and in so doing transformed the liquidity preference theory of the demand for money. He proposed that portfolio allocation decisions could have an impact on consumption – savings decisions determined by interest rate movements.

Among the determinants of stock market performance include, performance of the economy, fiscal policies, inflation, availability of substitute investments, change of investor preferences, market sentiments and monetary policies. Activities of government and general performance of the economy influence stock market activity and therefore the performance of stock markets. Monetary and fiscal measures enacted by various agencies of national governments influence the aggregate economies of those countries. The resulting economic conditions influence all industries and companies in an economy positively or negatively which in turn affect the performance of stock markets (Reilly 1997).

Bernanke (2003) stated that monetary policy matters for the stock market but, on the other hand, it is not one of the major influences on equity prices. Unanticipated changes in monetary policy affect stock prices not so much by influencing expected dividends or the risk-free real interest rate, but rather by affecting the perceived riskiness of stocks. A tightening of monetary policy, for example, leads investors to view stocks as riskier investments and thus to demand a higher return to hold stocks. Thorbecke (1997) examined the relationship between monetary policy and stock returns using the Federal funds rate target and found that a monetary expansion increases stock returns. Jensen et al (1996) believe that changes in monetary policy affect stock market performance and they especially lead to changes in stock prices.

Ibrahim (2003) studied the long run relationship and dynamic interactions between Malaysian Stock Market, various economic variables, and major equity markets in the United States and Japan. He used real output, aggregate price level, money supply, and exchange rate as explanatory variables for the variations in stock price movements. The findings of this study were in two folds: first, the Malaysian stock price index is positively related to money supply, consumer price index, and industrial production. Second, that stock price index is negatively related to the movement of exchange rates.

According to Mishkin (2000), monetary policy can influence the stock market in two ways, including money supply and interest rate. Firstly, a tightening monetary policy lowers money supply, making the public find that they have less money than they want and so try to acquire it by decreasing its spending. In this case, the public spend less in

the stock market, decreasing the demand for stocks and consequently lowering stock prices. Secondly, the rise in interest rate resulting from tightening monetary policy makes bonds more attractive relative to stocks, thereby causes the stock prices to fall. The results are reverse in expansionary monetary policy, which means an expansionary monetary policy stimulates the economy and increases the cash flow in the hands of public resulting in increasing demand for stocks and other financial assets. Once these demands are translated into actual purchases, stock prices are likely to go up.

Mukherjee and Naka (1995) however believed that negative effects will outweigh the positive effects and stock prices will eventually decrease due to expansionary monetary policy. They argued that if money demand remains constant, increase in money supply raises interest rates thereby increasing the opportunity cost of holding cash as well as stocks. Thus lured by higher interest earnings, people are likely to convert their cash and stock holdings to interest bearing deposits and securities with obvious implications for stock prices.

Rigobon and Sack (2002) investigated the impact of monetary policy on asset prices and indicated that increases in the short-term interest rate have a negative impact on stock prices, with the largest effect on Nasdaq index. Bernanke and Kuttner (2003) showed that very little of the market's reaction can be attributed to effect of monetary policy on the real rate of interest.



## 2.6 Theoretical Review

The basis of the study rests on the following theories:

### 2.6.1 Stock Market Valuation Models

In financial theory issues relating to valuation of shares in the stock market are based on the present value model. There are two versions of the present value model in finance literature that include: Smith's (1925) and Gordon's (1962) version. The purpose of stock valuation methods is to attempt to estimate the intrinsic value of a share. The current interest rate is used to discount future dividend flows. An investor decides if an investment which is to result in future cash flows is worthwhile by discounting future dividends at the current interest rate.

#### The Smith Present Value Model

The standard theory of the present value model of share valuation according to Smith (1925) postulates that the equilibrium price of a share at a point in time is equal to the discounted present value of the expected future (cash dividend) flows from that share. The model advocates that any factor that affects or alters the expected future profits of firms will affect their dividend payment, and consequently affect the share valuation. Smith (1925) presented the present value model as follows:

$$P_e = \sum \frac{D}{(1+R)^t} + \frac{\epsilon (pen)}{(1+R)^n}$$

Where  $E(P_e)$  is the expected price of the share in year  $n$ . This equation says that the value of equity is the discounted value of all the dividend payments due plus the discounted expected value of the share in year  $n$ .

### **Gordon Growth Model**

This model was developed to correct the major problem of the present value model as presented by Smith (1925). The major weakness of the present value model is the assumption that dividend payments  $D$  are fixed especially in the long run. It is more rational to assume that dividend payments are prone to change. This assumption is carried in a model put forward by Gordon (1962), which is a variant of the present value model as presented by Smith (1925). The Gordon constant growth model argues that, over time dividends will grow at a certain consistent growth rate of  $g$  percent per annum.

The value of a share according to the Gordon growth (1962) is computed as follows:

$$V = \frac{D_1}{r - g}$$

Where

$V$  = value of share  $i$

$D_1$  = expected dividends per share in one year's time

$r$  = shareholders required rate of return

$g$  = constant dividend growth rate

At all times  $r$  should be greater than  $g$  for the formula to make sense and avoid the possibility of a negative or infinite share price. Interest rate represented by  $r$  in the formula is the variable affected by monetary policy directly. Whenever interest rates increase rate of return has to increase as well but the increase in the denominator reduces the value of share. Then investors find that alternative investments like Treasury bills or negotiable certificates of deposit (CD's) become more desirable than equity. Investors sell stocks and stampede on the money market. A decrease in  $r$  reduces the discount rate on future dividends. The denominator in the formula is smaller which increases the value of shares. An expansionary monetary policy makes the stock market more attractive than money market investments.

The discussion on equity valuation models was explored since monetary policy particularly surprise policy moves is likely to have an impact on stock prices directly through the discount (interest) rate channel. Monetary policy is most likely to affect output, employment and inflation and this will affect company profitability indirectly through these variables. This will affect dividends companies pay eventually, which will lead to decrease in stock prices if a contractionary monetary policy is implemented. Monetary policy influences stock prices indirectly through its influence on the determinants of dividends and the stock return premium by influencing the degree of uncertainty faced by the agents.

