

**Test for Investor Rationality for Companies Quoted at the
Nairobi Stock Exchange**

By

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DECLARATION

I confirm this is my original work and has not been submitted for presentation at the University of Nairobi or any other institution of higher learning.

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This management research paper has been submitted for examination with my approval as the University Supervisor

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DEDICATION

I do dedicate this paper to my loving wife Janet, and my two sons, Caleb and Joshua, for their encouragement during the period of writing this paper. Thanks to the almighty God for His blessings

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Special thanks go to my supervisor Dr. Aduda, for his continuous scholarly guidance, inspiration and support during the writing of this paper. I also feel indebted to Mrs. Kithinji, who moderated my paper, for her helpful comments and suggestions. A lot of gratitude goes colleagues at my workplace for their corporation and assistance during the undertaking. Thanks to the Jomo Kenyatta Library, especially the e-journal section, for its thirst for information which assisted me in the gathering of data and information during the same period. Thanks to the entire library staff for assistance and also in maintaining a reading and scholarly environment in the library.

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ABSTRACT

The objective of this paper is to Test for Investor Rationality for Companies Quoted at the Nairobi Stock Exchange. Investors have traditionally been viewed as economically rational individuals who make decisions based on all available information. They have been assumed to use probability functions to arrive at the most optimal decision. More recent studies propose that investors are irrational and systematically overreact to good and bad information events. The concept of rational investor has been supported by among others Efficient Market Hypothesis and Modern Portfolio Theory. Other studies opposed to the notion of rational investors have identified psychological biases that influence decision making process of an investor leading them to make irrational decisions. Several anomalies have been identified that deviate from rational behaviour.

This study tested overreaction by investors to news and performance of companies listed at the Nairobi Stock Market as an anomaly that has been proven in other markets. The test involved forming companies into two portfolios, one of extreme good performers and the other of extreme poor performers during the base year. Performance of these portfolios was analysed for a nine year period from the year of portfolio formation.

The results are consistent with the notion of overreaction, showing that investors overreact to both good and bad news. Over the study period the loser portfolio outperformed the winner portfolio by about 35.92%. This confirms that investors are irrational, a view consistent with findings of other local studies like those done by werah (2006) and waweru et al (2008) testing different anomalies like herd behaviour, regret aversion, overconfidence and anchoring.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Rationality has been used to describe numerous theories, especially those concerned with truth, reason, and knowledge. A logical argument is sometimes described as rational if it is logically valid. However, rationality is a much broader term, as it includes "uncertain but sensible" arguments based on probability, expectation, personal experience etc. Rational behaviour implies consistent maximization of a well ordered function such as a utility or profit function (Becker, 1962).

Rational theories rest on the ideal of optimization. Optimization means the calculation of the maximum (or minimum) of some variable across a number of alternatives or values. For instance, according to a rational theory known as subjective expected utility (SEU) theory, an agent should choose between alternatives (e.g., houses, spouses) by determining all possible consequences of selecting each alternative, estimating the subjective probability and the utility of each consequence, multiplying the probability by the utility, and summing the resulting terms to obtain that alternative's subjective expected utility. Once this computation has been performed for each alternative, the agent chooses the alternative with the highest expected utility. This "subjective" interpretation of SEU has been used to instruct people in making rational choices (Gigerenzer, 2001).

Irrationality is talking or acting without regard of rationality. The term is used to describe emotion-driven thinking and actions which are, or appear to be, less useful than the rational alternatives. There is a clear tendency to view our own thoughts, words, and actions as rational and to see those who disagree as irrational. Types of behavior which are often described as irrational include: fads and fashions, crowd behavior, unrealistic expectations, belief in logical fallacies, falling victim to confidence tricks, belief in the supernatural without evidence, stock-market bubbles etc (Becker, 1962).

No rational theories, which stem from irrational behaviour, take account of what we know about humans' and other species' capacities rather than assuming unlimited knowledge, memory, time, and other resources. They model heuristics—cognitive, emotional, and social—that exploit the structure of information in real environments. Nonrational theories provide us with a more realistic picture of decision making when knowledge is scarce, deadlines are rapidly approaching, and the future is hard to predict (Gigerenzer, 2001).

Efficient Market Hypothesis and Modern investment theory are built on the assumption that markets and human beings are rational. These theories assume a status quo of the following conditions: markets are in equilibrium; they are competitive, i.e., there are a large number of small buyers and sellers, each of whom is unable to influence the market price; market participants have the goal of utility maximization and all investors have equal access to the same information set (Adams et al 2007).

Investors employ available information to make their consumption and portfolio decisions, but whether they process information rationally is still an open question. Simon (1955, 1987) doubts the full rationality of human behavior in making decisions and formally defines bounded rationality as "rational choice that takes into account the cognitive limitations of the decision maker - limitations of both knowledge and computational capacity". This implies that human beings have limited ability to process information and therefore make sub-optimal decisions.

Irrational optimism or pessimism can affect aggregate corporate profitability through the feedback effect, and business activity may respond in a confirming way to irrational swings in sentiment. Such effects can be magnified when there are positive investment externalities across firms. Indeed, the turn-of-the millennium tech boom was consistent with sentiment influencing stakeholders as well as investment within the internet sector. High stock prices encouraged executives and programmers to leave secure high-level positions to join internet startups, and also allowed internet companies to raise capital and increase investment rapidly (Hirshleifer et al, 2004)

The term overreaction carries with it an implicit comparison to some degree of reaction that is considered to be appropriate (De Bond and Thaler, 1985). One class of tasks which have a well established norm are the probability revision problems for which bayes' rules prescribes the correct reaction to new information. It has been established that bayes' rule is not an apt characterization of how individuals actually respond to new data (Kahneman and tvertsky, 1982). In revising their beliefs individuals tend to overweight recent and underweight prior (or base rate) data. People seem to make predictions according to a simple matching rule: "The predicted

value is selected so that the standing of the case in the distribution of outcomes matches its standing in the distribution of impressions” (kahneman and tversky, 1982). This rule-of –thumb, an instance of what kahneman and tversky call the representativeness heuristic, violates the basic statistical principal that the extremeness of predictions must be moderated by considerations of predictability.

When investor overreaction to market-wide news is large, firm valuations in the cross section become more dispersed and stocks earn lower expected returns. Consistent with these predictions, measures of cross-sectional dispersion of firm valuations are negatively related to subsequent market and portfolio excess returns, especially for sets of firms with highly subjective valuations and significant limits to arbitrage. Further, these firms under perform those with the opposite characteristics in periods when beginning-of-period firm valuation dispersion is high. In contrast, they over perform when beginning-of-period firm valuation dispersion is low (Jiang 2006).

There is a lot of controversy in recent financial literature around the subject on whether investors behave rationally in pricing stocks, or whether they overreact to market information, resulting in prices being too high or too low. Although the efficient market hypothesis states that, with minor exceptions, securities are rationally priced, repeated evidence has been presented of predictable over- and under reactions. The existence of overreaction in the marketplace, if it can be proven, is important to both investment decision making and theory, and in more acute cases can be the major cause of financial bubbles and panics. (Dreman and Lufkin 2000)

The context of this study will be companies listed in the Nairobi Stock Exchange (NSE). The main indices in the NSE are: the NSE 20 share index, Nairobi all share index (NASI) and AIG 27 share index. (NSE website) The NSE 20 share index is equi-weighted geometric mean of 20 large ordinary stocks traded on the Nairobi stock exchange. Companies with stocks listed in the NSE 20 share index include the following: Mumias, Express, Rea vipingo, Sasini, CMC, Kenya Airways, Safaricom, Nation Media Group, Barclays, Equity, KCB, Stan chart, Bamburi, BAT (K), Kengen, Centum, EABL, EA cables, KPLC and Athiriver mining (NSE website)

NASI was introduced in February 2008 to complement the NSE 20 share index. The NASI is a comprehensive and complimentary index designed to represent investor's expectations of the future performance of all listed companies. All stocks listed in the main investments segment (MIMS) and the alternative investment market segment (AIMS) of the NSE is eligible for inclusion in the NASI. NASI calculation is based on market capitalization, implying that the index level will reflect the total market value of the constituent stocks. This is reviewed during the last week of every quarter to track the changes in the number of shares for the constituent stocks (NSE website)

The AIG 27 share index was launched in 2001 to facilitate examining Kenyan equity market returns and to act as a bench mark for evaluating these stocks against other equity performance. It is also used by the industry to understand the factors that influence aggregate price movements. Similar to the major world indices, the AIG 27 share index is computed using arithmetic mean and constitutes 27 stocks representing different sectors of the economy. The

AIG 27 share index is a total return index, capturing both capital gains and dividends. It is market capitalization weighted and is rebalanced every three months (NSE website)

The context of this study (NSE) is substantially different from contexts of global studies reviewed in regard to overreaction hypothesis in that Kenya is a third world country whose economy is agriculture based while the other studies are carried out in first world industrialised countries.

1.2 Statement of the Problem

Traditional economic theory postulates an "economic man," who, in the course of being "economic" is also "rational.". (Simon, 1955). In the efficient market hypothesis it was generally believed that securities markets were extremely efficient in reflecting information about individual stocks and about the stock market as a whole (Fama, 1970). Efficient market hypothesis portrays investors as fully rational beings making optimum use of available information and hence the idea of 'random walk' of prices. Merton (1973) seems to agree with rationality of investors when he considered the portfolio selection behaviour by an arbitrary number of investors who act so as to maximize the expected utility of lifetime consumption and who can trade continuously in time. Lucas (1978) showed that in a rational expectations general equilibrium, rational asset prices may have a forecastable element that is related to the forecastability of consumption. The classic paradigm of financial theory assumes that investors operating in frictionless markets make rational decisions. Under this paradigm, rational investors set prices, and their actions lead to the elimination of dominated financial investments (Elton et al, 2002).

Financial economists and statisticians, from mid 80's and 90's, began to question investor rationality and market efficiency. A new breed of economists emphasized psychological and behavioral elements of stock-price determination, and came to believe that future stock prices are somewhat predictable on the basis of past stock price patterns as well as certain "fundamental" valuation metrics. A number of studies came up that question classic paradigm of financial economics based on rationality. There are studies that show that securities that are close substitutes can sometimes sell at different prices (Froot and Dabora, 1999). There are also studies that show that the behavior of an individual investor might not fit the classical paradigm. Some investors fail to exercise in the money options and exploit arbitrage opportunities (Longstaff, et al 2001). Individual investors trade too much, maintain undiversified portfolios, hold losing positions too long, require a risk premium for idiosyncratic risk, and overinvest in their own companies' stock (Blume and Friend (1975), Ferris, Haugen and Makhija (1998), Odean (1998), Barber and Odean (2000), Grinblatt and Keloharju (2001), Cohen, Gompers, and Vuolteenaho (2001), Green and Rydquist (1997), Hirshleifer, Myers, Myers, and Theoh (2001) and Huberman (2001).

Local studies seem to be mixed up with Waweru et al (2008) in support of market rationality and use of market fundamentals to make investment decisions. (Werah 2006) suggests that the behaviour of investors at the NSE is to some extent irrational in regard to fundamental estimations as a result of anomalies such as herd behaviour, regret aversion, overconfidence and anchoring.

