

**THE RELATIONSHIP BETWEEN MACROECONOMIC  
VARIABLES AND SHARE PRICES OF COMPANIES LISTED AT  
THE NAIROBI SECURITIES EXCHANGE**

**BY**

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## DECLARATION

This research project is my original work and has not been presented for a degree in any other University

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

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Date.....

## **DEDICATION**

This project is dedicated to my family for their encouragement and support throughout my course period.

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## **ABBREVIATIONS**

|      |                                   |
|------|-----------------------------------|
| ATS  | Automated Trading System          |
| DF   | Dickey Fuller                     |
| DSE  | Dhaka Stock Exchange              |
| CBK  | Central Bank of Kenya             |
| CMA  | Capital Markets Authority         |
| EXR  | Exchange rate                     |
| GDP  | Gross Domestic Product            |
| INF  | Inflation                         |
| INT  | Interest Rate                     |
| MBA  | Master of Business Administration |
| NSE  | Nairobi Securities Exchange       |
| UK   | United Kingdom                    |
| US   | United States                     |
| UON  | University of Nairobi             |
| VECM | Vector Error Correction Model     |

## **ABSTRACT**

The study was carried out to examine the relationship between macroeconomic variables and share prices of companies listed in Nairobi Securities Exchange as proxied by NSE 20 share index, for the period covering 2002 to 2012. Macroeconomic variables include GDP, inflation, exchange rate and interest rate analyzed using annual data covering the period 2002 to 2012.

Secondary data was used in the study and obtained from different sources including publications from the World Bank such as International Financial Statistics (IFS), Central Bureau of Statistics, Central Bank and various publications of the University of Nairobi.

The study first found it necessary to determine the trend of share prices for the year 2002-2012. This was to determine the overall share price performance as a result of the economic situation in the country over a range of time period. From the study findings, it is construable that in first seven years from 2002 to 2008 the share index showed upward trend. But in 2009, due to uncertainties it showed a downward trend but after that period, the trend goes upward again. The positive upward trend is as a result of stability in macroeconomic variables under consideration i.e. interest rate, gross domestic product, exchange rate and inflation rate.

The study also shows that share prices are affected by macroeconomic variables and this implies that macroeconomic variables GDP, INT, INF and EXR are very crucial in determining share price index in an economy. From the Correlation coefficients results, GDP, INT, INF and EXR posted a positive relationship with the share prices. Also. The correlation matrix indicates that gross domestic product is highly and positively correlated with share price index as well as interest, inflation and exchange rates. Logarithm of real values was used to reduce the statistical figures in to meaningful values for easy interpretation. The use of the natural log also reduces the heteroskedasticity and also provided a better fit for outliers within the distribution.

With these results, it is important that monetary managers should adopt suitable monetary measures to control inflation, so that the volatility of the share market can be reduced. The increase in Gross Domestic Product can play significant positive role in development of the capital market. Policy makers need to be careful too when trying to influence the

economy through changes in macroeconomic variables such as interest rate as this may inadvertently depress the stock market and curtail capital formation which itself would lead to further slowdown of the economy.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background of the Study**

The relationship between macroeconomic factors and stock markets has been a subject of interest among academicians and practitioners. It is often argued that stock prices are determined by some fundamental macroeconomic variables such as interest rate, gross domestic product, inflation and exchange rate. Evidence from financial press indicates that investors generally believe that monetary policy and macroeconomic events have a large influence on the volatility of stock price. This means that macroeconomic variables can influence investors' investment decision and motivates many researchers to investigate the relationship between share returns and macroeconomic variables (Gan et al, 2006)

The discussion on capital markets explains the creation of an enabling forum where users of capital can obtain the required capital financing from owners of such capital for an agreeable return while putting into consideration the risk inherent in their investment. A security market is defined as a mechanism designed to facilitate the exchange for financial asset by bringing orders from buyers and sellers of securities together. It is asserted that one of the main functions is price discovery which means that security prices reflect currently available information. The more quickly and accurately price discovery is achieved, the more efficiently financial markets will direct capital to its most productive opportunities, thereby leading to greater improvement in public welfare (Sharpe et al, 2006)

The activities in the financial markets and their relationship with the real sector have assumed significant importance since the inception of the financial sector reforms in the beginning of 1990's. The whole institutional reforms, introduction of new instruments, change in procedures, widening of network of participants call for a reexamination of the relationship between the financial sector and real sector. Interest has grown during the past two decades or so as more and more individuals own stocks (shares) than ever before. Research findings from developed markets show that stock markets are closely

interrelated to influence and also be influenced by other sectors of the economy. This relationship between equity markets and the general economy of a country is of interest to many more people in the community than just investors (Pattison, 1971). The explanation for this is because equity markets play an important role in the economy in terms of allocation of resources, financial intermediation and supply of capital (Feldman and Kumar, 1994).

Nyamute (1998) noted that the state of the economy influences the way stock prices move. When it's a period of depression or recession, investments (including investment in shares) are depressed and therefore the demand for stocks will fall leading to the downward change in their prices and the vice versa incase of economic boom.

### **1.1.1 The Concept of Macroeconomic Variables**

An economy where the stock market is on the rise is considered to be an up and coming economy. Rising share prices tend to be associated with increased business investment and vice versa. The stability rise and fall of share prices at the securities exchange is mostly dependent on the market forces of demand and supply and has a direct impact on the market capitalization of the individual companies and the market in general (Adel, 2004). On every trading day, the NSE uses a variety of market performance indicators to report performance which includes equity turnover or level of liquidity, volumes of shares traded, bond turnover. It is the NSE 20 share index that measures the overall performance of the stock market. The need to know how shares are determined in the market has become a necessity for many. Due to robustness of the market and emerging interests on stock price determination, this study aims to determine if there exists a relationship between macroeconomic variables and stock prices of companies listed in NSE.

Growth Domestic Product is the total market value of currently produced goods and services within the borders of a country in one year according to Economic Abstract of 2002 and New Zealand Institute of Economic Research (2006). It is the measure of country's overall official economic output. It is often positively correlated with the standard of living. When GDP is growing it indicates a growing economy and a bigger

market size and may signal high investment returns and consequently attract more investment returns in all sectors of the economy including capital and stock markets (Marshall, 1993). Inflation is the sustained rise in money prices generally. It is normally estimated by the consumer price index. It is a macroeconomic indicator for general economic and social analysis and is a tool used in wage and tax negotiations and indexation (Friedman, 1995)

Exchange rate also known as foreign exchange rate specifies how much one currency is worth in terms of the other. It is the value of a foreign nation's currency in terms of the home nation's currency (Gan et al, 2006). Interest rate is the impact of debt equity on the finances of listed companies would be examined through interest rate. An increase in interest rate will increase the opportunity cost of holding money and investors substitute holding interest bearing securities for share hence falling stock prices (Maysami et al, 2004).

### **1.1.2 The Concept of Share Prices in Kenya**

The stability rise and fall of share prices at the securities exchange in Kenya is mostly dependent on the market forces of demand and supply and has a direct impact on the market capitalization of the individual companies and the market in general (Sifunjo & Mwasaru, 2012). On every trading day, the NSE uses NSE 20 share index to measure the overall performance of the stock market.

The stock market in Kenya is an important institution for price discovery. The forces of demand and supply in the market determine the market price of shares. This market price is useful in valuation of companies, evaluating portfolio performance, facilitating transfer or disposal of securities among others. High volatility in the currency market and by extension the stock market will have an adverse effect on pricing efficiency. If volatility persists for a long time there will be a disruption in the price discovery process in the market. This disruption in price discovery process renders the stock market inefficient. The linkage between macro economic variables and share prices is important to managers of listed companies in Kenya. The managers of these companies have to plan in advance ways of mitigating the risk of adverse effects of macroeconomic variables on the

performance of their companies. The managers of listed companies in Kenya are rewarded with company shares for their good performance through executive share option plans. Therefore, it is in their best interest to grasp the relationship between macroeconomic variables and share prices.

### **1.1.3 Relationship between Financial System and Economic Variables**

Correspondingly, researches are also being conducted to understand the current working of the economic and financial system in the new scenario. Different results are emerging especially particularly for the developing countries where the markets are experiencing new relationships which are not perceived earlier (Bhattacharya and Mukherjee, 2002). The analysis of stock markets has come to the fore since this is the most sensitive segment of the economy. There are competing views on the interplay between stock market and the macro economy. One view begins with the idea that some real factors (typically unobservable to researchers) lead to variations in prospective real rate of return on capital. Given the discount rates for owners of capital, an increase in prospective returns raises stock prices and vice versa.

Researchers have attempted to use surrogate measures for these economic fundamentals that determine stock prices. The characteristics that describe a macro economy are usually referred to as key macroeconomic environment and describe the state of macro economy. The commonly used surrogates include overall economic activity (as captured by GDP), business investment, rate of inflation, exchange rates, interest rates, growth in domestic savings, consumption, money supply, unemployment rate and so on. Selected macroeconomic variables for this study will include GDP, inflation rate, exchange rate and interest rate because these are more prevalent to developing countries like ours and data on them is readily available. There is an approach that considers stock prices to behave in a random manner and as such they are unrelated to economic fundamentals. This appears to be the view that Keynes held when he termed stock markets as gambling casinos and this would not carry out regression between stock prices and economic variables (Munene, 2007).

The economic theory states that there is a close relationship between stock prices and economic factors (Reilly and Brown, 2006). My study will be based on the first view of stock market dynamics as dynamic interactions among macroeconomic variables and stock prices are important in the formulation of nation's macroeconomic policies (Maysami et al, 2004).

#### **1.1.4 Nairobi Securities Exchange**

NSE was formed in 1954 as a voluntary organization of brokers and today it is one of the most active markets in Africa. It has played a very vital role in championing the increase in investor confidence by modernizing its infrastructure. It has led to promotion and enhancement of culture of thrift and saving by providing alternatives avenues for investment and assists in the transfer of these savings to investment in productive enterprises and quoted stocks.