### 2.6.2 Tobin's Q Theory

Tobin (1969) defines  $q$  as firm's market value divided by the replacement cost of capital, and further argues that new plant and equipment is cheap relative to the market value of business firms. Companies can then issue equity and get a high price for it relative to the cost of plant and equipment they are buying. Thus investment spending will rise because firms can buy a lot of new investment goods with only a small issue of equity.

On the other hand, when  $q$  is low, firms will not purchase new investment goods because the market value of firms is low relative to the cost of capital. If companies want to acquire capital when  $q$  is low, they can buy another firm cheaply and acquire old capital instead. Investment spending will then be low.

It follows that a link exists between Tobin's  $q$  and investment spending. In a monetarist view, when the money supply rises, the public finds that it has more money than it wants and so tries to reduce the holdings of money by increasing their spending. One place the public can spend more is in the stock market, increasing the demand for equities and consequently raising their prices (Mishkin, 1996). A more Keynesian view comes to a similar conclusion because it sees the fall in interest rates stemming from expansionary monetary policy making bonds less attractive relative to equities, thereby causing the price of equities to rise.

Higher equity prices will lead to a higher  $q$  and thus higher investment spending which leads to a conclusion that stock market is a possible monetary policy transmission mechanism.

### **2.6.3 The Efficient Markets Hypothesis (EMH)**

Efficient market hypothesis postulates that any new information is quickly and efficiently incorporated into asset prices at any point in time, so that old information cannot be used to foretell future price movements. Fama (1970) first defined the term "efficient market" as one in which security prices fully reflect all available information. The market is efficient if the reaction of market prices to new information should be instantaneous and unbiased.

Three versions of EMH have been advanced. The weak form EMH stipulates that current asset prices already reflect past price and volume information. The information contained in the past sequence of prices of a security is fully reflected in the current market price of that security. It is named weak form because the security prices are the most publicly and easily accessible pieces of information. It implies that no one should be able to outperform the market using something that "everybody else knows".

The semi strong form EMH states that all publicly available information is similarly already incorporated into asset prices. In other words, all publicly available information is fully reflected in a security's current market price. The public information stated not only past prices but also data reported in a company's financial statements, company's

announcement, economic factors and others. It also implies that no one should be able to outperform the market using any information that is public knowledge.

The strong form EMH stipulates that private information or insider information too, is quickly incorporated by market prices and therefore cannot be used to reap abnormal trading profits. Thus, all information, whether public or private, is fully reflected in a security's current market price. That means even the company's management considered as insiders are not able to make gains from inside information they hold. They are not able to take the advantages to profit from information such as 'take over decisions' which has been made ten minutes ago. The rationale behind this is that the market anticipates, in an unbiased manner, future development and therefore information has been incorporated and evaluated into market price in a much more objective and informative way than insiders.

## **2.7 Empirical Literature**

Several studies report an empirical link between changes in monetary policy and short- as well as long-run stock market performance. Hondroyiannis and Papapetrou (2001) examined macroeconomic influences on the stock market for Greece. Among the macroeconomic variables investigated were interest rates and exchange rates. They found that stock prices do not lead changes in real economic activity but that the macroeconomic activity and foreign stock market changes only partially explained Greek stock price movements.

Thorbecke (1997) examined the relation between monetary policy and stock returns in the United States. He conducted the empirical estimation using impulse-response functions and variance decompositions from a VAR model depending on US monetary and stock market data. He showed that expansionary monetary policy increases stock returns. Booth and Booth (1997) using Federal funds rate and discount rate have confirmed these results. They showed also, that a restrictive monetary policy stance lowers monthly returns of both large and small stock portfolio. They concluded that monetary policy has explanatory power in forecasting stock portfolio returns.

Cassola and Morana (2004) also employ the VAR methodology. In particular, they use a cointegrated VAR system including real GDP, inflation, real M3 balances, short term interest rate, bond yield, and real stock prices in order to examine the transmission mechanism of monetary policy in the Euro area. They found that a permanent positive monetary shock has a temporary positive effect on real stock prices.

Patelis (1997) examines whether some portion of the observed predictability in excess US stock returns can be attributed to shifts in the monetary policy stance. Following Fama and French (1989), he employs the long-horizon regression methodology, using two sets of explanatory variables: monetary policy variables and financial variables. He finds that monetary policy variables are significant predictors of future returns, although they cannot account fully for the observed stock return predictability. Patelis' explanation for the finding that monetary policy indicators are significant predictors of excess stock

returns relates to the financial propagation mechanism (Bernanke and Gertler, 1989) and to the credit channel of monetary policy transmission (Bernanke and Gertler, 1995).

McQueen and Roley (1993) examined the stock market responses to macroeconomic news across different economic states. They used monthly time series of unemployment rate, money supply (M1) announcements, inflation rate and discount rate. The authors provided evidence that the stock market's response to macroeconomic news depends on the state of the economy. These results had been confirmed by Li and Hu (1998) showing that stock market responses to macroeconomic shocks varies across different stages of the business cycle. Furthermore, the authors provided evidence that the size of the firm matters. They showed that during restrictive monetary policy periods small caps tend to perform poorer compared to the large caps.

Salam (2008) investigated the influence of the Jordanian monetary and fiscal policies on Amman Stock Exchange (ASE) performance using the Vector Autoregressive (VAR) approach. Market capitalization (MC), money supply (M1), and government expenditure (GE) were used as proxies for ASE performance, monetary policy, and fiscal policy, respectively. The analysis was undertaken with annual data spanning over twenty-seven years in logarithms form 1978 till 2004. The results suggest that tools of the monetary policy managed by the Central Bank of Jordan should be directed toward maximizing the Jordanian capital market value since the monetary policy is more influential on the capital market and economic activities. Moreover, fiscal policy estimated by government expenditure did not have that influence suggesting that most of the government





expenditure not for long-term investment (capital investment), but for financing consumption activities, a fact could be clearly seen by exploring the government expenditures over the years, an issue could be taken into consideration by the Jordanian government in order to increase the positive influence of the fiscal policy on ASE growth performance. Finally, ASE efficiency should be increased in all kinds, namely operational, informational, and allocation. Such an effort for sure will attract more investment and liquidity to the capital market.