Despite early evidence that the stock market is rational hence efficient, there have been scores of studies that have documented long-term historical anomalies in the stock market that seem to contradict the Efficient Market Hypothesis. Anomalies in the stock market have been put in categories such as fundamental anomalies, technical anomalies, and calendar anomalies among others. Werah (2006) proved irrationality at NSE but overreaction anomaly has not been tested in this market and I believe it could be a key determinant of stock price trends. This study will thus test overreaction hypothesis (at the Nairobi Stock Exchange) as an anomaly in the stock market.

1.3 Objective of the Study

The objective of this study is to test for investor rationality for companies quoted at the Nairobi Stock exchange.

1.4 Importance of Study

Investors are very keen on the day to day performance of the stock market. The findings of this study will indicate whether Nairobi stock exchange behaves like the other stock markets in the world. It will benefit the foreign investors whose investments are cross listed and those ones that government of Kenya is targeting so as to increase the foreign shareholding in the local companies. A rational investor will buy stocks when returns are low and sell them when returns are high. Knowledge of seasonal patterns caused by anomalies will assist investors in buy or sell decisions.

Fund managers are charged with the responsibility of identifying and investing in viable projects. Findings from the study will help them gauge the performance of stock market hence know the right time to commit funds.

Financial analysts offer advice to investors. Findings from the study will help them give sound information that will lead investors to make sound decisions.

The government as a regulator of stock market through the capital market authority will be able to monitor the performance of stock market as a sign of economic stability of the country. The government has aimed at making major reforms through the Nairobi stock exchange so as to attract both local and foreign investment.

Academicians want to contribute to the body of knowledge; the same body of knowledge has been known to change and research is always the only way to study the same phenomenon over time. This research will therefore help in opening up opportunities for doing further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter has three sections: theoretical framework, empirical studies and a summary from literature review. Theories and empirical studies in support of investor rationality have been reviewed in this section. Theories and empirical studies questioning or disapproving investor rationality have been reviewed as well. A summary from the literature review shows the gap which this study intends to fill.

2.1.1 Investor Rationality

Rational investors, according to Efficient Market hypothesis (EMH), value securities for its fundamental value (i.e. net present value of its future cash flows, discounted using risk characteristic); quickly respond to new information and: bid up when news is good, and down when the news is bad. EMH assumes that securities price incorporate all available information almost immediately and price adjust to new levels corresponding to the new present value of cash flow. Rational investors assume that it is impossible to earn superior risk adjusted return (Fama, 1970)

Rational investors will use diversification to optimize their portfolios according to Modern portfolio theory (MPT). MPT proposes how a risky asset should be priced. The basic concepts of the theory are Markowitz diversification, the efficient frontier, capital asset pricing model, the alpha and beta coefficients, the Capital Market Line and the Securities Market Line (Sharp 1964).

Most economic and financial models explicitly or implicitly assume that investors are efficient and rational. Investors and consumers are assumed to make the best choices for themselves.

The use of normative model of an idealized decision maker to predict and explain actual behaviour is defended by several arguments as pointed out by Tversky and Kahneman (1986). First, people are generally thought to be effective in pursuing their goals, particularly when they have incentives and opportunities to learn from experience. Choice has been described as a maximization process. Second, competition favours rational individuals and organizations. Optimal decisions increase the chances of survival in a competitive environment and a minority of rational individuals can sometimes impose rationality on the whole market. Third, the intuitive appeal of the axioms of rational choice makes it plausible that the theory derived from these axioms should provide an acceptable account of choice behaviour.

In spite of these arguments, the logic of choice does not provide an adequate foundation for a descriptive theory of decision making. Tversky and Kahneman (1986) argue that the deviation of actual behaviour from the normative model are too widespread to be ignored, too systematic to be dismissed as random error, and too fundamental to be accommodated by relaxing the normative system. This is in line with other scholars who have questioned rationality of investors.

2.2 Theoretical Framework

2.2.1 Efficient Market Hypothesis (EMH)

Bachelier (1900) was the earliest to correctly model Brownian motion mathematically. In 1900, he defended his thesis *Théorie de la Spéculation* about the use of Brownian motion in pricing stock options. He made the connection between random walk and Brownian motion in continuous time. One of the earliest and most enduring models of the behavior of security prices is the random walk hypothesis

Samuelson (1965) showed that properly anticipated prices fluctuate randomly, thus indicating that a random walk in price was not inconsistent with a rational market. The Samuelson proof generalized price processes to martingales that are less restrictive than random walks. Roberts (1967) called this martingale feature of stock price a weak-form market efficiency. As a martingale goes, the best forecast of next period's price is the current period's price. Thus, a market is efficient in that past prices do not provide any useful information or trading rules upon which to make profits larger than a simple buy-and-hold strategy.

Fama (1965), a work based on his doctoral thesis, concluded that stock price movements were unpredictable and followed a random walk. Fama (1970) surveyed the idea of an informationally efficient capital market, and made the following famous definition: "A market in which prices always 'fully reflect' available information is called 'efficient'." He defined three forms of the efficient market hypothesis, or EMH, as follows. The Weak-form asserts that all past market prices or its history are fully reflected in securities prices. The semistrong-form asserts that all publicly available information, including historical prices, is fully reflected in securities prices.

Finally, the strong-form asserts that all available information including public and private information is fully reflected in securities prices. EMH posited that buying and selling securities in order to outperform the market was effectively a matter of chance rather than skill.

2.2.2 Cognitive Dissonance Theory

Cognitive dissonance theory was developed by Festinger in 1957. The theory asserts that individuals are distressed by conflicting cognitive elements such as discrepancy between empirical evidence and past choice, and that they alter their beliefs to reduce this discomfort. The key feature of dissonance is that individuals alter their beliefs to conform to their past actions. In the context of investment decision making, cognitive dissonance can be considered a psychological cost that investors seek to reduce by adjusting their beliefs about the efficacy of past investment choices. Cognitive dissonance theory is thus based on three fundamental assumptions: Humans are sensitive to inconsistencies between actions and beliefs - According to the theory, we all recognize, at some level, when we are acting in a way that is inconsistent with our beliefs/attitudes/opinions. For example, if you have a belief that it is wrong to cheat, yet you find yourself cheating on a test, you will notice and be affected by this inconsistency; Recognition of this inconsistency will cause dissonance, and will motivate an individual to resolve the dissonance; Dissonance will be resolved in one of three basic ways: Change beliefs, Change actions or Change perception of action

Festinger (1957) defines cognition as “the things a person knows about himself, about his behavior, and about his surroundings”. Dissonance and consonance he defines as “relations which exist between pairs of elements”. Festinger states that “two elements are in a dissonant relation if, considering these two alone, the obverse of one element would follow from the

other”. Essentially, cognitive dissonance is the situation in which two or more cognitions or thoughts are in disagreement with one another.

2.2.3 Prospect Theory

Kahneman and Tversky (1979) reviewed several empirical effects which appeared to invalidate expected utility theory as a descriptive model and presented an alternative account of individual decision making under risk, called prospect theory. Prospect theory suggests the hypothesis that investors display a disposition to sell winners and ride losers when standard theory suggests otherwise (Shefrin and Statman 1985).

Prospect theory modifies the analytic description of rational risk-averse investors found in standard financial theory (Kahneman and tversky, 1979). Higher wealth provides higher satisfaction or utility but at a diminishing rate. This gives rise to risk aversion: A gain of shs. 1,000 increases utility by less than a loss of shs. 1000 reduces it; therefore investors will reject risk prospects that don't offer a risk premium. Utility depends not on the level of wealth but on changes in wealth from current levels. Under prospect theory, when faced with choices involving simple two and three outcome lotteries, people behave as if maximizing an "S"-shaped value function. This value function is similar to a standard utility function except that it is defined on gains and losses rather than on levels of wealth. The function is concave in the domain of gains and convex in the domain of losses. It is also steeper for losses than for gains, which implies that people are generally risk-averse. Critical to this value function is the reference point from which gains and losses are measured. Usually the status quo is taken as the reference point; however, “there are situations in which gains and losses are coded relative to an expectation or aspiration level that differs from the status quo. A person who has not made peace

with his losses is likely to accept gambles that would be unacceptable to him otherwise” (Kahneman and Tversky, 1979).

2.2.4 The Disposition Theory

The disposition effect was introduced into the finance literature by Shefrin and Statman (1985) and refers to the tendency of investors to ride losses and realized gains. This runs counter to sound tax planning. The availability of account-level transaction data has made the disposition effect a widely documented behavioral regularity: subsequent to the seminal paper by Odean (1998), several studies find that investors are reluctant to sell assets at a loss relative to the price at which they were purchased. In the presence of disposition-prone investors, stock prices tend to under-react to news, generating short term returns continuation (price momentum) and post-event drift.

Shefrin and Statman (1985) sought to determine whether investors exhibit a reluctance to realize losses (disposition to ride losers) even when the prospects of standard theory prescribe realization. They developed a positive (descriptive) theory of capital gain and loss realisation in which investors tend to “sell winners too early and ride losers too long” and referred to this tendency as the “disposition effect” (Shefrin and Statman 1985).

A further consideration is capital gains tax which suggests that losses should be realized while they are short-term, while gains should be realised only when they are long-term. However, the disposition to sell winners too early and ride losers too long operates in the opposite direction (Shefrin and Statman 1985). In particular they find that tax considerations alone cannot explain

the observed patterns of loss and gain realization, and that the patterns are consistent with a combined effect of tax considerations and a disposition to sell winners and ride losers.

2.2.5 Loss Aversion Theory

‘Losing \$100 hurts more than gaining \$100 yields pleasure....The influence of loss aversion on mental accounting is enormous’ (Thaler, 1999). ‘The positive counterpart to regret is pride. While closing a stock account at a loss induces regret, closing at a gain induces pride. The quest for pride, and the avoidance of regret lead to a disposition to realize gains and defer losses,’ (Shefrin and Statman, 1985). However, there is asymmetry between the strength of pride and regret and losses loom larger than gains (Kahneman and Tversky, 1979). Asymmetry between the strength of pride and regret (regret is stronger) leads inaction to be favoured over action (Kahneman and Tversky, 1979; Thaler, 1985). Thus, investors who are prone to this bias may be reluctant to realize both gains and losses (Shefrin and Statman, 1985).

2.2.6 Mental Accounting Theory

Mental accounting is a specific form of framing in which people segregate certain decisions. For example, an investor may take a lot of risk with one investment account but establish a very conservative position with another account that is dedicated to her child’s education. Statman (1997) argues that mental accounting is consistent with some investors’ irrational preference for stocks with high cash dividends (they feel free to spend dividend income but do not dip into capital by selling a few shares of another stock with the same total rate of return) and with a tendency to ride losing stocks position for too long (because “behavioral investors” are reluctant to realize losses).

Thaler (1999) views mental accounting as the set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities. Three components of mental accounting receive the most attention. The first captures how outcomes are perceived and experienced, and how decisions are made and subsequently evaluated. The accounting system provides the inputs to be both ex ante and ex post cost-benefit analyses. A second component of mental accounting involves the assignment of activities to specific accounts. Both the sources and uses of funds are labeled in real as well as in mental accounting systems. Expenditures are grouped into categories (housing, food, etc.) and spending is sometimes constrained by implicit or explicit budgets. The third component of mental accounting concerns the frequency with which accounts are evaluated and 'choice bracketing'. Accounts can be balanced daily, weekly, yearly, and so on, and can be defined narrowly or broadly. Each of the components of mental accounting violates the economic principle of fungibility. As a result, mental accounting influences choice, that is, it matters. Mental accounting serves to explain why an investor is likely to refrain from readjusting his reference point for a stock. When the stock is purchased, a new mental account is opened. A running score is then kept in this account indicating gains or losses relative to a purchase price (Shefrin and Statman, 1985).

