DYNAMIC RELATIONSHIP BETWEEN MACROECONOMIC FACTORS AND EQUITY MARKET PRICE AT NAIROBI SECURITIES EXCHANGE, KENYA

BY

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN ECONOMICS OF THE DEPARTMENT OF ECONOMICS, SCHOOL OF BUSINESS AND ECONOMICS, MOI UNIVERSITY

AUGUST, 2015

DECLARATION

Declaration by the Candidate

This thesis is my original work and has not been presented for a degree in any other university. No part of this thesis may be produced without prior written permission of the author and/or Moi University.

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DEDICATION

To my beloved mum and dad

ACKNOWLEDGEMENT

Special thanks goes to the Almighty God for the gift of life and strength which enabled me to come this far. I would like in a special way to acknowledge the crucial role played by my supervisors, Dr Saisi and Dr. Ng'eno for their invaluable support and guidance at Moi University. Further, my gratitude and appreciations goes to all those individuals and organizations such as CBK, KNBS, and NSE whose contributions led to successful completion of this thesis work. I am sincerely grateful for those who shared their honest views on a number of issues related to this thesis work. Their invaluable and constructive criticism added value to this document. Finally, I would like to appreciate the guidance given by the panelist especially in my presentations at all stages that has since improved my presentation skills and the quality of my document.

Thank you all.

ABSTRACT

The Nairobi Securities Exchange is one of the emerging markets in the East African region and has seen consistent growth over time. The Exchange has stood out as an average Exchange with great potential for growth, however, in the period between the years 2000 and 2013, the share prices of firms listed at the Nairobi Securities Exchange experienced turbulence in the equity prices that led to investors losing billions of their investments in the portfolio. This study sought to explore the dynamic relationship between selected macroeconomic variables and equity prices in Kenya. Specifically, the study sought to establish long run and short run dynamic relationships between selected macroeconomic variables and equity price. The independent variables in the study were Treasury bill rate, consumer price index, gross domestic product, money supply and exchange rate, political environment, terms of trade and public debt and on the other hand, equity price was identified as the dependent variable. The data was collected from Nairobi Securities Exchange, Central Bank of Kenya, Kenya National Bureau of Statistics and Capital Markets Authority using data collection schedules. Particularly, data on NSE20 Share Index was obtained from the Nairobi Securities Exchange while data for the other variables were obtained from Central Bank of Kenya and the Kenya National Bureau of Statistics. Autoregressive Distributed Lag model was employed to analyze fourteen-year quarterly time series data for the period between 2000:1 and 2013:4 with the help of E-views software. Further, variance decomposition and impulse response function was run. First, diagnostic tests were conducted on the model to test the suitability of the model. The results of the test revealed that the model did not suffer from non-normality, heteroskedasticity, serial correlation and misspecification and hence the model was suitable for this analysis. The results of bound test revealed that there was a joint significant long relationship between selected macroeconomic variables (gross domestic product, public debt, consumer price index, money supply, exchange rate, political risk, terms of trade and Treasury bill rate) and equity prices. Further, short run dynamics was determined using error correction model. This indicated that the speed of adjustment from disequilibrium in equity prices in the previous period in the prevailing period was at 56.6%, which was quite high. The high speed of adjustment suggested a quick reaction of the market to information. In addition, variance decomposition and impulse response function showed that one standard deviation positive shock on gross domestic product, money supply, political risk and exchange rate negatively affected the equity price and standard deviation positive shock on public debt and lagged equity price positively affected equity price for firms listed at the Nairobi Securities Exchange. Based on the results of the study, it is recommended that the government of Kenya should put in place appropriate policy measures to ensure that the exchange rate is stabilized among measures that stimulate the economic growth. Further, the government should put in place measures aimed at reducing political risk in the Kenya.

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LIST OF ACRONYMS AND ABBREVIATIONS

NSE	Nairobi Securities Exchange
CBK	Central Bank of Kenya
CMA	Capital Market Authority
KNBS	Kenya National Bureau of Statistics
EMH	Efficient Market Hypothesis
ARDL	Autoregressive Distributed Lag
VECM	Vector Error Correction Model
OLS	Ordinary Least Square
DOLS	Dynamic Ordinary Least Square
ECM	Error Correction Model
PP	Philips Peron
PBR	Petroleo Brasileiro SA Petrobras
IRF	Impulse Response Function

OPERATIONAL DEFINITION OF TERMS

Financial Markets: This is generally any market where buyers and sellers transact in assets such as equities, bonds, currencies and derivatives and include money markets and capital markets

Listed Shares: These are shares that have been registered by a recognized and regulated stock exchange to be traded on its trading floor. Shares can be listed on more than one stock exchange.

Equity market Price: The last reported price at which a share was sold at the stock exchange.

Noise: refers to those pricing influences that are not associated with rational expectations about the underlying value of the asset.

The NSE 20 Share Index: It is a price weighted index that measures the average performance of 20 blue chip counters at the NSE. It is the oldest Kenyan stock market index established in 1966.

M0 and M1: this is narrow money and includes coins and notes that are in circulation and other money equivalents that can be converted easily to cash.

M2: includes M1 and, in addition, short-term time deposits in banks and in money market funds.

CHAPTER ONE

INTRODUCTION

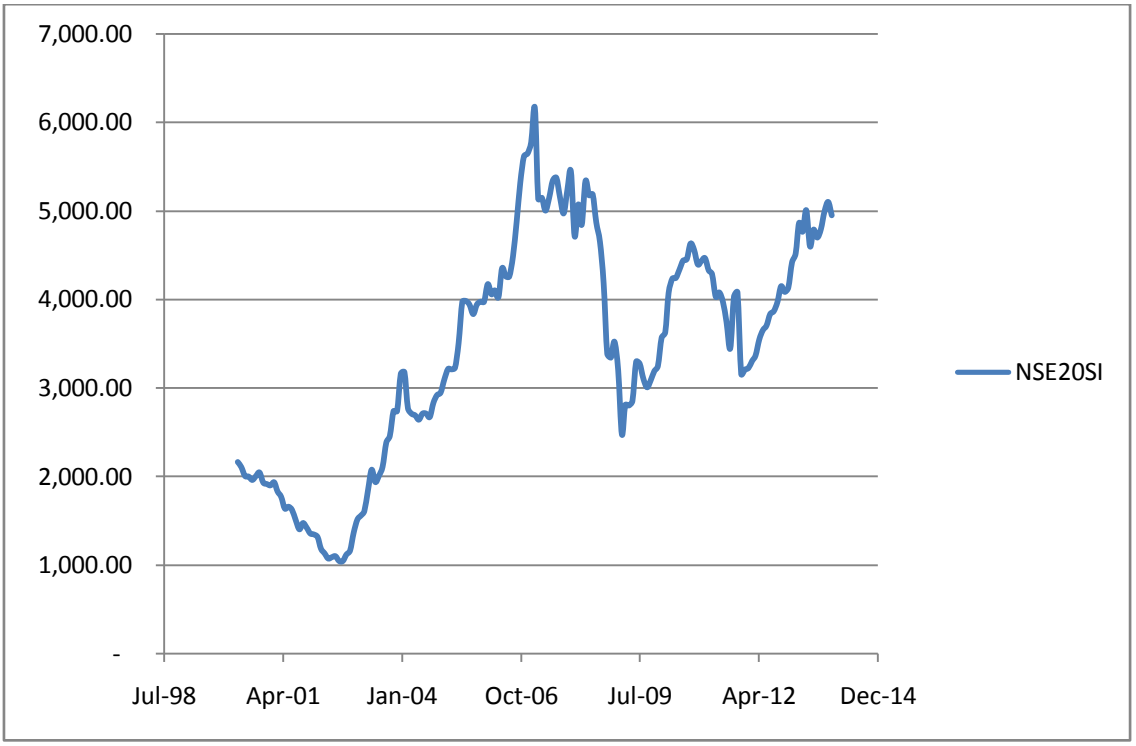
1.1 Background of the Study

The stock markets play a crucial role by providing vehicles for raising finances for companies. The liquidity that an exchange provides affords investors the ability to quickly and easily sell securities. This is an attractive feature of investing in stocks, compared to other less liquid investments such as real estate. In addition, the stock market performs a wide range of economic and political functions while offering trading, investment, speculation, hedging, and arbitrage opportunities. The stock market also serves as an instrument for price discovery and information dissemination. History has shown that the price of shares and other assets is an important part of the dynamics of economic activity, and can influence or be an indicator of social mood. An economy where the stock market is on the rise is considered to be an up-and-coming economy. In fact, the stock market is often considered the primary indicator of a country's economic strength and development. Rising share prices, for instance, tend to be associated with increased business investment and vice versa. Share prices also affect the wealth of households and their consumption (Aduda *et al.*, 2012).

The Nairobi Securities Exchange (NSE) is an emerging market that has been characterized by humble beginnings yet has grown considerably over time. It stands out as an average Securities Exchange with great potential for growth, one that is making considerable effort to not only be a significant economic driver in Kenya, but also in the East African region as whole. The market accounts for over 90% of market activity in the East African region and is a reference point in terms of setting standards for the other markets in the region (Kibuthu, 2005). However, in the recent past, the NSE has

witnessed slow growth in the number of listed firms. The performance of the Nairobi Securities Exchange to a large extend reflect on policy, institutional environment and political environment. Stock market in Kenya is influenced by a number of factors including general performance and the nature of the current economic environment in the country. The economic environment is reflected by the changes in the macroeconomic variables such as the level of gross domestic product, money supply, exchange rate, interest rates, inflation, public debt and political factors among other factors beyond the scope of this study (Kirui, Wawire, and Onono, 2014). 2011 saw the companies listed at the NSE categorised into 10 (ten) economic sectors: Agricultural, Automobile and Associates, Banking, Commercial and Service, Construction and Allied, Energy and Petroleum, Insurance, Investment, Manufacturing and Allied, Telecommunication and Technology.

As an emerging market, NSE has continually faced challenges which have inhibited its development and growth such as harsh economic and political conditions, illiquidity, lack of public awareness, decreased listings, underdeveloped market infrastructure, high and volatile interest rates among others (Ngugi *et al.*, 2005). Since the year 2000, investors at Nairobi Securities Exchange have been worried as the market remained turbulent with stock prices dipping to new levels (Bitok *et al*., 2011). Figure 1.1 shows the movement of share prices at the securities exchange between the years 2000 and 2013.



Source: NSE, 2014

Figure 1.1: NSE20SI monthly movement

1.2 Statement of the Problem

Nairobi Securities Exchange has faced severe fluctuations in equity prices for listed stock. Specifically, in the period between February 2007 and February 2009, the NSE20 share index slid by more than three thousand, six hundred and eighty seven percentage points. The share price dip at the bourse was also evidenced by drop in the NSE 20 Share Index to 1097.73 points in August 2002 from 1932.85 points in February 2001. Further, the index slid significantly from 6161 points high in February 2007 to 2474.75 points in February 2009 (NSE, 2012). This significantly affected the value of many firms listed at the NSE. In the period between 2000 and 2013, investors at the Exchange have been worried as the market remained turbulent with stock prices dipping to new levels (Bitok *et al.*, 2011)..

This period saw the Institutional investors lose close to eighty billion Kenyan shillings of the total portfolio invested in shares at the Nairobi Securities Exchange (NSE) due to the depreciation of share prices. The share price of listed firms is a matter of concern not only to the management of the firm but also to other stakeholders such as investors, employees, and customers. When the share price of a firm falls, the life of the company and its management may be threatened with adverse consequences, such as the discontent of individual and corporate investors, rise in cost of raising new capital, undercut the confidence of both employees and customers and handicap merger.

In the period between the year 2000 and 2013, and in particular, the year 2011, Kenyan economy experienced very unpredictable movement of macroeconomic variables such as very high interest rates and high rates of inflation that led to several domestic workers take industrial actions. Foreign currency rates were very volatile and led to importers losing a lot of funds in imports since the foreign currency rates were not favourable while farmers and exporters were beneficiaries of the same. This led Central Bank of Kenya to increase the base lending rates in a bid to stabilize the Kenyan currency that had performed poorly as compared to the major world currencies. All these however had an effect on the returns of various investments in the country since more funds were being channeled towards consumption rather than investments. This affects the equity prices of listed companies at the NSE through the forces of demand and supply.

Many researchers (Gan *et al.*, 2006; Robert, 2008) have investigated the relationship between stock index and macroeconomic variables. Despite the importance of these studies, the majority consider developed countries' financial markets, which are efficient enough and do not suffer from the inefficiency problems experienced by less

developed countries. Considering this matter, the subject of financial markets in developing countries still needs lengthy analysis and more research attention. It is against this background that this study intended to fill the gap in literature by investigating the dynamic relationship between the share price and selected macroeconomic variables at the Nairobi Securities Exchange.

1.3 Research Objectives

The general objective of this study was to investigate the dynamic relationship between selected macroeconomic variables and equity price at the Nairobi Securities Exchange.

The specific objectives of the study were:

1. To establish long run relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity market price at Nairobi Securities Exchange.
2. To investigate short run relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity prices at Nairobi Securities Exchange.

1.4 Hypotheses

To investigate the dynamic relationship between selected macroeconomic variables and equity price at Nairobi Securities Exchange, this study analysed the following hypotheses:

1. H_0: there is no significant long run relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity prices at Nairobi Securities Exchange.
2. H_0: there is no significant short run relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity prices at Nairobi Securities Exchange.

1.5 Significance of the Study

This study was undertaken to investigate the dynamic relationship between macroeconomic variables and equity prices at the NSE. The contributions of the study would be of interest to several stakeholders such as management of listed firms, potential investors, shareholders, researchers and regulatory institutions in Kenya.

The information from the study would form the basis of formulation of investment decisions by the senior management especially finance managers of listed companies whose main objective is to maximize the shareholder's wealth in a Kenyan context. The study would therefore help in making strategic investment decisions in line with prevailing macroeconomic environment which would eventually maximize shareholder's wealth.