The Kenyan government realized the need to design and implement policy reforms to foster sustainable economic development with an efficient and stable financial system in the 1980s. It set out to enhance the role of the private sector in the economy, reduce the demand for public enterprise on the exchequer, rationalize operations of the public enterprise sector to broaden the base of ownership and enhance capital market in the formation of a regulatory body "the capital market authority" in 1989, to assist in the creation of an environment conducive to the growth and development of country's capital markets (Statistical Abstract, 1990).

The NSE is poised to play an increasing role in the Kenyan economy and that is why the Government of Kenya (GOK), the Capital Market Authority (CMA) and the Central Bank of Kenya (CBK) have over the years played a principal role in the developing and strengthening the NSE to enable it take up these various roles and functions. Measures taken include enactment of legislation, rules, policies and guidelines, adjustment in macroeconomic variables such as taxation rates, interest rates, exchange rates and working towards managing inflation in the economy, setting up institutions such as

Central Depository and Settlement Corporation (CDSC) and Investor Compensation Fund (ICF).

In 2006 the NSE installed the automated trading systems which have resulted in high trading volumes. The implementation of automated trading system provided for longer trading hours, increased trading efficiency and price discovery (Economic Survey, 2007). The growth of NSE in the past five years has been attributed to positive growth rate registered by the Kenyan economy and the changing international perception of Kenya as a secure investment destination. The effect of post election violence of the 2008 election outcome that led to slower economic growth and reduced investment has not hampered the growth of NSE. In the beginning of 2010, the NSE introduced the NSE All – share index which is complementary to NSE 20 share index in an effort to provide investors with a comprehensive measure of the performance of the stock market. Nairobi Securities Exchange is one of the leading developing markets in the world and investing in stocks has been hyped so much that the mention of the initial public offer ( IPO) reflexively elicits a pat on the pocket.

## **1.2 Problem Statement**

The stock market is expected to have an effect on the role of providing an avenue for the mobilization and allocation of domestic savings and increasing the quantity and the quality of investment, Singh, (1997). However studies conducted by Aresticet al, (2001), Chen et al (2004) and Shahbaz et al, (2008) all indicated that that changes in competitive environment may contribute to negative association between macroeconomic variables and stock market development (Azarmi, Lazar and Jeyapaul, 2005).

Bencivenga and Smith (1991), Bhide (1993) and Koirala (2009) also note that stock markets can actually harm economic growth. A study carried out in India, Azarmi et al, (2005) found that during the post liberalization period of 1991 – 2001, the Indian stock market had a significant negative relationship with economic growth. The Annual report of 2002 has some comments from the chief executive of CMA which stated that the performance of the capital market is directly correlated with the performance of the economy and as such closely interrelated thereby indicating that the soundness of the

financial system affects the performance of the economy and vice versa. Some of the research findings that have been done in developing markets such as Humpe and Macmillian (2007), Adel (2004), Chen et al (1986) suggest a relationship between various economic indicators and the stock prices, although only a few of such studies have been done in developed markets.

There are some studies that have been conducted in Kenya on stock market focusing on various aspects of economic variables and share prices of companies listed companies. They include Munga (1974), Munene (2007), Gitobu (2000), Mwangi (1977) among others. In spite of all these alternative studies that have been carried out, a gap in the literature relating examining the relationship between macroeconomic variables and share prices exist because there are still no conclusive results that have been arrived at. Studies done by Munga (1974), Munene (2007) and Gitobu (2000) examined the composite stock indices of the Nairobi Securities Exchange and examined whether markets incorporate available information, but did not determine what information the market responds to and to how important this is to general economy and also did not establish the direction and magnitude of the interaction between economic variables and stock prices at the Nairobi Securities Exchange. Therefore, this study seeks to fill this gap by critically evaluating the relationship between macroeconomic variables and share price of companies listed at the Nairobi Securities Exchange and determine what information the market responds to and how important this information is to the general economy. This is because these linkages have implications for the ongoing attempts, by the government to develop the stock market while at the same time shifting to independently floating economic variables e.g. exchange rates.

### **1.3 Objective of the study**

The objective of the study is to establish the relationship between macroeconomic variables and share prices of companies listed at the Nairobi Securities Exchange.

## **1.4 Value of the study**

The findings of this study provide detailed comparative and empirical data on performance of NSE together with the various macroeconomic factors and will contribute to literature to various parties. To scholars and academicians this study will strengthen the theoretical framework of the determinants of share prices from the perspective of developing economies like Kenya. They will use this study to undertake further research in this field.

Investors will benefit from this study together with other market participants at the NSE as it provides information on share prices which is a key consideration in all investment decisions. By identifying and understanding which macroeconomic variables affect the stock market most, both personal and corporate investors would be able to strategize their investments according to the change of the monetary policy. Understanding of the economic variables will assist a potential investor in gauging the current state of the economy and the direction it is headed.

Economic Policy Makers will benefit from the findings of this study because regulatory bodies especially the Central Bank of Kenya and the Capital Markets Authority will better understand the share prices behavior towards achieving desired monetary goals. The relationship and interaction between macroeconomic variables and share prices is important in the formulation of the nation's macroeconomic policy. Finally the findings will help the policy makers in government to control various macroeconomic variables in order to maximize the value of stock.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter will review previous theoretical and empirical literature on the role of macroeconomic variables in determining stock prices. This chapter will be organized into four parts. It begins with introduction of variables used in the study later followed by a discussion on the relationship between share price and macroeconomic variables later followed by a review of the theories which link stock market/stock activity and macroeconomic variables. Then empirical studies on the relationship between macroeconomic variables and the stock prices will be reviewed. Lastly there will be a summary of the literature review.

#### **2.2 Variables Used**

##### **2.2.1 Share prices**

Ross, Westerfield and Jaffe, (2005) defined a share as a financial instrument which entitles the holders to a certain portion of the company's value. The price of a share can be used to indicate the performance of a company pitted against others in the same industry. Although there are various ways of analyzing and determining the price of a share, the one mostly used is fundamental analysis, which looks at the fundamentals of the company. These fundamentals include investment decisions, liquidity of assets, use of debt, profit margins, growth in earnings and the future prospects of the company. Fundamental analysis is said to determine the true value or intrinsic value of the share.

This study will use the NSE 20 share index because it is effective and representative and captures all the performance measures such as market capitalization, liquidity and turnover ratio (Odhiambo, 2000). It is a listing of selected stocks, statistically expressed to reflect the composite value of its component stocks. The NSE 20share index is therefore a weighted average index that is used to measure performance at the

NSE and has been in use since 1966. It measures the performance of 20 blue chip companies with strong fundamentals and which have consistently returned positive financial result (NSE Handbook Manual 2008).

### **2.2.2 Inflation**

This is an input into investors' analysis on the economy whether to invest or not to invest. If the inflation rate is high, the tendency is that as the real income declines, the investor end up selling their assets, including stocks to enhance their purchasing power. The reverse is the case when the inflation rate is low, investors would like to acquire more assets with stocks not exclusive. In essence, the era of high inflation rate negatively affects stock prices while low inflation rate boost stock prices. Inflation is therefore expected to have a negative impact on the share prices and the performance of the stock exchange (Friedman, 1995)

### **2.2.3 Interest Rate**

A rise in interest rate may encourage investors to switch from the stock market to the money market. Reduced interest rate encourages demand for cash for speculative purpose and therefore may boost stock activities. An increase in interest rate will increase the opportunity cost of holding interest bearing securities for share hence falling stock prices (Maysami et al, 2004)

### **2.2.4 Gross Domestic Product**

One of the best tools for measuring aggregate economic performance is the Gross Domestic Product. If there is an upward movement in GDP, equity prices may possibly rise due to the potential for higher profits arising from a healthy business climate. On the other hand, when the GDP is on the downward trend, there is likelihood of equity price drop. When GDP is positive, the overall stock market react positively as there will be a boost in the investor confidence, encouraging them to invest in the stock market. This will in turn boost the performance of companies. When GDP contracts, consumers tread cautiously and reduce their spending. This will

in turn affect the performance of the companies negatively thus exerting more downward pressure on the stock market ( Leon et al, 2008).

### **2.2.5 Exchange Rate**

Also known as foreign exchange rate it specifies how much one currency is worth in terms of the other. It is the value of a foreign nation's currency in terms of the home nation's currency. It is the price at which the currency of one country can be converted to the currency of another. Although some exchange rates are fixed by agreement, most fluctuate or float from day to day (Gan et al, 2006)

## **2.3 Share Prices and Macroeconomic Variables**

### **2.3.1 Share Prices and Gross Domestic Product**

Marshall (1993) defines Gross Domestic Product (GDP) as the aggregate of national income and output for a given country's economy. It is the total value of all final goods and services produced in a particular economy; the dollar value of all goods and services produced within a country's borders in a given year. GDP can be looked at in three ways, all of which are conceptually identical. First, it is equal to the total expenditures for all final goods and services produced within the country in a stipulated period of time (usually a 365-day year). Second, it is equal to the sum of the value added at every stage of production (the intermediate stages) by all the industries within a country, plus taxes less subsidies on products, in the period. Third, it is equal to the sum of the income generated by production in the country in the period that is, compensation of employees, indirect taxes on production and imports less subsidy subsidies, and gross operating surplus.

The status of the economy depicts the performance of stock returns. If the economy does look weak, we expect most stock returns to be equally dismal, and if it looks strong then the stocks should do well. The change in total economic activity over time is measured by the behavior of the economy which is captured by the business cycle. One of the measures of the business cycle is the gross domestic product (GDP) which is the market value of goods and services produced in an economy during a period of

time irrespective of the nationality of people who produce the goods and services. GDP moves up and down with the business cycle and in times when the economy is strong leading to a boom in the business cycle, investments will rise, resulting to increase in demand for shares and hence upward movement of share prices. In times of recession the economy is normally weak; investments will be depreciated leading to a fall in demand for stocks hence stock prices have a downward movement (Gitman and Joehnk, 2002)

### **2.3.2 Share Prices and Inflation**

Inflation describes the changes in prices of commodities such as food and non-alcoholic drinks, clothing and footwear, housing costs, household goods and services, transport and communication, medical goods and services and recreation and education. It's the overall general upward in price movement of goods and services in an economy, usually as measured by the Consumer Price Index and the Producer Price Index. The Consumer Price Index (CPI) considers the price changes that consumers have had to bear with to access basic commodities and services as a whole. Over time, as the cost of goods and services increase, the value of a shilling falls because a person won't be able to purchase as much with that shilling as he/she previously could. Inflation is always everywhere because it is a monetary phenomenon. Since all countries have monetarised economies they all experience inflation though in varying degrees (Friedman, 1995)

Friedman (1995) states further that mild inflation is healthy as it spurs economic growth. A principal goal of the CBK is to ensure that money plays its vital role of helping the economy run smoothly. Its monetary policies are therefore geared towards preserving the value of the Kenya Shilling. Stability in value of money promotes economic prosperity by providing a framework in which Kenyan households and businesses can make sound economic decisions.