2.2.7 Regret Avoidance Theory

Psychologists have found that individuals who make decisions that turn out badly have more regret (blame themselves more) when the decision was more unconventional. For example buying a blue chip portfolio that turns down is not as painful as experiencing the same losses on unknown start-up firm. Any losses on a blue-chip stock can be more easily attributed to bad luck rather than bad decision making and cause less regret. De Bondt and Thaler (1987) argue that such regret avoidance is consistent with both the size and book-to-market effect. Higher book-to-

market firms tend to have depressed stock prices. These firms are “out of favour” and more likely to be in a financially precarious position. Similarly, smaller less well known firms are also less conventional investments. Such firms require more courage on the part of the investor which increases the required rate of return. If investors focus on the gains or losses of individual stocks rather than on broad portfolios they can become more risk averse concerning stocks with recent poor performance, discount their cash flows at higher rate and thereby create a value-stock risk premium.

2.2.8 Representativeness Theory

Representativeness holds that people commonly do not take into account the size of a sample apparently reasoning that a small sample is just as representative of a population just as a large one. They may therefore infer a pattern too quickly based on a small sample and extrapolate apparent trends too far into the future. Such a pattern would be consistent with overreaction and correction anomalies. A short lived run of good earnings reports or high stock returns would lead such investors to revise their assessments of likely future performance and thus generate buying pressure that exaggerates the price run up. Eventually the gap between price and intrinsic value becomes glaring and the market corrects its initial error. (Chopra et al, 1992)

2.2.9 Overconfidence Theory

People tend to overestimate the precision of their beliefs or forecasts, and they tend to overestimate their abilities. Such overconfidence may be responsible for the prevalence of active versus passive investment management – itself an anomaly to adherents of the efficient market hypothesis. An interesting example of overconfidence in the financial markets is provided by Barber and odean (2001) who compare trading activity and average returns in brokerage

accounts of men and women. They find that men (in particular single men) trade far more actively than women, consistent with the greater overconfidence among men well documented in the psychology literature.

2.2.10 Conservatism Theory

A conservatism bias means that investors are too slow in updating their beliefs in response to new evidence. This means they might initially underreact to news about a firm, so that prices will fully reflect new information only gradually. Such a bias would give rise to momentum in stock market returns. (Bodie et al, 2009)

2.2.11 Framing Theory

Decisions seem to be affected by how choices are framed. For example an individual may reject a bet when it is posed in terms of the risk surrounding possible gains but may accept that same bet when described in terms of the risk surrounding potential losses. In other words, individual may act risk averse in terms of gains but risk seeking in terms of losses. But in many cases the choice of how to frame a risky venture – as involving gains or losses can be arbitrary. (Bodie et al, 2009)

2.2.12 The Disjunction Theory

The disjunction effect is a tendency for people to want to wait to make decisions until information is revealed, even if the information is not really important for the decision, and even if they would make the same decision regardless of the information. The disjunction effect is a contradiction to the "sure-thing principle" of rational behavior (Savage, 1954).

2.3 Empirical Studies

'Research in experimental psychology suggests that, in violation of Bayes' rule, most people tend to "overreact" to unexpected and dramatic news events.' (De Bondt and Thaler,1985). In a study of market efficiency, De Bondt and Thaler (1985) investigate whether such behavior affects stock prices. They used Monthly return data for New York Stock Exchange (NYSE) common stocks, as compiled by the Center for Research in Security Prices (CRSP) of the University of Chicago, for the period between January 1926 and December 1982. An equally weighted arithmetic average rate of return on all CRSP listed securities serve as the market index. The results are consistent with the overreaction hypothesis. Loser portfolios of 35 stocks outperform the market by, on average, 19.6%, thirty-six months after portfolio formation. Winner portfolios, on the other hand, earn about 5.0% less than the market, so that the difference in cumulative average residual between the extreme portfolios equals 24.6%. The findings have other notable aspects. First, the overreaction effect is asymmetric; it is much larger for losers than for winners. Secondly, most of the excess returns are realized in January. Finally the overreaction phenomenon mostly occurs during the second and third year of the test period.

Zarowin (1989), tests whether the stock market overreacts to extreme earnings by examining firms' stock returns over the 36 months subsequent to extreme earning years. Portfolios of firms that are characterized by extreme (good versus bad) current period earnings performance are formed and to compare the subsequent stock returns of the poorest earners versus the best earners. CRSP monthly return file and the Compustat Annual Industrial file are the data base for this study. Each year from 1971 to 1981 all firms meeting the following data requirements are included in the sample for that year: Availability of the six consecutive prior years and the

current year of earnings before extraordinary items and discontinued operations; December 31 fiscal year end and availability of price per share and number of shares outstanding on the CRSP monthly file at year end. To examine whether the stock market overreacts to extreme earnings news, the excess returns of the two extreme earnings portfolios over the 36 months subsequent to the extreme earnings year are compared. Results presented fail to support the overreaction to earnings hypothesis. Although the poorest earnings performers outperform the best earnings performers by a statistically significant 16.6 percent over the 36 months subsequent to the extreme earnings year, he argues that this result is due primarily to differences in size between the two groups. Poor earners tend to be smaller firms than good earners. When poor earners are matched with good earners of equal size there is little difference in return behaviour. When poor (or good) earners of disparate sizes are compared, small firms outperform large firms, and smaller winners outperform larger losers. Thus the statistically significant differences between the returns of extreme prior period performers appear to be the result not of investor overreaction to earnings but of the size effect. This is in contrast with BeBondt and thaler (1987) who maintain, "The winner loser effect is not primarily a size effect."

Clare and Thomas (1995) carried out a study on "the overreaction hypothesis and the UK stock market". UK data is used from 1955 to 1990 drawn from a random sample of up to 1000 stocks in any one year. Portfolios of stocks are formed on the basis of prior period performance. The portfolios are formed using stock return data taken from the London Business School LSPD tapes. The data base consists of the end month dividend adjusted returns on all those stocks quoted on the London Stock Exchange since January 1955. Stocks are ordered into portfolios according to their performance relative to the performance of the market over three separate

periods: one, two and three years. Then the market adjusted return for any month is calculated. Regression analysis on means of the winner and loser portfolio returns is done. A t -test is carried out on the significance level. It is found that losers outperform previous winners over a two year period by a statistically significant 1.7% per annum. On further investigation it is found that such overreaction may in fact be a manifestation of the small firm effect.

Odean (1998) tested the disposition effect, the tendency of investors to hold losing investments too long and sell winning investments too soon, by analyzing trading records for 10,000 active accounts at a large nationwide discount brokerage house from 1987 through 1993. There were two hypotheses to be tested. The first was that investors tend to sell their winners and hold their losers. The second hypothesis was that in December investors are more willing to sell losers and less willing to sell winners than during the rest of the year. The statistical method used is the t -test. These investors demonstrated a strong preference for realizing winners rather than losers. Their behavior did not appear to be motivated by a desire to rebalance portfolios, or to avoid the higher trading costs of low priced stocks. Nor was it justified by subsequent portfolio performance. For taxable investments, it is suboptimal and leads to lower after-tax returns. Tax-motivated selling is most evident in December.

Rozeff and Zamani (1998) carry out a study on overreaction and insider trading to provide evidence on whether market prices reflect investor overreaction. Cash flow and book value data from the annual compustat industrial tape is used over the years 1978 to 1991. The cash flow for year t is divided by the market value of equity at the end of May in year $t+1$. Market value of equity is the product of the number of shares outstanding and the end-of-may stock price, both of

which are obtained from the Centre for Research on Security Prices (CRSP) Monthly NYSE-AMEX files. After obtaining a ratio of cash flow to market value of equity each year for each company, the companies are sorted into deciles each year by the CF/P ratio and assigned a value of one to ten. Stocks ranked one have the lowest CF/P ratios and are called the growth stocks. Stocks ranked ten have the highest CF/P ratios and are called the value stocks. Returns of each stock in periods prior to may of year $t + 1$ are found. 12 – Month and 36 – Month periods are examined. The proportion of buy transactions in the insider trades is positively related to the ratio of cash flow to price (as well as book value to price) and negatively related to prior stock return. Outside investors, thus, overvalue growth stocks and undervalue value stocks. Insider transactions are consistent with a well – informed contrarian approach to stock investing. Insider buying climbs as stocks change from growth to value categories. Insider buying is also greater after low stock returns and lower after high stock returns. These findings are consistent with a version of overreaction which says that prices of value stocks tend to lie below fundamental values, and prices of growth stocks tend to lie above fundamental values.

Swallow and Fox (1998) investigate two competing models of investor decision making in the context of the New Zealand Stock Exchange. The first model views investors as economically rational individuals who make decisions based on all available information. The second model proposes that investors systematically overreact to good and bad information events. All New Zealand Stock Exchange companies were examined over a twenty year period (August 1975 to July 1995). Overreaction was tested using a similar method to that used by DeBondt and Thaler (1985). Results of this research indicate that New Zealand can be included among those

countries that exhibit long-run overreaction in their stock exchanges. However, only losers experience significant overreaction; winner portfolios show almost no abnormal market returns.

Elton et al (2002) carried out a study on choices among funds to determine if investors are rational. With a sample size of 52 open-end Standard and Poor's (S&P) 500 index funds they tracked the 52 funds through name changes (31 funds incur 36 name changes) and mergers (three funds) in subsequent editions of Morningstar *Principia Plus*. Fund data from January 1996 through December 2001 was used which included monthly returns and annual data consisting of the net asset value, expense ratio, actual management fee, load, capital gains in dollars, dividend income in dollars, and whether the fund is only available to institutional investors. Data analysis was done using *t*-test. Their paper shows that the relative returns offered by alternative S&P index funds are easily predictable. They show that the other important aspects of performance, risk and tax efficiency are also easily predictable. Despite this predictability, the relationship between new cash flows and performance is much weaker than would be expected based on rational behavior. Marketing and spillover account for some, but only a small amount, of the cash flows not accounted for by performance. They show that selecting funds based on low expenses or high past returns leads to a portfolio that outperforms the portfolio of index funds selected by investors. The results exemplify the fact that, in a market where arbitrage is not possible, dominated products can prosper.

Antoniou and Galariotis (2004) investigated the existence of contrarian profits for stocks listed in the London Stock Exchange according to the findings of DeBondt and Thaler (1985). Weekly price observations for all stocks listed on the London Stock Exchange that had at least 260

consecutive observations, between 1984 and 2000 were used. The FTSE100 Price Index is employed as a proxy for the common factor (market portfolio).

The results indicate that contrarian strategies are profitable for UK stocks and more pronounced for extreme market capitalisation stocks. These profits persist even after the sample is adjusted for market frictions, and irrespective of whether raw or risk-adjusted returns are used. This is done in two ways: first with a single factor model as is done in most previous studies and second with a three-factor model similar to the one suggested by Fama and French (1996).

