THE RELATIONSHIP BETWEEN INFLATION RATES AND LIQUIDITY OF COMPANIES QUOTED AT THE NAIROBI STOCK EXCHANGE

SUBMITTED BY

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DECLARATION

This research project is my original work and has not been presented in part or whole in any other University for an award of a degree.

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

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DEDICATION

To my precious family for believing in me and for their unfailing support and love during the entire period of my study.

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May God Bless You All.

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LIST OF ABBREVIATIONS

MIMS	Main Investment Market Segment
AIMS	Alternative Investment Market Segment
FISMS	Fixed Investment Securities Market Segment
CAPM	Capital Asset Pricing Model
NSE	Nairobi Stock Exchange
AGRI	Agriculture
COMM	Commercial and services
INDUST	Industrial and Allied
OVE INFL	Over Inflation
UND INFL	Under Inflation
CBK	Central Bank of Kenya
LIQRATIO	Liquidity Ratio

DEFINITION OF TERMS

1. Liquidity – The ability to trade large quantities quickly, at low cost and without moving the price.
2. Stock Market – One that deals in exchange of securities
3. Securities – Represent a spectrum of risky assets ranging from virtually risk free debt instruments to highly speculative bonds, common stocks and warrants.
4. Capital Market – A market where financial assets in form of shares, bonds and debentures are traded.
5. Equity – This is the financial claim of owners of the firm. It reflects the amounts of funds invested by the owners of the firm.
6. Returns – The gains that accrue to the investors from their investments inform of dividends, interest and capital gains.

ABSTRACT

Inflation as a macroeconomic indicator in the Kenyan economy has been fluctuating a lot since the year 2007 affecting the trading operations and especially Liquidity of stocks at the Nairobi Stock Exchange. The main objective of this study is to investigate the relationship between the overall inflation rates and the liquidity of companies quoted at the Nairobi Stock Exchange.

To achieve the objective of the study, regression models were developed using month on month overall inflation rates as the independent variable and both segment wise and market wide trading volume as the dependent variable. An empirical study was conducted using NSE listed firms as the population. The period of analysis was three years from January 2007 to December 2009 on a monthly basis.

The findings of the study indicate that overall inflation rates influence the stock market liquidity at varying degrees depending on the segment. There is however a positive relationship between overall inflation rates and market wide liquidity at the NSE which is an indication that as inflation rates go up, the overall market liquidity in terms of trading volume also goes up and vice versa.

The findings indicate a fluctuating trend of both variables as per the data analysis in chapter 4 depending on the sector being looked at. From the pattern on the findings it can be concluded that the higher the level of inflation rates, the higher the liquidity and vice versa for the market wide trading involving all segments. While when looking at the various segments, Commercial and Services sector and the finance and investment sector replicate the market wide relationship of positive and direct relationship while the Agricultural and Industrial and Allied sectors are showing an inverse relationship.
The significant difference in the relationships in the different sectors can be attributed to the fact that firms in some sectors such as agriculture are mostly affected by the underlying inflation rates and not the overall inflation rates.

CHAPTER ONE

1.0 INTRODUCTION

This chapter introduces the general overview of inflation and market liquidity and their definitions. It further analyses the problem statement and the objective of the study. Finally, it emphasizes of the importance of the study to the various stakeholders.

1.1 Background of the Study

Liquidity generally denotes the ability to trade large quantities quickly, at low cost, and without moving the price. Investors are concerned about liquidity risk as it affects their ability to trade the quantity of shares they want to buy or sell within their desired time-frame (Vassalou et. al., 2005). Most importantly, investors fear that in the event of a financial crisis, they may not be able to exit the market fast enough to contain their losses. These considerations may lead them to shy away from illiquid securities, or require a liquidity-related premium to hold them.

Liquidity therefore refers to the ability to dispose of an asset without significant loss in value. It is therefore not surprising that liquidity is an important concept in the world of business. Research has established that liquidity is an important determinant of financial distress (Beaver, 1966). Consequently, it is used by a variety of persons to evaluate the risk. Liquidity therefore involves managing portfolio effectively to allow for maximization of profits while bearing in mind that the investor will need some of these returns at a later date.

Common stocks are expected to hedge inflation; therefore, in a perfect market, return on common equity should keep pace with the rate of inflation. Following the seminal work of Bodie (1976), this proposition has been extensively tested in the context of the Fisher hypothesis (Fisher 1930), which originally postulated that the market rate of interest comprises the expected real rate of interest and expected inflation. This hypothesis, when applied to stock markets, postulates a positive one-to-one relation between stock market liquidity and inflation. The study therefore seeks to bridge the gap in the literature by

testing whether the common stocks in various industry groups in Kenya offered a hedge against inflation and the extent to which such hedging may differ across industries.

Liquidity is thus risky and has a commonality; it varies over time both for individual stocks and for the market as a whole (Chordia et al., 2000; Hasbrouck and Seppi, 2000; and Huberman and Halka, 1999). Liquidity is often noted in the press, for instance; "the possibility that liquidity might disappear from a market, and so not be available when it is needed, is a big source of risk to the investor." (The Economist September 23, 1999).

Inflation can be defined as a persistent increase in general price levels in an economy over time (Brealey R.A. et al, 1991). Inflation effectively reduces the purchasing power of a currency. Low or moderate level of inflation in a country can have a positive effect on the business sector in that they can act as an incentive to production. High level of inflation however can harm a company's profitability by affecting the cost of inputs as well as reducing final demand for its output.

Previous research provides evidence that much of the cross sectional variation in equity returns and liquidity can be explained by firm characteristics such as market capitalization and Price to Earnings ratio (P/E), change in operating earnings and book-to market ratios. For example, the market capitalization anomaly is documented by Banz (1981). Fama and French (1992, 1996) examine many of these variables simultaneously and conclude that two factors specifically, Size and Book-to-Market, explain the majority of the cross sectional variation in stock returns). It is with this in mind that the study seeks to determine the relationship between inflation rates on NSE liquidity due to reduced returns by first understanding the effects of inflation on the stock market liquidity. It will investigate the ultimate effects that are borne by investors' in terms of liquidity especially during skyrocketing inflation.

1.1.1 Market Liquidity and Inflation

Competing definitions of liquidity include the variation in trading costs such as bid-ask spreads among others,(Admati and Pfleiderer (1988), Foster and Viswanathan (1990),

Bhushan (1991), Amihud and Mendelson (1991)) and the risk that a (solvent) borrower is unable to obtain funding as in Diamond (1991). Finally, we note that intuitively appealing descriptions of the liquidity concept are discussed in Black (1971) and given more formal shape by Kyle (1985). In particular, Kyle suggests a tripartite definition of liquidity consisting of the cost of turning an asset around in a short time (tightness), the size of order flow needed to change prices a given amount (depth) and the recovery speed of prices after an uninformative shock (resiliency). While attractive, these transaction-based quantities are measures of liquidity-they do not explain the underlying cause of differences in liquidity. As such, they are of limited use in modeling liquidity risk.

The association between monetary policy and the performance of stock and other asset markets has long piqued the interest of economists and policymakers. Stocks are claims on real assets and, hence, monetary neutrality implies that monetary policy should not affect real stock prices in the long run (Bordo et.al. 2008). Although real stock returns and inflation have been negatively correlated historically (Fama and Schwert, 1977), the correlation is widely seen as an anomaly resulting from the simultaneous impacts of real economic activity on inflation and stock returns (Fama, 1981).

Despite the presumed irrelevance of inflation for real stock returns in the long run, researchers have found considerable evidence that monetary policy can affect real stock Prices in the short run (Bernanke and Kuttner (2005) and (2006)). Further, economists have conjectured that the nature of the monetary policy regime can affect the performance of asset markets over longer horizons. Good friend (2003), for example, argues that before 1980 the policies of the Federal Reserve and other central banks were an important source of macroeconomic and financial instability that could explain the negative correlation between real stock prices and inflation. Rising inflation, for example, tended to depress stock returns because higher expected inflation would increase long-term interest rates (and thereby raise the rate at which investors discount future dividends) and because monetary policy actions to limit inflation would tend to slow economic activity (and thereby depress current and forecast earnings). (Schwartz, 1995; Woodford, 2003).

1.2 Statement of the Problem

Prices of individual stocks reflect investors' hopes and fears about the future and taken in the aggregate stock price movements can generate a tidal wave of activity (Chen and Siems, 2002).Disastrous events can have negative implications for stocks and bonds because of their impact on liquidity (Barkett et. al.1987). Decisions to buy and sell quickly, easily and inexpensively can be reversed in liquid markets. Investors are concerned about liquidity risk because it affects their ability to trade the quantity of shares they want to buy or sell within their desired time frame (Vassalou et.al.,2005). Most importantly investors fear that in the event of a financial crisis they may not be able to exit the market fast enough to contain their losses. Generally stock market liquidity is affected by various cataclysmic events and macroeconomic variables but our main emphasis in this study is inflation rates. Thus the objective of the study was to determine the relationship between inflation rates and the liquidity of companies quoted at the NSE.

