ANALYSIS OF THE DETERMINANTS OF STOCK PRICE VOLATILITY AT NAIROBI SECURITIES EXCHANGE

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DECLARATION

I declare that, this Research Project is my original work and has not been presented for any academic award in any university.

Signed ……Date……

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

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Many people assisted and contributed in different ways in this project. I would like to express my gratitude to my supervisor who guided me through the research. I would also like to thank my class mates and colleagues for their encouragement.

DEDICATION

To my late dad, Joseph Waweru, my lovely mum Lucy Wangui and my entire family.

ABSTRACT

Most studies on the effect of macroeconomic variables on stock markets however seem focused on developed markets. Though in recent times, substantial amount of research is also emerging on macroeconomic volatility and stock markets in African markets. From the literature and empirical evidence review it is still not clear on the direction of the relationship between exchange rates, interest rates, and inflation and stock prices. Most of the studies done in Kenya previously considered two variables and used quarterly data. This study used four variables and considered monthly data on interest rate, inflation, exchange rate and stock price to examine the relationship between interest rate, exchange rate, inflation and stock price volatility in the NSE.

The study made used monthly data spanning from January2003 to December 2013. The data was obtained from various sources. Data on interest rates and the exchange rates was obtained from the Central Bank of Kenya. Data on inflation was obtained from Kenya National Bureau of Statistics. The NSE 20 Share Index was obtained from Nairobi Securities Exchange. Regression analysis and descriptive statistics were used to determine the relationship between inflation, interest rates, exchange rates and stock price volatility.

From the findings, the coefficients on Interest rate was -34.818, exchange rate was -119.475 and the coeficient for inflation was 32.204. These findings mean that a unit change in inflation rate leads to an increase in stock price. In addition a unit change in Interest rates leads to a decrease in stock price, while a unit change in exchange rate results to a decrease in stock price.

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LIST OF ABBREVIATIONS

ARIMA	-	Autoregressive Integrated Moving Average
ATS	-	Automated Trading System
CBK	-	Central Bank of Kenya
CDS	-	Central Depository System
CPI	-	Consumer Price Index
DASS	-	Computerized Delivery and Settlement System
EMH	-	Efficient Market Hypothesis
GC	-	Granger Causality Model
GDP	-	Gross Domestic Product
HIBOR	-	Hong Kong Interbank Offered Rate
IFC	-	International Finance Corporation
KSH	-	Kenya Shillings
MIT	-	Millennium Information Technologies
NSE	-	Nairobi Securities Exchange
PPP	-	Purchasing Power Parity Theory
SSPS	-	Statistical Package for Social Sciences
USA	-	United States of America
VAR	-	Vector Auto Regression

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

With the advent of information technology, especially the internet-based applications in the capital markets at the global level, information describing the macro and microenvironment of economies is readily accessible. This flow of information has perhaps, made the capital markets relatively more efficient as the stakeholders are better placed to access and act in accordance with the changing dynamics of environment (Pal and Mittal, 2011).

According to the efficient-market hypothesis (EMH) theory (Fama, 1970), an efficient capital market is one in which stock prices change rapidly as the new information becomes available (Maysami et al., 2004). Several studies have found a correlation between changes in world economy and macroeconomic variables. These studies also suggest that the movement of stock market indices is highly sensitive to the changes in the fundamentals of the economy, to the changes in the expectation about future prospects (Ahmed, 2008) and may even serve as a proxy for the pervasive risk factors (Brown and Otsuki, 1990)

Conducive macroeconomic environment promotes the profitability of business, which propels them to a stage where they can access securities for sustained growth. Generally,the barometers for measuring the performance of the economy include, among others,real GDP growth rate, rate of inflation, the exchange rate, fiscal position, the debt position and many other factors. These

macroeconomic factors are the major determinants of the growth of an economy. Further, as the stock prices accurately reflect the underlying fundamentals, they should be employed as leading indicators of future economic activities (Pal and Mittal, 2011)

1.1.1 Stock Price Volatility

According to Ambrosio (2007) stock market volatility is the fluctuation in the price of broad stock market indexes over a defined period. When people associated with the investment industry talk about stock market volatility, often they are referring to the standard deviation of a stock market index's returns.

Investors are by nature risk averse, and the volatility of their investments is of importance to them because it is a measure of the level of risk they are exposed. The common stock's volatility is a benchmark for measuring risk. It indicates the changing pace in the stock's price over a determined period; the more considerable volatility implies that the possibility of gain or loss is higher in short-term. So the price of volatile stock would differ considerably over time and it is very difficult to predict the future price of this stock. Investors usually choose less risky investment and less risky investments are better than those with higher risk (Kinder, 2002).

1.1.2Determinants of Stock Price Volatility

The determinants of stock price volatility include inflation rate, interest rate and exchange rate. Tucker (2007) refers to inflation as an increase in the general price level of goods and services in the economy. Inflation is an increase in the overall average level of prices and not an increase in any specific product.Sloman and Kevin (2007) explain that inflation may be either demand pull

inflation or cost push inflation. Demand pull inflation is caused by persistent rises in aggregate demand thus the firms responding by raising prices and partly by increasing output. Cost push inflation is associated by persistent increase in the costs experienced by firms. Firms respond by raising prices and passing the costs on to the consumer and partly cutting back on production. Hendry (2006) agrees that inflation is the resultant of many excess demands and supplies in the economy.

Tucker (2007) observed that there are many measures of inflation, because there are many different price indices relating to different sectors of the economy. Two widely known indices for which inflation rates are reported in many countries are the CPI, which measures prices that affect typical consumers, and the GDP deflator, which measures prices of locally-produced goods and services.

Exchange rate is the price at which one country's currency exchanges for another country's currency. The exchange rate plays a pivotal role in determining the price of a nation's product in the rest of the world and domestic price of goods imported from abroad. Today world trade is conducted in a floating exchange rate system, where exchange rate changes continuously throughout the day (Thomas, 2006). Samuelson and Nordhaus (2010) define exchange rate as prices of one currency expressed in terms of another, they can be expressed in two ways, direct and indirect quotation.