Further, the study would provide an insight to shareholders on the theory and practice of selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and their effects on the share price. The changes in share prices affect the value of the listed firms. The shareholders would therefore be able to continually appraise management's decisions in the light of prevailing state of macroeconomic variables. In addition, researchers and scholars would access and use the findings of this study as a reference and source of secondary data for future studies.

The study would also help potential investors to make rationally informed investment decisions in the face of prevailing macroeconomic indicators. This study would be useful for the investors to identify basic economic variables that they should focus on while investing in stock market and this would help them make informed investment decisions. The investors would invest in the capital market when the macroeconomic environment is deemed favourable. Finally, the findings of the study would aid regulatory bodies such as Central Bank of Kenya, Capital Markets Authority in policy formulation.

1.6 Scope of the Study

The general objective of this study was to investigate the dynamic relationship between selected macroeconomic variables and equity price at the Nairobi Securities Exchange. Specifically, the study sought to establish long run and short run relationships between macroeconomic variables and equity price. Further, the study sought to investigate the causal relationship among the specified variables. The study targeted all the 63 firms listed at the Nairobi Securities Exchange by December 2013. However, the population

was represented by a sample of twenty (20) blue chip companies whose prices are factored in the computation of the NSE 20 Share Index. Quarterly time series secondary data collected from CMA, NSE, CBK and KNBS for eight macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) as independent variables and equity prices as dependent variable for the period between 2000:1 and 2013:4 were used. The study was conducted in Kenya for companies listed at the NSE, Kenya. The NSE is located in the Nairobi Central Business District, in Nation House.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter acknowledges the relevance of literature on the relationship between macroeconomic variables and the equity prices of firms listed at the NSE. The first part presents the review of theoretical literature followed by past studies on relationship between selected macroeconomic variables and stock price. The fourth part focuses on the critical review of major issues followed by the summary and gaps to be filled by the study. Lastly, the chapter presents the conceptual framework of the study.

2.2 Theoretical Literature

2.2.1 The Efficient Market Theory

The efficient market theory or hypothesis (EMH) came to the forefront of economic theory on the strength of empirical tests in large part undertaken by finance theorist Fama (1970). These statistical tests demonstrated that the market prices securities as if there was a rational process, whether or not the market's constituent actors qualify as rational (Langevoort, 1992). In fact, the EMH can be seen as the natural consequence of thinking about financial asset prices as equilibrium in a competitive market consisting of rational actors. Indeed, there is almost a tautological character to some forms of the hypothesis once rationality is assumed (Langevoort, 1992). The EMH, in its relevant aspect, states that competition between sophisticated investors enables the stock market consistently to price stocks in accordance with our best expectations of the long-term earnings of the underlying businesses and assets (Lowenstein, 1983). To be "efficient", the prices in a given market must always fully reflect available information (Fama, 1970). Fama further classified market efficiency under the EMH into Weak form, in

which the information set is just historical prices, semi-strong form, in which the concern is whether prices efficiently adjust to other information that is obviously publicly available, and strong form, in which the concern is whether given investors or groups have monopolistic access to any information relevant for price formation.

It has already been stated that an efficient market is one where the prices of securities fully reflect all available information. However, sufficient conditions for capital market efficiency include but not limited to; no transaction costs in trading securities, all available information is available without cost to all market participants, and that all agree on the implications of current information for the current price and distributions of future prices of each security (Fama, 1970). Frictionless markets, however, do not exist in the real world, and in any market there will be a combination of transactional costs, costly information, and disagreement concerning the information that is commonly held. A large part of the EMH is measuring the effect that these three factors have on the efficient allocation of price in free markets (Fama, 1970). Furthermore, efficiency, as it pertains to the EMH, can be further broken down into two aspects: price efficiency and market efficiency. Price can be considered efficient in two senses: the current price of a security best predicts its future price and the prevailing price immediately assimilates new information provided to the market (Kornhauser *et al.*, 1985). To do this, the mechanism of price formation somehow captures information about and predicts the future payment of a security as well as about the investor who happens to know, with concrete particularity, of this relevant information (Kornhauser *et al.,* 1985). Market efficiency is thus premised on the claim that all relevant information will be available to the market and that the market rapidly, if not instantaneously, digests all information as it becomes available (Glen, 2005).

The present day criticisms of the EMH notwithstanding, even during its period of greatest acceptance, there were still rival theories concerning the movement of market prices. Two of these, the random walk theory and noise theory, are worth exploring because they move away from the underlying notions of the EMH and foreshadow the emergence of chaotic analysis in economics. Despite criticisms, EMH still remains relevant in the field of finance. This study is based on EMH, particularly the semi-strong Efficient Market Hypothesis which suggests that the current prices fully incorporate all publicly available information. Public information includes macroeconomic information published by Central Bank of Kenya and other related institutions. This study is thus premised on the postulation of EMH theory.

2.2.2 The Random Walk Theory

The random walk theory arose as a rationalization for underlying empirical data concerning market movement. Although the model dates to the dissertation of French mathematician Louis Bachelier in 1900 (Bachelier, 1900) and the work, five years later, of Albert Einstein concerning what would become known as Brownian motion (Hawking, 1988). The impetus for the development of a theory came from the accumulation of evidence in the middle 1950's and early 1960's that the behavior of common stock and other speculative prices could be well approximated by a random walk (Fama, 1970). As a logical extension of those studies, many economists thought that there is no pattern to the price history of a security and therefore that there can be no accurate prediction of future changes in security prices based on prior prices (Cunningham, 1994). The theory does not in fact posit absolute randomness in the movement of security prices, or that stock prices move aimlessly and erratically and are

insensitive to changes in fundamental information (Hazen, 1991). Rather, the theory maintains that the market is efficient, with prices moving so rapidly in response to new information that investors cannot consistently buy or sell fast enough to benefit (Hazen, 1991)

In this sense, the random walk theory is closely related to both the weak and semi-strong forms of the efficient market hypothesis. However, while they are consistent in outcomes, their underlying logic differs. Concerning the weak form, it is posited that all past data is reflected in present market prices. The random walk, however, divorces entirely the present from the past: In a random walk process, each step is made independently of preceding steps (Vaga, 1994). In either case, an investor cannot benefit except by luck, but the inability to consistently benefit from either a weak form efficient or random market rests on differing presuppositions. Moreover, the semi-strong form prices reflect all available information. Therefore, investors in the "semi-strong" world will all be on equal footing. Under a random walk theory, the same will occur, but only because information changes on a random basis and stock prices follow a similarly random pattern (Langevoort, 1992).

2.2.3 Noise Theory

The hallmark of the EMH is its belief in the rationality of human beings. This is consistent with the conventional economic model which postulates that rational decision-makers search for the option having the largest subjective expected utility, determined by reference to probabilities derived from the available information set (Langevoort, 1992). Economists have long resisted the possibility that human beings may act irrationally in the market setting, in large part accounting for the foundational

stone of rationality in the EMH (Cunningham, 1994). Irrational behavior that interferes with market efficiency has become known as “noise” (Hazen, 1991).

Noise, defined more narrowly, refers to those pricing influences that are not associated with rational expectations about the underlying value of the asset (Langevoort, 1992). The fact that such expectations are not necessarily rational should not, however, lead to the conclusion that they are in fact irrational. Investment strategies based on non-rational information may represent anything from loyalty to a friend to a personal heuristic. The noise theory is not so concerned with why individuals evidence these sub-optimal behaviours but rather the effect that it has on the market. Noise theory models hold that the public capital markets are infected by a substantial volume of trading based on information unrelated to fundamental asset values (Cunningham, 1994). These trades are largely undertaken due to underlying emotional or psychological impulses unrelated to the asset’s value (Cunningham, 1994). Moreover, most investors do not have the capacity or inclination to make comparative investment decisions independently, making them susceptible to external expressions of experts and peer(s) (Langevoort, 1992).

In the end, even if a public capital market is efficient in the sense of swiftly incorporating public information into security price that does not necessarily mean that securities prices in that market reflect fundamental values (Cunningham, 1994). Although noise theory has recently received extra attention, the notion itself is old, dating at least to John Maynard Keynes (Keynes, 1935). Keynes assumed that investors on the whole were not conducting fundamental analysis, but rather, were more apt to act based on information unrelated to the fundamental value of the particular asset

(Langevoort, 1992). The central notion of noise theory is that the prices of capital assets are driven by information unrelated to fundamental values. However, this is not its most important contribution to modem economic analysis. The more important implication of noise theory is that it reveals markets to be nonlinear systems, to which the linear mathematics and reasoning that underlie the EMH are inapposite (Cunningham, 1994). The move towards nonlinear systems paved the way for the emergence of chaos theory.

2.2.4 Chaos Theory

Chaos is mathematically defined as 'randomness' generated by simple deterministic systems (Greene, 1999). What must at all times be kept in mind is that chaos does not imply randomness. Chaos implies some underlying complex pattern or solution, not mere irregularity (Hazen, 1991). In fact, a process classified as chaotic is treated as deterministic rather than random predictability (Tsonis, 1992). In economic application, Chaos theory advances the notion that the 'linear frame of reference' which the EMH rests upon is insufficient to explain market behavior (Smith, 2000). Like noise theory, it criticizes EMH's simplistic informational approach by suggesting that other factors such as firm fundamentals, macroeconomic factors, and differentiated time dimensions affect prices of securities (Smith, 2000).

Chaos theory was immediately lent at least intuitive credence by its ability to explain chaotic events, such as market crashes, and by its criticism of the EMH for its purported inability to explain such events (Glen, 2005). The inability of the EMH to account for chaotic market-events is not, however, the only point of contention between the two theories. The most important revelation of chaos theory strikes directly at the heart of the EMH's account of the absorption of information in securities prices. Using the

nonlinear techniques of chaos theory in empirical studies, the results tend to show that information is not immediately absorbed by market prices, as the EMH and noise theory both predict; rather, such information remains useful for periods of up to four years (Cunningham, 1994). Because information can be utilized by market participations, and that information is not immediately absorbed into the prices of securities, the possession of such information becomes extremely important (Glen, 2005). This fact undermines not only the semi-strong and strong versions of the EMH, but even the weak, because the logical conclusion of the continued importance of information means that it retains such importance even after trades occur based on such information (Glen, 2005). The import of chaos theory to economics is thus twofold. First, counter to the absorption of information thesis of the EMH, chaos theory posits the existence of 'deeper structural phenomena that affect market movement' (Cunningham, 1994). Second, the original conditions of any system deeply affect the movement of that system, even after those underlying conditions are gone (Roe, 1996).

Although chaos theory to this point has been utilized almost exclusively for analyses of crashes (Smith, 2000), it is likely that it will have greater utility in the future. As Tsonis (Tsonis, 1992) poses the question: would it be possible that the underlying determinism of such processes could be used to improve their otherwise limited predictability? At least two individuals think there is hope for greater application of chaos theory to market movement: Vaga (1994), who states that in financial markets, the new science of complexity offers the hope of more complete explanation of complex market dynamics, improved investment performance and better management of investment risk, and (Cunningham, 1994) who argues that performance of financial markets over time should not be mapped as simple random walks, but instead may exhibit hidden patterns of

order and predictability that can account for market crashes and provide better rationales for such basic corporate and securities law doctrines as mandatory disclosure rules and mandatory fiduciary obligations (Levit, 1996).

2.3 Macroeconomic Variables

2.3.1 Inflation

The relationship between inflation and stock price can exist either positively or negatively. According to DeFina (1991), these two variables have a negative relationship. They indicate that inflation will increase the cost of production and at the same time it will also decrease the expected future cash fallow and profit of the company. While Mukherjee *et al*. (1995) points out that this negative relationship can be detected by looking at the increase of the inflation rate which will result in a strict economy policy. When this happens, the free risk nominal rate will increase and at the same time the rate of discount will also increase. This will in turn cause an increase in the stock price. However, other researchers indicate that these two variables have a positive relationship. Shabri *et al.* (2001) and Ibrahim (2003) specified this relationship through the concept of protection value. Equities serve as a hedge against inflation as they represent claims on real assets.

2.3.2 Money Supply

The relationship between money supply aggregate and stock price can exist either positively or negatively. Dhakal et al. (1993) and Mukherjee et al. (1995) indicated that this positive relationship can be noticed through economy encouragement feature. This is a basis for money supply to increase towards the increase of the corporate profit and this will further increase the future cash flow and result in an increase in stock price. Keynesian economists argue that there is a negative relationship between stock prices

and money supply whereas real activity theorists argue that the relationship between the two variables is positive (Sellin, 2001).

2.3.3 Interest Rate

The negative relationship can be observed by looking at direct relationship (positive) between money supply and inflation. In this direct relationship, the increase in the money supply will increase the discount rate and further decrease the price of stock market (Fama, 1981). The relationship between interest rate and stock price are in the negative form. The increase in interest rate will increase the free risk nominal rate and at the same time will increase the discount rate (Abdullah and Hayworth, 1993). As a result, the price of the stock will decrease (Mukherjee and Naka , 1995). On the other hand, Abdullah *et al*. (1993) established that interest rate can influence the level of corporate profit through expectation where the investor will get higher dividend in the future. Most of the companies support their equipment and inventory through loans. Reduction in the interest rate will cut down the cost of borrowing and at the same time it provides an incentive to the company to expand their operation. Consequentially, the future expected value of the company will increase. Howe *et al*. (2004) explained that most of the stock is bought through the money the investor borrowed from financial institutions. The increase in interest rate will increase the cost of buying stocks. The investor will try to find the stock that can give a higher rate of return to balance the cost of borrowing, which they borrow from financial institution. When this happens, the demand towards the stock will decrease and at the same time decrease the price of the stock.