According to Amihud and Mendelson (1986), Illiquidity is driven by the explicit and implicit costs of buying or selling the stock. The cost of liquidity is therefore the sum of three components: adverse selection costs, opportunity costs, and direct costs (commissions and fees).

Previous research suggests that inflation rates, interest rates and the Nairobi stock exchange (NSE) index are the possible influencers of the industry returns (Whittington, Sarporta and Singh, 1997). This is due to the fact that macro-economic variables are likely to erode the real value of any financial claims outstanding as opposed to the nominal value of such claims which may remain unaffected. This may ultimately have an impact on the stock market's liquidity due to the fact that liquidity of a stock is a measure of the ease with which cash can be converted to an investment in the stock or vice versa.

As fortunes of the issuing firms change with economic and industry conditions so do the prices and liquidity of their stocks (Gitman and Joehnk 2001).They further state that, not all stocks are affected in the same way or to the same extent. Some sectors of the economy may only be mildly affected by the economy others are usually hard hit when

times are rough (Gitman and Joehnk, 2001). This therefore may lead to the argument that performance of the economy partly indicated by the inflation rates may not affect the stock market.

Waciira (1999), analysed the relationship between liquidity and macro economic indicators; an industry comparison. His study sought to find out if a relationship exists between the liquidity of quoted firms and the following macro economic variables; Interest rates, Inflation and the NSE 20 share index. He specifically sought to determine the magnitude or strength of the relationship if it exists and the effect of industry categorization on the relationship described above. He concluded that there was a relatively high degree of correlation between short and long term measures of liquidity especially cash flow from operations to current liabilities and cash flow from operations to total liabilities. The proposed study seeks to deviate from the above study by considering the other aspect of liquidity related to share transactions.

There are also other local studies on the Nairobi stock exchange that have been carried out, like Sitienei (2005) studied the relationship between liquidity and stock ownership pattern at the NSE. His main objectives were to document the ownership pattern and liquidity of stocks listed at the NSE; and to determine the relationship between stock liquidity and stock ownership patterns traded at NSE. There is no specific local study on stock market liquidity and inflation.

Sargent (1986), points out that rational expectation of inflation greatly affect the current purchase of securities. However, Kohn and Tsiang (1988) said that there must be equilibrium between the traders who hold the stocks and the buyers (investors) who need the stocks.

Bordo et al (2008) in their paper sought to quantify the extent to which various macroeconomic and policy shocks, including inflation shocks, can explain the behavior of U.S. real stock prices during the second half of the 20th century. Prior research found

that the impact of monetary policy actions on stock returns has varied over time with changes in market conditions.

A research activity determining the relationship between inflation rates and NSE share transaction liquidity should therefore be carried out in order to bridge the gap in knowledge that is completely lacking by first understanding the effects of inflation on the stock market liquidity. It will investigate the ultimate effects that are borne by investors' in terms of liquidity especially during skyrocketing inflation. It will also try to find out if the magnitude and direction of the stock market liquidity vary to the same extent as inflation.

1.3 Objective of the Study

The study's main objective was to establish the relationship between inflation rates and liquidity of companies quoted at the Nairobi Stock Exchange.

1.4 Importance of the Study

The study is useful to financial analysts and capital market intermediaries since it will guide on how best to construct investment portfolios across market industries given the prevailing economic conditions. Asset and Fund managers can also get guidance on how to place investor funds in a combination of high yield returns during different economic times. The study will also give a good insight to academic researchers who may want to conduct further research on the effect of macro economic variables in particular inflation on stock market liquidity.

Government authorities (policy makers) who are in a position to influence inflation and to some extent other macro economic variables would gain a deeper appreciation of the impact of their decisions on the stock markets. Finally the investors and the general public would use this study in making decisions about their investment options at the stock exchange.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter looks into the various existing literature both foreign and local studies on liquidity and inflation. In addition it looks at theories relevant to the study, the Significance of Liquidity Management on Performance, Measures of Liquidity and NSE in brief and concludes by highlighting the measures used in liquidity by different authors.

2.2 Theoretical Literature

Theoretical studies of the effect of illiquidity on asset prices have yielded mixed results. While Kyle (1985) and Allen and Gale (1994) show an important effect of illiquidity on asset prices, Constantinides (1986) and Vayanos (1998) show that illiquidity inform of transaction costs has a large effect on the asset turnover but only a very small effect on asset prices. Empirical studies consistently show, however, that illiquidity depresses asset prices and leads to a higher asset returns. Amihud (2002) shows that the aggregate stock returns are higher when the market is less liquid.

The empirical evidence on the issue of whether the Fisher hypothesis holds in stock markets is far from conclusion. For instance, event studies, which look at the effects of inflation announcements on stock returns, report a negative relation between inflation and stock returns (e.g., Amihud 1996). Short-horizon studies that use monthly data covering what is typically 10 to 15 years also report either a negative or an insignificant relation between stock returns and inflation (e.g., Jaffe and Mandelker 1976). In contrast, the long-horizon studies (e.g., Boudoukh, Richardson and Whitelaw 1994) and studies that tests for co integration between stock and commodity price indexes (e.g. Ely and Robinson 1997) find a positive and significant relation between stock returns and inflation but report a commodity price elasticity of less than unity. One exception is Anari and Kolari (2001), who reported the commodity price elasticity of stock returns to be above unity by analyzing six industrialized countries using a cointegrating framework.

The study on the Fisher Hypothesis provides further evidence on the long-run relation between stock returns and inflation in a co integration frame work. It makes two contributions to the literature. First, even though it is acknowledged that the commodity price elasticity of stock prices is likely to be heterogeneous across industry groups (Boudoukh, Richarddson and Whitelaw 1994), no study according to the researchers examines the long-run relation between stock prices and goods prices using industry-level stock indexes in a co integrating framework.

The study found statistically significant co integration between stock and goods indexes in both aggregate and disaggregate (industry) data. Of the seven industry groups examined, six showed positive commodity price elasticity above unity and the remaining showed elasticity below-unity. The overall market index also showed commodity price elasticity above unity (Fisher, 1930).

These findings of above unity elasticity are consistent with the tax-augmented version of the Fisher hypothesis; that is, the return on stocks must exceed the rate of inflation to compensate for the loss in the real wealth of tax-paying investors. The study further revealed a considerable heterogeneity in the point estimates of the commodity price elasticities across industry groups. This suggested that the long run real return varies across industries. In most cases, the study found significant structural shifts in the cointegrating relation. This indicates that economic shocks indeed impinge on the long-run relation between stock prices and goods prices. Finally, accounting for these structural shifts improves the precision of the results. This suggests that in modeling the long-run relation between stock and commodity price indexes, the structural breaks need to be addressed.

According to Fama (1980), the Efficient Market Hypothesis (EMH) is about informational efficiency. It explains how security prices should behave under the conditions of perfect market characterized by free availability of information, homogenous investor expectations and zero transaction costs. These conditions sufficiently ensure that prices "fully reflect" what is knowable, obviously when relevant

information to the value of a security is reflected in its current price, the same is an unbiased estimate of intrinsic value. Every time new information is released, the price adjusts towards a new value. The EMH does not imply that the prices will always be "correct"! It simply implies consensus in the market, though it does not require every market player to be well informed.

The liquidity preference theory asserts that the long term interest rates not only reflect investors assumptions about the future interest rates but also includes a premium for holding the long term securities called the liquidity premium. This premium compensates investors for the added risk of having their money tied for a long period and including the greater price uncertainity.

2.3 Significance of Liquidity Management on Performance

Liquidity always comes first; without it a firm does not open its doors and with it a firm may not have time to solve its basic problem. Liquidity is an important determinant of financial distress, because without it a firm cannot meet its financial obligations (Beaver, 1966).The study however proposes to study stock market liquidity and not this concept of liquidity.

A study done by Tamari (1966) has shown that liquidity ratios are strong predictors of financial distress in a study of companies based in the US and elsewhere. In Kenya, similar work has been done by Keige (1991) who also established the viability of liquidity ratios in predicting financial distress as early as two years in advance. Meigs and Meigs (1999), observe that being too liquid is as costly as having too little liquidity. The objective of liquidity management therefore is to ensure that a firm will be able to meet in full all its obligations as and when they fall due (Gardner and Mills, 1994).

The importance of cash flow is not new to the finance literature. Over twenty years ago, Largay and Stickney (1980) reported that the then-recent bankruptcy of W.T. Grant, a nationwide chain of department stores, should have been anticipated because the corporation had been running a deficit cash flow from operations for 8 of the last 10 years

of its corporate life. As part of a study of the Fortune 500's financial management practices, Gilbert and Reichert (1995) found that time value of money cash flow analysis is used to select projects in 91 percent of the firms. Accounts receivable management models are used in 59 percent of these firms, while inventory management models were used in 60 percent of the companies. Recently, Farragher, Kleiman and Sahu (1999) found that 55 percent of firms in the S&P Industrial index complete some form of a cash flow assessment, but did not present insights regarding accounts across industries.