The role of exchange rate in an open economy frame work is important in the monetary transmission mechanism. Real exchange rates affect aggregate demand channel of the monetary

transmission of monetary policy. It affects the relative prices between domestic and foreign goods and foreign demand for domestic goods (Ncube and Ndou 2011). Changes in foreign exchange rates can be measured in nominal and real terms. Most previous studies on the relationship between stock returns and changes in exchange rates have used nominal exchange rates. Khoo (1994) argues that if the changes in exchange rates are measured in real terms, then all variables in the regression equations must also be adjusted for inflation for consistency purposes. Mark (1990) claims that the contemporaneous movements in nominal and real foreign exchange rates are almost perfectly correlated for the seven countries used in his study.

According to Thomas (2006) interest rate is the cost of borrowing expressed as a percentage per year. It is a key economic variable that plays an important role in consumer's decision to purchase. The real interest rate, the interest adjusted for expected inflation is particularly significant. Samuelson and Nordhaus (2010) define interest as the price paid for borrowing money over a period of time; they add that there are many interest rates depending upon the maturity, risk, tax status, and other attributes of loan. Howells and Bain (2008) define interest as payment from borrowers to lenders which compensates the latter for parting with funds for a period of time at some risk.

The real interest rate influences consumption and investment expenditures and the way in which wealth is redistributed between borrowers and lenders. If real interest rates are unusually high lenders benefit at the expense of borrowers. If real interest rates are abnormally low, borrowers benefit at the expense of the lenders (Thomas, 2006). Interest rates rank among the most crucial variables in macroeconomics and in the practical world of finance. Interest rate changes

influence many economic phenomena, including the level of consumer expenditures on durable goods, investment expenditures on plants, equipment and technology and the way wealth is redistributed between borrowers and lenders. Interest rates influence the prices of key financial assets such as stocks, bonds, and foreign currencies (Thomas, 2006)

1.1.3 Relationship between Stock Price Volatility and Its Determinants

It is argued that inflation andstock prices are inversely related (Jaffe and Mandelker, 1976; Bodie, 1976; Nelson, 1976; Fama and Schwert, 1977). This is contrary to prior expectations by the Fisher hypothesis of a one to one increasing relationship between stock returns and inflation. Further empirical tests on the response of stock returns to inflation, in the 1980s by Fama (1981), Gertler and Grinols (1982), and Solnik (1983), amongst others, also yielded similar results of a negative relationship. Empirical works however continue toproduce mixed results (Gultekin, 1983; Solnik, 1983; Ely and Robinson, 1994; Groenewold et al., 1997; Caporale and Jung, 1997; Barnes et al., 1999; Boyd et al., 2001).

Two portfolio models of exchange rate transmission mechanism explain the link between exchange rates and stock returns. According to the Flow-Oriented model (Dornbusch and Fischer, 1980; Gavin, 1989) a reduction in stock prices reduces wealth of local investors and further reduces liquidity in the economy. The reduction in liquidity also reduces interest rates, which in turn induces capital outflows and causes currency depreciation.

In the case of the Stock-Oriented (Branson, 1983; Frankel, 1983) model, the exchange rate equates demand and supply for assets (bonds andstocks). Therefore, expectations of relative

currency movements have a significant impact on price movements of financially held assets. For instance, the depreciation ofa domestic currency against a foreign currency (for example, US dollar) increases returns on the foreign currency and induces investors to shift funds from domesticassets (stocks) towards US dollar assets, depressing stock prices. Thus, a depreciating currency has a negative impact on stock market returns.

It is argued that there is an inverse relationship between interest rates and stock returns. Thorbecke (1997) and Smal and de Jager (2001) observe that a reduction in interest rates induces an injection of liquidity into the economy. This extra liquidity could be channeled to the stock market, driving up the demand and prices of stocks. Patelis (1997) notes that interest rate changes are helpful in predicting stock market returns over a long period. Thus, there is evidence to conclude that interest rate policies should also target stock market price movements.

There are, however, counterarguments that seek to show that interest rate changes may not be enoughto influence stock-price misalignments. Bernanke and Gertler (1999, 2001) observe that the volatile nature of asset prices makes them hard to predict and that monetary authorities should only change interest rates in reaction to stock-price movements, when they expect such movements to affect inflation. Goodfriend (2003) also notes that, since there is no stable correlation between stock-price returns and short-term interest rates, it would be difficult for interest rates to target stock-price changes appropriately. Bernanke and Kuttner (2003)also note that stock markets do not react much to interest rate changes.

1.1.4 Nairobi Securities Exchange

In Kenya, dealing in shares and stocks started in the 1920's when the country was still a British colony. However the market was not formal as there were no rules and regulations to govern stock broking activities. Trading took place on a 'gentleman's agreement.' Standard commissions were charged with clients being obligated to honor their contractual commitments of making good delivery, and settling relevant costs. At that time, stock broking was a sideline business conducted by accountants, auctioneers, estate agents and lawyers who met to exchange prices over a cup of coffee. Because these firms were engaged in other areas of specialization, the need for association did not arise (www.nse.co.ke).

In 1951, an Estate Agent by the name of Francis Drummond established the first professional stock broking firm. He also approached the then Finance Minister of Kenya, Sir Ernest Vasey and impressed upon him the idea of setting up a stock exchange in East Africa. The two approached London Stock Exchange officials in July of 1953 and the London officials accepted to recognize the setting up of the Nairobi Stock Exchange as an overseas stock exchange (www.nse.co.ke).

In 1954 the Nairobi Stock Exchange was then constituted as a voluntary association of stock brokers registered under the Societies Act. Since Africans and Asians were not permitted to trade in securities, until after the attainment of independence in 1963, the business of dealing in shares was confined to the resident European community. At the dawn of independence, stock market activity slumped, due to uncertainty about the future of independent Kenya (www.nse.co.ke).

1988 saw the first privatization through the NSE, of the successful sale of a 20% government stake in Kenya Commercial Bank. The sale left the Government of Kenya and affiliated institutions retaining 80% ownership of the bank. Notably, on February 18, 1994 the NSE 20-Share Index recorded an all-record high of 5030 points. The NSE was rated by the International Finance Corporation (IFC) as the best performing market in the world with a return of 179% in dollar terms. The NSE also moved to more spacious premises at the Nation Centre in July 1994, setting up a computerized delivery and settlement system (DASS). For the first time since the formation of the Nairobi Stock Exchange, the number of stockbrokers increased with the licensing of 8 new brokers (www.nse.co.ke).