Investment professionals and monetary policy makers have endured greater interest in the empirical relationship between inflation and share prices. Fisher (1930) hypothesis states that nominal assets returns move one for one with the expected

inflation so that real stock returns are determined by real factors independent of the rate of inflation. According to Fisher, assets which represent claims to physical or real assets such as stocks should offer a hedge against inflation, providing a hedge against rising prices. Stock investors will be vulnerable to inflation if the implied positive relationship between share prices and inflation does not hold.

A number of hypotheses have been advanced to explain the negative relation between inflation and stock prices. The first one is the proxy hypothesis as advanced by Fama which explains the correlation between expected inflation and real economic growth. The second one is explained by changes in expected return and risk aversion. The third is explained by the hypothesis that investors may irrationally discount real cash flows using nominal interest rates (Modigliani and Cohn, 1979) and the fourth is explained by inflation non neutralities tax code which distorts accounting profit.

The proxy hypothesis suggested by Fama (1981) explains that the negative stock return inflation relation is spurious. This hypothesis predicts that rising inflation rates reduce real economic activity and demand for money hence a reduction in economic activity negatively affects future corporate profit and stock prices. The resulting negative relationship between the stock return and inflation is called the “proxy effect”. When real activity does not fall because of inflation then the proxy effect vanishes.

A positive correlation between stock prices and inflation has been explained using several hypotheses. The first one argues that inflation damages the real economy in particular the profitability of the corporate sector. The second one explains that inflation makes investors more risk averse and the third is given by Modigliani and Cohn (1979) and they asserted that the correlation between stock prices and inflation is as a result of inflation illusion. They argued that stock market investors fail to understand the effect of inflation in nominal dividend growth rates and extrapolate historical nominal growth rate even in periods of changing inflation. The rational investor’s perspective is that stock prices are undervalued when inflation is high and

overvalued when inflation is low. According to Gitman and Joehnk (2002), inflation is detrimental to stock prices. High inflation leads to higher interest rates and lower price earnings multipliers and generally makes equality securities less attractive.

### **2.3.3 Share Prices and Exchange Rate**

The Government policy, national consumption and savings and the accumulation and allocation of financial assets (investments) are variables having a direct impact on the exchange rate. Imported or exported commodities will usually be priced in terms of foreign currency at least one on one side of transaction and sometimes the currency of denomination of the trade will be foreign on both sides. Foreign currency transactions are involved when financial assets are bought and sold or borrowed and lend across national boundaries. When a country's currency depreciates, this will lead to an increase in demand for exports and thereby increasing cash flows to the economy assuming that demand for exports is sufficiently elastic. In a situation where the currency is expected to appreciate, the market will attract investors and the rise in demand will push up the stock market levels implying that stock market returns will positively be correlated to the changes in the exchange rates (Grabbe, 1986)

The level of international trade and the trade balance will to a greater extent determine the impact of exchange rates on the economy. The impact therefore will be determined by the relative dominance of import and export sectors of the economy. If a country is export oriented and its currency appreciates, it reduces the competitiveness of its exports and would therefore have a negative impact on the domestic market. This is because the listed companies in the stock market which are exporters would be less profitable and thus less attractive to investors. If the currency depreciates, this will make exports competitive. This situation was witnessed in the NSE during 1993/1994 when the Kenyan shilling depreciated drastically, making the plantation (tea and coffee) companies earn huge profits and helping the stock exchange as a whole to boom (Economic Survey, 1994).

### **2.3.4 Share Prices and Interest Rates**

Reilly and Brown (2006) define interest rate as a cost of capital to companies and influence the profitability and value of quoted companies for if a company pays a very high interest rate on its debt capital, then its earning potential will be severely eroded and hence investors will mark down its value. There is an argument that complicated the matter a bit by stating that cash flows from stocks can change along with interest rates and it is not certain whether these changes in cash flows will offset the changes in interest rate. The level of corporate profits is influenced by interest rates which in turn influence the price that investors are willing to pay for the stock through expectations of higher future dividend payments. When interest rates reduce, the cost of borrowing reduces and thus serves as an incentive for expansion. This however will have a positive effect on the expected returns for the firm.

## **2.4 A Review of Theories**

### **2.4.1 Economic Theory**

Conventional theory by Fama (1981) states that an increase in money supply in the economy will lead to increase inflation rate which will then increase the discount rates and lead to lowers the price of stock, thus conferring a negative effect. When there is an increase in inflation rate due to increase in money supply the stock prices decrease as a result of this.

The theory argues that the relation between financial markets and the macro economy is not entirely in one direction. However stock prices are usually considered as responding to external forces even though they have a feedback on other variables. The stock market are related to fluctuations or changes in the economy as a whole because the determination of the price of a particular firms share price or value of the investment is a fluctuation of many interacting forces, mainly the demand for and the supply of stock ( Chen et al, 1986).

### **2.4.2 Arbitrage Pricing Theory**

The theoretical framework of stock market and various macroeconomic factors is based on the work of Ross (1976), who introduces the Arbitrage Pricing Theory (APT) that links stock returns on several variables that characterize several sources of income violation. APT holds that the expected return of a financial asset can be modeled as a linear function of various macroeconomic factors, where sensitivity to changes in each factor is represented by a factor specific beta coefficient. The uniqueness of these variables depends on the models underlying assumptions. The model was first developed assuming that investors have access to domestic securities only but it has been revised to incorporate possible integration with foreign market as a result of arbitrageurs who trade stocks internationally (Ross, 1976)

### **2.4.3 Substitutability Theory**

It was advanced by neoclassical monetary theorists and explains that high positive interest rates have a direct impact on savings and investments. An increase in interest rate increases the required rate of return and the share price would decrease with the increase in the interest rate. An increase in interest rate would raise opportunity cost of holding cash, and the tradeoffs to holding other interest bearing securities would lead to a decrease in share price (Aynor and Babafemi, 2008)

### **2.4.4 Keynesian Theory**

It was advanced by Keynes in 1939. Keynesian Theory on interest rates argues that low interest rate increases investments income and eventually savings. This argument is in agreement with neoclassical on the impact of interest rates on investment. Keynes's theory of the determination of equilibrium real GDP, employment, and prices focuses on the relationship between aggregate income and expenditure. In this situation, the classical theorists believe that prices and wages will fall, reducing producer costs and increasing the supply of real GDP until it is again equal to the natural level of real GDP. Keynesian, however, believes that prices and wages are not so flexible. They believe that prices and wages are sticky, especially downward. The stickiness of prices and wages in the downward direction prevents the economy's resources from being fully employed and

thereby prevents the economy from returning to the natural level of real GDP (Friedman and Milton, 1997)

### **2.4.5 Classical Theory**

The classical theory applies the classical theory of economics to determining interest rates. Classical theory of interest rates compares the supply of savings with the demand for borrowing. Using supply and demand curves the equilibrium rate is calculated by determining the curves intersection point. Thus if savings are greater than investments the interest rate drops until they reach equilibrium and vice versa, if savings are less than investment the interest rate increases until the reward for savings encourages increased savings rates causing the market to again reach equilibrium. This theory will explain the movement of share prices of companies because if savings will be less than investing then it means that the share prices will move up because of increased investment and vice versa is also true. However the classical theory of interest rates fails to account for factors besides supply and demand that may affect interest rates such as the creation of funds, the importance of income and wealth and changes in the primary borrowers in an economy (Mundell, 1963)

### **2.4.6 The Rational Expectation Theory**

The rational expectations theory explains that interest rates are based on the idea that people formulate expectations based on all the information that is available in the market. Rational expectation theory holds that the best estimation for future interest rates is the current spot rate and that changes in interest rates are primarily due to unexpected information or changes in economic factors. The rational expectations theory can be incorporated with the loanable funds theory in order to better consider the available information with the economy. When people formulate expectations based on all information available in the market they might either decide to invest or not. If their idea is not to invest, then the share prices will be affected in that if we have less people investing then the share prices may come down and the vice versa is also true ( Hamoa, 1988).

## 2.5 Empirical Studies

The relationship between macroeconomic factor and stock price performance is extensively investigated. The findings of this literature suggest that there is a significant linkage between macroeconomic factor and the share prices.

Mutai (2012) in his study empirically tested the relationship between the stock prices on Nairobi Securities Exchange and Kenya's macroeconomic variables that included; inflation, exchange rates, current account balance, money supply, budget deficit and treasury bill rates. Monthly data for the period 2000 to 2011 were used. The model was specified based on the Arbitrage Pricing Theory. Before any analysis of the data was done, stationarity tests for time series data were conducted. By applying the Augmented Dickey Fuller test, it was found that the variable were I (1) except GDP and current account balance, which were I (2) and I(0) respectively. Johansen's procedures for co integration were used and it was found that cointegrating vectors existed. The findings of the study suggest that the stock prices and inflation, exchange rates, current account balance, money supply, budget deficit, treasury bill rates tend to evolve together over time. The relatively small coefficient of the error term in the Vector Error Correction Model (VECM) indicated a slow rate of adjustment to restore equilibrium in the dynamic model. In order to get a deeper insight of the interrelationships among the variables identified, Granger-Causality analysis was performed. The empirical results show that bi-directional relationship existed between stock prices and inflation, exchange rates, money supply, budget deficit, treasury bill rates and Gross Domestic Product. Unidirectional relationship was found to exist between stock prices and current account balance. Thus, stock prices are caused by inflation, exchange rates, money supply, budget deficit, treasury bill rates and GDP.