Theoretical determination of optimal trade credit limits are the subject of many articles over the years (Schwartz, 1974), with scant attention paid to actual accounts receivable management. Across a limited sample, Weinraub and Visscher (1998) observe a tendency of firms with low levels of current ratios to also have low levels of current liabilities. Liquidity Management insight across firms, industries, and time is needed.

2.4 Measures of Liquidity

Liquidity is an elusive concept. It cannot be observed directly and generally denotes the ability to trade large quantities quickly, at low cost, and without moving the price. Since liquidity has many dimensions, it is hard to proxy it with a single measure. Many different measures of illiquidity have been used in empirical studies. For example, Amihud and Mendelson (1986) used the quoted bid-ask spread on stock returns and Chalmers and Kadlec (1998) used the amortized effective spread as a measure of liquidity. Brennan and Subrahmanyam (1996) measured illiquidity with the price response to signed order flow and within the fixed cost of trading based on continuous data on transaction and quotes. Pastor and Stambaugh (2003) estimated liquidity cost from signed volume related return reversals. Most of these liquidity measures require data that is not readily available.

The liquidity of a market is often measured as the size of its bid-ask spread, but this is an imperfect metric at best. More generally, Kyle (1985) identifies three components of market liquidity as tightness in the bid-ask spread; depth, that is the volume of transactions necessary to move prices; and resiliency, that is the speed with which prices

return to equilibrium following a large trade. Persaud (2003) identifies a fourth component, which he calls diversity. This is simply the degree of diversity among market participants in their market views and desired trades. Persaud argues that lack of diversity can lead to 'liquidity black holes.' These are conditions where liquidity dries up, and a decline (or increase) in prices brings out more sellers (or buyers), further exasperating the price move.

Chan et al. (2005) measure of illiquidity is related to Kyle's (1985) lambda, which measures the effect of order flow on prices. Amihud (2002) shows how to construct a Kyle-type measure of illiquidity using only daily returns and volume, which are readily available for almost every market.

For each fund, Chan et.al (2005) measures illiquidity each month for the fund itself, for the US market in which the fund shares are traded, and the corresponding foreign market in which the fund underlying assets are traded. Following Amihud (2002), Chan et.al (2005) illiquidity measure for stock i at month t in market c, $IL_{i,c,t,}$ is defined as the average ratio of the absolute daily price change to a measure of the trading volume:

$$IL_{i,c,t} = \frac{1}{Dt} \sum_{d=1}^{Dt} R_{i,d} \; / \; VOL_{i,d,} \qquad 2.5.1$$

Where D_t is the number of trading days in month t, R_{id} and VOL_{id} are, respectively, stock i's daily return and daily volume in day d of month t. Unlike Amihud (2002) who calculates illiquidity annually for stocks with at least 200 daily observations each year, Chan et.al (2005) uses only around 21 days to calculate IL for each month, so that they can relate illiquidity to fund premium at a monthly frequency.

Chan et.al (2005) calculates the illiquidity of the shares of fund f in month t, $IL_{f,t,}$ using equation (2.5.1) from the fund's daily share price return and volume, and the illiquidity for the portfolio of all 41 funds is obtained by averaging over the 41 individual funds' illiquidity $IL_{f,t}$ at each month t:

$$FIL_t \equiv \frac{1}{41} \sum_{f=1}^{41} IL_{f,t} \qquad 2.5.2$$

The market wide illiquidity for the asset market c, CILc,t ($USIL_T$), is calculated as the equally weighted average of the illiquidity of all qualifying individual stocks in a representative market index for that market:

$$CIL_{c,t} = \frac{1}{N_{c,t}} \sum_{i=1}^{Nc,t} IL_{i,c,t} \qquad 2.5.3$$

Where $N_{c,t}$ is the number of stocks in the index of country c in month t.

2.5 Review of Empirical and Previous Studies

A review of the empirical studies and previous studies done in Kenya on stock market liquidity and inflation indicate that very little work has been done in this area. A lot has been done on the effects of macroeconomic variables on the stock market returns which finally relates to stock market liquidity.

Sargent (1986), points out that rational expectation of inflation greatly affect the current purchase of securities. This is because under a situation where the level of inflation in the future is highly uncertain, the buyers of the securities accept the risk that will be associated by those securities only at lower prices. This ultimately affects the liquidity of the market. The sellers of the security will tend to sell their securities at high prices because they speculate that the level of inflation in the future will be low, hence their securities will have minimal risk. However, Kohn and Tsiang (1988) said that there must be equilibrium between the traders who hold the stocks and the buyers (investors) who need the stocks.

Bordo et al (2008) in their paper sought to quantify the extent to which various macroeconomic and policy shocks, including inflation shocks, can explain the behavior of U.S. real stock prices during the second half of the 20th century. Prior research found that the impact of monetary policy actions on stock returns has varied over time with changes in market conditions. Chen (2007), for example, uses a Markov-switching model

to identify bull and bear markets, and finds that monetary policy shocks have a larger impact on market returns in bear markets and that contractionary monetary policy increases the probability of the market moving to a bear market state (Bordo et al, 2008).

Policy makers and others often link the performance of the stock market to changes in inflation and monetary policy, especially during extended periods of rapid appreciation or decline in real stock prices. Bordo et al (2008) presents an empirical model that allows the impact of macroeconomic and policy shocks on real stock prices to vary with stock market conditions. Further, the approach enabled them to examine the contribution of various shocks to stock market conditions during particular episodes. Thus, the use of a latent boom/bust measure of stock market conditions captures an additional channel through which a central bank's efforts to reduce fluctuations in inflation can contribute to greater asset market stability.

The evidence reported provided support for the view that unanticipated changes in inflation and interest rates have played important roles in major movements in the U.S. stock market since World War II and thus the need to look at this effect on Nairobi Stock Exchange. Bordo et al (2008) found that inflation and interest rate shocks have large, negative impacts on stock market conditions, apart from their effects on real stock prices. Disinflationary shocks, for example, can help explain the U.S. stock market boom of 1994-2000, whereas inflationary shocks can help explain the bust of 1973-74. The policy lesson they drew concerns not necessarily what policymakers ought to do when faced with a bubbling stock market but how they can contribute to equity market stability by minimizing unanticipated fluctuations in inflation. Similarly, the impulse responses to long-term interest rate shocks suggest that monetary policies can induce financial market stability (Bordo et al, 2008).

Jacque (2004) postulates that if one can visualize emerging national capital markets positioned along a continuum ranging from recently 'hatched' or embryonic to truly mature markets one can hypothesize that the race along this continuum is indeed beneficial as ascending countries avail themselves of a lower national cost of capital.

Arguably this process is welfare-enhancing as it improves living standards and makes national firms more competitive in the global marketplace. This is more likely to affect economic performance in general and inflation in particular due to the fact that as markets graduate to higher levels of 'emergedness' their national firms avail themselves of a lower cost of capital that makes them more competitive in the global economy and spurs economic growth.

Waciira (1999) said that from liquidity point of view, inflation is likely to result in an erosion of the real value of any financial claims outstanding as opposed to the nominal value of such claims which may remain unaffected. Therefore a firm may find it with receivables whose real value is diminished, thus inflation harms lenders and benefits borrowers. This defect is to some extent remedied by indexing interest payments to the prevailing rate of inflation; however this arrangement is more typical of long-term borrowing arrangements between lenders and lending institutions and is not common in short-term credit arrangements especially amongst non-financial institutions.

Sitienei (2005) studied the relationship between liquidity and stock ownership pattern at the NSE. His main objectives were to document the ownership pattern and liquidity of stocks listed at the NSE; and to determine the relationship between stock liquidity and stock ownership patterns traded at NSE. The results of his study support the fact that there is a positive relationship between liquidity, shares outstanding, number of shareholders, public ownership as well as foreign ownership.

Kamanda (2001) set out to determine and evaluate quoted equity portfolios of insurance companies. He did this by examining the risk return characteristics of the equity portfolios held by the individual insurance companies. His major finding was that quoted equity portfolios held by Insurance companies were poorly diversified as they had performed worse than the market portfolio.

Kangethe (2000) set out to investigate the effect of Government ownership on share price volatility of companies quoted at Nairobi Stock Exchange for the period 1997 to

1998. The specific objective of the study was to establish whether government ownership influences the share price volatility of the companies quoted at the Nairobi Stock Exchange. He found that there was a significant difference in the share stock volatility between the companies in which the government had share holding and the market index.

Nyariji (2001), sought to evaluate the risk reduction benefits of portfolio diversification at the Nairobi Stock Exchange. His analysis (using the mean-variance model) indicates that there is significant risk reduction at the Nairobi Stock Exchange as a portfolio grows in size. This continues until a portfolio size of 13 securities is after which the risk reduction becomes insignificant. He concludes by saying that, the current size of the NSE does not fully diversify specific risk and therefore the need to widen the market to enhance further diversification.

Risk is seen as a problem but investors still choose to invest in risky projects (Nyariji, 2001). The justification is that the most risky projects, if successful, offer the greatest reward. Investors therefore usually have to make a selection decision, as to which particular assets from the available alternatives to put their money in and how much to allocate to each of the selected securities.