In 1996, the largest share issue in the history of NSE, the privatization of Kenya Airways, came to the market. Having sold a 26% stake to KLM, the Government of Kenya proceeded to offer 235,423,896 shares (51% of the fully paid and issued shares of Kshs. 5.00 each) to the public at Kshs. 11.25 per share. More than 110,000 shareholders acquired a stake in the airline and the Government of Kenya reduced its stake from 74% to 23%. The Kenya Airways Privatization team was awarded the World Bank Award for Excellence for 1996 for being a model success story in the divestiture of state-owned enterprises (www.nse.co.ke).

In September 2006 live trading on the automated trading systems (ATS) of the Nairobi Stock Exchange was implemented. The ATS was sourced from Millennium Information Technologies (MIT) of Colombo, Sri Lanka, who is also the suppliers of the Central Depository System (CDS). MIT have also supplied similar solutions to the Colombo Stock Exchange and the Stock Exchange of Mauritius. The NSE ATS solution was customized to uphold the spirit of the Open Outcry Trading Rules in an automated environment (www.nse.co.ke).

In July 2011, the Nairobi Stock Exchange Limited changed its name to the Nairobi Securities Exchange Limited. The change of name reflected the strategic plan of the Nairobi Securities Exchange to evolve into a full service securities exchange which supports trading, clearing and settlement of equities, debt, derivatives and other associated instruments (www.nse.co.ke).

In September 2011 the Nairobi Securities Exchange converted from a company limited by guarantee to a company limited by shares and adopted a new Memorandum and Articles of Association reflecting the change (www.nse.co.ke).

In Kenya,sixty (60) companies are listed in the NSE, which is the only stock exchange firm in the country. Listed companies fall into two main segments, the main market segment and the alternative investment market segment. The NSE has classified these companies into ten sectors. These are; agriculture, commercial and services, telecommunication and technology, automobiles and accessories, banking, insurance, investment, manufacturing and allied, construction and allied, energy and petroleum. (www.nse.co.ke).

1.2 Research Problem

It is argued that inflation andstock prices are inversely related (Jaffe and Mandelker, 1976; Bodie, 1976; Nelson, 1976; Fama and Schwert, 1977). This is contrary to prior expectations by the Fisher hypothesis of a one to one increasing relationship between stock returns and inflation. Further empirical tests on the response of stock returns to inflation in the 1980s byFama (1981), Gertler and Grinols (1982), and Solnik (1983), amongst others yielded similar results of negative relationship.

It is argued that there is an inverse relationship between interest rates and stock returns. Thorbecke (1997) and Smal and de Jager (2001) observe that a reduction in interest rates induces an injection of liquidity into the economy. This extra liquidity could be channeled to the stock market, driving up the demand and prices of stocks. Patelis (1997) notes that interest rate changes are helpful in predicting stock market returns over a long period. Thus, there is evidence to conclude that interest rate policies should also target stock market price movements. There are, however, counterarguments that seek to show that interest rate changes may not be enough to influence stock-price misalignments. Bernanke and Gertler (1999, 2001) observe that the volatile nature of asset prices makes them hard to predict and that monetary authorities should only change interest rates in reaction to stock-price movements, when they expect such movements to affect inflation.

According to the Flow Oriented model (Dornbusch and Fischer, 1980; Gavin, 1989) a reduction in stock prices reduces wealth of local investors and further reduces liquidity in the economy. The reduction in liquidity also reduces interest rates, which in turn induces capital outflows and causes currency depreciation. In the case of the Stock-Oriented (Branson, 1983; Frankel, 1983) model, the exchange rate equates demand and supply for assets (bonds and stocks). Therefore, expectations of relative currency movements have a significant impact on price movements of financially held assets. For instance, the depreciation of a domestic currency against a foreign currency increases returns on the foreign currency and induces investors to shift funds from domestic assets (stocks) towards foreign assets, depressing stock prices. Thus, a depreciating currency has a negative impact on stock market returns.

Most studies on the effect of macroeconomic variables on stock markets however seem focused on developed markets. Though in recent times, substantial amount of research is also emerging on macroeconomic volatility and stock markets in emerging markets, these are largely concentrated on markets in Eastern Europe, South America and Asia, with very few (Jefferis and Okeahalam, 2000; Osei, 2006) on African markets.

In Kenya, Sifunjo (1999) sought to establish the causal relationship between exchange rate and stock prices at NSE between 1993 and May 1999. The results showed a unidirectional causality from exchange rate to stock prices. Nyamute (1998) studied the relationship between stock prices and other financial variables like money supply, interest rates, inflation rates and exchange rates in Kenya. He found a positive relationship between stock prices and exchange rates However results from Sifunjo andNyamutecould have been obsolesced by passage of time owing to stock automation at NSE and introduction of the Central Depository System.

Seile (2009) studied the relationship between stock market and selected macroeconomic variables in the NSE which included GDP growth rate, inflation, interest and Treasury bill rates. Results of the study reveal that market share index is positively related to inflation rate, Treasury bill rate and gross domestic product while it is negatively related to interest rate. However Siele (2009) used quarterly time series data this study will use monthly data.

From the literature and empirical evidence review it is still not clear on the direction of the relationship between exchange rates, interest rates, and inflation and stock prices. Most of the studies done in Kenya have considered two variables for example Sifunjo and Mwasaru (2012)

which considered only two variables, exchange rates and share prices. Seile (2009) considered four variables but used quarterly time series data. This study will use four variables and consider monthly data to answer the question, is there a relationship between interest rate, exchange rate, inflation and stock price volatility in the NSE?

1.3 Objectives of the Study

To examine the determinants of stock price volatility in the Nairobi Securities Exchange.

1.4 Value of the Study

The findings of the study are important in understanding inflation, interest rate and exchange rate and their impact on share prices in Kenya. The study is important in the formulation of policies by the government with regard to control of inflation, interest rate and exchange rate and promotion of investment in the stock market.

The use of information on interest rates, inflation and exchange rate will help market traders and money market analysts manage better their portfolios. Similarly policymakers are also better placed to manage the economy and further help develop stock markets more efficiently by managing these variables that impact on stock markets

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses other studies that have been conducted in the area of study. The areas covered include the theoretical framework empirical literature and summary.