Sifunjo (2011) in his study examined the causal relationship between foreign exchange rates and stock prices in Kenya from November 1993 to May 1999. The data set consisted of monthly observations of the NSE stock price index and the nominal Kenya shillings per US dollar exchange rates. The objective was to establish the causal linkages between leading prices in the foreign exchange market and the Nairobi Securities

Exchange (NSE). The empirical results show that foreign exchange rates and stock prices are non stationary both in first differences and level forms, and the two variables are integrated of order one, in Kenya. Secondly, the study tested for co integration between exchange rates and stock prices. The results show that the two variables are co integrated. Thirdly, the study used error-correction models instead of the classical Granger-causality tests since the two variables are co integrated. The empirical results indicated that exchange rates Granger-causes stock prices in Kenya.

Ochieng and Oriwo (2012) in their study investigated the relationship between macroeconomic variables on NSE All share index (NASI) and went further to determine whether changes in macroeconomic variables can be used to predict the future NASI. Three key macroeconomic variables were examined and they included lending interest rate, inflation rate and 91 day Treasury bill (T bill) rate. Secondary data for the periods March 2008 to March 2012 was collected as follows; data for NASI was obtained from the Nairobi Securities Exchange (NSE), data for inflation was obtained from Kenya National Bureau of Statistics and finally data for lending rates and 91-day T Bill was obtained from Central Bank of Kenya (CBK). The findings in the study indicated that 91 – day T bill rate has a negative relationship with the NASI while inflation has a weak positive relationship with the NASI. Based on these findings, the study recommended that monitoring of the macroeconomic environment since the changes in the macroeconomic variables has an effect on the stock market performance, which also influences the foreign investor's decisions in the local investments.

Munene (2007) studied the relationship between inflation and stock prices in Kenya and used monthly data on selected stocks from a sample of six companies listed at the Nairobi Stock Exchange for a period of four years (2000-2006). OLS estimation equation was employed to determine variable and information dummy. Another model applied was the Error correlation model to capture the long run equilibrium after variables were differenced to achieve stationarity. The study found a negative relationship between stock returns and expected inflation contrary to Fisher (1930) hypothesis. A positive relationship was found between actual inflation and stock prices and the dividend information dummy but the actual inflation being significant.

Tabak (2006) studied the dynamic relationship between stock prices and exchange rates in the Brazilian economy and the study used unit root and co integration tests to test for long run relationship between the variables. Linear and non linear causality test were performed. The results of the study found out that there is no long run relationship, but there is a linear Granger causality from stock prices to exchange rates; a negative correlation. The evidence of non-linear Granger causality from exchange rates to stock prices was found which is in line with the traditional approach; exchange rates lead stock prices. However it is obvious that the data set selected spread across two economic structures: the crawling peg exchange rate regime and floating exchange rate and no test of structural break in the model was done.

Humpe and Macmillian (2007) carried out a study to investigate the relationship that exist between a number of macroeconomic variables and stock prices in the US and Japan within the framework of a standard discount model. They applied co integration analysis using Johansen (1991) procedure in order to model the long term relationship between industrial productions. The macroeconomic variables used were consumer price index, long term interest rates and stock prices in the US and Japan. Using the US data they found evidence of a single co integration vector between stock prices, interest rates, industrial production, inflation and long term interest rates. In their findings, stock prices were positively related to industrial production, inflation and long term interest rates. However, they found an insignificant (although positive) relationship between US stock prices and interest rates. For Japanese data they found two co integrating vectors. The first one provided that stock prices are positively related to industrial production but negatively related to interest rates. The second one found out that industrial production was negatively related to interest rate and the rate of inflation.

Wickremasinghe (2005) examined the casual relationship between stock prices and six macroeconomic variables in Sri lanka, for the period January 1985 to December

2004. The study analyzed both long run and short run relationships by employing Johanesen's test, Error Correction Model, variance decomposition and impulse response. In Johanesen's test, one co integration relationship was found among the stock price and macro economic variables. Islam (2003) replicated the above studies to examine the short run adjustment and the long run equilibrium relationships between four macro economic variables which include interest rate, inflation rate, exchange rate and the industrial productivity with the stock prices. He concluded that there existed statistically significant short run (dynamic) and long run (equilibrium) relationships among macroeconomic variables and share prices.

Mohiuddin, et, al (2008) undertook a study of the relationship between macroeconomic variables and the stock prices. This study was on Dhaka stock exchange (DSE) and was aimed at investing the explanatory power of various macro factors such as inflation rate, exchange rate, interest rate, money supply, production index on the variability of the stock price in Bangladesh. Multiple regression analysis was used in the study and all share price index of the Dhaka stock exchange was used as proxy for stock price and any of the macroeconomic factors. The study revealed that interest rates were found to have a negative and significant relationship with the market returns. They used time series data but failed to capture the use of an estimation technique that takes into account time series characteristics of variables. The reason why it is necessary to achieve stationarity of such variables is because the mean and variance estimates would be unbiased estimates of the unknown population mean and variance. It is clear from their study and the not all data were available for the period of study and they did not perform diagnostic checks which render the findings questionable.

Marhyereh (2002) investigated the long run relationship between the Jordanian stock prices and selected macroeconomic variables using Johansen's (1998) co integration analysis and monthly time series data for the period from January 1987 to December 2000. The study showed that macroeconomic variables were reflected in stock prices

in the Jordanian capital market. Gan et al (2006) studied New Zealand stock index and a set of seven macroeconomic variables from 1990 to 2003 using co integration test. The findings were that the New Zealand index is consistently determined by the interest rate, GDP and inflation. Schwert (1989) show that changes in the macroeconomic variables can predict the stock market movements.

Gunasekarage, Pisedtasalasai (2004) examined the influence of macroeconomic variables on stock market equity values in Sri Lanka using Colombo All Share price index to represent stock market and interest rates, consumer price index (as a measure of inflation), and exchange rate as macroeconomic variables. A monthly data of seventeen years from January 1985 to December 2001 and employing the usual battery of tests, which included unit roots, co integration and VCEM, they examined both the long run and short run relationships between the stock market index and the economic variables. The VECM analysis provided support for the argument that macroeconomic variables such as consumer price index, the interest rates and inflation have a significant influence on the stock market.

Dhakal et al (1993) used Vector Auto Regression (VAR) analysis to test for causality between share prices and money supply. The model used seasonally adjusted data for share prices narrowly defined money stock, real output as shown by industry production, the short term interest rate as proxied by the the three month treasury bill rate and the aggregate price level as measured by consumer price index(CPI) .The findings were that there is a direct causal impact of changes in money supply on share price and that the indirect channels which are mainly as a result of causal impact of money supply on the interest rate and inflation rate, reinforce the direct channels.

Kagume (1991) carried out a study to examine the determinants of stock prices at the NSE. He used regression analysis to establish a model which had the following variables. A share price adjustment coefficient which is the lagged stock market price and which gave a measure of efficiency that is how fast the share price adjusted to

investor expectations? Other variables used were the rate of share premium, inflation income the nominal money supply as a proportion of GDP and quasi money. He found that share price adjustment factor was very low at 0.15 and statistically insignificant at the 5% level. Money supply as a proportion of GDP was statistically insignificant at 5% while inflation was seen to have a negative but insignificant effect on share price. The level of real income was found to be positively significant to share prices. Schiller (1981) examined the volatility of share prices using variance ratio test. His findings were that the share prices were volatile than could be justified by change in economic fundamentals. This implies inefficiency in the price formation process hence a rejection of the random walk hypothesis.

Pearce supports these findings and Roley (1985) Hashemzadah and Taylor (1988) who found a causal impact of the interest rate on share prices while Schwert (1981) found evidence of a significant impact of inflation on share prices. Bennet and Kellener (1988) sought to examine the impact of domestic variables which included the short and long term interest rates, industrial production and inflation on the stock markets of the USA, UK, Japan and Germany using monthly data for thirty years. The findings were that both industrial production and interest rates were found to be statistically significant for some countries.

Sifunjo (1999) carried out a study on the relationship between exchange rate and share prices in Kenya for a period of six years from November 1993 to May 1999. The study employed co integration and error correction approach using Dicky Fuller (DF) and Augmented Dicky Fuller (ADF) tests. From the study there was evidence that exchange rates “Granger cause” stock prices in Kenya. There exists a unidirectional causality from exchange rates to stock prices. The study explains that the movements in exchange rates exert significant influence on stock price determination in Kenya. This explains that the movements in exchange rates exert significant influence on stock price determination in Kenya. This study is however not conclusive because it used only one variable and the use of and the use of macroeconomic variables have been suggested.

Nyamute (1998) analyzed the movement of stock prices in relation to changes in the macroeconomic variables which includes; interest rates, inflation and exchange rate. She concluded that changes in the macroeconomics causes simultaneous change in the stock prices of companies. Mbashu (2007) conducted a study on the relationship between macroeconomic variables and sector specific returns at the NSE. He used interest rates, exchange rate, inflation and oil prices as macroeconomic variables. He used linear regression and correlation analysis to the relationship and concluded that increase in interest rates reduced earnings for firms because borrowing becomes expensive.

Ibrahim (1999) investigated the dynamic interactions between stock prices and seven macroeconomic variables for an emerging market, Malaysia, using co integration and Granger causality tests. The observation deduced from this study strongly suggested information inefficiency in the Malaysian market. Results from the bivariate analysis provided evidence of co integration between the stock prices and three macroeconomic variables namely consumer prices, credit aggregates and official reserves. Chong and Koh's (2003) results were similar meaning they showed that stock prices, economic activities, interest rates and money balances in Malaysia were linked in the long run both in the pre and post capital sub periods.

Specifically, it indicated that stock prices respond to deviations from the long run equilibrium path traced between the stock market and the three macroeconomic variables.