Jensen and Johnson (1995) also find that monetary policy developments are associated with patterns in stock returns. They show that long-term stock returns following discount rate decreases are higher and less volatile than returns following rate increases. Their motivation for the employment of the discount rate as a proxy for the stance of monetary policy follows from the view that the discount rate is typically regarded as a signal of monetary and possibly economic developments.

In a subsequent study, Jensen et al. (1996) extend the Fama and French (1989) analysis by suggesting that the monetary environment affects investors' required returns. Monetary policy stance is proxied by a binary dummy variable indicating discount rate changes.

Conover et al. (1999) argue that not only US stock returns, but also returns on foreign markets are related with US monetary environments as well as their local monetary environment. They find that stock returns are generally higher in expansive monetary

environments than they are in restrictive environments. As in Jensen and Johnson (1995) and Jensen et al. (1996), the monetary policy proxy used by Conover et al. (1999) is a dummy variable based on discount rate changes. Jensen et al. (1996) show that this categorization of monetary regimes effectively differentiates US monetary conditions.

Hsing (2011) too studied the JSE in South Africa using GARCH models and found a positive relationship between exchange rate and stock return volatility.

## **2.8 Conclusions from Literature Review**

This chapter reviewed literature related to the key variables of the study. The review found that past researchers used different monetary policy instruments to assess the effect of monetary policy on stock market performance. These include interest rates, reserve requirements, selective credit controls, rediscount rate, and treasury bill rate (Aziza, 2010). Other researchers used only some selected monetary policy instruments and these include federal funds rate (Thorbecke, 1997), and (Bernanke and Kuttner, 2004); interest rate and money supply (Mishkin, 2000); short-term interest rate (Rigobon and Sack, 2002); and aggregate price level, money supply and exchange rate (Ibrahim, 2003).

As with different monetary policy instruments, the empirical studies reviewed had mixed results on the relationship between monetary policy and stock market performance. Those that found positive relationship included Thorbecke (1997); Jensen et al. (1996); Ibrahim (2003) as far as money supply is concerned. Others like Bernanke (2003) found that monetary policy had no effect on stock market performance. Researchers who found

negative relationship include Ibrahim (2003) as far as exchange rate is concerned; Mishkin (2000); Mukherjee and Naka (1995); and Rigobon and Sack (2002).

The review of literature clearly found a research gap in Kenya as most of the studies done in the area are conducted in the USA, Europe and to some extent Asia. The empirical studies also indicated that the researchers only considered some selected monetary policy instruments and not all monetary policy instruments in a single study. The current study therefore seeks to contribute towards this research gap by establishing the relationship between the monetary policy instruments used by the CBK to manage the economy and the NSE 20-share index.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter describes in detail all the procedures and methodologies that will be undertaken in conducting the study to arrive at proper conclusions regarding the relationship between the monetary policy and the performance of NSE. It will cover matters related to design of the study, target population, study sample; data collection, data analysis and model specification.

#### **3.2 Research Design**

The study employed descriptive as well as correlational research designs. The study used time series empirical data on Nairobi Stock Exchange (NSE) 20- share index and the monetary policy tools as provided by the Central Bank of Kenya publications to examine the relationship between monetary policy and the performance of NSE by establishing correlation coefficients between the NSE 20-share index and the monetary policy variables.

#### **3.3 Target Population**

The target population comprised all the 60 listed companies at the NSE as of July 2012. The listed companies are categorized in to 10 groups according to their activities as follows: agricultural (7); automobiles and accessories (4); banking (10); commercial and allied (9); construction and allied (5); energy and petroleum (4); insurance (6); investment (4); manufacturing and allied (9); and telecommunication and technology (2).

### **3.4 Study Sample**

The sample was made up of the 20 companies whose stocks are used to compute the NSE 20-share index. These companies are shown in appendix 1.

### **3.5 Data Collection**

The study used secondary data on the NSE 20-share index, 91-day Treasury bill rate, exchange rate, money supply (M3), repo rate, cash reserve ratio, and central bank rate. The data on NSE 20-share index was obtained from the NSE while data on 91-day Treasury bill rate, exchange rate, money supply (M3), repo rate, cash reserve ratio and central bank rate were obtained from the CBK. For the exchange rate, the study focused on the US dollar rate since it is the most widely used as the Kenyan government and public use the US dollar to settle international transactions and therefore has a bearing on the value of the local currency. The data was public data as it was published in the websites of CBK and NSE. The period of study for which data was obtained focused on a six year period between June 2006 and June 2012. The period was relevant because one of the monetary policy variables, the central bank rate (CBR), was introduced in June 2006 as the rate at which CBK lends to commercial banks through the overnight window.

### **3.6 Data Analysis**

The study employed computer software 'e-views' version 7 to analyse the data. Given that the study model was a multivariate one, the study used multiple regression technique in analyzing the relationship between the monetary policy tools and NSE 20-share index. The analyses entailed the computation of the various coefficients of correlation denoted

as 'β' in the model to determine the relationship between individual monetary policy instruments and NSE 20-share index.

### 3.7 Model Specification

The variables of the study comprised the NSE 20-share index as the dependent variable and 91-day Treasury bill, exchange rate, money supply (M3), repo rate, cash reserve ratio, and central bank rate as the independent variables. The regression model was a multivariate model stating the NSE 20-share index as a function of the stated monetary policy tools.

$$\text{NSE 20-share index} = \beta_0 + \beta_1(91\text{-T-billrate}) + \beta_2(\text{exchange rate}) + \beta_3(\text{M3}) + \beta_4(\text{repo rate}) + \beta_5(\text{CRR}) + \beta_6(\text{CBR}) + \text{error term.}$$

To simplify, Let:

Y = NSE 20-share index;

X<sub>1</sub> = 91-day Treasury bill rate;

X<sub>2</sub> = exchange rate (US dollar);

X<sub>3</sub> = money supply (M3);

X<sub>4</sub> = repo rate;

X<sub>5</sub> = Cash reserve ratio (CRR);

X<sub>6</sub> = central bank rate (CBR);

ε be error term.