Andrew (2005) reviews the case for and against the Efficient Markets Hypothesis and describes a new framework—the Adaptive Markets Hypothesis—in which the traditional models of modern financial economics can coexist alongside behavioral models in an intellectually consistent manner. Based on evolutionary principles, the Adaptive Markets Hypothesis implies that the degree of market efficiency is related to environmental factors characterizing market ecology such as the number of competitors in the market, the magnitude of profit opportunities available, and the adaptability of the market participants. Many of the examples that behavioralists cite as violations of rationality that are inconsistent with market efficiency—loss aversion, overconfidence, overreaction, mental accounting, and other behavioral biases—are, in fact, consistent with an evolutionary model of individuals adapting to a changing environment via simple heuristics.

Peng and Xiong (2006) Motivated by psychological evidence that attention is a scarce cognitive resource, modeled investors' attention allocation in learning and studied the effects of this on asset-price dynamics. they show that limited investor attention leads to category-learning

behavior, i.e., investors tend to process more market and sector-wide information than firm-specific information. This endogenous structure of information, when combined with investor overconfidence, generates important features observed in return comovement that are otherwise difficult to explain with standard rational expectations models. The model also demonstrates new cross-sectional implications for return predictability. After controlling for the degree of investor overconfidence, firms in a sector with a lower average return correlation tend to have more pronounced overreaction-driven return predictability, such as long-run price reversals and short-term price momentum. However, ignored information in public domain, such as certain variables in firms' financial statements, is less effective in predicting the future returns of these firms.

Clements et al (2009), Using the CRSP data set used by De Bondt and Thaler (1985) for the period of 1926 through 1982, and additional two decades of data (1983 through 2003), provide preliminary support for the original work of De Bondt and Thaler, reporting that the overreaction anomaly has not only persisted over the past twenty years but has increased when risk is unaccounted for. However, using the three-factor model of Fama and French (1993), no statistically significant alpha can be garnered via the overreaction anomaly, with contrarian returns seeming driven by the factors of size and value, not the behavioral biases of investors. The anomaly is not robust under the Fama and French framework, with 'contrarian' investors following such a scheme simply compensated for the inherent portfolio risk held.

Ali et al (2009) attempt to seek linkage between stock overreaction behaviour and financial bubbles in the Malaysian stock market. The study covers the period between January 1989 and December 2006. The study uses the basic framework of De Bondt and Thaler (1985) to test for

stock overreaction. Duration dependence test is used to investigate evidence of bubbles. Monthly data over a period between January 1987 and December 2006 shows no clear evidence of stock overreaction behaviour in the market. However, when the study split the analysis into two sub-periods, evidence of stock overreaction behaviour becomes significant in the pre-crisis sub-period, but there is no significant evidence of financial bubbles in the same sub-period. During the post crisis, evidence of stock overreaction seems to diminish, and evidence of financial bubbles however, is observed in the period. This study believes that evidence of bubbles observed in the Malaysian stock market in the post crisis period is due to stock overreaction that took place in the market prior to the crisis.

Angeletos et al (2009) examined the interaction between real and financial decisions in an economy in which information about underlying profitability is dispersed. By conveying a positive signal about profitability, higher aggregate investment stimulates higher asset prices, which in turn raise the incentives to invest. This creates an endogenous complementarity, making investment decisions sensitive to higher-order expectations. In turn, this can dampen the impact of fundamental shocks and amplify the impact of common expectational shocks. Importantly, all these effects are symptoms of inefficiency. These effects are likely to be stronger during periods of intense technological change, when the dispersion of information about the potential of the new technologies is particularly high. The analysis therefore predicts that such periods come hand-in-hand with episodes of high non-fundamental volatility and comovement in investment and asset prices. At some level, this seems consistent with the recent experiences surrounding the internet revolution or the explosion of investment opportunities. What looks like irrational exuberance may actually be the amplified, but rational, response to noise in information.

Information regarding aggregate supply and demand conditions seems to be widely dispersed in the population, which explains the financial markets anxiety preceding the release of key macroeconomic statistics.

Githinga (2008) examined whether share prices of companies trading at the Nairobi Stock Exchange follow a random walk trend. A sample of 16 stocks was drawn from companies that comprised the NSE 20 share index during the five year period between September 2003 and August 2007. Weekly average prices were shown to exhibit significant random walk behaviour in the sense that the autocorrelation coefficient was less than 0.5 but more than -0.5 through out the period. The study seemed to support that stock prices followed a random walk and that one cannot predict future prices based on the past price trends.

Werah (2006) surveyed the influence of behavioral factors on investor activities at the Nairobi Stock Exchange. Study population composed of both individual and institutional investors at the NSE. Institutional investors included mutual fund companies, pension fund managers, investment banks, venture capital fund firms and investment advisors. A sample of forty institutional investors and one hundred individual investors was targeted. Results obtained from the research suggested that the behavior of investors at the NSE was irrational especially in investors' disregard of fundamental estimations as a result of herd behaviour, regret aversion, overconfidence and anchoring.

Waweru, et al (2008) investigated the role of behavioral finance and investor psychology in investment decision-making at the Nairobi Stock Exchange with special reference to institutional

investors. The population in the study included all the 40 institutional investors operating at the NSE as on 30 June 2004. This covered the banks, mutual funds, pension funds, endowment schemes, investment banks, companies, collective investment schemes, and insurance companies. The study established that behavioural factors such as representativeness, overconfidence, anchoring, gambler's fallacy, availability bias, loss aversion, regret aversion and mental accounting affected the decisions of the institutional investors operating at the NSE. Moreover, these investors made reference to the trading activity of the other institutional investors and often exhibited an institutional-herding behaviour in their investment decision-making.

2.4 Conclusions from the Literature Review

Early empirical evidence in the 1970's seemed to be in support of efficient market hypothesis and hence rational market and investors. Merton (1973), on an intertemporal model for the capital market considered the portfolio selection behaviour by an arbitrary number of investors who act so as to maximize the expected utility of lifetime consumption and who can trade continuously in time. Global studies reviewed here seem to reject the theory of rational expectations. They have however tended to drift in diverse directions in trying to explain the concept of irrationalism observed in markets. Some have concluded that financial markets are dominated by investors who perceive probabilities incorrectly or are vulnerable to the impact of fads and mass psychology. Others have concluded that for some unexplained reason the market can be irrational sometimes and each failed prediction of the theory has been ascribed to a corresponding incident of such irrationality. As a result, it is common to find in the investment community the argument that each instant of such presumed irrationality offers an opportunity

for excess returns (i.e. when an investment opportunity is viewed as "excellent" and inexpensive).

Studies in US, UK, New Zealand and several countries in Asia seem to agree that asset returns are predictable over both long and short time horizons for both individual stocks and stock market indices a position that contradicts EMH and random walk hypothesis anchored on rationality of markets and its participants. The overreaction hypothesis has also been proven in those markets it has been tested. It (overreaction hypothesis) asserts that stocks which have underperformed the market over a period of time (often one to five years) will outperform the market over a subsequent and similar time period. Some of the studies suggest that the overreaction is a manifestation of the size effect, i.e. that losers tend to be small and that small firms outperform large firms. Zarowin (1990), Chopra et al. (1992) and Clare and Thomas (1995) investigate the impact of the size effect within the overreaction hypothesis and find that adjustment for size does reduce the extra return available from loser. De Bond and Thaler (1985) did not believe that their results were due to the size effect.

Some local studies seem to be in support of market efficiency and random walk of stock prices. Githinga (2008) showed that stock prices followed a random walk and that one cannot predict future prices based on the past price trends. Werah (2006) and Waweru et al (2008) however tested rationality at the Nairobi Stock exchange and identified some anomalies which would make prices to be predictable to some extent. Anomalies tested were herd behaviour, regret aversion, overconfidence, anchoring and institutional herding behaviour.

Market overreaction has not been tested locally. The global studies reviewed bring out the importance of market overreaction in predicting future trend of securities. Stocks that have underperformed the market in previous period have been shown to outperform the market in future by up to 25% in the markets tested. It is important therefore that a test for overreaction hypothesis is carried out in Nairobi stock exchange to establish if the NSE would behave like the other markets that have been tested. This is the gap that this study intends to fill.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Methodology refers to the theoretical analysis of the methods appropriate to a field of study or to the body of methods and principles particular to a branch of knowledge (Sekaran 1992). This chapter highlights the research design to be used, population of study, sampling and data analysis techniques to be used. The methodology used is close to what has been used in other markets for similar study but is localized so that it reflects the local situation. The type of research used is quantitative research. Quantitative research is that which involves gathering and analysis of data that can be expressed in numerical form. Data type used is primary data. Primary data is data which is being collected by the researcher for the specific purpose of answering the problem at hand.

3.2 Research Design

The research adopted longitudinal survey design. A longitudinal study is a correlational research study that involves repeated observations of the same items over long periods of time (Sekaran 1992). It involves tracking changes over time on a broad range of population members, which is desirable for comparative purposes. Again, since the given study is largely descriptive (concerned with finding out 'by how much') sample statistics are used to make generalization about population parameters. This study focused attention on the performance of different companies at NSE as well as the movement of their share price to determine whether there was any evidence of the overreaction hypothesis. Portfolios of stocks were formed on the basis of

prior period performance as was the case with DeBondt and Thaler (1985), Zarowin (1989), Clare and Thomas (1995), swallow and fox (1998) and others. The portfolios were formed using stock return data taken from the Nairobi Stock Exchange. An equally weighted arithmetic average rate of return on all NSE listed securities served as the market index.

3.3 Population of Study

The target population of this study was all the companies quoted at the Nairobi Stock Exchange (NSE) as at December 2009. As at December 2009, there were 56 companies listed at the Nairobi Stock Exchange. This formed the population of study.

3.4 Sampling

The sampling frame adopted in the study was obtained from the NSE list of quoted companies that have been listed since January 2001. This was because the study analysed stock returns for listed companies over a period of 9 years.

3.5 Data Analysis

To determine the returns on the stock, the study used a model used by swallow and fox (1998). Clare and Thomas (1995) formed portfolios using stock return data taken from the London Business School LSPD tapes. DeBondt and Thaler (1985) and Zarowin (1989) use monthly return data for New York Stock Exchange (NYSE) common stocks as compiled by the Centre for Research in Security Prices (CRSP) of the University of Chicago. The model used by swallow and fox (1998) is shown in equation (1):

$$R_{it} = \ln (P_{it}/P_{it-1}).100 \quad (1)$$

Where: R_{it} = the monthly return for stock i in month t

P_{it} = the share price for stock i in month t

P_{it-1} = the share price for stock i on month $t-1$

t = the month.

The returns data approximated the monthly percentage increase or decrease experienced by the stock. The arithmetic mean of these returns provided a monthly market return (R_{mt}) that was used for analysis. Once the market return was created, the analysis of the abnormal returns took place. The abnormal returns are worked out by Equation (2).

$$U_{it} = R_{it} - R_{mt} \quad t = 1 \dots n \quad (2)$$

where: $n = 1 \dots 12$, or $n = 1 \dots 24$, or $n = 1 \dots 36$.