Mukherjee and Naka (1995) applied Johansen's (1998) VECM to analyze the relationship between the Japanese Stock Market and exchange rate, inflation, money supply, real economic activity, long term government bond rate and call money rate. They concluded that a co integration relation existed and that stock prices contributed to this relation. Maysami and Koh (2000) examined similar relationship in Singapore and found out that inflation, money supply, changes in short and long term interest rate and variations in exchange rate formed co integrating relation with changes in Singapore's stock market levels. Islam (2003) showed a strong, significant long run

relationship between stock prices and macroeconomic factors (interest rate, bond prices, price earnings ratio, foreign exchange rate, market capitalization and consumer price index) during 1992 to 2001 in Thailand.

Fama and Gibbon (1982) examine the relationship between inflation, real returns and capital investment. Their results support Mundell (1963) and Tobin (1965) findings that expected real returns on bills and expected inflation rates are negatively correlated. They suggest that a relationship that arises with stock returns is as a result of positive relationship with expected real returns on financial assets and real activity.

Chen, Roll and Ross (1986) suggested that the following macroeconomic variables were systematically affecting asset returns; the spread between long and short term interest rates, expected and unexpected inflation, industrial production growth and the spread between high and low grade bonds. Industrial production growth represents the real cash flows, inflation affects returns as nominal cash flow growth rates are not equivalent to expected inflation rates while the spread between long and short term interest rates and high or low grade bond spread affect the choice of discount rate. Similar to Chen and Ross (1986), Hamoa (1988) determines whether the observed relationships between macroeconomic variables and share returns are still applicable when the analysis is conducted in the Japanese market. Apart from industrial production appearing insignificant in asset pricing, Hamao's findings are consistent with Chen, Roll and Ross (1986) study.

## **2.6 Summary of Literature Review**

From the studies that have been conducted earlier which have contributed to a lot of literature, it is evident that macroeconomics variables selected to examine the determinants of stock prices differ slightly across studies. A significant part of the existing literature has established the relations between macroeconomic variables and stock prices indicating a unidirectional causality running from the macro environment to the financial markets. It is evident from the studies done that most of them done on

stock prices and the macro economy have been done in developed countries which are relatively more efficient.

The economic conditions and stability of these developed economies is different from ours. In developed countries interest rates are determined by market forces and there is more public awareness of stock trade. In these developed countries also, they have greater variety of financial assets and there is need for a model that is suitable to our economy.

Although some studies have been conducted earlier with respect to Kenyan context, the results were inconclusive. Majority of these studies conducted in Kenya have examined the composite stock indices of the NSE and also examined whether the market incorporates available information, but they failed to determine what information the market responds to and how important this is to the general economy. These studies also did not establish the direction and magnitude of interaction between economic variables and stock prices at NSE. This study will attempt to contribute to further research by critically examining the relationship between macroeconomic variables and share prices of companies listed at NSE and determining what information the market responds to and how important this information is to the general economy.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.0 Introduction**

This chapter outlines the methodological techniques that will be used in the study. The section will describe the research design, the study population, data collection, data analysis and lastly the model to be used in the study.

#### **3.1 Research Design**

This study explored the relationship between share prices and macroeconomic variables. The study made use of annual data from 2002 to 2012. The study employed multiple regression analysis technique to determine whether the selected macroeconomic variables have an effect on stock prices of companies listed at the NSE. The data covered the period during which there was a lot of political activity when the National Rainbow Coalition and Grand coalition governments saw positive economic growth and increased investments in the country.

#### **3.2 Sample Population**

The population considered all the companies listed at the Nairobi Securities Exchange. The sample was made up of 20 companies whose securities comprise the calculation of the NSE 20 share index. The period chosen for this study is thought to be representative because a lot of developments and policy guidelines affecting the NSE performance took place during this period. Also this period saw a lot of political activity that increased investment and accelerated economic growth. It also covers the most current performance at the NSE.

#### **3.3 Sample Frame**

The sample selected was the NSE 20 share index, as a representative of all listed companies. Yearly data for the period 2002 to 2012 was used for the NSE 20 share

index(s), inflation (INF), interest rate (INT), exchange rate (EXR) and Gross Domestic Product (GDP)

### **3.4 Data Collection and Sources**

Collection of data for this study was from secondary sources. The data was obtained from Kenya National Bureau of Statistics, Central Bank of Kenya, Capital Markets Authority, Nairobi Securities Exchange and Government of Kenya publications. Share prices was measured using the NSE 20 share index, Interest rates was measured using the Treasury bill rate, exchange rate was measured in Kenya shillings against the US dollar, annual inflation rate and real Gross Domestic Product were used.

### **3.5 Data Analysis and Model**

The study was aimed to establish the relationship between share prices and macroeconomic variables. Multiple regression analysis was used based on arbitrage pricing theory. The regression equation to be tested will be as follows;

$$St = \beta_0 + \beta_1 INF + \beta_2 INT + \beta_3 GDP + \beta_4 EXR + \varepsilon_i, \text{Where;}$$

St = Share price as measured by the NSE 20 share index

INF = Inflation rate

INT = Interest rate

GDP = Gross Domestic Product

EXR = Exchange rate

$\beta_0$  = The constant term

$\beta_1$  = Coefficient of Inflation rate

$\beta_2$  = Coefficient of Interest rate

$\beta_3$  = Coefficient of Gross Domestic Product

$\beta_4$  = Coefficient of Exchange rate

$\varepsilon_i$  = The error term

The package used was Statistical Package for the Social Scientist (SPSS) and data analysis was done using summary statistics, correlation analysis and regression

analysis. These techniques were used to explain the relationship between the dependent variable (share price) and independent variables (inflation rate, interest rate, GDP, exchange rate). Tests of significance were done to establish the strength of the relationship that is the degree of association between the macroeconomic variables and the share prices.

## CHAPTER FOUR

### DATA PRESENTATION AND ANALYSIS

#### 4.0 Introduction

In this chapter, the study provided two types of data analysis; namely descriptive analysis and inferential analysis. The descriptive analysis helps the study to describe the relevant aspects of the phenomena under consideration and provide detailed information about each relevant variable. For the inferential analysis, the study used the Pearson correlation and the panel data regression analysis statistics. While the Pearson correlation measures the degree of association between variables under consideration, the panel data regression estimates the relationship between macro economic variables and share price index. Furthermore, in examining if macro economic variables are significantly different from that of share price index, the Chi-Square Test statistics was used.

#### 4.1 Descriptive statistics

The study first found it necessary to determine the trend of share prices for the year 2002-2012. This was to determine the overall share price performance as a result of the economic situation in the country over a range of time period. The findings were as illustrated in Figure 4.1.

**Figure 4.1: Share Prices of NSE Index (SP)**



*Source: Computed by the researcher from annual reports companies (2012)*

From the graph, it is construable that in first seven years the share index showed upward trend. But in 2009, due to uncertainties it showed a downward trend but after that period, the trend goes upward as shown in the graph. The positive upward trend may have been as a result of stability in macroeconomic variables under consideration i.e. interest rate, gross domestic product, exchange rate and inflation rate.

The study further determined the overall performance of the macro economic variables under the study from 2002-2012 i.e. interest rate, gross domestic product, exchange rate and inflation rate. Their mean, median, maximum, minimum, skewness and kurtosis were taken in to account. Logarithm of real values was used to reduce the statistical figures in to meaningful values for easy interpretation. Interest and Inflation rates had small values hence no need to take their logarithm The use of the natural log also reduces the heteroskedasticity. Use of natural log also provided a better fit for outliers within the distribution. The findings were as indicated in Table 4.1.

**Table 4.1 The overall performance of macroeconomic variables from 2002-2012**

|              | LSt   | LGDP  | INT    | INF   | LEXR   |
|--------------|-------|-------|--------|-------|--------|
| Mean         | 2.649 | 3.813 | 6.115  | 2.523 | 5.876  |
| Median       | 2.242 | 3.701 | 6.147  | 2.236 | 5.930  |
| Maximum      | 4.932 | 4.906 | 8.910  | 3.756 | 8.438  |
| Minimum      | 1.312 | 2.961 | 3.383  | 1.561 | 3.233  |
| Std. Dev     | 1.157 | 0.554 | 1.649  | 0.595 | 1.545  |
| Skewness     | 0.639 | 0.257 | -0.021 | 0.770 | -0.078 |
| Kurtosis     | 1.877 | 1.819 | 1.747  | 2.202 | 1.734  |
| Observations | 20    | 20    | 20     | 20    | 20     |

Note: LSt = Log of share price index, LGDP = Log of gross domestic product, INT = interest rate, INF = inflation rate, LEXR = Log of exchange rate.

Table 4.1 shows that the average value of INT is 6.115 and its Standard Deviation is 1.649 which is relatively very high as compared to other variables. It shows that there was significant variability or high volatility (Risk) in the share prices during 2002-2012.

High volatility indicated that there was a higher risk in share prices. While the standard deviation of INF is relatively very low as compared to other variables and its value is 0.595, and its average value is 2.523. INT has highest range as compare to other variables which is from 8.910 to 3.383. From skewness, the study observed that SPI, GDP and INF are positively skewed while INT and EXR are negatively skewed which clarified that the variables are asymmetrical. Skewness value of GDP is very near to zero so it is relatively symmetrical. Kurtosis values indicated that all variables have platy-kurtic distribution and it is concluded that variables are not normally distributed.

## 4.2 Correlation Coefficients of the Macroeconomic Variables and Share Price Index

The study further established the relationship between macro economic variables and share price index. For this analysis Pearson correlation was used to determine the degree of association within the independent variables and also between independent variables and the dependent variable. Table 4.2 reports very high positive correlation among different pairs of macroeconomic variables.