Ochieng (2006) studied the relationship between working capital of firms listed in NSE and economic activities in Kenya. The objective was to examine how the changes in economic activities affect changes in working capital by firms listed in NSE.The liquidity position of the 50 small firms included in this study as measured by the current and quick ratios increased slightly during economic expansions and decreased during economic slowdown. However the liquidity positions reacted differently to different economic indications.

Kotler (2000) asserts that a major circumstance provoking price increases and share returns is cost inflation. Rising cost unmatched by productivity gains squeeze profit margins and lead companies to regular rounds of price increases. Companies often raise their prices by more than the cost increase in anticipation of further inflation or

government price controls in a practice called anticipatory pricing. Another factor leading to price increases is over-demand. When a company cannot supply all of its customers, it can raise its prices or ration supplies to customers. The price can be increased in the following ways; delayed quotation pricing, escalator clauses and reduction of discount.

Gitman et. al (2001), asserts that the ultimate effect of inflation on a firm is dependent on the nature of its operations as well as its competitive environment. A firm which experiences inelastic demand for its products may be able to cushion itself from adverse impact of inflation by transferring the price increases to final consumers, thus leaving its margins untouched. The same could be said of a company operating in a sector with low levels of competition.

2.6 Historical Development of Nairobi Stock Exchange (NSE).

The Nairobi stock exchange was established in 1954 and operated as an association of stockbrokers with no trading floor until October 1991. The introduction of the trading floor has led to a substantial increase in trading volumes and upward movement in the various indexes. The Nairobi Stock Exchange has been instrumental in enabling the public and private sectors in Kenya to raise large amounts of capital for expansion of new businesses (NSE Manual, 2005). There are 18 registered brokers and 52 firms listed on the exchange. It deals in ordinary shares and fixed income securities such as preference shares and most recently treasury bonds. The NSE also has some of its shares cross-listed with other stock exchanges in South Africa, Uganda and Tanzania. Both operational and informational efficiencies are key to ensuring that the NSE fulfils its mandate as the capital markets intermediary for Kenya and the world over (NSE Handbook, 2005).

The NSE operates under Capital Markets Authority (CMA) regulations which enforce maximum disclosures by listed companies and all those seeking a listing on the exchange. The principal objective of the authority is the development of all aspects of capital markets with particular emphasis on the removal of impediments and the creation of incentives for longer term investments in productive activities.

Fundamental reforms of the market structure were undertaken in the year 2000. This saw the market reorganized into two independent market segments namely; main investment market segment (MIMS) and alternative investment market segment. MIMS is the main quotation market with more stringent listing requirements which is further divided into four markets namely; Agricultural market sector, Commercial and services market sector, Finance and investment sector and Industrial and Allied market sector.

The second category is the Alternative Investment Market Segment. This is made up of firms whose public listing at the NSE is governed by less stringent rules in terms of capitalization levels.

2.7 Conclusion

From the above literature it is evident that there have been various empirical studies on liquidity and inflation but no conclusive results have been found on the relationship between inflation rates and stock market liquidity in the context of the ability to trade large quantities quickly, at low cost, and without moving the price. As witnessed from the various studies, a number of them have concentrated on liquidity related to the ability of a company to meet its obligations as they fall due and also on returns. In Kenya, some studies have been carried out on the same subject of liquidity and macro economic variables, however it is not very clear in today's business environment to what extent these macro-economic variables and in particular inflation do affect the Nairobi stock market liquidity despite the fact that these are closely related to the industry returns. This study would therefore help us to understand if inflation rates affect the NSE liquidity.

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research methodology used in the study including the research design, population of the study, sample size, data collection instruments and procedures and data analysis.

3.2 Research Design

The study sought to determine the relationship between inflation rates and liquidity of companies quoted at the Nairobi Stock Exchange, hence an empirical study of the NSE was conducted.

3.3 Population of the study

The population of interest in this study consisted of all the firms quoted at the Nairobi Stock Exchange (N.S.E). There were 53 companies listed on the NSE as at January 31, 2007 (www.nse.co.ke).

3.4 Sample of the study

The study followed the stratified sampling technique in obtaining viable set of stocks representing the various strata of the companies listed at the NSE. The sample of this study consisted of 45 companies quoted at the Nairobi Stock Exchange for three years from January 2007 to December 2009 drawn from appendix 1.The two main reasons for using a stratified sampling design are to ensure that particular groups within a population are adequately represented in the sample, and to improve efficiency by gaining greater control on the composition of the sample. The firms in the population were be categorized into the Main Market Segment consisting of Commercial, Industrial and Allied, Finance and Investment and Agriculture. A representative sample from each of the four categories was used. However from the list of companies in appendix 1, AIMS companies and firms which were not listed for the entire period under study were left out of the sample.

3.5 Data Collection

This study was facilitated by the use of secondary data, which was obtained at the N.S.E library and from other financial intermediaries. Where data was not available from Nairobi Stock Exchange reference was made to annual financial reports published by companies studied. Such data included segment by segment monthly trading volume and the market wide monthly trading volume. Data on turnover was extracted from the monthly economic Reviews from CBK. The data regarding inflation was obtained from the Central Bank of Kenya monthly economic reviews. The month on month overall inflation rate was preferred over underlying inflation rate because of full representation of the whole economy. The collected data was captured in form of tables.

3.6 Data analysis

The data collected was analyzed using multiple regression analysis to estimate the relationship between inflation rates and the liquidity of companies quoted at the NSE. A correlation matrix was constructed to evaluate whether there was a linear relationship between the explanatory variables. The problem of non-normality was dealt with by using the approach outlined by Frecka and Hopwood (1983). This method entails removal of outliers from the data and to improve the validity of the result. The items in the population were grouped according to the industry classifications that enabled inter sector companies to be made. Such an approach is also a means of minimizing deviations from normality (Buijink and Jegers, 1986).Then subsequently applying a natural logarithm transformation. The significance of each of the independent variables was tested at a confidence level of 95%.

Liquidity Regression model to be used in the study

The study's measure of liquidity was related to Chan et.al (2005) but unlike him who calculated it from daily prices and volume, the study used monthly data. Following Chang et.al (2005) liquidity measure for stock i at month t in market c, $IL_{i,c,t}$ is defined as the average ratio of the absolute daily price change to a measure of the trading volume:

$$IL_{i,c,t} = \frac{1}{D_t} \sum_{d=1}^{D_t} R_{i,d} / VOL_{i,d,} \qquad 3.5.1$$

Where D_t is the number of trading days in month t, R_{id} and VOL_{id} are, respectively, stock i's monthly return and monthly volume in day d of month t. Unlike Amihud (2002) who calculated illiquidity annually for stocks with at least 200 daily observations each year, the study will use monthly data to calculate the liquidity measure.

The market wide liquidity ratio of the asset market c, CILc,t ($USIL_T$), was calculated as the total monthly turnover in the whole market divided by the total monthly volume in the whole market.

$$CIL_{c,t} = \frac{\text{Turnover}}{\text{MARKET}} \qquad 3.5.2$$

Where MARKET is the monthly trading volume in the whole market

The above variables will further be investigated by the use regression model suggested below whereby the market liquidity ratio (y) will be regressed against the overall inflation rates (x) so as to derive the coefficients which will help to explain the correlation.

$$CIL_{c,t} = B_{(O)} + B_{(1)} I + E_i$$

Where

$CIL_{c,t}$ is the market liquidity ratio adjusted by removing outliers so as to restore normality.

B(o) is the constant term explaining the level of liquidity ratio that is not dependent on the independent variables (y intercept).

$B_{(1)}$ is the marginal changes in liquidity ratio following a change of the average ratio of the turnover to a measure of the trading volume.

I is the month on month overall rate of inflation.

E i is a measure of the error term contained in the model. This measures the goodness of model fit or the explanatory power of the model.

The companies were then categorized under different segments in the stock exchange and means of their trading volumes and overall inflation rates computed. The trend of the means was then analyzed to identify whether some segments were more sensitive to changes in inflation rates than others for the respective segments in the NSE.

The trading volumes data that had been extracted for the years 2007 to 2009 were regressed against the overall inflation rates for the respective months for both the whole market and segment wise. This was to establish if the inflation rate has a direct relationship with the market liquidity in terms of trading volume. Calculations were carried out for coefficient of correlation (R) and coefficient of determination (R^2) to establish the nature and strength of the relationship.

Coefficient of correlation – p-value was used to establish the relationship between the overall inflation rates and market liquidity. Positive p-value showed a direct relationship while a negative p-value showed an inverse relationship.

The test of significance was undertaken to analyze the magnitude of the relationship. The analysis of quantitative data was carried out using SPSS (Statistical Package for Social Science) and Minitab and then presented inform of tables while contextual data was analyzed qualitatively.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

The objective of the study was to determine the relationship between the overall inflation rates and the liquidity of companies listed at the Nairobi Stock Exchange. The data used for the analysis were the month on month overall inflation rates and the monthly trading volumes in the following sectors; Commercial and services, Agricultural, Finance and Investment and Industrial and Allied and also monthly trading volumes for the whole market for the years 2007, 2008 and 2009. Data on monthly turnover was also included to calculate monthly liquidity ratio.