2.2 Theoretical Framework

The theories include liquidity preference theory, portfolio balance, purchasing power parity, fisher effect theory, the theory of cost push and demand pull inflation.

2.2.1 Liquidity Preference Theory

Liquidity preference theoryconsists in the statement that the rateof interest at any time, being the reward for parting with liquidity, is a measure of the unwillingness of those who possess money to part with their liquid control over it. The rate of interest is the price which equilibrates the desire to hold wealth in the form of cash, with the available quantity of cashone needs money because one has expenditure plans to finance, or is speculating on the future path of the interest rate, or, finally, because one is uncertain about what the future may have in store so it is advisable to hold some fraction of one's resources in the form of pure purchasing power. (Keynes, 1964).

These motives became known as transactions, speculative and precautionary motives to demand money. On the other hand, in the world of the quantity of money in existence one of the ultimate

independent variables is determined by the action of the central bank. Accordingly, most of the Keynesian literature took liquidity preference to mean demand for money and liquidity preference theory as a theory whereby the rate of interest is determined by demand andsupply of money. This narrow interpretation of liquidity preference theory is debatable though. An alternative view is that it is a theory of asset choice. In fact, as Keynes emphasized in his debate withOhlin in 1937, liquidity preference was a theoryof choice between holding money idle and Holding loans, being the role of the rate of interest to equalize the attractions of both (Keynes, 1937).

2.2.2 Portfolio Balance

Portfolio balance model is also known as stock oriented model. Unlike goods market models, portfolio balance models put much more stress on the role of capital account transactions Portfolio balance model assumes a negative relationship between stock prices and exchange rates. A rise in domestic stock prices would attract capital flows, which increase the demand for domestic currency and causes exchange rate to appreciate. A rising stock market leads to the appreciation of domestic currency through direct and indirect channels. A rise in prices encourages investors to buy more domestic assets simultaneously selling foreign assets to obtain domestic currency indispensable for buying new domestic stocks. The described shifts in demand and supply of currencies cause domestic currency appreciation (Tahir and Ghani, 2004).

The indirect channel grounds in the following causality chain. An increase in domestic assets prices results in growth of wealth that leads investors to increase their demand for money, which

in turn raises domestic interest rates. Higher interest rates attract foreign,demand for domestic currency and its subsequent appreciation (Stavarek, 2004).

2.2.3 Purchasing Power Parity Theory

The starting point of exchange rate theory is purchasing power parity (PPP), which is also Called the inflation theory of exchange rates. PPP can be traced back to sixteen-century Spain and early seventeen century England, but Swedish economist Cassel (1918) was the first to name the theory PPP. Cassel once argued that without it, there would be no meaningful way to discuss over-or-under valuation of a currency. Absolute PPP theory was first presented to deal with the price relationship of goods with the value of different currencies. The theory requires very strong preconditions. Generally, Absolute PPP holds in an integrated, competitive product market with the implicit assumption of a risk-neutral world, in which the goods can be traded freely without transportation costs, tariffs, export quotas, and so on. However, it is unrealistic in a real society to assume that no costs are needed to transport goods from one place to another. In the real world, each economy produces and consumes tens of thousands of commodities andservices, many of which have different prices from country to country because of transport costs, tariffs, and other trade barriers (Kanamori& Zhao, 2006).

Absolute PPP is generally viewed as a condition of goods market equilibrium. Under absolute PPP, both the home and foreign market are integrated into a single market. Since it does not deal with money markets and the balance of international payments, we consider it to be only a partial equilibrium theory, not the general one. Perhaps because absolute PPP require many strong

impractical preconditions, it fails in explaining practical phenomenon, and signs of large persistent deviations from Absolute PPP have been documented (Kanamori& Zhao, 2006).

2.2.4 Fisher Effect Theory

Fisher effect theory states that nominal interest rates in two or more countries should be equal to the required real rate of return to investors plus compensation for the expected amount of inflation in each country (Dimand, 2003). That is the relationship that exists between interest rates and exchange rate movements. Fisher (1930) hypothesized that the expected nominal return on common stocks consists of a "real" return plus one expected rate of inflation (Dimand, 2003). Results of empirical studies have shown that expected inflation, changes in expected inflation, and unexpected inflation are negatively correlated to stock returns (Kaul, 1987).

Fama and Schwert (1977) explain the generalized fisher effect such that the market, if it is efficient and reflects all the available information at time t-1, will set the price of common stocks so that the expected nominal return from t-1 to t is the sum of the appropriate equilibrium expected real rate and the market's assessment of expected inflation rate for the same time period. When expected inflation is high, investors move out of financial assets into real assets. According to this hypothesis equities serve as hedges against inflation because they represent claims to real assets, which suggest a positive stock price is correlated to expected inflation and appreciation in stock price (Dimand, 2003).

2.3Empirical Literature

Pal and Mittal (2011) conducted a study on the relationship between Indian Capital Markets and key macroeconomic variables such as interest rates, inflation rate, exchange rates and gross domestic savings of India economy. The study was carried from January 1995 to December 2008. Unit root test, the co-integration test and error correction mechanism (ECM) were used. The findings of the study established that capital markets indices are dependent on macroeconomic variables even though the same may not be statistically significant in all the areas.

Gultekin (1983) tested the Fisher Hypothesis in a sample of 26 countries using time series and cross-sectional analyses. His time series results were not favorable to the Fisher Hypothesis, while the cross-sectional study finds that countries with high inflation rates are associated with high nominal stock returns and this appears to be in contrast to the time series results.

Kullapom and Lalita (2010) conducted a study on the relationship between inflation and stock prices in Thailand. The study was carried out in the period January 2000 to March 2010. The statistical method vector auto regression (VAR) was used to find and analyze the association. Interview was also conducted to gather opinions of investors in stock exchange of Thailand on how inflation affects equity value. The findings demonstrate that movement to stock prices is irrelevant to inflation.

In Kenya, Sifunjo (1999) sought to establish the causal relationship between exchange rate and stock prices at NSE between 1993 and May 1999. He studied the monthly average stock price

index and nominal dollar exchange rates by employing co-integration and error-correction methodology. Sifunjo found the exchange rate and stock prices are co-integrated, non-stationary in first difference and integrated of order one. The results showed a unidirectional causality from exchange rate to stock prices. However results from Sifunjo could have been obsolesced by passage of time owing to stock automation at NSE and introduction of the Central Depository System.