**Table 4.2 Correlation coefficients of the macroeconomic variables and share price index**

|      | LSt   | LGDP   | INT    | INF    | LEXR   |
|------|-------|--------|--------|--------|--------|
| LSPI | 1.000 | 0.9534 | 0.9384 | 0.9723 | 0.9318 |
| LGDP |       | 1.000  | 0.9874 | 0.9470 | 0.9856 |
| LIR  |       |        | 1.000  | 0.9222 | 0.9994 |
| LIFR |       |        |        | 1.000  | 0.9145 |
| LER  |       |        |        |        | 1.000  |

*Source: Computed by the researcher from annual reports companies (2012)*

The regression equation  $St = \beta_0 + \beta_1INF + \beta_2INT + \beta_3GDP + \beta_4EXR + \varepsilon_i$

becomes  $St = 1+0.9723INF+ 0.9384INT+0.9534GDP+0.9318EXR$

The correlation matrix indicates that gross domestic product is highly and positively correlated with share price index as indicated by a Pearson coefficient of 0.9534. Interest rate is also highly and positively correlated with share price index as indicated by a Pearson coefficient of 0.938. Inflation rate is also highly and positively correlated with share price index as indicated by a Pearson coefficient of 0.972. Finally exchange rate is also highly and positively correlated with share price index as indicated by a Pearson coefficient of 0.931. This implies that the macro economic variables GDP, IR, IFR and ER are very crucial in determining share price index in an economy.

**Table 4.3: Chi-Square Test: two-sample assuming equal variances Companies with efficient share prices and companies with non-efficient share prices**

|                              | (Companies with efficient share price index) | (Companies with non-efficient share price index) |
|------------------------------|--|--|
| Mean                         | 0.062177643                                  | 0.023739   |
| Variance                     | 0.00233563                                   | 1.38085E-05                                      |
| Observations                 | 13   | 7  |
| Hypothesized Mean Difference | 0  |  |
| Df                           | 18   |  |
| t Stat                       | 2.958540189                                  |  |
| P(T<=t) one-tail             | 0.00554419                                   |  |
| t Critical one-tail          | 1.770933383                                  |  |
| P(T<=t) two-tail             | 0.01108838                                   |  |
| t Critical two-tail          | 2.160368652                                  |  |
| Mean                         | 0.062177643                                  | 0.023739   |

*Source: Computed by the researcher from annual reports companies (2012)*

From the Chi-square results, companies with efficient share prices recorded a mean of 0.0622 while the non-efficient share prices companies recorded a mean of 0.0237. However, the variance for the efficient share prices companies and the no-efficient share

prices companies are 0.0023 and 1.3808 respectively. Furthermore, at two- tailed, the t-calculated of 2.9585 is seen to be greater than the t-tabulated of 2.1603.

Further the study carried out the hypothesis testing between macroeconomic variables and share price index. The study findings are as shown below.

**Table 4.4 Macroeconomic Variables Vs Share price index**

|  | Share price index |
|--|-------------------|
| Macro economic variables Pearson Correlation | 0.880             |
| Sig. (2-tailed)                              | 0.000             |
| N  | 20                |

*Source: Computed by the researcher from annual reports companies (2012)*

A Pearson coefficient of 0.880 and p-value of 0.000 shows a strong, significant, positive relationship between macro economic variables and share prices of companies listed on NSE in Kenya. Therefore basing on these findings the study rejects the null hypothesis that there is no relationship between macro economic variables and share prices of companies listed on NSE in Kenya and accepts the alternative hypothesis that there exists a relationship between macro economic variables and share prices of companies listed on NSE in Kenya.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSION AND COMMENDATION**

#### **5.1 Introduction**

This chapter summarizes the study and makes conclusion based on the results. The implications from the findings and areas for further research are also presented. This section presents the findings from the study in comparison to what other scholars have said as noted under literature review.

#### **5.2 Summary of Findings**

The study first found it necessary to determine the trend of share prices for the year 2002-2012. This was to determine the overall share price performance as a result of the economic situation in the country over a range of time period. From the study findings, it is construable that in first seven years from 2002 to 2008 the share index showed upward trend. But in 2009, due to uncertainties it showed a downward trend but after that period, the trend goes upward again. The positive upward trend may have been as a result of stability in macroeconomic variables under consideration i.e. interest rate, gross domestic product, exchange rate and inflation rate.

The study further determined the overall performance of the macro economic variables under the study from 2002-2012 i.e. interest rate, gross domestic product, exchange rate and inflation rate. Their mean, median, maximum, minimum, skewness and kurtosis were taken into account. Logarithm of real values was used to reduce the statistical figures in to meaningful for easy interpretation. The study found that the average value of INT was relatively very high as compared to other variables. It shows that there was significant variability or high volatility (Risk) in the share prices during 2002-2012. High volatility indicated that there was a higher risk in share prices. While the standard deviation of IFR is relatively very low as compare to other variables. IR has highest range as compare to other variables. From skewness, the study observed that SPI, GDP and INF are positively skewed while INT and EXR are negatively skewed which clarified that the variables are asymmetrical. Skewness value of GDP is very near to zero so it is relatively symmetrical.

Kurtosis values indicated that all variables have platy-kurtic distribution and it is concluded that variables are not normally distributed.

The study further established the relationship between macro economic variables and share price index. For this analysis Pearson correlation was used to determine the degree of association within the independent variables and also between independent variables and the dependent variable. The correlation matrix indicates that gross domestic product is highly and positively correlated with share price index. Interest rate is also highly and positively correlated with share price index. Inflation rate is also highly and positively correlated with share price index. Finally exchange rate is also highly and positively correlated with share price index. This implies that the macro economic variables GDP, INT, INF and EXR are very crucial in determining share price index in an economy. From the Chi-square results, companies with efficient share prices recorded a higher mean than the non-efficient share prices companies. However, there was higher variance for the no-efficient share prices companies than efficient share prices companies.

Further the study carried out the hypothesis testing between macroeconomic variables and share price index. A higher Pearson coefficient showed a strong, significant, positive relationship between macro economic variables and share prices of companies listed on NSE in Kenya. Therefore basing on the findings the study rejected the null hypothesis that there is no relationship between macro economic variables and share prices of companies listed on NSE in Kenya and accepted the alternative hypothesis that there exists a relationship between macro economic variables and share prices of companies listed on NSE in Kenya.

### **5.3 Conclusion**

In this study, the empirical impact of selected macroeconomic variables on share prices in Nairobi Securities Exchange was investigated. For this purpose, the long-run, short-run and causal relationships among the variables were found from January 2002 to December 2012. All data set used in this study was non-stationary at level but stationary at first difference. Long-run relationships were found between macroeconomic variables and NSE20 share Index. In the long-run all the variables under consideration i.e. gross

domestic product, interest rate, exchange rate and inflation rate were found to have positive relationship with share prices of companies listed on NSE. The market responds to several information as seen during the analysis. The incorporation of weak, semi strong and strong form of information available in the market shows that information disclosure has an effect of how investors invest which will in turn affect the share prices of different companies. The has an effect on the general economy because economic growth is affected by how the stock market performs together with the influence it has on foreign investors in local investments.

#### **5.4 Policy Recommendations**

From the above findings, it can be scrutinize that the government should adopt suitable policies to monitor the economic activities and capital market. It is a matter of facts that these variables have been discussed in isolation. The real market works on the basis of all these variables. Combined together, there may be a situation, where one variable is neutralizing the impact of any other. This leads us to conclude that share market's behavior especially in shorter span of time may not follow the academic path.

As a result, the study recommended that monetary managers should adopt suitable monetary measures to control the inflation, so that the volatility of the share market can be reduced. The increase in Gross domestic product can play significant positive role in development of the capital market. Thus, it is recommended that authorities should formulate such a policy which promotes GDP and then share prices will increase automatically. NSE and capital market authority should keep a closer eye on the functioning of share markets and bring more reform to boost up the investor's confidence and availability of new products in the share market.

#### **5.5 Limitations of the Study**

Since the main purpose of this study is to identify the effect of macroeconomic variables on share price index of listed firms, NSE considered some information sensitive and

confidential and thus the researcher had to convince them that the purpose of information is for academic research only and may not be used for any other intentions

The findings of this study may not also be generalized to all listed firms but can be used as a reference to listed firms in developing countries since they face almost the same challenges due to the same prevailing economic situations as opposed to listed firms in developed countries.

The small size of the sample in this study was the most obvious limitation. The research was limited to a few listed companies. The results thus cannot be generalized to all listed companies in NSE. This is because different companies may have different strategies for managing macroeconomic variables.

Macroeconomic variables keep on changing from period to period depending on prevailing economic situations and demand on the capital market. The findings therefore may not reflect the true effect of macroeconomic variables across the companies listed for a period of 10 years since some companies are delisted and listed again depending on their performance on NSE.

## **5.6 Suggestions for Further Study**

There is need for further studies to carry out similar study for a longer time period. A similar study should also be carried out on relationship between firms' performance, macroeconomic and share price index performance in Kenya incorporating more macroeconomic variables as opposed to the current study which took into consideration only four macroeconomic variables.

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## **APPENDIX A: COMPANIES LISTED IN THE NSE**

### **AGRICULTURAL**

Eaagads Ltd

Kapchorua Tea Co. Ltd

Kakuzi

Limuru Tea Co. Ltd

Rea Vipingo Plantations Ltd

Sasini Ltd

Williamson Tea Kenya Ltd

### **COMMERCIAL AND SERVICES**

Express Ltd

Kenya Airways Ltd

Nation Media Group

Standard Group Ltd

TPS Eastern Africa (Serena) Ltd

Scangroup Ltd

Uchumi Supermarket Ltd

Hutchings Biemer Ltd

### **TELECOMMUNICATION AND TECHNOLOGY**

AccessKenya Group Ltd

Safaricom Ltd

### **AUTOMOBILES AND ACCESSORIES**

Car and General (K) Ltd

CMC Holdings Ltd

Sameer Africa Ltd  
Marshalls (E.A.) Ltd

## **BANKING**

Barclays Bank Ltd  
CFC Stanbic Holdings Ltd  
Diamond Trust Bank Kenya Ltd  
Housing Finance Co Ltd  
Kenya Commercial Bank Ltd  
National Bank of Kenya Ltd  
NIC Bank Ltd  
Standard Chartered Bank Ltd  
Equity Bank Ltd  
Co-operative Bank of Kenya Ltd.