The study was based on the perceived existence of a relationship between overall inflation rates and the NSE market liquidity. Regression models were constructed and Minitab, Ms excel and Statistical Package for Social Sciences (SPSS) used to analyze the data by regressing overall inflation rates (x) as the independent variable and Trading volume (market liquidity) – y as the dependent variable. The monthly liquidity ratio was regressed against overall inflation rates and coefficients of correlation derived whereby the intention was to get the value of p, which in this relationship is the coefficient of correlation. The value of p under regression analysis lies between +1 and -1.A value closer to +1 indicates a strong relationship between the variables under consideration and a value closer to -1 indicates a weak relationship. R^2 (R squared) shows the coefficient of determination which shows the percentage of the dependent variable that is explained by change in the independent variable.

4.2 Descriptive Statistics

The table below reports descriptive statistics of central tendency for the trading volume and overall inflation rates for the five sectors for years January 2007 to December 2009.

Table 4.1 (a): Descriptive Statistics: LIQRATIO and OVE INFL

	Mean	Std. Deviation	N
LIQRATIO	29.685431	18.964572726	34
OVE INFL	14.3715	8.31505	34

LIQRATIO refers to liquidity ratio which has been calculated using Turnover divided by MARKET (monthly trading volume for the whole market).The monthly average mean of the liquidity ratio is 29.69 while the mean overall inflation is 14.37% and its risk measured by standard deviation is 8.3% as almost similar to the results when trading volume is regressed against overall inflation rates. This is detailed in table 4.1 (a) above.

Table 4.1 (b): Descriptive Statistics: COMM, FINANCE, INDUST, AGRI, ALTM, MARKET, OVE INFL, UND

Variable	N	N*	Mean	Median	TrMean	StDev
COMM	32	4	108.4	70.3	96.8	98.5
FINANCE	36	0	64.17	64.00	61.42	32.22
INDUST	36	0	41.73	41.35	41.77	16.83
AGRI	33	3	2.292	1.912	2.054	1.790
ALTM	17	0	1.055	0.777	1.006	0.598
MARKET	34	2	229.2	197.9	220.7	103.7
OVE INFL	36	0	15.12	12.20	14.79	8.67
UND INFL	36	0	6.440	5.910	6.384	1.475

Variable	SE Mean	Minimum	Maximum	Q1	Q3
COMM	17.4	14.4	376.0	32.8	173.1
FINANCE	5.37	14.40	168.20	38.38	80.90
INDUST	2.81	10.84	75.00	29.95	57.38
AGRI	0.312	0.600	9.300	1.000	3.212
ALTM	0.145	0.146	2.700	0.700	1.300
MARKET	17.8	87.5	490.8	151.0	292.3
OVE INFL	1.44	5.00	31.54	7.61	25.33
UND INFL	0.246	4.560	9.100	5.153	7.89

Min = minimum max = maximum

The average monthly trading volume was highest for commercial and services sector at 108.4 million shares compared to the average market wide liquidity of 229.2 million shares. This was followed by Finance and Investment at 64.17 million shares, Industrial and Allied at 41.73 million shares, Agriculture with 2.292 million shares and the Alternative market segment with 1.055 million shares being the lowest .The total risk as measured by the standard deviation shows that commercial and services sector had the

highest at 98.5 which can be compared to the overall market trading volume risk of 103.7 while the other sectors had relatively low risk. The mean overall inflation rate was 15.12% with its standard deviation at 8.67%. Overall inflation rate was used because it is representative of the whole economy as compared to underlying inflation rate which concentrates on only a few sectors like food and transport.

Commercial and services reported a maximum trading volume of 376 million shares which positively relates to the market wide maximum of 490.8 million shares. The lowest maximum trading volume of 2.7 million shares was reported for the AIMS which in the regression analysis, has been treated as outlier data.

4.3 Regression Results

Table 4.2 (a): Correlations: LIQRATIO, UND INFL and OVE INFL

		LIQRATIO	UND INFL	OVE INFL
LIQRATIO	Pearson Correlation	1	-.535(**)	-.154
	Sig. (2-tailed)	.	.001	.385
	N	34	34	34
UND INFL	Pearson Correlation	-.535(**)	1	.716(**)
	Sig. (2-tailed)	.001	.	.000
	N	34	36	36
OVE INFL	Pearson Correlation	-.154	.716(**)	1
	Sig. (2-tailed)	.385	.000	.
	N	34	36	36

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

From the table 4(a) above the p value showing the correlation between LIQRATIO and OVE INFL is -0.154 indicating that the correlation is negative and weak just like the correlation between the MARKET and OVE INFL in the table 4.2(b) below. The relationship is not significant since the t value is 0.385.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	-.154(a)	.024	-.007	19.02934267

a Predictors: (Constant), OVE INFL

In the model summary above, the correlation coefficient is also -0.154 which indicates negative correlation and R^2 of 0.024 which indicates that the relationship is not significant.

Table 4.2(b): Correlations: MARKET, OVE INFL, UND INFL

```
           MARKET OVE INFL
OVE INFL   0.274
           0.117

UND INFL   0.373    0.716
           0.030    0.000

Cell Contents: Pearson correlation
               P-Value
```

The table 4.2(b) above shows the correlations between the Market trading volume and the overall inflation rates .The results indicate that the coefficient of correlation, p-value is 0.274 implying a positive correlation between inflation rates and liquidity of the stock market but the relationship is a weak one. The equation of this model will thus be in the form, y=180+3.42x. The constant value of 180 indicates that there will be a trading volume of 180 million shares, whether overall inflation rates vary or not.

Table 4.3: Correlations: COMM, FINANCE, INDUST, AGRI

```
             COMM  FINANCE   INDUST
FINANCE   -0.073
           0.692

INDUST    -0.332    0.577
           0.063    0.000

AGRI      -0.024    0.555    0.151
           0.895    0.001    0.403

Cell Contents: Pearson correlation
               P-Value
```

From the table 4.3 above, the negative p-values for FINANCE and COMM of -0.073, INDUST and COMM of -0.332 and AGRIC of -0.024 indicate that as the liquidity of one is going up the other is reducing thus an inverse relationship .This can be useful for control purposes. While the positive p- values indicate that the correlations between FINANCE and INDUST, AGRIC and FINANCE and AGRIC and INDUST are positive and move towards the same direction.

Table 4.4: Regression Analysis: MARKET versus OVE INFL

```
The regression equation is
MARKET = 180 + 3.42 OVE INFL

34 cases used 2 cases contain missing values

Predictor        Coef     SE Coef          T        P
Constant       180.17       35.07       5.14    0.000
OVE INFL        3.415       2.120       1.61    0.117

S = 101.3       R-Sq = 7.5%      R-Sq(adj) = 4.6%
```

The result of the regression analysis, with market wide trading volume as the dependent variable (MARKET) and overall inflation rates as the independent variable (OVE INFL) are summarized in the table 4.4 above. The alpha of 180.17 (with a p-value of 0.00) suggests a tendency of no results where there is no change in the overall inflation rates which means the variations in trading volumes in the market as a whole is related to the overall inflation rates. From the above observation, it is clear that there is a positive relationship between overall inflation rates and liquidity (trading volume) at the NSE for the period under consideration. The model specified y=180+3.42x indicates that whatever value of x, y will take a positive value and therefore the results from the expression clearly indicate a positive and direct relationship between the two variables. The p value of 0.274 indicates a positive but weak correlation.

The beta of 3.415, suggesting that when overall inflation rates changes by one percentage point, the market trading volume changes by 3.415. This betas p-value is 0.117 suggesting that it has information content and a relationship exists. The T-value of 1.61 shows that the relationship is not significant. The R^2 of 7.5% indicates a strong positive correlation.

Table 4.5: Regression Analysis: COMM versus OVE INFL

```
The regression equation is
COMM = 97.4 + 0.71 OVE INFL

32 cases used 4 cases contain missing values

Predictor       Coef     SE Coef          T        P
Constant       97.43       37.71       2.58    0.015
OVE INFL       0.708       2.144       0.33    0.744

S = 99.94       R-Sq = 0.4%      R-Sq(adj) = 0.0%
```

The result of the regression analysis, with commercial and services sector trading volume as the dependent variable (COMM) and overall inflation rates as the independent variable (OVE INFL) are summarized in the table 4.5 above. The model equation is y = 97. 4+ 0.71x.The alpha of 97.4 (with a p-value of 0.015) suggests a tendency of no results where there is no change in the overall inflation rates. Which means the variations in trading volumes in this segment is positively related to the overall inflation rates.

The beta of 0.71, suggesting that when overall inflation rates changes by one percentage point, the COMM segment trading volume changes by 0.71. This betas p-value is 0.744 suggesting that it has information content and a positive relationship exists. For every value of x, y remains positive and vice versa. The R^2 whose value is 0.4% indicates that the correlation is not strong, though the T value of 0.33 shows that the relationship is not significant.