Anene (2011) studied the relationship between exchange rate and stock prices in Kenya. He used Granger Causality (GC) model. The study showed that there is a unidirectional causal relationship between exchange rates (Ksh /US $) for the five year period, that is Granger causes stock prices at NSE. The study was strong and significant at 90% confidence level.

Nyamute (1998) studied the relationship between stock prices and other financial variables like money supply, interest rates, inflation rates and exchange rates in Kenya. He found a positive relationship between stock prices and exchange rates. However, his research performed data analysis on non-stationary series which may adversely affect the validity of the results.

Sifunjo and Mwasaru (2012) analyzed the casual relationship between NSE stock prices and foreign exchange rate using monthly data from November 1993 to May 1999. Johansen consideration procedure and error correction model were used for analysis. The empirical results indicate that in Kenya, nominal exchange rate of shillings per dollar Granger causes stock price. The study also found out a unidirectional causality from exchange rates to stock prices.

Therefore, the movements in exchange rates exert significant influence on stock price determination in Kenya.

Seile (2009) studied the relationship between stock market and selected macroeconomic variables in the NSE which included GDP growth rate, inflation, interest and Treasury bill rates. Quarterly time series data for the period 1999 to 2008 was analyzed using summary statistics, correlation and regression analysis to ascertain the relationships. Results of the study reveal that market share index is positively related to inflation rate, Treasury bill rate and gross domestic product while it is negatively related to interest rate.

In Africa, Jefferis and Okeahalam (2000) examine the effect of macroeconomic factors on stock markets in South Africa, Zimbabwe, and Botswana. They found that stock prices have a positive long-run relationship with real GDP, and real exchange rate in South Africa and Zimbabwe and a short-run relationship with exchange rate and interestrates in Botswana. Stock prices are also negatively related to interest rates in SouthAfrica.

Mok(1993) by ARIMA approach and verified by Granger causality test examined the causality of daily interest rate, exchange rate and stock prices in Hong Kong for the period 1986 to 1991. The result concluded that the HIBOR (Hong Kong Interbank offered rate) and the price indices are independent series. As a further extension to the study the relationship between exchange rate and stock price was examined, the research concluded that those series are independent.

2.4Summary of Literature Review

The literature has tackled the concepts of inflation, interest rates, exchange rates and stock price volatility of firms listed in the NSE. Understanding the inflation, interest rates, exchange rate and stock price volatility will help advocate for intervention by government through fiscal and monetary policies to control inflation and interest rates. Empirical review has been provided with studies on macroeconomic variables being evaluated. As it can be noted, the debate on the relationshipbetween inflation, interest rate, exchange rate and stock price volatility is not yet settled. Further, most of these studies were done in different environments which cannot be generalized to developing countries especially Kenya. Hence, the present study seeks to bridge the gap.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines how the research was conducted. It contains the research design, population of the study, sample and sampling design, data collection and data analysis techniques.

3.2 Research Design

Research design refers to the way the study is planned and conducted, the procedures and techniques employed to answer the research problem or question (McMillan& Schumacher, 1984). The research design used was causal study design that sought to study causal relationship between variables also referred to as interrelationship because they trace relationship among the facts obtained to gain a deeper insight into the situation

3.3 Population

A population is a well defined or set of people, services, elements, events, groups of things or households that are being investigated (Ngechu, 2006). The target population for this study was all the companies listed in the Nairobi Stock Exchange (NSE). In Kenya, sixty (60) companies were listed in the NSE by 31st December 2012, which is the only stock exchange firm in the country. Listed companies fall into two main segments, the main market segment and the alternative investment market segment (NSE, 2013)

3.4 Sample and Sampling Design

A sample size should be chosen in a way that it gives a wide scope for the aim of the study (Ngechu, 2006). Sampling design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting item for the sample (Kothari, 2004).It should be representative of the whole target population. This study used NSE 20 Share Index companies.

3.5 Data Collection Techniques

The study used monthly data on inflation rate, interest rates, and exchange rate and stock prices for the period January 2003 to December 2012. The study used secondary data which was readily available from authentic sources and also suitable and adequate. Data for the stock market price was obtained from the NSE whilst inflation, consumer price index (proxy for inflation) was obtained from Kenya National Bureau of Statistics while interest rate and exchange rate was obtained from Central Bank of Kenya. .

3.6 Data Analysis

Data wasanalyzed using regression model to establish the relationship between inflation, interest rate, exchange rate and stock price volatility. The study applied the following regression model:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \varepsilon$$

Where;

Y = Stock Price Volatility; measured standard deviation/variance

X_1 = Interest Rate; measured by nominal interest rate

X_2 = Exchange Rate; measured by nominal exchange rate

X_3 = Inflation Rate; measured by consumer price index

a = Constant term

b_1–b_3 = Regression coefficients – define the amount by which Y (response variable) is changed for every unit of change in the predictor variable.

ε = the error term, which defines the variation in the response variable, Y, which Cannot be explained by the predictor variables.

T-tests were used to test the significance of the relationship between stock price volatility and determinants variables. Statistical Package for Social Sciences (SPSS) was conducted on the data to establish the relationship on the variables.

Hypothesis test;

H_0 – there is no relationship between stock price volatility and its determinants.

H_1- there is a relationship between stock price volatility and its determinants.

The null hypothesis will be evaluated using 5% level of significance.

CHAPTER FOUR

DATA ANALYSIS RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the data findings on interest rates, exchange rates, inflation rates and NSE 20 Share Index performance and analysis aimed at determining the relationship between the variables. The monthly data for NSE 20 Share index was collected from Nairobi Securities exchange while data on exchange rate and interest was collected from the Central Bank of Kenya, inflation data was collected from Kenya National Bureau of Statistics.

Data analysis was carried out using both descriptive and quantitative analysis.The results of the analyses were as follows:

4.2 Descriptive Statistics

Descriptive analysis shows the average and standard deviation of the differentvariables of interest in the study. It also presents the minimum and maximumvalues of the variables which help in getting a picture about the maximum andminimum values a variable can achieve.