2.3.4 Foreign Exchange Rate

Stock prices can have either positive or negative relationship with the foreign exchange rate. Any changes in value of exchange rate will give a big impact towards the price of the stock. Mukherjee *et al*.(1995), Maysami *et al*. (2000) and Ibrahim *et al.* (2003) proposed that the relationship between these two variables are in positive form. Looking at the situation where there is a decrease in value of the currency can prove this. This causes the product that is being exported from this country to become cheaper in the international market. As a result, if the products experience elasticity, the volume of the export from that country will increase. The flow of cash will increase in line with the profit and local share price. Ibrahim *et al*. (2001) shared a different perspective. They believed that the relationships between these two variables are negative. They believed that if the country depends on the export, the decrease in currency value will increase the growth of export. Nevertheless, the decrease in currency value will increase the cost of production impact as well as increase the domestic price. As a result, the profit margin in the company will decrease hence declining the demand of the shares and hence negatively affecting the equity price of the respective shares.

2.3.5 Political Risk

Gul *et al.* (2013) examines the impact of events of different nature like: political, natural calamities and terrorism on the share prices of the financial sector of Pakistan. A sample of 14 companies are selected randomly from the financial sector (Insurance and Banking) listed on the KSE-100 index. The time span was of four years, that is, between 2007 and 2010. The data was analyzed through paired samples t-test statistics. The

results indicated that events have significant impact on the stock prices and prices behave negatively when a major event emerges on national or international front.

2.3.6 Terms of Trade

Bhattacharya and Mukherjee (2002) investigated the nature of the causal relationship between stock prices and macroeconomic aggregates including exchange rate in the foreign sector in India. By applying the techniques of unit root tests, cointegration and the long run Granger non–causality test recently proposed by Toda and Yamamoto (1995) the causal relationships between the BSE Sensitive Index and the three macroeconomic variables, viz., exchange rate, foreign exchange reserves and value of trade balance using monthly data for the period 1990-91 to 2000-01 were tested. The results suggested that there is no causal linkage between stock prices and exchange rate.

2.3.7 Real Gross Domestic Product

Nishat and Shaheen (2004) analyze the long-run co-movement between macroeconomic factors and Karachi Stock market index. Vector Error Model was implemented to explore such relationship during 1973 to 2004. The result indicated that there is a "casual" co-movement between the economy and the stock market and reverse causality between industrial production and stock prices. Industrial production has largest positive impact on stock price and inflation has largest negative impact on Karachi Stock Market (KSE) Prices. The result also shows that stock prices are not predicted on the basis of past economy trends.

2.4 Empirical Literature

Several studies have been conducted to examine the effects of macroeconomic variables on stock market of industrialized economies. Some of these studies for developed

economies includes Fama (1981,1990), Chen *et al.* (1986) ,Chen (1991), Thornton (1993), Abdalla and Murinde (1997). The few notable studies for developing economies include Mookerjee and Yu (1997) and Maysami *et al*. (2000) for Singapore, Kwon and Shin (1999) for South Korea, and Habibullah and Baharumshah (1996) and Ibrahim (1999) for Malaysia. Using bi-variate co-integration and causality tests, Mookerjee and Yu (1997) noted significant interactions between money supply and foreign exchange reserves and stock prices for the case of Singapore. However, Maysami *et al*. (2000) document significant relationship between interest rate and exchange rate and Singapore's stock prices in the long-run .

Chowan (2000) have tried to obtain reasons for turbulence in stock market in the short run in India taking into account SENSEX as the main index. They have tried to find that how SENSEX which stood at 2761 on 21st of October 1998 rose to 6000 in February 2000, that is, 117% increment in just 15 months, which is not at all strongly supported by fundamental economic factors in these years as Indian economy grew by just 5.9% in 1999-2000, As per the results of this paper, even long run economic factors do not support such a spike in stock prices. Such a trend was noted not just in Indian stock markets but word wide.

Muhammad and Rasheed (2002) examine the exchange rates and stock price relationships for Pakistan, India, Bangladesh and Sri Lanka using monthly data from 1994 to 2000. The empirical results show that there is a bi-directional long-run causality between these variables for only Bangladesh and Sri Lanka. No associations between exchange rates and stock prices are found for Pakistan and India.

Menike (2006) used monthly data from the period of 1991 to 2002 of Sri Lankan Stock Exchange market. Multivariate regression model was applied. The null hypothesis indicates that inflation rate, exchange rate, interest rate and money supply have no effect on stock market prices. The stock prices have an opposite impact on T-bill, inflation and exchange rate in the CSE. The evidence tells that stock prices react by rising interest rate. Exchange rate, Inflation rate, and interest rate exert pressure to increase stock prices. Exchange rate and inflation rate and money supply cause the stock prices movements.

Husain (2006) has examined the causal relationship between stock price and real sector variables of Pakistan economy, using annual data from 1959-05 to 2004-05. It has divided the data into two halves- pre and post liberalization and has studied the causal relationship between them using various econometric techniques like ECM, Engle-Granger co integrating regressions and Augmented Dickey Fuller (ADF) Unit Root tests. By using this data set and methodology, this analysis has indicated the presence of a long run relationship between the stock prices and real sector variables.

Gan *et al.* (2006) investigated the relationship between the New Zealand stock market index and macroeconomic factors from January 1990 to January 2003 and employed the monthly data. They used co integration test, Granger-causality test, Accounting Innovation test, and they also used the co-integration test to see long run relationship between New Zealand stock market prices and macroeconomic factors. This study showed that CPI has negative impact on the NZSE40. Johansen Multivariate Co integration Test revealed that there is a long-term relationship exists between New Zealand and macroeconomic factors. The result of granger causality test indicates that

NZSE40 factor does not affect because New Zealand stock market is very small as compare to other developed countries.

Tweneboah and Adam (2007) study the impact of macroeconomic variables on Ghana Stock market. They investigate the long-run and short-run dynamic relationship between stock prices index and macroeconomics index by taking quarterly data from the period 1991 to 2004. The employed the Johannes's multivariate co-integration tests to find out the long-run relationship and innovation accounting test for short-run relationship. Hypothesis indicates that inflation positively correlated with share prices. The Fixed Effects Vector Decomposition (FEVD) result indicates that inflation become small portion of cause in stock price variation as compare to exchange rate, Foreign Direct Investment and interest rate.

Kyereboah-Coleman and Agyire-Tettey (2008) concluded in their study of the impact of macroeconomic indicators on Ghana stock market that lending rates from deposit money banks have adverse effect on stock market performance. The study also found inflation to be negatively related to stock market performance and this effect takes time because of the presence of a lag period.

Robert (2008) while conducting a study on the effect of macroeconomic variables on stock market returns for four emerging economies of Brazil, Russia, India and China affirmed that there was no significant relationship between present and past market returns with macroeconomic variables, suggesting that the markets of Brazil, Russia, India and China exhibit weak form of market efficiency. Also, no significant

relationship was found between respective exchange rate and oil price on the stock market index prices of the four countries studied.

Kanakaraj *et al*. (2008) have examined the trend of stock prices and various macroeconomic variables between the time periods 1997-2007. They have tried to explore upon and answer that if the recent stock market boom can be explained in the terms of macroeconomic fundamentals and have concluded by recommending a strong relationship between the two. The GDP growth in India has grown consistently at high levels touching the highest average from 2003-04 to 2006-07 since Independence, and is strongly backed by manufacturing sector growth and services sector growth. Gross Domestic Investment and Gross Domestic Saving as percentage of GDP have also grown enormously with inflation remaining under control most of the time.

Benaković *et al.* (2010) investigates impact of macroeconomic factors on share prices. For this purpose, multifactor model was applied. Factor model is based on (APT) theory developed by (Ross, 1976) that is used to estimate the systematic risk. The result revealed that index of market has significance for all stocks prices and has positive relationship with stock return. Interest rate, industrial production and oil prices have also positive relation with stock return but inflation has negative influence. Furthermore cross-sectional regression result of time series of risk premium of each sector. The important variable which affects the stock return is the CROBEX index which has a positive risk premium. Stock prices are mostly affected by the investor's expectations because they response quickly to the announced information such as economic and political news.

Mahmood and Dinniah (2009) conducted the research in order to investigate the dynamic co-movement between stock prices of six Asian specific countries of Malaysia, Thailand, Korea, Hong Kong, Australia & Japan, and macroeconomic variables. Statistics for the Return Series, Unit Root Tests, Engle-Granger Co integration Test, granger co integration Test, Multivariate Johansen Co integration Test, Estimates of the (ECM) – Multivariate are used to find out the results. The result indicates that the relationship between and among the variables that are exists in only four countries i.e. Korea, Japan, Australia Hong Kong and the short run relationship exist between all countries but not in Thailand and Hong Kong. The Thailand stock return is linked with inflation and exchange rate. The Japanese stock return linked with industrial production and inflation while Hong Kong and Korea stock returns are correlated with inflation.

Siele (2009) in the Study on the relationship between stock market and some selected macroeconomic variables in Kenya used NSE 20 share index to represent Kenya Stock Market and real GDP growth rate, inflation, interest and treasury bill rates as macroeconomic variables. Quarterly time series data for the period 1999-2008 was analysed using summary statistics, correlation and regression analysis to ascertain the relationships. Findings of the study reveal that macro economic variables explain about 70% of the variation of the market share index. The regression coefficients show that the market share index is positively related to inflation rate, Treasury bill rate and gross domestic product while it is negatively related to interest rate. This study results with similar views to those of Kaimba (2010) and Kiptoo (2010).

Rashid (2010) investigates the relationship between macroeconomic variables and stock prices in Pakistan. The purpose of study was to explore the dynamic interaction stock

prices and the four macro-economic variables. They used co-integration test and granger Causality test for structural breaker. The Error-correction model indicates that there is a long-term casual co-movement between said macroeconomic factors and stock prices with the exception of consumer price index that only lead to stock prices. The result is also shows that in short run stock prices caused by interest rate. The empirical result also indicate that GDP and exchange rate effect the portfolio return but on the other side exchange rate, inflation rate and money supply have negative impact on portfolio return of medium and big companies.

Büyükşalvarcı (2010) explored the effect of macroeconomic factors on Turkey Stock Market. Arbitrage Pricing Theory was applied and monthly data is taken from January of 2003 to March of 2010 for this purpose. Public information about economic factors has impact in the prediction of stock prices. In order to calculate the relationship between economic factors and stock prices multi-factor regression model is used. The outcome of this study indicates that macroeconomic variables can lead to the stock market return. The result of the study indicates that industrial production, exchange rate and interest rate negatively effect on TSE-100 Index. On the other hand inflation rate and gold prices have no impact on prices of ISE-100 index.

Kaimba (2010) conducted a study on relationship between Nairobi Stock Exchange 20 Share Index and selected macro economic variables. The study was for the period 1990 to 2009. Data analysis was done using descriptive and inferential statistics using Statistical Package for Social Sciences (SPSS) and Ms Excel spreadsheets. The study found significant relationship between the NSE 20 Share Index with selected Macro

economic variables except for foreign portfolios flows where the relationship was found to be insignificant.

Kiptoo (2010) conducted a study on an empirical investigation on the relationship between selected Macro Economic Variables and stock prices based on evidence from the Nairobi Stock Exchange. The study used NSE 20 Share index to represent all listed companies and covered the period 1978-2008. Data was analysed using unit root test regression. The study agrees with that of Kaimba (2010) in that there is significant relationship between the NSE 20 Share Index and both exchange rate and Inflation. She however found insignificant relationship on interest rates, money supply and gross domestic product.

Singh *et al.* (2011) investigate the relationship between Taiwan stock market price and macroeconomic factors. The aim of paper was to find the casual relationship between stock market index and macroeconomic factors including money supply, inflation, GDP, exchange rate and employment rate. Leaner regression was employed. Empirical result shows that GDP and exchange rate effect on all portfolio returns but not small company's portfolio. Inflation rate have significant effect on PBR portfolio return of small companies. On other side money supply and employment rate have no significant impact on stock market returns. Furthermore that internal financing and high financing are highly related with growth of the firms. The net effect of equity financing on basic industries is significantly positive. All findings have significant impact for both the companies and the investors.

Arshad and Nasır (2012) found the co movement between macroeconomic factors and stock prices and employed the ARDL approach for investigation. They also employed the bound testing procedure proposed by Pesaran *et al*. (2001). Data was tested to find the problems of econometric such as series correlation, normality, functional form and unit root by applying LM test. Findings revealed that inflation is not significant in determine stock price in long-run but money supply, exchange rate, interest rate significantly determine the equity prices in long run. Foreign investment has significant effect in short-run while it has no effect in long-run.

2.5 Review of Major Issues

A theoretical view in explaining the relationship between selected macroeconomic variables and equity prices provide a clear view and fundamental concept to the respective investors, portfolio managers, and companies about the influencing capacity of each macroeconomic variable. However, stock prices are affected by a number of other factors and events not part of the chosen macroeconomic variables which directly or indirectly influences stock prices. Some of the factors that affect or predict the buying and selling of stock that ultimately affect the stock prices can generally be grouped into quantitative and qualitative factors. Qualitative factors include company goodwill, market sentiments, international situation, changes in government policies, investor's hype, analyst's report, and unexpected circumstances. Quantitative factors include take-over or merger, stock splits, margin loan, dividend policy among other factors.