Table 4.6: Regression Analysis: FINANCE versus OVE INFL

```
The regression equation is
FINANCE = 69.3 - 0.340 OVE INFL

Predictor       Coef     SE Coef          T        P
Constant       69.30       11.03       6.29    0.000
OVE INFL     -0.3396      0.6348      -0.53    0.596

S = 32.56       R-Sq = 0.8%      R-Sq(adj) = 0.0%
```

The result of the regression analysis, with finance and investment sector trading volume as the dependent variable (FINANCE) and overall inflation rates as the independent

variable (OVE INFL) are summarized in the table 4.6 above. The model equation is y = 69.30-0.34x. The alpha of 69.30 (with a p-value of 0.000) suggests a tendency of no results where there is no change in the overall inflation rates, which means the variations in trading volumes in this segment is related to the overall inflation rates.

The beta of -0.34, suggesting that when overall inflation rates change by one percentage point, the FINANCE segment trading volume changes by -0.34 but in the opposite direction. This betas p-value is 0.596 suggesting that it has information content and a relationship exists. For every negative value of x, y remains positive and vice versa. The R^2 which is 0.8% shows that there is a correlation but a weak one, while the T value of -0.53 also indicates that the relationship is not significant.

Table 4.7: Regression Analysis: INDUST versus OVE INFL

```
The regression equation is
INDUST = 39.6 + 0.142 OVE INFL

Predictor        Coef     SE Coef          T        P
Constant       39.584       5.769       6.86    0.000
OVE INFL       0.1417      0.3321       0.43    0.672

S = 17.03       R-Sq = 0.5%      R-Sq(adj) = 0.0%
```

The result of the regression analysis, with industrial and Allied sector trading volume as the dependent variable (INDUST) and overall inflation rates as the independent variable (OVE INFL) are summarized in the table 4.7 above. The model equation is y = 39.6+0.142x. The alpha of 39.6 (with a p-value of 0.000) suggests a tendency of no results where there is no change in the overall inflation rates, which means the variations in trading volumes in this segment is related to the overall inflation rates.

The beta of 0.142, suggesting that when overall inflation rates changes by one percentage point, the INDUST segment trading volume changes by 0.142. This betas p-value is 0.672 suggesting that it has information content and a relationship exists. For every value

of x, y remains positive and vice versa. The R^2 of 0.5% indicates a weak but positive correlation while the T value of 0.43 indicates that the relationship is not significant.

Table 4.8: Regression Analysis: AGRI versus OVE INFL

```
The regression equation is
AGRI = 4.03 - 0.109 OVE INFL

33 cases used 3 cases contain missing values

Predictor        Coef     SE Coef          T        P
Constant       4.0295      0.5770       6.98    0.000
OVE INFL     -0.10890     0.03196      -3.41    0.002

S = 1.551       R-Sq = 27.2%     R-Sq(adj) = 24.9%
```

The result of the regression analysis, with agricultural sector trading volume as the dependent variable (AGRI) and overall inflation rates as the independent variable (OVE INFL) are summarized in the table 4.8 above. The model equation is y = 4.03-0.109x. The alpha of 4.03 (with a p-value of 0.000) suggests a tendency of no results where there is no change in the overall inflation rates, which means the variations in trading volumes in this segment is related to the overall inflation rates.

The beta of -0.11, suggesting that when overall inflation rates changes by one percentage point, the AGRI segment trading volume changes by -0.11. This betas p-value is 0.002 suggesting that it has information content and a relationship exists. For every negative value of x, y remains positive and vice versa. The R^2 of 27.2% shows that there is a strong correlation and the t value of -3.41 also shows that the relationship is significant.

4.4 The relationship between Overall inflation rates and Liquidity (Trading Volume) at NSE

From appendix I NSE has been categorized into five segments, that is, Commercial and services, Agricultural, Finance and Investment, Industrial and Allied and the Alternative Market Segment. The Alternative segment market was left out because most of the months under study did not have complete data. There was no consistency in volumes traded over the

period under study. The overall inflation rates kept fluctuating over the period. There was no specific upward or downward trend as per the data for analysis in appendix II.

From the findings of the study, there is a relationship between overall inflation rates and trading volume/liquidity of companies quoted at the NSE. From the above regression analysis on overall inflation rates and trading volume as a measure of liquidity, it is clear the two variables tend to move in the same direction depicting a positive relationship between the inflation rates and the market liquidity at the NSE.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 Summary of Findings

This study was conducted with the main aim of achieving the objective of determining the relationship between inflation rates and the liquidity of companies listed at the NSE.

The findings indicate a fluctuating trend of both variables as per the data analysis in chapter 4 depending on the sector being looked at. From the pattern on the findings it can be concluded that the higher the level of inflation rates, the higher the liquidity and vice versa for the market wide trading involving all segments. Therefore there is a positive relationship between overall inflation rates and liquidity at the NSE. While when looking at the various segments, Commercial and Services sector and the finance and investment sector replicate the market wide relationship of positive and direct relationship while the Agricultural and Industrial and Allied sectors are showing an inverse relationship.

5.2 Conclusion

The findings give an insight into the influence of the inflation rates on the liquidity of companies listed at the NSE. There exists a positive relationship between the inflation rates and the NSE liquidity. It is very clear that investors at the NSE take the impact of inflation rates consideration when choosing portfolios to buy and sell.

A direct relationship exists between the overall inflation rates and the market liquidity in all the four segments studied at the NSE for the three years. The significant difference in the relationships in the different sectors can be attributed to the fact that firms in some sectors such as agriculture are mostly affected by the underlying inflation rates and not the overall inflation rates.

5.3 Limitations of the study

There were other factors that affected the macroeconomic environment during the period of study like the Post election violence which may have greatly affected the NSE trading

operations other than the inflation rates thus affecting the accuracy of this research. Others include sky rocketing interest rates especially on the Finance and investment sector and NSE share index composition which may have affected the liquidity at the NSE. It has further been assumed that there were no other intervening variables that might have affected the market liquidity at the NSE.

Some quoted companies at the NSE were not included in the sample due to unavailability of complete data and other company's data were outliers. This reduction in the sample size would have affected the calculations in this study.

The data used in this study was obtained from CBK monthly economic reviews and CMA website and caution must be taken with the limitations of such data which goes to the public domain. The data may to some extent be manipulated by the management to represent a favorable view to the public. The study was undertaken with a fixed duration in mind thus limiting as to the findings as compared to if a longer time period was used.

5.4 Recommendations

It is important that a similar study be conducted with a bigger sample and time horizon by using advanced time series models to enhance the understanding of the association between inflation rates and liquidity at the NSE. Other macroeconomic variables affecting the whole economy and especially stock market liquidity should also be considered for future research.

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APPPENDICES

Appendix I: Listed Companies at the NSE

Agriculture

1. Unilever Tea (K) Ltd.
2. Rea Vipingo Ltd.
3. Sasini Tea & Coffee Ltd.
4. Kakuzi Ltd.

Commercial and Services

5. Access Kenya Group
6. Marshalls E.A. Ltd.
7. Car & General Ltd.
8. Hutchings Biemer Ltd.
9. Kenya Airways Ltd.
10. CMC Holdings Ltd.
11. Uchumi Supermarkets Ltd.
12. Nation Media Group Ltd.
13. TPS (Serena) Ltd.
14. ScanGroup Ltd.
15. Standard Group Ltd.

Finance and Investment

16. Barclays Bank of Kenya Ltd.
17. CFC Bank Ltd.
18. Housing Finance Company of Kenya Ltd.
19. Centum Investment Company Ltd.
20. Kenya Commercial Bank Ltd.
21. National Bank of Kenya Ltd.
22. Pan Africa Insurance Holdings Co. Ltd
23. Diamond Trust Bank of Kenya Ltd.

24. Jubilee Insurance Co. Ltd
25. Standard Chartered Bank Ltd.
26. National Industrial Credit Bank Ltd.
27. Equity Bank Ltd.