4.1 Descriptive statistics of interest rate, inflation (CPI), exchange rate and stock price.

Variables	N	Minimum	Maximum	Mean	Standard deviation
Interest	120	.83	20.56	6.8906	3.77161
Inflation	120	55.91	134.25	90.9263	23.26413
Exchange	120	61.90	101.27	76.9153	6.92450
Share	120	1510.63	5774.27	3771.2487	986.49004

Source: (Waweru, 2013)

The study conducted a descriptive analysis on the data collected from secondary sources which is presented in appendix II. Table 4.1 represents descriptive statistics for NSE 20 Share Index, interest rate, inflation and exchange rate. The average monthly interest rate, inflation rate, exchange rate, and NSE 20 share index for the period 2003 to 2012 was 6.8906, 90.9263, 76.9153 and 3771.2487 respectively. The highest value for the interest rate, inflation rate, and exchange rate and NSE 20 share index for the 10 years was 20.56, 134.25, 101.27, and 5774.27 respectively. The minimum value of interest rate, inflation, exchange rate and NSE 20Share Index is 0.83, 55.19, 61.90, and 1510.63 respectively. The deviation from the mean value is 3.77161, 23.26413, 6.92450 and 986.49004 for interest rate, inflation, exchange rate and stock price respectively

4.2 correlations for interest rate, inflation, exchange rate and NSE 20 share index

		Interest rate	Inflation	Exchange rate	NSE
Interest rate	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	120			
Inflation	Pearson Correlation	.526**	1		
	Sig. (2-tailed)	.000			
	N	120	120		
Exchange rate	Pearson Correlation	.258**	.570**	1	
	Sig. (2-tailed)	.004	.000		
	N	120	120	120	
NSE	Pearson Correlation	.050	.211*	-.440**	1
	Sig. (2-tailed)	.585	.021	.000	
	N	120	120	120	120

Correlation is significant at the 0.01 level (2-tailed).

Correlation is significant at the 0.05 level (2-tailed).

Source: (Waweru, 2013)

4.3.1 Relationship between Interest rate and stock price

Results from the table 4.2 reveal that there is positive relationship between Interest and stock price (r = 0.050). This implies that there is a very weak association between interest and NSE 20 Share Index which is not significant.

4.3.2 Relationship between Inflation and stock price

The findings also disclosed a significant positive relationship between inflation and NSE 20 Share Index (r = .211**, P-value < 0.05), thus implying that inflation has a positive and significant relationship with stock price.

4.3.3 Relationship between Exchange rate and stock price

The findings indicated a significant negative relationship between Exchange rate and NSE 20 Share Index (r = .-440**, P-value < 0.01) thus, depicting that exchange rate has a significant negative relationship to stock price.

4.3.4Relationship between Interest rate, Inflation and Exchange rate

The results in the table above 4.2 indicate that there was a significant positive relationship between interest rate and inflation (r = .526**, P-value < 0.01). A significant positive relationship was observed between interest rate and exchange rate (r = .258**, P-value < 0.01). This implies that exchange rate influences interest rates. In addition, there is a significant relationship between Inflation and Exchange rate (r = . 570**, P-value < 0.01).

4.3 Inferential Statistics

Regression analysis is the statistical technique that identifies the relationship between two or more quantitative variables: a dependent variable, whose value is to be predicted, and an independent or explanatory variable (or variables), about which knowledge is available. The technique is used to find the equation that represents the relationship between the variables. Multiple regressions provide an equation that predicts one variable from two or more independent variables. The study adopted multiple regression guided by the following model:

$Y= \beta 0+ \beta_1 X1+\beta_2 X2+ \beta_3 X3 +\varepsilon$

Where:

Y is the dependent variable (NSE 20 Share Index)

β_0 is the regression constant

$\beta 1, \beta 2, \beta 3, \beta 4$, and $\beta 5$ are the coefficients of independent variables,

X1 is Interest rate

X2 is Inflation

X3 is Exchange rate

ε is the Error Term.

4.3 Analysis of the predictor variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723[a]	.522	.510	690.58310

a. Predictors: (Constant), Exchange, Interest, Inflation

Source: Waweru, 2013)

In this study, the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R2 equals .522, that is, interest rate, inflation and exchange rate explain 52.2 percent of the variance in stock price.

4.4 Analysis of Variance of exchange rate, interest rate and inflation.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.049E7	3	2.016E7	42.276	.000[a]
	Residual	5.532E7	116	476905.023		
	Total	1.158E8	119			

a. Predictors: (Constant), Exchange, Interest, Inflation

b. Dependent Variable: NSE

Source: (Waweru, 2013)

In this case, the significance value of the F statistic is 0.00indicating that all the predictor variables (interest rate, inflation and exchange rate) explain a variation in stock price and that the overall model is significant

4.5 Coefficients of interest rate, inflation and exchange rate.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10272.371	730.793		14.056	.000
	Interest	-34.818	19.777	-.133	-1.761	.081
	Inflation	32.204	3.772	.759	8.538	.000
	Exchange	-119.475	11.152	-.839	-10.714	.000

a. Dependent Variable: NSE

Source: (Waweru, 2013)

4.4Regression Equation for interest rate, inflation, exchange rate and stock price

From the above table 4.5 the analysis the Equation becomes;

$Y= 10272.371-34.818X1+32.204X2-119.475X3 +\varepsilon$

From the findings, the coefficients on Interest rate and exchange rate are negative while that of inflation rate is positive. These findings mean that a unit change in inflation rate leads to an increase in stock price by 32.204 units. In addition a unit change in Interest rates leads to a decrease in stock price by 34.818 units, while a unit change in exchange rate results to a decrease in stock price by 119.475 units.

4.6 Hypothesis testing for relationship between interest, inflation, exchange and stock price

Hypothesis	T statistics	Sig.	Conclusion
H0: There is no significant relationship between Interest rate and stock price. H1: There is a significant relationship between	-1.761	.081	Reject H1,
H0: There is no significant relationship between Inflation and stock price. H1: There is a significant relationship between Inflation and stock price.	8.538	.000	Accept HI
H0: There is no significant relationship between Exchange rate and stock price. H1: There is a significant relationship between Exchange rate and stock price.	-10.714	.000	Accept HI,

There was significant relationship between Inflation and stock price; as well as a significant relationship between Exchange rate and stock price

Source: (Waweru, 2013)

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents summary, conclusion and recommendations. The objective of the study was to examine the determinants of stock price volatility of firms listed at Nairobi Securities Exchange.The results of the study were presented in tables. Regression analysis was used to determine the relationship between interest rate, inflation, exchange rate and stock price. Descriptive statistics was used to get the minimum, maximum, mean and standard deviation of the variables.