## **INSURANCE**

Jubilee Holdings Ltd  
Pan Africa Insurance Holdings Ltd  
Kenya Re-Insurance Corporation Ltd

## **INVESTMENT**

City Trust Ltd  
Olympia Capital Holdings Ltd  
Centum Investment Co Ltd

## **MANUFACTURING AND ALLIED**

B.O.C Kenya Ltd  
British American Tobacco Kenya Ltd

Carbacid Investments Ltd  
East African Breweries Ltd  
Mumias Sugar Co. Ltd  
Unga Group Ltd  
Eveready East Africa Ltd  
Kenya Orchards Ltd  
A.Baumann CO Ltd

#### **CONSTRUCTION AND ALLIED**

Athi River Mining  
Bamburi Cement Ltd  
Crown Berger Ltd  
E.A.Cables Ltd  
E.A.Portland Cement Ltd

#### **ENERGY AND PETROLEUM**

KenolKobil Ltd  
Total Kenya Ltd  
KenGen Ltd  
Kenya Power & Lighting Co Ltd

**APPENDIX B: NSE MACROECONOMIC DATA INDEX FOR  
SELECTED VARIABLES FROM 2002-2012**

| Macro economic variables     |  | 2002   | 2003  | 2004  | 2005   | 2006   | 2007   | 2008  | 2009   | 2010  | 2011   | 2012   | t      | Sig. (2-tailed) |
|------------------------------|--|--------|-------|-------|--------|--------|--------|-------|--------|-------|--------|--------|--------|-----------------|
| <b>Kenya Airways Ltd</b>     |  |        |       |       |        |        |        |       |        |       |        |        |        |                 |
| GDP                          |  | -0.007 | 0.004 | 0.003 | 0.006  | -0.011 | -0.049 | 0     | 0.017  | 0     | -0.005 |        | -0.841 | .422            |
| INT                          |  | -0.001 | 0.034 | 0.002 | 0.009  | -0.008 | -0.086 | 0.026 | 0.014  | 0.012 | -0.01  | -0.015 | -0.987 | .350            |
| INF                          |  | -0.066 | 0     | 0.001 | 0.008  | -0.011 | 0.041  | 0.018 | 0.009  | 0.012 | 0      | -0.014 | .018   | .986            |
| EXR                          |  | -0.003 | 0.005 | 0.011 | -0.008 | -0.107 | -0.01  | 0.01  | 0.041  | 0.005 | -0.007 | -0.021 | -0.581 | .576            |
| <b>Nation Media Group</b>    |  |        |       |       |        |        |        |       |        |       |        |        |        |                 |
| GDP                          |  | 0.004  | 0.001 | 0.004 | -0.114 | -0.03  | 0.009  | 0.003 | 0.027  | 0.007 | -0.01  | -0.032 | -0.838 | .424            |
| INT                          |  | 0.001  | 0.006 | 0.001 | 0.149  | -0.081 | -0.004 | 0.003 | -0.009 | 0.009 | 0.006  | -0.026 | .344   | .739            |
| INF                          |  | 0.003  | 0.005 | 0.005 | 0.016  | -0.099 | 0.01   | 0.019 | 0.02   | 0.007 | -0.005 | -0.031 | -0.479 | .644            |
| EXR                          |  | 0.005  | 0.001 | 0.001 | 0.003  | 0.006  | 0.005  | 0.014 | -0.015 | 0.002 | -0.001 | -0.032 | -0.171 | .868            |
| <b>Standard Group Ltd</b>    |  |        |       |       |        |        |        |       |        |       |        |        |        |                 |
| GDP                          |  | 0.002  | 0.027 | 0.004 | 0      | 0.063  | -0.03  | 0.004 | 0.006  | 0.02  | 0.009  | -0.023 | 1.168  | .273            |
| INT                          |  | 0.002  | 0.001 | 0.002 | -0.043 | 0.042  | -0.068 | 0.015 | 0.009  | 0.005 | -0.004 | -0.027 | -0.422 | .683            |
| INF                          |  | -0.001 | 0.013 | 0.001 | -0.007 | 0.048  | 0.015  | 0.002 | -0.003 | 0.016 | 0.006  | -0.021 | 1.033  | .328            |
| EXR                          |  | -0.002 | 0.016 | 0.026 | -0.008 | 0      | 0.086  | 0.016 | 0.009  | 0.035 | 0.014  | -0.007 | 1.536  | .159            |
| <b>AccessKenya Group Ltd</b> |  |        |       |       |        |        |        |       |        |       |        |        |        |                 |
| GDP                          |  | 0.003  | 0.002 | 0.002 | -0.007 | 0.008  | 0.042  | 0.024 | -0.004 | 0.072 | 0.009  | 0.002  | .982   | .352            |
| INT                          |  | 0.004  | 0.014 | -0.01 | 0.054  | -0.02  | -0.05  | 0.008 | 0.004  | 0.009 | 0.001  | 0.003  | .135   | .896            |

|                                |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
|--------------------------------|--|--------|-------|-------|--------|--------|--------|-------|--------|-------|--------|--------|--------|------|
| INF                            |  | 0.001  | 0.008 | -     | 0.018  | 0.017  | 0.026  | 0.003 | -0.017 | 0.021 | 0      | 0.003  | -0.045 | .965 |
| EXR                            |  | -0.001 | 0.001 | -     | -0.04  | -0.022 | -0.026 | 0.003 | -0.012 | -0.02 | -0.012 | -0.009 | 2.065  | .069 |
| <b>Safaricom Ltd</b>           |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                            |  | 0.001  | 0.003 | -     | -0.013 | 0.006  | 0.002  | 0.011 | -0.003 | 0.015 | -0.004 | -0.013 | -0.790 | .450 |
| INT                            |  | 0.002  | 0.001 | -     | 0.028  | -0.007 | -0.005 | 0.032 | -0.014 | 0.031 | 0.004  | -0.009 | .720   | .490 |
| INF                            |  | 0.003  | 0.003 | -     | -0.025 | 0      | 0.007  | 0.005 | 0.015  | 0.025 | -0.004 | -0.012 | -0.459 | .657 |
| EXR                            |  | -0.002 | 0.011 | -     | 0.029  | -0.009 | 0.009  | 0.012 | -0.007 | 0.019 | 0      | -0.012 | -0.048 | .963 |
| <b>Car and General (K) Ltd</b> |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                            |  | 0.001  | 0.001 | -     | -0.001 | -0.007 | 0.006  | 0.003 | -0.016 | -0.01 | -0.004 | -0.016 | 1.713  | .121 |
| INT                            |  | -0.005 | 0.001 | 0.004 | 0.014  | 0.002  | 0.013  | 0.012 | -0.011 | 0.024 | -0.002 | -0.019 | -0.628 | .546 |
| INF                            |  | 0.001  | 0.016 | 0.016 | -0.002 | -0.005 | 0.06   | 0.024 | 0.022  | 0.015 | 0.01   | -0.009 | 1.353  | .209 |
| EXR                            |  | 0.001  | 0.003 | 0.006 | 0.027  | 0      | 0.039  | 0.011 | 0.024  | 0.024 | 0.005  | -0.004 | .844   | .420 |
| <b>CMC Holdings Ltd</b>        |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                            |  | -0.004 | 0     | 0.004 | 0.025  | -0.005 | -0.004 | 0.057 | 0.02   | 0.008 | 0.008  | 0.005  | 1.318  | .220 |
| INT                            |  | 0.005  | 0.009 | 0.012 | 0.003  | -0.002 | -0.078 | 0.041 | 0.049  | 0.001 | -0.004 | 0.001  | -0.331 | .748 |
| INF                            |  | -0.001 | 0.005 | 0.014 | -0.011 | 0.001  | 0.058  | 0.003 | -0.04  | 0.007 | 0.004  | 0.005  | .497   | .631 |
| EXR                            |  | 0.005  | 0.023 | 0.013 | -0.023 | 0.017  | 0.024  | 0.004 | -0.006 | 0.002 | 0.001  | 0.006  | .270   | .793 |
| <b>Marshalls (E.A.) Ltd</b>    |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                            |  | 0.002  | 0.003 | -     | -0.01  | 0.02   | 0.097  | 0.023 | 0.003  | 0     | 0.006  | 0.013  | .591   | .569 |
| INT                            |  | -0.01  | 0     | -     | -0.014 | -0.022 | -0.024 | 0.103 | 0.002  | 0.003 | 0.006  | 0.019  | .518   | .617 |