Industrial and Allied

28. Athi River Mining Ltd.
29. BOC Kenya Ltd.
30. British American Tobacco Kenya Ltd.
31. Carbacid Investments Ltd.
32. Olympia Capital Holdings Ltd.
33. E.A. Cables Ltd.
34. E.A. Breweries Ltd.
35. Sameer Africa Ltd.
36. Kenya Oil Ltd.
37. Mumias Sugar Company Ltd.
38. Unga Group Ltd.
39. Bamburi Cement Ltd.
40. Crown berger (K) Ltd.
41. E.A Portland Cement Co. Ltd.
42. Kenya Power & Lighting Co. Ltd.
43. Total Kenya Ltd.
44. Eveready East Africa Ltd.
45. Kengen Ltd.
46. A.Baumann & Co.Ltd
47. City Trust Ltd
48. Eaagads Ltd
49. Express Ltd
50. Williamson Tea Kenya Ltd
51. Kapchorua Tea Co. Ltd
52. Kenya Orchards Ltd
53. Limuru Tea Co. Ltd

Appendix II: Data for Analysis – Trading Volume in millions and Inflation rates (%) and Turnover in Kshs. millions

MONTH	COMM	FINANCE	INDUST	AGRI	ALTM	MARKET	OVE INFL	UND INFL	Turnover	LiqR tio
Jan-07	14.4	14.4	43.8	3.1	1.7	136.31	9.67	5.15	10482.89	76.
Feb-07	22	46.5	61.7	3.4	2.7	109.08	6.81	4.92	7763.86	71.
Mar-07		36.5	57.7		1.2	114.27	5.87	5.13	6955.35	60.
Apr-07		35.9	32.3		0.766	87.45	5.66	5.03	4342.38	49.
May-07		35.9	32.3		0.766	123.72	6.33	5.22	6224.92	50.
Jun-07	42.1	63.5	41.5	3.323	0.687	151.11	11.1	4.9	6079.43	40.
Jul-07	42	73.5	49.8	1.87	1.4	168.57	13.56	4.56	6442.34	38.
Aug-08	32.5	143.6	67.6	3.54	0.9	248.14	12.37	5.06	9251.2	37.
Sep-07	30.7	168.2	68.5	9.3	0.146	275.7	11.72	5.34	9902	35.
Oct-07	29.8	93.7	57.98	1.5	0.7	183.6	10.55	5.41	7714.02	42.
Nov-07	34.5	82	67.1	1.1	0.777	177.95	11.83	5.3	7522.12	42.
Dec-07	16	54.7	43.3	0.9	1.9	140.8	12.03	5.25	6017.99	42.
Jan-08	49.6	86.9	57.5	2.3	0.7	197.04	18.22	5.07	7046.14	35.
Feb-08	33.5	99.4	63.7	1.4	0.7	198.83	19.13	6.64	8011.26	40.
Mar-08	48	73.2	57	1.7	0.7	180.64	21.83	6.98	7320.55	40.
Apr-08	30.3	64.5	44.7	1.1	1.1	141.76	26.63	6.54	5635.56	39.
May-08	30.3	64.5	44.7	1.1	1.1	168.03	31.54	7.24	6840	40.
Jun-08		86.8	51.2	0.9			29.26	7.6		
Jul-08	80	49.6	75	1			26.5	7.62	14280	
Aug-08	354.1	73.5	43.4	0.6		490.81	27.58	8.23	7490.2	15.
Sep-08	376	52.8	39.5	1		485.3	28.23	8.59	6787.8	13.
Oct-08	159.8	25.1	23.3	0.9		393.5	28.43	8.67	3642.4	9
Nov-08	118.2	18.5	17.2	0.7		290.94	29.37	9.1	3723.72	12
Dec-08	88.3	44	30.8	0.9		170.86	27.72	9.04	4617.11	27
Jan-09	88.3	44	30.8	0.9		177.55	13.34	8.43	2624.39	14
Feb-09	84.8	25.3	25.41	2.2		150.64	14.62	8.39	1645.28	10
Mar-09	58	35	11	2		207.39	14.56	7.99	2414.12	11
Apr-09	61	36	11	2		215.56	12.38	8.1	2549.12	11
May-09	215.4	63.3	23.9	5.5		308	9.57	7.43	3087.67	10
Jun-09	230.4	101.6	40.5	5		377.56	8.57	6.7	4126.87	10
Jul-09	178.6	82.6	30.7	4.1		296.19	8.41	6.18	3261.63	11
Aug-09	177.5	71.5	29.7	2		280.89	7.34	5.64	3149.21	11
Sep-09	125.7	77.6	26.3	2.1		231.69	6.72	5.16	3547.59	15
Oct-09	184.8	73.3	41.2	4		303.3	6.6	5.17	4520.97	14
Nov-09	292.2	64.6	37.2	2.1		396.36	5	4.86	4646.57	11
Dec-09	141.1	48.4	22.8	2.2		214.9	5.34	5.2	2591.19	12

Appendix III: Regression Analysis Results and descriptive statistics for LiqRatio, OVE INFL and UND INFL

Correlations

		LIQRATIO	UND INFL	OVE INFL
LIQRATIO	Pearson Correlation	1	-.535(**)	-.154
	Sig. (2-tailed)	.	.001	.385
	N	34	34	34
UND INFL	Pearson Correlation	-.535(**)	1	.716(**)
	Sig. (2-tailed)	.001	.	.000
	N	34	36	36
OVE INFL	Pearson Correlation	-.154	.716(**)	1
	Sig. (2-tailed)	.385	.000	.
	N	34	36	36

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

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
LIQRATIO	29.685431 22754952	18.964572726 083000	34
OVE INFL	14.3715	8.31505	34

Correlations

		LIQRATIO	OVE INFL
Pearson Correlation	LIQRATIO	1.000	-.154
	OVE INFL	-.154	1.000
Sig. (1-tailed)	LIQRATIO	.	.193
	OVE INFL	.193	.
N	LIQRATIO	34	34
	OVE INFL	34	34

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	OVE INFL(a)	.	Enter

a All requested variables entered.
b Dependent Variable: LIQRATIO

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	-.154(a)	.024	-.007	19.02934267 7150580

a Predictors: (Constant), OVE INFL

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	34.728	6.590		5.270	.000		
	OVE INFL	-.351	.398	-.154	-.881	.385	1.000	1.000

a Dependent Variable: LIQRATIO

Collinearity Diagnostics(a)

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	OVE INFL
1	1	1.869	1.000	.07	.07
	2	.131	3.774	.93	.93

a Dependent Variable: LIQRATIO

Regression

Descriptive Statistics

	Mean	Std. Deviation	N
LIQRATIO	29.685431 22754952	18.964572726 083000	34
UND INFL	6.3712	1.48995	34

Correlations

		LIQRATIO	UND INFL
Pearson Correlation	LIQRATIO	1.000	-.535
	UND INFL	-.535	1.000
Sig. (1-tailed)	LIQRATIO	.	.001
	UND INFL	.001	.
N	LIQRATIO	34	34
	UND INFL	34	34

Variables Entered/Removed(b)

Model	Variables Entered	Variables Removed	Method
1	UND INFL(a)		Enter

a All requested variables entered.
b Dependent Variable: LIQRATIO

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.535(a)	.286	.264	16.26872560 3628500

a Predictors: (Constant), UND INFL

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3399.130	1	3399.130	12.843	.001(a)
	Residual	8469.486	32	264.671		
	Total	11868.616	33			

a Predictors: (Constant), UND INFL
b Dependent Variable: LIQRATIO

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	73.084	12.427		5.881	.000		
	UND INFL	-6.812	1.901	-.535	-3.584	.001	1.000	1.000

a Dependent Variable: LIQRATIO

Collinearity Diagnostics(a)

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				(Constant)	UND INFL
1	1	1.974	1.000	.01	.01
	2	.026	8.795	.99	.99

a Dependent Variable: LIQRATIO

Appendix IV: Results for: Data for Analysis

Correlations: MARKET, OVE INFL, UND INFL

	MARKET	OVE INFL
OVE INFL	0.274	
	0.117	
UND INFL	0.373	0.716
	0.030	0.000

Cell Contents: Pearson correlation
P-Value

Descriptive Statistics: COMM, FINANCE, INDUST, AGRI, ALTM, MARKET, OVE INFL, UND

Variable	N	N*	Mean	Median	TrMean	StDev
COMM	32	4	108.4	70.3	96.8	98.5
FINANCE	36	0	64.17	64.00	61.42	32.22
INDUST	36	0	41.73	41.35	41.77	16.83
AGRI	33	3	2.292	1.912	2.054	1.790
ALTM	17	0	1.055	0.777	1.006	0.598
MARKET	34	2	229.2	197.9	220.7	103.7
OVE INFL	36	0	15.12	12.20	14.79	8.67
UND INFL	36	0	6.440	5.910	6.384	1.475

Variable	SE Mean	Minimum	Maximum	Q1	Q3
COMM	17.4	14.4	376.0	32.8	173.1
FINANCE	5.37	14.40	168.20	38.38	80.90
INDUST	2.81	10.84	75.00	29.95	57.38
AGRI	0.312	0.600	9.300	1.000	3.212
ALTM	0.145	0.146	2.700	0.700	1.300
MARKET	17.8	87.5	490.8	151.0	292.3
OVE INFL	1.44	5.00	31.54	7.61	25.33
UND INFL	0.246	4.560	9.100	5.153	7.898

Regression Analysis: COMM versus OVE INFL

The regression equation is
COMM = 97.4 + 0.71 OVE INFL

32 cases used 4 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	97.43	37.71	2.58	0.015
OVE INFL	0.708	2.144	0.33	0.744

S = 99.94 R-Sq = 0.4% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1088	1088	0.11	0.744
Residual Error	30	299626	9988		
Total	31	300714			