5.2 Summary of findings

Most studies on the effect of macroeconomic variables on stock markets seem focused on developed markets. Though in recent times, substantial amount of research is also emerging on macroeconomic volatility and stock markets in African markets.From the literature and empirical evidence review it is still not clear on the direction of the relationship between exchange rates, interest rates, and inflation and stock prices. This study sought to examine the relationship between interest rate, exchange rate, inflation and stock price volatility in the NSE.

From the findings, the coefficients on Interest rate and exchange rate are negative while that of inflation rate is positive. These findings mean that a unit change in inflation rate leads to an increase in stock price by 32.204 units. In addition a unit change in Interest rates leads to a

decrease in stock price by 34.818 units, while a unit change in exchange rate results to a decrease in stock price by 119.475 units.

The results from table 4.2indicate that there was a significant positive relationship between interest rate and inflation (r = .526**, P-value < 0.01). A significant positive relationship was observed between interest rate and exchange rate (r = .258**, P-value < 0.01). This implies that exchange rate influences interest rates. In addition, there is a significant relationship between Inflation and Exchange rate (r = . 570**, P-value < 0.01).

In this study, the coefficient of determination (the percentage variation in the dependent variable being explained by the changes in the independent variables) R2 equals .522, that is, interest rate, inflation and exchange rate explain 52.2 percent of the variance in stock price. The significance value of the F statistic is 0.00indicating that all the predictor variables (interest rate, inflation and exchange rate) explain a variation in stock price and that the overall model is significant

5.3 Conclusion

A number of studies have tried to find out whether a relationship exists between Macroeconomic factors and stock returns for both developed and emerging markets. It is important to understand the influence of macroeconomic factors on stock prices, because variables such as interest rate, inflation are used to estimate intrinsic value of financial instruments. In this study, the relationship between stock prices and macroeconomic variables such as inflation, interest rate, exchange rate are investigated over the period from January 2003 to December 2012. According to the findings of the study, the results in the table 4.2 indicate that there was a significant

positive relationship between interest rate and inflation, significant positive relationship was observed between interest rate and exchange rate this implies that exchange rate influences interest rates. In addition, there is a significant relationship between Inflation and Exchange rate. Further, there was little evidence of multicollinearity among the predictor variables since the correlations among them are so strong.

The interest rate variable was found to have a positivebut statistically weak effect on the performance NSE 20 share index. The lending rate which is avery important determinant when it comes to the direction of the flow of funds in acountry showed it has considerable effect on the performance of stock price. From the studyhighlending rate impact negatively on stock prices. Inflation was found to have adverse effect on the performance of the stock.

5.4 Limitations of the study

The study was restricted only to companies listed in the Nairobi Stock Exchangeand therefore caution should be taken in generalizing the findings of the study.The analysis has also been constrained by the sample size which could haveaffected the results.Correlation measures the linear association between two variables, but it may not always be reliable. Two variables can have a strong nonlinear relation and still have a very low correlation.

5.5 Recommendations

It is important to highlight that there is the need to implement prudent macroeconomic policies in order for a country to derive maximum benefits from stock markets. In order to enable the capital market in general and stock market in particular to take full advantage of the various

opportunities and cope with challenges, interest rates, inflation, must be reduced. This must be done in relation to appropriate monetary policies to ensure macroeconomic stability.

5.6 Suggestion for further study

This research considered four variables; exchange rates, interest rates, inflation and share prices. In addition, the study considered the exchange rates between Kenya shilling and the US dollar. Other studies may bedone using additional variables. Future research should not be restricted to the exchange rates between Kenya shillings and the US dollar, but can consider other major exchange rates. Significance of the results could possibly be improved upon by applying weekly data. The use of more frequent observations may better capture the dynamics of stock price and its determinants.

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APPENDICES

Appendix I: Companies listed on the NSE as at 30th December 2012

Agriculture

Eaagads Ltd

Kapchorua Tea Co. Ltd

Kakuzi Ltd.

Limuru Tea Co. Ltd

Rea Vipingo plantationsLtd.

Sasini Tea Ltd

Williamson Tea Kenya Ltd

Commercial and Services

Express Ltd.

Kenya Airways Ltd.

Nation Media Group Ltd.

Standard Group Ltd.

TPS East Africa (Serena) Ltd

Scan Group Ltd

Uchumi Supermarkets Ltd

Hutchings Biemer Ltd

Longhorn Kenya Ltd

Telecommunication and Technology

Access Kenya Group Ltd

Safaricom Ltd

Automobiles and Accessories

Car and General (K) Ltd

CMC Holdings Ltd

Sameer Africa Ltd

Marshalls (E.A.) Ltd

Banking

Barclays Bank Ltd.

CFC Stanbic Holdings Ltd.

I & M Holdings Ltd

Diamond Trust Bank of Kenya Ltd

Housing Finance Co. Ltd

Kenya Commercial Bank Ltd

National Bank of Kenya Ltd

NIC Bank Ltd

Standard Chartered Bank Ltd

Equity Bank Ltd

The Co-operative Bank of Kenya Ltd

Insurance

Jubilee Holdings Ltd

Pan Africa Insurance Holdings Ltd

Kenya Re-Insurance Corporation Ltd

Liberty Kenya Holdings Ltd

British American Investments Company (Kenya) Ltd

CIC Insurance Group Ltd

Investment

Olympia Capital Holdings Ltd

Centum Investment Co. Ltd

Trans-Century Ltd

Manufacturing and Allied

B.O.C Kenya Ltd

British American Tobacco Kenya Ltd

Carbacid Investments Ltd

East Africa Breweries Ltd

Mumias Sugar Co. Ltd

Unga Group Ltd

Eveready East Africa Ltd

Kenya Orchards Ltd

Baumann and Company Ltd

Construction and Allied

Athi River Mining Ltd

Bamburi Cement Ltd

Crown Berger Ltd

East Africa Cables Ltd

East Africa Portland Cement Ltd

Energy and Petroleum

KenolKobil Ltd

KenGen Ltd

Kenya Power and Lighting Co. Ltd

Umeme Ltd

Appendix II – Data for NSE 20 Share Index, interest rate, exchange rate and Consumer Price Index