|                                    |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
|------------------------------------|--|--------|-------|-------|--------|--------|--------|-------|--------|-------|--------|--------|--------|------|
| INF                                |  | -0.006 | 0     | 0.005 | 0.016  | 0.099  | 0.015  | 0.081 | 0.004  | 0.024 | 0.02   | 0.039  | 1.618  | .140 |
| EXR                                |  | 0.001  | 0.001 | 0.005 | -0.002 | 0.094  | -0.001 | 0.015 | -0.038 | 0.032 | 0.002  | 0.041  | .180   | .861 |
| <b>Kenya Commercial Bank Ltd</b>   |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                |  | -0.005 | 0.001 | 0.001 | -0.029 | 0.079  | 0.015  | 0.072 | -0.016 | 0.01  | 0.004  | 0.045  | .298   | .772 |
| INT                                |  | -0.001 | 0.001 | 0.002 | -0.006 | 0.048  | -0.033 | 0.033 | 0.002  | 0.015 | -0.005 | 0.04   | -0.671 | .519 |
| INF                                |  | 0      | 0.003 | 0.008 | -0.022 | -0.012 | -0.008 | 0.047 | 0.086  | 0.002 | -0.012 | 0.028  | -0.823 | .432 |
| EXR                                |  | 0.003  | 0.003 | 0.011 | -0.036 | -0.031 | 0.012  | 0.195 | -0.038 | 0.003 | -0.032 | -0.004 | 1.701  | .123 |
| <b>Housing Finance Co Ltd</b>      |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                |  | 0.003  | 0.001 | 0.003 | -0.028 | -0.048 | -0.007 | -0.09 | -0.004 | 0.004 | -0.014 | -0.018 | 1.209  | .257 |
| INT                                |  | 0.003  | 0.004 | 0.002 | 0.003  | -0.008 | 0.015  | 0.051 | -0.004 | 0.004 | -0.002 | -0.02  | -0.356 | .730 |
| INF                                |  | -0.003 | 0.004 | 0.006 | 0      | -0.085 | 0.002  | 0.026 | -0.001 | 0.004 | -0.008 | -0.027 | -0.844 | .420 |
| EXR                                |  | -0.004 | -0.01 | 0.005 | 0.021  | 0.003  | -0.054 | 0.012 | 0.019  | 0.008 | -0.003 | -0.031 | -0.476 | .645 |
| <b>National Bank of Kenya Ltd</b>  |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                |  | -0.006 | 0.016 | 0.002 | 0.037  | -0.084 | 0.02   | 0.006 | -0.01  | 0.003 | 0      | -0.03  | .034   | .974 |
| INT                                |  | 0.001  | -0.01 | 0.001 | 0.028  | -0.065 | -0.048 | 0.006 | 0.018  | 0.015 | -0.012 | -0.043 | 1.308  | .223 |
| INF                                |  | -0.002 | 0.017 | 0.007 | 0.035  | 0.02   | 0.041  | 0.022 | 0.008  | 0.001 | 0.015  | -0.028 | 1.380  | .201 |
| EXR                                |  | -0.002 | 0.003 | -0.01 | 0.006  | -0.025 | -0.028 | 0.002 | -0.027 | 0.007 | -0.012 | -0.04  | 2.324  | .045 |
| <b>Standard Chartered Bank Ltd</b> |  |        |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                |  | 0.003  | 0.002 | 0.005 | -0.07  | 0      | -0.014 | 0.019 | -0.004 | 0.002 | -0.008 | -0.047 | -0.922 | .381 |
| INT                                |  | 0.001  | 0.007 | 0.002 | -0.003 | 0      | -0.001 | 0.013 | 0.02   | 0.017 | 0.003  | -0.044 | .949   | .367 |
| INF                                |  | 0.005  | 0.029 | -     | 0.011  | 0.003  | -0.003 | -0.01 | -0.051 | -     | -0.006 | -0.05  | -0.820 | .434 |

|  |  |       |       |       |        |        |        |       |        |       |        |        |        |      |
|--|--|-------|-------|-------|--------|--------|--------|-------|--------|-------|--------|--------|--------|------|
|  |  |       |       | 0.002 |        |        |        |       |        | 0.012 |        |        |        |      |
| EXR                                    |  | 0.004 | 0.005 | 0.005 | -0.01  | -0.019 | -0.008 | 0.011 | 0.008  | 0.002 | -0.001 | -0.051 | -0.350 | .734 |
| <b>Co-operative Bank of Kenya Ltd.</b> |  |       |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                    |  | 0.01  | 0.005 | -     | 0.014  | 0.003  | 0.043  | 0.009 | -0.044 | 0.004 | 0      | -0.05  | .051   | .960 |
| INT                                    |  | 0     | 0.002 | -     | 0.019  | -0.1   | -0.06  | 0.052 | 0.006  | 0.001 | -0.01  | -0.061 | -0.757 | .468 |
| INF                                    |  | 0.003 | 0.002 | -     | 0.013  | -0.042 | -0.004 | 0.054 | 0.007  | 0.014 | 0.001  | -0.059 | .143   | .890 |
| EXR                                    |  | 0.005 | 0     | 0.006 | 0.023  | 0.007  | -0.017 | 0.025 | 0.028  | 0.015 | 0.009  | -0.051 | 1.902  | .090 |
| <b>Mumias Sugar Co. Ltd</b>            |  |       |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                    |  | 0.007 | -     | -     | 0.042  | -0.015 | 0.008  | 0.063 | 0.004  | 0.018 | -0.004 | -0.055 | -0.474 | .647 |
| INT                                    |  | 0     | 0.001 | -     | 0.073  | -0.013 | 0.009  | 0.027 | -0.005 | 0.001 | 0.007  | -0.048 | .803   | .443 |
| INF                                    |  | 0.006 | 0.022 | -     | -0.016 | -0.057 | 0.033  | 0.001 | -0.007 | 0.011 | -0.01  | -0.058 | 1.295  | .227 |
| EXR                                    |  | 0.001 | 0.072 | -     | 0.01   | -0.028 | -0.01  | 0.027 | 0.008  | 0.011 | -0.019 | -0.077 | 1.724  | .119 |
| <b>East African Breweries Ltd</b>      |  |       |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                    |  | 0.006 | -     | -     | 0      | -0.006 | 0.001  | 0.025 | -0.007 | 0     | -0.005 | -0.083 | 2.000  | .077 |
| INT                                    |  | 0.002 | 0.002 | 0.008 | 0      | 0      | 0.051  | 0.009 | -0.002 | 0.006 | 0.004  | -0.079 | .509   | .623 |
| INF                                    |  | 0.008 | 0.005 | 0.007 | -0.001 | -0.004 | -0.011 | 0.014 | 0.02   | 0.015 | 0.011  | -0.068 | 1.876  | .093 |
| EXR                                    |  | 0.001 | 0.026 | -     | -0.012 | 0.065  | -0.003 | 0.01  | -0.025 | 0.02  | 0.003  | -0.065 | .290   | .779 |
| <b>Unga Group Ltd</b>                  |  |       |       |       |        |        |        |       |        |       |        |        |        |      |
| GDP                                    |  | 0.003 | -     | -     | -0.07  | 0      | -0.014 | 0.019 | -0.004 | 0.002 | -0.008 | -0.047 | -0.922 | .381 |
| INT                                    |  | 0.001 | 0.007 | 0.002 | -0.003 | 0      | -0.001 | 0.013 | 0.02   | 0.017 | 0.003  | -0.044 | .949   | .367 |
| INF                                    |  | 0.005 | 0.029 | -     | 0.011  | 0.003  | -0.003 | -0.01 | -0.051 | 0.012 | -0.006 | -0.05  | -0.820 | .434 |
| EXR                                    |  | 0.004 | 0.005 | -     | -0.01  | -0.019 | -0.008 | 0.011 | 0.008  | 0.002 | -0.001 | -0.051 | -0.350 | .734 |

|  |  |       |       |       |        |        |        |       |        |       |        |        |       |      |
|--|--|-------|-------|-------|--------|--------|--------|-------|--------|-------|--------|--------|-------|------|
|  |  |       |       | 0.005 |        |        |        |       |        |       |        |        |       |      |
| <b>Bamburi Cement Ltd</b>                |  |       |       |       |        |        |        |       |        |       |        |        |       |      |
| GDP                                      |  | 0.01  | 0.005 | -     | 0.014  | 0.003  | 0.043  | 0.009 | -0.044 | 0.004 | 0      | -0.05  | .051  | .960 |
| INT                                      |  | 0     | 0.002 | -     | 0.019  | -0.1   | -0.06  | 0.052 | 0.006  | 0.001 | -0.01  | -0.061 | -.757 | .468 |
| INF                                      |  | 0.003 | 0.002 | -     | 0.013  | -0.042 | -0.004 | 0.054 | 0.007  | 0.014 | 0.001  | -0.059 | .143  | .890 |
| EXR                                      |  | 0.005 | 0     | 0.006 | 0.023  | 0.007  | -0.017 | 0.025 | 0.028  | 0.015 | 0.009  | -0.051 | 1.902 | .090 |
| <b>E.A.Portland Cement Ltd</b>           |  |       |       |       |        |        |        |       |        |       |        |        |       |      |
| GDP                                      |  | 0.007 | -     | -     | 0.042  | -0.015 | 0.008  | 0.063 | 0.004  | 0.018 | -0.004 | -0.055 | -.474 | .647 |
| INT                                      |  | 0     | 0.001 | -     | 0.073  | -0.013 | 0.009  | 0.027 | -0.005 | 0.001 | 0.007  | -0.048 | .803  | .443 |
| INF                                      |  | 0.006 | 0.022 | -     | -0.016 | -0.057 | 0.033  | 0.001 | -0.007 | 0.011 | -0.01  | -0.058 | 1.295 | .227 |
| EXR                                      |  | 0.001 | 0.072 | -     | 0.01   | -0.028 | -0.01  | 0.027 | 0.008  | 0.011 | -0.019 | -0.077 | 1.724 | .119 |
| <b>Kenya Power &amp; Lighting Co Ltd</b> |  |       |       |       |        |        |        |       |        |       |        |        |       |      |
| GDP                                      |  | 0.006 | 0.008 | -     | 0      | -0.006 | 0.001  | 0.025 | -0.007 | 0     | -0.005 | -0.083 | 2.000 | .077 |
| INT                                      |  | 0.002 | 0.002 | 0.008 | 0      | 0      | 0.051  | 0.009 | -0.002 | 0.006 | 0.004  | -0.079 | .509  | .623 |
| INF                                      |  | 0.008 | 0.005 | 0.007 | -0.001 | -0.004 | -0.011 | 0.014 | 0.02   | 0.015 | 0.011  | -0.068 | 1.876 | .093 |
| EXR                                      |  | 0.001 | 0.026 | -     | -0.012 | 0.065  | -0.003 | 0.01  | -0.025 | 0.02  | 0.003  | -0.065 | .290  | .779 |
| <b>KenGen Ltd</b>                        |  |       |       |       |        |        |        |       |        |       |        |        |       |      |
| GDP                                      |  | 0.01  | 0.005 | -     | 0.014  | 0.003  | 0.043  | 0.009 | -0.044 | 0.004 | 0      | -0.05  | .051  | .960 |
| INT                                      |  | 0     | 0.002 | -     | 0.019  | -0.1   | -0.06  | 0.052 | 0.006  | 0.001 | -0.01  | -0.061 | -.757 | .468 |
| INF                                      |  | 0.003 | 0.002 | -     | 0.013  | -0.042 | -0.004 | 0.054 | 0.007  | 0.014 | 0.001  | -0.059 | .143  | .890 |
| EXR                                      |  | 0.005 | 0     | 0.006 | 0.023  | 0.007  | -0.017 | 0.025 | 0.028  | 0.015 | 0.009  | 0.005  | 1.902 | .090 |