Unusual Observations

Obs	OVE INFL	COMM	Fit	SE Fit	Residual	St Resid
20	27.6	354.1	117.0	31.3	237.1	2.50R
21	28.2	376.0	117.4	32.4	258.6	2.74R

R denotes an observation with a large standardized residual

Regression Analysis: COMM versus UND INFL

The regression equation is
COMM = - 18.4 + 19.4 UND INFL

32 cases used 4 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	-18.42	76.84	-0.24	0.812
UND INFL	19.43	11.48	1.69	0.101

S = 95.66 R-Sq = 8.7% R-Sq(adj) = 5.7%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	26205	26205	2.86	0.101
Residual Error	30	274509	9150		
Total	31	300714			

Unusual Observations

Obs	UND INFL	COMM	Fit	SE Fit	Residual	St Resid
20	8.23	354.1	141.5	25.9	212.6	2.31R
21	8.59	376.0	148.5	29.1	227.5	2.50R
35	4.86	292.2	76.0	25.5	216.2	2.34R

R denotes an observation with a large standardized residual

Regression Analysis: FINANCE versus OVE INFL

The regression equation is
FINANCE = 69.3 - 0.340 OVE INFL

Predictor	Coef	SE Coef	T	P
Constant	69.30	11.03	6.29	0.000
OVE INFL	-0.3396	0.6348	-0.53	0.596

S = 32.56 R-Sq = 0.8% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	303	303	0.29	0.596
Residual Error	34	36035	1060		

Total	35	36338

Unusual Observations

Obs	OVE INFL	FINANCE	Fit	SE Fit	Residual	St Resid
8	12.4	143.60	65.10	5.70	78.50	2.45R
9	11.7	168.20	65.32	5.84	102.88	3.21R

R denotes an observation with a large standardized residual

Regression Analysis: UND INFL versus OVE INFL

The regression equation is
UND INFL = 4.60 + 0.122 OVE INFL

Predictor	Coef	SE Coef	T	P
Constant	4.5985	0.3541	12.99	0.000
OVE INFL	0.12178	0.02038	5.97	0.000

S = 1.045 R-Sq = 51.2% R-Sq(adj) = 49.8%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	39.005	39.005	35.70	0.000
Residual Error	34	37.152	1.093		
Total	35	76.157			

Unusual Observations

Obs	OVE INFL	UND INFL	Fit	SE Fit	Residual	St Resid
25	13.3	8.430	6.223	0.178	2.207	2.14R

R denotes an observation with a large standardized residual

Regression Analysis: FINANCE versus OVE INFL

The regression equation is
FINANCE = 69.3 - 0.340 OVE INFL

Predictor	Coef	SE Coef	T	P
Constant	69.30	11.03	6.29	0.000
OVE INFL	-0.3396	0.6348	-0.53	0.596

S = 32.56 R-Sq = 0.8% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	303	303	0.29	0.596
Residual Error	34	36035	1060		
Total	35	36338			

Unusual Observations

Obs	OVE INFL	FINANCE	Fit	SE Fit	Residual	St Resid
8	12.4	143.60	65.10	5.70	78.50	2.45R
9	11.7	168.20	65.32	5.84	102.88	3.21R

R denotes an observation with a large standardized residual

Regression Analysis: FINANCE versus UND INFL

The regression equation is
FINANCE = 113 - 7.58 UND INFL

Predictor	Coef	SE Coef	T	P
Constant	112.97	23.20	4.87	0.000
UND INFL	-7.577	3.514	-2.16	0.038

S = 30.66 R-Sq = 12.0% R-Sq(adj) = 9.4%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	4372.8	4372.8	4.65	0.038
Residual Error	34	31965.4	940.2		
Total	35	36338.2			

Unusual Observations

Obs	UND INFL	FINANCE	Fit	SE Fit	Residual	St Resid
8	5.06	143.60	74.63	7.04	68.97	2.31R
9	5.34	168.20	72.50	6.41	95.70	3.19R

R denotes an observation with a large standardized residual

Regression Analysis: INDUST versus OVE INFL

The regression equation is
INDUST = 39.6 + 0.142 OVE INFL

Predictor	Coef	SE Coef	T	P
Constant	39.584	5.769	6.86	0.000
OVE INFL	0.1417	0.3321	0.43	0.672

S = 17.03 R-Sq = 0.5% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	52.8	52.8	0.18	0.672
Residual Error	34	9863.0	290.1		
Total	35	9915.9			

Regression Analysis: INDUST versus UND INFL

The regression equation is
INDUST = 71.8 - 4.67 UND INFL

Predictor	Coef	SE Coef	T	P
Constant	71.81	11.79	6.09	0.000
UND INFL	-4.671	1.785	-2.62	0.013

S = 15.58 R-Sq = 16.8% R-Sq(adj) = 14.3%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	1661.4	1661.4	6.84	0.013
Residual Error	34	8254.4	242.8		
Total	35	9915.9			

Unusual Observations

Obs	UND INFL	INDUST	Fit	SE Fit	Residual	St Resid
19	7.62	75.00	36.22	3.34	38.78	2.55R

R denotes an observation with a large standardized residual

Regression Analysis: AGRI versus OVE INFL

The regression equation is
AGRI = 4.03 - 0.109 OVE INFL

33 cases used 3 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	4.0295	0.5770	6.98	0.000
OVE INFL	-0.10890	0.03196	-3.41	0.002

S = 1.551 R-Sq = 27.2% R-Sq(adj) = 24.9%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	27.926	27.926	11.61	0.002
Residual Error	31	74.558	2.405		
Total	32	102.483			

Unusual Observations

Obs	OVE INFL	AGRI	Fit	SE Fit	Residual	St Resid
9	11.7	9.300	2.753	0.302	6.547	4.30R

R denotes an observation with a large standardized residual

Regression Analysis: AGRI versus OVE INFL

The regression equation is
AGRI = 4.03 - 0.109 OVE INFL

33 cases used 3 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	4.0295	0.5770	6.98	0.000
OVE INFL	-0.10890	0.03196	-3.41	0.002

S = 1.551 R-Sq = 27.2% R-Sq(adj) = 24.9%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	27.926	27.926	11.61	0.002
Residual Error	31	74.558	2.405		
Total	32	102.483			

Unusual Observations

Obs	OVE INFL	AGRI	Fit	SE Fit	Residual	St Resid
9	11.7	9.300	2.753	0.302	6.547	4.30R

R denotes an observation with a large standardized residual

Regression Analysis: AGRI versus UND INFL

The regression equation is
AGRI = 5.32 - 0.461 UND INFL

33 cases used 3 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	5.318	1.345	3.96	0.000
UND INFL	-0.4613	0.2001	-2.31	0.028

S = 1.680 R-Sq = 14.6% R-Sq(adj) = 11.9%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	15.002	15.002	5.32	0.028
Residual Error	31	87.481	2.822		
Total	32	102.483			

Unusual Observations

Obs	UND INFL	AGRI	Fit	SE Fit	Residual	St Resid
9	5.34	9.300	2.854	0.381	6.446	3.94R
29	7.43	5.500	1.890	0.340	3.610	2.19R

R denotes an observation with a large standardized residual

Regression Analysis: MARKET versus OVE INFL

The regression equation is
MARKET = 180 + 3.42 OVE INFL

34 cases used 2 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	180.17	35.07	5.14	0.000
OVE INFL	3.415	2.120	1.61	0.117

S = 101.3 R-Sq = 7.5% R-Sq(adj) = 4.6%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	26610	26610	2.59	0.117
Residual Error	32	328155	10255		
Total	33	354765			

Unusual Observations

Obs	OVE INFL	MARKET	Fit	SE Fit	Residual	St Resid
20	27.6	490.8	274.4	33.0	216.5	2.26R
21	28.2	485.3	276.6	34.1	208.7	2.19R

35	5.0	396.4	197.2	26.4	199.1	2.04R

R denotes an observation with a large standardized residual

Regression Analysis: MARKET versus UND INFL

The regression equation is
MARKET = 63.8 + 26.0 UND INFL

34 cases used 2 cases contain missing values

Predictor	Coef	SE Coef	T	P
Constant	63.76	74.62	0.85	0.399
UND INFL	25.97	11.41	2.28	0.030

S = 97.68 R-Sq = 13.9% R-Sq(adj) = 11.2%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	49424	49424	5.18	0.030
Residual Error	32	305341	9542		
Total	33	354765			

Unusual Observations

Obs	UND INFL	MARKET	Fit	SE Fit	Residual	St Resid
20	8.23	490.8	277.5	27.0	213.3	2.27R
21	8.59	485.3	286.9	30.4	198.4	2.14R
35	4.86	396.4	190.0	24.0	206.4	2.18R

R denotes an observation with a large standardized residual

* NOTE * Command canceled.

Correlations: COMM, FINANCE, INDUST, AGRI

	COMM	FINANCE	INDUST
FINANCE	-0.073		
	0.692		
INDUST	-0.332	0.577	
	0.063	0.000	
AGRI	-0.024	0.555	0.151
	0.895	0.001	0.403

Cell Contents: Pearson correlation
P-Value