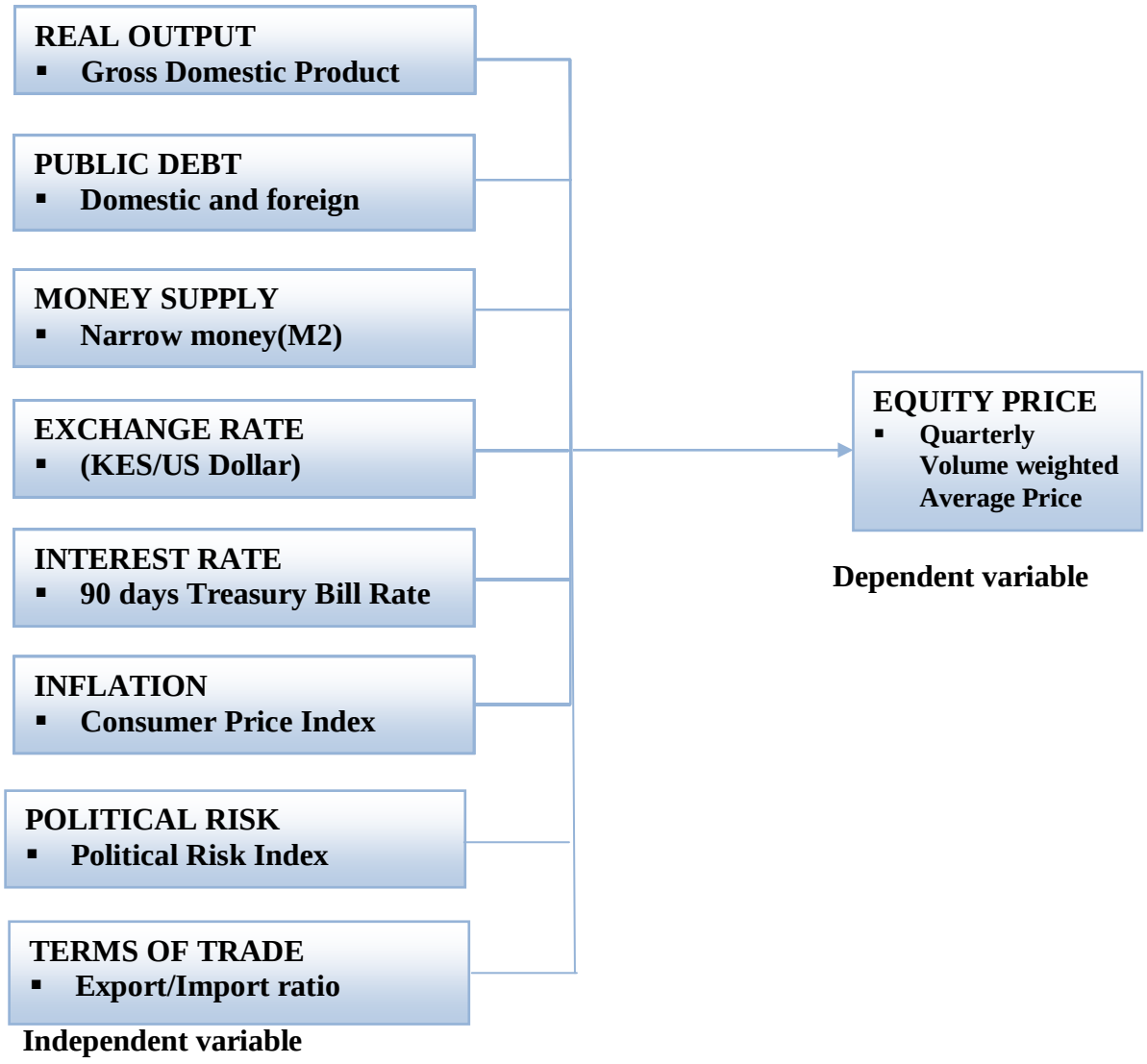
2.6 Summary and Gaps to be filled by the Study

Despite many researches in the past on the relationship between macroeconomic variables and equity prices, the question whether macroeconomic variables affects stock

prices still remains debatable among managers, policy makers and researchers to date. The recent fluctuations in the share price for quoted companies have made investors at the Nairobi Securities Exchange, Kenya worried as the market remained turbulent with stock prices dipping to low levels (Bitok *et al*. 2011). Further, many studies conducted in this area have either selected limited macroeconomic variables or used multiple linear regression analysis to come up with the findings. This research adopted ARDL approach for time series data and used nine independent variables. In addition, there were few studies of this nature that were found in the Kenyan context. It is against this background that the study sought to establish the dynamic relationship between selected macroeconomic variables and equity prices.

2.7 Conceptual Framework

In this study, the NSE 20 Share Index was taken as dependent variable. Inflation, interest rate, money supply, real output, exchange rate, terms of trade, political risk and public debt were used as independent variables.



Source: Survey data, 2014

Figure 2.1: Conceptual Framework

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is structured around research design, target population, sample design, data collection instruments and procedures, and data analysis and presentation.

3.2 Research Design

Explanatory or causal research design was deemed appropriate for this study since the main aim of the study was to identify any causal links between the variables that pertain to the research problem and to determine the dynamic relationship between selected macroeconomic variables and equity price of shares listed at the NSE. Causal or explanatory research studies causal relationships between variables. This research design emphasizes the study of a situation or a problem in order to explain the causal relationship between variables (Saunders, Lewis, and Thornhill, 2009). Explanatory research is designed to test whether one event causes another.

3.3 Empirical Model

The model of this study was largely borrowed from Al-Sharkas (2004) study. The variables used in the adopted model were the Amman Stock Exchange Index (ASE), Consumer Price Index (CPI), Money supply (M2), Industrial Production Index (IP), and Treasury bill (TB) rates which represented Jordanian stock market, inflation, money stock, output (real activity), and interest rate respectively. The model assumed a linear trend and was in the following form:

$$ASE = f(CPI, TB, M2, IP)$$

The above model was modified as follows in this study:

NSE20SI = f (GDP, GD, M2, XR, CPI, PE, TOT, TBR) (3.1)

The researcher recognized that financial and economic data are nonlinear in nature. The model was thus modified and presented in a nonlinear form as follows:

$$NSE20SI = \alpha {GDP_t}^{\beta 1} {GD_t}^{\beta 2} {M2_t}^{\beta 3} {XR_t}^{\beta 4} {CPI_t}^{\beta 5} {PE_t}^{\beta 6} {ToT_t}^{\beta 7} {TBR_t}^{\beta 8}$$

(3.2)

Further, to make it possible to conduct the analysis, the above model variables were log transformed as follows:

$$lNSE20SI_t = \alpha + \beta_1 lGDP_t + \beta_2 lGD_t + \beta_3 lM2_t + \beta_4 lXR_t + \beta_5 lCPI_t + \beta_6 lPE_t + \beta_7 lToT_t + \beta_8 TBR_t + \varepsilon$$ (3.3)

Where

NSE20SI	-NSE 20 Share Index,
GDP	-Real Output/Gross Domestic Product,
GD	-Public debt,
M2	-Money supply
TBR	-Treasury bill rate
XR	-Exchange rate,
CPI	-Inflation
PE	-Political Risk
ToT	-Terms of Trade
l	-log

3.4 Target Population

The population of this study consisted of all the sixty-three (63) firms listed at the NSE by December 2013(see Appendix C).

3.5 Sample Design

The Sample of the study comprised of companies whose information was used in computing NSE20 share Index during the period between 2000:1 and 2013:4. Purposive sampling was used in the study. The index measures the performance of 20 blue chip companies with strong fundamentals and which consistently return positive financial results. The Nairobi Securities Exchange 20 Share Index is a price weighted index whose twenty (20) members are selected based on a weighted market performance for a 12 month period as follows: Market capitalization and shares traded form 40% and 30% respectively while the number of deals and turnover constitute 20% and 10% respectively. Included in the Index as of December 2013 were Mumias Sugar, Express Kenya, Rea Vipingo, Sasini Tea, CMC Holdings, Kenya Airways, Safaricom, Nation Media Group, Barclays Bank Kenya, Equity Bank, Kenya Commercial Bank, Standard Chartered Bank, Bamburi Cement, British American Tobacco, Kengen, Centum Investment Company, East African Breweries, EA Cables, Kenya Power and Lighting Company Ltd and Athi River Mining. This index primarily focuses on price changes amongst these 20 companies.

3.6 Data Collection

3.6.1 Data collection procedure

Data was collected for the specified variables from the NSE, CBK, CMA and KNBS. Particularly, data on NSE20 Share Index was obtained from the NSE while data for the other variables were obtained from CBK, CMA and KNBS for the period between the first quarter of 2000 and the fourth quarter of 2013. From data collected, desk review was conducted in order to extract the required data set for the study.

3.6.2 Data collection instruments

The study used secondary data. This data was obtained using data collection schedules which were filled from secondary data obtained from sources such as KNBS, CBK, CMA and NSE (see Appendix C)

3.7 Data Analysis and Presentation

3.7.1 Unit Root Test

Although unit root test was not a requirement for testing for cointegrations using the ARDL approach, it was necessary for verifying that the series were not cointegrated of order higher than one. Augmented Dickey-Fuller (ADF) test for conducting the unit root test was employed. The ADF tested the null hypothesis of non-stationarity.

3.7.2 Cointegration Analysis

There are various techniques for conducting co-integrated analysis for the specified model. The popular residual approach proposed by Engle and Granger (1987) and the maximum likelihood-based approach posited by Johansen and Juselius (1990) and Johansen (1991). When there are more than two I(1) variables in the system, maximum likelihood approach of Johansen and Julius has the advantage over residual-based approach of Engle and Granger; however, both of the approaches require that the variables have the same order of integration. This requirement often causes difficulty when the system contains variables with different order of integration. To overcome this difficulty, Pesaran *et al*. (1997, 2001) proposed a new approach an called Autoregressive Distributed Lag (ARDL) for cointegration that does not require classification of variables into I(0) or I(1).

Pesaran *et al*. (2001) suggests ARDL estimation can be applied even if the underlying variables have different orders of integration except when some variables are integrated of order two I(2) . Adopting ARDL approach for cointegration test does not require conducting of unit root test, which is a prerequisite for residual-based and maximum likelihood-based approach. For this reason, ARDL approach has gained popularity over recent years in the analysis of dynamic relationship between variables. For this reason, this study adopted ARDL approach for empirical analysis on the dynamic relationship between equity prices and macroeconomic variables in Kenya.

$$\Delta lNSE20SI_t =$$

$$\propto_0 + \sum_{i=1}^{n} \propto_{1i} \Delta lNSE20SI_t K_{t-i} + \sum_{i=0}^{n} \propto_{2i} \Delta lGDP_{t-i} + \sum_{i=0}^{n} \propto_{3i} \Delta lGD_{t-i} +$$

$$\sum_{i=0}^{n} \propto_{4i} \Delta lM2_{t-i} + \sum_{i=0}^{n} \propto_{5i} \Delta TBR_{t-i} + \sum_{i=0}^{n} \propto_{6i} \Delta lXR_{t-i} + \sum_{i=0}^{n} \propto_{7i} \Delta lCPI_{t-i} +$$

$$\sum_{i=0}^{n} \propto_{8i} \Delta lPE_{t-i} + \sum_{i=0}^{n} \propto_{9i} \Delta lToT_{t-i} + \beta_1 lNSE20SI_{t-i} + \beta_2 lGDP_{t-i} + \beta_3 lGD_{t-i} +$$

$$\beta_4 lM2_{t-i} + \beta_5 lXR_{t-i} + \beta_6 lCPI_{t-i} + \beta_7 lPE_{t-i} + \beta_8 lToT_{t-i} + \beta_9 LTBR_{t-i} + \varepsilon_t$$

(3.4)

Where;

Δ	-denotes the first difference operator
$\propto_{ji}$	-drift component
ε_t	- white noise residuals
l	-log
i	-lag

The left-hand side is the equity share price. The first nine expressions (β1 –β9) on the right hand side of the model correspond to the long run relationship. The remaining expressions with the summation sign ($\alpha_1 - \alpha_9$) represent the short run dynamics of the model.

To investigate the presence of joint long run relationships between the equity price and Gross Domestic Product, Public Debt, Money Supply, Exchange Rate, Consumer Price Index, Political Risk and Terms of Trade, bound testing under Pesaran *et al*. (2001) procedure was used. The bound testing procedure is based on the F-test. The F-test is actually a test of the hypothesis of no cointegration among the variables against the existence or presence of co-integration among the variables, denoted as:

Ho: $\beta_1 = \beta_2 = \beta_3 = \ldots\ldots = \beta_9 = 0$ that is, there is no co-integration among the variables.

Ha: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \ldots\ldots \neq \beta_9 \neq 0$ that is, there is co-integration among the variables.

The ARDL bound test is based on the Wald-test (F-statistic). The asymptotic distribution of the Wald-test is non-standard under the null hypothesis of no co-integration among the variables. Two critical values are given by Pesaran *et al*., (2001) for the co-integration test. The lower critical bound assumes all the variables are I(0) meaning that there is no co-integration relationship between the examined variables. The upper bound assumes that all the variables are I(1) meaning that there is co-integration among the variables. When the computed F-statistic is greater than the upper bound critical value, then the H_0 is rejected (the variables are co-integrated). If the F-statistic is below the lower bound critical value, then the H_0 cannot be rejected (there is no cointegration among the variables). When the computed F-statistics falls between the lower and upper bound, then the results are inconclusive.

When the results of F-statistics in the first step support the evidence of the existence of cointegration between variables, the lag orders of the variables would be chosen using Akaike Information Criteria (AIC). The step of selecting the lag orders of variables is very important because the appropriate lag selection enables identification of the true dynamics of the model.

Equation (3.4) in the ARDL version of the error correction model (ECM) was expressed as equation (3.5): The error correction version of ARDL model pertaining to the variables in equation (3.4) was as follows:

$$\Delta lNSE20SI_t = \propto_0 + \sum_{i=1}^{n} \propto_{1i} \Delta lNSE20SI_{t-i} + \sum_{i=0}^{n} \propto_{2i} \Delta lGDP_{t-i} + \sum_{i=0}^{n} \propto_{3i} \Delta lGD_{t-i} + \sum_{i=0}^{n} \propto_{4i} \Delta lM2_{t-i} + + \sum_{i=0}^{n} \propto_{5i} \Delta lXR_{t-i} + \sum_{i=0}^{n} \propto_{6i} \Delta lCPI_{t-i} + \sum_{i=0}^{n} \propto_{7i} \Delta lPE_{t-i} + \sum_{i=0}^{n} \propto_{8i} \Delta lToT_{t-i} + \sum_{i=0}^{n} \propto_{9i} \Delta LTBR_{t-i} + \lambda ECT_{t-i} + u_t$$

(3.5)

Where

λ -the speed of adjustment parameter and

ECT -the residuals that are obtained from the estimated co-integration model of equation (3.4).