Thus, the regression equation appeared as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

The error term stands for the effect of other factors other than monetary policy instruments on the NSE performance and helps in stabilizing the model.

## CHAPTER FOUR

### DATA ANALYSIS, RESULTS AND DISCUSSION

#### 4.1 Introduction

This chapter focuses on the results of data analysis, results and discussion of findings. It addresses issues such as the regression method; descriptive statistics; regression results; correlation coefficients among the variables; and lastly the robustness of the study model. Data analysis results were presented using tables.

#### 4.2 Regression Method

The regression method used for this study was the least square method. This was used to determine the line of best fit for the model through minimising the sum of squares of the distances from the points to the line of best fit. Through this method, the analysis assumed linearity between the dependent variable and the independent variables.

#### 4.3 Descriptive Statistics

**Table 1: Descriptive Statistics of the Variables**

	<b>CBR</b>	<b>CRR</b>	<b>EX. Rate</b>	<b>M3</b>	<b>NSE</b>	<b>REPO</b>	<b>T.B.Rate</b>
Mean	9.03	5.27	76.57	1022.01	4186.11	5.87	7.50
Median	8.63	5.13	77.03	939.53	4240.10	6.05	7.23
Maximum	18.00	6.00	99.83	1561.57	5774.24	18.89	20.56
Minimum	5.75	4.50	62.03	611.22	2474.75	0.00	1.60
Std. Dev.	3.19	0.68	8.39	289.90	865.89	3.94	3.98
Skewness	1.87	0.05	0.448	0.38014	0.015	1.61	1.48
Kurtosis	5.92	1.19	3.17	1.86	1.79	6.11	5.61
Jarque-Bera	67.75	9.86	2.49	5.61	4.40	60.01	46.78
Probability	0.00	0.01	0.29	0.06	0.11	0.00	0.00
Sum	650.50	379.08	5513.18	73584.33	301399.9	422.81	539.64
Sum Sq. Dev.	724.29	32.36	4999.33	5966984	53233331	1104.83	1125.77
Observations	72	72	72	72	72	72	72

Source: Study data on appendix II



Table 1 presents the descriptive statistics of the data series. From the table, all series show features of non-normality which is common in financial time series data. All the series have a coefficient of kurtosis of either less than or greater than 3 against the standard value of 3 for a normal distribution and a non-zero coefficient of excess kurtosis. The Jarque-Bera statistic is also significant for all the data series and therefore the time series data can be concluded to have a non-normal distribution. Jarque-Bera statistic tests whether the coefficient of skewness and the coefficient of kurtosis are jointly zero and that Jarque-Bera would not be significant for a normal distribution.

#### 4.4 Regression Results

**Table 2: Regression Results**

Dependent Variable: NSE 20 Share Index

Method: Least Squares

Date: 10/01/12 Time: 11:09

Sample: 1 72

Included observations: 72

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGERATE	-48.73017	13.29928	-3.664121	0.0005
M3	2.095772	0.471841	4.441687	0.0000
CRR	1054.824	178.2971	5.916100	0.0000
CBR	20.45855	37.57725	0.544440	0.5880
REPO	22.12648	21.57032	1.025784	0.3088
TBRATE	-161.2804	31.13577	-5.179906	0.0000
C	1115.964	1505.959	0.741032	0.4613
R-squared	0.711849	Mean dependent var		4186.110
Adjusted R-squared	0.685250	S.D. dependent var		865.8898
S.E. of regression	485.7864	Akaike info criterion		15.30158
Sum squared resid	15339246	Schwarz criterion		15.52292
Log likelihood	-543.8569	Hannan-Quinn criter.		15.38970
F-statistic	26.76267	Durbin-Watson stat		0.405887
Prob(F-statistic)	0.000000			

Source: Study data on appendix II

#### **4.4.1 NSE 20-Share Index and 91- Day Treasury Bill Rate**

From table 2 above, there is a negative correlation between the NSE 20-share index and the 91-day Treasury bill rate of 161.2804%. This indicates that an increase in Treasury bill rate by 1% leads a decline of NSE 20-share index by 161.2804% implying that investors are selling off equity stocks and investing in the treasury bills which are now attractive owing to the increase in the rate. The divesture from the stock market to invest in the money market makes equity prices to decline and thus the NSE 20-share index declines as well.

#### **4.4.2 NSE 20-Share Index and Exchange Rate**

The study found a negative correlation between the NSE 20-share index and the exchange rate (US Dollar) of 48.73 as shown in table 2. This means that when exchange rate depreciates, the NSE 20-share index reduces by about 48.73 suggesting capital flight. The exchange rate volatility makes investors divest from the stock market and look for investment opportunities in other economies for fear of erosion of their wealth resulting from unstable local currency. This divesture leads to a decline in equity prices and thus the NSE 20-share index reduces as well. The depreciation of exchange rate will also affect listed companies which may have foreign currency denominated transactions such as importation of goods and services which will push their costs upward thus affecting their profitability. These high costs and thus low profitability will lead to decline in their shares prices at the NSE thereby affecting negatively the NSE 20-share index.

#### **4.4.3 NSE 20-Share Index and Money Supply (M3)**

According to table 2, the study established that the NSE 20-share index and money supply as measured by broad money (M3) are positively correlated with a correlation coefficient of 2.096 billion. This implies that when the CBK increases money supply, investors get more money at their disposal and are therefore looking for investment opportunities. One place that accords investors investment opportunities is the stock market with investors rushing to buy equities as a way of holding their wealth instead of holding it in liquid cash. This demand for equity securities at the stock market pushes the equity prices upwards leading to an increase in the NSE 20-share index.