Where U_{it} is the abnormal monthly return for stock i in month t

R_{it} is the share return on stock i at period t , and,

R_{mt} is the return on the market at period t (Equally weighted)

The Average Return (\tilde{R}_i) for stock i is the mean of that stock's U_i over period $t = 1$ to n .

Stocks were grouped into portfolios according to their performance relative to the performance of the market.

On the basis of the \tilde{R}_i each stock was assigned to one of five portfolios: grouping stocks by their \tilde{R}_i 's from low to high, the first quintile of stocks were grouped together to form an equally weighted portfolio of losers, while those stocks in the final quintile were grouped together to form an equally weighted portfolio of winners. Having formed portfolios of winners and losers the average return of the portfolio (\tilde{R}_p) was calculated over the post portfolio formation period, *i.e.* this was just an average of the \tilde{R}_i 's of the stocks used to form each portfolio.

The averages of the portfolio returns for the winner quintile and the loser quintile were denoted \tilde{R}_p^w and \tilde{R}_p^l respectively.

The test performed on the average portfolio was based upon forming a 'difference' portfolio, where \tilde{R}_p^w was subtracted from \tilde{R}_p^l . The test compared the means of the winner and loser portfolio returns by regressing \tilde{R}_p^w and \tilde{R}_p^l against a constant. Spss version 17 was used for data analysis.

$$\tilde{R}_{Dt} = \tilde{R}_p^l - \tilde{R}_p^w = \alpha_1 \quad (3)$$

$$t = 1, \dots, n$$

Where α_1 is a constant. A simple *t-test* on the significance of the constant α_1 tells us whether there is a difference in the means of the winner and loser stocks. A significant and positive value for α_1 was seen as confirmation of the overreaction hypothesis.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

In this chapter data obtained from relevant sources is analyzed and presented in summarized form. The first part contains data analysis associated with computation of base year return for all stocks under observation. The second part is on portfolio formation based on returns determined in the first section. The third part is about test for overreaction based on previous performance and a test for significance of overreaction. Lastly is a summary of findings and interpretations.

4.2 Data Presentation and Analysis

In order to test the propositions of overreaction, all Nairobi Stock Exchange companies were examined over a nine year period (January 2001 to December 2009). Companies listed at the Nairobi Stock Exchange as at December 2009 are shown in appendix 1. The following model was applied to all the share price data in the sample to determine the returns on the stock:

$$R_{it} = \ln (P_{it}/P_{it-1}).100$$

Where: R_{it} = the monthly return for stock i in month t

P_{it} = the share price for stock i in month t

P_{it-1} = the share price for stock i on month $t-1$

t = the month.

The monthly share price for each stock in the sample (P_{it}) was determined first since available data was the daily share prices. Monthly return data (R_{it}) was then calculated as per equation 1.

The returns data approximated the monthly percentage increase or decrease experienced by the stock. The arithmetic mean of these returns provided a monthly market return (R_{mt}). Once this market return was created then the analysis of the abnormal returns took place. Appendix 2 shows one month calculation of these variables. All other months were done the same way. The abnormal returns were determined according to Equation 2.

$$U_{it} = R_{it} - R_{mt} \quad t = 1 \dots n$$

where: $n = 1 \dots 12$

Where U_{it} , is the abnormal monthly return for stock i in month t

R_{it} , is the share return on stock i at period t , and,

R_{mt} , is the return on the market at period t (Equally weighted)

4.3 Portfolio Formation

The Average Return (\tilde{R}_i) for stock i was calculated over period $t = 1$ to 12. Using year 2001 as our base year, average return for all stocks was calculated and stocks grouped into five portfolios according to their performance relative to performance of the market. Stocks were grouped by their average portfolios from low to high and divided into five quintiles. The first and fifth quintiles were used for this study and were as shown in table 1:

Table 1: first and fifth quintile stocks

Stocks	Year 2001
first quintile	\tilde{R}_i(average return)
Total Kenya Ltd Ord 5.00	-6.55
Express Ltd Ord 5.00	-4.74
Kenya Power & Lighting Ltd Ord 20.00	-4.63
Sasini Tea & Coffee Ltd Ord 5.00	-4.16
Bamburi Cement Ltd Ord 5.00	-4.16
Unga Group Ltd Ord 5.00	-3.85
Limuru Tea Co. Ltd Ord 20.00	-2.48
Diamond Trust Bank Kenya Ltd Ord 4.00	-2.30
Nation Media Group Ord. 5.00	-2.27
Firestone East Africa Ltd Ord 5.00	-2.22
	-3.74
Mean loser portfolio returns	
fifth quintile	\tilde{R}_i(average return)
Standard Newspapers Group Ord 5.00	1.91
Barclays Bank Ltd Ord 10.00	1.92
East African Breweries Ltd Ord 10.00	1.95
E.A.Packaging Ltd Ord 5.00	2.05
C.F.C Bank Ltd ord.5.00	2.13
E.A.Cables Ltd Ord 5.00	2.17
Standard Chartered Bank Ltd Ord 5.00	2.19
Tourism Promotion Services Ltd Ord 5.00 (Serena)	2.46
Pan Africa Insurance Ltd Ord 5.00	2.76
E.A.Portland Cement Ltd Ord 5.00	3.15
Mean winner portfolio returns	2.27

The first quintile of stocks were grouped together to form an equally weighted portfolio of losers (i.e. stocks with lowest return this year), while those stocks in the final quintile were grouped together to form an equally weighted portfolio of winners (stocks with the highest return this year). The average return of the portfolio (\tilde{R}_p) was then calculated. The averages of the portfolio returns for the winner quintile and the loser quintile were denoted \tilde{R}_p^w and \tilde{R}_p^l respectively. Table 2 shows averages of both portfolio returns over the study period.

Table 2: Averages of portfolio returns over the study period.

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Losers' portfolio									
Total Kenya Ltd Ord 5.00	-6.55	0.75	-0.17	4.71	9.04	-1.27	4.78	6.31	1.76
Express Ltd Ord 5.00	-4.74	-3.45	1.37	10.08	-4.74	13.65	23.64	16.64	10.02
Kenya Power & Lighting Ltd Ord 20.00	-4.63	-1.74	-2.76	4.69	-0.88	12.87	-7.64	-3.06	1.61
Sasini Tea & Coffee Ltd Ord 5.00	-4.16	7.14	6.34	8.21	8.37	12.19	20.43	17.94	11.57
Bamburi Cement Ltd Ord 5.00	-4.16	-2.58	2.63	-3.01	7.83	-2.28	2.50	4.32	-0.26
Unga Group Ltd Ord 5.00	-3.85	0.92	2.74	2.19	-11.77	5.72	10.56	7.78	2.99
Limuru Tea Co. Ltd Ord 20.00	-2.48	4.27	8.16	18.04	11.86	17.69	27.83	22.04	8.95
Diamond Trust Bank Kenya Ltd Ord 4.00	-2.30	1.85	-3.54	1.90	16.76	-0.09	-1.82	-0.73	-0.88
Nation Media Group Ord. 5.00	-2.27	-8.45	-0.63	6.53	1.21	-0.36	4.82	3.33	4.78
Firestone East Africa Ltd Ord 5.00	-2.22	1.28	7.51	1.40	11.17	0.63	6.86	1.61	1.84
Mean loser portfolio (\tilde{R}_p^l)	-3.74	0.00	2.17	5.47	4.88	5.87	9.20	7.62	4.24
Winners' portfolio									
Standard Newspapers Group Ord 5.00	1.91	2.09	4.15	4.78	19.53	7.05	4.37	7.58	2.96
Barclays Bank Ltd Ord 10.00	1.92	0.43	10.04	23.10	19.34	12.66	6.59	6.28	3.67
East African Breweries Ltd Ord 10.00	1.95	2.69	14.80	28.89	7.98	11.73	14.62	14.90	11.33

E.A.Packaging Ltd Ord 5.00	2.05	-1.02	-5.46	1.32	-0.30	1.40	1.54	4.55	2.04
C.F.C Bank Ltd ord.5.00	2.13	-1.11	3.78	8.43	6.13	7.85	14.03	-3.56	-0.50
E.A.Cables Ltd Ord 5.00	2.17	-1.74	-3.56	12.85	-6.28	4.07	3.86	2.79	0.34
Standard Chartered Bank Ltd Ord 5.00	2.19	-0.11	7.59	15.14	0.25	15.48	17.46	19.28	13.03
Tourism Promotion Services Ltd Ord 5.00 (Serena)	2.46	-0.27	-4.18	7.32	7.37	7.95	6.90	6.76	2.92
Pan Africa Insurance Ltd Ord 5.00	2.76	0.09	1.08	5.23	-1.40	10.31	8.94	7.68	3.59
E.A.Portland Cement Ltd Ord 5.00	3.15	-1.04	7.29	4.09	12.13	11.94	12.13	9.69	8.05
Mean winner portfolio (\tilde{R}_p^w)	2.27	0.00	3.55	11.12	6.48	9.05	9.05	7.60	4.74

The average return for winner portfolio was initially higher than that for the loser portfolio. The gap bridged with time and there were instances like year 2008 when the average return for loser portfolio was higher than that for the winner portfolio.

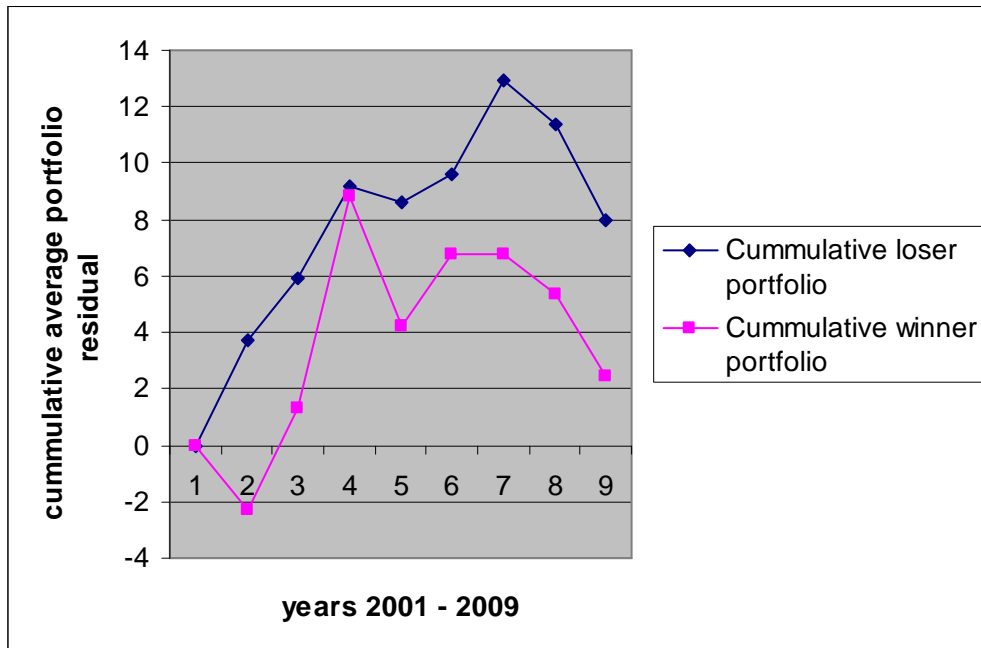
4.4 Test for Overreaction

In order to test for overreaction, a cumulative excess return for the two portfolios was calculated over the study period. The difference in returns for the year under consideration and the base year gives cumulative excess returns. Table 3 and figure 1 illustrates this.