Diagnostic tests associated with the model were conducted to check the performance of the estimated model. Bothe residual and stability tests were performed.

3.7.3 Definition and Measurement of Variables

The description and measurement of variables is explained in table 3.1 as shown below.

Table 3.1: Variable Definition

Type	Variable	Transformation and Measure	Variable Description
Dependent variable	Equity Price	$LNSE20SI_t$ (Index)	Market capitalization weighted index of 20 companies. Measured by quarterly volume weighted average price of the indices.
Independent Variables	Gross Domestic Product	$LGDP_t$	Total market value of final output produced within the country. Measured quarterly
	Public Debt	LGD_t	Measured by quarterly government borrowing both domestic and foreign.
	Money Supply	$LM2_t$	A measure of aggregate money supply that includes M1 and long-term money deposits. Measured by quarterly average of money supply.

Exchange rate (Percentage)	lXR_t	Measured by quarterly average rate at which Kenya shillings exchanges with one US dollar.
Inflation	$LCPI_t$	It is a persistence increase in general prices of goods and services. Measured by quarterly percentage consumer price index.
Political Risk	LPE_t	Measure by Kenya's political risk index.
Terms of Trade (ratio)	$LToT_t$	Measured by quarterly average ratio of Kenyan exports to imports
Treasury Bill Rate	$LTBR_t$	Treasury bill rate used as a proxy for domestic rate of interest. It is measured as the quarterly average of the 91-day Treasury Bill Rate.

Source: Survey data, 2014

3.7.4 Results Presentation

The results of the study were interpreted and inferences made and presented using tables and figures in order to explain the outcome of the study.

CHAPTER FOUR

EMPIRICAL RESULTS AND INTERPRETATION

4.1 Introduction

This chapter presents empirical results including descriptive statistics, unit root tests, co integration, ordinary least square, error correction models, relevant econometric tests, and key findings from the study.

4.2 Descriptive Statistics

The descriptive statistics for all nine variables under study, namely, Equity Price (LNSE20SI), Gross Domestic Product (LGDP), Public Debt (LGD), Consumer Price Index (LCPI), Money supply (LM2), Political Risk (LPE), Terms of Trade (LTOT), Exchange Rate (LXR) and Treasury Bills Rate (LTBR) are presented in Table 4.1.

Table 4.1: Descriptive Statistics

	NSE20SI	GDP	GD	CPI	M2	PE	TOT	XR	TBR
Mean	34.094	0.321	0.996	86.738	0.720	55.993	0.492	77.833	0.078
Median	36.125	0.322	0.795	78.930	0.565	56.500	0.477	78.049	0.077
Maximum	56.460	0.442	2.112	143.850	1.633	63.000	0.780	96.357	0.183
Minimum	10.430	0.242	0.595	46.540	0.305	47.500	0.340	63.303	0.008
Std. Dev.	13.008	0.058	0.428	29.709	0.411	3.118	0.107	6.443	0.037
Skewness	-0.238	0.264	1.098	0.468	0.795	-0.170	0.780	-0.014	0.435
Kurtosis	1.909	1.857	3.011	1.957	2.311	3.866	3.088	3.526	3.779
Jarque-Bera	3.303	3.698	11.245	4.587	7.010	2.019	5.699	0.647	3.178
Probability	0.192	0.157	0.004	0.101	0.030	0.364	0.058	0.724	0.204
Sum	1909.270	17.999	55.797	4857.350	40.341	3135.600	27.554	4358.641	4.363
Sum Sq. Dev.	9306.894	0.182	10.070	48545.270	9.301	534.857	0.633	2282.848	0.075
Observations	56	56	56	56	56	56	56	56	56

Source: Survey data, 2015

The Jarque-Bera (JB) test statistic was used test whether or not equity price and macroeconomic variables follow the normal probability distribution. The JB test of

normality is an asymptotic test that computes kurtosis and the skewness measures and uses the following test statistic:

$$\text{Jarque} - \text{Bera(JB)} = n\left(\frac{S}{3} + \left(\frac{K-3}{12}\right)\right)$$

Where n = sample size, S = skewness coefficient, and K = kurtosis coefficient. For a normally distributed variable, S = 0 and K = 3. Therefore, the JB test of normality is a test of the joint hypothesis that S and K are 0 and 3 respectively. The results of Jarque-Bera test indicate that all the variables are normally distributed except for public debt and money supply.

4.3 Diagnostic Tests

The ARDL regression model represented by equation 3.4 with log transform for all variables except Treasury bill rate was estimated. Diagnostic tests for the estimated model were conducted and the results of specific tests are discussed below:

4.3.1 Residual tests

Table 4.2 gives a summary of diagnostic (residual) tests.

Table 4.2: Diagnostic Test for ARDL Model

ITEM	TEST APPLIED	Prob. F
Serial Correlation	Breusch-Godfrey Serial Correlation LM Test	0.4399
Normality	Jargue-Bera	0.7369
Functional Form	Ramsey RESET Test	0.4159
Heteroskedasticity Test	Breusch-Pagan-Godfrey	0.0546

Source: Survey data, 2015

Serial correlation is a statistical term used to describe the situation when the residual is correlated with lagged values of itself which was not desirable .Breusch-Godfrey Serial Correlation LM Test was used to test for the presence of serial correlation on the residuals. The null hypothesis was of no serial correlation. The p-value of prob.F=

0.4399 which is more than 5 percent (p>0.05), hence null hypothesis could not be rejected. This means that residuals (u) are not serially correlated which was desirable.

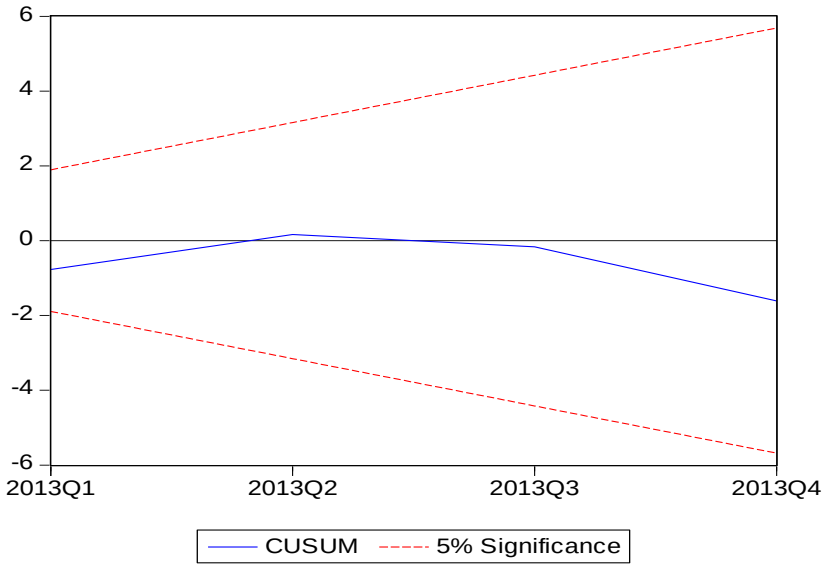
Diagnostic test for normality of residuals was tested using Jarque-Bera statistic. The null hypothesis for this test was that the residuals were normally distributed. When the p-value (probability) for the test large (is smaller than 0.05 for a 95% confidence level), the residuals are normally distributed. Since the prob.F= 0.7369 was greater that the level of significance (0.05), the null hypothesis was not rejected, implying that the residual was normally distributed.

Heteroscedasticity is a term used to describe the situation when the variance of the residuals from a model is not constant. Breusch-Pegan-Godfrey test was used to test for the presence of heteroscedasticity. The p-value was 0.0546 showed that the null hypothesis of homoscedasticity could be rejected. This implied that the residuals had constant variance which was desirable.

Ramsey RESET test was used to test for the correct model specification. The test indicated that the model had no evidence of any misspecification since prob.F= 0.4159 was greater that the level of significance (0.05).

4.3.2 Stability test

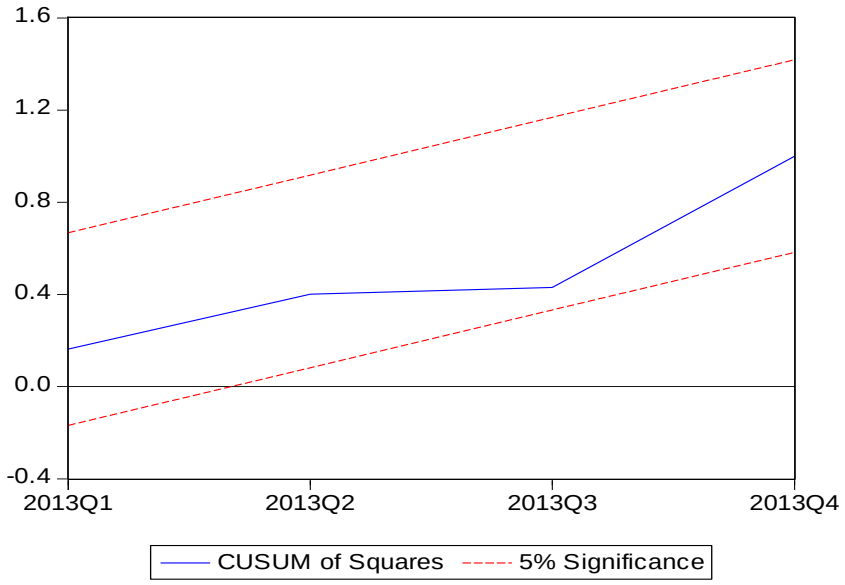
Pesaran (1997) suggested applying the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests proposed by (Brown *et al.*, 1975) to assess the parameter constancy. The ARDL models were estimated and the residuals subjected to the CUSUMSQ and CUSUM tests. The results are as shown in figure 4.1 and 4.2.



The straight lines represent critical bounds at 5% level of significance

Source: Survey data, 2015

Figure 4.1: Cumulative sum of recursive residuals of ARDL Model



The straight lines represent critical bounds at 5% level of significance

Source: Survey data, 2015

Figure 4.2: Cumulative sum of squares of recursive residuals of ARDL Model

Figures 4.1 and 4.2 plot the CUSUMS and CUSUMSQ statistics for ARDL model (3.4). Overall, the results indicated no instability in the coefficients as the plots of the CUSUM and CUSUMSQ statistics were confined within the 5% critical bounds of parameter stability.

4.4 Lag Length Selection

There are many methods of selecting the lag length in statistics which include sequential modified LR test statistic (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). For the purpose of this study, Akaike Information Criterion (AIC) was used to select the appropriate lag length for the model. Table 4.3 indicates that Akaike Information Criterion (AIC) showed significant results at four lag periods. Therefore, the lag length for the variables was selected at four periods**.**

Table 4.3: VAR Lag Order Selection Criteria

Endogenous variables: LNSE20SI LGDP LGD LCPI LM2 LPE LTOT LXR TBR

Lag	Log	LR	FPE	AIC	SC	HQ
0	355.092	NA	1.34e-17	-13.311	-12.974	-13.182
1	787.115	697.883	1.92e-23	-26.812	-23.435*	-25.517
2	868.118	102.810	2.52e-23	-26.812	-20.396	-24.352
3	979.931	103.213	1.76e-23	-27.997	-18.541	-24.372
4	1178.560	114.593*	1.52e-24*	-32.522*	-20.026	-27.731*

* indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ:Hannan-Quinn information criterion

Source: Survey data, 2015

4.5 Unit Root Test Results

Analysis of long run relationship between the variables requires that the economic time series must be stationary at same order to avoid instantaneous causation. Stationarity was tested by applying Augmented Dickey Fuller (ADF) and Phillip Perron (PP). The Augmented Dickey-Fuller (ADF) and Phillip Perron (PP) unit roots tests for the nine variables included logarithms of NSE20 share index, real output, terms of trade, consumer price index, political risk, exchange rate and money supply. Treasury Bill Rate was not transformed. The ADF and the Phillip Perron (PP) tests were based on inclusion of intercept (constant) as well as linear time trend, given the dynamic nature of the variables of the study. The lag lengths of the models are auto-selected by Schwartz Information Criterion (SIC); the maximum lag length was set at ten.

The decision was reached by comparing the ADF and PP statistics with their critical values. Table 4.4 provides a summary of unit root test results.

Table 4.4: Unit Root Tests Results

	ADF without trend		ADF with trend		PP without trend		PP with trend	
	Test statistics		Test statistics		Test statistics		Test statistics	
Variable	At level	1st difference	At level	1st difference	At level	1st difference	At level	1st difference
Log Equity Price	-0.802	-5.384***	-1.473	-5.327***	-1.1963	-5.441***	-1.989	-5.386***
L og Gross Domestic Product	0.736	-9.287***	-3.117	-9.341***	1.065	-9.342***	-3.042	-9.562***
Log Consumer Price Index	-0.292	-7.693***	-2.787	-7.655***	1.862	-7.699***	-2.787	-7.682***
Log Public Debt	2.924**	-6.871***	-0.790	-8.294***	3.604***	-6.870***	-0.645	-8.353***
Log Money Supply	3.054**	-5.423***	-3.828**	-6.263***	2.484	-5.423***	-3.913**	-6.263***
Log Political Risk	-3.839**	-6.521***	-3.814**	-6.487***	-3.8223***	-7.751***	-3.712**	-8.128***
Log Exchange Rate	-1.465	-6.568***	-1.694	-6.555***	-1.5743	-6.601***	-1.754	-6.658***
Treasury Bill Rate	-3.085**	-5.597***	-3.064	-5.565***	-2.534	-5.586***	-2.517	-5.550***
Log Terms of Trade	-0.453	-5.443***	-6.579***	-5.565***	-2.6543*	-27.072***	-6.625***	-29.75***

Test critical values								
1% level	**-3.555**	**-3.558**	**-4.134**	**-4.137**	**-3.555**	**-3.557**	**-4.134**	**-4.134**
5% level	**-2.916**	**-2.917**	**-3.494**	**-3.495**	**-2.916**	**-2.917**	**-3.494**	**-3.494**
10% level	**-2.596**	**-2.596**	**-3.176**	**-3.177**	**-2.596**	**-2.596**	**-3.176**	**-3.176**

*represents significance level of .10(10%), ** significance level of .05(5%) and *** as the significance level of .01(1%). ADF and PP represents the Augmented Dickey Fuller and Phillip Peron tests for stationary with and without trend at level and first difference.