#### **4.4.4 NSE 20-Share Index and Repo Rate**

Table 2 shows that NSE 20-share index and repo rate are positively correlated with a coefficient of 22.13%. This implies that an increase in repo by 1% causes the NSE 20-share index to increase by 22.13%. The repo rate is the interest rate payable for repos, which are agreements between the CBK and commercial banks to purchase or sell government securities from or to commercial banks for a specified period. Repos serve as collateral in the interbank market where banks can access credit from other banks and hence help expand credit to the public thus making funds available for investment in the stock market. This pushes equity prices upwards and hence leads to increase in the NSE 20-share index.

#### **4.4.5 NSE 20-Share Index and CRR**

The study found that the NSE 20-share index and CRR are positively correlated with a coefficient of 1054.82% implying an increase of CRR by 1% causes the NSE 20-share index to increase by 1054.82%. CRR, also called the liquidity ratio, works like brakes on the economy's money supply. CRR is increased in times of high inflation aimed to bring down inflation resulting in increase in purchasing power of the people who may now spend the increased purchasing power in the stock market. This pushes the equity prices upwards and thus the NSE 20-share index increases.

#### **4.4.6 NSE 20-Share Index and CBR**

The study results show that there was a positive correlation coefficient of 20.46% between NSE 20-share index and CBR. This implies that an increase of 1% in CBR causes the NSE 20-share index to increase by 20.46%. CBR is the lowest rate of interest that the CBK charges on loans to commercial banks and is reviewed and announced by the MPC at least every two months as part of its decisions. It is increased to tame rising inflation and exchange rate volatility and by stabilising prices through the reduction of inflation, it causes the purchasing power of the people to increase thus increased investment activities at the NSE. Also the stabilisation of the exchange rate will attract foreign investors which coupled with increased investment activities by local people will push equity prices upwards and thus increase in the NSE 20-share index.

#### 4.5 Pearson-Spearman's Correlation Coefficients among the Variables

Table 3: Pearson-Spearman's Correlation coefficients among the Variables

	CBR	CRR	Ex.Rate	M3	NSE	Repo	T.B.Rate
CBR	1	0.27894	0.08868	0.22853	-0.13621	0.65503	0.84350
CRR	0.27894	1	-0.68817	-0.72211	0.60661	0.34254	0.12098
Ex.Rate	0.08868	-0.68817	1	0.83344	-0.65939	0.07152	0.29642
M3	0.22853	-0.72211	0.83344	1	-0.53459	0.11936	0.37487
NSE	-0.13621	0.60661	-0.65939	-0.53459	1	-0.01144	-0.38840
Repo	0.65503	0.34254	0.07152	0.11936	-0.01144	1	0.66523
T.B.Rate	0.84350	0.12098	0.29642	0.37487	-0.38840	0.66523	1

Source: Study data on appendix II

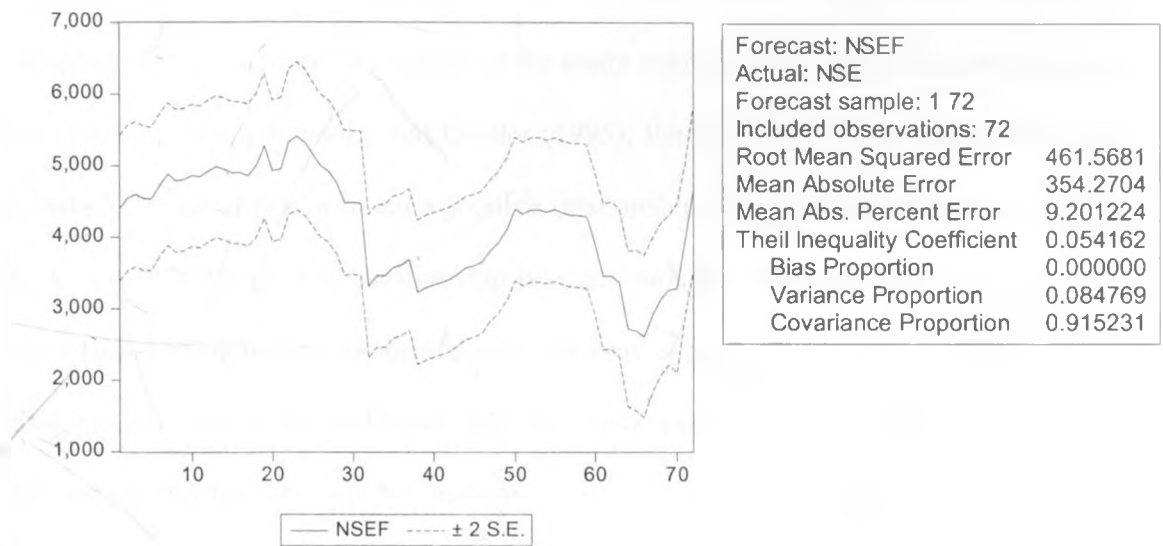
From table 3 above, all explanatory variables except CRR are negatively correlated with the dependent variable, NSE 20-share index. Whereas the negative sign of the correlation coefficients between the NSE 20-share index and exchange rate on one hand and 91 Day-Treasury bill rate on the other hand are consistent with the regression results, the signs of correlation coefficients between NSE 20-share index and M3, Repo rate and CBR are consistent with the regression results. This implies the lagged effect of those monetary policy variables such that it takes a while before any variation in those variables influences the variation in the NSE 20-share index.

#### 4.6 Robustness of the Study Model

This entailed testing the 'goodness of fit' of the model to the actual data and the extent to which the explanatory variables explained the variation in the dependent variable. The researcher used the adjusted  $R^2$ , which is the coefficient of determination measuring the proportion of variation in NSE 20-share index due to the independent variables. From table 2, adjusted  $R^2$  is 0.685 indicating that about 68.5 % of variation in the dependent variable in the regression model are due to explanatory variables or explained while

31.5% are due to error term or chance or unexplained. Also in this model, the F-statistic is 26.76 and has a probability of 0.000, which highly significant, thus all the independent variables jointly influence NSE 20-share index. The model therefore was considered robust or fitted well to the actual data.