Table 3: Cumulative excess returns for both portfolios

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009
Cumulative loser portfolio(Rc_p^l)	0	3.74	5.90	9.21	8.62	9.61	12.93	11.35	7.97
Cumulative winner portfolio(\tilde{R}_p^w)	0	-2.27	1.28	8.85	4.21	6.78	6.78	5.33	2.47

Figure 1: Plot of cumulative portfolio against time

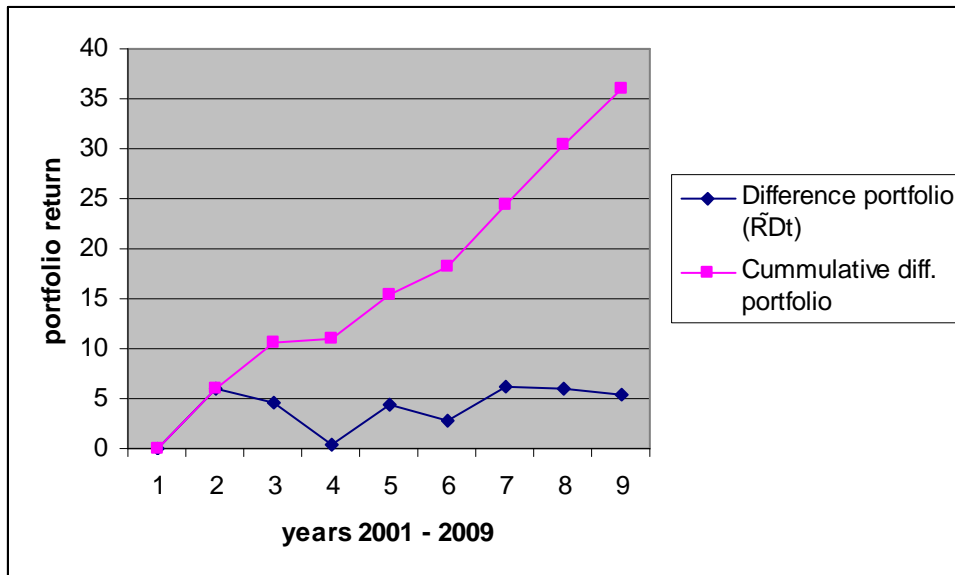


A 'difference' portfolio was formed where $\tilde{R}c_p^w$ was subtracted from Rc_p^l . A cumulative difference portfolio shows the cumulative difference in returns between the winner and loser portfolios over the study period.

Table 4 Cumulative returns difference portfolio

year	2001	2002	2003	2004	2005	2006	2007	2008	2009	Sum
Cumulative loser portfolio(Rc^l_p)	0	3.74	5.90	9.21	8.62	9.61	12.93	11.35	7.97	69.34
Cumulative winner portfolio Rc^w_p	0	-2.27	1.28	8.85	4.21	6.78	6.78	5.33	2.47	33.42
Difference portfolio (\tilde{R}_{Dt})	0	6.01	4.62	0.36	4.41	2.83	6.16	6.03	5.50	
Cumulative diff. portfolio	0	6.01	10.62	10.99	15.40	18.23	24.39	30.42	35.92	

Figure 2 Cumulative returns difference portfolio against time



The loser portfolio outperformed the winner portfolio cumulatively by 35.92%. From both the table 4 and figure 2 the difference portfolio (\tilde{R}_{Dt}) is significantly different from zero for eight out of nine years. This could thus be taken as confirmation of the overreaction hypothesis.

4.5 Significance Test

The test was simply to compare the means of the winner and loser portfolio returns by regressing cumulative Rc^l_p and Rc^w_p against a constant:

$$\tilde{R}_{Dt} = R\tilde{c}_p^t - \tilde{R}c_p^w = \alpha_t$$

$$t = 1, \dots, 12$$

The regression output was as shown in tables 5 and 6

Table 5: Group Statistics

winner or loser	N	Mean	Std. Deviation	Std. Error Mean
portfolio loser	9	7.7033	3.96444	1.32148
winner	9	3.6922	3.63394	1.21131

Table 6: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
portfolio	Equal variances assumed	.000	.997	2.238	16	.040	4.01111	1.79265	.21087	7.81136
	Equal variances not assumed			2.238	15.880	.040	4.01111	1.79265	.20854	7.81369

Table 5 gave mean and standard deviation for both loser and winner portfolio. The means were significantly different with mean for loser portfolio being almost twice that of winner portfolio (i.e. 7.7033 and 3.6922). The two portfolios were observed for a period of nine years as indicated by the N value.

Table 6 gave the results of Levene's test. This tested whether the variance (variation) of scores for loser portfolio and winner portfolio were the same. Since the sig. value was greater than 0.5 (0.997) the first row was considered for analysis. The sig. (2-tailed) value was 0.04 from column 7. As this value was below the required cut-off of 0.05 then it was concluded that there was statistically significant difference in the mean performance scores for loser and winner portfolios.

Effect size statistic was worked out to provide an indication of the magnitude of the differences between the two portfolios. This was arrived at by calculating the value of Eta squared as follows:

$$\text{Eta squared} = \frac{t^2}{t^2 + (N_1 + N_2 - 2)}$$

Replacing with appropriate values from table 6

$$\text{Eta squared} = \frac{2.238^2}{2.238^2 + (9 + 9 - 2)}$$

$$\text{Eta squared} = 0.2384$$

The effect size from this calculation was 23.84% which was an indication of significant magnitude of the difference in means from the two portfolios. A *t-test* statistic of 2.238 further

confirmed that there was significant difference between the means of winner and loser portfolio.

4.6 Summary of Findings and Interpretations

Table 1 shows average returns for loser and winner portfolio stocks during the year of formation (2001). Mean loser portfolio return was -3.74 while the mean winner portfolio return was 2.27. This implies that the winner portfolio out performed the loser portfolio by an average mean return of 6.01 during the year of portfolio formation. All the stocks constituting loser portfolio underperformed the market during this year. Stocks constituting winner portfolio, on the other hand, out performed the market.

Averages of portfolio returns over the study period were shown in table 2. Number of stocks registering below market return from the loser portfolio from year 2002 onwards decreased with only four out of ten stocks having below market return during year 2002. Stocks with above market return from the loser portfolio went up to six from zero the previous year. From the winner portfolio only four out of ten stocks registered above market return in year 2002. The rest (six) registered below market return. The average mean returns for the two portfolios were at par by the second year (24 months) after portfolio formation. This could imply that most stocks in the loser portfolio were undervalued while those from the winner portfolio were over valued. By the 24th month the stocks seem to be correcting the mispricing or initial overreaction of investors to stock performance. Figures from this table seem to support the notion that investors overreact to news and thus are irrational.

Results of the tests were shown in table 3 and Figure 2. Over the past nine years, loser portfolios were shown to outperform the winner portfolio by an average of 35.92 per cent. There were instances when the winner portfolio underperformed the market. These results appear to support the contention of DeBondt and Thaler (1985) that extreme movements in share price will be followed by subsequent adjustments in the opposite direction.

Over the last nine years the loser portfolio increased in value by up to 69.34% (See table 4). Winner portfolio on the other hand increased in value by 33.42% so that the difference in cumulative average for extreme portfolios was about 35.92%. This is demonstrated graphically by figure 2. An investor would thus have gained more holding a portfolio of stocks from the loser portfolio than from the winner portfolio.

Regression analysis done on the variables confirmed that the variability in performance of the winner and loser portfolio was indeed depended on previous performance of both stocks which disapproves investor rationality. Table 5 shows that means for the two portfolios are significantly different with mean for loser portfolio being almost twice that of the winner portfolio (i.e. 7.7033 and 3.6922 respectively). With a significance level of 0.04, table 6 shows that there is a statistically significant difference in the mean performance scores for the loser and winner portfolios. A *t-test* statistic of 2.238 was a confirmation of the significance level of this difference in means.

Effect size statistic was arrived at by calculating Eta squared value of 0.2384. This implies that 23.84% variability of performance of stocks at the Nairobi stock exchange was explained by

reaction of investors to previous performance of different stocks. This is contrary to rational expectations where investors are assumed to make decisions based on fundamentals of different companies that are listed. Results from tables 5 and 6 further shows that it is statistically significant, at a confidence level of 95%, to make future buy or hold decisions based on previous performance of stocks in consideration.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The objective of this paper was to Test for Investor Rationality for Companies Quoted at the Nairobi Stock Exchange. This is in view of two competing models of investor decision making. The first model views investors as economically rational individuals who make decisions based on all available information. The second model proposes that investors systematically overreact to good and bad information events. Empirical studies in support or against either of the two models were reviewed.

In order to test whether investors are rational and overreact to news all Nairobi Stock Exchange companies were examined over a period of nine years (January 2001 – December 2009). With 2001 as the base year, monthly returns for all stocks were worked out which represented the approximate percentage increase or decrease experienced by the stock. The arithmetic mean of these returns was worked out to provide a monthly market return. Each stock's monthly return above or below the market monthly return was established and was called abnormal return. Abnormal returns for all stocks were worked out for 12 months from January 2001 to December of the same year. Annual means for abnormal return for all stocks were calculated and called average return. Stocks were arranged in ascending order by their average returns from the lowest return to the highest return and divided into five groups to form five quintiles. The extreme quintile stocks (first and fifth quintiles) were picked for examination. Average returns for the stocks constituting the two quintiles were worked out for the remaining eight years. Mean

average return for stocks in each quintile was worked out for all the years to form portfolio return for first quintile stocks and fifth quintile stocks. The portfolio of the first quintile stocks was called loser portfolio and the portfolio of the fifth quintile stocks was called winner portfolio. The averages of portfolio returns for the winner portfolio and loser portfolio were compared and analyzed over the entire study period and tested for overreaction hence irrationality.

The results were consistent with the notion of overreaction, showing that investors overreact to both good and bad news. Over the study period the loser portfolio outperformed the winner portfolio by about 35.92%. This confirms that investors are irrational and make decisions based on some biases which is in agreement with findings of local studies done by Werah (2006) and Waweru et al (2008).

5.2 Conclusions

Even though data analyzed is in support of overreaction hypothesis, only losers experience significant overreaction; winner portfolios show low abnormal market returns. This is consistent with DeBondt and Thaler (1985) assertion that overreaction effect is asymmetric i.e. it is much larger for losers than winners. Investors thus react more adversely to bad or perceived bad news and performance than to good or perceived good news and performance. Over the study period the loser portfolio has outperformed the winner portfolio by about 35.92%. Research in experimental psychology suggests that in violation of Bayes' rule most people overreact to unexpected and dramatic news events.

The results of this study are in support of scholars who have argued against rationality of investors and hence rational or efficient markets. It confirms that investors are irrational and make decisions based on some biases. Overreaction to previous performance of stocks has been proved a significant bias/influence to investors while making buy, sell and hold decisions. Investors would thus get better value for their money if they would consider overreaction effect when making investment decisions.

After an event or performance to which investors overreact there is observed to be reversal in performance in about two to three years. The market thus seems to correct itself only that it overdoes it and thus the reversal of returns in the opposite direction. Stocks thus seem to exhibit upward and downward movements spanning between two to three years.