Source: Survey data, 2015

From the table above, results indicate that the PP statistics were less than the critical values in their levels except for money supply and political risk and terms of trade which were greater than critical values at 5% and 1% level of significance. However, the PP statistics for all variables were greater than the critical values at their first differences (in absolute values). These results were supported by ADF test. These tests therefore revealed that NSE20 share index , real output, consumer price index, exchange rate and money supply in logarithm forms and Treasury bill rate were all non-stationary at their levels but money supply and political risk were stationary at levels at 5% and terms of trade at 1% level of significance. All variables were stationary at their first differences. This indicated that all the variables are integrated at first difference or of order one, I (1) and they may exhibit some long run linear combination, but terms of trade, political risk and money supply were integrated at level and justified the use of ARDL as the series are integrated at different levels. Table 4.4 summarizes the unit root tests results for the variables under study in their levels as well as their first difference.

4.6 Long Run Relationship

The first specific objective of the study was to establish the relationship between selected macroeconomic factors (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity price. This was achieved by test following hypothesis;

Ho: there is no statistically relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity price at the Nairobi Securities Exchange.

H1: there is statistically relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity price at the Nairobi Securities Exchange.

This hypothesis was tested by employing Autoregressive Distribution Lag (ARDL) approach proposed by Pesaran *et al.*, (2001). Duration of the lag which provided the smallest critical value was identified as the model's duration of lag in the absence of autocorrelation. In this study, the duration of lag was taken as four as indicated in section 4.4

A regression based on ARDL Model (equation 3.4) was run and the results shown in Appendix D for the purpose of applying the results in bound testing for the Wald statistics for joint long run relationship between dependent variable and independent variables. This was done by taking the difference or the change in the four lagged values of all the selected macroeconomic variables and keeping the difference of the equity price as dependent variable. Thereafter, a restriction on the coefficients of the lag values was run. The results of the regression run for the purpose of bound testing are given in table 4.5, while Pesaran *et al.*, (2001) critical bound values are given in table 4.6.

Table 4.5: Bounds Testing for Cointegration Analysis

Test Statistic	Value	df	Probability
F-statistic	7.3307	(9, 4)	0.0353
Chi-square	65.9764	9	0.0000

Source: Survey data, 2015

Table 4.6: Pesaran *et al.,* (2001) Critical bound values

k=8		
Bounds	**Lower I (0)**	**Upper I (1)**
Critical Bounds Value (5%)	2.604	3.846

The results of the bounds tests approach to co-integration showed that the calculated *F-statistics* of 7.333 in table 4.5 was significant (prob=0.0353 which was less than 0.5 level of significance) and was higher than the upper level of bounds critical value of 3.846 as per Pesaran *et al*., (2001) at the 5 percent level of significance as shown in table 4.6. This implied that the null hypothesis of no cointegration or long run relationship was rejected. This implied that there was indeed a cointegrating relationship between selected macroeconomic variables specified in the model and equity price. This is consistent with Akbar et al. (2012) which examined the relationship between the Karachi stock exchange index and macroeconomic variables for the period of January 1999 to June 2008 by employing a co-integration and VECM. They found that there is a long-run equilibrium relationship exists between the stock market index and the set of macroeconomic variables.

Further, the long run coefficients for ARDL model was estimated and results are as shown below;

Table 4.7: Long run Coefficients Estimating Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	36.48321	11.9594	3.0506	0.0039
TREND	0.037687	0.0160	2.3586	0.0229
Log Equity Price(-1)	0.960384	0.0666	14.4229	0.0000
Log Gross Domestic Product (-1)	-2.453895	1.0068	-2.4374	0.0189
Log Public Debt(-1)	0.847142	0.3334	2.5407	0.0147
Log Consumer Price Index(-1)	0.156435	0.6257	0.2500	0.8038
Log Money Supply(-1)	-0.900786	0.4037	-2.2313	0.0308
Log Political Risk(-1)	-0.773104	0.3728	-2.0738	0.0440
Log Terms of Trade(-1)	0.052836	0.1390	0.3802	0.7056
Log Exchange Rate(-1)	-0.750398	0.3636	-2.0637	0.0450
TBR(-1)	-0.005598	0.0063	-0.8878	0.3795
Adjusted R-squared	**0.9570**	**Durbin-Watson stat**		**2.0407**
F-statistic	**121.1095**	**Prob(F-statistic)**		**0.0000**

Source: Survey data, 2015

Table 4.7: displays the results long term coefficients under ARDL Approach. The long run relationship results reveal an Adjusted R-square of 95.7%. This meant that the changes in macroeconomic variables explained 95.7% change in equity prices while 19% of the changes in share prices were explained by other factors other than the selected macroeconomic variables. The F-statistics probability value (0.0000) was statistically significant at five percent level of significance implying a good fit.

The coefficient of money supply aggregate was found to be and negative insignificant at five percent level of significance. This is contrary to Dhakal et al. (1993) and Mukherjee et al. (1995) which found that there is a positive relation between money supply and stock price. The effect of money supply on stock prices in this study was negative. This can be explained by the fact that the rate of inflation is positively related to money growth rate, as noted by Fama (1981), an increase in the money supply may lead to an increase in the discount rate and lower stock prices.

The coefficient of political risk was found to be negative and significant at five percent level of significance. This results are in agreement with the findings of (Gul et al., 2013) which examined the impact of events of different nature like: political, natural calamities and terrorism on the share prices of the financial sector of Pakistan and the results indicated that such events have significant impact on the stock prices and prices behave negatively when a major event emerges on national or international front.

The coefficient of exchange rate was found to be negative and significant at five percent level of significance. The results are in agreement with Muhammad and Rasheed (2002), which explained that as the local currency depreciates against other major currencies, for the firms that rely on the imports, their costs increases reducing their cash inflow which leads to reduction of the relative dividends, hence reducing the stock prices. Kenya's currency is always under pressure from the major foreign currencies due to reliance on imports. While the exporting firms benefit from the depreciating currency, the increased competition and local inflationary pressure makes it difficult as the inflation rates in Kenya is much higher and this erodes the increase in the corporate profits that the exporting firms get from the depreciating currency, which is not the case with other strong economies which benefits from this effect.

The coefficient of gross domestic product was found to be negative and significant at five percent level of significance. This could be explained that during the recession phase, there is often a de-coupling of Gross Domestic Product growth and stock market return: Gross Domestic Product growth will be falling while the excess return on shares will tend to be positive. Historically, falling inflation and an accompanying loosening of

monetary policy during this phase lead to a ‘re-rating’ of the equity markets. The discounted cash flow method of equity valuation usually equates the fair value of a stock to the present value of expected future cash flows. The Value of the equity price is calculated by discounting expected future cash flows by the relevant interest rate. Decrease in interest rates as a result of loosening of monetary policy causes stock prices to increase, hence equity investors may realise good returns on equity during a period in which the rate of Gross Domestic Product growth is falling. Given that the Gross Domestic Product growth expectations are already priced into the equity markets, a sustained period of weak economic growth would not necessarily lead to poor performance in the equity markets for as long as this weak growth is not unexpected. Further, the coefficient of public debt was found to be positive and significant at five percent level of significance. This can be explained by the fact that expenditure as a result of borrowing will stimulate the economy. This will have slight tendency to stimulate the securities market in the short run.

4.7 Short Run Dynamic Relationship

The second objective of the study was to establish short run dynamic relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity prices. This could be achieved by testing the following hypothesis;

> Ho: there is no statistically significant short run dynamic relationship between macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity price at the Nairobi Securities Exchange.

H1: there is a statistically significant short run dynamic relationship between macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity price at the Nairobi Securities Exchange.

This was done by running error correction representation of equation (3.5) for the ARDL model and establishing whether the error correction term was significant. Table 4.8 reports the short run coefficient estimates obtained from the Error Correction Model.

Table 4.8: Error Correction Representations of ARDL Model
Dependent Variable: **D(LNSE20SI)**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.4145	0.005916	70.0630	0.0091
TREND	0.0050	0.000147	34.0248	0.0187
D(Log Gross Domestic Product)	-34.9914	0.407667	-85.8333	0.0074
D(Log Terms of Trade)	-0.4937	0.017797	-27.7410	0.0229
D(Log Public Debt)	-6.0845	0.090203	-67.4527	0.0094
D(Log Consumer Price Index)	-23.7467	0.26839	-88.4781	0.0072
D(Log Political Risk)	11.5727	0.115992	99.7712	0.0064
D(Log Money Supply)	-4.5123	0.130746	-34.5123	0.0184
D(Log Exchange Rate)	2.0169	0.052904	38.1240	0.0167
D(Treasury Bill Rate)	0.0282	0.000535	52.6659	0.0121
D(Log Public Debt(-1))	20.4864	0.211736	96.7544	0.0066
D(Log Money Supply(-1))	-4.4054	0.08691	-50.6889	0.0126
D(Log Consumer Price Index(-1))	1.0697	0.044462	24.0601	0.0264
D(Log Political Risk(-1))	-7.8993	0.080326	-98.3407	0.0065
D(Log Terms of Trade (-1))	2.0532	0.0185	110.9835	0.0057
D(Log Exchange Rate(-1))	-11.1209	0.085346	-130.3038	0.0049
D(Treasury Bill Rate(-1))	-0.0478	0.000613	-78.0347	0.0082
D(Log Equity Price(-1))	-3.0786	0.028765	-107.0281	0.0059
D(Log Gross Domestic Product(-2))	-8.8805	0.128598	-69.0559	0.0092
D(Log Public Debt(-2))	-5.7224	0.106602	-53.6797	0.0119
D(Log Consumer Price Index(-2))	3.7420	0.041632	89.8817	0.0071
D(Log Money Supply(-2))	16.8284	0.199024	84.5549	0.0075
D(Log Political Risk(-2))	-6.4577	0.051455	-125.5024	0.0051
D(Log Terms of Trade(-2))	-1.2324	0.03139	-39.2608	0.0162
D(Log Exchange Rate(-2))	-4.3258	0.050159	-86.2428	0.0074
D(Treasury Bill Rate(-2))	-0.1000	0.000941	-106.2860	0.0060
D(Log Equity Price(-2))	2.5510	0.029793	85.6228	0.0074
D(Log Gross Domestic Product(-3))	-13.5339	0.085828	-157.6865	0.0040
D(Log Public Debt(-3))	3.7014	0.077861	47.5386	0.0134

D(Log Consumer Price Index(-3))	12.2536	0.127273	96.2783	0.0066
D(Log Money Supply(-3))	-5.4748	0.068512	-79.9113	0.0080
D(Log Political Risk(3))	-4.3919	0.054117	-81.1559	0.0078
D(Log Exchange Rate(-3))	2.7554	0.049313	55.8750	0.0114
D(Log Terms of Trade(-3))	-0.4670	0.011585	-40.3134	0.0158
D(Treasury Bill Rate(-3))	0.0333	0.000942	35.3623	0.0180
D(Log Equity Price(-3))	0.4437	0.014164	31.3273	0.0203
D(Log Gross Domestic Product(-4))	-13.1771	0.121309	-108.6245	0.0059
D(Log Terms of Trade(-4))	0.2363	0.006116	38.6348	0.0165
D(Log Public Debt(-4))	-8.1199	0.104273	-77.8714	0.0082
D(Log Money Supply(-4))	1.4474	0.047387	30.5442	0.0208
D(Log Exchange Rate(-4))	4.2537	0.051254	82.9931	0.0077
D(Treasury Bill Rate(-4))	-0.1073	0.00135	-79.4908	0.0080
D(Log Consumer Price Index(-4))	1.3319	0.033696	39.5275	0.0161
D(Log Equity Price(-4))	4.5889	0.045023	101.9243	0.0062
D(Log Public Debt(-5))	0.4632	0.028885	16.0357	0.0396
D(Log Gross Domestic Product(-5))	0.6628	0.106015	6.2519	0.1010
D(Log Equity Price(-5))	0.2589	0.010369	24.9679	0.0255
Error Correction Term (-1)	-0.5668	0.023584	-24.0326	0.0265
R-squared	**0.999994**	**Durbin-Watson stat**		**1.8988**
Adjusted R-squared	**0.99972**	**Prob(F-statistic)**		**0.013146**

Source: Survey data, 2015

The Error Correction Term coefficient shows how quick/ slow variables return to equilibrium and it should have a statistically significant coefficient with negative sign. Table 4.8 shows that the coefficient of the lagged error correction term carries an expected negative sign, which is statistically significant supporting the existence of the cointegration relationship among the variables of this model as supported by bound test. The coefficient of error correction term is equal to (-0.56). The absolute value of the coefficient of the error correction term indicates that about 56.68% of the previous quarter disequilibrium in equity prices would be corrected in the current quarter. This findings show that the speed of adjustment is high. This implied that long run equilibrium could be attained. Kremers et al., (1992) ; Banerjee et al., (1993) and Bannerjee et al., (1998) held that a highly significant error correction term is further proof of the existence of stable long run relationship. Indeed, he argued that testing the significance of error correction term, which is supposed to carry a negative coefficient,

is relatively more efficient way of establishing co-integration. The results are in agreement with Asaolu and Ogunmuyiwa (2011) which investigated the impact of macroeconomic variables on Average Share Price for Nigeria for the period of 1986 to 2007using the Johansen Co-integration test. The results affirmed that a long run relationship exists between average share price and the macroeconomic variables. Further, the results agree with Akbar *et al,* (2012) which examined the relationship between the Karachi stock exchange index and macroeconomic variables for the period of January 1999 to June 2008. Employing a co-integration and VECM, they found that there is a long-run equilibrium relationship exists between the stock market index and the set of macroeconomic variables.