**Figure 1: Determining the forecasting accuracy of the model**



Source: Study data on appendix II

From figure 1 above, the model could also be concluded as robust and adequate since it produced an accurate forecast with a bias proportion of 0.00000 and a small variance proportion of 0.084769. The standard deviation of  $\pm 2$  was within the recommended standard deviation for an accurate forecast and thus the model was adequate.

#### 4.7 Summary and Interpretation of Findings

The study found that a positive relationship existed between monetary policy and the performance of the NSE with an  $R^2$  of 0.711 or 71.1%, adjusted  $R^2$  of 0.685 or 68.5% and

F-statistic of 26.76 with a probability of 0.0000 which was significant. This implies that more than 50% of the variation in NSE 20-share index in the regression model was due to the explanatory variables. Particularly, considering the adjusted  $R^2$  which is the coefficient of determination measuring the proportion of variation in NSE 20-share index due to the independent variables means that 68.5% of the variation in the NSE 20-share index was caused by the explanatory variables and only 31.5% was due to chance or unexplained or error term. The results of the study confirmed earlier findings in Bermanke and Gertler (1989), Bermanke and Gertler (1995), Patelis (1997), Thorbecke (1997) and Salam (2008) all of whom found a positive relationship between monetary policy and the stock market. This positive relationship between monetary policy and stock market has implications to monetary authorities who are now supposed to watch the movement in asset prices since it is confirmed that the stock market is an important channel of monetary policy transmission mechanism.

The relationship between 91 day-Treasury bill rate and the NSE 20-share index has been found to be strongly negative. Treasury bills are money market instruments and it is acclaimed to be the most risk free asset because it is backed by the government might. As interest rate in the money market is increasing, investors will be attracted to invest in the money market due to higher expected returns. Treasury bills are largely seen as an alternative investment portfolio to stocks. The negative finding is a corroboration of Mishkin (2000), Rigobon and Sack (2002) and Mukherjee and Naka (1995).

The strongly negative relationship between exchange rate and NSE 20-share index show that the depreciation of the local currency to the US dollar is a disincentive to investment in the stock market. A depreciating Kenya shilling reduces the performance of the stock market as it leads to capital flight with foreign investors divesting from the NSE and looking for alternative investment opportunities in foreign economies. The negative relationship observed here is in tandem with Ibrahim (2003). However, the finding contradicts that of Hsing (2011), who found a positive relationship between exchange rate and stock return volatility.

The strongly positive relationship between money supply and the NSE 20-share index observed in this study confirms the findings in Ibrahim (2003), Mishkin (2000) and Mukherjee and Naka (1995). The finding implies that increase in money supply makes the public have more cash at their disposal than they actually need and therefore increase their spending. One place that offers the public an opportunity to invest the excess cash is the stock market resulting in increasing demand for stocks and other financial assets. Once these demands are translated into actual purchases, stock prices are likely to go up.

The relationship between repo rate and the NSE 20-share index was found to be strongly positive. Repos are agreements between CBK and commercial banks for sell and repurchase of government securities after a pre-agreed period and at a pre-agreed interest rate. Repos are short term maturity instruments and can serve as collateral in the interbank market for commercial banks holding such securities to access credit. Though used to control liquidity, repos are an important source of information to the CBK for



signals of how well monetary policy instruments are working. Furthermore, with investing commercial banks being able to access credit in the interbank market with repos serving as collateral, this increases the commercial banks' ability to advance more credit to the public who may use the loans' proceeds to invest in the NSE. This increases demand for stocks and consequently pushes the stock prices upwards.

The study established a strong positive relationship between CRR and the NSE 20-share index. CRR is used to manage liquidity and money supply in times of rising inflation with an aim of bringing down inflation. When CRR is increased and brings down inflation, it increases people's purchasing power and therefore people find that they have more money to spend. One place which accords people an opportunity to spend the excess purchasing power is the stock market which increases the demand for stocks and therefore this pushes stock prices upwards

The study found a strong positive relationship between the CBR and the NSE 20-share index. This implies that an increase in CBR leads to an increase in stock prices. CBR is used to control interest rates in times of rising inflation and therefore CBR is meant to contain inflation by making credit expensive. When high CBR contains the inflation rate, this results in increased purchasing power. With increased purchasing power, people have more cash to spend and they look up to the NSE for investment opportunities which in turn pushes stock prices up. The finding of this study contradicts the findings in Booth and Booth (1997) and Jensen and Johnson (1995) who found an inverse relationship between discount rate (CBR) and stock market performance.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Summary

The study sought to determine the relationship between monetary policy and performance of Nairobi Securities Exchange as measured by the NSE 20-share index. To achieve the objective, the study employed monthly secondary data on monetary policy variables and the NSE 20-share index which were obtained from the CBK and NSE respectively. The study regression model expressed the NSE 20-share index as a function of the monetary policy instruments which included 91 Day-Treasury bill rate, exchange rate, M3, repo rate, CRR and CBR. The study covered a period of six years from June 2006 to June 2012 and data were analysed using 'eviews' version 7. The study period was selected because one of the monetary policy variables, the CBR, was introduced in Kenya in June 2006.

A review of the related literature revealed a general consensus from the theoretical and empirical studies that there is indeed a relationship between monetary policy and stock market. Empirical studies reviewed included Salam (2008), Cassola and Morana (2004), Thorbecke (1997), Booth and Booth (1997), Patelis (1997), and Jensen and Johnson (1995). However, the review found a knowledge gap in literature because the past studies had no common stand on what constituted monetary policy and they employed different variables to represent monetary policy. The studies also produced mixed results with Salam (2008), Ibrahim (2003), Rigobon and Sack (2002), Thorbecke (1997) and Jensen et. al. (1996) reporting positive relationship and Ibrahim (2003), Mishkin (2000),

Mukherjee and Naka (1995) reporting negative relationship. Moreover, most of the past studies were done in the USA, Europe and to some extent Asia with a few studies done in Kenya.

Data were analysed using the ordinary least square (OLS) regression method. The results were presented in tables and covered descriptive statistics, regression results and Pearson-Spearman's correlations among the variables. The study found a strong positive relationship between monetary policy and the NSE 20-share index with an adjusted  $R^2$  of 0.685 or 68.5%. The study also established that the NSE 20-share index was negatively correlated with the 91 day-Treasury bill rate and exchange rate and positively correlated with money supply (M3), repo rate, CRR and CBR.