5.3 Policy Recommendations

The historical information about stocks provided for in the daily reports by the Nairobi stock Exchange include the previous stock price and the last 12 months high and low price. It has been observed in this study that returns reversal for stocks occur at between two to three years. A provision should be put in place to report stock's high return month (and the month's return) and stock's low return month (and the month's return) for each of the previous three years (36 months). This gives potential investors an idea of the trend a certain stock has taken. More investors will thus make informed decisions and the market is likely to move towards a more efficient one.

The Nairobi Stock Exchange uses equally weighted geometric mean to calculate the daily market index which is an indicator of how the market performs. Studies have shown that weighted arithmetic mean presents a better picture of market performance than un-weighted geometric mean. The index as it is arrived at today could be a contributing factor to observed overreaction and market irrationality/inefficiency. A move towards arithmetic mean index should be explored especially now that the activity of the market has been on the increase.

Long term graphical performance of stocks should be kept and alerts given where cases of excessive overreaction is evident. Overreaction leads to mis-allocation of resources in the sense that investors may put money in a stock that has had good performance but the stock's today performance is below market return. This means that stocks with above market returns will be starved of money and there will be an overall low market return which in extreme cases can lead to bubbles and financial crisis. Availability of evidence of extreme overreaction in such cases can lead to reversal of the trend before it is late.

5.4 Limitations of Study

While collecting data for this project at NSE library, daily share prices records for listed companies were missing on some days, weeks or even months especially years before year 2002. Because of inconsistencies in availability of reliable data in early years this study focused on data from year 2001 onwards. There are occasions where share price data for some days was obtained from nation Media Group library. For quite a long period of time most operations at NSE were not computerized making it difficult to retrieve the necessary data.

Prior to year 2006, activity at NSE was quite slow and cases of listed stocks failing to trade for a number of days were common. This may to some extent give biased results as it leaves a feeling that the stocks were trading at a constant price. There have also been cases of some stocks being suspended from trading or some companies de-listed from the stock market.

Daily stock data reported by the Nairobi Stock Exchange is raw. This means that tabulation of monthly return data which consumed a lot of time for the research paper. In more advanced markets, monthly return data for stocks is done and records kept which helps a lot in research work and also in understanding research papers.

5.5 Suggestions for Further Research

This research paper has looked at overreaction by observing winner and loser portfolios formed over a period of nine years. Some scholars have argued that winners start recovering from losses made after about three years and losers as well start experiencing lower returns from the third year onward and this reversal continues every three years. A research can thus be carried out with winner and loser portfolios being formed every three years and observed over the same period after which the constituent stocks for loser and winner portfolio are reconstituted. Some scholars have described this as the directional effect.

Some scholars have tried to explain the extreme movements of earnings with size of the firm. They argue that small firms generally exhibit higher than market returns while large firms exhibit normal returns. They thus explain reversals of returns between winner and loser portfolio with size of the firm. Research can be carried out locally to test the validity of this argument.

Overreaction of investors to either bad or news/performance should be studied against other factors affecting price movements to determine its independent effect on stock prices.

REFERENCES

- Adams, M. et al. (2007). "Pedagogical Strategies for Incorporating Behavioral Finance Concepts in Investment Courses" *Journal of College Teaching & Learning*, Vol 4, No. 3 (March 2007)
- Ali, N. et al (2009). "Stock Overreaction and Financial Bubbles: Evidence from Malaysia" *Journal of Money, Investment and Banking* Vol.10, No. 11, pp91 – 101
- Andrew, W. Lo (2005). "Reconciling efficient markets with behavioral finance: the adaptive markets hypothesis" *The Journal of Investment Consulting* Vol. 7, No. 2
- Angeletos, G. M. et al (2009). "A Rational Theory of "Irrational Exuberance" *Carlo Alberto Notebooks* No. 126
- Antoniou, A. and Galariotis, E. C. (2004). "Profits From Buying Losers And Selling Winners In The London Stock Exchange" *Journal Of Business & Economics Research* Vol. 1, No. 11, pp 59 – 66.
- Bachelier, L. (1900). "Theory Of Speculation, The Random Character Of Stock Market Prices" MIT Press 1964, Reprinted In P. Cootner (Ed.)
- Barber, B. and Odean, T (2000). "Trading is hazardous to your wealth: The common stock investment performance of individual investors." *Journal of Finance* Vol.55, No.2, pp. 773-805.
- Barber, B. and Odean, T. (2001). "Boys will be boys: Gender, Overconfidence and Common Stock Investment," *Quarterly journal of economics* Vol.16 pp. 262-92.
- Becker S.G. (1962). "Irrational Behaviour and Economic Theory," *The Journal of Political Economy*, Vol. 70, No. 1, pp 1-13.
- Becker, et al (1964). "Measuring utility by a single-response sequential method,"

- Behavioral *Science* vol. 9, pp. 226-232.
- Blume, M. and Friend, I. (1975). “The asset structure of individual portfolios and some implications for utility functions.” *Journal of Finance* Vol. 30, no. 2, pp. 585-603.
- Bodie, ZVI et al (2009). Investments (eighth edition) New York: Mc Graw Hill publishers
- Chopra, N. et al (1992). “Measuring Abnormal performance: Do stocks overreact?” *Journal of financial economics* Vol.31, pp 235 – 68.
- Clare, A. and Thomas, S. (1995). “The overreaction hypothesis and the UK stock market” *Journal of Business Finance & Accounting*, Vol. 22, No. 7 pp 961- 973.
- Clements, A. et al (2009). “The death of the overreaction anomaly? A multifactor explanation of contrarian returns” *Investment Management and Financial Innovations* Volume 6, No. 1
- Cohen, R. et al (2002). “Who underreacts to cash-flow news? Evidence from trading between individuals and institutions.” *Journal of Financial Economics*. Vol. 66, No. 2, pp 409 – 462.
- DeBondt, W. F. M and Thaler, R. (1985). “Does the stock Market overreact?” *the journal finance*. Vol. 40 No.3. July 1985
- DeBondt, W. F. M and Thaler, R. (1987). “Further evidence on investor overreaction and stock market seasonality” *the journal finance*. Vol. 42 pp 557-81.
- Dimitropoulos, P.E (2008). “Conservatism and Accruals: Are They Interactive? Evidence from the Greek Capital Market” *international journal of business management*, Vol. 3 No. 10
- Dreman, D. N. and Eric, A. (2000), “Investor Overreaction: Evidence That Its

- Basis Is Psychological” *The Journal of Psychology and Financial Markets*, Vol. 1, No. 1, 61–75 (2000)
- Elton, et al (2002). “Are Investors Rational? Choices Among Index Funds” Stern School Of Business, New York University
- Fama, E. (1965). “The Behavior of Stock-Market Prices”, *Journal Of Business*, Vol. 38, No.1, pp. 34-105.
- Fama, E. (1970). “Efficient Capital Markets: A Review Of Theory And Empirical Work” *Journal Of Finance*, Vol. 25, No. 2, Papers And Proceedings Of The Twenty Eighth Annual Meeting Of The American Finance Association New York, N.Y. December, 28 30, 1969 (May, 1970), 383-417.
- Fama, E. (1970). “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance*, vol. 25, no.2 pp. 383-417.
- Ferris, S. et al (1998). “Predicting contemporary volume with historic volume at differential price levels: Evidence supporting the disposition effect.” *Journal of Finance* vol. 43, No. 3, pp. 677-697.
- Festinger, L. (1957). “A theory of cognitive dissonance,” Stanford university press, Stanford, CA
- Froot, K. and Dabora, E. (1999). “How are stock prices affected by the location of trade?” *Journal of Financial Economics* vol. 53, no. 2, pp. 189-216.
- Gigerenzer, G. (2001). “Decision Making: Nonrational Theories” *International Encyclopedia of the Social and Behavioral Sciences*. Vol. 5, pp. 3304–3309.
- Githingi, M. (2008). “Testing the Random Walk Theory on Share Prices at the Nairobi Stock Exchange.” Unpublished MBA research proposal, University of Nairobi

- Gonzalez and Wu (2003). “Composition Rules in Original and Cumulative Prospect Theory” Graduate School of Business, University of Chicago
- Green, R. and Rydquist, K. (1997). “The valuation of nonsystematic risks and the pricing of Swedish lottery bonds.” *Review of Financial Studies* Vol.10, No. 2, pp. 447-480.
- Grinblatt, M. and Keloharju, M. (2001). “What makes investors trade?” *Journal of Finance* Vol. 56, No. 2, pp. 589-616.
- Hilsenrath, J. E. (2004). “As Two Economists Debate Markets, The Tide Shifts” Article in *The Wall Street Journal*. October 18, 2004 ; Page A I
- Hirshleifer, D. et al (2001). “Do individual investors drive post-earnings announcement drift?” Working Paper, The Ohio State University.
- Hirshleifer, D. et al (2004). “Feedback and the success of irrational investors” Fisher College of business, Ohio state university, June 5 2004
- Huberman, G., (2001). “Familiarity breeds investment.” *Review of Financial Studies* Vol. 14, No. 3, pp. 659-680.
- Jiang, D. (2006). “Investor Overreaction, Cross-Sectional Dispersion of Firm Valuations, and Expected Stock Returns” Fisher College of business, Ohio state university, May 25 2006
- Kahneman, D. and tversky, A. (1979). “Prospect theory: An analysis of decision under risk,” *econometrica* Vol 47, No.2, pp 261-91.
- Kiyilar, M. and Acar, O. (2009). “Behavioural Finance And The Study Of The Irrational Financial Choices Of Credit Card Users” Istanbul University,Istanbul, Turkey
- Krause, A. and John Wei, K. C. (2006). “Behavioral Bias of Traders: Evidence for the

- Disposition and Reverse Disposition Effect” Tsinghua University School of Economics and Management.
- Kurz, M. (1999). “Endogenous Uncertainty and Rational Belief Equilibrium: A Unified Theory of Market Volatility” Stanford University, July 14 1999
- Lei Lu (2008). “Asset Pricing and Welfare Analysis with Bounded Rational Investor” School of Finance, Shanghai University of Finance and Economics
- Longstaff, F. et al (2001). “Throwing away a billion dollars: The cost of suboptimal exercise strategies in the swaptions market.” *Journal of Financial Economics* vol.62, No. 1, pp. 39-66.
- Lucas Robert, E. (1978). “Asset Prices in an Exchange Economy,” *Econometrica*, vol. 46, no.6 (November, 1978) pp. 1429-1445.
- Md Nassir, A. et al (2009). “Stock Overreaction and Financial Bubbles: Evidence from Malaysia” *Journal of Money, Investment and Banking*, ISSN 1450-288X Issue 11 (2009)
- Merton, Robert C. (1973). “An intertemporal capital asset pricing model,” *Econometrica*, vol. 41, no.5 (September, 1973)
- Odean, T. (1998). “Are investors reluctant to realize their losses?” *Journal of Finance* Vol. 53, No. 5, pp. 1775-1798.
- Peng and Xiong (2006). “Investor attention, overconfidence and category learning” *Journal of Financial Economics* No. 80 pp. 563–602
- Roberts, H. (1967). “Statistical Versus Clinical Prediction Of The Stock Market” Unpublished Manuscript, CRSP, University Of Chicago