4.8 Variance Decomposition

Variance Decomposition analysis was employed as additional evidence presenting more detailed information regarding the variance relations between the equity price and selected macroeconomic variables. Variance decomposition breaks down and shows the extent to which each variable in the model indicates the amount of information each variable contributes to the other variables in the model. It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables. This implies that each variable is explained as a linear combination of its own current innovation and lagged innovation of all the variables in the system.

Table 4.9: Variance Decomposition

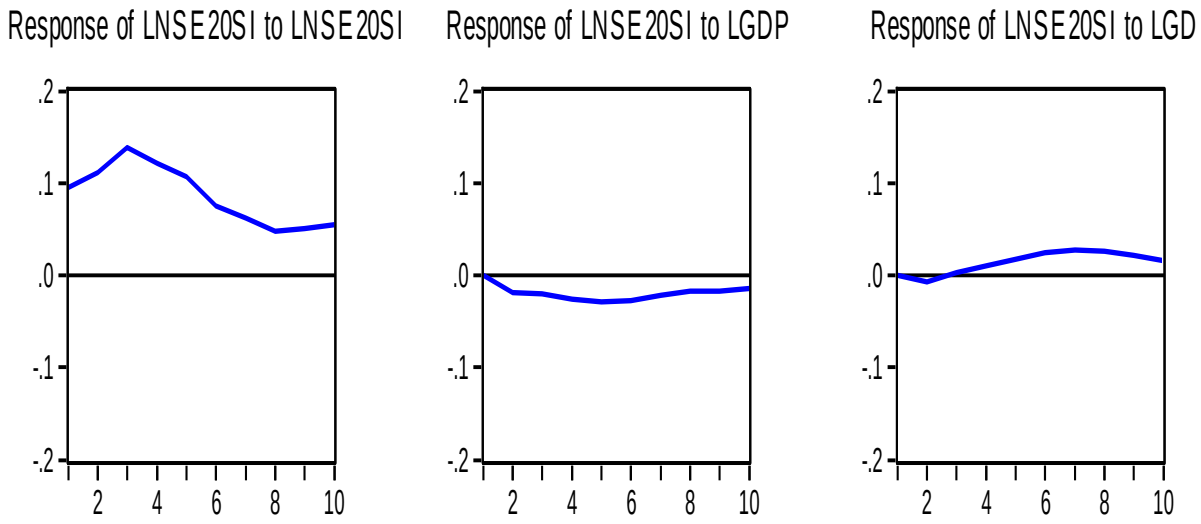
Variance Decomposition of LNSE20SI:										
Period	**Standard Error**	**Equity price**	**Gross Domestic Product**	**Public Debt**	**Money Supply**	**Inflation**	**Exchange Rate**	**Terms of Trade**	**Political Risk**	**Treasury Bill Rate**
1	0.095	100.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.159	85.066	1.323	0.222	0.281	0.455	2.892	0.005	9.693	0.063
3	0.228	78.320	1.416	0.124	0.164	0.298	8.717	0.004	10.540	0.418
4	0.281	70.077	1.833	0.206	0.336	0.483	11.263	0.654	14.145	1.003
5	0.331	60.982	2.090	0.401	0.374	1.037	14.973	0.833	18.201	1.108
6	0.369	53.371	2.248	0.773	0.499	1.660	17.486	0.996	21.658	1.309
7	0.398	48.257	2.242	1.131	0.647	2.030	18.977	1.196	24.099	1.422
8	0.419	44.845	2.196	1.405	0.910	2.406	19.961	1.257	25.570	1.450
9	0.435	42.916	2.181	1.543	1.064	2.652	20.209	1.273	26.751	1.410
10	0.449	41.815	2.155	1.585	1.229	2.784	20.204	1.266	27.580	1.383

Source: Survey data, 2015

Table 4.9 present the variance decomposition results. Results showed that in the first year (quarter four) the equity price were less exogenous in relation to other variables, gross domestic product, public debt, money supply, exchange rate, consumer price index, political risk, terms of trade and Treasury bill rate since 70% of its variance was explained by its own shocks or innovations. Gross domestic product explained 1.8% of the variations in equity price, public debt 0.2%, money supply 0.3%, exchange rate 11%, consumer price index 0.4%, political risk 14%, terms of trade 0.6% and Treasury bill rate 1% of the variations in the equity price. In the tenth quarter (two and half years), 42% of its variance in the equity price was explained by its own shocks or innovations. Gross domestic product explained 2% of the variations in equity price, public debt 1.5%, money supply 1.2%, exchange rate 20%, consumer price index 2.7%, political risk 27%, terms of trade 1.2% and Treasury bill rate 1.3% of the variations in the equity price.

4.9 Impulse Response Function (IRF)

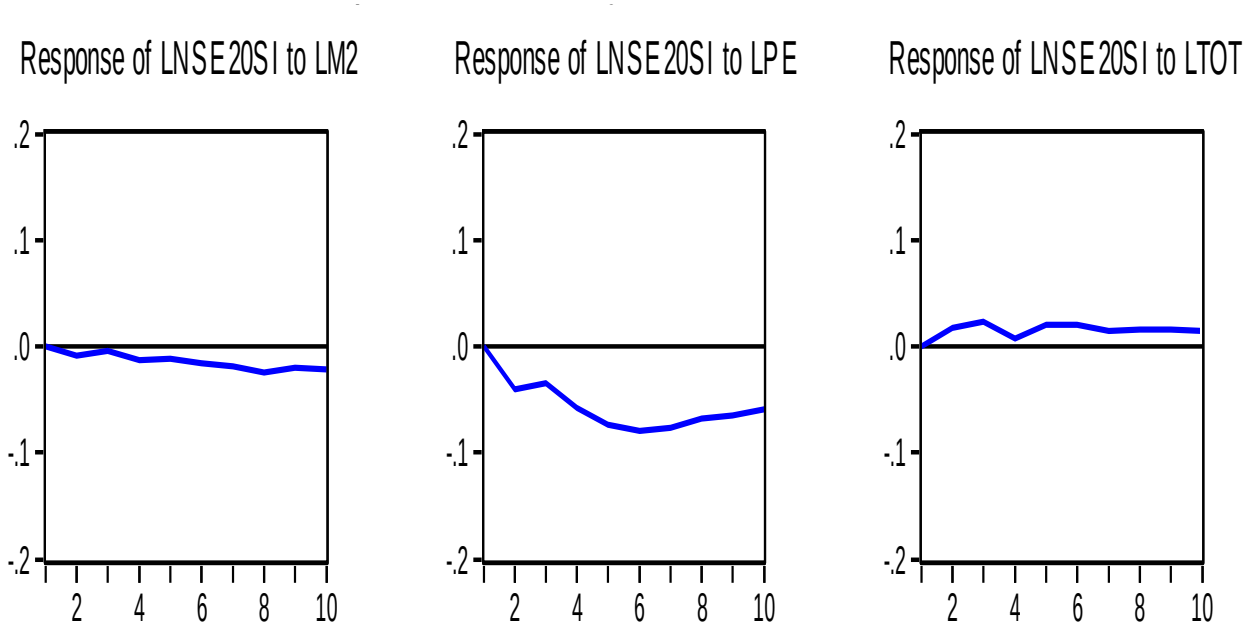
To examine the persistence of the short run response of the equity price to one standard error shocks in each of the macroeconomic variables, impulse response functions were estimated ten quarters. Figures 4.3, 4.4 and 4.5 show the results of the response of equity price resulting from one standard deviation shock in macroeconomic variables. An impulse response function traces the effect of one or more standard deviation shock or innovation to one of the endogenous variables on the current and future values of the endogenous variables in the system.



Source: Survey data, 2015

Figure 4.3: Equity Price Response to Cholesky One S.D Innovation of lagged equity price, gross domestic product and public debt.

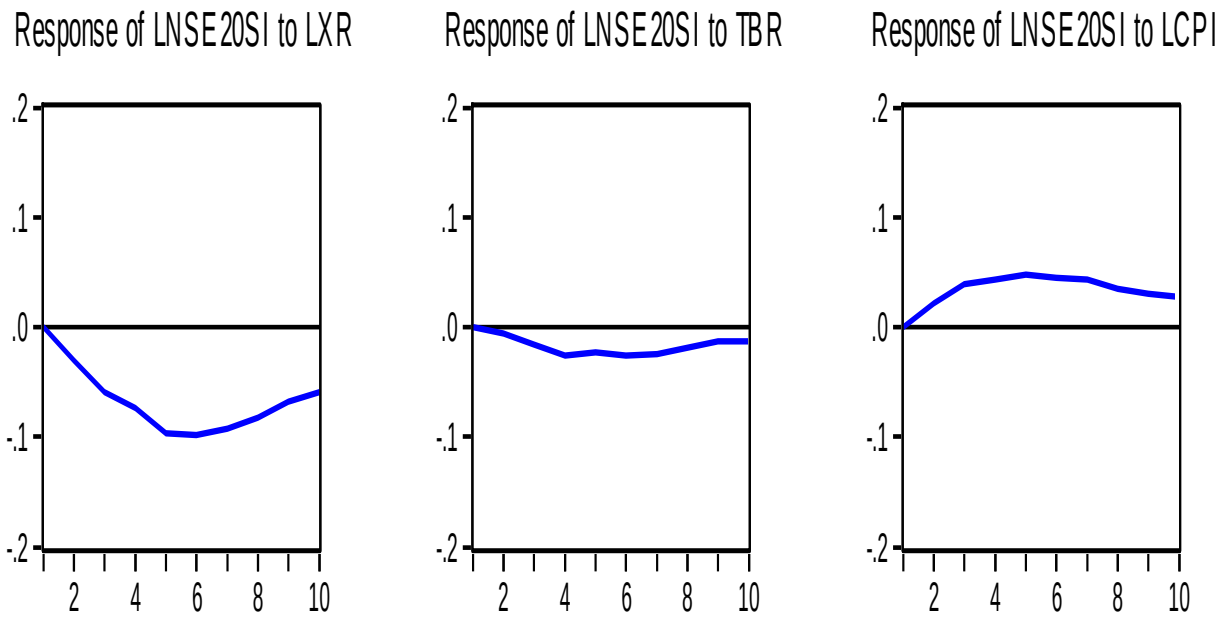
Figure 4.3 indicates that responses of the equity price to one standard deviation positive shock or innovation given to it was positive rise in the first two quarters, then a gradual dropped up to the eighth quarter when it stabilized. Further, the response of stock prices to one standard deviation innovation in real output was stable in the first four quarters, then positive in the fifth quarter as it died out. Finally, the initial response of stock prices to a unit standard deviation shock in public debt was stable for five quarters, and then positive in the sixth quarter as it died out into the tenth quarter.



Source: Survey data, 2015

Figure 4.4: Equity Price Response to Cholesky One S.D Innovation of money supply, political environment and terms of trade.

Figure 4.4 shows that the response of equity prices to Cholesky one standard deviations innovation in money supply in the first eight quarters was negative but stabilized into the future. Additionally, the initial response of stock prices to a unit shock in political risk was negative in the first six quarters then died out. Finally, a shock in terms of trade elicited a positive response in stock prices in the first five quarters which eventually died out.



Source: Survey data, 2015

Figure 4.5: Equity Price Response to Cholesky One S.D Innovation of exchange rate, Treasury bill rate and consumer price index

Figure 4.5 shows that the initial response of exchange rate to a unit standard deviation shock in stock price was negative for the first six quarters then gradually died out into the tenth quarter. Further, the response of stock prices to a unit shock in inflation was negative as it stabilized into the third quarter. Finally, the initial response of stock prices to a unit shock in Treasury bill rate was negative in the first year as it died out into the future.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter summarizes the main findings of the study, highlights the policy implications of the study findings and suggested areas for further research.

5.2 Summary of the findings

The objective of this study was to investigate the dynamic relationship between selected macroeconomic variables (real output, public debt, money supply, exchange rates, inflation, political risk, terms of trade and interest rates) and equity price at the Nairobi Securities Exchange. The first specific objective of the study was to establish long run relationship between selected macroeconomic variables and equity prices. ARDL model was used with specific employment of bound test approach. The results of the bounds tests approach to co-integration showed that the calculated *F-statistics* of 7.333 was significant (prob=0.0353 which was less than 0.5 level of significance) and was higher than the upper level of bounds Pesaran critical value of 3.846. This implied that macroeconomic variables significantly explained equity prices jointly in the long run. The long run coefficients of the model pointed to negative statistical significance for gross domestic product, money supply, political risk and exchange variables and positive statistical significance for lagged equity price and public debt

The second specific objective of the study was to investigate short run dynamic relationship between macroeconomic variables and equity prices. Short run dynamic relationship was established by employing error correction model. The coefficient of lagged error correction term was statistically significant at five percent level of

significance with negative sign. The Coefficient of the Error Correction Term suggested that the speed of adjustment was high at 56.68%. This implied that 56.68% of the previous quarter disequilibrium in equity prices would be corrected in the current quarter.

Further, variance decomposition showed that the equity price was less exogenous in relation to macroeconomic variables in the model reason being 70% of its variance was indeed explained by its own shocks and innovations. The exchange rate explained 11% of the variation in the equity price political risk 14% of the variations in the equity price in the fourth quarter. In the tenth quarter, 42% of its variance in the equity price was explained by its own shocks or innovations. Further, the exchange rate explained 20% and political risk explained 27% of the variations in the equity price.

Impulse response functions showed indicates that responses of the equity price to one standard deviation positive shock or innovation given to itself was positive rise in the first two quarters, then a gradual dropped up to the eighth quarter as it stabilized. The initial response of exchange rate to a unit standard deviation shock in stock price was negative for the first six quarters then gradually died out into the tenth quarter. Finally, the initial response of stock prices to a unit shock in political risk was negative in the first six quarters then died out into the tenth quarter.