The study therefore contributed to the existing knowledge and found that CBK has a significant influence on the performance of the NSE through its monetary policy decisions. There is a pressing need therefore for the CBK to understand the role and impact that the NSE has on its decisions, the economy and the ultimate goals it seeks to achieve.

## **5.2 Conclusion**

The study results revealed that monetary policy instruments jointly influenced the NSE 20-share index. The study also found that the NSE 20-share index was correlated with the individual monetary policy tools as it was negatively correlated with the 91 day-Treasury bill rate and exchange rate and positively correlated with M3, repo, CRR and CBR. The

objective of the study, which was to establish the relationship between monetary policy and the performance of the NSE, was therefore met. From the study results, it can be concluded that the central bank can indeed influence the performance of the stock market to a large extent through its monetary policy decisions.

### **5.3 Policy Recommendations**

The results of this study have established that there exist a positive relationship between monetary policy and the performance of the Nairobi Securities Exchange. This positive relationship is reflected on the adjusted  $R^2$  of 68.5%. The implication of the study is that the CBK has a significant influence on the NSE performance and therefore need to consider the following in its policy formulation in order to enhance the performance of the NSE.

Firstly, the performance of the NSE is very dependent on investors' confidence and the general perception of the health of the economy. Therefore, the CBK needs to make the environment enabling and free of fear in order to bring about development of the NSE. CBK also needs to take into account speculations going on in the economy and incorporate these speculations into the formulation framework.

Secondly, the CBK should obtain adequate and reliable information on the NSE's present stance before taking action to avoid depressing the NSE. The CBK should also be able to anticipate and forecast what effects policy would have on NSE in the long run so that inside and outside lags that plague monetary policy would not render policies ineffective.

Furthermore, CBK should be consistent in its policy formulation. Inconsistencies in the policies bring about uncertainty and this will not be healthy for the development of the NSE in the long run.

Lastly, CBK also needs to recognize its limitations and not attempt to do too much so as not to overheat the economy and worsen it. There is a limit to which monetary policy can be effective in affecting the stock market performance and beyond this limit, any attempt to further use monetary policy to influence the stock market would be ineffective at best or harmful in adverse circumstances.

#### **5.4 Limitations of the Study**

A number of limitations could be pointed out for this study. Firstly, the study concentrated on a six year period between June 2006 and June 2012 selected on the basis of the introduction of the CBR in June 2006. This period of analysis may be considered short for the applicability of the study results considering the volatility of the asset prices in the NSE.

Secondly, this descriptive and correlational study relied on secondary data which had already been compiled by the CBK and NSE. Data were used as they were obtained from the two government agencies and the researcher had no means of verifying for the validity of the data which were assumed to be accurate for the purpose of this study. The study results are therefore subject to the validity of the data used.

Thirdly, the study was conducted in Kenya and its results may not be generally applicable in other countries whose economic, monetary policy targets and stock market development conditions may be different from those of Kenya.

Fourthly, the study used the ordinary least square regression method of analysis which may have its own weaknesses compared to other methods which may limit the general applicability of the study results.

### **5.5 Suggestions for Further Research**

The primary objective of this study was to establish the relationship between monetary policy and the performance of the Nairobi Securities Exchange. The study concentrated on a six year period between June 2006 and June 2012 as the era that saw the introduction of one of the monetary policy variables, CBR, in Kenya. CBR was launched in June 2006. Future research could expand the period of analysis, to say ten years, and establish whether this would result in different findings and conclusion.

The study employed ordinary least square 'OLS' regression method to determine the coefficients of correlation between the NSE 20-share index as the dependent variable and monetary policy instruments as the independent variables. Future research could employ other methods of analysis such as ARCH model, GARCH model, co-integration model, VAR, SVAR among others to establish whether results would be comparable to those of the current study.

A similar study could be carried out using the same monetary policy variables but employ stepwise regression analysis to determine the lag effects of the monetary policy variables on the NSE performance. This should be done especially on those variables which are not primary targets of the monetary policy such as CRR, CBR and repo rate and which may be viewed as influencing primary targets such as the interest rate.

The current study employed the NSE 20-share index as a measure of the performance of the NSE. Future studies could attempt to use the 'All-share index' or come up with a composite index that also captures the bond market in order to establish whether this will result in different findings and conclusions. A multi-country study can also be done between Kenya and other emerging market economies for comparison purposes.

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## APPENDIX I

### List of Stocks used in Computing the NSE 20-Share Index

1. Mumias Sugar Company Ltd
2. Express Kenya Ltd
3. Rea Vipingo Ltd
4. Sasini Tea Company Ltd
5. CMC Holdings Ltd
6. Kenya Airways Ltd
7. Safaricom Company Ltd
8. Nation Media Group Ltd
9. Barclays Bank Kenya Ltd
10. Equity Bank Ltd
11. Kenya Commercial Bank Ltd
12. Standard Chartered Bank Ltd
13. Bamburi Cement Ltd
14. British American Tobacco Ltd
15. Kengen Company Ltd
16. Centum Investment Company Ltd
17. East African Breweries,
18. EA Cables Ltd
19. Kenya Power & Lighting Company Ltd
20. Athi River Mining Ltd