NSE 20 Share

Month/Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
JANUARY	1,510.63	3,157.88	3,094.30	4,171.80	5,774.27	4,712.71	3,198.90	3,565.28	4464.92	3224.18
FEBRUARY	1,557.74	3,175.36	3,212.81	4,056.63	5,387.28	5,072.41	2,474.75	3,629.41	4240.18	3303.75
MARCH	1,608.34	2,770.60	3,208.66	4,101.64	5,133.67	4,843.17	2,805.03	4,072.93	3887.07	3366.89
APRIL	1,846.63	2,707.60	3,227.59	4,025.21	5,148.07	5,336.03	2,800.10	4,233.24	4029.23	3546.66
MAY	2,074.67	2,689.14	3,505.39	4,349.75	5,001.77	5,175.83	2,852.57	4,241.81	4,078.10	3650.85
JUNE	1,934.96	2,639.75	3,972.15	4,260.49	5,146.73	5,185.56	3,294.56	4,339.28	3,968.12	3703.94
JULY	2,005.08	2,708.03	3,982.00	4,258.54	5,340.08	4,868.27	3,273.10	4,438.58	3,738.46	3832.42
AUGUST	2,107.43	2,708.86	3,938.70	4,486.07	5,371.72	4,648.78	3,102.68	4,454.59	3,465.02	3865.76
SEPTEMBER	2,379.91	2,670.69	3,832.69	4,879.86	5,146.46	4,180.40	3,005.41	4,629.80	3.284	3972.03
OCTOBER	2,457.21	2,829.65	3,939.45	5,314.36	4,971.04	3,386.65	3,083.63	4,659.56	3507.34	4147.28
NOVEMBER	2,736.98	2,918.34	3,974.12	5,615.20	5,234.54	3,341.47	3189.55	4,395.17	3,155	4083.00
DECEMBER	2,737.59	2,945.58	3,973.04	5,645.65	5,444.83	3,521.18	3247.44	4432.60	3,205	4133.00

Monthly data on exchange rates

Month/Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
JANUARY	77.72	76.29	77.93	72.21	69.88	68.08	78.95	75.79	81.03	86.34
FEBRUARY	76.84	76.39	76.94	71.80	69.62	70.62	79.53	76.73	81.47	83.18
MARCH	76.58	77.26	74.80	72.28	69.29	64.92	80.26	76.95	84.21	82.90
APRIL	75.66	77.91	76.15	71.30	68.58	62.26	79.63	77.25	83.89	83.19
MAY	71.61	79.24	76.40	71.76	67.19	61.90	77.86	78.54	85.43	84.38
JUNE	73.72	79.27	76.68	73.41	66.57	63.78	77.85	81.02	89.05	84.79
JULY	74.75	79.99	76.23	73.66	67.07	66.70	76.75	81.43	89.90	84.14
AUGUST	75.96	80.83	75.81	72.87	66.95	67.68	76.37	80.44	92.79	84.08
SEPTEMBER	77.90	80.72	74.10	72.87	67.02	71.41	75.60	80.91	96.36	84.16
OCTOBER	77.77	81.20	73.71	72.29	66.85	76.66	75.24	80.71	101.27	85.11
NOVEMBER	76.74	81.20	74.74	71.13	65.49	78.18	74.74	80.46	93.68	85.63
DECEMBER	76.02	79.77	73.11	69.63	63.30	78.04	75.43	80.57	86.66	85.99

Monthly data on interest rates

Month/Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
JANUARY	8.38	1.58	8.26	8.23	6.00	6.95	8.46	6.56	2.46	20.56
FEBRUARY	7.77	1.57	8.59	8.02	6.22	7.28	7.55	6.21	2.59	19.70
MARCH	6.24	1.59	8.63	7.60	6.32	6.90	7.31	5.98	2.77	17.80
APRIL	6.25	2.11	8.68	7.02	6.65	7.35	7.34	5.17	3.26	16.01
MAY	5.84	2.87	8.66	7.01	6.77	7.76	7.45	4.21	5.35	11.18
JUNE	3.00	2.01	8.50	6.60	6.53	7.73	7.33	2.98	8.95	10.09
JULY	1.54	1.71	8.59	5.89	6.52	8.03	7.24	1.60	8.99	11.95
AUGUST	1.18	2.27	8.66	5.96	7.30	8.02	7.25	1.83	9.23	10.93
SEPTEMBER	0.83	2.75	8.58	6.45	7.35	7.69	7.29	2.04	11.93	7.77
OCTOBER	1.00	3.95	8.19	6.83	7.55	7.75	7.26	2.12	14.80	8.98
NOVEMBER	1.28	5.06	7.84	6.41	7.52	8.39	7.22	2.21	16.14	9.80
DECEMBER	1.46	8.04	8.07	5.73	6.87	8.59	6.82	2.28	18.30	8.30

Monthly data on inflation - consumer price index(CPI)

Month/Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
JANUARY	56.21	61.35	70.48	76.22	79.75	86.07	97.55	104.89	110.57	130.82
FEBRUARY	55.91	61.41	69.97	76.19	78.57	87.25	100.00	105.18	112.05	130.76
MARCH	57.24	62.00	70.78	76.62	78.40	88.22	100.96	104.97	114.62	132.51
APRIL	58.21	62.61	72.64	76.23	77.76	90.85	101.84	105.56	118.29	133.74
MAY	61.23	64.08	73.54	76.48	78.08	92.68	101.84	105.79	119.48	134.09
JUNE	61.96	65.64	73.46	76.44	79.53	92.89	102.05	105.61	120.91	133.06
JULY	60.46	65.62	73.34	76.30	80.41	92.75	102.33	105.98	122.44	131.92
AUGUST	59.27	68.63	73.35	76.87	80.86	93.79	102.94	106.25	123.97	131.51
SEPTEMBER	58.85	70.02	73.00	77.23	81.43	94.72	103.42	106.74	125.23	131.89
OCTOBER	59.44	70.32	72.93	77.54	81.66	95.29	103.68	106.97	127.20	132.46
NOVEMBER	59.69	70.07	73.33	77.82	82.47	96.95	103.87	107.86	129.13	133.33
DECEMBER	60.28	70.57	74.04	79.46	83.91	96.89	104.66	109.38	130.09	134.25