5.3 Conclusions

This study examined the long run and short run relationship between selected macroeconomic variables and equity prices at the Nairobi Securities Exchange, using statistical such as ARDL approach. The analysis showed that there is a long run

negative relationship between gross domestic product, money supply, political risk and exchange rate and equity price. Further, there was long run positive significant relationship between lagged equity price and public debt and equity price at the Nairobi Securities Exchange. In addition, the analysis showed that in the short run, 56.68% of the previous quarter disequilibrium in equity prices would be corrected in the current quarter. Based on the findings of this research, it was concluded that one standard deviation positive shock on gross domestic product, money supply, political risk and exchange rate negatively affect the equity price and standard deviation positive shock on public debt and lagged equity price positively affect equity price for firms listed at the Nairobi Securities Exchange. The high speed of adjustment suggested quick reaction of the market to information.

5.4 Policy Implications

Several implications could be drawn from the theoretical literature and findings of the study. First, the investors and senior managers of listed companies should incorporate political risk, fiscal policy and macroeconomic environment as a special consideration in their investment strategy aimed at maximizing shareholders' wealth. Secondly, the government of Kenya should put in place appropriate policy measures to ensure that the exchange rate is stabilized. This is because empirical evidence from study has shown that exchange rate negatively affects equity price. Depreciation in the exchange rate leads to a decline in equity price from the Nairobi Securities exchange. Once the currency is stabilized, it will create the investors' confidence at the Nairobi Securities Exchange; this would create demand for securities therefore enhancing equity prices and hence maximizing shareholder's wealth. In addition, the Kenya government should put in place measures to stimulate the economic growth. This would put the Country in an

economic recovery route which would significantly affect the performance of the Nairobi Securities Exchange positively. The measures could be fiscal or monetary in nature. Empirical evidence from study has shown that money supply negatively affects equity price at Nairobi Securities Exchange. The architects of monetary policy should be careful in revision of monetary instruments so as to ensure that money supply is stable. A stable money supply will ultimately have a positive impact to capital market. Further, the government of Kenya should put in place measures such as good governance principles incorporated in law, zero tolerance to corruption, implement devolution structures in the constitution and hold to account leaders and citizens through constitutional bodies who incite citizens to violence and implement any other measure that aimed at reducing political risk in the Kenya. This is because empirical evidence from study has shown that political risk negatively

5.5 Limitations of the Study

The limitations of the study are related to the case study and data set. First, the use of quarterly data set was as a result of lack of monthly data for Gross Domestic Product. This forced the researcher to use quarterly data as opposed to monthly data as had been planned.

Secondly, this study used NSE20Share Index, an index that keep changing based on the performance of the company in the previous 12 months. In addition, reliability and accuracy of the data have a bearing on the results of the study. Despite a lot of effort being put to ensure accuracy of the data collected, there was a problem with some data being averaged since data collected was on yearly basis. Stock prices for example were provided on a daily basis while most of macroeconomic variables were available on monthly basis. The time difference and averaging of variables may have affected the

accuracy results. Finally, despite effort being put to ensure accuracy of the data collected, there was a problem with some data being averaged since data collected for all variables except Gross Domestic Product was on monthly. The time difference and averaging of variables could have affected the accuracy of the results.

5.6 Areas for Further Studies

Future studies may be conducted to identify microeconomic factors on stock price and how an investor can reduce microeconomic risk by undertaking a strong portfolio diversification strategy.

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APPENDICES

Appendix A: Research Permit

MOI UNIVERSITY
SCHOOL OF BUSINESS AND ECONOMICS

Tel: (053) 43620
Fax No: (053) 43360
Telex No. 35047 MOIVARSITY

Box 3900
Eldoret
KENYA

REF: SBE/PGR/STA/20 **DATE:** 9th September, 2014

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: WILSON KIBET TUIGONG - SBE/PGE/002/13

This is to confirm that the above named person is a bonafide student of Moi University, School of Business & Economics undertaking a Master of Arts Degree in Economics.

He has completed course work, defended his proposal and currently proceeding to the field to collect data for his thesis titled; *"Dynamic Relationship Between Macroeconomic Variables and Equity Price at the NSE, Kenya"*.

Any assistance accorded to him will be highly appreciated.

Yours faithfully,

SCHOOL OF BUSINESS & ECONOMICS
MOI UNIVERSITY
P O Box 3900 ELDORET 30100

DR. MARK KORIR
HOD, ECONOMICS

Appendix B: Data Collection Schedule

Quarter	NSE20SI	CPI	XR	TBR	ToT	GD	PE	GDP	M2
2000:1									
2000:2									
2000:3									
2000:4									
2001:1									
2001:2									
2001:3									
2001:4									
2002:1									
2002:2									
2002:3									
2002:4									
2003:1									
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2005:4									
2006:1									
2006:2									
2006:3									
2006:4									
2007:1									
2007:2									
2007:3									
2007:4									
2008:1									
2008:2									
2008:3									
2008:4									
,,									
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,,									
2013:4									

Appendix C: Target Population

S/No	COMPANY	SYMBOL	ISSUED SHARES	COMPARTMENT
1	A.Baumann & Co Ltd	BAUM	3,840,066	Main
2	AccessKenya Group Ltd	ACCS	218,467,081	Main
3	ARM Cement Ltd	ARM	495,275,000	Main
4	Atlas Development & Support Services	ADSS	39,139,827	GEMS
5	B.O.C Kenya Ltd	BOC	19,525,446	Main
6	Bamburi Cement Ltd	BAMB	362,959,275	Main
7	Barclays Bank of Kenya Ltd	BBK	5,431,536,000	Main
8	British American Tobacco Kenya Ltd	BAT	100,000,000	Main
9	British-American Investments Co.(K) Ltd	BRIT	1,891,451,850	Main
10	Car & General (K) Ltd	C&G	33,419,424	Main
11	Carbacid Investments Ltd	CARB	33,980,265	Main
12	Centum Investment Co Ltd	ICDC	665,441,775	Main
13	CFC Stanbic of Kenya Holdings Ltd	CFC	395,321,638	Main
14	CIC Insurance Group Ltd	CIC	2,179,615,440	Main
15	CMC Holdings Ltd	CMC	582,709,440	Main
16	Co-operative Bank of Kenya Ltd	COOP	4,190,845,080	Main
17	Crown Paints Kenya Ltd	BERG	23,727,000	Main
18	Diamond Trust Bank Kenya Ltd	DTK	220,100,096	Main
19	Eaagads Ltd	EGAD	32,157,000	Main
20	East African Breweries Ltd	EABL	790,774,356	Main
21	East African Cables Ltd	CABL	253,125,000	Main
22	East African Portland Cement Co. Ltd	PORT	90,000,000	Main
23	Equity Bank Ltd	EQTY	3,702,777,020	Main
24	Eveready East Africa Ltd	EVRD	210,000,000	Main
25	Express Kenya Ltd	XPRS	35,403,790	Main
26	Flame Tree Group Holdings Ltd	FTGH	161,866,804	GEMS
27	Home Afrika Ltd	HAFR	405,255,320	GEMS
28	Housing Finance Co.Kenya Ltd	HFCK	235,750,000	Main
29	Hutchings Biemer Ltd	HBL	360,000	Main
30	I&M Holdings Ltd	I&M	392,362,035	Main
31	Jubilee Holdings Ltd	JUB	59,895,000	Main
32	Kakuzi Ltd	KUKZ	19,599,999	Main
33	Kapchorua Tea Company Ltd	KAPC	3,912,000	Main
34	KenGen Company Ltd	KEGN	2,198,361,456	Main
35	KenolKobil Ltd	KENO	1,471,761,200	Main
36	Kenya Airways Ltd	KQ	1,496,469,035	Main
37	Kenya Commercial Bank Ltd	KCB	2,984,137,017	Main
38	Kenya Orchards Ltd	ORCH	12,868,124	Main
39	Kenya Power & Lighting Co Ltd	KPLC	1,951,467,045	Main
40	Kenya Re Insurance Corporation Ltd	KNRE	700,000,000	Main
41	Liberty Kenya Holdings Ltd	CFCI	515,270,364	Main

42	Limuru Tea Company Ltd	LIMT	1,200,000	Main
43	Longhorn Kenya Ltd	LKL	58,500,000	Main
44	Marshalls East Africa Ltd	MASH	14,393,106	Main
45	Mumias Sugar Co. Ltd	MSC	1,530,000,000	Main
46	Nation Media Group Ltd	NMG	188,542,286	Main
47	National Bank of Kenya Ltd	NBK	280,000,000	Main
48	NIC Bank Ltd	NIC	542,984,148	Main
49	Olympia Capital Holdings Ltd	OCH	40,000,000	Main
50	Pan Africa Insurance Holdings Ltd	PAFR	96,000,000	Main
51	Rea Vipingo Plantations Ltd	REA	60,000,000	Main
52	Safaricom Ltd	SCOM	40,000,000,000	Main
53	Sameer Africa Ltd	FIRE	278,342,393	Main
54	Sasini Ltd	SASN	228,055,500	Main
55	Scangroup Ltd	SCAN	284,789,128	Main
56	Standard Chartered Bank Kenya Ltd	SCBK	309,159,514	Main
57	Standard Group Ltd	SGL	81,481,478	Main
58	Total Kenya Ltd	TOTL	175,028,706	Main
59	TPS Eastern Africa Ltd	TPSE	182,174,108	Main
60	Trans-Century Ltd	TCL	273,950,284	Main
61	Uchumi Supermarket Ltd	UCHM	265,426,614	Main
62	Unga Group Ltd	UNGA	75,708,873	Main
63	Williamson Tea Kenya Ltd	WTK	8,756,320	Main

Appendix D: ARDL Estimation Results

Dependent Variable: D(LNSE20SI) Method: Least Squares				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	85.7264	103.5687	0.8277	0.4544
@TREND	-0.0603	0.1165	-0.5179	0.6319
Log NSE20 Share Index (-1)	-0.9195	0.2485	-3.6999	0.0208
Log Terms of Trade (-1)	-0.9532	1.5327	-0.6219	0.5677
Log Consumer Price Index(-1)	5.8975	3.1087	1.8971	0.1307
Log Gross Domestic Product (-1)	-5.3341	7.7687	-0.6866	0.5301
Log Government Debt (-1)	1.2861	0.8604	1.4948	0.2093
Log Political Risk (-1)	-5.8719	1.5572	-3.7708	0.0196
Log Money supply(-1)	-0.7703	1.2776	-0.6030	0.5791
Log Treasury Bill Rate (-1)	-0.0377	0.0246	-1.5322	0.2002
Log Exchange Rate(-1)	-4.5890	1.5008	-3.0576	0.0377
D(Log NSE20 Share Index (-1))	-0.1018	0.2413	-0.4220	0.6947
D(Log Gross Domestic Product (-1))	14.4412	6.0526	2.3859	0.0755
D(Log Government Debt (-1))	3.3538	1.4273	2.3498	0.0785
D(Log Political Risk (-1))	0.8300	1.6395	0.5062	0.6393
D(Log Money supply (-1))	5.9819	1.8403	3.2505	0.0314
D(Log Treasury Bill Rate (-1))	0.0114	0.0192	0.5929	0.5851
D(Log Exchange Rate (-1))	-0.8473	1.2072	-0.7018	0.5215
D(Consumer Price Index (-1))	0.9900	2.3283	0.4252	0.6926
D(Log Terms of Trade (-1))	1.4069	1.3347	1.0541	0.3513
D(Log NSE20 Share Index (-2))	0.8338	0.5572	1.4964	0.2089
D(Log Terms of Trade (-2))	0.7965	1.0252	0.7769	0.4806
D(Log Gross Domestic Product (-2))	13.5335	4.0418	3.3484	0.0286
D(Log Government Debt (-2))	-1.4191	0.8230	-1.7242	0.1598
D(Log Political Risk (-2))	0.2400	1.1273	0.2129	0.8418
D(Log Money supply (-2))	5.4848	2.4594	2.2302	0.0896
D(Log Treasury Bill Rate (-2))	0.0189	0.0149	1.2683	0.2735
D(Log Exchange Rate (-2))	0.3548	0.9829	0.3609	0.7364
D(Consumer Price Index (-2))	3.4013	1.8380	1.8506	0.1379
D(Log NSE20 Share Index (-3))	0.7870	0.5146	1.5293	0.2009
D(Log Terms of Trade (-3))	0.9334	0.6528	1.4300	0.2259
D(Log Gross Domestic Product (-3))	8.9489	2.7448	3.2603	0.0311
D(Log Government Debt (-3))	-1.0303	1.0261	-1.0041	0.3722
D(Log Political Environment (-3))	-0.2566	0.9821	-0.2613	0.8068
D(Log Money supply (-3))	-3.4802	2.6508	-1.3129	0.2595
D(Log Treasury Bill Rate (-3))	0.0183	0.0108	1.7037	0.1636
D(Log Exchange Rate (-3))	3.2481	1.3159	2.4683	0.0691
D(Consumer Price Index (-3))	3.6740	1.2579	2.9208	0.0432
D(Log NSE20 Share Index (-4))	1.1959	0.4255	2.8108	0.0483
D(Log Terms of Trade (-4))	0.3625	0.2773	1.3072	0.2612
D(Log Gross Domestic Product (-4))	3.7998	2.1026	1.8072	0.1450

D(Log Government Debt (-4))	-3.5647	1.3218	-2.6968	0.0543
D(Log Political Risk (-4))	0.7443	0.9293	0.8009	0.4680
D(Log Money supply (-4))	-0.0364	1.4704	-0.0248	0.9814
D(Log Treasury Bill Rate (-4))	-0.0464	0.0152	-3.0433	0.0383
D(Log Exchange Rate (-4))	1.7098	1.1676	1.4644	0.2169
D(Consumer Price Index (-4))	0.4122	0.8282	0.4978	0.6448
Adjusted R-squared	**0.848205**	**Prob(F-statistic)**		**0.034102**
F-statistic	**7.073742**	**Durbin-Watson stat**		**2.032299**

Source: Author, 2015