## APPENDIX II

### Study Data

Year	Month	Nse-20 Share Index	91-Day Tbill (%)	Exchange Rate	M3 (Kshs.'Billi on)	Repo Rate (%)	CRR (%)	CBR (%)
2006	Jun	4260.49	6.60	73.88	611.22	6.39	6.00	9.75
	Jul	4258.54	5.89	73.62	625.90	5.73	6.00	9.75
	Aug	4486.07	5.96	72.62	628.92	5.94	6.00	10.00
	Sep	4879.86	6.45	72.68	638.69	6.16	6.00	10.00
	Oct	5314.36	6.83	72.02	649.47	6.23	6.00	10.00
	Nov	5615.20	6.41	69.95	658.47	6.33	6.00	10.00
	Dec	5645.65	5.73	69.40	666.84	6.34	6.00	10.00
2007	Jan	5774.24	6.00	70.54	669.37	6.43	6.00	10.00
	Feb	5387.28	6.22	69.73	673.21	6.60	6.00	10.00
	Mar	5133.67	6.32	68.78	684.97	6.70	6.00	10.00
	Apr	5199.44	6.65	68.31	690.44	6.79	6.00	10.00
	May	5001.77	6.77	66.97	701.52	7.03	6.00	10.00
	Jun	5146.73	6.53	66.56	719.52	7.07	6.00	8.50
	Jul	5340.08	6.52	67.51	723.32	7.19	6.00	8.50
	Aug	5371.72	7.30	66.99	741.05	7.49	6.00	8.75
	Sep	5146.46	7.35	66.97	743.99	7.70	6.00	8.75
	Oct	4971.04	7.55	67.11	750.14	6.95	6.00	8.75
	Nov	5215.36	7.52	64.42	760.41	6.01	6.00	8.75
	Dec	5444.83	6.87	62.68	797.54	6.64	6.00	8.75
2008	Jan	4712.71	6.95	70.56	807.04	7.75	6.00	8.75
	Feb	5072.41	7.28	68.98	818.91	6.90	6.00	8.75
	Mar	4843.17	6.90	62.85	831.45	6.46	6.00	8.75
	Apr	5336.03	7.35	62.14	886.91	6.67	6.00	8.75
	May	5175.83	7.76	62.03	864.35	7.42	6.00	8.75
	Jun	5185.56	7.73	64.69	840.68	7.61	6.00	9.00
	Jul	4868.27	8.03	67.32	850.41	7.41	6.00	9.00
	Aug	4648.78	8.02	68.73	854.95	6.35	6.00	9.00
	Sep	4180.40	7.69	73.22	859.33	6.06	6.00	9.00
	Oct	3386.70	7.75	79.65	883.50	6.03	6.00	9.00
	Nov	3341.00	8.39	77.88	890.23	6.26	6.00	9.00
	Dec	3521.18	8.59	77.71	901.13	6.23	6.00	8.50
2009	Jan	3198.90	8.46	79.54	895.40	5.10	5.00	8.50
	Feb	2474.75	7.55	79.69	900.03	5.08	5.00	8.50
	Mar	2805.03	7.31	80.43	906.07	4.62	5.00	8.25
	Apr	2800.10	7.34	78.66	928.82	4.05	5.00	8.25
	May	2852.57	7.45	78.35	928.60	6.18	5.00	8.00
	Jun	3294.56	7.33	77.16	950.24	4.01	5.00	8.00
	Jul	3273.10	7.24	76.61	973.62	3.35	4.50	7.75

	Aug	3102.68	7.25	76.23	982.85	4.31	4.50	7.75
	Sep	3005.41	7.29	75.00	986.90	3.43	4.50	7.75
	Oct	3083.63	7.26	75.24	1006.01	3.50	4.50	7.75
	Nov	3189.65	7.22	74.91	1022.30	3.50	4.50	7.00
	Dec	3247.44	6.82	75.82	1045.20	3.66	4.50	7.00
2010	Jan	3565.28	6.56	75.89	1067.27	3.91	4.50	7.00
	Feb	3629.31	6.21	76.90	1084.35	2.80	4.51	7.00
	Mar	4072.93	5.98	77.33	1107.90	2.43	4.51	6.75
	Apr	4233.24	5.17	77.27	1122.79	2.46	4.51	6.75
	May	4241.81	4.21	79.75	1159.59	2.41	4.51	6.75
	Jun	4339.28	2.98	81.92	1198.93	2.41	4.51	6.75
	Jul	4438.58	1.60	80.23	1213.21	1.72	4.50	6.00
	Aug	4454.59	1.83	81.07	1216.83	1.84	4.50	6.00
	Sep	4629.80	2.04	80.78	1243.60	1.84	4.50	6.75
	Oct	4659.56	2.12	80.79	1248.50	1.84	4.51	6.75
	Nov	4395.17	2.21	80.97	1258.81	1.07	4.51	6.00
	Dec	4432.60	2.28	80.75	1272.59	1.41	4.51	6.00
2011	Jan	4464.92	2.46	81.27	1285.45	1.23	4.50	5.75
	Feb	4240.18	2.59	82.36	1306.40	1.18	4.50	5.75
	Mar	3887.07	2.77	82.99	1324.68	1.66	4.50	6.00
	Apr	4029.23	3.26	83.42	1334.90	4.50	4.50	6.00
	May	4078.10	5.35	85.70	1351.39	5.72	4.50	6.25
	Jun	3968.12	8.95	89.86	1380.73	5.73	4.75	6.25
	July	3738.46	8.99	91.10	1412.70	6.25	4.75	6.25
	Aug	3465.02	9.23	93.62	1440.90	6.25	4.75	6.25
	Sep	3284.06	11.93	99.83	1484.20	5.75	4.75	7.00
	Oct	3507.34	14.80	99.78	1513.66	18.89	4.75	11.00
	Nov	3155.46	16.14	89.72	1489.75	0.00	4.75	16.50
	Dec	3205.02	18.30	85.07	1489.75	17.75	4.75	18.00
2012	Jan	3224.00	20.56	84.59	1505.76	17.88	5.25	18.00
	Feb	3303.75	19.70	82.97	1504.78	13.78	5.25	18.00
	Mar	3366.89	17.80	83.06	1517.13	0.00	5.25	18.00
	APR	3546.66	16.01	83.22	1536.29	15.47	5.25	18.00
	MAY	3650.85	11.18	86.83	1561.57	16.97	5.25	18.00
	JUN	3703.94	10.09	84.23	1595.01	17.60	5.25	18.00

**Source:** Nairobi Securities Exchange - NSE 20-Share index

**Source:** Central Bank of Kenya - 91 day T-bill rate; exchange rate (USD); Repo rate; M3; CRR and CBR