- Rozeff, M.S. and Zamani, M.A. (1998). "Overreaction and Insider Trading: Evidence from Growth and Value Portfolios." *The Journal of Finance* Vol. 53, No. 2, pp 701 – 716.
- Samuelson, P. A. (1965). "Proof That Properly Anticipated Prices Fluctuate Randomly" *Industrial Management Review*, Vol.6, No. 2, pp. 41-9.
- Savage, L. J. (1954). The foundations of statistics. New York: Dover publications inc.
- Sekaran, U. (1992). Research methods for business. New York: John Wiley & sons, inc
- Simon, H., (1955). "A Behavioral Model of Rational Choice." *Quarterly Journal of Economics*, Vol. 69, no. 1, pp. 99-118. (1955)
- Simon, H. (1987). "Bounded Rationality." In *The New Palgrave*, Ed. J. Eatwell, M. Milgate, and P. Newman, New York, W.W.Norton.
- Sharp, W. F.(1964). "Capital Asset Prices: a theory of market equilibrium under conditions of risk" *Journal of Finance*, Vol.19, No.3, pp. 425 - 442
- Shefrin, H. and Statman, M. (1985). "The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence," *Journal of Finance* Vol.40, No.3 pp. 777—791.
- Statman, R. (1997). "Effective reduction and conversion strategies for combinatorics" *Rewriting Techniques and Applications*, vol. 1232 of *Lecture Notes in Computer Science*, pp. 299–307.
- Sultana, S. T. (2010). "An Empirical Study of Indian Individual Investors' Behavior" *Global Journal of Finance and Management*, Vol. 2, No. 1, pp. 19-33

- Swallow, S. and fox, M. A. (1998). “Long Run Overreaction on the New Zealand Stock Exchange” Commerce Division, Lincoln University, CANTERBURY
- Thaler, R. H. (1999). “Mental Accounting Matters” *Journal of Behavioral Decision Making* Vol 12, pp 183 – 206.
- Tversky, A. and Kahneman, D. (1986). “Rational Choice and the Framing of Decisions” *Journal of Business*, Vol.59, No. 4, pp. S251 – S278.
- Waweru, N.M. et al (2008). “The effects of behavioural factors in investment decision-making: a survey of institutional investors operating at the Nairobi Stock Exchange” Unpublished MBA research proposal, University of Nairobi
- Werah, (2006). “A survey of the influence of Behavioural Factors on Investor Activities at the Nairobi Stock Exchange.” Unpublished MBA research proposal, University of Nairobi
- Zarowin, P. (1989). “Does the stock market overreact to corporate earnings information?,” *The Journal of Finance* Vol. 44, No. 5, pp. 1385 – 1399.

Appendix 1: List of companies quoted at NSE as at 31st December 2009



DAILY PRICE LIST

NATION CENTRE, (1st FLOOR), KIMATHI STREET

P.O. BOX 43633, NAIROBI. TEL: 2831000 FAX: 224200

E-MAIL: info@nse.co.ke: Website: www.nse.co.ke

AGRICULTURAL

Kakuzi Ord.5.00

Rea Vipingo Plantations Ltd Ord 5.00

Sasini Ltd Ord 1.00

COMMERCIAL AND SERVICES

AccessKenya Group Ltd Ord. 1.00

Car & General (K) Ltd Ord 5.00

CMC Holdings Ltd Ord 0.50

Hutchings Biemer Ltd Ord 5.00

Kenya Airways Ltd Ord 5.00

Marshalls (E.A.) Ltd Ord 5.00
Nation Media Group Ord. 2.50
Safaricom limited Ord 0.05
Scangroup Ltd Ord 1.00
Standard Group Ltd Ord 5.00
TPS Eastern Africa (Serena) Ltd Ord 1.00
Uchumi Supermarket Ltd Ord 5.00

FINANCE AND INVESTMENT

Barclays Bank Ltd Ord 2.00
Centum Investment Company Ltd Ord 0.50
CFC Stanbic Holdings Ltd ord.5.00
Diamond Trust Bank Kenya Ltd Ord 4.00
Equity Bank Ltd Ord 0.50
Housing Finance Co Ltd Ord 5.00
Jubilee Holdings Ltd Ord 5.00
Kenya Commercial Bank Ltd Ord 1.00
Kenya Re-Insurance Corporation Ltd Ord 2.50
National Bank of Kenya Ltd Ord 5.00
NIC Bank Ltd Ord 5.00
Olympia Capital Holdings ltd Ord 5.00
Pan Africa Insurance Holdings Ltd Ord 5.00
Standard Chartered Bank Ltd Ord 5.00

The Co-operative Bank of Kenya Ltd Ord 1.00

INDUSTRIAL AND ALLIED

Athi River Mining Ord 5.00

B.O.C Kenya Ltd Ord 5.00

Bamburi Cement Ltd Ord 5.00

British American Tobacco Kenya Ltd Ord 10.00

Carbacid Investments Ltd Ord 5.00

Crown Berger Ltd Ord 5.00

E.A.Cables Ltd Ord 0.50

E.A.Portland Cement Ltd Ord 5.00

East African Breweries Ltd Ord 2.00

Eveready East Africa Ltd Ord.1.00

KenolKobil Ltd Ord 0.50

Kenya Power & Lighting Ltd Ord 20.00

KenGen Ltd. Ord. 2.50

Mumias Sugar Co. Ltd Ord 2.00

Sameer Africa Ltd Ord 5.00

Total Kenya Ltd Ord 5.00

Unga Group Ltd Ord 5.00

ALTERNATIVE INVESTMENT MARKET SEGMENT

A.Baumann & Co.Ltd Ord 5.00

City Trust Ltd Ord 5.00

Eaagads Ltd Ord 1.25

Express Ltd Ord 5.00

Williamson Tea Kenya Ltd Ord 5.00

Kapchorua Tea Co. Ltd Ord Ord 5.00

Kenya Orchards Ltd Ord 5.00

Limuru Tea Co. Ltd Ord 20.00

Appendix 2: Details of monthly return for analysis

Stocks	Dec-01			
	Pit	Rit	Uit	\tilde{R}_i
AGRICULTURAL				
Brooke Bond Ltd Ord 10.00	82.53	-9.34	-7.05	0.38
Kakuzi Ord.5.00	36.56	-1.19	1.11	-1.53
Rea Vipingo Plantations Ltd Ord 5.00	3.07	-1.48	0.81	0.50
Sasini Tea & Coffee Ltd Ord 5.00	16.46	-10.45	-8.15	-4.16
Theta group Ltd Ord 1.00	5.05	0.00	2.30	1.96
COMMERCIAL AND SERVICES				
African Lakes Corporation PLC. Ord 5.00	27.63	-1.35	0.95	-0.06
Car and General	10.00	0.00	2.30	-0.75
CMC Holdings Ltd Ord 5.00	9.03	5.56	7.86	1.04
Hutchings Biemer Ltd Ord 5.00	20.25	0.00	2.30	1.96
Kenya Airways Ltd Ord 5.00	7.51	-0.41	1.89	0.32
Lonrho Motors EA Ltd Ord 5.00	12.90	0.00	2.30	1.96
Marshalls (E.A.) Ltd Ord 5.00	18.30	0.00	2.30	1.82
Nation Media Group Ord. 5.00	43.17	-9.65	-7.35	-2.27
Pearl Drycleaners Ltd Ord 5.00	2.05	0.00	2.30	1.96
Tourism Promotion Services Ltd Ord 5.00 (Serena)	17.01	4.12	6.42	2.46
Uchumi Supermarket Ltd Ord 5.00	32.02	-10.97	-8.67	-1.98

FINANCE AND INVESTMENT

Barclays Bank Ltd Ord 10.00	75.28	0.77	3.06	1.92
C.F.C Bank Ltd ord.5.00	9.13	4.46	6.75	2.13
Diamond Trust Bank Kenya Ltd Ord 4.00	8.89	-2.96	-0.67	-2.30
Housing Finance Co Ltd Ord 5.00	3.90	-2.82	-0.52	-1.43
I.C.D.C Investments Co Ltd Ord 5.00	38.16	-3.26	-0.96	-0.49
Jubilee Insurance Co. Ltd Ord 5.00	15.49	0.37	2.67	0.27
Kenya Commercial Bank Ltd Ord 10.00	15.63	-5.06	-2.77	-0.95
National Bank of Kenya Ltd Ord 5.00	3.10	-7.08	-4.78	-0.12
National Industrial Credit Ltd Ord 5.00	15.10	-0.44	1.85	-0.66
Pan Africa Insurance Ltd Ord 5.00	13.10	-0.48	1.81	2.76
Regent Undervalued Assets Africa Fund Ord \$10.00	580.00	0.00	2.30	1.96
Standard Chartered Bank Ltd Ord 5.00	50.11	0.67	2.97	2.19

INDUSTRIAL AND ALLIED

Athi River Mining Ord 5.00	3.98	1.50	3.79	1.54
B.O.C Kenya Ltd Ord 5.00	30.25	4.69	6.99	-2.08
Bamburi Cement Ltd Ord 5.00	17.44	-15.26	-12.96	-4.16
British American Tobacco Kenya Ltd Ord 10.00	50.97	1.47	3.76	-0.23
Carbacid Investments Ltd Ord 5.00	35.50	-0.54	1.75	0.34
Crown Berger Ltd Ord 5.00	6.28	-5.36	-3.06	-1.50
Dunlop Kenya Ord 5.00	5.00	-1.35	0.94	0.52
E.A.Cables Ltd Ord 5.00	9.62	-1.22	1.08	2.17

E.A.Portland Cement Ltd Ord 5.00	13.18	-2.03	0.26	3.15
East African Breweries Ltd Ord 10.00	75.72	-5.07	-2.78	1.95
Firestone East Africa Ltd Ord 5.00	7.02	-2.22	0.08	-2.22
Kenya National Mills Ltd. Ord. 5.00	6.78	-1.17	1.13	1.69
Kenya Oil Co Ltd Ord 5.00	73.13	1.39	3.69	1.87
Kenya Power & Lighting Ltd Ord 20.00	19.46	4.24	6.54	-4.63
Total Kenya Ltd Ord 5.00	19.58	-3.98	-1.69	-6.55
Unga Group Ltd Ord 5.00	6.60	-12.66	-10.36	-3.85

**ALTERNATIVE INVESTMENT MARKET
SEGMENT**

A.Baumann & Co.Ltd Ord 5.00	8.28	-1.09	1.20	1.37
City Trust Ltd Ord 5.00	19.20	0.00	2.30	0.85
E.A.Packaging Ltd Ord 5.00	8.00	0.00	2.30	2.05
Eaagads Ltd Ord 1.25	19.62	-1.42	0.87	1.56
Express Ltd Ord 5.00	6.72	3.31	5.61	-4.74
George Williamson Kenya Ltd Ord 5.00	68.50	-31.11	-28.82	-1.05
Kapchorua Tea Co. Ltd Ord Ord 5.00	137.00	-1.19	1.11	1.14
Kenya Orchards Ltd Ord 5.00	5.30	0.00	2.30	2.49
Limuru Tea Co. Ltd Ord 20.00	398.88	-0.28	2.01	-2.48
Standard Newspapers Group Ord 5.00	7.08	-3.63	-1.34	1.91

Rmt -2.30